

**ARMY TM 9-2320-280-20-1
AIR FORCE TO 36A12-1A-2092-1-1
MARINE CORPS TM 2320-20/7B**

Volume No. 1

(SUPERSEDES TM 9-2320-280-20-1, 19 JANUARY 1990)

**TECHNICAL MANUAL
UNIT MAINTENANCE**

TRUCK, UTILITY: CARGO/TROOP CARRIER, 1-1/4 TON, 4X4, M998 (2320-01-107-7155) (EIC: BBD); M998A1 (2320-01-371-9577) (EIC: BBN);

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TRUCK, UTILITY: TOW CARRIER, ARMORED, 1-1/4 TON, 4X4, M966 (2320-01-107-7153) (EIC: BBC); M966A1 (2320-01-372-3932) (EIC: BBX); M1121 (2320-01-456-1282) (EIC: B6H);

TRUCK, UTILITY: TOW CARRIER, ARMORED, 1-1/4 TON, 4X4, W/WINCH, M1036 (2320-01-107-7154) (EIC: BBH);

TRUCK, UTILITY: TOW CARRIER, W/SUPPLEMENTAL ARMOR, 1-1/4 TON, 4X4, M1045 (2320-01-146-7191); M1045A1 (2320-01-371-9580) (EIC: BBR); M1045A2 (2320-01-380-8229) (EIC: BB5);

TRUCK, UTILITY: TOW CARRIER, W/SUPPLEMENTAL ARMOR, 1-1/4 TON, 4X4, W/WINCH, M1046 (2320-01-146-7188); M1046A1 (2320-01-371-9582) (EIC: BBT);

TRUCK, UTILITY: ARMAMENT CARRIER, ARMORED, 1-1/4 TON, 4X4, M1025 (2320-01-128-9551) (EIC: BBF); M1025A1 (2320-01-371-9584) (EIC: BBV); M1025A2 (2320-01-380-8233) (EIC: BB3);

TRUCK, UTILITY: ARMAMENT CARRIER, ARMORED, 1-1/4 TON, 4X4, W/WINCH, M1026 (2320-01-128-9552) (EIC: BBG); M1026A1 (2320-01-371-9579) (EIC: BBQ);

TRUCK, UTILITY: ARMAMENT CARRIER, W/SUPPLEMENTAL ARMOR, 1-1/4 TON, 4X4, M1043 (2320-01-146-7190); M1043A1 (2320-01-372-3933) (EIC: BBY); M1043A2 (2320-01-380-8213) (EIC: BB4);

TRUCK, UTILITY: ARMAMENT CARRIER, W/SUPPLEMENTAL ARMOR, 1-1/4 TON, 4X4, W/WINCH, M1044 (2320-01-146-7189); M1044A1 (2320-01-371-9581) (EIC: BBS);

TRUCK, UTILITY: S250 SHELTER CARRIER, 4X4, M1037 (2320-01-146-7193) (EIC: BBK);

TRUCK, UTILITY: S250 SHELTER CARRIER, 4X4, W/WINCH, M1042 (2320-01-146-7187);

TRUCK, AMBULANCE, 2-LITTER, ARMORED, 4X4, M996 (2310-01-111-2275) (EIC: BBB); M996A1 (2310-01-372-3935) (EIC: BB2);

TRUCK, AMBULANCE, 4-LITTER, ARMORED, 4X4, M997 (2310-01-111-2274) (EIC: BBA); M997A1 (2310-01-372-3934) (EIC: BBZ); M997A2 (2310-01-380-8225) (EIC: BB8);

TRUCK, AMBULANCE, 2-LITTER, SOFT TOP, 4X4, M1035 (2310-01-146-7194); M1035A1 (2310-01-371-9585) (EIC: BBW); M1035A2 (2310-01-380-8290) (EIC: BB9).

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**HEADQUARTERS, DEPARTMENTS OF THE ARMY,
THE AIR FORCE, AND MARINE CORPS**

JANUARY 1996

WARNING**EXHAUST GASES CAN KILL**

Brain damage or death can result from heavy exposure. Precautions must be followed to ensure crew safety when the personnel heater, main, or auxiliary engine of any vehicle is operated for any purpose.

1. Do not operate your vehicle engine in enclosed areas.
2. Do not idle vehicle engine with vehicle windows closed.
3. Be alert at all times for exhaust odors.
4. Be alert for exhaust poisoning symptoms. they are:
 - Headache
 - Dizziness
 - Sleepiness
 - Loss of muscular control
5. If you see another person with exhaust poisoning symptoms:
 - Remove person from area
 - Expose to open air
 - Keep person warm
 - Do not permit physical exercise
 - Administer artificial respiration, if necessary*
 - Notify a medic

*For artificial respiration, refer to FM 21-11.

6. BE AWARE, the field protective mask for nuclear, biological or chemical (NBC) protection will not protect you from carbon monoxide poisoning.

THE BEST DEFENSE AGAINST EXHAUST POISONING IS ADEQUATE VENTILATION.

WARNING SUMMARY (Cont'd)

- Drycleaning solvent is flammable and will not be used near an open flame. A fire extinguisher will be kept nearby when the solvent is used. Use only in well-ventilated places. Failure to do this may result in injury to personnel and/or damage to equipment.
- Compressed air used for cleaning purposes will not exceed 30 psi (207 kPa). Use only with effective chip guarding and personal protective equipment (goggles/shield, gloves, etc.).
- Diesel fuel is highly flammable. Do not perform any procedure near fire, flames, or sparks. Severe injury or death will result.
- Do not touch hot exhaust system components with bare hands. Severe injury will result.
- Do not remove surge tank filler cap before releasing internal pressure when engine temperature is above 190°F (88°C). Steam or hot coolant under pressure will cause injury.
- Do not drain oil when engine is hot. Severe injury to personnel will result.
- Always wear eye protection when bleeding brakes. Failure to do this may cause injury if brake fluid comes in contact with eyes.
- Do not perform battery system checks or inspections while smoking or near fire, flames, or sparks. Batteries may explode causing damage to vehicle, injury, or death to personnel.
- Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry or disconnected battery ground cable contacts battery terminal, a direct short will result, causing injury to personnel, or damage to equipment.
- Use caution when testing thermostat. Hot water will cause burns.
- Negative battery cable must be disconnected before disconnecting any harness from protective control box, or serious injury to personnel or damage to equipment will result.
- Keep hands and arms away from fan blade and drivebelts while engine is running, or serious injury may result.
- Battery acid (electrolyte) is extremely harmful. Always wear safety goggles and rubber gloves, and do not smoke when performing maintenance on batteries. Injury will result if acid contacts eyes or skin.
- When removing battery cable clamps, disconnect ground cable first. Ensure all switches are in OFF position before disconnecting ground cable. Do not allow tools to come in contact with vehicle when disconnecting cable clamps. A direct short can result, causing instant heating of tools, tool damage, battery damage, or battery explosion.
- Allow transmission/transfer case to cool before performing maintenance. Failure to do this may cause injury.
- Always apply parking brake and chock opposite wheel before removing wheel. Avoid removing wheel when vehicle is on sloping terrain. Injury to personnel or damage to equipment may result.
- Gloves must be worn whenever handling winch cable. Severe injury may result.
- Opening one end of cargo door without ensuring opposite end is securely closed will cause both ends to open simultaneously, resulting in injury to personnel or damage to equipment.
- Direct all personnel to stand clear during engine hoisting operations. Failure to do this may cause injury to personnel.
- Hydraulic jacks are used for raising and lowering, and are not used to support vehicle. Never work under vehicle unless wheels are blocked and it is properly supported. Injury or damage to equipment may result if vehicle suddenly shifts or moves.
- Remove only the inner group of nuts when removing a wheel from the vehicle. Removing the outer nuts which hold the rim together while the assembly is inflated could result in serious injury or death.

WARNING SUMMARY (Cont'd)

- In all disassembly of the wheel assembly operations, ensure the tire is totally deflated before removing wheel nuts. Failure to follow proper safety precautions could cause serious injury or death.
- Never inflate a wheel assembly with the wheel locknuts removed in an attempt to separate inner and outer rim halves. The assembly will separate under pressure resulting in serious injury or death.
- Never use wheel assemblies with studs which are damaged, loose, or have damaged threads. Damaged studs can cause improper assembly, which could cause individual fasteners to fail. Any of these situations could cause serious injury or death.
- Never use tubes in wheel assemblies. Use of a tube defeats built-in safety features, and could allow the wheel to come apart under pressure, resulting in serious injury or death.
- Use only replacement parts specified in TM 9-2320-280-24P. Wheels assembled with components which do not meet specifications could cause the assembly to separate under pressure, resulting in serious injury or death.
- Never inflate a wheel assembly without having checked wheel locknut torques to ensure to wheel locknuts are tightened to specifications. An assembly with improperly tightened locknuts could separate under pressure resulting in serious injury or death.
- Always use a tire inflation cage for inflation purposes. Stand on one side of cage, during inflation, never directly in front. Keep hands out of the cage during inflation. Inflate assembly to recommended pressure, using a clip-on air chuck. Do not exceed 30 psi (207 kPa) cold bias tire inflation pressure or 50 psi (344 kPa) cold radial tire inflation pressure. Failure to follow these instructions may result in serious injury or death.
- Never mix radial tires and bias ply tires on the same vehicle. Injury to personnel or damage to equipment may result.
- Rear steps must be raised before disconnecting retractor lever from rear steps. Failure to do this may cause injury to personnel and damage to equipment.
- NBC contaminated filters must be handled and disposed of only by authorized and trained personnel. The unit commander or senior officer in charge of maintenance personnel must ensure that prescribed protective clothing (FM 3-4) is used, and prescribed safety measures and decontamination procedures (FM 3-5) are followed. The local unit SOP is responsible for final disposal of contaminated air filters. Failure to do this may cause severe injury to personnel.
- Seatbelts are to be replaced as a set. Failure to do this may cause injury to personnel or damage to equipment.
- The Department of Transportation requires 105 mm cannon ammunition to be in wooden boxes when transporting ammunition on public highways, by fixed wing aircraft, rail, or ship. Movement of cannon ammunition in fiber containers (inner pack) in the HMMWV ammunition rack is restricted to other than public highways.

CHANGE
NO. 2

HEADQUARTERS
DEPARTMENTS OF THE ARMY,
THE AIR FORCE, AND MARINE CORPS
Washington, D.C., 15 July 2004

TECHNICAL MANUAL
VOLUME 1 OF 3
UNIT MAINTENANCE

TRUCK, UTILITY: CARGO/TROOP CARRIER, 1-1/4 TON, 4X4,
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TM 9-2320-280-20-1, 31 January 1996, is changed as follows:

1. Remove old pages and insert new pages as indicated below.
2. New or changed material is indicated by a vertical bar in the margin of the page.

Remove pages

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DA Form 2028

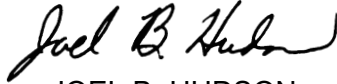
3. File this change sheet in front of the publication for reference purposes.

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Director, Program Support
Marine Corps Systems Command

Distribution:

To be distributed in accordance with the initial distribution number (IDN) 380900, requirements for TM 9-2320-280-20-1.

CHANGE

NO. 1

HEADQUARTERS
DEPARTMENTS OF THE ARMY,
THE AIR FORCE, AND MARINE CORPS
Washington, D.C., 30 JUNE 1999

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TM 9-2320-280-20-1, 31 January 1996, is changed as follows:

1. Two new models have been added to the front cover. The new cover, located at the end of the change package, replaces the existing cover.
2. Remove old pages and insert new pages as indicated below.
3. New or changed material is indicated by a vertical bar in the margin of the page.

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cover

4. File this change sheet in front of the publication for reference purposes.

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RONALD R. FOGLEMAN
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General, United States Air Force
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LIST OF EFFECTIVE PAGES

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Original . . . 0 . . .31 January 1996
 Change . . . 130 June 1999
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Volume 1 contains 927 pages

Dates of issue for original and changed pages of volume 2 are:

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 Change . . . 1 . . .14 September 1998
 Change . . . 230 June 1999
 Change . . . 331 July 2003

Volume 2 contains 947 pages

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 Change . . . 130 June 1999
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Volume 3 contains 1,170 pages

TOTAL NUMBER OF PAGES IN THIS PUBLICATION IS 3,044. CONSISTING OF THE FOLLOWING:

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2-250 Blank 1	2-428 - 2-429 1	FP-6 Blank 0
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NO. 9-2320-280-20-1
NO. 2320-20/7B

HEADQUARTERS
DEPARTMENTS OF THE ARMY,
THE AIR FORCE, AND MARINE CORPS
Washington, D.C., 31 JANUARY 1996

TECHNICAL ORDER
NO. 36A12-1A-2092-1-1

TECHNICAL MANUAL
VOLUME 1 OF 3
UNIT MAINTENANCE

- TRUCK, UTILITY: CARGO/TROOP CARRIER, 1-1/4 TON, 4X4, M998 (2320-01-107-7155) (EIC: BBD);
M998A1 (2320-01-371-9577) (EIC: BBN);
- TRUCK, UTILITY: CARGO/TROOP CARRIER, 1-1/4 TON, 4X4, W/WINCH, M1038 (2320-01-107-7156) (EIC: BBE);
M1038A1 (2320-01-371-9578) (EIC: BBP);
- TRUCK, UTILITY: HEAVY VARIANT, 4X4, M1097 (2320-01-346-9317) (EIC: BBM); M1097A1 (2320-01-371-9583) (EIC: BBU);
M1097A2 (2320-01-380-8604) (EIC: BB6); M1123 (2320-01-455-9593) (EIC: B6G);
- TRUCK, UTILITY: TOW CARRIER, ARMORED, 1-1/4 TON, 4X4, M966 (2320-01-107-7153) (EIC: BBC);
M966A1 (2320-01-372-3932) (EIC: BBX); M1121 (2320-01-456-1282) (EIC: B6H);
- TRUCK, UTILITY: TOW CARRIER, ARMORED, 1-1/4 TON, 4X4, W/WINCH, M1036 (2320-01-107-7154) (EIC: BBH);
- TRUCK, UTILITY: TOW CARRIER, W/SUPPLEMENTAL ARMOR, 1-1/4 TON, 4X4, M1045 (2320-01-146-7191);
M1045A1 (2320-01-371-9580) (EIC: BBR); M1045A2 (2320-01-380-8229) (EIC: BB5);
- TRUCK, UTILITY: TOW CARRIER, W/SUPPLEMENTAL ARMOR, 1-1/4 TON, 4X4, W/WINCH, M1046 (2320-01-146-7188);
M1046A1 (2320-01-371-9582) (EIC: BBT);
- TRUCK, UTILITY: ARMAMENT CARRIER, ARMORED, 1-1/4 TON, 4X4, M1025 (2320-01-128-9551) (EIC: BBF);
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- TRUCK, UTILITY: ARMAMENT CARRIER, ARMORED, 1-1/4 TON, 4X4, W/WINCH, M1026 (2320-01-128-9552) (EIC: BBG);
M1026A1 (2320-01-371-9579) (EIC: BBQ);
- TRUCK, UTILITY: ARMAMENT CARRIER, W/SUPPLEMENTAL ARMOR, 1-1/4 TON, 4X4, M1043 (2320-01-146-7190);
M1043A1 (2320-01-372-3933) (EIC: BBY); M1043A2 (2320-01-380-8213) (EIC: BB4);
- TRUCK, UTILITY: ARMAMENT CARRIER, W/SUPPLEMENTAL ARMOR, 1-1/4 TON, 4X4, W/WINCH, M1044 (2320-01-146-7189);
M1044A1 (2320-01-371-9581) (EIC: BBS);
- TRUCK, UTILITY: S250 SHELTER CARRIER, 4X4, M1037 (2320-01-146-7193) (EIC: BBK);
- TRUCK, UTILITY: S250 SHELTER CARRIER, 4X4, W/WINCH, M1042 (2320-01-146-7187);
- TRUCK, AMBULANCE, 2-LITTER, ARMORED, 4X4, M996 (2310-01-111-2275) (EIC: BBB); M996A1 (2310-01-372-3935) (EIC: BB2);
- TRUCK, AMBULANCE, 4-LITTER, ARMORED, 4X4, M997 (2310-01-111-2274)
(EIC: BBA); M997A1 (2310-01-372-3934) (EIC: BBZ); M997A2 (2310-01-380-8225) (EIC: BB8);
- TRUCK, AMBULANCE, 2-LITTER, SOFT TOP, 4X4, M1035 (2310-01-146-7194);
M1035A1 (2310-01-371-9585) (EIC: BBW); M1035A2 (2310-01-380-8290) (EIC: BB9).

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This manual is published in three parts. TM 9-2320-280-20-1 contains chapters 1 and 2, TM 9-2320-280-20-2 contains chapters 3 through 9, and TM 9-2320-280-20-3 contains chapters 10 through 13 and appendices A through G.

This manual contains a table of contents for all three volumes 1, 2, and 3 and alphabetical index for chapters 1 and 2.

*This publication supersedes TM 9-2320-280-20-1 dated 19 January 1990 and all changes.

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HOW TO USE THIS MANUAL

ABOUT YOUR MANUAL

- a. Spend some time looking through this manual. You'll find that it has a new look, different than most of the TMs you've been using. New features added to improve the convenience of this manual and increase your efficiency are:
1. **Accessing Information** - These include physical entry features such as the bleed-to-edge indicators on the cover and edge of the manual. Extensive troubleshooting guides for specific systems lead directly to step by step directions for problem solving and maintenance tasks.
 2. **Illustrations** - A variety of methods are used to make locating and fixing components much easier. Locator illustrations with keyed text, exploded views, and cut-away diagrams make the information in this manual easier to understand.
 3. **Keying Text With Illustrations** - Instructions are located together with figures that illustrate the specific task you are working on. In most cases, the task steps and figures are located side by side making part identification and procedure sequence easier to follow.

The TM is the fundamental means by which the Army communicates to soldiers the requirements and procedures necessary to perform equipment operations and maintenance. This manual describes in detail the Unit Maintenance authorized by the Maintenance Allocation Chart (appendix B) and Source, Maintenance, and Recovery (SMR) codes (TM 9-2320-280-24P).

- b. **General Features.** Your TM is the best source available for providing information and data critical to vehicle operation and maintenance:
- Safety summary (warning page a, b, and c)
 - General information, equipment descriptions, and data (chapter 1)
 - Principles of operation (chapter 1, section III)
 - Preventive Maintenance Checks and Services – PMCS (chapter 2, section III)
 - Electrical/Mechanical Systems Troubleshooting (chapter 2, section IV)
 - Detailed maintenance procedures (chapters 3-12)
 - General maintenance instructions (chapter 2, section II and III)
 - Maintenance Allocation Chart - MAC (appendix B)
 - Expendable/durable supplies and materials list (appendix C)
 - Manufactured items (appendix D)
 - Torque limits (appendix E)
 - Wiring Diagrams and Schematic (appendix F)
 - Mandatory replacement parts (appendix G)

A typical example of how to use this manual is provided on the following pages.

USING YOUR MANUAL AN EXAMPLE

a. **TASK:** The operator of an M998 series vehicle has complained that his TOW carrier uses too much engine oil. The vehicle has been assigned to you for repair.

b. **TROUBLESHOOTING STEPS:**

1. Look at the cover of this manual. You'll see chapter titles listed from top to bottom on the right-hand side.

2. Look at the right edge of the manual. On some of the pages you'll see black bars (bleed-to-edge indicators) that are aligned with the chapter bars on the cover. These are the locations of the chapters in the text.

3. Look for "SERVICE AND TROUBLESHOOTING INSTRUCTIONS" in the chapter list on the cover. This is where the troubleshooting information is located.

4. Turn to those pages with the edge indicator matching the black bar for service and troubleshooting instructions. Page numbers are also listed next to chapter titles.

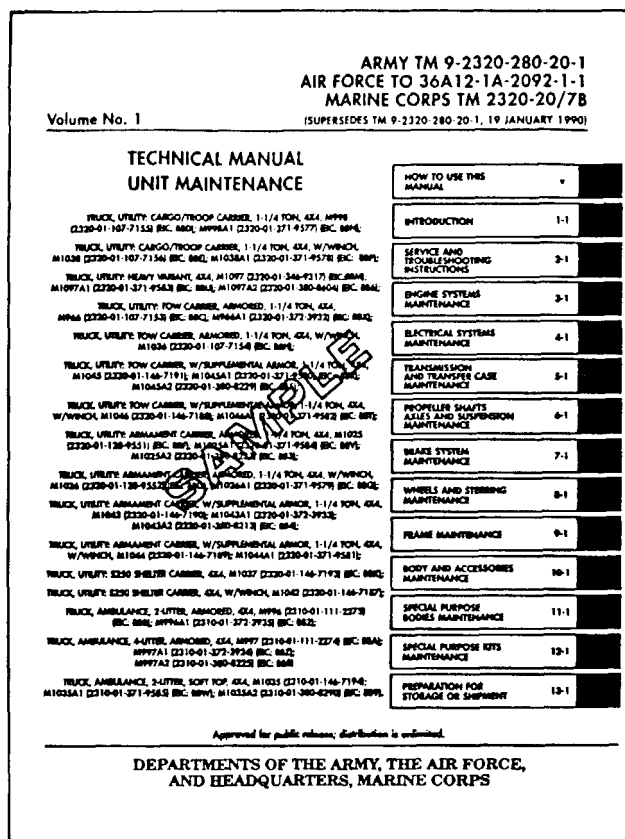
5. Chapter 2 is divided into four sections:

Section I - Repair Parts, Special Tools, TMDE, and Support Equipment

Ž Section II - Service Upon Receipt

Ž Section III - PMCS

Ž Section IV - Electrical/Mechanical Systems Troubleshooting



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LUBRICATION TABLE (Cont'd)

USAGE	FLUID/LUBRICANT	CAPACITIES	EXPECTED TEMPERATURE
Transmissions (SL80) (4L80-E)	Devox [®] II Devox [®] III OEA	Dry 11 qt (10.4 L) Dress & Refill: 6 qt (5.7 L) Dry 13.6 qt (12.8 L) Dress & Refill 7.7 qt (7.3 L)	All Temperatures Except Arctic Arctic Temperatures
Transfer (E18) Case (F43)	Devox [®] II	2.8 qt (2.6 L) 2.26 qt (2.1 L)	All Temperatures
Steering System	Devox [®] II	1 qt (936 L) or/Center, 1.25 qt (1.18 L)	All Temperatures
Overhaul Wash (4)	Multiurpose Gear Oil 80W90	1 pt. ea. (0.47 L)	All Temperatures
Axles (2)	Multiurpose Gear Oil 80W90	2 qt ea. (1.9 L)	All Temperatures
Ball Joints, Tie Rod Ends, Pitman Arms, Propeller Shafts, etc.	GAA	As Specified	All Temperatures
Hinges, Cables, and Linkages	OL/HDO	As Specified	All Temperatures

Section IV. ELECTRICAL/MECHANICAL SYSTEMS TROUBLESHOOTING

2-12. GENERAL

a. This section provides information to diagnose and correct malfunctions of the electrical/mechanical system.

b. Principles of operation showing system operation can be found in chapter 1. It should be used as a reference when performing electrical/mechanical troubleshooting.

c. Each malfunction symptom given for an individual component or system is followed by steps; you should take to determine the cause and corrective action you must take to remedy the problem.

d. Before taking any action to correct a possible malfunction, the following rules should be followed:

- (1) Question operator to obtain any information that might help you determine the cause of the problem.
- (2) Never over look the chance that the problem could be of simple origin. The problem could be corrected with minor adjustment.
- (3) Use all senses to observe and locate trouble.
- (4) Use test instruments or gauges to help you determine and isolate problem.
- (5) Always isolate the system where the malfunction occurs and then locate the defective component.
- (6) Use standard automotive theories and principles when troubleshooting the vehicle covered in this manual.

e. The ST/ACE-R is an integral part of these troubleshooting procedures. It should be used whenever possible, although other options are given, when available. The Vehicle Identification Number (VIN) assigned to the M998 series vehicle is 21 (14 is the temporary VDI). On page 2-762, you will find information on ST/ACE-R description and operation. Use this information to become familiar with ST/ACE-R operation and the equipment contained in the test set. On page 2-762 you will find ST/ACE-R setup and internal checks. These must be performed prior to performing tests.

2-30

6. Turn to section IV, "ELECTRICAL/MECHANICAL SYSTEMS TROUBLESHOOTING" (page 2-30). This troubleshooting section is system-oriented and is broken down into five top level tests and twenty-one system level tests.

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2-13. ELECTRICAL/MECHANICAL SYSTEMS TROUBLESHOOTING

ELECTRICAL/MECHANICAL TROUBLESHOOTING

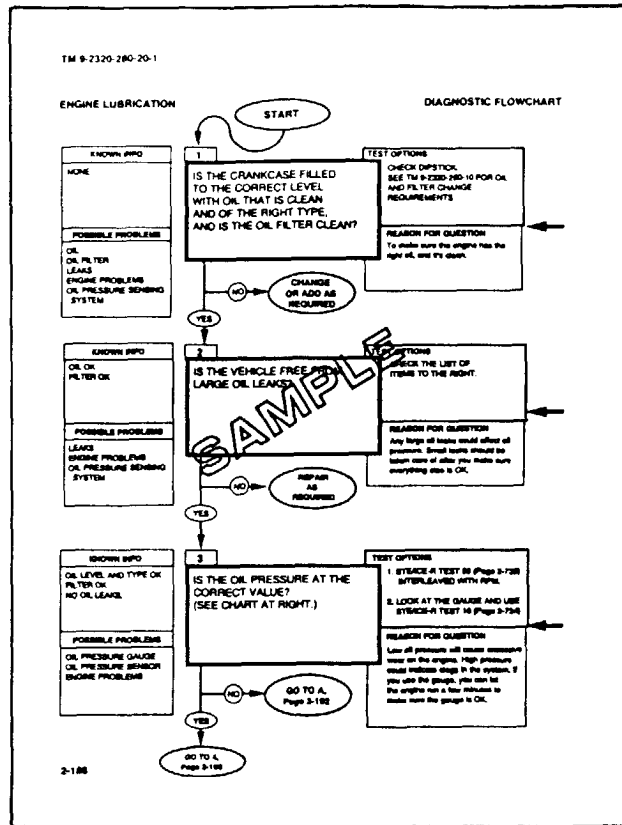
PARA NO.		PAGE NO.
2-14	How to use this troubleshooting guide	2-32
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7. One of the first pages of this section is the "ELECTRICAL/MECHANICAL SYSTEM TROUBLESHOOTING" (turn to page 2-31)
8. Look down the list of symptoms until you find "ENGINE LUBRICATION TESTS". In that paragraph you will find the diagnostic flow chart that the vehicle operator can pick the test as "OIL LEAKS OR ENGINE PROBLEMS".
9. Turn to the test indicated.

10. On page 2-188, steps relating to resolving the problem of excessive oil loss are listed. Read the diagnostic flow chart until you find "OIL LEAKS OR ENGINE PROBLEMS". The tests listed are shown in the example page to the right of this text.

11. In accordance with Test 1, you checked the oil level and filter for leaks. The oil level and filter appears normal and you move on to Test 2.



12. In Test 2, you begin a methodical check of the engine lubricating system. You discover a leak in the oil cooler assembly adjacent to one of the mounting brackets. One of the welds has cracked, allowing a class III leak from a small area of the cooling fins. The oil cooler assembly must be repaired or replaced.

13. At this point, the engine lubrication diagnostic flow chart would direct you to a specific detailed procedure to solve the problem. However, the engine lubricating system is complex and you must now refer to the table of contents to locate the proper task paragraph.

NOTE: Before attempting to repair or replace the oil cooler assembly, as a Unit mechanic, you must:

- Determine the maintenance responsibility of repair or replacement of the component.
- If the task is at your echelon of maintenance responsibility, you must identify the tools needed and the replacement parts required.

Refer to the Maintenance Allocation Chart – MAC (appendix B) to determine not only the maintenance responsibility of the item, but also to obtain an estimate of the time required to perform the task, tools needed, and any special notes/requirements necessary.

Refer to TM 9-2320-280-24P, Unit Maintenance Repair Parts and Special Tools List for M998 Series Vehicles, for requisition data concerning replacement parts for this task.

c. **OIL COOLER ASSEMBLY REPLACEMENT.** After reporting the results of your troubleshooting efforts to your supervisor, he decides that the most expedient means of returning the vehicle to service would be to replace the oil cooler assembly.

1. Turn to the "TABLE OF CONTENTS" and find the chapter dealing with the engine. You find it as "CHAPTER 3, ENGINE SYSTEMS MAINTENANCE". Furthermore, you note that the chapter is divided into five sections; you are interested in "Section I. Lubrication System Maintenance".

2. Turn to chapter 3, section I on page 3-1. Here you find the "Lubrication System Maintenance Task Summary". Read down the list of tasks until you find the one that will correct your maintenance problem. For our example, you find it as task 3-8 "Engine and Transmission Oil Cooler Assembly Maintenance". Turn to page 3-12.

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TM 9-2320-280-20-2

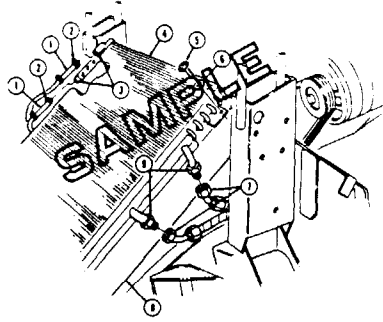
CHAPTER 3
ENGINE SYSTEMS MAINTENANCE

Section I. LUBRICATION SYSTEM MAINTENANCE

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3-8.	Engine and Transmission Oil Cooler Assembly Maintenance	3-12
3-9.	Oil Pressure Regulator (OPR) Bracket Maintenance	3-14
3-10.	Oil Valve Plugs Replacement	3-18

3-1

<p style="text-align: right; font-size: small;">TM 9-2320-280-20-2</p> <p style="text-align: center; border: 1px solid black; padding: 2px;">3-8. ENGINE AND TRANSMISSION OIL COOLER ASSEMBLY MAINTENANCE</p> <p>The task covers:</p> <p style="margin-left: 20px;">a. Removal b. Installation c. Cleaning and Inspection</p> <hr/> <p>INITIAL SETUP</p> <table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> <p>Tools (General mechanic's tool kit automotive) (Appendix B, Item 1)</p> <p>Manual References TM 9-2320-280-10 TM 9-2320-280-24P</p> </td> <td style="width: 50%; vertical-align: top;"> <p>Equipment Conditions</p> <ul style="list-style-type: none"> • Engine left splash shield removed (para. 10-17) • Power steering cooler removed (para. 8-28) <p>General Safety Instructions Do not drain oil when engine is hot.</p> </td> </tr> </table> <hr/> <p style="text-align: center; font-weight: bold; font-size: small;">CAUTION</p> <p style="font-size: x-small;">Do not bend transmission oil cooler hose. Damaged hose reduce cooling efficiency, which may damage engine and/or transmission.</p> <p style="border: 1px solid black; padding: 2px; width: fit-content; margin: 5px 0;">a. Removal</p> <p style="text-align: center; font-weight: bold; font-size: x-small;">WARNING</p> <p style="font-size: x-small;">Do not drain oil when engine is hot. Oil splashing on personnel will result in burns.</p> <p style="font-size: x-small;">Cover or plug all hose ends immediately after disconnection to prevent contamination. Remove all plugs prior to connection.</p> <p style="text-align: center; font-weight: bold; font-size: x-small;">NOTE</p> <p style="font-size: x-small;">• Have drainage container ready to catch oil. • Note position of hoses for installation.</p> <ol style="list-style-type: none"> 1. Disconnect two engine oil cooler supply and return lines (7) from engine oil cooler parts (9). 2. Loosen two hose clamps (2) and disconnect two transmission oil cooler hose connector hoses (1) from transmission oil cooler ports (3). 3. Remove four socket-head screw and washer assemblies (5), washers (6) and oil cooler (4) from radiator (8). <p style="border: 1px solid black; padding: 2px; width: fit-content; margin: 5px 0;">b. Installation</p> <ol style="list-style-type: none"> 1. Install oil cooler (4) on radiator (8) with four washers (6) and socket-head screw and washer assemblies (5). 2. Connect two transmission oil cooler hose connector hoses (1) to transmission oil cooler parts (3) and tighten two hose clamps (2). Tighten clamps (2) to 10-30 N-m (7-9 ft-lb). 3. Connect two engine oil cooler supply and return hoses (7) to engine oil cooler parts (9). <p style="border: 1px solid black; padding: 2px; width: fit-content; margin: 5px 0;">c. Cleaning and Inspection</p> <ol style="list-style-type: none"> 1. Remove four socket-head screw and washer assemblies (5) and washers (6) securing oil cooler (4) to radiator (8). 2. Make four two-by-four wood blocks, 3-1/2 inches (31 mm) long. Place oil cooler (4) 1-1/2 inches (38 mm) and place one block under each corner between oil cooler (4) and radiator (8). <p style="font-size: x-small;">3-12</p>	<p>Tools (General mechanic's tool kit automotive) (Appendix B, Item 1)</p> <p>Manual References TM 9-2320-280-10 TM 9-2320-280-24P</p>	<p>Equipment Conditions</p> <ul style="list-style-type: none"> • Engine left splash shield removed (para. 10-17) • Power steering cooler removed (para. 8-28) <p>General Safety Instructions Do not drain oil when engine is hot.</p>	<p style="text-align: right; font-size: small;">TM 9-2320-280-20-2</p> <p style="text-align: center; border: 1px solid black; padding: 2px;">3-8. ENGINE AND TRANSMISSION OIL COOLER ASSEMBLY MAINTENANCE (Cont'd)</p> <p style="text-align: center; font-weight: bold; font-size: x-small;">WARNING</p> <p style="font-size: x-small;">Compressed air used for cleaning purposes will not exceed 30 psi (207 kPa). Use only with effective chip guarding and personal protective equipment (goggles/shield, gloves, etc.)</p> <ol style="list-style-type: none"> 3. Using water and compressed air, remove dirt, trash, and insects embedded in oil cooler (4) and radiator fins (8). 4. Inspect oil cooler (4) for breaks, punctures, cracks, and splits. Replace oil cooler (4), if damaged. 5. Remove four wood blocks. 6. Secure oil cooler (4) on radiator (8) with four washers (6) and socket head screw and washer assemblies (5). <div style="text-align: center; margin: 10px 0;">  </div> <p style="font-size: x-small;">FOLLOW-ON TASKS:</p> <ul style="list-style-type: none"> • Install power steering cooler (para. 8-28). • Fill transmission oil to proper level (TM 9-2320-280-10). • Fill engine oil to proper level (TM 9-2320-280-10). • Install engine left splash shield (para. 10-17). • Start engine (TM 9-2320-280-10) and check for leaks. <p style="text-align: right; font-size: x-small;">3-12</p>
<p>Tools (General mechanic's tool kit automotive) (Appendix B, Item 1)</p> <p>Manual References TM 9-2320-280-10 TM 9-2320-280-24P</p>	<p>Equipment Conditions</p> <ul style="list-style-type: none"> • Engine left splash shield removed (para. 10-17) • Power steering cooler removed (para. 8-28) <p>General Safety Instructions Do not drain oil when engine is hot.</p>		

3. On page 3-12 you find paragraph 3-8, the detailed procedure for replacing the oil cooler assembly.

d. **DETAILED MAINTENANCE PROCEDURES.** Detailed maintenance procedures include everything you must do to accomplish a basic maintenance task. Unless otherwise stated, general mechanic's automotive tool kit will be used for maintenance of this vehicle.

1. Before beginning the maintenance task, look through the procedure. You must familiarize yourself with the entire maintenance procedure of para. 3-8: "Engine and Transmission Oil Cooler Assembly Maintenance". The task includes "a. Removal" "b. Installation" and "c. Cleaning and Inspection".

2. The ten basic headings listed under "INITIAL SETUP" outline task conditions, materials, special tools, manpower requirements, and special conditions. The headings are:

- **Applicable Models:** Any models that require a particular maintenance task. If a maintenance task covers all models, then this heading will not be used.
- **Test Equipment:** Test equipment needed to complete a task. If test equipment is not required, this heading will not be used.
- **Tools** These are common tools and general mechanic tool sets required to perform maintenance tasks. These common tools should be on hand to properly perform the task. Torque wrenches are required for many tasks; the proper torque wrench should be available to tighten mounting hardware.
- **Special Tools:** Those special tools needed to complete a maintenance task. If no special tools are needed, this heading will not be used.

If you don't have one of these special tools, requisition it (before starting the task) using the data supplied in TM 9-2320-280-24P, the repair parts and special tools list for this level of maintenance. Special tools are located in section III.

- **Materials/Parts:** This heading lists only mandatory replacement materials or parts (gaskets, O-rings, sealant, etc.). To replace other unserviceable parts, refer to TM 9-2320-280-24P for requisition data. If no mandatory replacement materials/parts are required, this heading will not be used.

- **Personnel Required:** The number of personnel needed to perform a task. If only one mechanic is needed, this heading will not be used.

NOTE

If you think that you need more help to adequately or safely complete a task, perhaps as the result of unusual conditions, etc., alert your supervisor and ask for help.

- **Manual References:** Those TMs needed to complete the task.
 - **Equipment Condition:** Notes the conditions that must exist before starting the task. If none are required, this heading will not be used. For oil cooler assembly replacement, the left-hand engine splash shield should be removed before we can start the task. If not already done, follow the procedure for splash shield removal in para. 10-17, before proceeding with this task.
 - **General Safety Instructions:** Summarizes all safety warnings for the maintenance task. If none are required, this heading will not be used.
3. A step by step maintenance procedure follows the "INITIAL SETUP" and gives detailed instructions for the procedure. These instructions give the part's general location and name and action performed. In the example, oil cooler assembly replacement -a. Removal, step 1 is "Disconnect engine oil cooler supply and return lines (7) from engine oil cooler ports (9)". Note that the numbers in parenthesis correspond to the part's callout number in the accompanying illustration.

NOTE

Warnings, cautions, and notes provide supplemental information:

- **Warnings:** Indicate conditions, practices, or procedures which must be observed to avoid personnel injury, loss of life, loss of life, or long-term health hazard.
 - **Cautions:** Indicate condition, practices, or procedures which must be observed to avoid damage to equipment or destruction of equipment.
 - **Notes:** Include essential information of special importance, interest, or aid in job performance which should be remembered and would be otherwise difficult to find or incorporate into the text.
4. At the end of a procedure, "FOLLOW-ON TASKS" will list those additional tasks that must be performed to complete the procedure. The Follow-On Tasks for oil cooler assembly replacement are:
- Ž Fill oil to proper level (TM 9-2320-280-10).
 - Ž Install left-hand splash shield (para. 10-17).
 - Ž Start engine (TM 9-2320-280-10) and check for leaks.

- e. Refer to the example pages for para. 3-8, Engine and Transmission Oil Cooler Assembly Maintenance, as we review the following points:
1. **Modular Text:** Both pages of text and illustrations are to be used together. This manual was designed so that the two pages would be visible at once, making part identification and procedure sequence easy to follow.
 2. **Initial Setup:** Outlines task conditions.
 3. **Illustrations:** An exploded diagram of the component shows part locations, attachments, and spatial relationships. Cutaway views (part of the vehicle is "erased") show the location and orientation of screws and attachments.
- f. Your manual is easy to use once you understand its design. We hope it will encourage you to use your TM more often as an aid to maintenance support for M998 series vehicles.

CHAPTER 1

INTRODUCTION

Section I. GENERAL INFORMATION

1-1. SCOPE

a. This technical manual contains instructions for organizational maintenance of the 1-1/4 ton, 4X4, M998 series vehicles.

b. Models included are:

- (1) M998 and M998A1, Cargo/Troop Carrier
- (2) M1038 and M1038A1, Cargo/Troop Carrier, W/Winch
- (3) M1097, M1097A1, M1097A2, and M1123 Heavy Variant
- (4) M966, M966A1, and M1121 TOW Carrier, Armored
- (5) M1036, TOW Carrier, Armored, W/Winch
- (6) M1045, M1045A1, and M1045A2 TOW Carrier, W/Supplemental Armor
- (7) M1046 and M1046A1, TOW Carrier, W/Supplemental Armor, W/Winch
- (8) M1025, M1025A1, and M1025A2 Armament Carrier, Armored
- (9) M1026 and M1026A1, Armament Carrier, Armored, W/Winch
- (10) M1043, M1043A1, and M1043A2 Armament Carrier, W/Supplemental Armor
- (11) M1044 and M1044A1, Armament Carrier, W/Supplemental Armor, W/Winch
- (12) M1037, S250 Shelter Carrier
- (13) M1042, S250 Shelter Carrier, W/Winch
- (14) M996 and M996A1 2-Litter Ambulance, Armored
- (15) M997, M997A1, and M997A2 4-Litter Ambulance, Armored
- (16) M1035, M1035A1, and M1035A2 2-Litter Ambulance, Soft Top

1-2. MAINTENANCE FORMS, RECORDS, AND REPORTS

(Army) Department of the Army forms and procedures used for equipment maintenance will be those prescribed by DA Pam 738-750, The Army Maintenance Management System (TAMMS). (Marine Corps) Refer to TM 4700-15/1-.

1-3. DESTRUCTION OF ARMY EQUIPMENT TO PREVENT ENEMY USE

Refer to TM 750-244-6, Procedures for Destruction of Army Tank-Automotive Equipment to Prevent Enemy Use.

1-4. PREPARATION FOR SHIPMENT

(Army) Refer to TM 746-10, Marking, Packaging and Shipment of Supplies and Equipment: General Packaging Instructions for Field Use. (Marine Corps) Refer to MCO 4450-7.

1-5. REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIR)

(Army) If your vehicle needs improvement, let us know. Send us an EIR. You, the user, are the only one who can tell us what you don't like about your equipment. Let us know why you don't like the design or performance. The preferred method for submitting QDRs is through the Army Electronic Product Support (AEPS) website under the Electronic Deficiency Reporting System (EDRS). The web address is: <http://aeps.ria.army.mil>. This is a secured site requiring a password that can be applied for on the front page of the website. If the above method is not available to you, put it on an SF 368, Product Quality Deficiency Report (PQDR), and mail it to us at: Department of the Army, U.S. Army Tank-automotive and Armaments Command, ATTN: AMSTA-TR-E/PQDR MS 267, 6501 E. 11 Mile Road, Warren, MI 48397-500. We'll send you a reply. (Marine Corps) Submit QDR's in accordance with MCO 4855-10.

1-6. EQUIPMENT IMPROVEMENT REPORT AND MAINTENANCE DIGEST (EIR MD)

The quarterly Equipment Improvement Report and Maintenance Digest, TB 43-0001-62 series, contains valuable field information on the equipment covered in this manual. The information in the TB 43-0001-62 series is compiled from some of the Equipment Improvement Reports that you prepared on the vehicles covered in this manual. Many of these articles result from comments, suggestions, and improvement recommendations that you submitted to the EIR program. The TB 43-0001-62 series contains information on equipment improvements, minor alterations, proposed Modification Work Orders (MWOs), warranties (if applicable), actions taken on some of your DA Form 2028s (Recommended Changes to Publications and Blank Forms), and advance information on proposed changes that may affect this manual. The information will help you in doing your job better and will help in keeping you advised of the latest changes to this manual. Also refer to DA Pam 25-30, Consolidated Index of Army Publications and Blank Forms, and appendix A, References, of this manual. (Marine Corps) Submit QDR's in accordance with MCO 4855-10. For those with access to the World Wide Web (WWW), the EIR MD can be viewed through the Army Electronic Product Support. The site is <http://aeps.ria.army.mil>.

1-7. METRIC SYSTEM

The equipment described herein contains metric components and requires metric common and special tools; therefore, metric units in addition to standard units will be used throughout this publication. In addition, a metric conversion table is located on the inside back cover of this publication.

1-8. MANDATORY REPLACEMENT PARTS

The maintenance instructions contained herein make reference to removing and discarding piece parts such as: gaskets, lockwashers, cotter pins, O-rings, seals; etc.; these items should be considered mandatory replacement items and replaced with new parts during assembly/installation.

1-9. BREAK-IN PROCEDURE

Upon receipt of vehicles, or after engine replacement, break-in procedures must be observed during the first 500 miles (804 kilometers) of operation. For break-in procedure, refer to TM 9-2320-280-10.

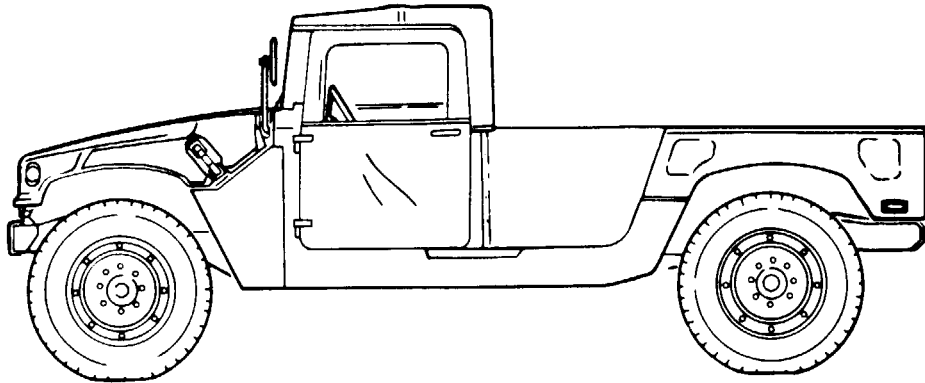
Section II. EQUIPMENT DESCRIPTION AND DATA

1-10. EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES

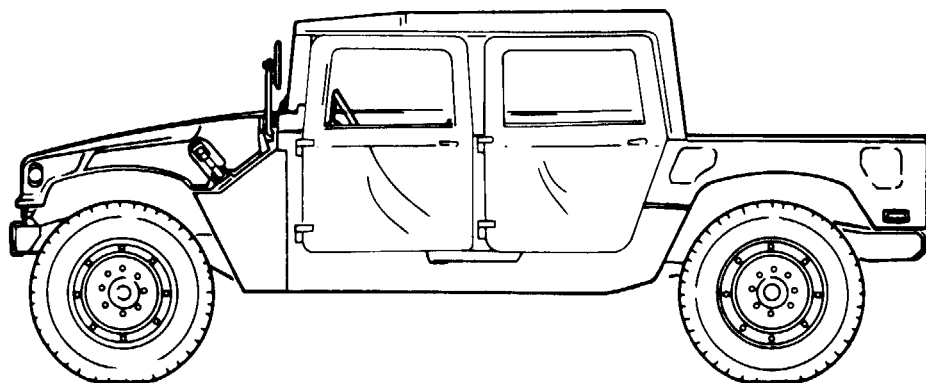
The 1-1/4 ton, 4x4, M998 series of vehicles are tactical vehicles designed for use over all types of roads, as well as cross-country terrain in all weather conditions. The vehicles have four driving wheels powered by a V-8, liquid-cooled, diesel engine. Four-wheel hydraulic service brakes and a mechanical parking brake are common to all models in the M998 series. All vehicles are equipped with a pintle hook for towing. Tiedown and lifting eyes are provided for air, rail, or sea shipment.

CARGO/TROOP CARRIERS: M998, M998A1, M1038, AND M1038A1

PURPOSE: These models are used to transport cargo and troops. The M1038 and M1038A1 models, which have a winch, can be used for recovery operations. Both models utilize a troop seat kit for troop transport operations.



**M998/M998A1
(WITH 2-MAN SOFT TOP INSTALLED)**



**M1038/M1038A1 W/WINCH
(WITH 4-MAN SOFT TOP INSTALLED)**

HEAVY VARIANT CARGO/TROOP CARRIERS: M1097, M1097A1, M1097A2, AND M1123

PURPOSE: This model is used for transporting equipment, materials, and/or personnel (including crew) of 4,400 pounds (1,998 kilograms). The only difference between the M998 and M998A1 cargo/troop carriers and the M1097, M1097A1, M1097A2, and M1123 heavy variant cargo/troop carriers is that the M1097, M1097A1, M1097A2, and M1123 are specifically designed to accommodate a higher payload capacity. This difference affects vehicle length, width, and shipping dimensions, but does not affect the basic purpose and performance of the vehicle. The increased payload capabilities accommodate the following kit configurations:

A. 105MM TOWED HOWITZER PRIME MOVER (L119 KIT) consists of:

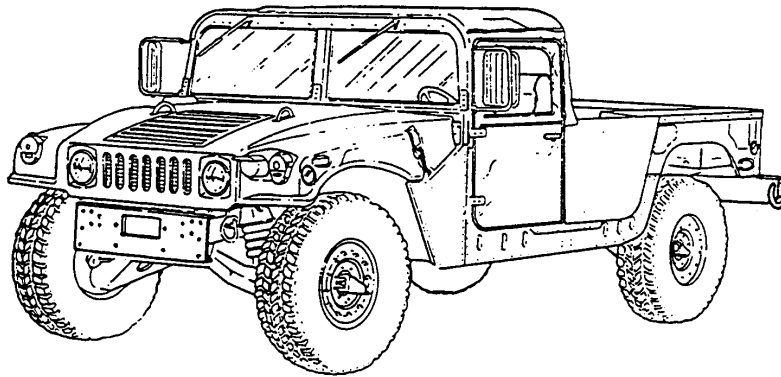
- Larger rear bumper and reinforced mounting
- Body wiring harness trailer receptacle extension
- Ammunition stowage rack and tiedown straps
- Camouflage net stowage rack
- Winch
- Two-man crew area soft top
- Troop area soft top
- Cargo bulkhead

B. TOWED VULCAN SYSTEMS (TVS) MOVER consists of:

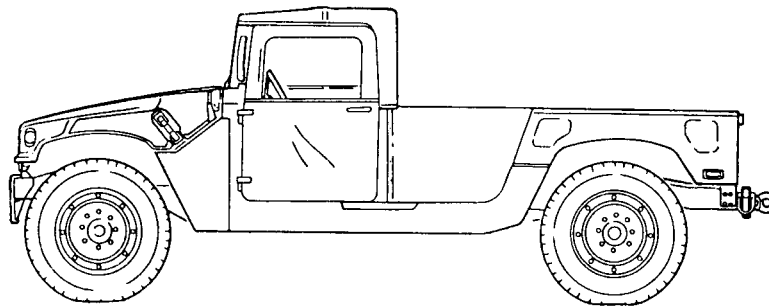
- Two-man crew area soft top
- Troop area soft top
- Camouflage net stowage rack
- Troop seat kit
- Cargo bulkhead

C. S250 ELECTRICAL EQUIPMENT SHELTER consists of:

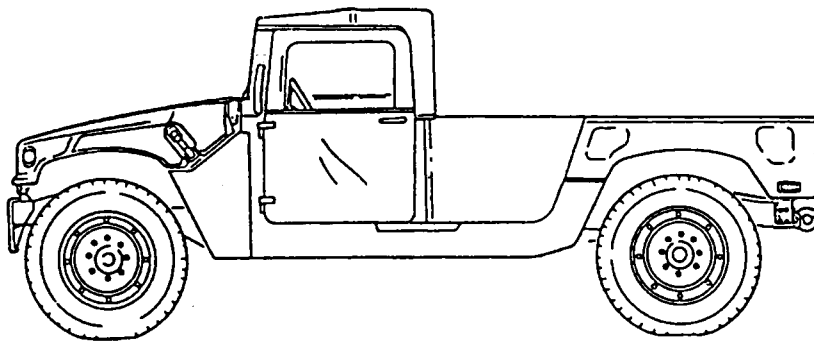
- Shelter support
- Shelter tailgate
- 200 amp umbilical power cable



**M1097/M1097A1/M1097A2/M1123
(WITH 2-MAN SOFT TOP INSTALLED)**



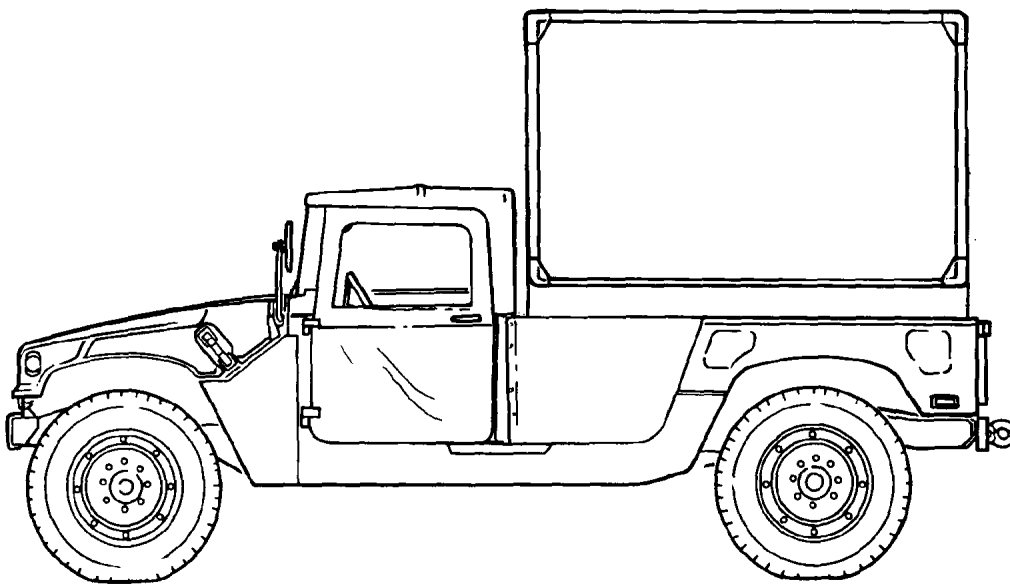
M1097A2



M1123



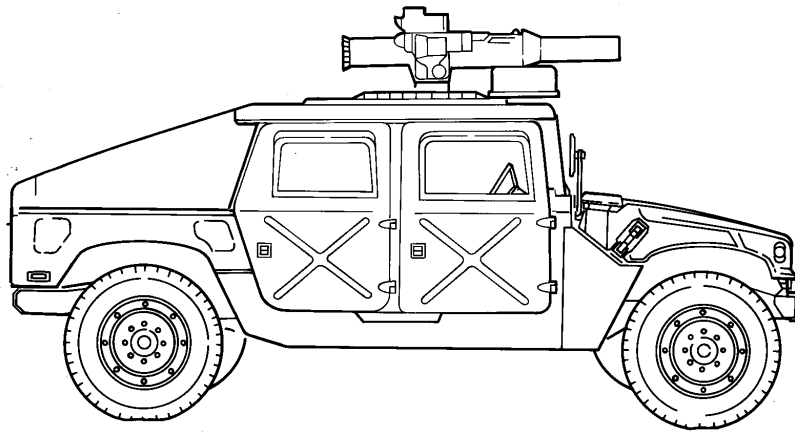
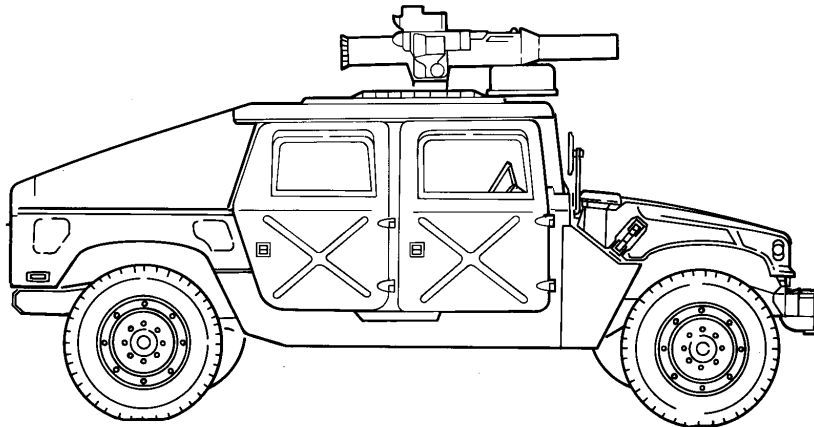
M1097/M1097A1/M1097A2/M1123
(WITH L119 KIT INSTALLED)
(WITHOUT WINCH, TOWED VULCAN SYSTEMS (TVS) MOVER)



M1097/M1097A1/M1097A2/M1123
(WITH S250 SHELTER INSTALLED)

TOW CARRIERS: M966, M966A1, M1036, AND M1121

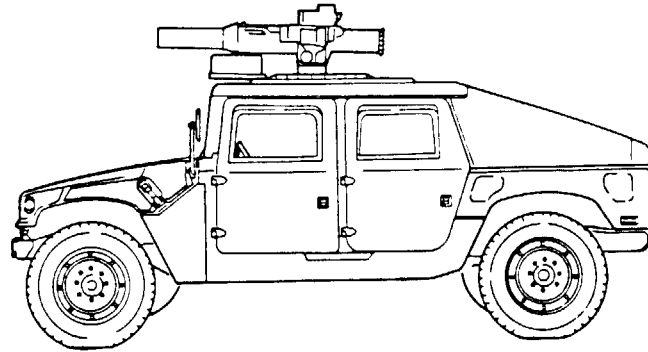
PURPOSE: These models are used to transport, mount, and operate the TOW missile launcher system with armor protection for crew, TOW system components, and ammunition. The M1036 model, which has a winch, can be used for recovery operations.

**M966/M966A1/M1121****M1036 W/WINCH**

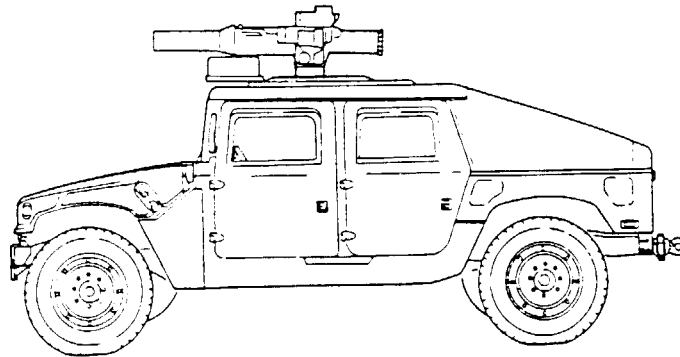
TOW CARRIERS, W/SUPPLEMENTAL ARMOR M1045, M1045A1, M1045A2, M1046, AND M1046A1

a. **PURPOSE:** These models are used to transport, mount, and operate the TOW missile launcher system with added ballistic protection for crew, TOW system components, and ammunition. The M1046 and M1046A1 models, which have a winch, can be used for recovery operations.

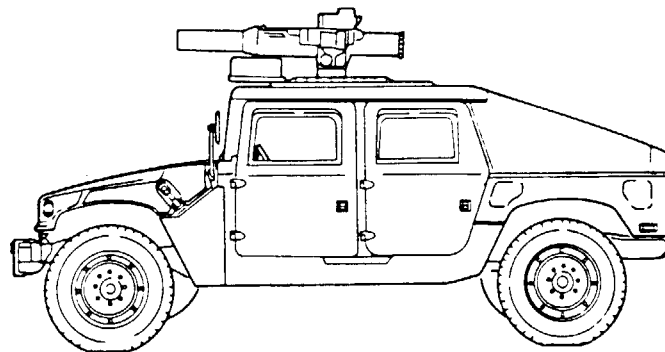
b. **SPECIAL LIMITATIONS:** Weapon station azimuth is limited to 300° left and right of vehicle centerline when Vehicle Power Conditioner (VPC) cables are connected. With launcher installed, elevation is limited to 20° and depression is limited to 10°.



M1045/M1045A1



M1045A2

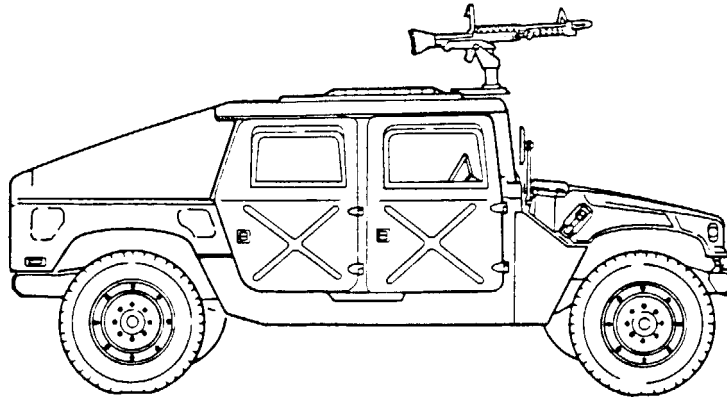


M1046/M1046A1 W/ WINCH

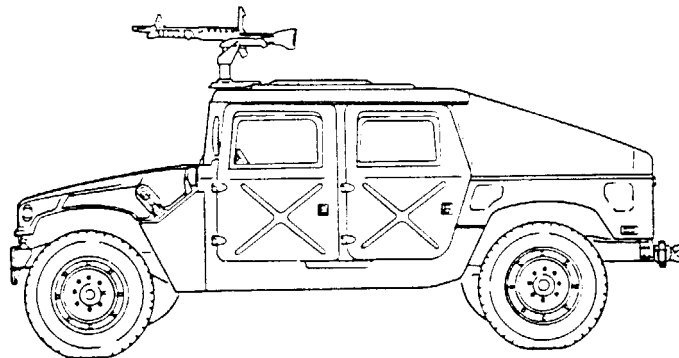
ARMAMENT CARRIERS, W/SUPPLEMENTAL ARMOR: M1025, M1025A1, M1025A2, M1026, AND M1026A1

a. **PURPOSE:** These models are used to transport, mount, and operate the M2 and M60 machine guns and MK19 automatic grenade launcher with armor protection for crew, weapons components, and ammunition. The M1026 and M1026A1 models, which have a winch, can be used for recovery operations.

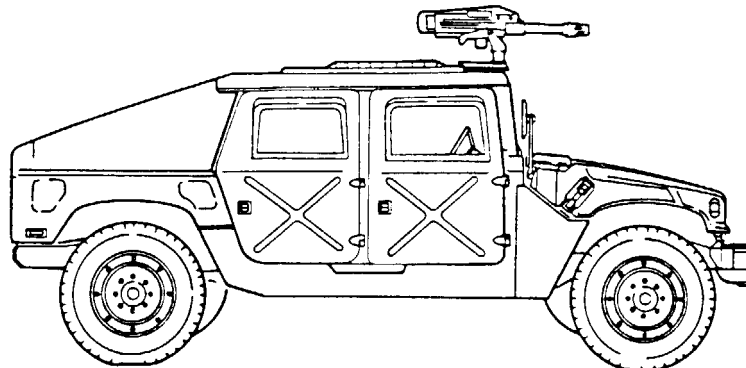
b. **SPECIAL LIMITATIONS:** Weapon station azimuth is limited to 300° left and right of vehicle centerline when Vehicle Power Condition (VPC) cables are connected. With launcher installed, elevation is limited to 20° and depression is limited to 10°.



**M1025/M1025A1
(WITH M60, 7.62 MM MACHINE GUN MOUNTED)**



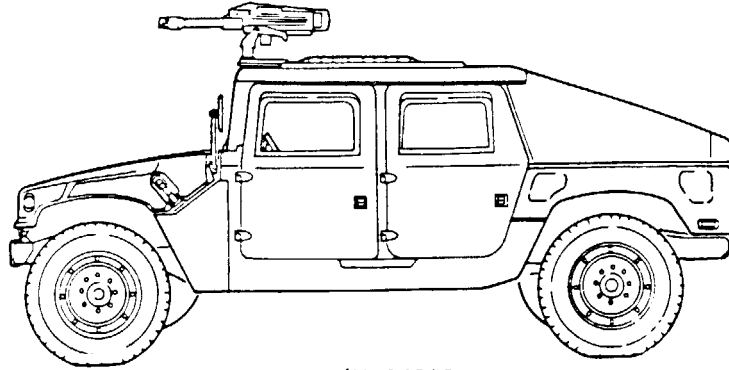
**M1025A2
(WITH M60, 7.62 MM MACHINE GUN MOUNTED)**



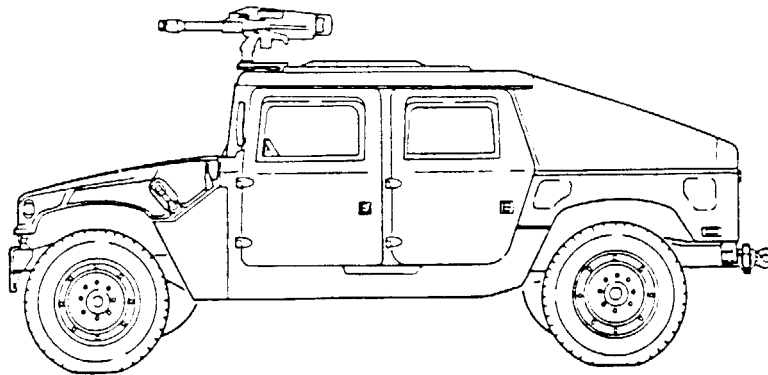
**M1026/M1026A1 W/WINCH
(WITH MK19 GRENADE LAUNCHER MOUNTED)**

ARMAMENT CARRIERS, W/SUPPLEMENTAL ARMOR M1043, M1043A1, M1043A2, M1044, AND M1044A1

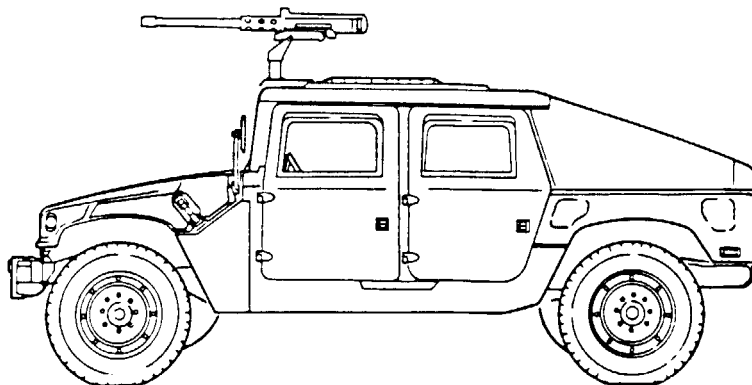
PURPOSE: These models are used to transport, mount, and operate the M2 and M60 machine guns and MK19 automatic grenade launcher with added ballistic protection for crew, weapons components, and ammunition. The M1044 and M1044A1 models, which have a winch, can be used for recovery operations.



**M1043/M1043A1
(WITH MK19 GRENADE LAUNCHER MOUNTED)**



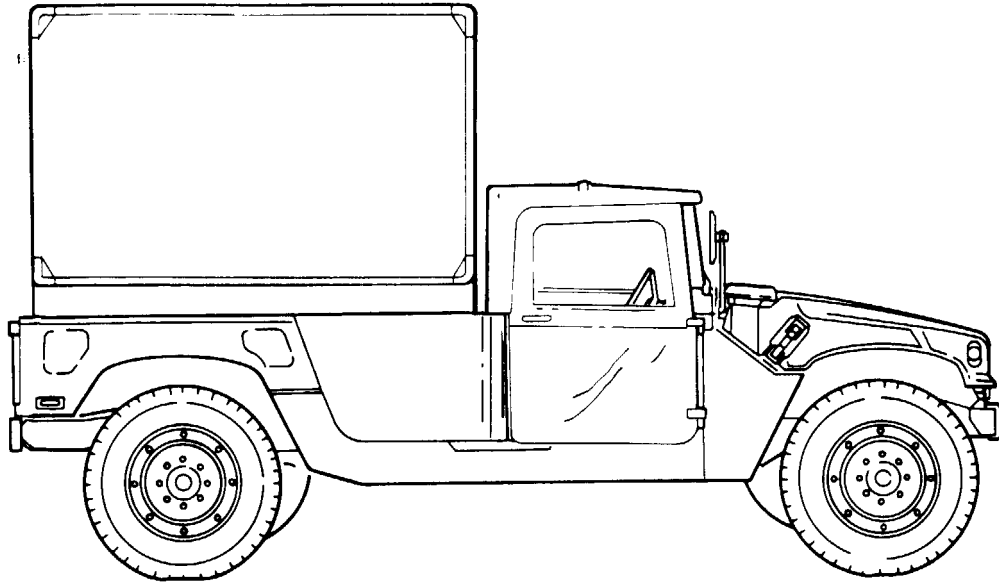
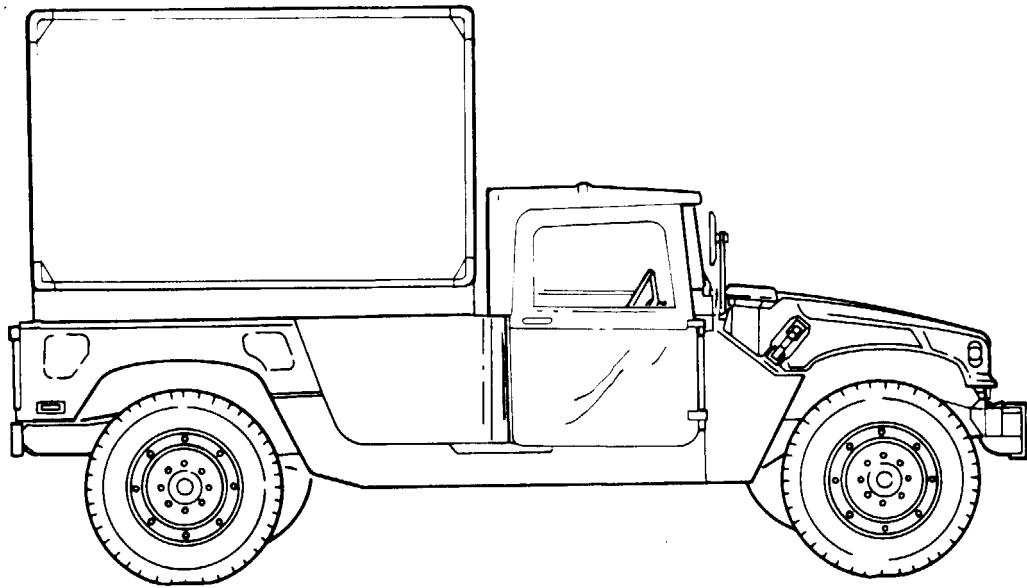
**M1043A2
(WITH MK19 GRENADE LAUNCHER MOUNTED)**



**M1044/M1044A1 W/ WINCH
(WITH M2, CALIBER .50 MACHINE GUN MOUNTED)**

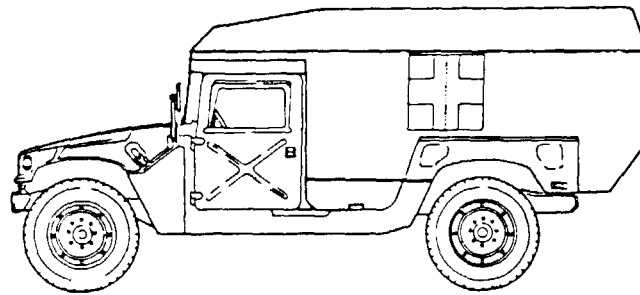
S250 SHELTER CARRIERS M1037 AND M1042

PURPOSE: These models are used for securing and transporting the S250 electrical equipment shelter. The M1042 model, which has a winch, can be used for recovery operations.

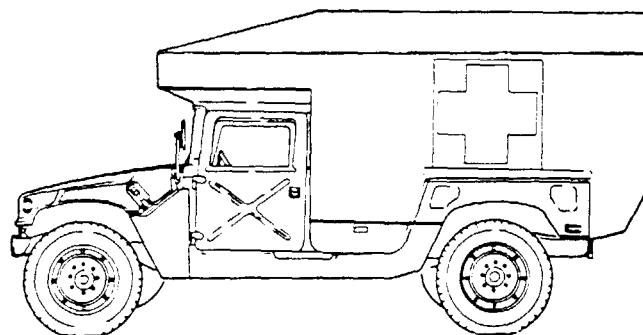
**M1037****M1042
W/WINCH**

ARMORED AMBULANCES: M996, M996A1, M997, M997A1, AND M997A2

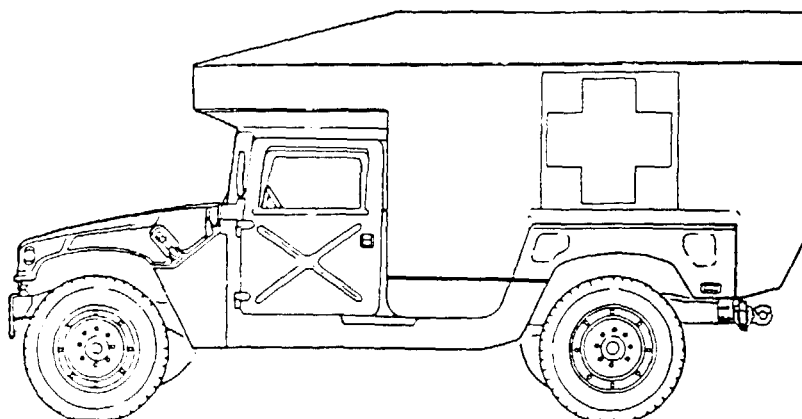
PURPOSE: These models are used to transport patients with armor protection for crew and patients. The M996 and M996A1 are reducible in height for CH47 helicopter transport. The M997, M997A1, and M997A2 have air conditioning for patient comfort. For operation in an NBC environment, the M997, M997A1, and M997A2 is equipped with a Gas-Particulate Filter Unit (GPFU) with heaters capable of supporting up to seven personnel equipped with either M25 series protective masks or M13 series patient protective masks.



M996/M996A1



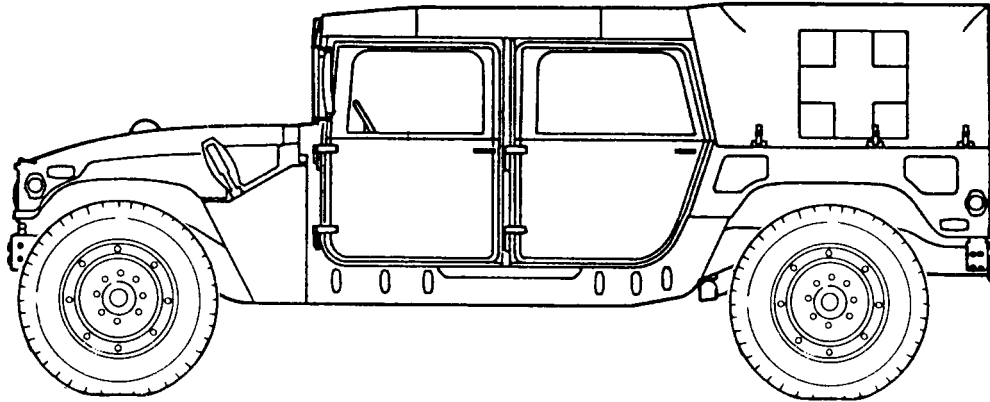
M997/M997A1



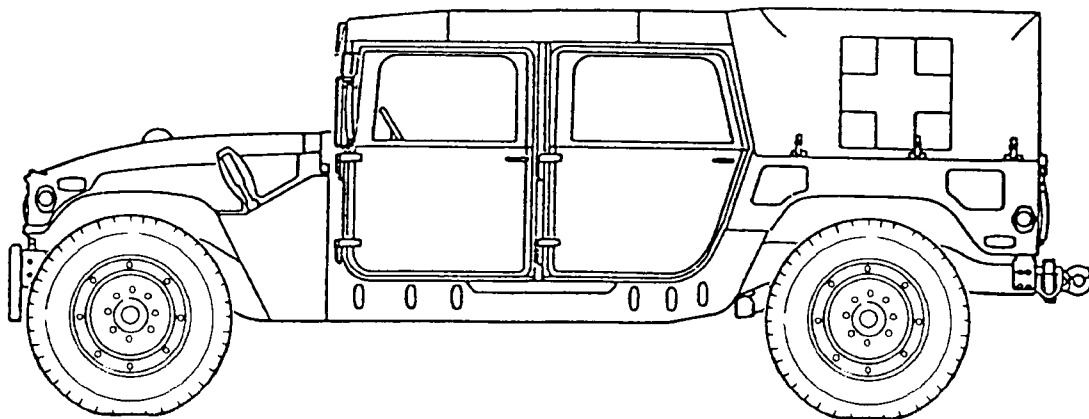
M997A2

SOFT TOP AMBULANCES: M1035, M1035A1, AND M1035A2

PURPOSE: These models are used to transport a maximum of 2 litter and 2 ambulatory patients and are transportable by a CH47 helicopter.



M1035/M1035A1



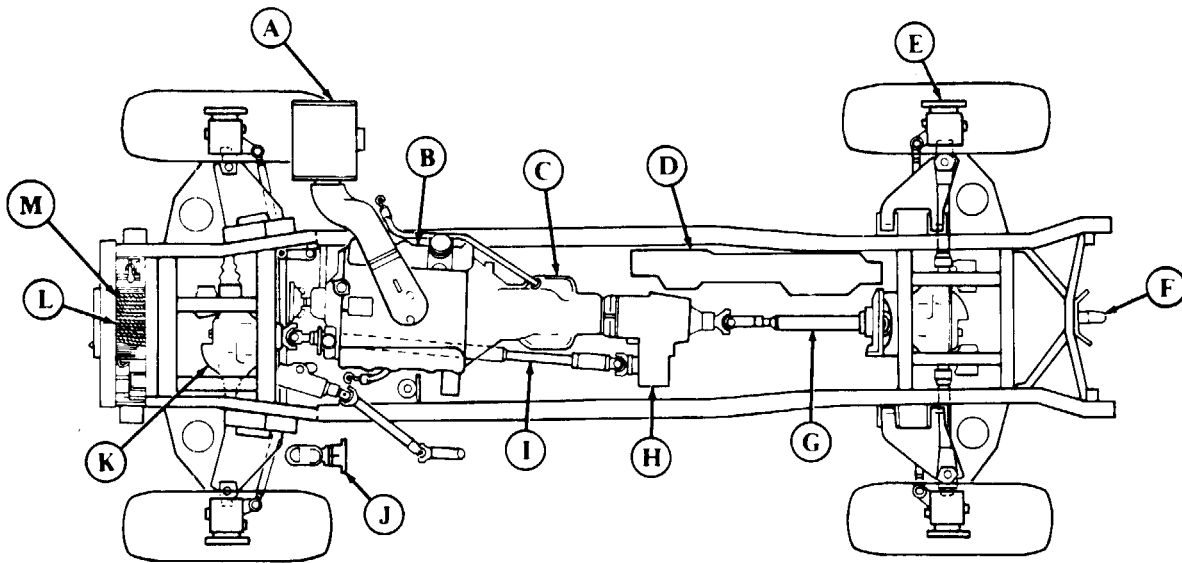
M1035A2

1-11. LOCATION AND DESCRIPTION OF MAJOR EXTERIOR COMPONENTS

The exterior components described below are common to all vehicles covered in this manual. Special differences are found in TM 9-2320-280-10 or table 1-1, differences between models, of this manual.

- Ⓐ **AIR CLEANER** – Filters air before it enters intake manifold.
- Ⓑ **ENGINE** – Provides power for the vehicle.
- Ⓒ **TRANSMISSION** – Transmits engine power to transfer case at varying speeds.
- Ⓓ **FUEL TANK** – Stores fuel.
- Ⓔ **GEARED HUB** – Transfers turning action of half shafts to wheels for vehicle motion.
- Ⓕ **PINTLE HOOK** – Permits towing of vehicles or equipment.
- Ⓖ **REAR PROPELLER SHAFT** – Transmits power from the transfer case to the rear differential.
- Ⓗ **TRANSFER CASE** – Provides full-time four-wheel drive with three drive ranges.
- Ⓘ **FRONT PROPELLER SHAFT** – Transmits power from the transfer case to the front differential.
- Ⓙ **MASTER CYLINDER AND HYDRO-BOOST** – Provides hydraulic pressure and power assist for vehicle stopping power.
- Ⓚ **DIFFERENTIAL** – Transfers turning action of the propeller shaft to the geared hubs through the half shafts.
- Ⓛ **WINCH** – 6000 lb (M1026, M1026A1, M1036, M1038, M1038A1, M1042, M1044, M1044A1, M1046, and M1046A1 only), electrically powered to provide recovery capability.
- Ⓜ **WINCH** – 9000 lb, can be used on “A2” models M1025A2, M1043A2, M1045A2, and M1097A2 and M1123.

1-11. LOCATION AND DESCRIPTION OF MAJOR EXTERIOR COMPONENTS (Cont'd)



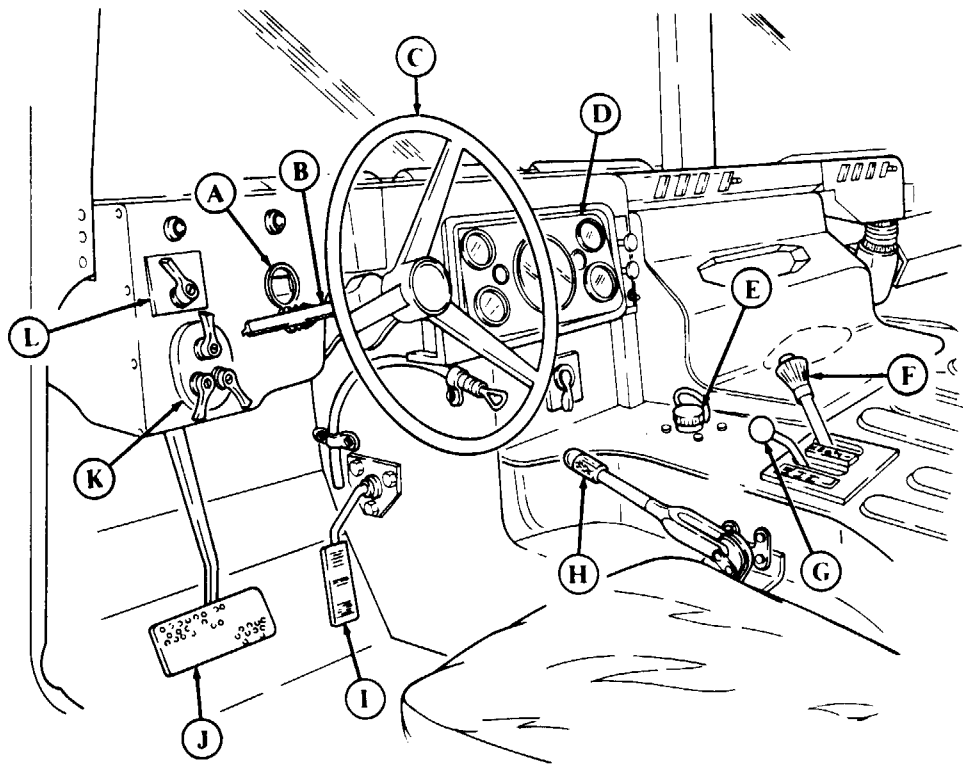
- | | |
|-------------------------|--|
| (A) AIR CLEANER | (G) REAR PROPELLER SHAFT |
| (B) ENGINE | (H) TRANSFER CASE |
| (C) TRANSMISSION | (I) FRONT PROPELLER SHAFT |
| (D) FUEL TANK | (J) MASTER CYLINDER AND HYDRO-BOOST |
| (E) GEARED HUB | (K) DIFFERENTIAL |
| (F) PINTLE HOOK | (L) WINCH (6000 lb) |
| | (M) WINCH (9000 lb) |

1-12. LOCATION AND DESCRIPTION OF MAJOR INTERIOR COMPONENTS

The major interior components shown below are common to all vehicles covered in this manual. Components not covered here can be found in TM 9-2320-280-10 or the applicable maintenance chapters of this manual.

- (A) AIR RESTRICTION GAUGE** - Indicates restrictions in the air cleaner.
- (B) DIRECTIONAL SIGNAL CONTROL** - Activates turn signal lights.
- (C) STEERING WHEEL** - Manual control for turning vehicle.
- (D) INSTRUMENT CLUSTER** - Houses controls and indicators.
- (E) DIAGNOSTIC CONNECTOR** - Connection point for STE/ICE-R test set.
- (F) TRANSMISSION SHIFT LEVER** - Manual control for shifting transmission.
- (G) TRANSFER CASE SHIFT LEVER** - Manual control for shifting transfer case.
- (H) PARKING BRAKE LEVER** - Manual control for applying parking brake.
- (I) ACCELERATOR PEDAL** - Foot control for determining engine speed.
- (J) BRAKE PEDAL** - Foot control for stopping vehicle.
- (K) MAIN LIGHT SWITCH** - Controls operation of vehicle lights.
- (L) ROTARY SWITCH** - When positioned to START, the starter is engaged to crank the engine.

1-12. LOCATION AND DESCRIPTION OF MAJOR INTERIOR COMPONENTS (Cont'd)



① "R" (Reverse)

② "N" (Neutral)

③ "D" (Manual Third)

④ "2" (Manual Second)

⑤ "1" (Manual First)

⑥ "P" (Park)

⑦ "R" (Reverse)

⑧ "N" (Neutral)

⑨ "D" (Overdrive)

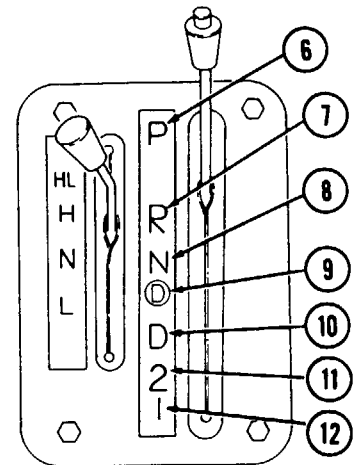
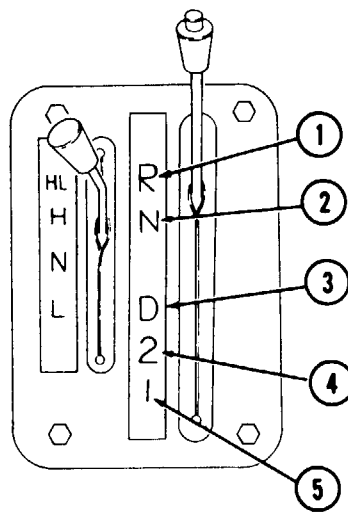
⑩ "D" (Manual Third)

⑪ "2" (Manual Second)

⑫ "1" (Manual First)

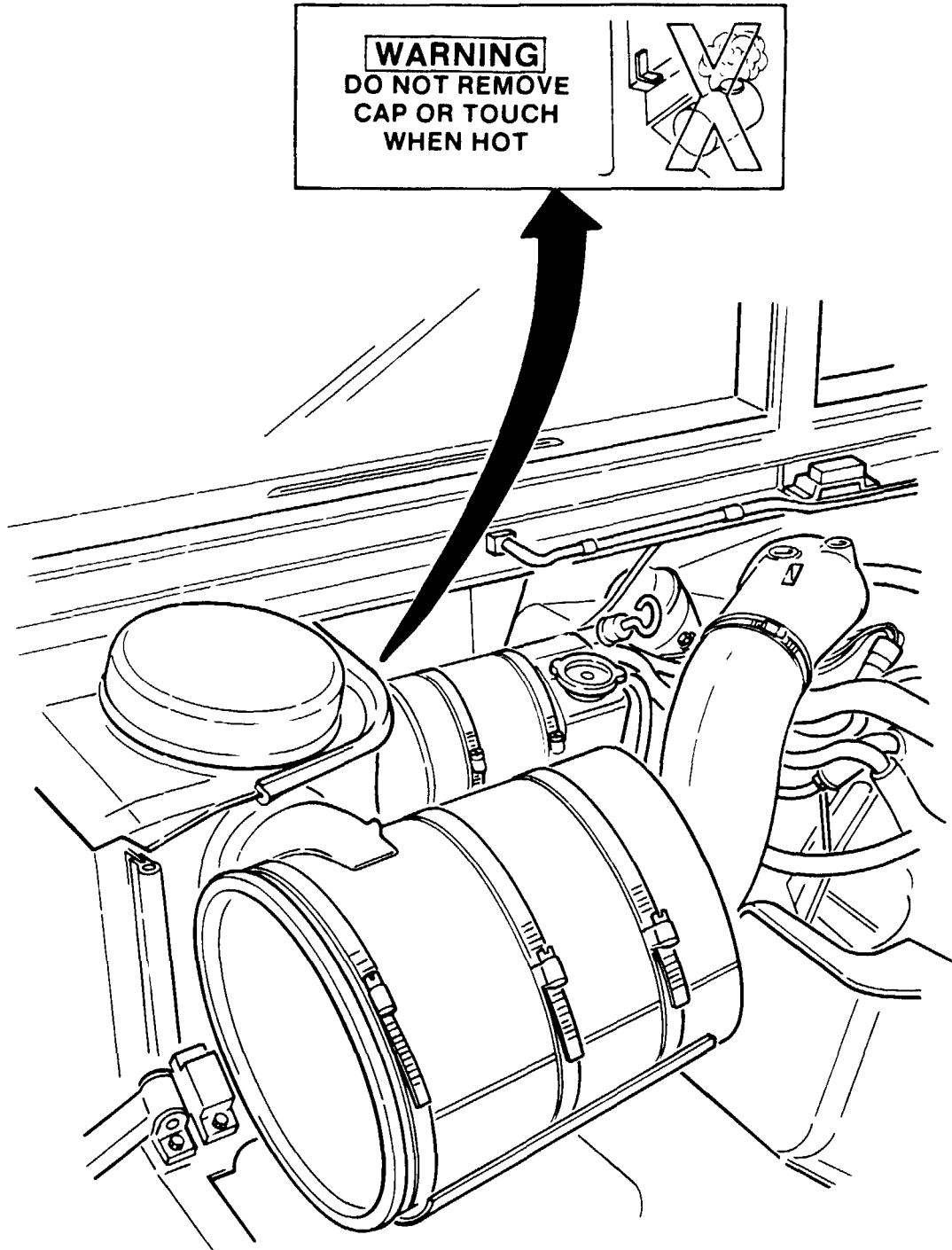
3L80 TRANSMISSION

4L80-E TRANSMISSION

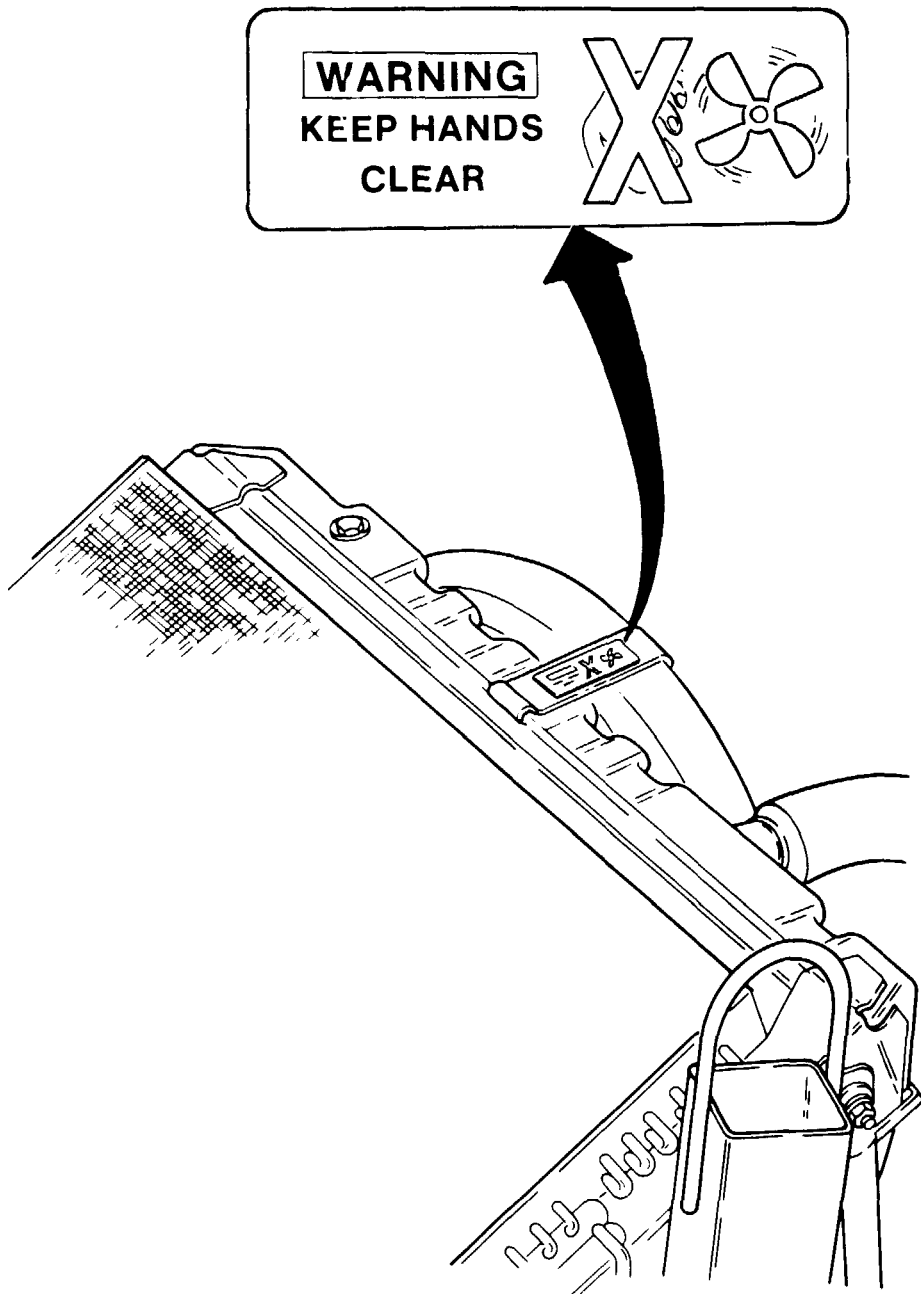


1-13. LOCATION AND CONTENTS OF WARNING, CAUTION, AND DATA PLATES

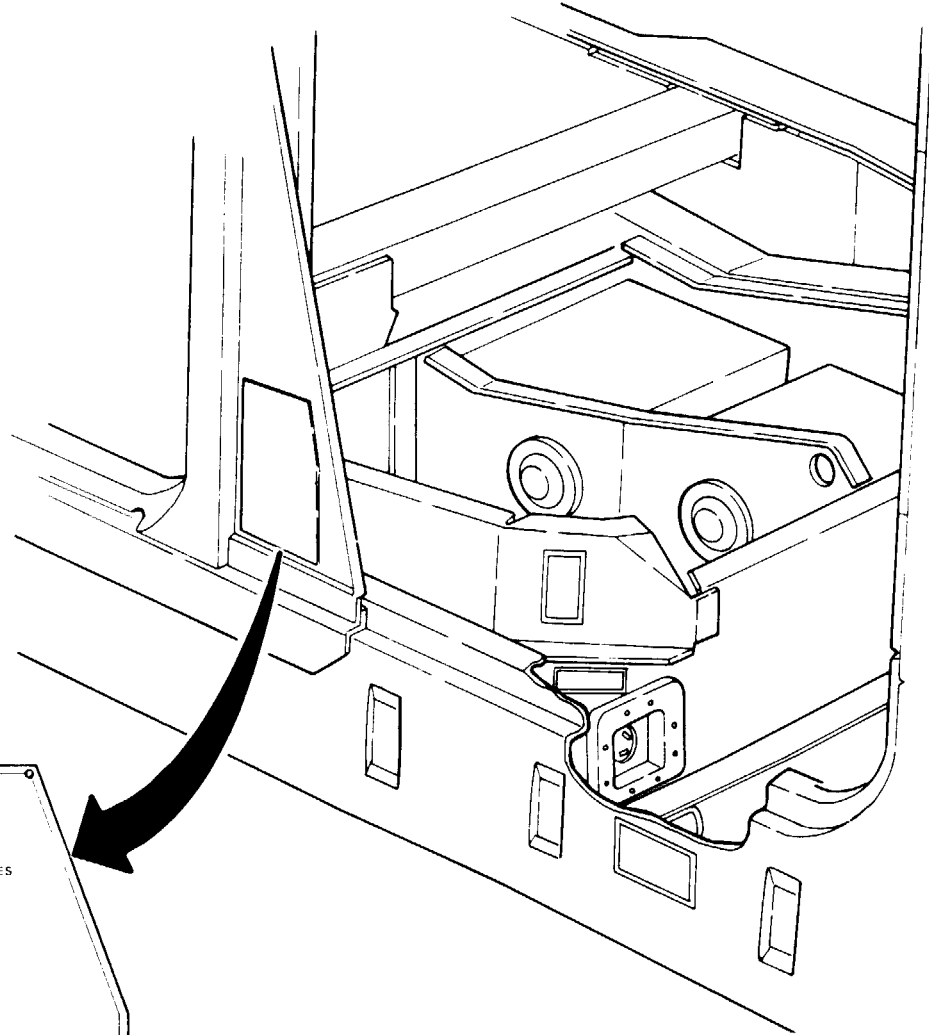
The location and contents of caution, data, and warning plates are provided in this paragraph. If any of these plates are worn, broken, painted over, missing, or unreadable, they must be replaced. Information on data plate may vary per model.



1-13. LOCATION AND CONTENTS OF WARNING, CAUTION, AND DATA PIATES
(Cont'd)



**1-13. LOCATION AND CONTENTS OF WARNING, CAUTION, AND DATA PLATES
(Cont'd)**



TRUCK UTILITY CGO TRP CARR
1 TON 4X4 W E (HMMWV) M998

SLING AND TIE DOWN DATA
ATTACH TIE DOWNS AT POINTS TD
ATTACH SLINGS AT POINTS SL
REAR SLINGS MUST PASS THRU GUIDES

PASS SLING THRU GUIDE

INTERMEDIATE TIE DOWNS ON FRAME
A 57.7 IN
B 29.9 IN



MFD BY AM GENERAL

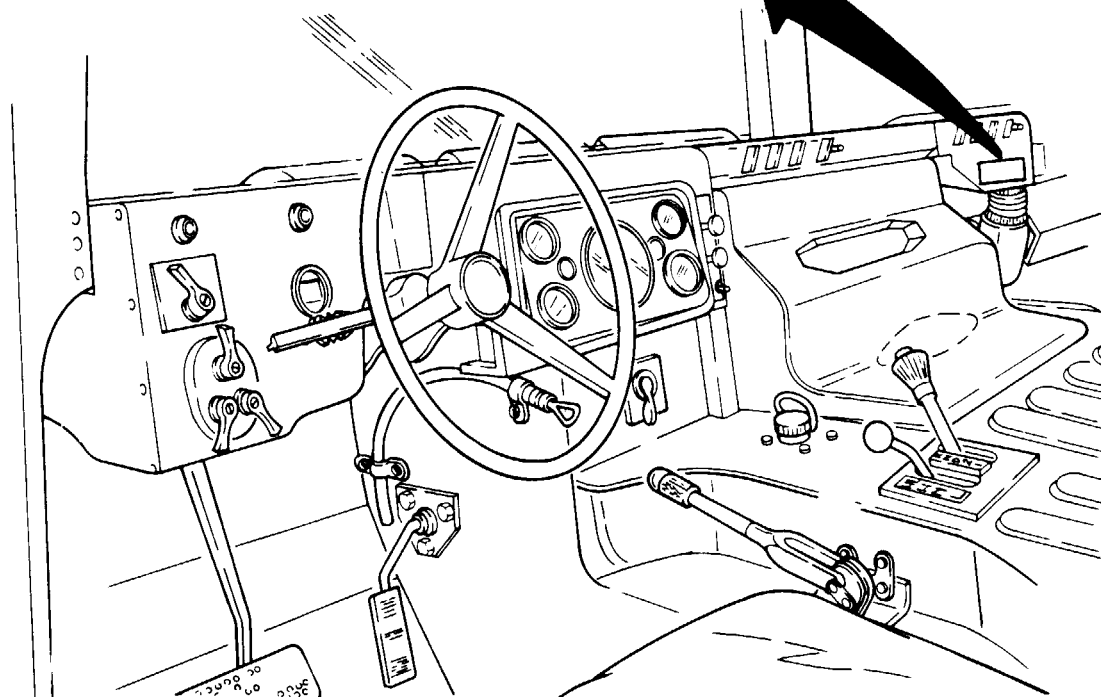
WEIGHT AND DIMENSIONAL DATA

	CURB	Gvw
FRT AXLE WT	LBS	LBS
RR AXLE WT	LBS	LBS
TOTAL WT	LBS	LBS
MAX TOWED LOAD		LBS
VERTICAL PINTLE LOAD		LBS
SHIPPING CUBAGE	CU FT REDUCIBLE TO	LBS
CU FT SHIPPING WEIGHT DRY		LBS

U S PROPERTY

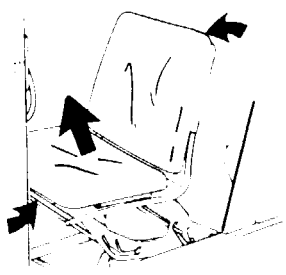
1-13. LOCATION AND CONTENTS OF WARNING, CAUTION, AND DATA PLATES
(Cont'd)

<p>R.H. HEATER OUTLET</p> <p>ROTATE CLOCKWISE TO CLOSE</p> 	<p>FRESH AIR INTAKE</p> <p>OPERATING LEVER LOCATED UNDER DUCT ON GRILLE</p> <p>PULL TO OPEN</p> 
---	--



TO ADJUST SEAT

Grasp top and front rails of seat firmly at center and lift into desired position.



**1-13. LOCATION AND CONTENTS OF WARNING, CAUTION, AND DATA PLATES
(Cont'd)**

MAX. VEHICLE OPERATING SPEEDS

TRANSFER CASE RANGE SELECTION

TRANSMISSION RANGE SELECTION	"L" Low Lock	"H" High	"H/L" High Lock
"R" Reverse	11 MPH	29 MPH	11 MPH
"D" Drive	27 MPH	55 MPH	55 MPH
"2" Second	19 MPH	48 MPH	48 MPH
"1" First	11 MPH	29 MPH	29 MPH

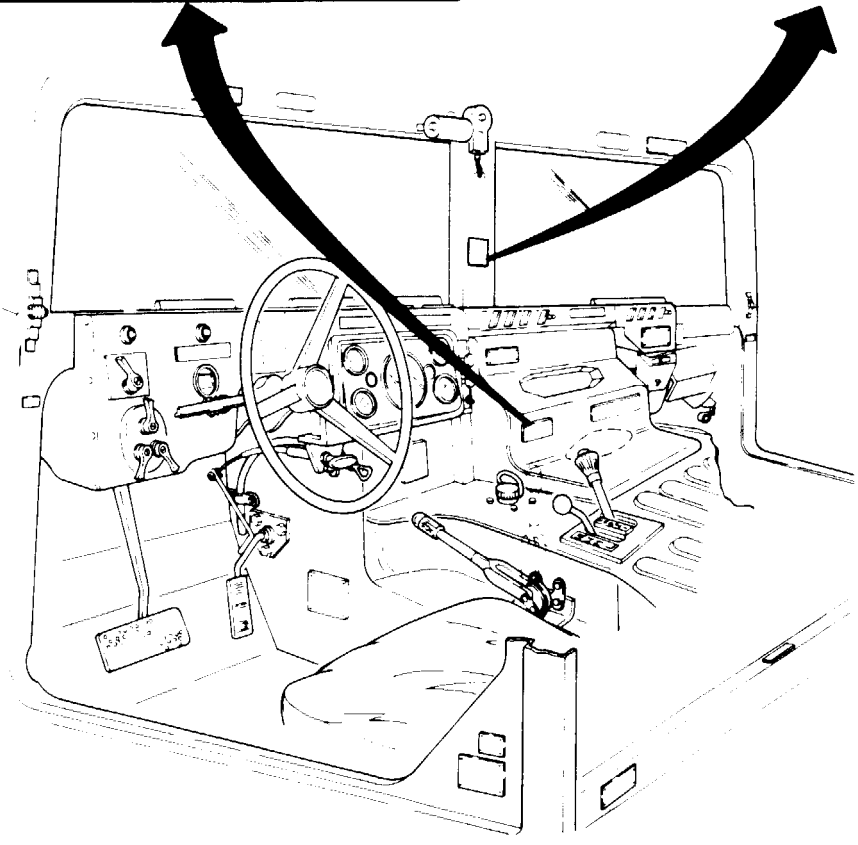
TRANSFER CASE IN HIGH "H" WHEN OPERATING ON HARD SURFACE

FORDING
SHALLOW FORDING DEPTH 30 INCHES

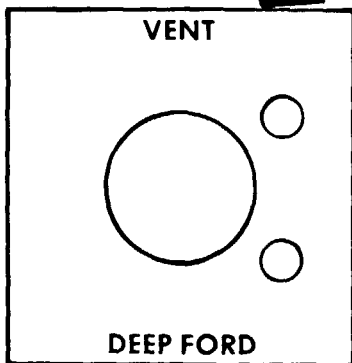
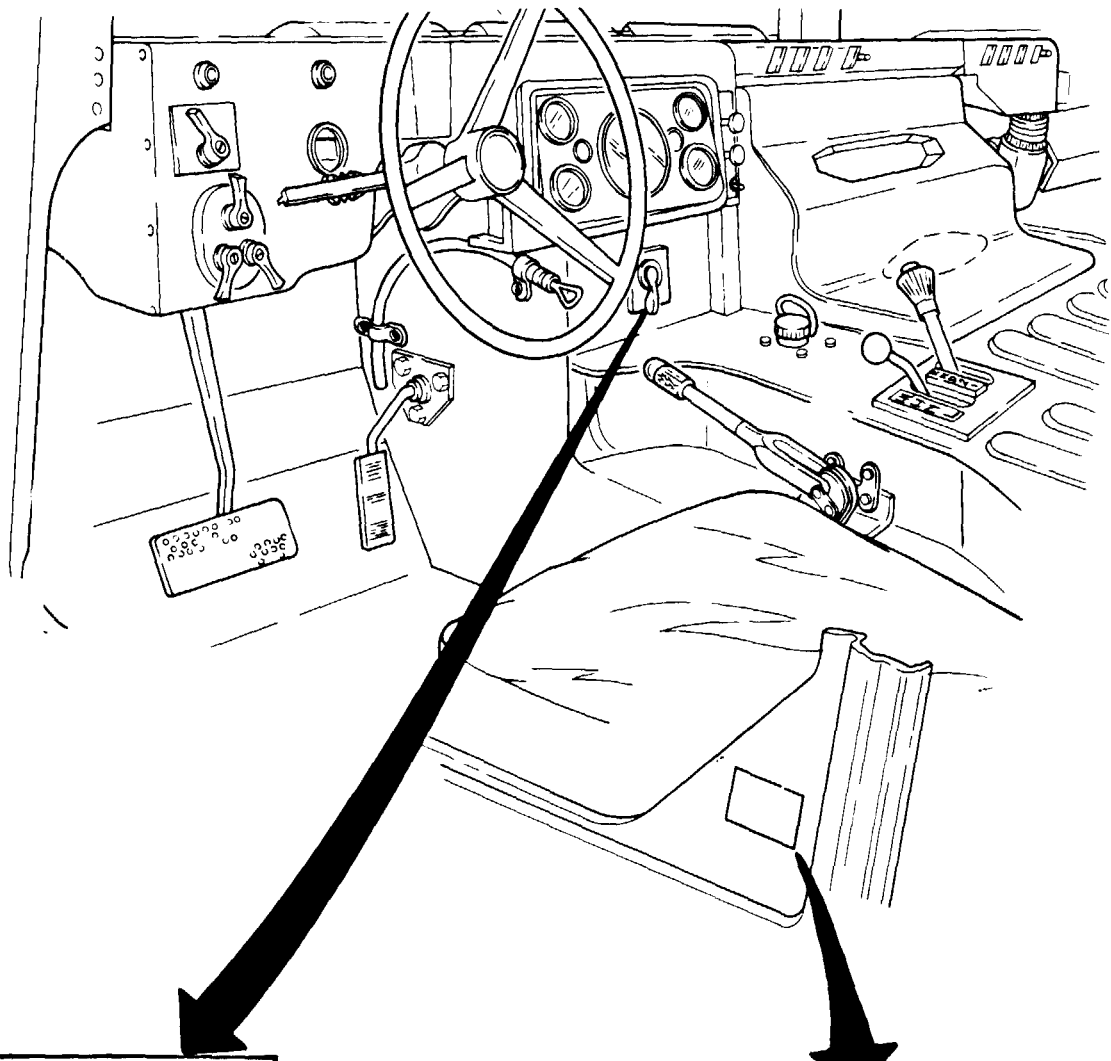
VEHICLE BREAK-IN SERVICE

DURING THE FIRST 500 MI. (804 KM) OF OPERATION:

- DO NOT EXCEED A SPEED OF 55 MPH (88 KPH)
- DO NOT DRIVE FOR LONG PERIODS OF TIME AT CONSTANT SPEED
- AVOID RAPID ACCELERATION OR DECELERATION
- DRIVE AT MODERATE SPEED UNTIL THE ENGINE IS FULLY WARMED UP
- NO TRAILER TOWING

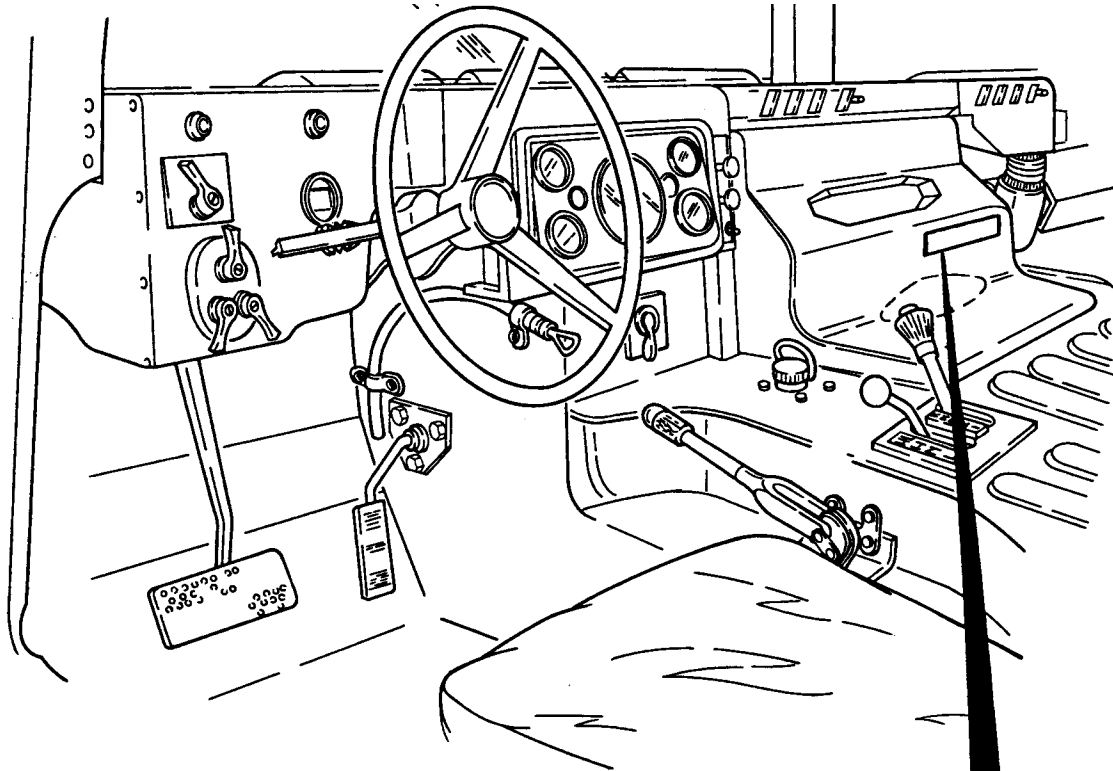


1-13. LOCATION AND CONTENTS OF WARNING, CAUTION, AND DATA PLATES
(Cont'd)



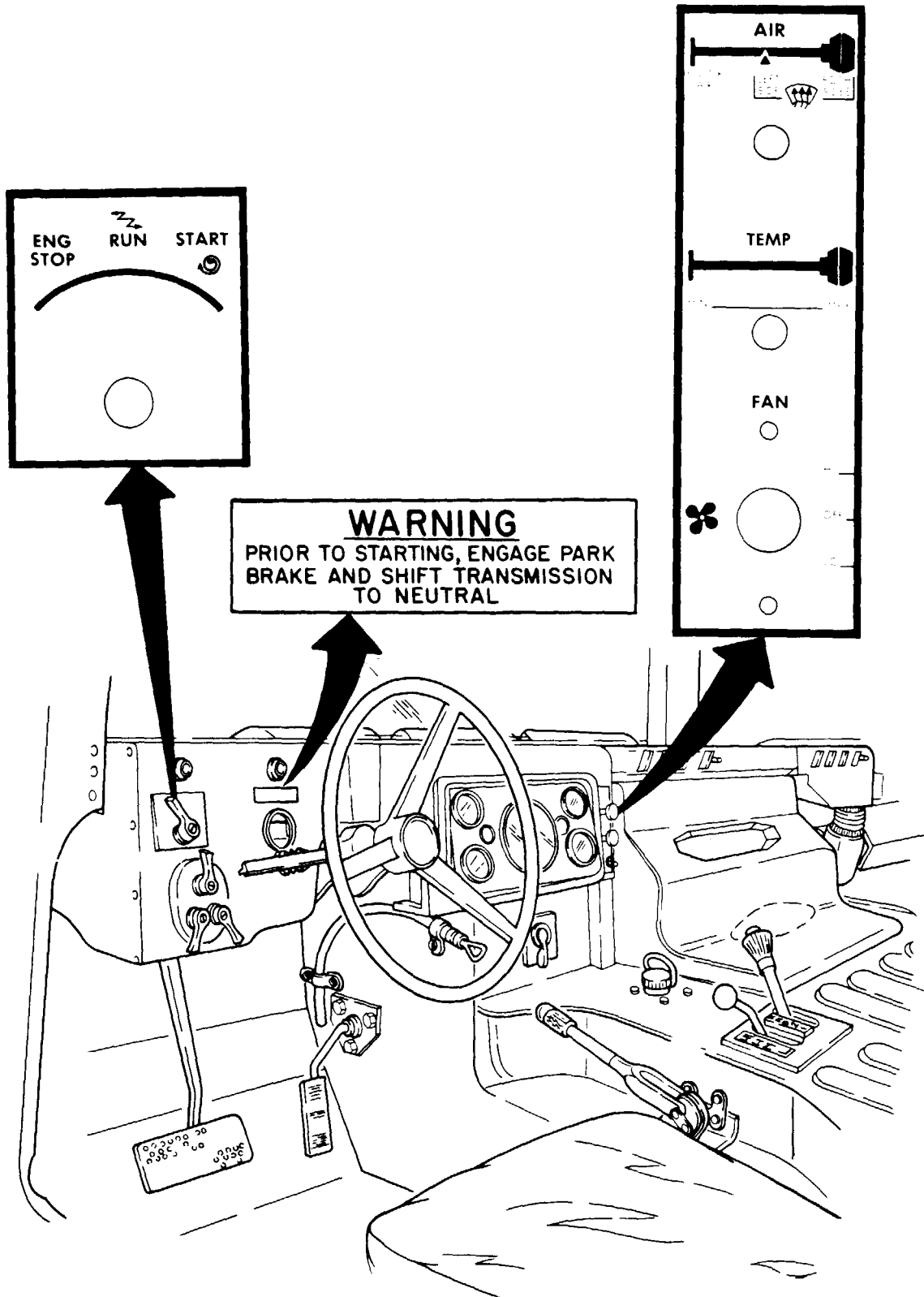
TRUCK UTILITY: CGO/TRP CARR		M998
1-1/4 TON, 4X4, W/E (HMMWV)		
MFD. BY AM GENERAL CORP.		
MFR'S SERIAL NUMBER	-	<input type="text"/>
REGISTRATION NUMBER	-	<input type="text"/>
NATIONAL STOCK NUMBER	-	2320-01-107-7155
VEHICLE CURB WEIGHT	-	<input type="text"/>
PAYLOAD MAXIMUM	-	<input type="text"/>
GROSS WEIGHT MAXIMUM	-	<input type="text"/>
DATE OF DELIVERY	-	<input type="text"/>
CONTRACT NUMBER	-	DAAE07-83-C-0034
U.S. PROPERTY		

1-13. LOCATION AND CONTENTS OF WARNING, CAUTION, AND DATA PAGES (Cont'd)



SERVICING DATA				TIRE INFLATION PRESSURE			MANUALS	
FUEL	DIESEL NO. 1, NO. 2, DFA			ALL MODELS EXCEPT	FRONT	REAR		
FUEL TANK CAPACITY	25 GALS			M996, M997, M1037, AND M1042	P.S.I.	P.S.I.		
COOLING SYSTEM CAPACITY	25 QTS				20	22		
CRANKCASE CAPACITY	7 QTS + 1 QT FOR FILTER			M996, M997, M1037, M1042	22	30		
TEMPERATURE	ABOVE +15°F	+40° TO -15°F	+40° TO -65°F	TO DRAIN COOLING SYSTEM OPEN DRAINCOCK LOCATED AT LOWER RADIATOR TUBE				
ENGINE OIL	OE-30	OE-10	OEA					
GEAR OIL	GO 80/90	GO 80/90	GO 75					
GREASE	GAA	GAA	GAA					
				MAINTENANCE MANUAL	TM 9-2320-280-20 TM 9-2320-280-34			
				OPERATOR'S MANUAL	TM 9-2320-280-10			
				PARTS LIST	TM 9-2320-280-20P TM 9-2320-280-34P			

1-13. LOCATION AND CONTENTS OF WARNING, CAUTION, AND DATA PLATES
(Cont'd)



1-13. LOCATION AND CONTENTS OF WARNING, CAUTION, AND DATA PLATES
(Cont'd)

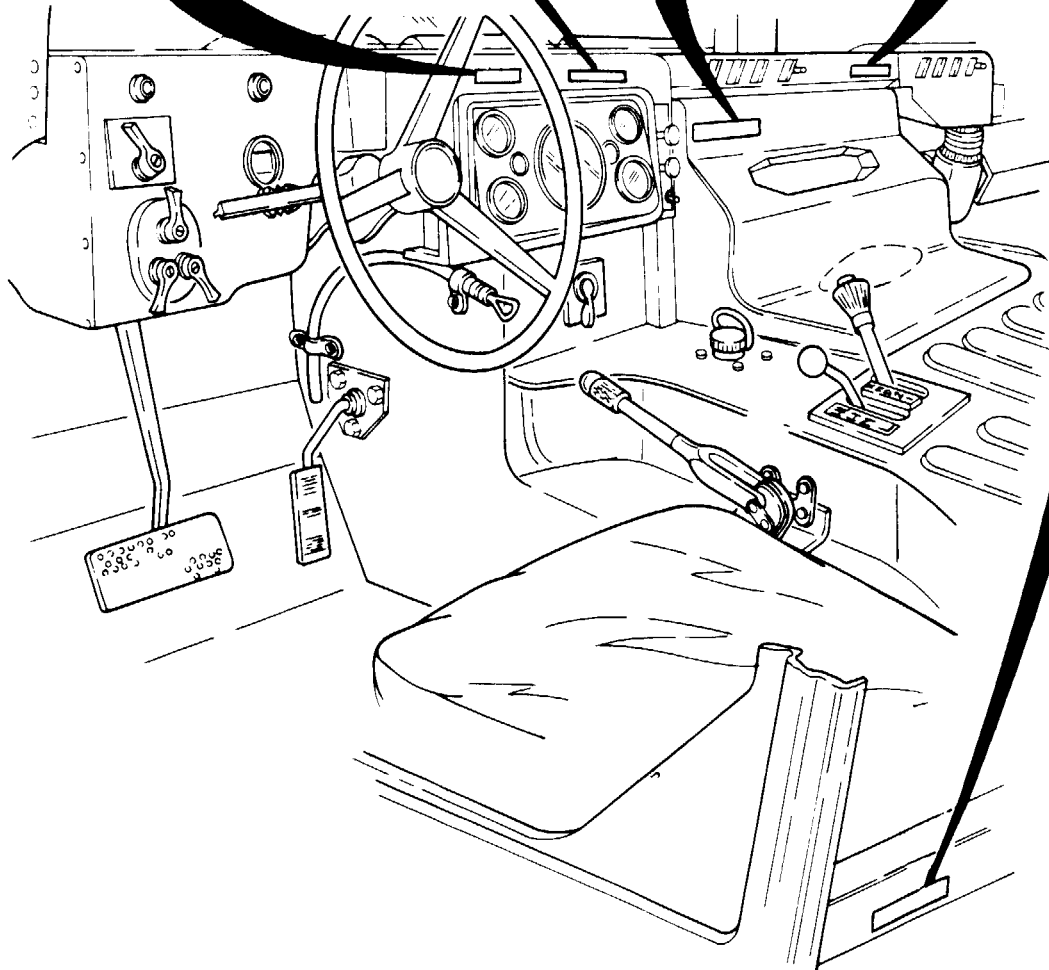
WARNING

DO NOT USE HAND THROTTLE AS AN AUTOMATIC VEHICLE SPEED OR CRUISE CONTROL. THE HAND THROTTLE WILL NOT DISENGAGE AUTOMATICALLY WHEN BRAKE IS APPLIED.

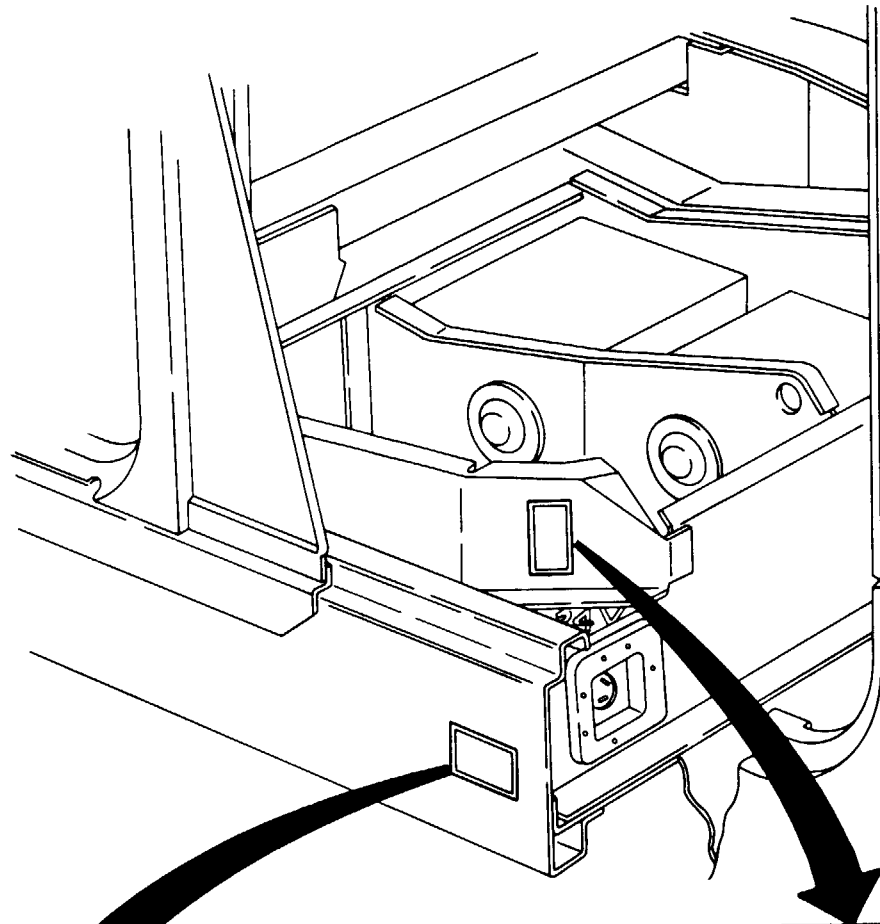
WARNING

SEAT BELT HAS NON-LOCKING RETRACTORS. FOR PROPER USE, WEBBING MUST FIRST BE COMPLETELY EXTENDED FROM THE NON-LOCKING RETRACTOR DEVICE. ALL EXCESS WEBBING MUST THEN BE ADJUSTED AT THE BUCKLE.

STEERING WHEEL LOCKING DEVICE LOCATED UNDER INSTRUMENT PANEL

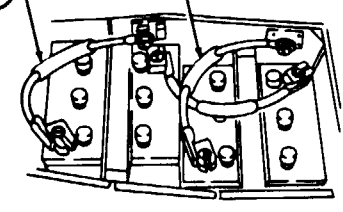


1-13. LOCATION AND CONTENTS OF WARNING, CAUTION, AND DATA PLATES (Cont'd)



**SLAVE
RECEPTACLE
INSIDE**

- BATTERY NEG. BATTERY POS.

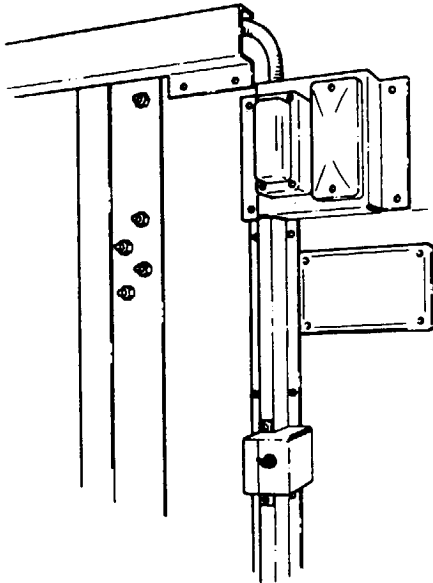


CONNECTING BATTERY CABLES
CAUTION

CONTINUED RELIABILITY OF ELECTRICAL SYSTEM REQUIRES THAT ROUTINE MAINTENANCE BE PERFORMED TO ASSURE GOOD ELECTRICAL CONNECTIONS AND SAFE CABLE POSITIONS

1. BATTERY AND CABLES MUST BE INSTALLED AS SHOWN
2. CABLES MUST LAY DOWN FLAT ON TOP OF BATTERIES
3. LEAD 68 IS 12 VOLT POWER
4. KEEP TERMINALS AND CONNECTIONS CLEAN AND TIGHT APPLY A HEAVY COAT OF GREASE TO BATTERY TERMINALS

1-13. LOCATION AND CONTENTS OF WARNING, CAUTION, AND DATA PLATES (Cont'd)



HEATER OPERATING INSTRUCTIONS

TO START HEATER:

1. WITH HEATER "HI-LO" SWITCH IN "LO" POSITION, HOLD HEATER SWITCH IN "START" POSITION.
2. WHEN HEATER INDICATOR LIGHT COMES ON, MOVE HEATER SWITCH TO "RUN" POSITION.

TO SELECT TEMPERATURE:

1. SNAP "HI-LO" SWITCH TO DESIRED LEVEL

TO DEFROST (IF APPLICABLE):

1. CLOSE DAMPER.

IF HEATER FAILS TO START:

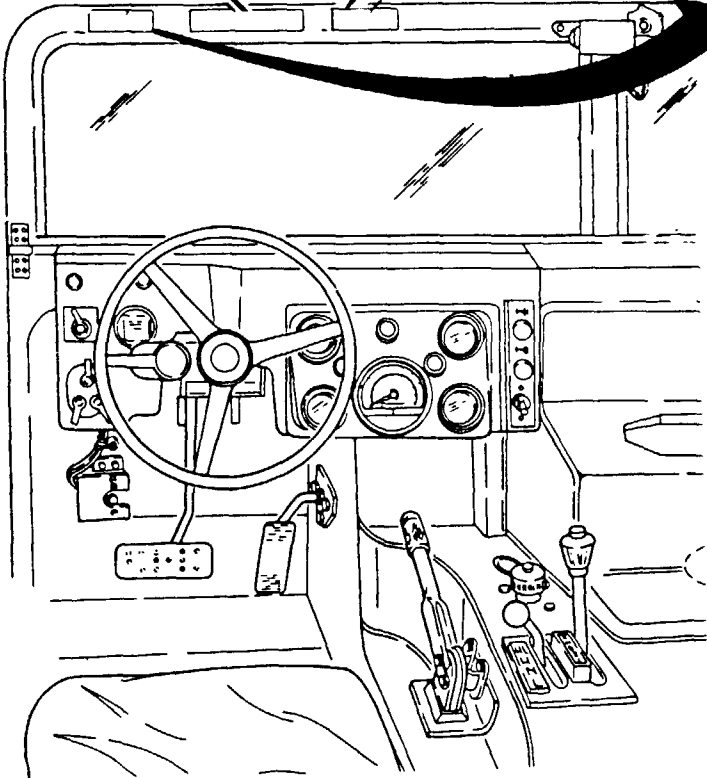
1. CHECK "PRESS TO TEST" INDICATOR LIGHT.
2. IF LIGHT WORKS AND HEATER STILL FAILS TO START IN APPROXIMATELY 3 MINUTES, SERVICE IS REQUIRED. SEE SERVICE MANUAL.

NOTE: CLEAN FUEL FILTER FREQUENTLY TO PREVENT ICE FORMATION.

1-13. LOCATION AND CONTENTS OF WARNING, CAUTION, AND DATA PLATES (Cont'd)

WARNING
THE DEPARTMENT OF TRANSPORTATION REQUIRES 105 MM CANNON AMMUNITION TO BE IN WOODEN BOXES WHEN TRANSPORTING AMMUNITION ON PUBLIC HIGHWAYS, BY FIXED WING AIRCRAFT, RAIL, OR SHIP.
RESTRICT MOVEMENT OF CANNON AMMUNITION IN FIBER CONTAINERS (INNER PACK) IN THE AMMUNITION RACK OF THE HMMWV TO OTHER THAN PUBLIC HIGHWAYS.

CAUTION
HIGH INTENSITY NOISE
HEARING PROTECTION
REQUIRED



1-14. DIFFERENCES BETWEEN MODELS

Table 1-1. Differences Between Models

Equipment/ Function	M966, M966A1, M1121	M996, M996A1	M997, M997A1, M997A2	M998, M998A1	M1025, M1025A1, M1025A2	M1026, M1026A1	M1035, M1035A1, M1035A2	M1036	M1037	M1038, M1038A1	M1042	M1043, M1043A1, M1043A2	M1044, M1044A1	M1045, M1045A1, M1045A2	M1046, M1046A1	M1097, M1097A1, M1097A2, M1123
Personnel/Cargo Operations				x						x						x
TOW Launcher Mounting	x							x						x	x	
Armament Mounting					x	x						x	x			
S250 Shelter Configuration									x		x					x
Ambulance:																
Two Litter Patients		x					x									
Four Litter Patients			x													
Eight Ambulatory Patients			x													
Six Ambulatory Patients		x														
Two Litter and Four Ambulatory Patients			x													
One Litter and Three Ambulatory Patients		x														
Vehicle Winch						x		x		x	x		x		x	
Communications:																
AN/GRC-160	x	x	x	x	x	x	x	x		x		x	x	x	x	
AN/VRC-12 Series									x							
Collective NBC Protection		x	x													
Basic Armor	x	x	x		x	x		x								
Supplemental Armor												x	x	x	x	
Howitzer Prime Mover																x

1-15. TABULATED DATA

Vehicle performance data for the M998 series vehicles is listed in table 1-2. This information includes only that data applicable to unit maintenance. Information not covered can be found in TM-9-2320-280-10.

Table 1-2. Tabulated Data

NOTE

Standard and metric measurements will be used in this table.
A list of their abbreviations is provided below.

TABULATED DATA ABBREVIATIONS

MEASUREMENT	ABBREVIATION	MEASUREMENT	ABBREVIATION
Pint	pt	Fahrenheit	F
Quart	qt	Celsius	C
Gallon	gal.	Liters	L
Inch	in.	Centimeter	cm
Miles Per Hour	mph	Kilometers Per Hour	kph
Miles Per Gallon	mpg	KiloPascal	kPa
Pounds Per Square Inch	psi	Maximum	max
Revolutions Per Minute	rpm	Minimum	min
Kilometers Per Liter	km/L	Kilogram	kg
Pound-Feet	lb-ft	Newton-Meter	N•m
Gallon Per Minute	gpm	Millimeter	mm
Volt	V	Ampere	A
Horsepower	hp	KiloWatt	kW
Liters Per Minute	l/m		

	STANDARD	METRIC
1. PAYLOAD		
M998, M998A1, M1038, and M1038A1	2,500 lb	1,135 kg
M1097, M1123, "A1" and "A2" Series	4,400 lb	1,998 kg
2. CAPACITIES*		
Cooling System	26 qt	24.6 L
Engine		
Crankcase Only	7 qt	6.6 L
Crankcase and Filter	8 qt	7.6 L
Fuel Tank	25 gal.	94.6 L
Differential (each)	2 qt	1.9 L
Transmission (3L80):		
Drain and Refill	6 qt	5.7 L
W/Dry Converter	11 qt	13.2 L
Transmission (4L80-E):		
Drain and Refill	7.7 qt	7.3 L
W/Dry Converter	13.5 qt	12.8 L
Transfer Case (model 218)	3.5 qt	3.3 L
Transfer Case (model 242)	3.35 qt	3.17 L
Geared Hub	1 pt	0.47 L
Steering Hydraulic System	1 qt	0.95 L
Steering Hydraulic System with Steering Cooler	1.25 qt	1.18 L
Brake Hydraulic System (All except M1097, M1123, "A1" and "A2" series)	1.2 pt	0.57 L
Brake Hydraulic System (M1097, M1123, "A1" and "A2" series)	1.63 pt	0.77 L
Brake Master Cylinder (All except M1097, M1123, "A1" and "A2" series)	0.69 pt	0.33 L
Brake Master Cylinder (M1097, M1123, "A1" and "A2" series)	1.12 pt	0.53 L
Windshield Washer Reservoir	1 qt	0.95 L

*ALL HYDRAULIC SYSTEMS AND ALL FUEL CAPACITIES ARE CALCULATED APPROXIMATIONS

Table 1-2. Tabulated Data (Cont'd)

	STANDARD	METRIC
3. ENGINE		
Model	DDA 6.2 L	
Type	Diesel, Naturally Aspirated Liquid-Cooled, V8	
Brake Horsepower	150 hp @ 3,600 rpm	111.9 kW @ 3,600 rpm
Idle Speed	650 ± 25 rpm	
Operating Speed	1,500-2,300 rpm	
Oil Pressure:		
@ Idle	10 psi	69 kPa
@ Operating Speed	40-50 psi	276-345 kPa
4. ENGINE		
Model	DDA 6.5 L and 6.5 L Detuned	
Type	Diesel, Naturally Aspirated, Liquid-Cooled, V8	
Brake Horsepower	160 hp @ 3,400 rpm	119.4 kW @ 3,400 rpm
Idle Speed	700 ± 25 rpm	
Operating Speed	1,500-2,300 rpm	
Oil Pressure		
@ Idle	10 psi	69 kPa
@ Operating Speed	40-50 psi	276-345 kPa
5. FUEL SYSTEM		
Fuel Pump (Mechanical):		
Type	Cam-Driven Diaphragm	
Fuel Filter		
Type	Fuel/Water Separator	
Air Cleaner:		
Type	Dry Element	
Glowplug:		
Type	Fast Start	
6. COOLING SYSTEM		
Surge Tank Cap Pressure	15 psi	103 kPa
Thermostat:		
Starts to Open	190°F	88°C
Fully Open	212°F	100°C
Radiator:		
Type	Downflow	
Fan:		
Type	Ten Blade	
Diameter	19 in.	48.26 cm
7. ELECTRICAL SYSTEM		
Alternator:		
60 Ampere	60 A @ 28 V	
100 Ampere	100 A @ 28 V	
200 Ampere	200 A @ 28 V	
400 Ampere	400 A @ 28 V	
Starter:		
Voltage	14 V	
Batteries (2):		
Voltage	12 V	

Table 1-2. Tabulated Data (Cont'd)

	STANDARD	METRIC
8. TRANSMISSION		
Model	3L80	
Type	3-Speed, Automatic	
Oil Type	Dexron® II	
Oil Pressure	55-160 psi	379-1,103 kPa
9. TRANSMISSION		
Model	4L80-E	
Type	4-speed, Automatic Torque Converter Stall Ratio and Direct Drive w/Lock Up Clutch	
Gear Ratios		
First	2.48:1	
Second	1.45:1	
Third	1.00:1	
Fourth	0.75:1	
Reverse	2.08:1	
Oil Type	Dexron® III	
Oil Pressure	35-324 psi	241-2,234 kPa
10. TRANSFER CASE		
Model	NPG 218 w/Cooler NPG 242 w/Cooler	
Type	2-speed	
Oil Type	Dexron® II	
11. SERVICE BRAKE CALIPER (FRONT)		
Manufacturer	Kelsey-Hayes	
Piston Diameter	2.6 in.	66 mm
12. SERVICE/PARKING BRAKE CALIPER (REAR)		
Manufacturer	Kelsey-Hayes	
Piston diameter	2.6 in.	66 mm
13. SERVICE BRAKE ROTOR (FRONT)		
Manufacturer	Kelsey-Hayes	
A2 Manufacturer	Kelsey-Hayes	
Diameter	10.5 in.	267 mm
A2 Diameter	12 in.	305 mm
Thickness	0.87 in.	22.1 mm
A2 Thickness	1.02 in.	26 mm
14. SERVICE/PARKING BRAKE ROTOR (REAR)		
Manufacturer	Kelsey-Hayes	
A2 Manufacturer	Kelsey-Hayes	
Diameter	10.5 in.	267 mm
A2 Diameter	12 in.	305 mm
Thickness	0.87 in.	22.1 mm
A2 Thickness	1.02 in.	26 mm

Table 1-2. Tabulated Data (Cont'd)

15. PARKING BRAKE (VEHICLES SERIAL NUMBERS 1 THROUGH 44824)		
Type	Rod and Cable Actuated, Caliper	
Rotor Diameter	8 in.	203 mm
Brake Pad:		
Type	Bonded	
Minimum thickness	0.125 in.	3.2 mm
Lever Type	Over-Center	
16. WHEELS AND TIRES		
Tire size (Bias ply)	36 in. x 12.5 in. x 16.5 in.	91.4 cm x 31.75 cm x 41.9 cm
Tire size (Radial)	37 in. x 12.5 in. x 16.5 in.	93.98 cm x 31.75 cm x 41.9 cm
Wheels:		
Type	Offset Disc	
Runflat Insert:		
Type	2-Piece Magnesium	
17. STEERING SYSTEM		
Steering Gear:		
Manufacturer	Saginaw	
Type	Variable Ratio	
Ratio	13/16:1	
Power Steering Pump:		
Model	Saginaw 125	
Output Pressure (max)	1,450 psi	9,998 kPa
Flow Rate (max)	3.5 gpm	13.2 l/m
Tow-In (Front/Rear @ curb weight):		
M998, M998A1, M1025, M1025A1, M1025A2, M1026, M1026A1, M1035, M1035A1, M1035A2, M1038, M1038A1, M1043, M1043A1, M1043A2, M1044, M1044A1, M1097, M1097A1, M1097A2, and M1123	0.438 in. ± 0.125 in.	11 mm ± 3.2 mm
M966, M966A1, M996, M996A1, M997, M997A1, M997A2, M1036, M1037, M1042, M1045, M1045A1, M1045A2, M1046, M1121, and M1046A1	0.312 in. ± 0.125 in.	8 mm ± 3.2 mm
18. WINCH		
Model	W6000D25	
Type	Electric Drive, Thermal Cutoff Switch	
Capacity	6,000 lb	2,724 kg
19. WINCH		
Model	MIL-9000	
Type	Electric Drive, Thermal Cutoff Switch	
Capacity	9,000 lb	4,086 kg
19.1. WINCH		
Model	983-75-50050	
Type	Hydraulic	
Capacity	10,500 lb	4,767 kg
20. AIR-CONDITIONING COMPRESSOR		
Manufacturer	Sanden	
Model	510	
Field Coil	24V	

Section III. PRINCIPLES OF OPERATION

1-16. GENERAL

This section explains how components of the M998 series vehicles work together. The systems (functional groups) covered are listed in the Principles of Operation Reference Index, paragraph 1-17.

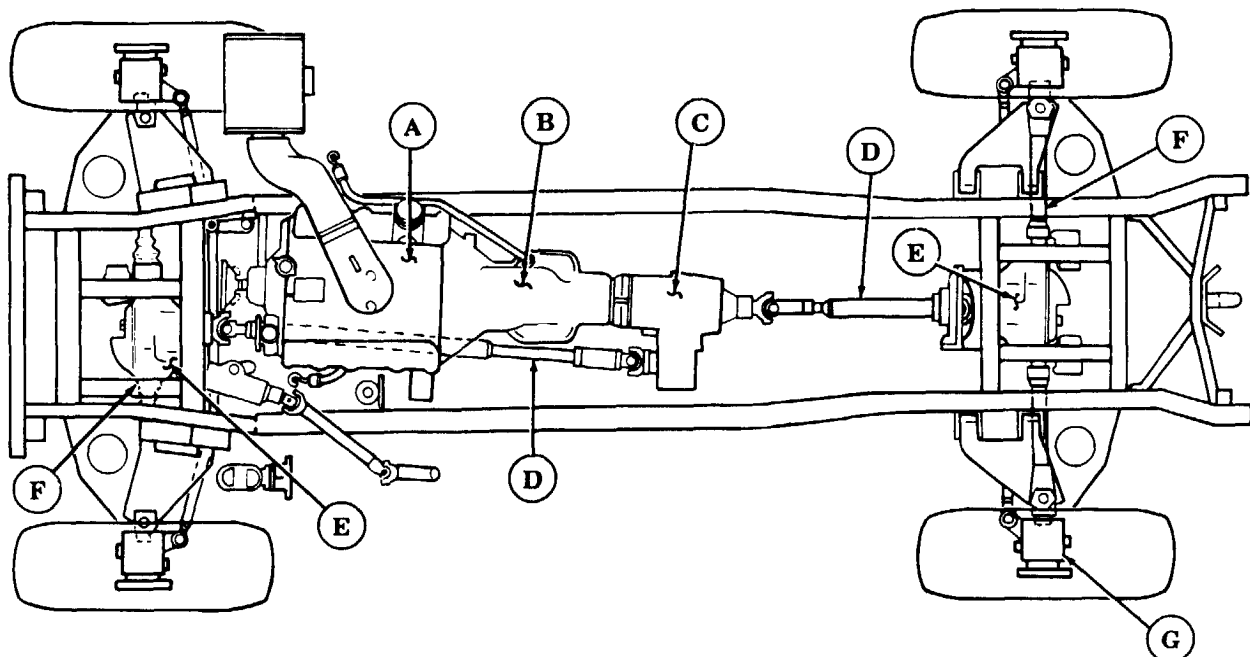
1-17. PRINCIPLES OF OPERATION REFERENCE INDEX

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1-18. DRIVETRAIN OPERATION

The drivetrain is identical for all models covered in this manual. It converts horsepower into mechanical force to move the vehicle. Major components of the drivetrain are:

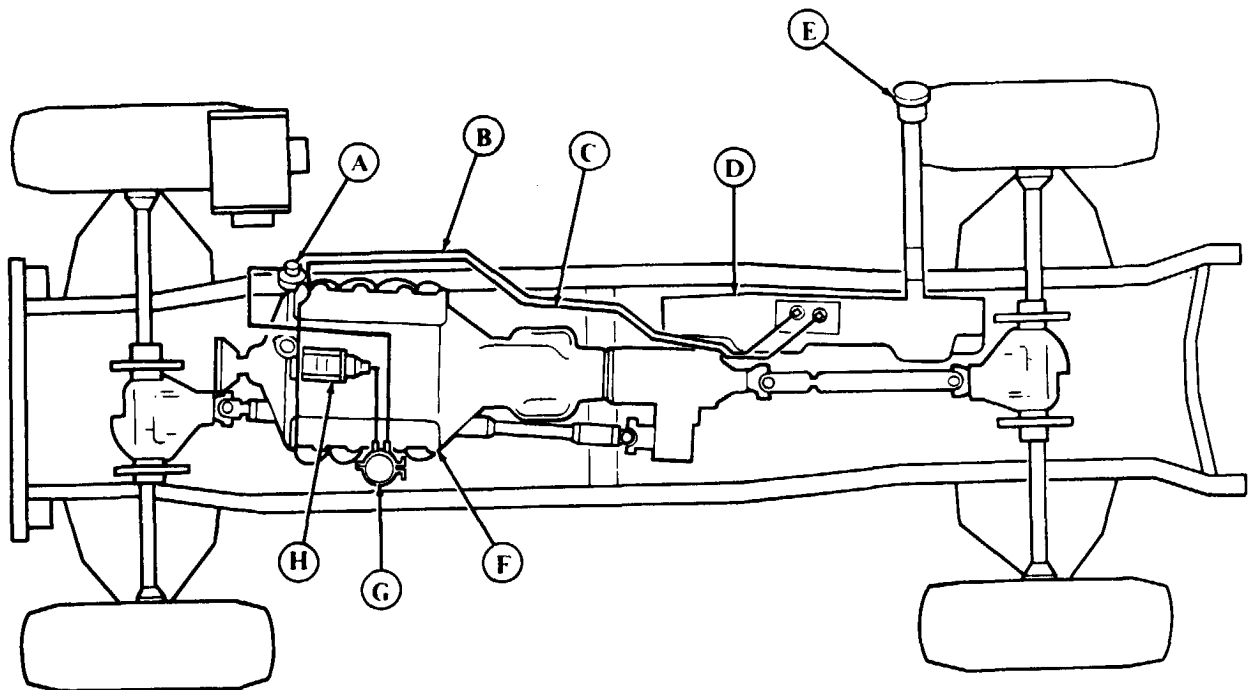
- (A) ENGINE** - The water-cooled 6.2 liter, V-8, Diesel engine provides up to 150 horsepower at 3600 rpm to power the vehicle. The 6.5 liter V-8 engine develops approximately 160 horsepower at 3400 rpm to power the vehicle. The engines are essentially the same on all models except those equipped with deep water fording kit installed, which adds a specially sealed dipstick, dipstick tube, and vented CDR valve. These differences do not affect engine performance.
- (B) TRANSMISSION (3L80)** - Adapts engine power to meet different driving conditions. The automatic transmission has three forward speeds, a reverse and a neutral. A neutral safety switch prevents the vehicle from being started with the transmission in any selector lever position except neutral.
TRANSMISSION (4L80E) - Adapts engine power to meet different driving conditions. The automatic transmission has four forward speeds, a reverse, a neutral and a park. A neutral safety switch prevents the vehicle from being started with the transmission in any selector lever position except park and neutral.
- (C) TRANSFER CASE** - Directs engine-to-transmission power to front and rear differentials simultaneously. This condition means the vehicle is always in four-wheel drive. The transfer case allows for selection of three drive ranges and a neutral position. A complete description of these driving ranges and the recommended driving conditions during which they are used can be found in TM 9-2320-280-10.
- (D) PROPELLER SHAFTS** - Link transfer case to differentials. Universal joints, located at either end of the front and rear propeller shafts, permit inline driving power between the transfer case and differentials even though they are mounted at different angles.
- (E) DIFFERENTIALS** - Transmit driving power, via halfshafts and geared hubs, to left and right wheels. The differential ensures power is applied to the wheel having traction, regardless of which wheel is slipping. This feature is called torque biasing.
- (F) HALFSHAFTS** - Transmits power from differentials to geared hubs.
- (G) GEARED HUBS** - Serve as the front wheel steering spindle and act as the final drive components to front and rear wheels.



1-19. FUEL SYSTEM OPERATION

The HMMWV diesel fuel system operation is identical for all models covered in this manual. It stores, cleans, and supplies fuel for the engine. Major components of the fuel system are:

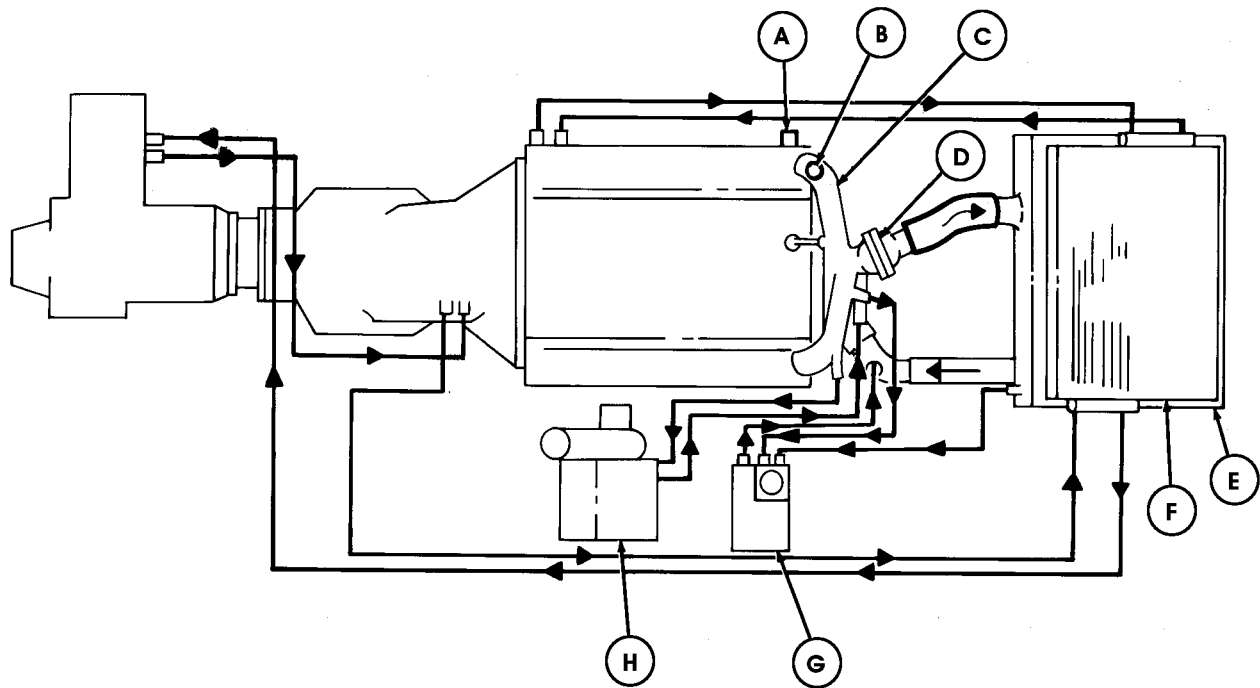
- (A) FUEL PUMP** - Draws fuel from fuel tank through the supply line and pumps it to the fuel filter.
- (B) FUEL RETURN LINE** - Directs unused fuel from the injection pump back to the fuel tank.
- (C) FUEL SUPPLY LINE** - Directs fuel from fuel tank to the system.
- (D) FUEL TANK** - Stores 25 gallons of diesel fuel.
- (E) FUEL FILLER CAP** - Located at right rear side of vehicle, the cap is removed to permit fuel tank servicing.
- (F) FUEL INJECTORS** - Receive metered fuel from the injection pump and sprays fuel into the combustion chamber.
- (G) FUEL FILTER/WATER SEPARATOR** - Filters water and sediment from fuel before fuel enters the injection pump.
- (H) INJECTION PUMP** - Directs metered and pressurized fuel to the eight injector nozzles. It is mounted on top of the engine under the intake manifold.



1-20. COOLING SYSTEM OPERATION

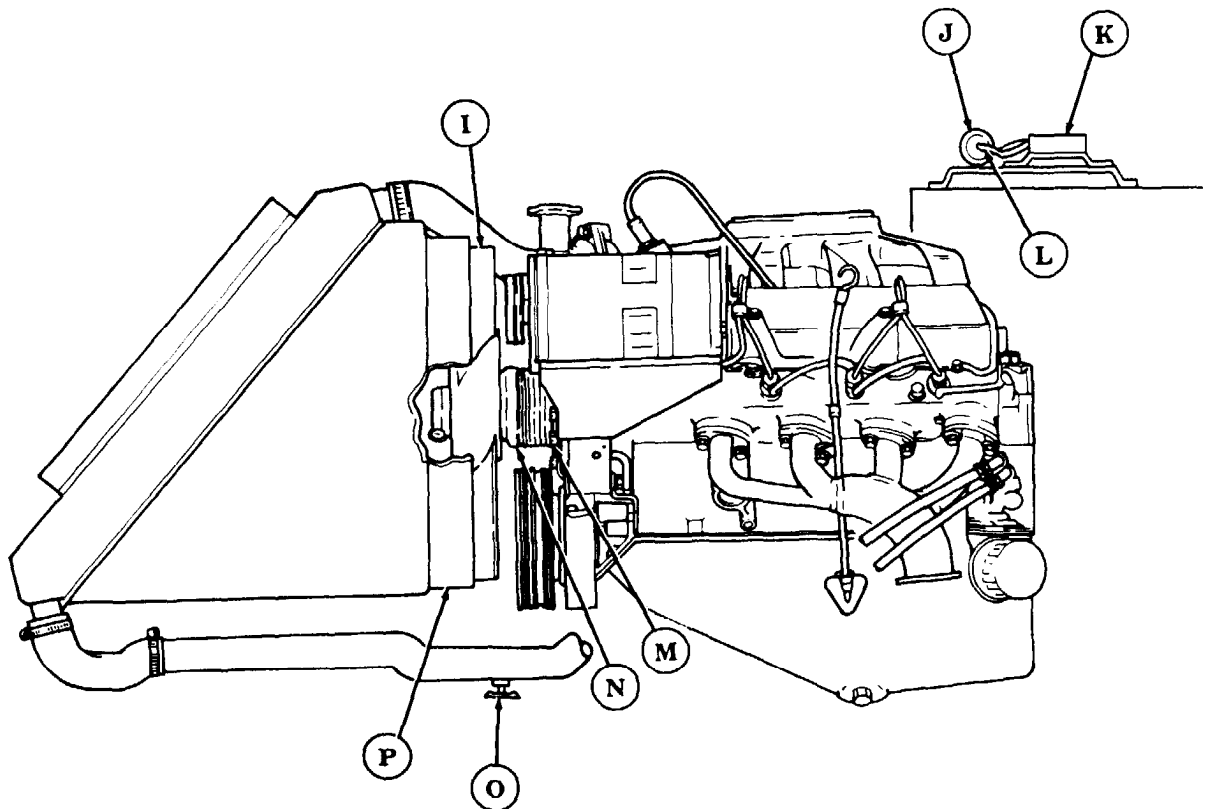
The cooling system removes excess heat from the engine, engine oil, transfer oil, and transmission oil. This system is identical on all models covered in this manual. Major components of the cooling system are:

- (A) **ENGINE TEMPERATURE SENDING UNIT** – Sends signal indicating coolant temperature to gauge on instrument cluster.
- (B) **ENGINE TEMPERATURE SWITCH** – Sends signal to activate control valve system to operate fan when engine temperature exceeds 215°F (102°C) and deactivate when engine temperature drops below 190°F (88°C).
- (C) **WATER CROSSOVER** – Collects coolant from cylinder heads and channels it to the thermostat housing where it is redirected through the cooling system.
- (D) **THERMOSTAT** – Shuts off coolant return flow to radiator until temperature reaches 190°F (88°C). Coolant is then directed to the radiator through the radiator inlet hose.
- (E) **RADIATOR** – Directs coolant through a series of fins and baffles so outside air can dissipate excess engine heat before the coolant is recirculated through the engine.
- (F) **OIL COOLER** – Directs engine oil (lower half of cooler) and transmission oil (upper half of cooler) through a series of fins or baffles so outside air can remove heat from oil.
- (G) **SURGE TANK** – Filling and expansion point for cooling system.
- (H) **PERSONNEL HEATER** – Provides heat for personnel and interior of vehicle.



1-20. COOLING SYSTEM OPERATION (Cont'd)

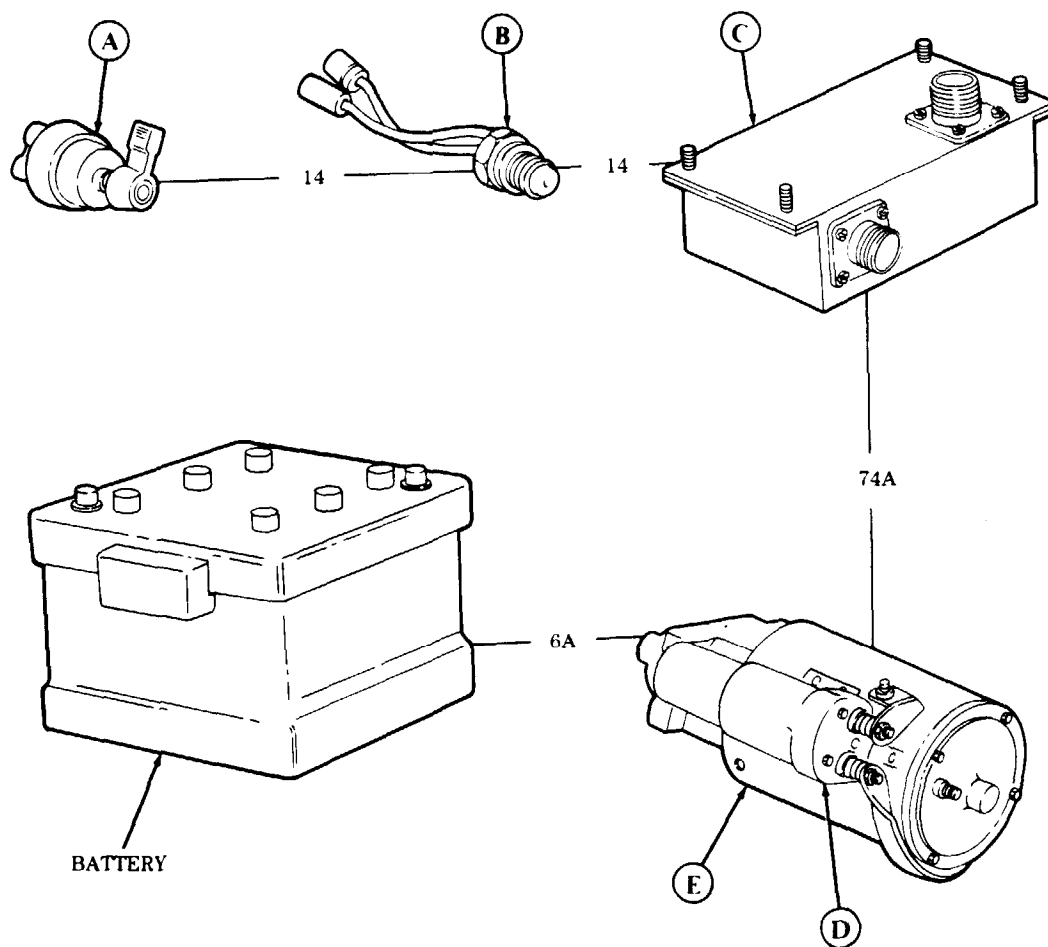
- I FAN** - Pulls outside air through radiator to remove heat from coolant.
- J HYDRAULIC CONTROL VALVE** - Directs hydraulic fluid to provide required pressure to actuate fan clutch as required by engine temperature. Hydraulic pressure supplied by power steering pump.
- K TIME DELAY MODULE** - Sends delayed signal to fan clutch solenoid for delay of fan actuation to provide needed horsepower for engine acceleration.
- L FAN CLUTCH SOLENOID** - Actuates hydraulic control valve as required by coolant temperature.
- M WATER PUMP** - Driven by V-belts provides circulation of coolant through cooling system.
- N FAN CLUTCH** - Hydraulically actuated by pressure from hydraulic control valve to control operation of fan. Hydraulic pressure supplied by power steering pump.
- O DRAINCOCK** - Draining point for radiator and cooling system.
- P RADIATOR SHROUD** - Permits a greater concentration of air to be pulled through the radiator.



1-21. STARTING SYSTEM OPERATION

The starting system is identical for all vehicles covered in this manual, and consists of the following components and circuits.

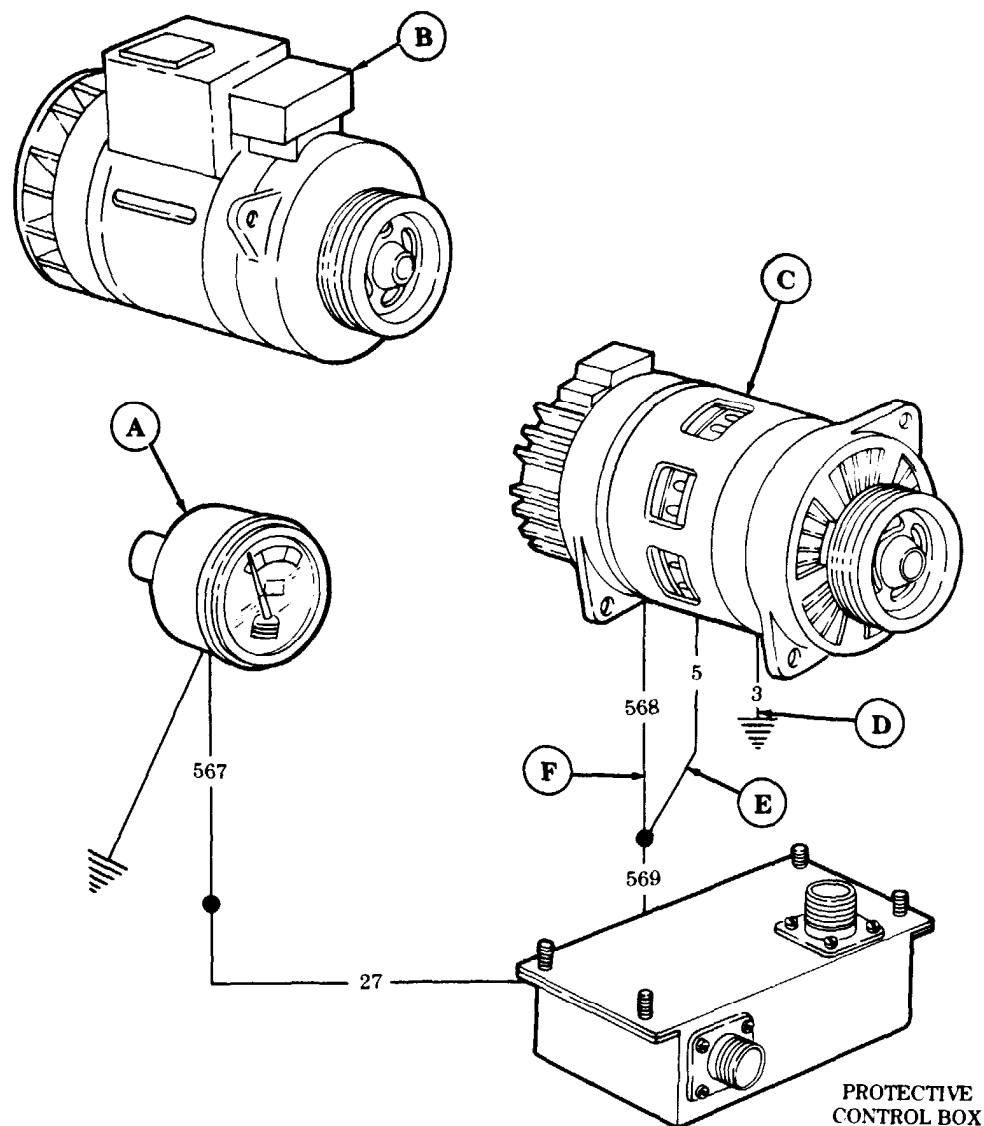
- (A) ROTARY SWITCH** - When in "START" position, provides battery power to the starter solenoid and to the neutral start switch through circuit 14.
- (B) NEUTRAL STARTER SWITCH** - When transmission shift lever is in "N" (neutral) position, this switch closes a relay in the protective control box through circuit 14 allowing battery power to reach the starter solenoid.
- (C) PROTECTIVE CONTROL BOX** - Locks out the starter circuit, which prevents starter from reengaging while engine is running.
- (D) STARTER SOLENOID** - A magnetic relay that transmits 24-volt battery power to the starter motor.
- (E) STARTER MOTOR** - Cranks the engine for starting, and is supplied 24-volt battery power through circuit 6A.



1-22. GENERATING SYSTEM OPERATION (60/100 AMPERE ALTERNATOR)

The 60 ampere generating system is identical for all vehicles except the M997, M997A1, M997A2 4-litter and M996, M996A1 2-litter ambulances.

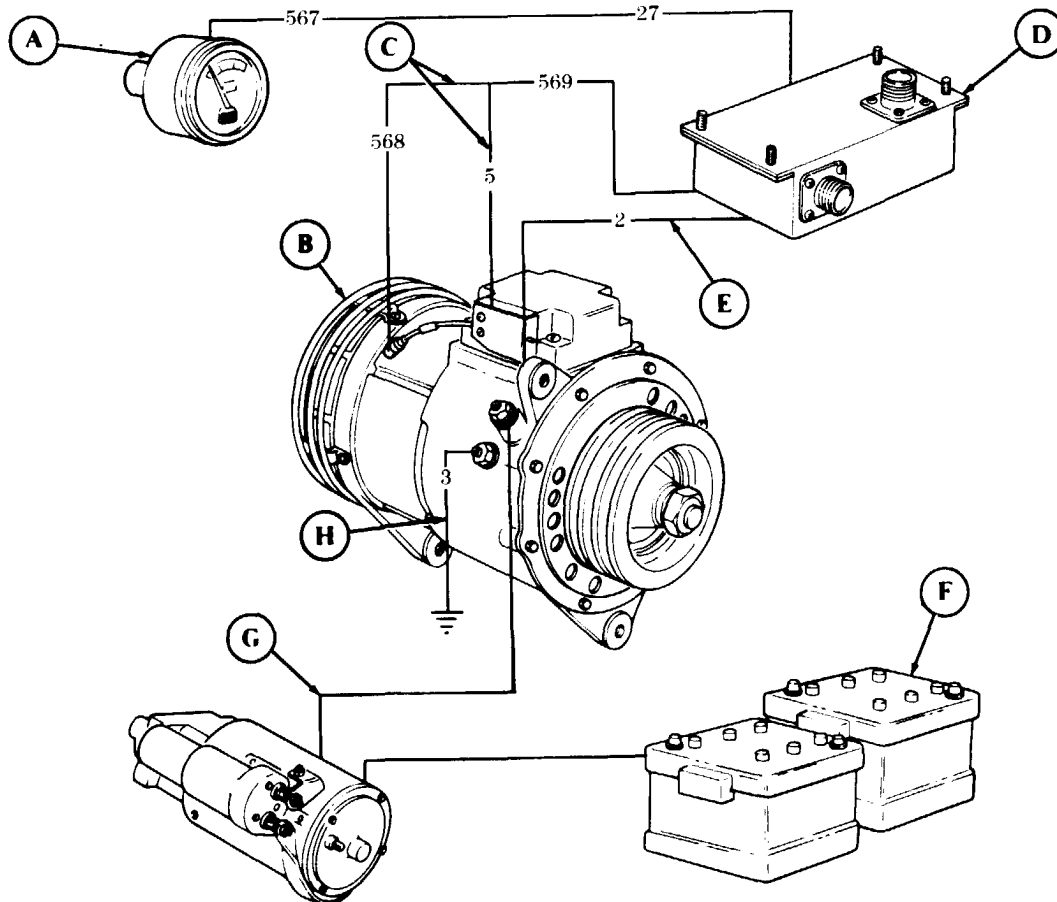
- (A) BATTERY GAUGE** – Indicates electrical system voltage. It is connected to the electrical system through circuit 567.
- (B) ALTERNATOR (100 ampere)** – Rated at 28 volts, 100 amperes, with external regulator. The alternator assists and recharges the batteries during operation.
- (C) ALTERNATOR (60 ampere)** – Rated at 28 volts, 60 amperes, with internal regulator. The alternator assists and recharges the batteries during operation.
- (D) CIRCUIT 3** – Provides a ground circuit to alternator.
- (E) CIRCUIT 5** – Conducts alternator output to charge the batteries and maintain vehicle voltage.
- (F) CIRCUIT 568** – Senses vehicle voltage activating the field current in the alternator to generate current.



1-23. GENERATING SYSTEM OPERATION (200 AMPERE ALTERNATOR)

The 200 ampere generating system maintains battery charge and provides electrical power to operate vehicle circuits. Major components of the generating system are:

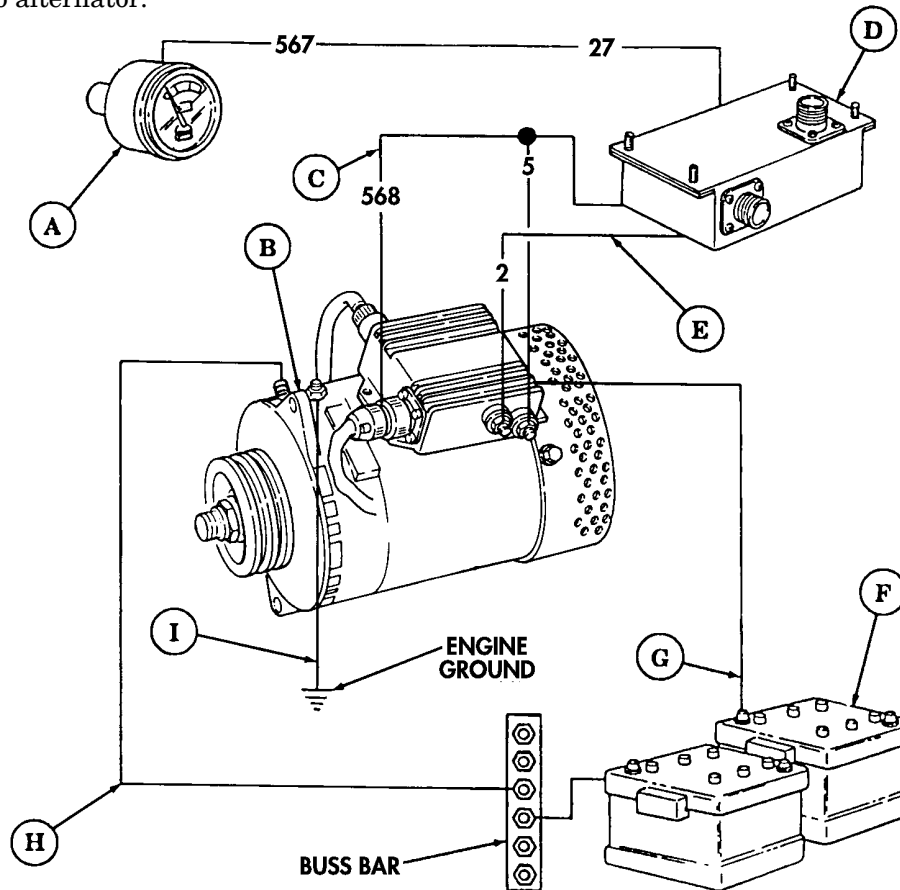
- (A) BATTERY GAUGE** - Indicates electrical system voltage. It is connected to the electrical system through circuit 567.
- (B) ALTERNATOR (200 AMPERE)** - Is rated at 28 volts, 200 amperes, with external regulator. The alternator assists and recharges the vehicle batteries during operation.
- (C) CIRCUIT 568/CIRCUIT 5 (ALTERNATOR A0013036AA ONLY)** - Senses vehicle voltage, and activates the field current in the alternator to generate current.
- (D) PROTECTIVE CONTROL BOX** - Protects the vehicle electrical system in the event battery polarity is reversed.
- (E) CIRCUIT 2** - Sends AC signal, indicating alternator shaft rpm, to frequency switch in protective control box to prevent operation of starter solenoid when engine is running.
- (F) BATTERIES** - Two 12-volt batteries are connected in a series to provide 24 volts to start vehicle and assist alternator during operation.
- (G) POSITIVE CABLE** - Transmits alternator output to maintain battery charge. A fuse at the alternator power stud will prevent damage to alternator if battery polarity is reversed.
- (H) CIRCUIT 3** - Connects to negative stud on alternator with engine ground strap to provide a ground circuit to alternator.



1-23.1. GENERATING SYSTEM OPERATION (100 AMPERE DUAL VOLTAGE ALTERNATOR)

The 100-ampere dual voltage generating system maintains battery charge and provides electrical power to operate vehicle circuits. Major components of the generating system are:

- (A) **BATTERY GAUGE** – Indicates electrical system voltage. It is connected to the electrical system through circuit 567.
- (B) **ALTERNATOR (100 AMPERE)** – Is rated at 28 volts at 100 amperes and 14 volts at 50 amperes with external regulator. The alternator assists and recharges the vehicle batteries during operation.
- (C) **CIRCUIT 568** – Senses vehicle voltage, and activates the field current in the alternator circuit to alternator.
- (D) **PROTECTIVE CONTROL BOX / DISTRIBUTION BOX*** – Protects the vehicle electric system in the event battery polarity is reversed. Provides load dump, glow plug operation, and interfacing of engine and body harnesses.
- (E) **CIRCUIT 2** – Sends AC signal, indicating alternator shaft rpm, to frequency switch in protective control box to prevent operation of starter solenoid when engine is running.
- (F) **BATTERIES** – Two 12-volt batteries are connected in a series to provide 24 volts to start vehicle and assist alternator during operation.
- (G) **POSITIVE CABLE 6** – Provides 28-volt alternator output to maintain charge across two batteries.
- (H) **POSITIVE CABLE 68A** – Provides 16-volt alternator output to maintain charge across the lower battery.
- (I) **CIRCUIT 3** – Connects to negative stud on alternator with engine ground strap to provide a ground circuit to alternator.

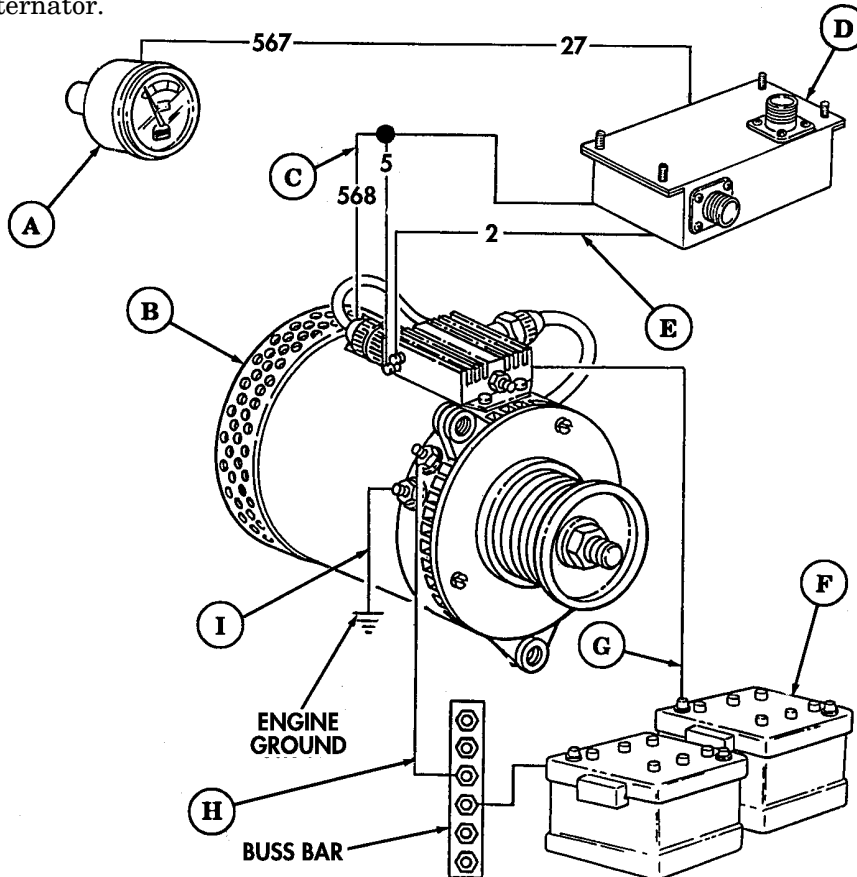


* Distribution box provides same function as protective control box except distribution box does not protect against reversal of battery polarity.

1-23.2. GENERATING SYSTEM OPERATION (200 AMPERE DUAL VOLTAGE ALTERNATOR)

The 200-ampere dual voltage generating system maintains battery charge and provides electrical power to operate vehicle circuits. Major components of the generating system are:

- (A) **BATTERY GAUGE** – Indicates electrical system voltage. It is connected to the electrical system through circuit 567.
- (B) **ALTERNATOR (200 AMPERE)** – Is rated at 28 volts at 200 amperes and 14 volts at 50 amperes with external regulator. The alternator assists and recharges the vehicle batteries during operation.
- (C) **CIRCUIT 568** – Senses vehicle voltage, and activates the field current in the alternator circuit to alternator.
- (D) **PROTECTIVE CONTROL BOX / DISTRIBUTION BOX*** – Protects the vehicle electric system in the event battery polarity is reversed. Provides load dump, glow plug operation, and interfacing of engine and body harnesses.
- (E) **CIRCUIT 2** – Sends AC signal, indicating alternator shaft rpm, to frequency switch in protective control box to prevent operation of starter solenoid when engine is running.
- (F) **BATTERIES** – Two 12-volt batteries are connected in a series to provide 24 volts to start vehicle and assist alternator during operation.
- (G) **POSITIVE CABLE 6** – Provides 28-volt alternator output to maintain charge across two batteries.
- (H) **POSITIVE CABLE 68A** – Provides 16-volt alternator output to maintain charge across the lower battery.
- (I) **CIRCUIT 3** – Connects to negative stud on alternator with engine ground strap to provide a ground circuit to alternator.

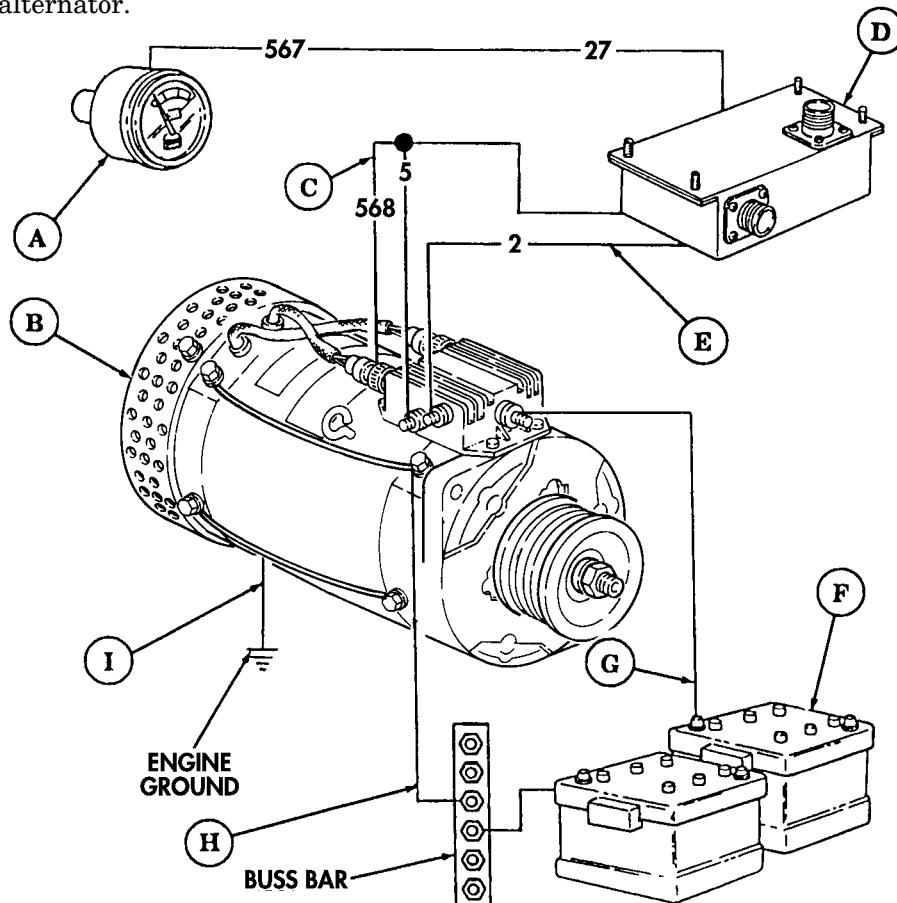


* Distribution box provides same function as protective control box except distribution box does not protect against reversal of battery polarity.

1-23.3. GENERATING SYSTEM OPERATION (400 AMPERE DUAL VOLTAGE ALTERNATOR)

The 400-ampere dual voltage generating system maintains battery charge and provides electrical power to operate vehicle circuits. Major components of the generating system are:

- (A) **BATTERY GAUGE** – Indicates electrical system voltage. It is connected to the electrical system through circuit 567.
- (B) **ALTERNATOR (400 AMPERE)** – Is rated at 28 volts at 400 amperes and 14 volts at 50 amperes with external regulator. The alternator assists and recharges the vehicle batteries during operation.
- (C) **CIRCUIT 568** – Senses vehicle voltage, and activates the field current in the alternator circuit to alternator.
- (D) **PROTECTIVE CONTROL BOX / DISTRIBUTION BOX*** – Protects the vehicle electric system in the event battery polarity is reversed. Provides load dump, glow plug operation, and interfacing of engine body harnesses.
- (E) **CIRCUIT 2** – Sends AC signal, indicating alternator shaft rpm, to frequency switch in protective control box to prevent operation of starter solenoid when engine is running.
- (F) **BATTERIES** – Two 12-volt batteries are connected in a series to provide 24 volts to start vehicle and assist alternator during operation.
- (G) **POSITIVE CABLE 6** – Provides 28-volt alternator output to maintain charge across two batteries.
- (H) **POSITIVE CABLE 68A** – Provides 16-volt alternator output to maintain charge across the lower battery.
- (I) **CIRCUIT 3** – Connects to negative stud on alternator with engine ground strap to provide a ground circuit to alternator.

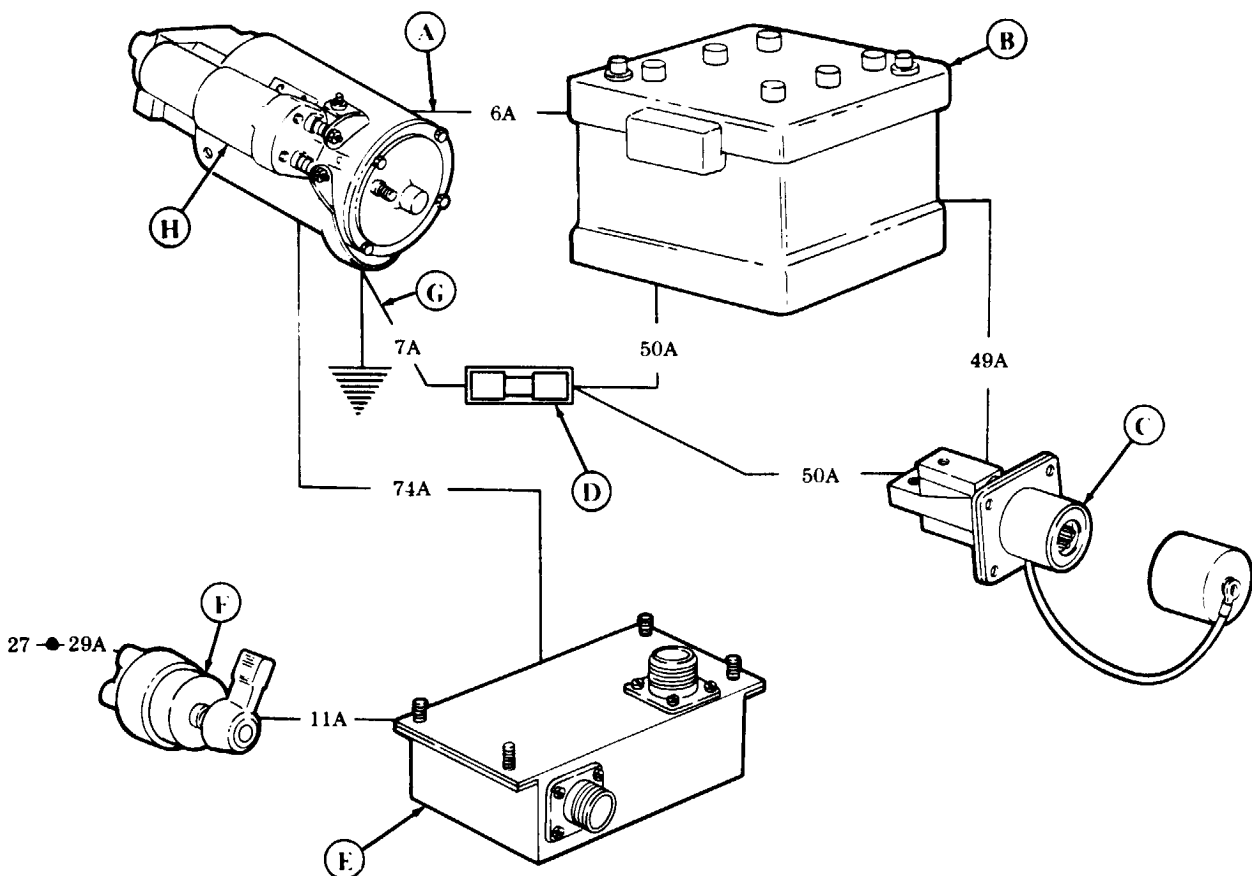


* Distribution box provides same function as protective control box except distribution box does not protect against reversal of battery polarity.

1-24. BATTERY SYSTEM OPERATION

The battery system is identical for all vehicles covered in this manual and consists of the following circuits and components.

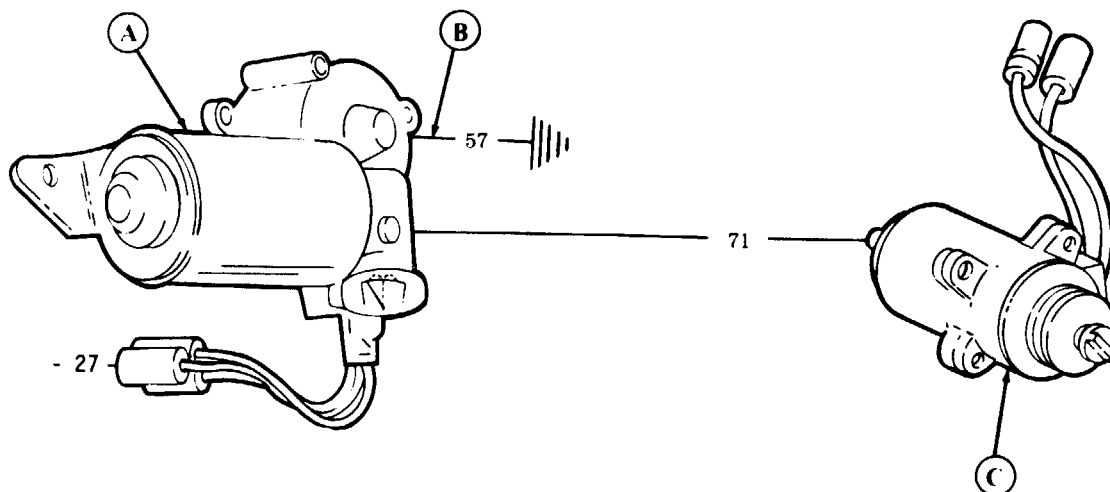
- (A) CIRCUIT 6A** - Connects the batteries to the starter and to the protective control box through circuit 74A.
- (B) BATTERIES** - Two 6TN batteries are connected to provide 24 volts D.C. for the electrical starting system.
- (C) SLAVE RECEPTACLE** - Links an external power source directly to the slaved vehicle's batteries to assist in cranking the engine when the vehicle's batteries are not sufficiently charged.
- (D) SHUNT** - Used when measuring current draw from batteries utilizing STE/ICE-R.
- (E) PROTECTIVE CONTROL BOX** - Protects the vehicle electrical system in the event the battery system polarity is reversed.
- (F) ROTARY SWITCH** - When in "START" position actuates starter solenoid through circuit 11A and 74A. When in "RUN" position closes circuit 29A to activate instrument cluster gages through circuit 27.
- (G) CIRCUIT 7A** - Connects the battery system to the starter negative terminal and chassis ground.
- (H) STARTER SOLENOID** - Actuates starter motor gear to crank vehicle engine.



1-25. WINDSHIELD WIPER/WASHER SYSTEM OPERATION

The following miscellaneous components and circuits are not covered in any of the other electrical systems:

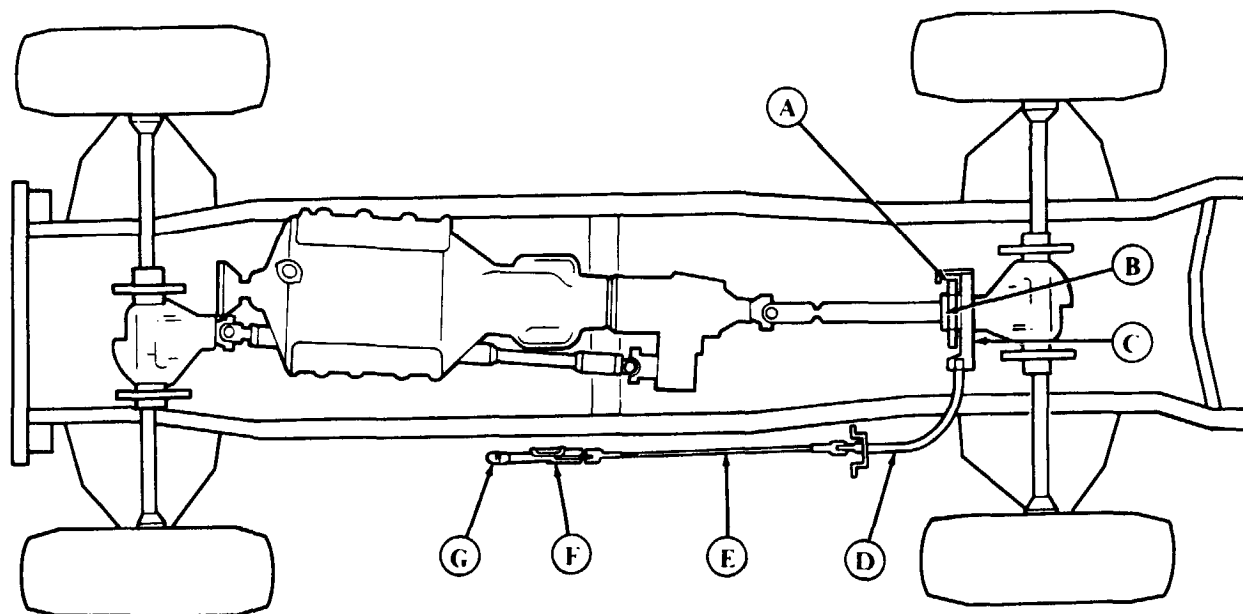
- (A) WINDSHIELD WIPER MOTOR** - When knob is turned to “LOW” or “HIGH” position, circuit 27 carries battery power to wiper motor to activate windshield wipers.
- (B) CIRCUIT 57**- Provides a ground circuit for wiper motor.
- (C) WINDSHIELD WASHER MOTOR** - When knob on wiper motor is pushed, the washer motor is activated through circuit 71 to spray water onto windshield.



1-26. PARKING BRAKE SYSTEM OPERATION

The parking brake system for vehicles with serial numbers 1 through 44824 is a mechanically-actuated system that provides a means of keeping the vehicle still once it stops. It also assists in emergency stopping if there is a service brake system failure. Major components of the parking brake system are:

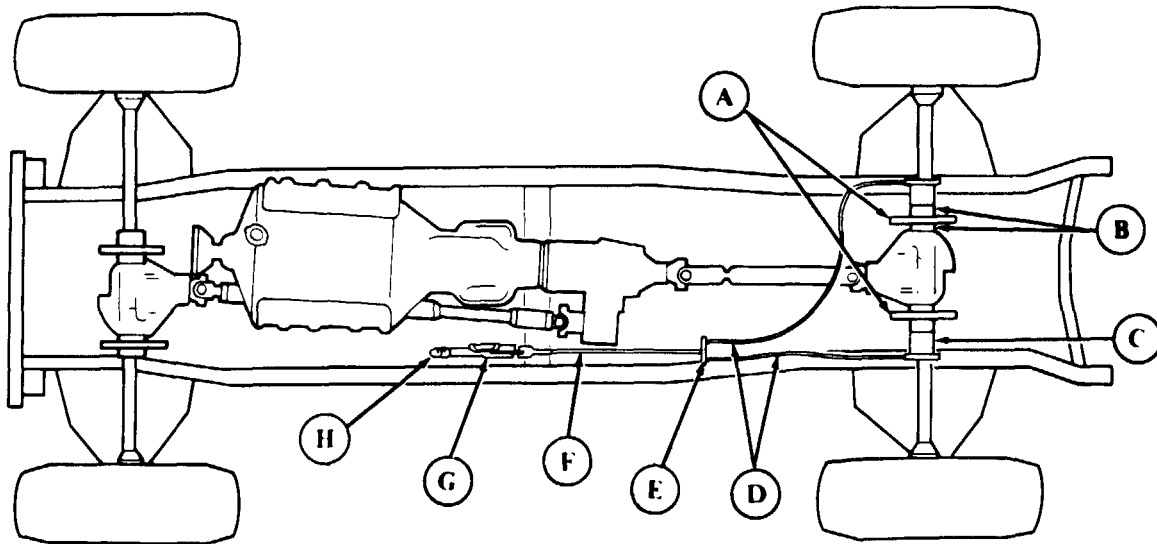
- (A) PARKING BRAKE ROTOR** - Attached to pinion flange on rear differential, rotor prevents pinion flange from turning when parking brake is applied.
- (B) BRAKE PADS** - Apply friction to rotor when hand lever is applied.
- (C) PARKING BRAKE CALIPER** - Forces brake pads against rotor when hand lever is applied.
- (D) PARKING BRAKE CABLE** - Connects brake caliper to parking brake rod at bracket on left frame rail.
- (E) PARKING BRAKE ROD** - Connects parking brake hand lever to parking brake cable by means of a adjustable clevis.
- (F) PARKING BRAKE HAND LEVER** - Permits operator to engage the parking brake.
- (G) PARKING BRAKE HAND LEVER ADJUSTING CAP** - Permits operator to make minor tension adjustment of parking brake.



1-27. SERVICE/PARKING BRAKE SYSTEM OPERATION

The parking brake system is a mechanically-actuated system that provides a means of keeping the vehicle still once it stops. It also assists in emergency stopping if there is a complete service brake system failure. Major components of the parking brake system are:

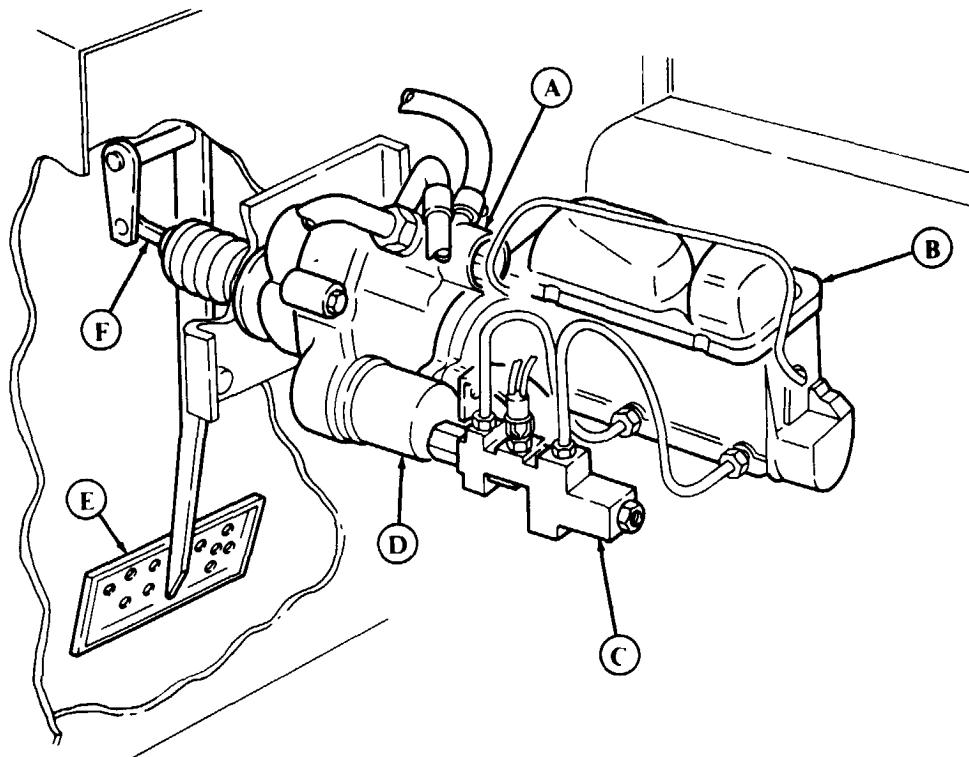
- (A) PARKING BRAKE ROTORS** - Attached to output flanges on rear differential, rotors prevents output flanges from turning when parking brake is applied.
- (B) BRAKE PADS** - Apply friction to rotors when hand lever is applied.
- (C) PARKING BRAKE CALIPERS** - Forces brake pads against rotors when hand lever is applied.
- (D) PARKING BRAKE CABLES** - Connects parking brake hand lever to equalizer bar.
- (E) EQUALIZER BAR** - Evenly distributes braking pressure to the rear brake rotors.
- (F) PARKING BRAKE ROD** - Connects parking brake hand lever to equalizer bar.
- (G) PARKING BRAKE HAND LEVER** - Permits operator to engage the parking brake.
- (H) PARKING BRAKE HAND LEVER ADJUSTING CAP** - Permits operator to make minor tension adjustment of parking brake.



1-28. SERVICE BRAKE SYSTEM OPERATION

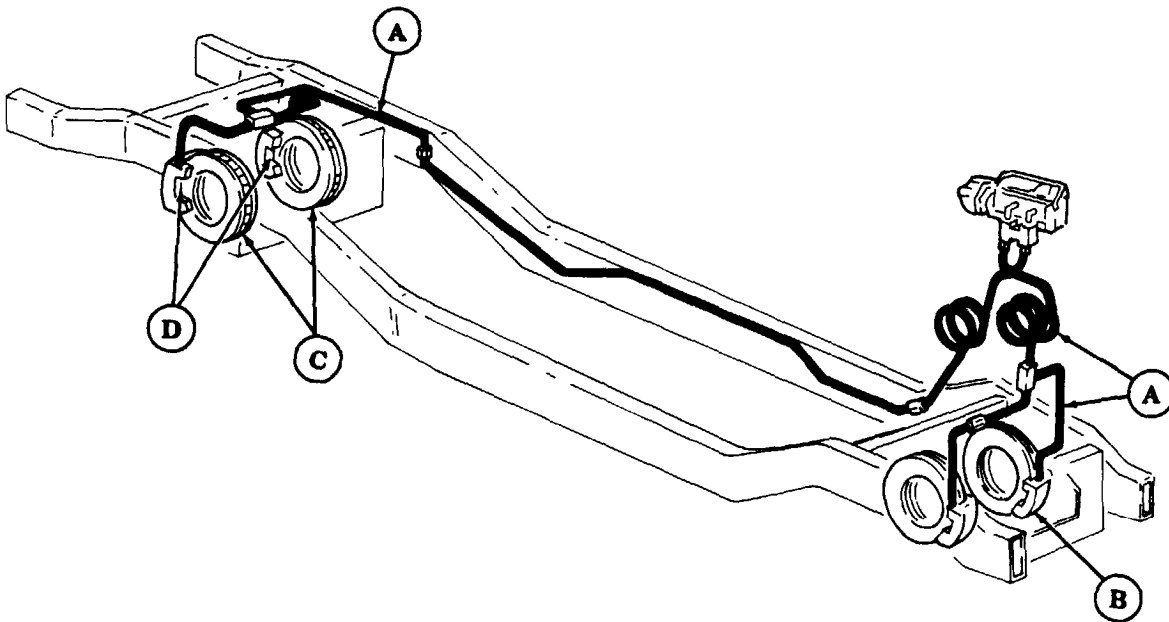
The service brake system is identical for all models covered in this manual. It is an inboard-mounted, four-wheel, disc brake, hydraulically-assisted system. Major components of the braking system are:

- Ⓐ **HYDRO-BOOST** - Converts hydraulic power from the steering pump to mechanical power to the master cylinder, providing power assist during braking.
- Ⓑ **MASTER CYLINDER/RESERVOIR** - Stores brake fluid, and converts mechanical pedal pressure to hydraulic pressure.
- Ⓒ **PROPORTIONING VALVE** - Provides balanced front-to-rear braking and activates brake warning lamp in case of brake system malfunction.
- Ⓓ **ACCUMULATOR** - Stores hydraulic pressure for additional power-assisted braking in case of loss of pressure in steering system.
- Ⓔ **BRAKE PEDAL** - Provides operator control for stopping vehicle.
- Ⓕ **BRAKE LINKAGE** - Directs brake pedal pressure to hydro-boost.



1-28. SERVICE BRAKE SYSTEM OPERATION (Cont'd)

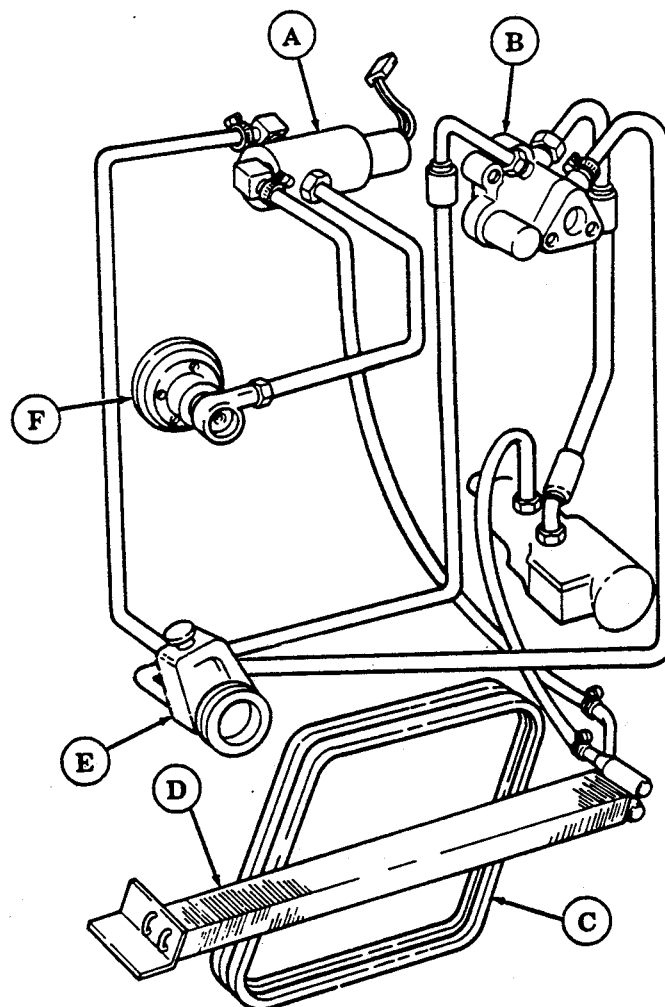
- (A) HYDRAULIC BRAKE LINES** - Directs brakes fluid under pressure to all four brake calipers from master cylinder.
- (B) BRAKE CALIPER** - Converts hydraulic pressure to mechanical force to compress brake pads against brake rotors.
- (C) BRAKE ROTOR** - Attached to output flange on front and rear differentials, rotor prevents output flange from turning when brakes are applied.
- (D) BRAKE PADS** - Apply friction to brake rotor when brake pedal is depressed.



1-29. STEERING CONTROL SYSTEM OPERATION

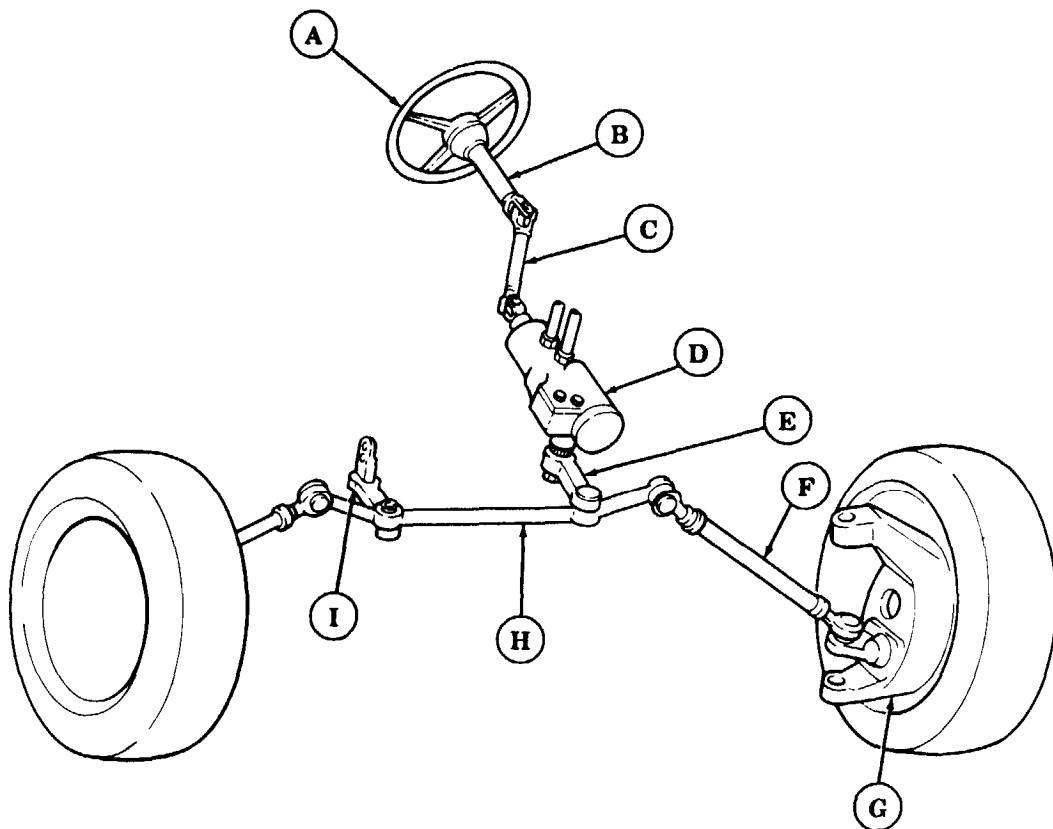
The steering system is identical for all models covered in this manual. Major components of the steering system are:

- (A) **HYDRAULIC CONTROL VALVE** – Directs hydraulic fluid to provide required pressure to actuate and deactivate fan clutch as required by engine temperature. Hydraulic pressure supplied by power steering pump.
- (B) **HYDRO-BOOST** – Converts hydraulic power from the steering pump to mechanical power to the master cylinder, providing power assist during braking.
- (C) **ACCESSORY DRIVE PULLEY BELTS** – Transmits mechanical driving power from crankshaft drive pulley to steering pump pulley which drives the steering pump.
- (D) **POWER STEERING COOLER** – Directs power steering fluid through a series of fins or baffles so outside air can dissipate excess heat before the fluid is recirculated through the steering system.
- (E) **OIL RESERVOIR AND STEERING PUMP** – Combined in one unit, the reservoir serves as an oil filling point and the pump supplies the oil under pressure throughout the steering system.
- (F) **FAN CLUTCH** – Hydraulically actuated and deactivated by the hydraulic control valve. The fan is actuated when hydraulic pressure is released, and deactivated when hydraulic pressure is applied. Hydraulic pressure is supplied by the power steering pump.



1-29. STEERING CONTROL SYSTEM OPERATION (Cont'd)

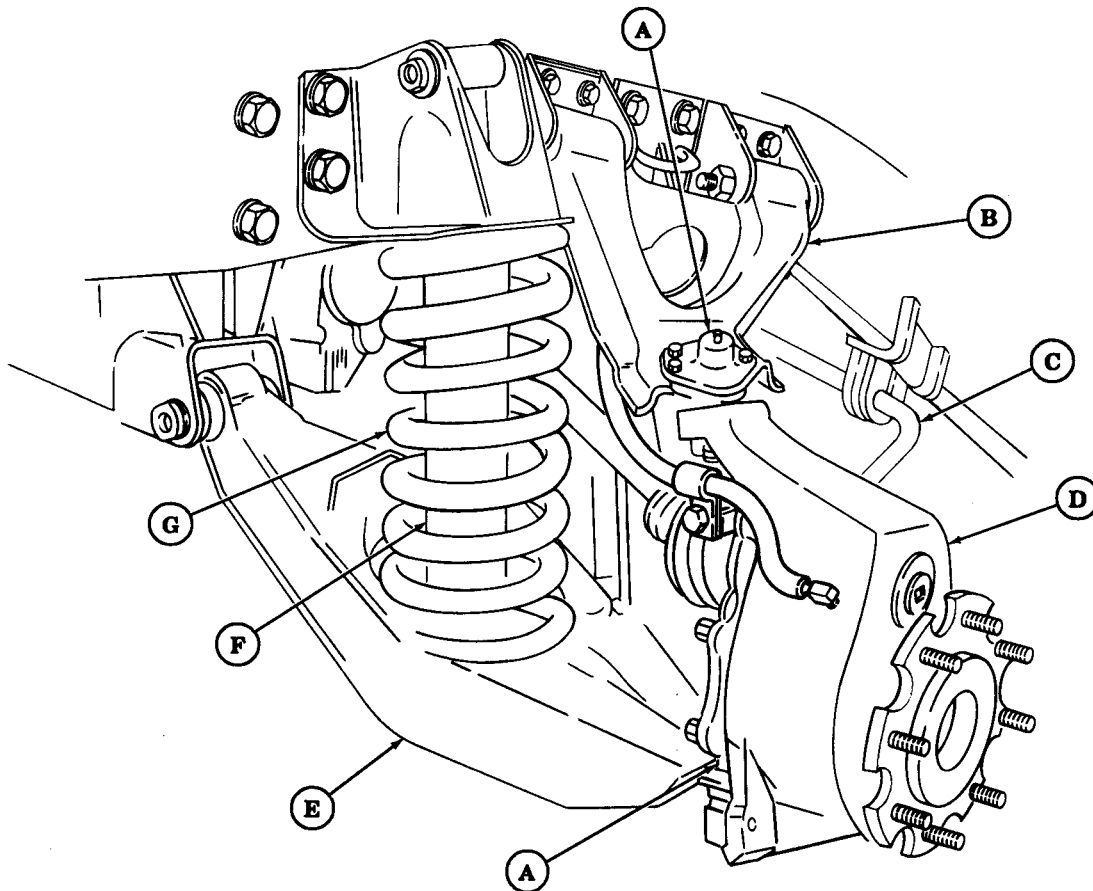
- (A) STEERING WHEEL** - Serves as manual steering control for the operator.
- (B) STEERING COLUMN** - Transmits turning effort from steering wheel to intermediate steering shaft.
- (C) INTERMEDIATE STEERING SHAFT** - Permits angle of torque from steering column to input shaft of power steering gear.
- (D) STEERING GEAR** - Converts hydraulic power from steering pump to mechanical power at pitman arm.
- (E) PITMAN ARM** - Transfers steering torque from power steering gear to center link.
- (F) TIE ROD ASSEMBLY** - Transmits movement from center link to geared hub.
- (G) GEARED HUB** - Serves as the pivot point and link for the front wheels via the tie rod assembly.
- (H) CENTER LINK** - Transmits movement from pitman arm to tie rods.
- (I) IDLER ARM** - Supports right side of center link.



1-30. SUSPENSION SYSTEM OPERATION

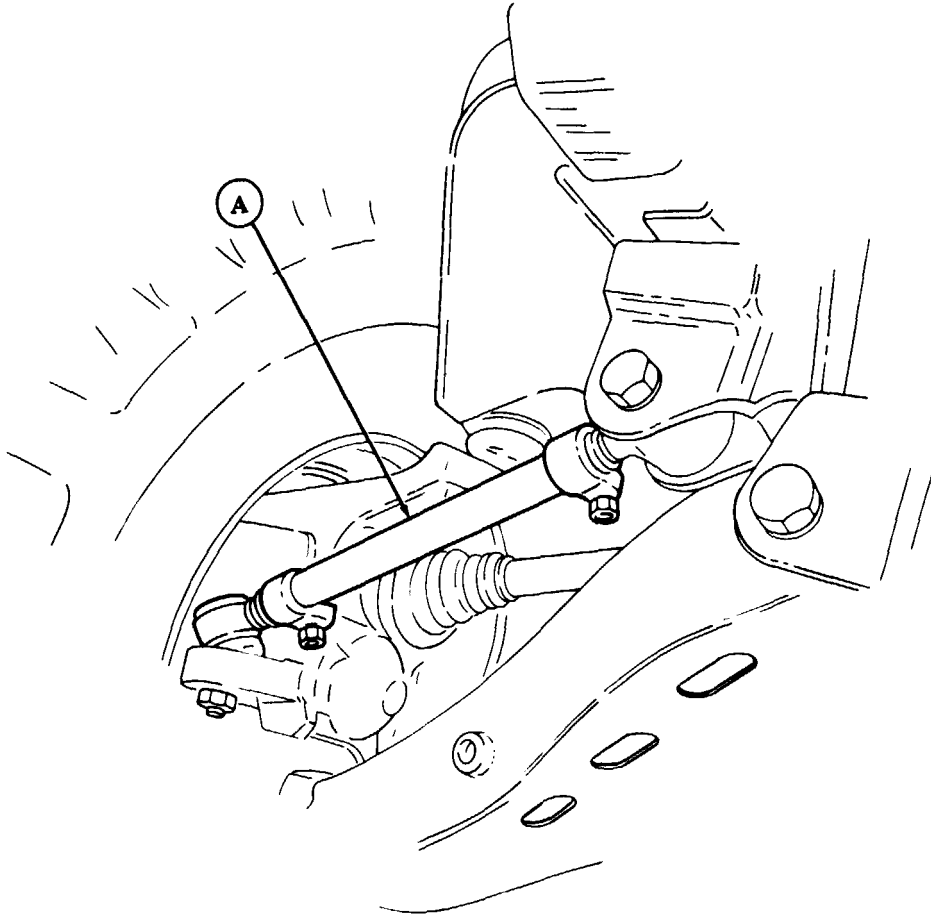
The suspension system is identical for all models covered in this manual. It is an independent coil spring type system. Major components of the suspension system are:

- (A) **BALL JOINTS** – Connects geared hub to control arms, and allows change of angle between geared hub and control arms during suspension movement.
- (B) **UPPER CONTROL ARM** – Connects geared hub to frame rail.
- (C) **STABILIZER BAR (FRONT ONLY)** – Prevents vehicle sway when cornering.
- (D) **GEARED HUB** – Serves as a mounting point for wheel and tire assembly and provides 1.92:1 gear reduction to increase torque to wheel and tire assembly.
- (E) **LOWER CONTROL ARM** – Connects geared hub to frame rail.
- (F) **SHOCK ABSORBER** – Dampens suspension movement and limits amount of suspension travel.
- (G) **COIL SPRING** – Supports weight of vehicle and allows suspension travel to vary depending on terrain and vehicle loading.



1-30. SUSPENSION SYSTEM OPERATION (Cont'd)

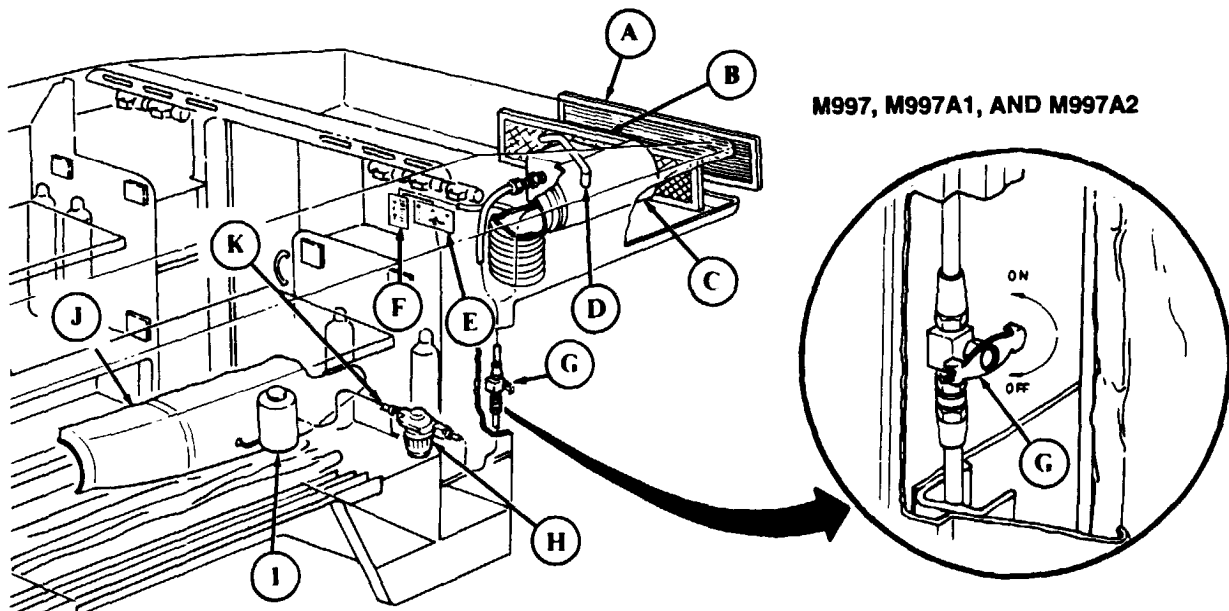
- (A) RADIUS ROD (REAR ONLY)** - Connects geared hub to frame, to maintain rear end alignment.



1-31. AMBULANCE PATIENT COMPARTMENT FUEL BURNING HEATER SYSTEM OPERATION

The ambulance patient compartment fuel burning heater in the M996, M996A1, M997, M997A1, and M997A2 vehicles are similar in that they are multi-fuel burning and heat filtered fresh air. Major components of the fuel burning heater system are:

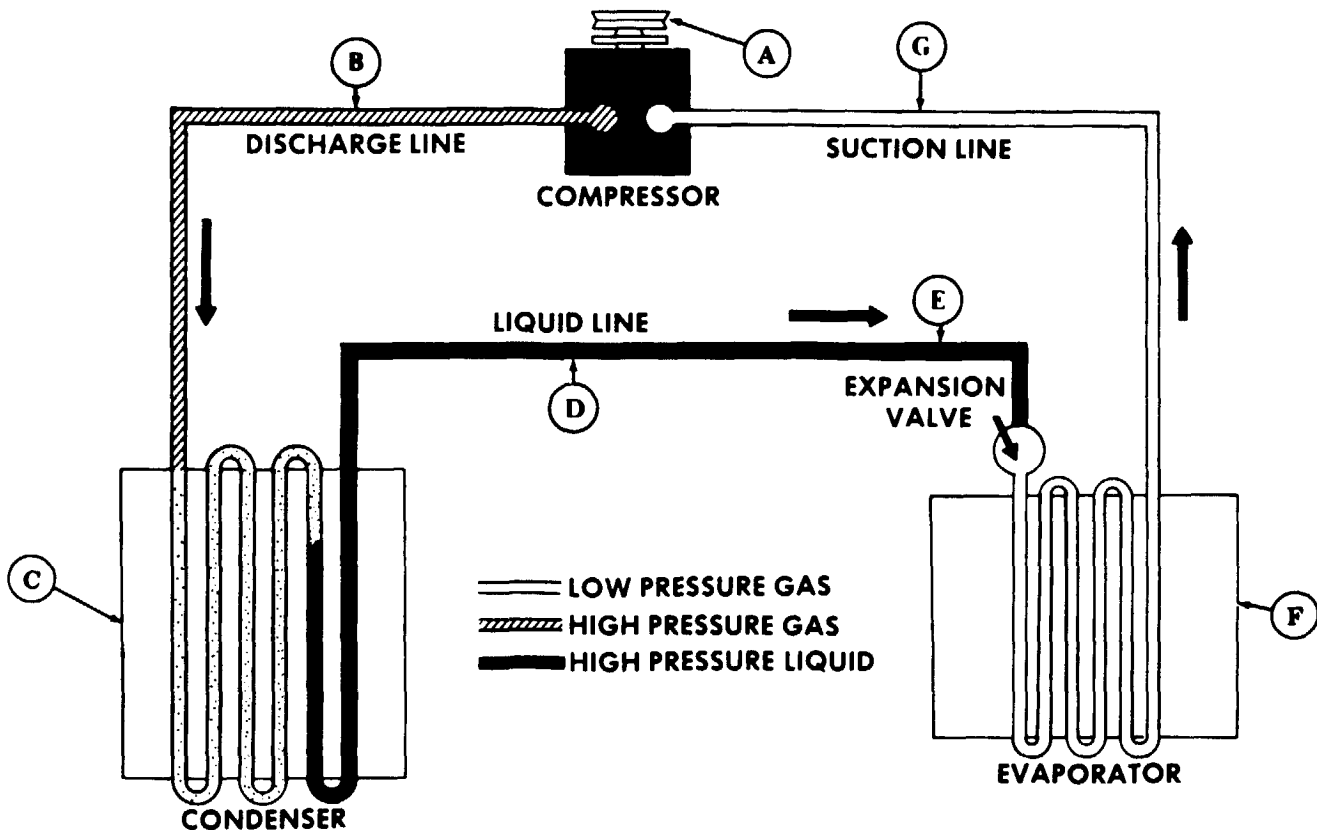
- (A) FRESH AIR INTAKE GRILLE** — The entry point of fresh air for the heater and ventilation system. The grille stops large debris from entering the system.
- (B) FRESH AIR FILTER** — Filters out dust and dirt which could foul the system.
- (C) FUEL BURNING HEATER** — A self-contained heater/blower unit which heats filtered fresh air with a heat exchanger and forces it out to heat vents in the patient compartment.
- (D) HEATER EXHAUST PIPE** — Outlet for exhaust gases from fuel burning heater.
- (E) HEATING/VENTILATION AND AIR-CONDITIONING SYSTEM (HVAC) CONTROL BOX** — The central point of operation for fuel burning heater.
- (F) ELECTRICAL SYSTEM FUSE BOX** — Provides electrical overload protection for the HVAC system.
- (G) MANUAL SHUTOFF VALVE** — Stops fuel flow to heater in an emergency or when performing maintenance on the heater.
- (H) FUEL FILTER** — Filters contaminants out of the fuel for efficient burning.
- (I) FUEL PUMP** — Pumps fuel out of the fuel tank and provides fuel pressure to the rest of the system. Pump will not draw fuel if tank is below 1/4 tank.
- (J) FUEL TANK** — The supply point of fuel for fuel burning heater.
- (K) FUEL LINES** — Supply fuel to the fuel burning heater.



1-32. M997, M997A1, AND M997A2 AMBULANCE AIR-CONDITIONING SYSTEM OPERATION

The air-conditioning system covered in this manual applies only to the M997, M997A1, and M997A2 vehicles and consists of the following major components:

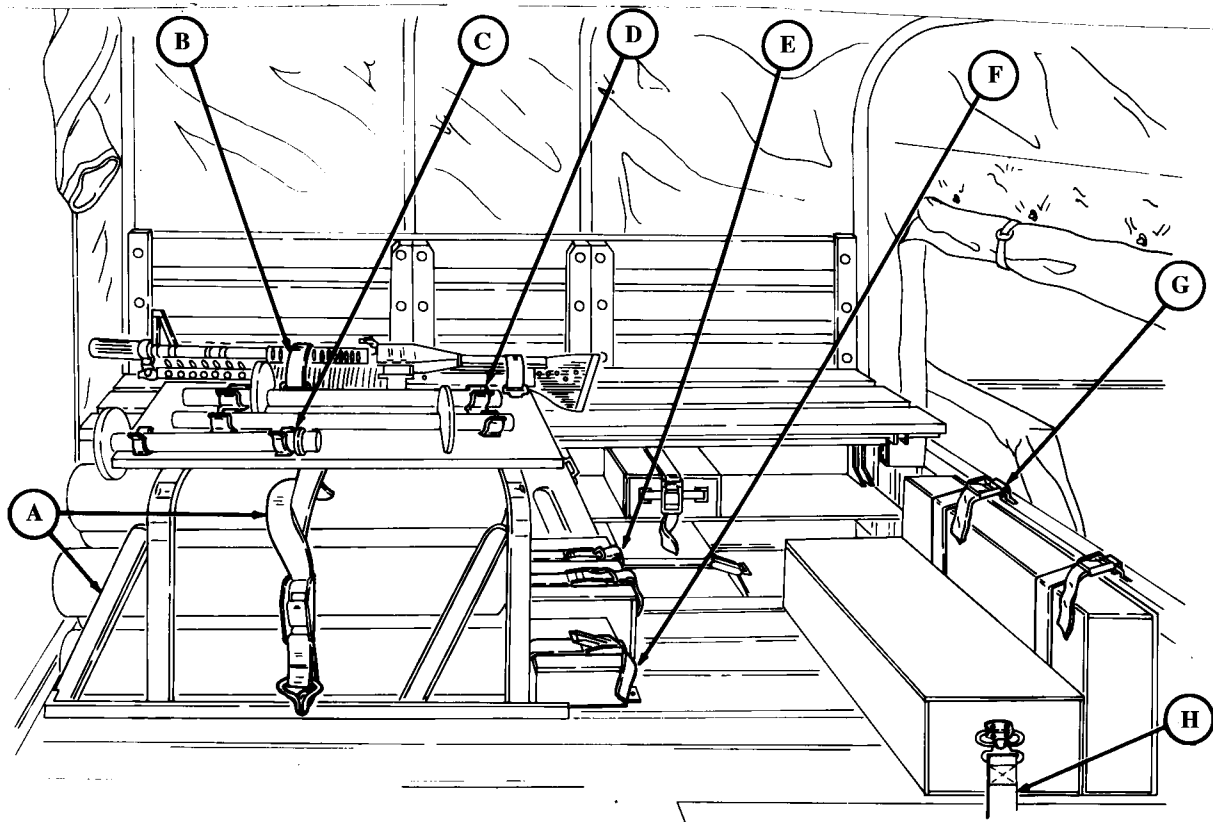
- (A) COMPRESSOR** - Inside the compressor, low pressure gas refrigerant is compressed into a high pressure gas that is pushed into the condenser by the compressor.
- (B) DISCHARGE LINE** - High pressure gas is carried through the discharge line from the compressor to the condenser.
- (C) CONDENSER** - Refrigerant enters the condenser as a high pressure gas. When condensed, it gives up its heat to the outside air and becomes a high pressure liquid.
- (D) LIQUID LINE** - High pressure liquid refrigerant is carried back to the evaporator by the liquid line to repeat the evaporation/condensation cycle.
- (E) EXPANSION VALVE** - High pressure liquid refrigerant enters a non-adjustable expansion valve where the refrigerant is formed into a liquid spray.
- (F) EVAPORATOR** - Refrigerant enters evaporator as a liquid spray. It absorbs heat from the air in the patient compartment and vaporizes into a low pressure gas.
- (G) SUCTION LINE** - Refrigerant in low pressure gas form is drawn from the evaporator by the suction action of the compressor.



1-33. STOWAGE RACKS AND TIEDOWN STRAPS

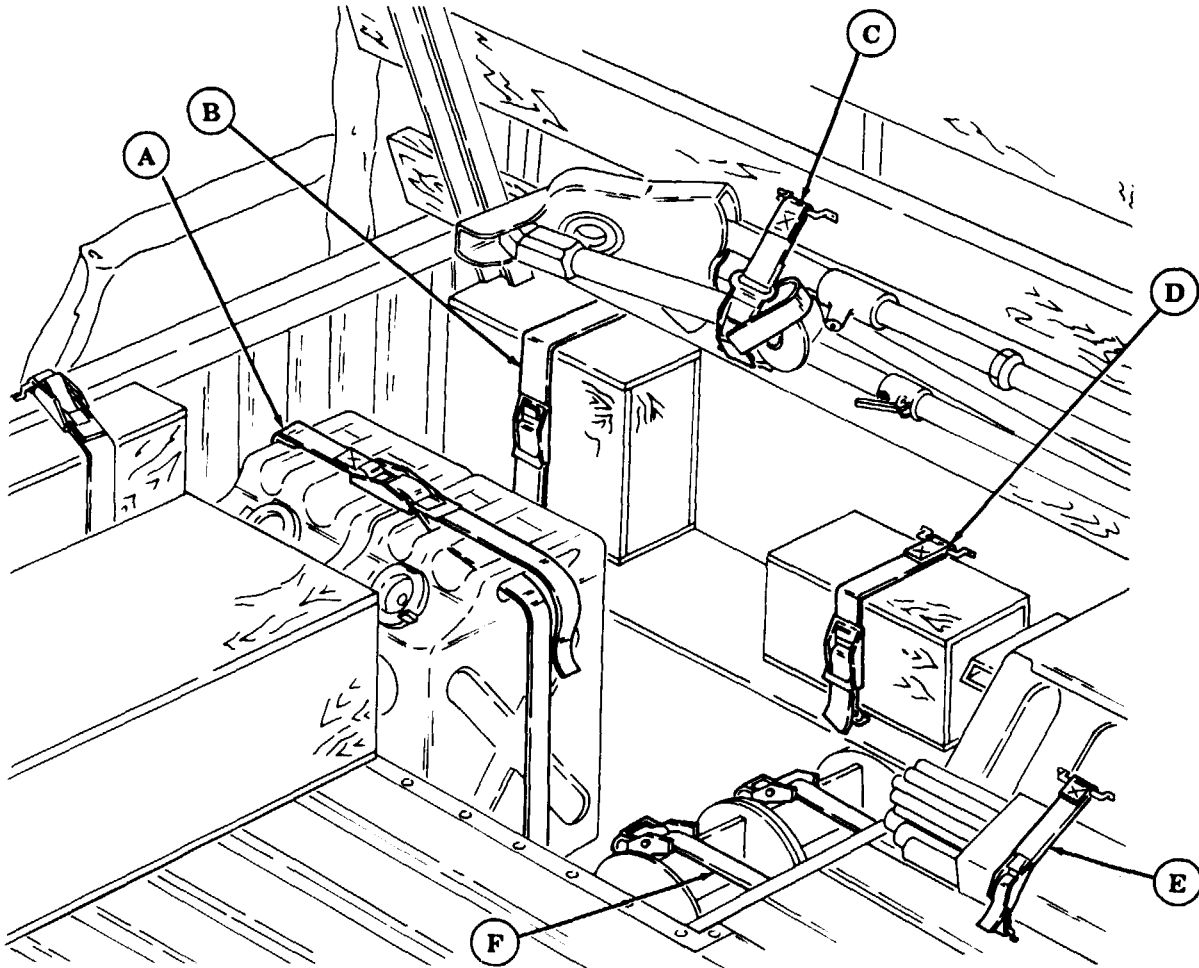
The stowage racks and tiedown straps covered in this manual apply to the M1097, M1097A1, M1097A2, and M1123 vehicles and consist of the following major components:

- (A) **AMMO STOWAGE RACK AND AMMO STRAP ASSEMBLY** — Provides stowage for twenty-two ammunition rounds during transportation and allows quick access to rounds during reload operations.
- (B) **M60 MACHINE GUN STRAPS** (two each) — Secure M60 machine gun on top of ammo rack.
- (C) **JACK STRUT SPRING CLIPS** (two each) — Secure jack strut on top of ammo rack.
- (D) **PARALLELOSCOPE SPIKE CLIPS** (four each) — Secure two aiming stacks on top of ammo rack.
- (E) **SIGHT BOX #1 STRAPS** (two each) — Secure sight box #1 to cargo floor in front of ammo rack.
- (F) **SIGHT BOX #2 STRAP** — Secure sight box #2 to cargo floor in front of ammo rack.
- (G) **SPADE STRAPS** (two each) — Secure spade on cargo floor and against cargo bulkhead.
- (H) **SECTION CHEST STRAPS** (two each) — Secure section box on cargo floor.



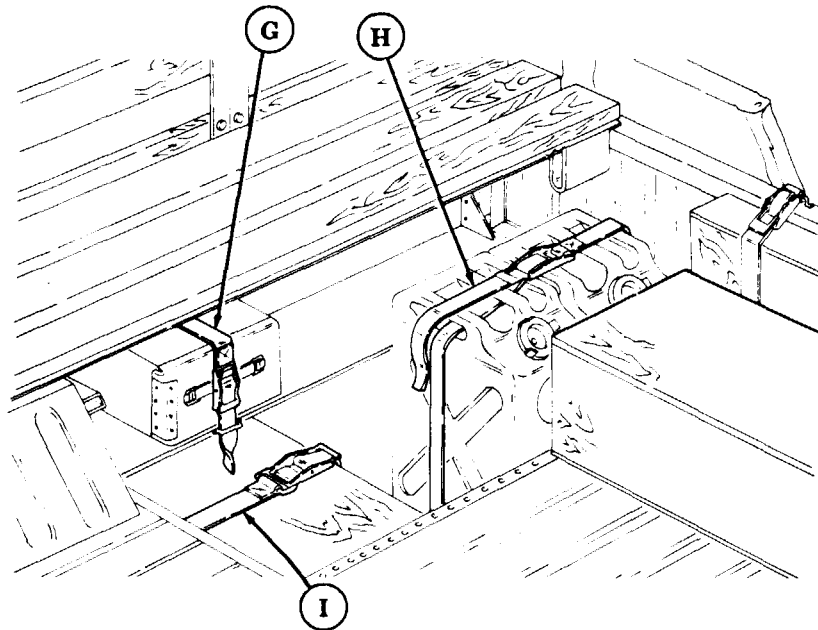
1-33. STOWAGE RACKS AND TIEDOWN STRAPS (Cont'd)

- (A) FUEL CAN STRAP** - Secures fuel cans to cargo bulkhead in front of right footwell.
- (B) REMOTE STRAP** - Secures remote to right fixed door behind companion seat.
- (C) TRIPOD STRAPS (two each)** - Secure tripod to bottom of troop seat.
- (D) TELEPHONE STRAP** - Secures telephone to right fixed door in front of wheelhouse.
- (E) PARALLELOSCOPE AIMING POST STRAPS (three each)** - Secure paralleloscope and aiming posts to cargo floor and right wheelhouse.
- (F) CABLE REEL STRAPS (two each)** - Secure cable reels to right footwell in front of wheelhouse.

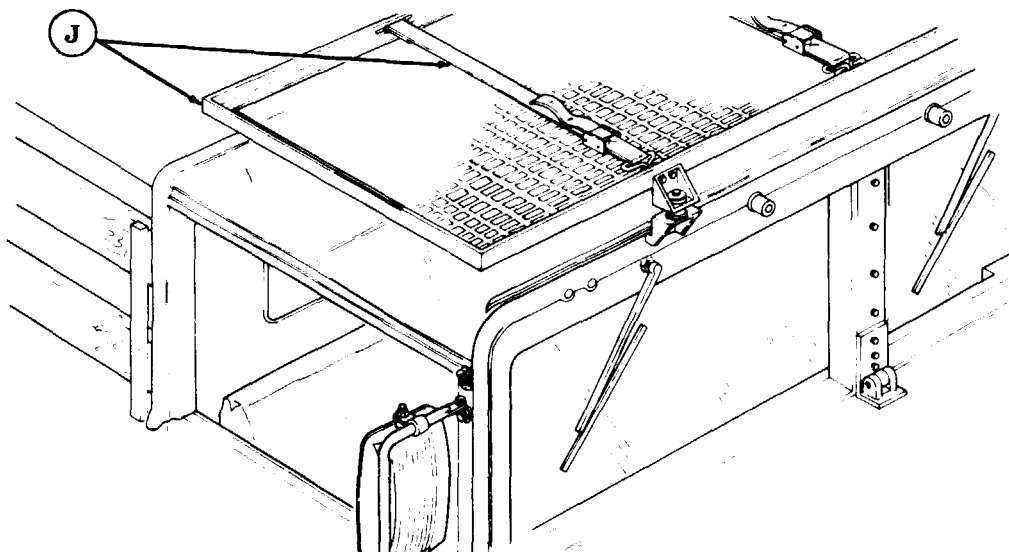


1-33. STOWAGE RACKS AND TIEDOWN STRAPS (Cont'd)

- ⓐ **G.D.U. BATTERY STRAP** - Secures G.D.U. battery to left fixed door in front of wheelhouse.
- ⓑ **WATER CAN STRAP** - Secures water cans to cargo bulkhead in front of left footwell.
- ⓒ **G.D.U. BOX STRAP** - Secures G.D.U. to left footwell in front of wheelhouse.



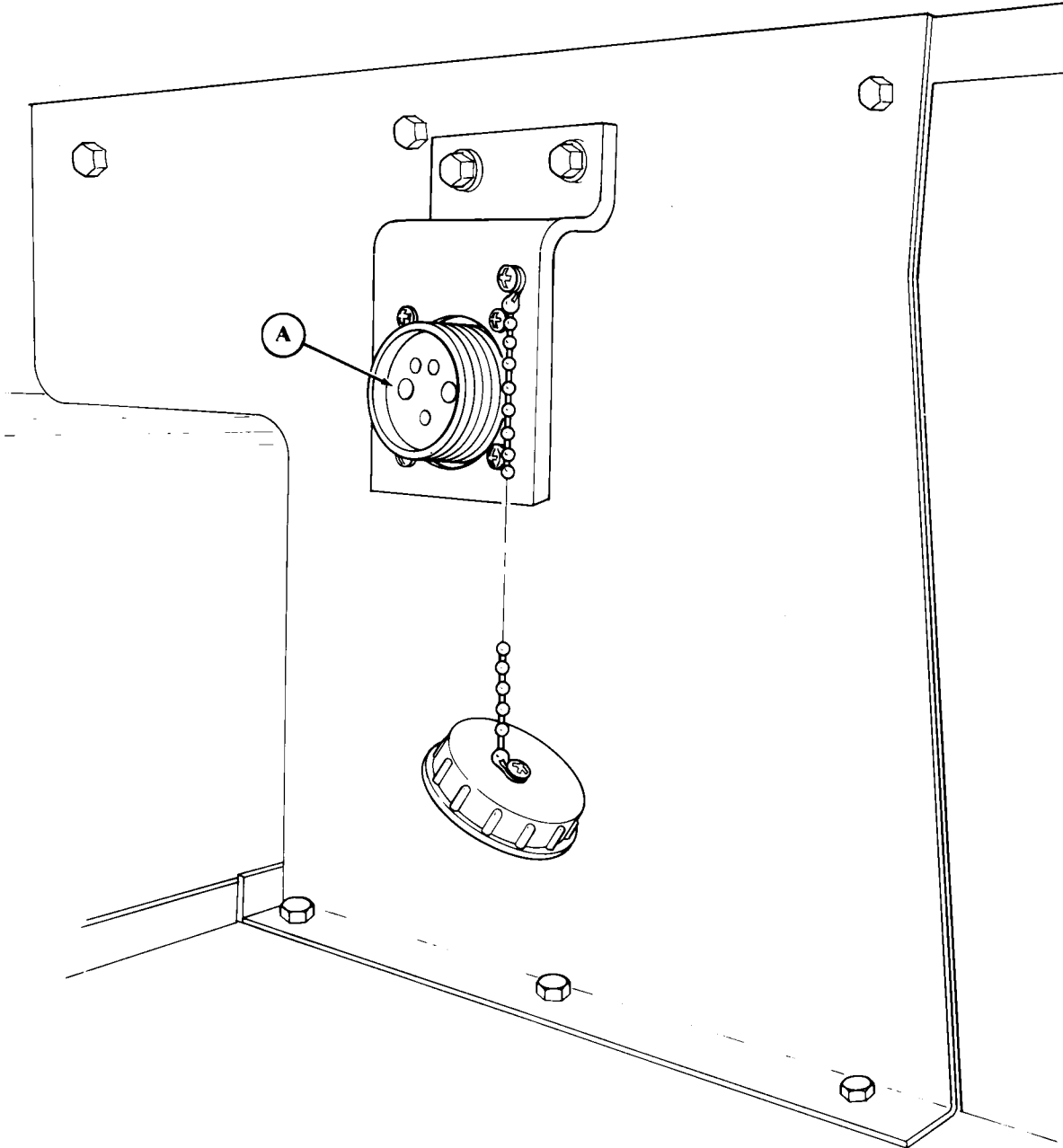
- ⓓ **CAMOUFLAGE STOWAGE RACK AND STRAPS (three)** - Provide stowage for camouflage screen and support system during transportation.



1-34. 200 AMPERE UMBILICAL POWER CABLE

■ The 200 ampere umbilical power cable covered in this manual applies to the M1097A2 and M1123 vehicles and consists of the following major component.

- Ⓐ **POWER CABLE** - Located behind the companion seat provides power for shelter equipment.



CHAPTER 2 SERVICE AND TROUBLESHOOTING INSTRUCTIONS

Section I. REPAIR PARTS, SPECIAL TOOLS, TEST, MEASUREMENT DIAGNOSTIC EQUIPMENT (TMDE), AND SUPPORT EQUIPMENT

2-1. COMMON TOOLS AND EQUIPMENT

For authorized common tools and equipment, refer to the Modified Table of Organization and Equipment (MTOE) applicable to your unit.

2-2. SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT

Special Tools, Test, Measurement, Diagnostic Equipment (TMDE), and Support Equipment used to maintain the vehicles covered in this manual can be found in TM 9-2320-280-24P.

2-3. REPAIR PARTS

Repair parts are listed and illustrated in TM 9-2320-280-24P.

Section II. SERVICE UPON RECEIPT

2-4. GENERAL

a. Upon receipt of a new, used, or reconditioned vehicle, you must determine if the vehicle has been properly prepared for service. The following steps should be followed:

- (1)** Inspect all assemblies, subassemblies, and accessories to be sure they are in proper working order.
 - (2)** Secure, clean, lubricate, or adjust as needed.
 - (3)** Check all Basic Issue Items (TM 9-2320-280-10) to be sure every item is present, in good condition, and properly mounted, or stowed.
 - (4)** Follow general procedures for all services and inspections given in TM 9-2320-280-10.
- b.** The operator will assist when performing service upon receipt inspections.
- c.** See TM 9-2320-280-10 when checking equipment for proper operation.
- d.** Refer to TM 9-2320-280-10 for information concerning brake-in procedures.

2-5. GENERAL INSPECTION AND SERVICING INSTRUCTIONS

The following steps should be taken while performing general inspection and services:

NOTE

Cooler fin and engine protective covers can be used to prevent damage to the vehicle components during maintenance. Refer to Appendix D for fabrication instructions.

- (1)** Use TM 9-2320-280-10 as well as other sections of this manual, when servicing and inspecting equipment.

WARNING

Drycleaning solvent is flammable and will not be used near an open flame. A fire extinguisher will be kept nearby when the solvent is used. Use only in well-ventilated places. Failure to do this may result in injury to personnel and/or damage to equipment.

- (2)** Clean all exterior surfaces coated with rust-preventive compounds. Use drycleaning solvent (Appendix C, Item 18).

(3) Clean fittings before lubrication. Clean parts with drycleaning solvent (SD), type II, or equivalent. Dry before lubricating. Relubricate all items found contaminated after fording.

WARNING

Compressed air used for cleaning purposes will not exceed 30 psi (207 kPa). Use only with effective chip guarding and personal protective equipment such as goggles or shield, gloves, etc.

NOTE

Use compressed air to dry electrical components. Use sealing compound (Appendix C, Item 40) before reconnecting plugs.

(4) Inspect electrical connectors for corrosion and/or damage (i.e., bent pins). Clean and repair damage. Clean electrical components with clean cloth dampened with drycleaning solvent. Care must be taken not to damage protective insulation.

(5) Read "Processing and Deprocessing Record of Shipping, Storage, and Issue of Vehicles and Spare Engines," tag (DD Form 1397) and follow all precautions listed. This tag should be attached to steering wheel, steering column, or rotary switch.

2-6. SPECIFIC INSPECTION AND SERVICING INSTRUCTIONS

The following steps should be taken while performing specific inspections and services:

- (1) Do the Semiannual (S) preventive maintenance checks and services listed in Section III in this chapter.
- (2) Lubricate the vehicle. Do not lubricate gear cases and engine unless processing tag states that the oil is unsuitable for 500 mi (805 km) operation. If oil is suitable, just check level.
- (3) Schedule semiannual service on DD Form 314 (Preventive Maintenance Schedule and Record Card).
- (4) If vehicle is delivered with a dry charged battery, activate it according to TM 9-6140-200-14.
- (5) Check vehicle coolant level and determine if solution is proper for climate (refer to TB 750-651 for preparation of antifreeze solutions).
- (6) Remove towing brackets from their stowed position behind the bumper and install them in their proper location (para. 9-2, 9-3, or 9-4).
- (7) Remove front lifting shackles from stowed position under passenger seat and install on towing brackets (para. 9-13).

Section III. PREVENTIVE MAINTENANCE CHECKS AND SERVICES

2-7. GENERAL

The best way to maintain vehicles covered by this manual is to inspect them on a regular basis so minor faults can be discovered and corrected before they result in serious damage, failure, or injury. All intervals are based on normal operation. Hard time intervals may be shortened if your lubricants are contaminated or if you are operating the equipment under adverse conditions, including longer-than-usual operating hours. Hard time intervals may be extended during periods of low activity, though adequate preservation precautions must be taken. This section contains systematic instructions of inspection, adjustment, lubrication, and correction of vehicle components to avoid costly repairs or major breakdowns. This is Preventive Maintenance Checks and Services (PMCS).

2-8. INTERVALS

a. Unit maintenance, assisted by operator/crew, will perform checks and services contained in Table 2-1 at the following intervals:

- (1) **Semiannually (S)**. Every 6 months or 3,000 miles (4,800 km), whichever comes first.
- (2) **Annually (A)**. Every 12 months or 6,000 miles (9,654 km), whichever comes first.
- (3) **Biennially (B)**. Every 24 months or 12,000 miles (19,308 km), whichever comes first.

b. Refer to following steps when performing lubrication checks and services:

(1) **Intervals.** Lubrication services coincide with the vehicle's Semiannual (S) Preventive Maintenance Service. For this propose, a 10% tolerance (variation) in specified lubrication point mileage is permissible. Those vehicles not accumulating 1,000 mi (1,609 km) in a 6-month period will be lubricated at the time of (S) Preventive Maintenance Service.

(2) **Army Oil Analysis Program (AOAP).** HMMWV engines and transmissions are enrolled in the Army Oil Analysis Program (AOAP). The sampling interval for the engine is every six months or 3,000 miles, or 100 hours (if hour meter is installed) of operation. For the transmission, the sampling interval is every 12 months or 6,000 miles, or 300 hours (if hour meter is installed) of operation.

(3) **For Operation of Equipment in Protracted Cold Temperatures Below -15°F (-26°C).** Remove lubricants prescribed in lubrication table for temperatures above -15°F (-26°C). Relubricate with lubricants specified in lubrication table for temperatures below -15°F (-26°C). If OEA lubricant is required, see the temperature ranges prescribed in the lubrication table. OEA lubricant is to be used in place of OE/HDO 10 lubricant for all temperature ranges where OE/HDO 10 is specified in the lubrication table.

c. Perform all (S) inspections in addition to (A) inspections at the time of the annual inspection. Perform all (A) and (S) inspections in addition to (B) inspections at the time of the biennial inspection.

2-9. REPORTING REPAIRS

All vehicle shortcomings will be reported on DA Form 2404 Equipment Inspection and Maintenance Worksheet or DA Form 5988-E (automated) (DA Pam 738-750) immediately after the PMCS, and before taking corrective action. All vehicle deficiencies will be reported in the equipment record.

2-10. GENERAL SERVICE AND INSPECTION PROCEDURES

a. While performing specific PMCS procedures, make sure items are correctly assembled, secure, not worn, serviceable, not leaking, and adequately lubricated as defined below.

(1) An item is **CORRECTLY ASSEMBLED** when it is in proper position and all parts are present.

(2) When wires, nuts, washers, hoses, or attaching hardware cannot be moved by hand, or wrench, they are **SECURE**.

(3) An item is **WORN** if there is too much play between joining parts or when marking data, warning, and caution plates are not readable.

(4) An item is **UNSERVICEABLE** if it is worn beyond repair and is likely to fail before the next scheduled inspection.

(5) **LEAKS.** TM 9-2320-280-10 contains definitions of Class I, II, and III leaks and their effect on vehicle operation.

(6) If an item meets the specified lubrication requirements, then it is **ADEQUATELY LUBRICATED**.

b. Where the instruction “tighten” appears in a procedure, you must tighten with a wrench to the given torque value even when the item appears to be secure.

WARNING

Drycleaning solvent is flammable and will not be used near an open flame. A fire extinguisher will be kept nearby when the solvent is used. Use only in well-ventilated places. Failure to do this may result in injury to personnel, and/or damage to equipment.

c. Where the instruction “clean” appears in a procedure, you must use drycleaning solvent (Appendix C, Item 18) to clean grease or oil from metal parts. After the item is cleaned, rinsed, and dried, apply a light grade of oil to unprotected surfaces to prevent rusting.

d. Clean rubber and plastic materials with soap and water. Refer to TM 9-2320-280-10 for general vehicle cleaning instructions.

2-11. SPECIFIC PMCS PROCEDURES

a. The preventive maintenance for which you are responsible is provided in Table 2-1. The checks and services listed are arranged in logical order requiring minimal time and effort on your part.

b. The following columns read across on the PMCS schedule:

(1) Item Number. Provides logical order of PMCS performance and is used as a source number for DA Form 2404, on which your PMCS results will be recorded.

(2) Intervals. Shows the interval next to each item number to indicate when that check is to be performed. The interval will be repeated when consecutive item numbers are to be inspected during the same interval. Interval columns include:

(a) Semiannual (six month) checks;

(b) Annual (yearly) checks; and

(c) Biennial (every two years) checks.

(3) Item To Be Inspected. Lists the system, common name, or location of the item to be inspected.

(4) Procedures. Provides instructions for servicing, inspection, lubrication, replacement, or adjustment, and in some cases, having item repaired at a higher level.

NOTE

Always do your preventive maintenance checks and services in the order prepared. Once it gets to be a habit, you will be able to spot anything wrong in a hurry.

(5) Not Fully Mission Capable. If vehicle meets criteria in this column, vehicle is not mission capable (NMC).

Table 2-1. Unit Level Preventive Maintenance Checks and Services HMMWV

ITEM NO.	INTERVAL	ITEM TO BE INSPECTED	PROCEDURES	NOT FULLY MISSION CAPABLE IF:
1	Semi-Annual	Pre-Service Checks	<p style="text-align: center;"><u>PRIOR TO ROAD TEST</u></p> <p>Ensure Operator/Crew has performed PMCS listed in TM 9-2320-280-10.</p> <p style="text-align: center;"><u>ROAD TEST</u></p> <p>Maintenance personnel will be with vehicle operator to assist in performing PMCS checks and verify pre-service checks.</p> <p>a. Notice if starter engages smoothly and turns the engine at normal cranking speed.</p> <p>b. Listen for unusual noise at idle, at operating speed, and under acceleration. Be alert for excessive vibration and the smell of oil, fuel, and exhaust.</p> <p>c. Check for transmission response to shifting and for smoothness of operation in all gear ranges. Be alert for unusual noises and difficulty in shifting in any speed range.</p> <p style="text-align: center;">NOTE</p> <p>If desired range cannot be selected, turn engine off, select range, and re-start engine.</p> <p>d. Check for transfer response to shifting and for smoothness of operation in all gear ranges. Be alert for unusual noises and difficulty in shifting in any gear range.</p> <p>e. Test for response to accelerator feed. Observe for sticking pedal.</p> <p>f. With vehicle speed approximately 5 mph (8 kph) turn steering wheel to left, then right, to detect hard steering, steering backlash, or shimmy. Vehicle should respond instantly. With vehicle moving on straight, level terrain, lightly hold steering wheel to check for pull and wandering.</p> <p>g. Apply brake pedal with steady force. Vehicle should slow and stop without pulling to one side or jerking. Release brake pedal. The brakes should release immediately and without difficulty.</p>	<p>a. Starter inoperative or makes excessive grinding sound.</p> <p>b. Engine knocks, rattles, or smokes excessively.</p> <p>c. Transmission shifts improperly, does not shift, or makes excessive noises.</p> <p>d. Lever inoperable or does not engage in all ranges with engine not running.</p> <p>e. Pedal sticking or binding.</p> <p>f. Steering binds, grabs, wanders, or has excessive freeplay.</p> <p>g. Brakes chatter, pull to one side, or inoperative. Brakes will not release.</p>

Table 2-1. Unit Level Preventive Maintenance Checks and Semites HMMWV (Cont'd)

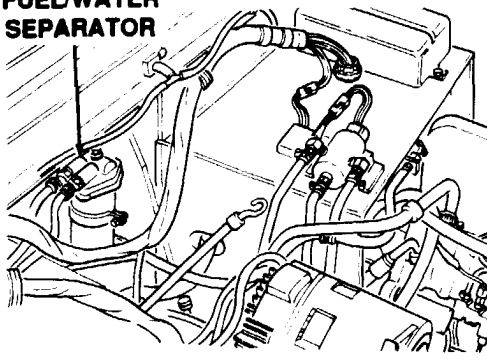
ITEM NO.	INTERVAL	ITEM TO BE INSPECTED	PROCEDURES	NOT FULLY MISSION CAPABLE IF:
1	Semi-Annual	Pre-Service Checks (Cont'd)	<p>h. Bring vehicle to full stop. Engage parking brake while transmission is still in "D" (drive) or "D" (overdrive) for A2 series vehicles. Vehicle should remain stationary.</p> <p>i. Observe vehicle response to road shock. Side sway or continuous bouncing indicates a malfunction.</p>	<p>h. Parking brake doesn't hold vehicle stationary.</p>
2	Semi-Annual	Body	<p style="text-align: center;">AFTER ROAD TEST</p> <p>a. Make sure the vehicle has been cleaned of mud, gravel, etc., from the underbody, outside, and crew compartment area.</p> <p>b. Thoroughly wash all underbody sheet metal panels and corners.</p> <p style="text-align: center;">NOTE</p> <p>Lubricate vehicle in accordance with Lubrication Table.</p> <p>c. Inspect for loose rivets, cracks, loose or missing bolts and general body damage.</p>	<p>c. Any body damage that would hinder vehicle operation.</p>
3	Semi-Annual	Fuel System	<p>a. Inspect fuel filter/water separator assembly for dents and cracks that could cause leaks.</p> <p>b. Inspect fuel injection pump, nozzle lines, and fittings for leaks and damage.</p> <p>c. Inspect rear fuel injector nozzle rubber cap for presence and condition.</p> <p style="text-align: center;">FUEL/WATER SEPARATOR</p> 	<p>a. Any class III fuel leak.</p> <p>b. Any class III leak. Any nozzle loose or damaged.</p> <p>c. Rubber cap missing or damaged.</p>

Table 2-1. Unit Level Preventive Maintenance Checks and Services HMMWV (Cont'd)

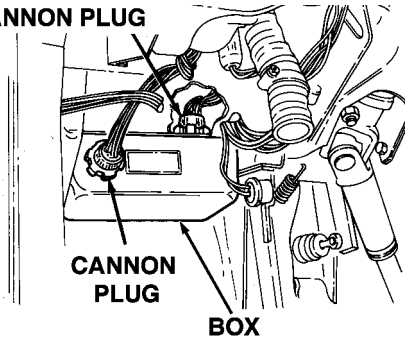
ITEM NO.	INTERVAL	ITEM TO BE INSPECTED	PROCEDURES	NOT FULLY MISSION CAPABLE IF:
3	Semi-Annual	Fuel System (Cont'd)	<p>d. Inspect all fuel lines for loose connections, splits, cracks, and bends that could leak.</p> <p>e. Disconnect leads from each glow plug (paragraph 3-38) and check for resistance between glow plug terminal and ground. Continuity should be present.</p> <p>f. Check each glow plug for looseness and damage. Tighten each plug to 8-12 lb-ft (11-16 N•m).</p> <p>g. Check locknut on body mounts. Proper torque 90 lb-ft (122 N•m).</p> <p>h. Check the fuel tank for propeller shaft rub marks and damage. Ensure straps are properly installed in fuel tank slots. Tighten strap locknuts to 23-27 lb-in. (2.6 - 3 N•m).</p>	<p>d. Any class III leak.</p> <p>e. Continuity is not present.</p> <p>f. Glow plugs are loose or damaged.</p> <p>g. Body mounts loose.</p> <p>h. Any class III fuel leak or tank strap improperly installed or loose.</p>
4	Semi-Annual Belt	Engine Accessory Drive and Serpentine	<p>a. Check for missing, broken, cracked, and frayed drivebelts. Ensure serpentine drivebelt has not moved out of place on pulley.</p> <p>b. (All models except M1123 and "A2" vehicles). Check all drivebelts tension using belt tension gauge. Belt tension should be 70 lbs (311 N) minimum. If belt tension is not at least 70 lbs (311 N), adjust drivebelts (paragraph 3-82). Tension should not be greater than 110 lbs (489 N) for new belts; old belts 95 lbs (422 N).</p>	<p>a. Any drivebelt is missing, broken, frayed, or dry-rotted. Belt fiber has more than one crack 1/8 in. (3.2 mm) in depth or 50% of belt thickness) or has frays more than 2 in. (51 mm) long. Serpentine belt has moved out of place on pulleys.</p> <p>b. Tension below 70 lbs (311 N), or greater than 110 lbs (489 N) new belt and 95 lbs (422 N) old belts.</p>
5	Semi-Annual	Protective Control Box	<p>a. Inspect four nuts for security of mounting.</p> <p>b. Ensure cannon plugs are securely connected to box.</p> 	<p>a. Mounting not secure, four nuts loose.</p>

Table 2-1. Unit Level Preventive Maintenance Checks and Services HMMWV (Cont'd)

ITEM NO.	INTERVAL	ITEM TO BE INSPECTED	PROCEDURES	NOT FULLY MISSION CAPABLE IF:
6	Semi-Annual	Cooling System	<p style="text-align: center;"><u>WARNING</u></p> <p>If vehicle has been operating, use extreme care to avoid being burned when removing cooling system radiator cap. Use heavy rags or gloves to protect hands. Turn radiator cap only one-half turn counterclockwise and allow pressure to be released before fully removing cap.</p> <p style="text-align: center;">NOTE</p> <p>Ž Coolant level is correct when coolant recovery tank is full TM 9-2320-280-10). Ž Use MIL-A-46153 in temperatures above 0°F (-18°C) and MIL-A-11755 in temperature below 0°F (-18°C).</p> <p>a. Check coolant condition. Test coolant to see if draining is necessary (TB 750-651).</p> <p>b. Inspect surge tank, radiator shroud, power steering cooler, oil cooler, all hoses, quick disconnects and fittings for security of mounting, leaks, and deterioration. Inspect and clean as necessary the radiator and oil cooler cores.</p>	<p>a. Coolant condition/testing shows draining is required.</p> <p>b. Any class III water leak. Hoses cracked or dry rotted.</p>

Table 2-1. Unit Level Preventive Maintenance Checks and Services HMMWV (Cont'd)

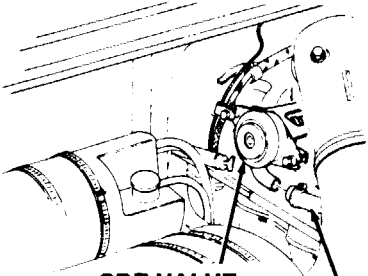
ITEM NO.	INTERVAL	ITEM TO BE INSPECTED	PROCEDURES	NOT FULLY MISSION CAPABLE IF:
7	Semi-Annual	Air-Intake System	<p style="text-align: center;"><u>WARNING</u></p> <p>If NBC exposure is suspected, all air filter media should be handled by personnel wearing protective equipment. Consult your unit NBC officer or NBC NCO for appropriate handling or disposal instructions.</p> <p>a. Inspect and clean air cleaner element and housing (para. 3-13).</p> <p>b. Check CDR valve oil saturation. Disconnect CDR valve oil fill tube hose from CDR valve and inspect. Some oil accumulation in the CDR valve is acceptable. Correct CDR function is determined by checking vacuum with a water manometer. (para. 3-9a).</p> <p style="text-align: center;"><u>CAUTION</u></p> <p>Do not clean CDR valve with solvent. This will damage the diaphragm inside the CDR valve. Wiping with a rag is the only authorized method of cleaning.</p> <p>c. Remove and wipe off the CDR valve and hoses with a rag.</p> <div style="text-align: center;">  <p>CDR VALVE TUBE HOSE</p> </div>	<p>b. CDR fails water manometer vacuum test.</p>

Table 2-1. Unit Level Preventive Maintenance Checks and Services HMMWV (Cont'd)

ITEM NO.	INTERVAL	ITEM TO BE INSPECTED	PROCEDURES	NOT FULLY MISSION CAPABLE IF:
8	Semi-Annual	60, 100, and 200 Amp Alternators	<p>a. Inspect alternator and voltage regulator (200 amp only) for condition, proper installation, and security of mounting.</p> <p>b. Inspect electrical wiring for broken strands, frayed, cracked or worn insulation, and loose connections.</p> <p>c. Deleted</p> <p>d. Check alternator mounting bolts for security of mounting. Tighten bolts to 40 lb-ft (54 N•m).</p>	<p>a. Mounting bolts missing or alternator damaged.</p> <p>b. Wiring frayed, broken, or loose connections.</p> <p>d. Any alternator mounting bolt is loose.</p>
9	Semi-Annual	Accelerator Linkage	Inspect for bends, excessive play, cracks, and damage that could cause failure.	Linkage damaged, bent, or cracked.
10	Semi-Annual	Suspension and Steering System	<p style="text-align: center;">NOTE</p> <p>If access to locknut is a problem, remove geared hub from control arm (para. 6-11).</p> <p>a. Remove wheel and tire assembly (para. 8-3). Check front and rear lower ball joint mounting. For M996, M997, M1042, M1037, M1097, M1123, and “A1” and “A2” series vehicles, tighten rear lower ball joint to lower control arm locknuts to 60 lb-ft (81 N•m) and front to 35 lb-ft (48 N•m). All other models, tighten front and rear lower ball joint to lower control arm locknuts to 35 lb-ft (48 N•m) and ensure cotter pin is present. Tighten ball joint slotted nut to 73 lb-ft (99 N•m) and ensure cotter pin is present.</p> <p>b. Check front and rear upper ball joint mounting. Tighten upper ball joint to upper control arm locknuts to 21 lb-ft 29 (N•m). Tighten upper control arm to control arm bracket locknuts to 260 lb-ft (353 N•m) . Tighten ball joint slotted nut to 65 lb-ft (88 N•m) and ensure cotter pin is present.</p> <p style="text-align: center;">NOTE</p> <p>Do not over lubricate ball joints, one or two shots is adequate.</p> <p>c. Lubricate front and rear upper ball joints with GAA.</p>	<p>a. Capscrews or locknuts are finger or hand turnable.</p> <p>b. Capscrews or locknuts are finger or hand turnable.</p>

Table 2-1. Unit Level Preventive Maintenance Checks and Services HMMWV (Cont'd)

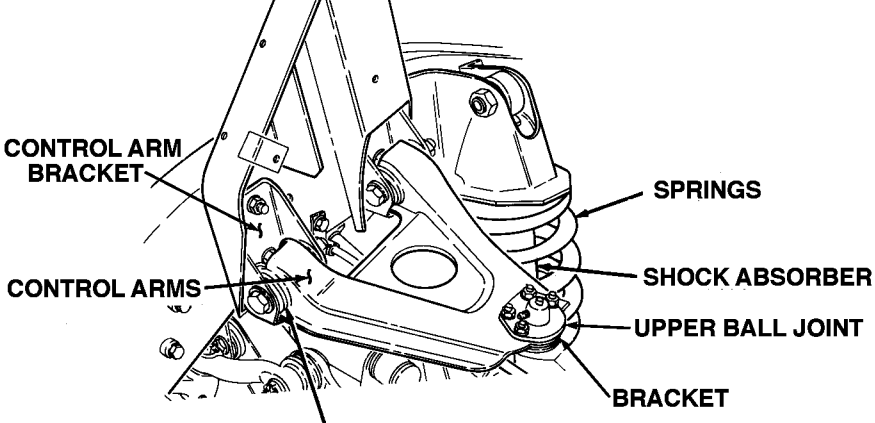
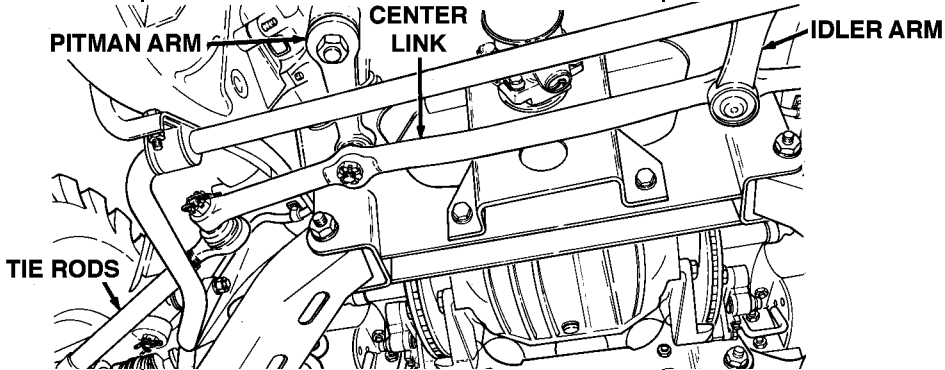
ITEM NO.	INTERVAL	ITEM TO BE INSPECTED	PROCEDURES	NOT FULLY MISSION CAPABLE IF:
10	Semi-Annual	Suspension and Steering System (Cont'd)	<p style="text-align: center;">NOTE</p> <p>Do not lubricate shock absorber bushings, radius rod bushings, stabilizer bar bushing, or suspension arm pivot bushing.</p> <p>d. Inspect control arms, control arm bushings, springs, shock absorbers, and bracket for damage.</p>  <p style="text-align: center;">CONTROL ARM BUSHINGS</p> <p>e. Inspect steering column U-joints, tie rods or radius rods, pitman arm, center link, and idler arm for breaks, cracks, and wear.</p>  <p>e.1. Inspect steering column for security of mounting hardware.</p> <p>f. Inspect steering gear for mounting security. Tighten mounting bolts to 60 lb-ft (81 N·m).</p>	<p>d. Control arm bent, bushing worn or obvious damage that would hinder operation.</p> <p>e. U-joints, tie rods, pitman arm or idler arm are worn or cracked.</p> <p>e.1. Steering column is not secure.</p> <p>f. Any mounting bolt missing or unserviceable.</p>

Table 2-1. Unit Level Preventive Maintenance Checks and Services HMMWV (Cont'd)

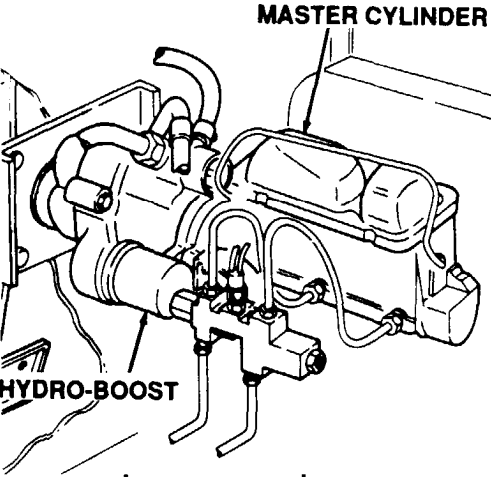
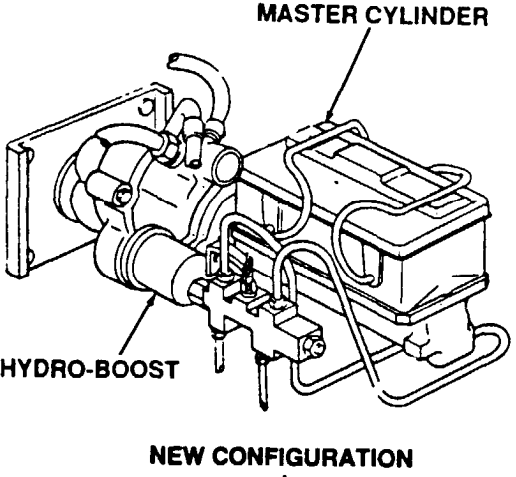
ITEM NO.	INTERVAL	ITEM TO BE INSPECTED	PROCEDURES	NOT FULLY MISSION CAPABLE IF:
10	Semi-Annual	Suspension and Steering System (Cont'd)	g. Inspect power steering pump, power steering gear, hydraulic control valve, hoses, lines, and fittings for leaks or damage.	g. Any class III leak Any component damaged.
11	Semi-Annual	Brake System	a. Inspect master cylinder, hydro-boost, lines, and fittings for leaks and damage.	a. Any leak. Plugged, broken, or damaged lines and fittings.
				
			<p style="text-align: center;">CAUTION</p> <ul style="list-style-type: none"> • Use MIL-B-46176, Silicone Brake Fluid (BFS), for filling master brake cylinder. Failure to use BFS will cause damage to brake cylinder. • Thoroughly clean exterior of master cylinder cover before removing cover (table 2-1). Dirt, water, or grease will contaminate brake fluid causing brake system damage. • Do not use screwdriver to remove cover. Damage to bail wire will result. • To prevent excessive fluid spillage, ensure that rubber diaphragm is completely seated before installing cover to master cylinder. <p style="text-align: center;">NOTE</p> <p>Remove cover from brake master cylinder by moving bail wire using thumb pressure only.</p> <p>b. Check master brake cylinder fluid level. Level should be 1/8 inch (3.2 mm) from top of master cylinder reservoirs. Fill with BFS as necessary.</p>	<p>b. Level below 1/8 inch (3.2 mm) from top of master cylinder reservoir.</p>

Table 2-1. Unit Level Preventive Maintenance Checks and Services HMMWV (Cont'd)

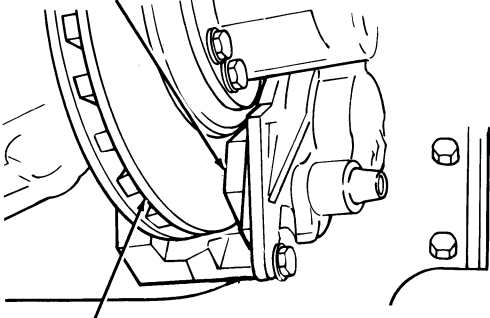
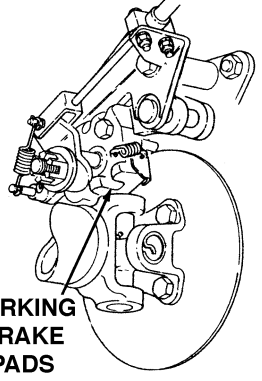
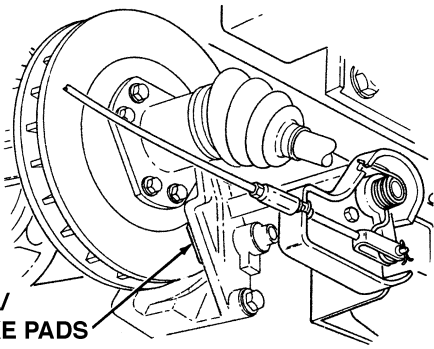
ITEM NO.	INTERVAL	ITEM TO BE INSPECTED	PROCEDURES	NOT FULLY MISSION CAPABLE IF:
11	Semi-Annual	Brake System (Cont'd)	<p>c. Inspect service brake pads and rotor disks for wear (para. 7-11).</p> <p style="text-align: center;">SERVICE BRAKE PADS</p>  <p style="text-align: center;">ROTOR DISK</p> <p>d. Inspect parking brake pads and rotor disk for wear (para. 7-3).</p>  <p style="text-align: center;">PARKING BRAKE PADS</p> <p>d.1. Inspect brake calipers and mounting hardware for damage or loose hardware.</p>  <p style="text-align: center;">SERVICE/ PARKING BRAKE PADS</p> <p>e. Inspect dual service/park brake pads and rotor for wear (para. 7-21).</p>	<p>c. Service brake pads less than 1/8 inch (3.2 mm).</p> <p>d. Parking brake pads less than 1/8 inch (3.2 mm).</p> <p>d.1. Brake calipers are damaged or mounting bolts are loose.</p> <p>e. Brake pads less than 1/8 inch (3.2 mm).</p>

Table 2-1. Unit Level Preventive Maintenance Checks and Services HMMWV (Cont'd)

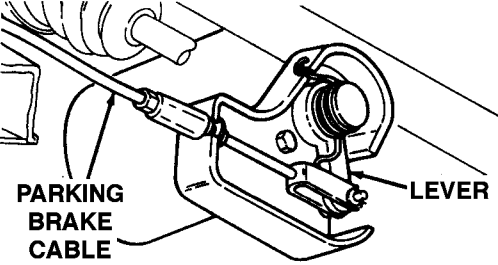
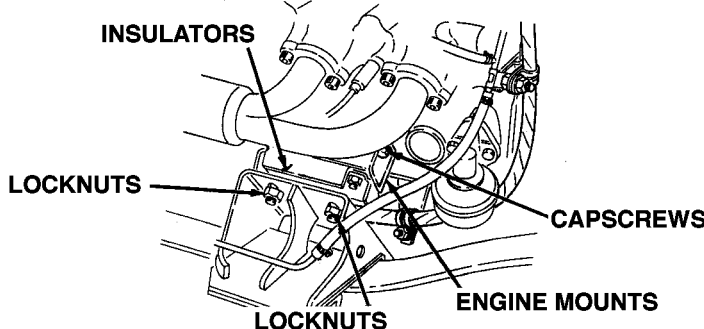
ITEM NO.	INTERVAL	ITEM TO BE INSPECTED	PROCEDURES	NOT FULLY MISSION CAPABLE IF:
11	Semi-Annual	Brake System (Cont'd)	<p>f. Inspect parking brake cable, cable clip, lever, spring, and pushrod/guide pin for binding and loose components.</p>  <p>PARKING BRAKE CABLE LEVER</p> <p>g. On vehicles equipped with a single parking brake assembly mounted between the rear prop shaft and rear differential, lubricate parking brake lever, parking brake cam, parking brake push pins, and parking brake guide pins with WTR. On vehicles equipped with a left and right parking/service brake assembly mounted between the rear axle half-shafts and rear differential, lubricate the parking brake lever with WTR. The parking/service brake assembly needs no lubrication.</p> <p>h. Inspect rear parking brake cables for damage and/or chaffing in the area of the control arm. If cables are damaged, replace cables (paragraph 7-23 or 7-24).</p> <p>i. Inspect for presence of, or damage to, parking brake cable clamps.</p>	<p>f. Parking brake binding or cable frayed or broken. Spring or cable clip missing.</p> <p>h. Parking brake binding or cable frayed or broken.</p>
12	Semi-Annual	Engine and Transmission Mounts	<p>a. Inspect engine mounts and insulators for loose, worn, and damaged condition.</p> <p>b. Check for loose or missing engine mount capscrews and locknuts. If engine mount capscrews or locknuts are loose or missing, notify DS maintenance.</p>  <p>INSULATORS LOCKNUTS CAPSCREWS ENGINE MOUNTS</p>	<p>a. Engine mounts or insulators cracked, damaged, loose, or worn.</p> <p>b. Capscrews or locknuts, loose or missing.</p>

Table 2-1. Unit Level Preventive Maintenance Checks and Services HMMWV (Cont'd)

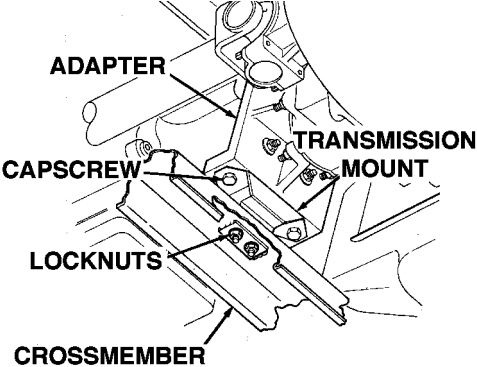
ITEM NO.	INTERVAL	ITEM TO BE INSPECTED	PROCEDURES	NOT FULLY MISSION CAPABLE IF:
12	Semi-Annual	Engine and Transmission Mount (Cont'd)	<p>c. Using 3/4 inch torque adapter (reefer to Appendix B, Item 145), tighten two capscrews securing transmission mount to adapter to 65 lb-ft (88 N•m). Tighten two locknuts securing transmission mount to crossmember to 28 lb-ft (38 N•m).</p> 	c. Transmission mount loose, cracked, or damaged.
13	Semi-Annual	Starter	<p>CAUTION Disconnect negative cable.</p> <p>a. Inspect starter for mounting security. Tighten mounting bolts to 40 lb-ft (54 N•m).</p> <p>b. Inspect cables and studs for loose nuts and damage.</p>	<p>a. Mounting bolt missing or will not torque.</p> <p>b. Stud nut loose.</p>
13.1	Semi-Annual	Neutral Start Safety Switch	<p>WARNING Ensure vehicle parking brake is set, wheels are chocked, and rotary switch is in the ENG STOP position. Failure to comply may result in injury to personnel and/or damage to equipment.</p> <p>a. Disconnect wires 14A and 14B from wires 14 at neutral start safety switch.</p> <p>b. Check for continuity of neutral start safety switch.</p> <p>(1) With transmission shift lever in N (neutral), or P (park) (for M1123, A2 series, and up-armor models only), continuity should be present between wires 14 at neutral start safety switch.</p>	Neutral start safety switch is malfunctioning.

Table 2-1. Unit Level Preventive Maintenance Checks and Services HMMWV (Cont'd)

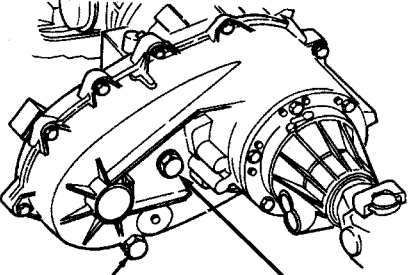
ITEM NO.	INTERVAL	ITEM TO BE INSPECTED	PROCEDURES	NOT FULLY MISSION CAPABLE IF:
13.1	Semi-Annual	Neutral Start Safety Switch (Cont'd)	<p>(2) Place transmission shift lever in D (drive). There should be no continuity present between wires 14. If continuity is present, replace neutral start safety switch (para. 5-6).</p> <p>c. Connect wires 14A and 14B to wires 14 at neutral start safety switch.</p>	
14	Semi-Annual	Transmission	<p>a. Inspect vent lines and connectors for security, cracks, and deterioration.</p> <p>b. Inspect transmission shift linkage for bends, excessive play, cracks, and damage that could cause failure.</p>	<p>a. Vent line cracked, plugged, or missing.</p> <p>b. Shift linkage is unserviceable.</p>
15	Semi-Annual	Transfer	<p>a. Inspect transfer case vent lines and connectors for security, cracks, and deterioration.</p> <p>b. Inspect transfer case shift linkage for bends, excessive play, cracks, and damage that could cause failure.</p> <p style="text-align: center;">CAUTION</p> <p>Use Dexron® II for filling transfer case. Failure to use Dexron® II will cause damage to transfer case.</p> <p>c. Check transfer case fluid level every 3,000 (4,800 km) or semiannually, whichever occurs first. Remove fill plug and gasket. Level should be within 1/2 in. (12.7 mm) of fill plug opening when vehicle is on level ground. Install fill plug and gasket, and tighten to 35 lb-ft (47 N·m).</p> <div style="text-align: center;">  <p>TRANSFER CASE DRAIN TRANSFER CASE CHECK AND FILL</p> </div>	<p>a. Vent line cracked, plugged or missing. Shift linkage is unserviceable.</p>

Table 2-1. Unit Level Preventive Maintenance Checks and Services HMMWV (Cont'd)

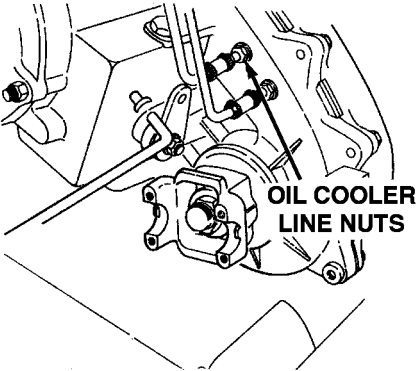
ITEM NO.	INTERVAL	ITEM TO BE INSPECTED	PROCEDURES	NOT FULLY MISSION CAPABLE IF:
15	Semi-Annual	Transfer (Cont'd)	<p style="text-align: center;">NOTE</p> <p>Do not overtorque retaining nuts.</p> <p>d. Inspect oil cooler lines for leaks or damage. Check for loose oil cooler line nuts and damage to the spiral wrap on the cooler line. If oil cooler line nuts are loose, hold end of oil cooler stationary, and tighten line nuts to 194-212 lb-in. (22-24 N.m)</p> 	<p>d. Any class III oil leak or damage to spiral wrap.</p>
16	Semi-Annual	Driveline Components	<p>a. Inspect geared hub vent lines and connectors for security, cracks, and deterioration.</p> <p>b. Inspect geared hub for leaking seals and damage.</p> <p style="text-align: center;">CAUTION</p> <p>Change geared hub and differential lubricants when required by maintenance repair action, contaminated by water or foreign material, or if lubricant appears by smell, feel, or visual indication to be overheated.</p> <p style="text-align: center;">NOTE</p> <ul style="list-style-type: none"> • Fill each axle differential with 2 quarts (1.9 L) of GO. • Fill each geared hub with 1 pint (0.5 L) of GO. <p>c. Adjust spindle bearing (paragraph 6-14).</p> <p>d. Inspect differential vent lines and connectors for security, cracks, and deterioration.</p> <p>e. Inspect differentials for leaking seals and cracks.</p>	<p>a. Hub vent lines cracked, plugged, or missing.</p> <p>b. Class III leaks or damage.</p> <p>c. Bearing damaged.</p> <p>d. Differential vent line has hole, plugged, or cracked.</p> <p>e. Class III leak.</p>

Table 2-1. Unit Level Preventive Maintenance Checks and Services HMMWV (Cont'd)

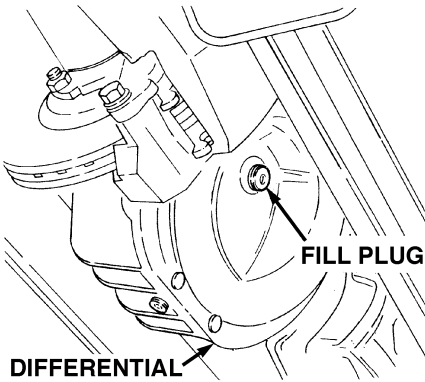
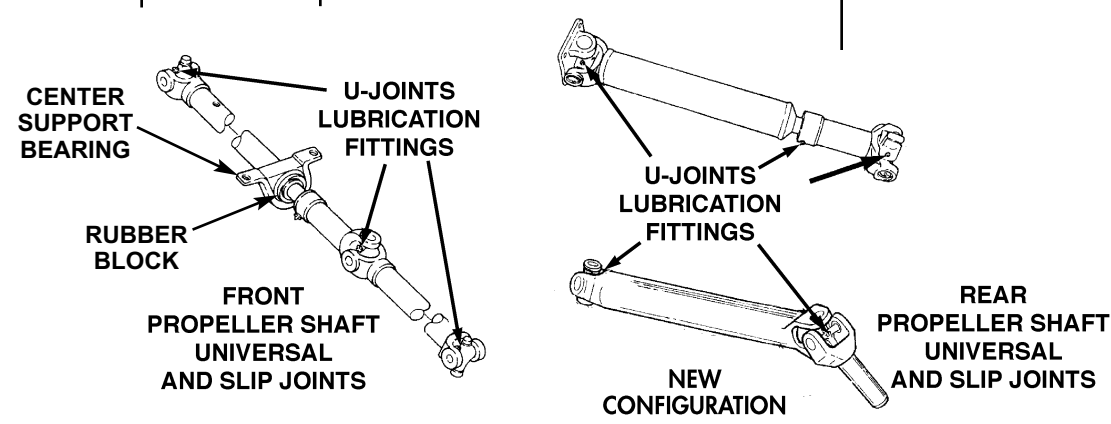
ITEM NO.	INTERVAL	ITEM TO BE INSPECTED	PROCEDURES	NOT FULLY MISSION CAPABLE IF:
16	Semi-Annual	Driveline Components (Cont'd)	<p>f. M998, M998A1, and M1121 series vehicles – Check differential lubricant level semiannually or every (3,000 miles) (4,830 km). M998A2 and M1123 series vehicles – Change differential lubricant semiannually or every 3,000 miles (4,830 km). Differential level should be within 1/4 inch (6.4 mm) of fill plug opening when lubricant is cold or to plug level when hot.</p>  <p>g. Inspect U-joints for damage, free play, and missing or unserviceable lubrication fittings.</p> <p>h. Tighten front prop shaft mounting capscrews to 13-18 lb-ft (18-24 N·m) and center support capscrews to 60 lb-ft (81 N·m). Tighten rear prop shaft capscrews to 13-18 lb-ft (18-24 N·m) and tighten U-bolt nuts to 21 lb-ft (29 N·m).</p> <p>i. Inspect rubber block and center support bearing for wear and wobble in propeller shaft.</p>	<p>f. Lube level not within 1/4 inch (6.4 mm) of fill plug opening when cold or to plug level when hot.</p> <p>g. U-joint is damaged, unserviceable, or missing lubrication fitting.</p> <p>h. Loose, missing, or broken capscrews.</p> <p>i. Rubber block or center support bearing is worn or propeller shaft wobbles.</p>
				

Table 2-1. Unit Level Preventive Maintenance Checks and Services HMMWV (Cont'd)

ITEM NO.	INTERVAL	ITEM TO BE INSPECTED	PROCEDURES	NOT FULLY MISSION CAPABLE IF:
16	Semi-Annual	Driveline Components (Cont'd)	j. Tighten halfshaft mounting bolts to 48 lb-ft (65 N•m).	j. Loose, missing, or broken bolts.
17	Semi-Annual	Exhaust Components	Inspect for cracked and loose pipes, muffler, and hangers. Check for exhaust leaks.	Cracked, loose, or holes in pipes or muffler. Exhaust leak.
18	Semi-Annual	Frame and Crossmembers	<p>a. Inspect frame side rails for cracks, breaks, bends, wear, deterioration, and missing or loose fasteners.</p> <p>b. Inspect crossmembers for cracks, breaks, bends, deterioration, and loose or missing fasteners.</p> <p>c. Inspect for missing, broken, bent, or loose bumper supports before towing a trailer.</p>	<p>a. Any loose or missing fasteners, cracks, bends, or breaks in frame.</p> <p>b. Any loose or missing fasteners. Cracks, bends (bends are defined as a condition that would affect vehicle operation) or breaks in crossmembers.</p> <p>c. Any missing, broken, bent, or loose bumper supports.</p>
19	Semi-Annual	Tires	<p style="text-align: center;"><u>WARNING</u></p> <ul style="list-style-type: none"> • Changing tire pressures or wheel alignment, out of the recommended specification, may adversely affect the vehicle's handling characteristics. Loss of vehicle control may result in serious injury or death and damage to equipment. • Radial and bias ply tires should not be mixed on the same vehicle. Injury to personnel and damage to equipment may result. <p style="text-align: center;"><u>NOTE</u></p> <p>Vehicle must be up on jack stands for the following checks.</p> <p>a. Check tread depth of tires with tire gauge. If tread depth is less than 1/16 in. (1.59 mm), replace tire in approximately 400 miles (644 km), bias tires will wear 1/32 in. (0.79 mm), radial tires will take approximately 1,300 miles (2092 km) to wear 1/32 in. (0.79 mm). If mission will require the vehicle to travel this distance within a month, replace tire if it measures 3/32 in. (2.38 mm).</p>	<p>a. Tread depth is less than 1/16 in. (1.59 mm).</p>

Table 2-1. Unit Level Preventive Maintenance Checks and Services HMMWV (Cont'd)

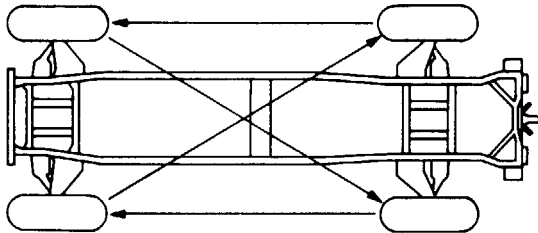
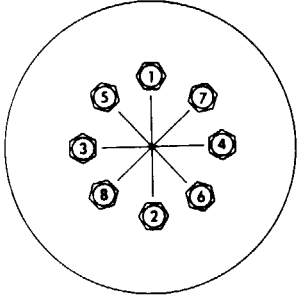
ITEM NO.	INTERVAL	ITEM TO BE INSPECTED	PROCEDURES	NOT FULLY MISSION CAPABLE IF:
19	Semi-Annual	Tires (Cont'd)	<p>b. Inspect tires for uneven wear and balance (paragraph 8-9). For normal wear, rotate tires as shown in rotation diagram. The vehicle's wheel alignment is optimally designed for GVW operation. Operating the vehicle without a load can cause excessive wear on the outer edge of the tread pattern. If this pattern develops, turn tires around on the rim (para. 8-4).</p> <p>c. Rotate tires as diagram shows.</p> <p style="text-align: center;">ROTATION DIAGRAM</p>  <p>d. Tighten wheel lug nuts to 90-110 lb-ft (122-149 N•m) in tightening sequence shown.</p> <p style="text-align: center;">TIGHTENING SEQUENCE</p> 	<p>b. Tires exhibit excessive or uneven wear or balance.</p> <p>d. Any broken studs, loose or missing lug nuts.</p>

Table 2-1. Unit Level Preventive Maintenance Checks and Services HMMWV (Cont'd)

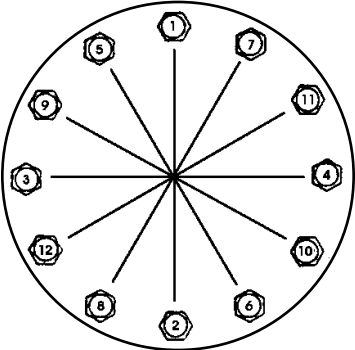
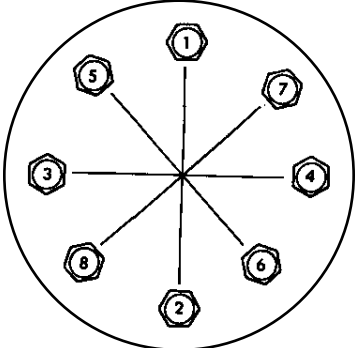
ITEM NO.	INTERVAL	ITEM TO BE INSPECTED	PROCEDURES	NOT FULLY MISSION CAPABLE IF:
19	Semi-Annual	Tires (Cont'd)	<p>e. Check for loose, missing, or broken wheel studs and nuts.</p> <p>CAUTION Prior to checking torque, the tire assembly must be deflated.</p> <p>(1) Release air pressure from tire (para. 8-4 or 8-5).</p> <p>CAUTION Tighten locknuts gradually to avoid bent and broken studs, or damage to wheel components will result.</p> <p>(2) Wheel configurations:</p> <p>(a) 12-bolt configuration – Tighten locknuts to 85 lb-ft (115 N•m) in sequence shown; repeat torque sequence at 125 lb-ft (170 N•m).</p> <p>12-BOLT TIGHTENING SEQUENCE</p>  <p>(b) 8-bolt configuration – Tighten locknuts to 55 lb-ft (75 N•m) in sequence shown; repeat torque sequence at 65 lb-ft (88 N•m).</p> <p>8-BOLT TIGHTENING SEQUENCE</p>  <p>(3) Inflate tire to recommended tire pressure (TM 9-2320-280-10).</p>	e. Any broken studs, or loose or missing wheel nuts.

Table 2-1. Unit Level Preventive Maintenance Checks and Services HMMWV (Cont'd)

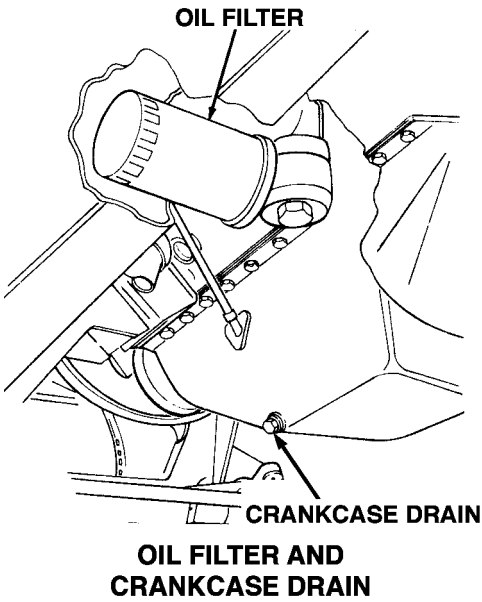
ITEM NO.	INTERVAL	ITEM TO BE INSPECTED	PROCEDURES	NOT FULLY MISSION CAPABLE IF:
19	Semi-Annual	Tires (Cont'd)	<p>NOTE If vehicle is new and has been driven less than 3,000 miles (4,800 km), it is not necessary to align wheels unless abnormal handling is reported.</p> <p>f. Check alignment of front and rear wheels (paras. 8-10 and 8-11).</p>	<p>f. Front or rear wheels are out of alignment.</p>
20	Semi-Annual	Engine	<p>a. Inspect engine for leaks or damage that could cause engine failure.</p> <p>NOTE Oil and oil filter will be changed when they are known to be contaminated, clogged, or when service is recommended by AOAP laboratory.</p> <p>b. Perform AOAP sample. If AOAP is not available, change oil and oil filter at 3,000 miles (4,800 km), or 100 hours (if hour meter is installed), or every six months.</p> 	<p>a. Class III leaks. Damage evident that would cause engine failure.</p>

Table 2-1. Unit Level Preventive Maintenance Checks and Services HMMWV (Cont'd)

ITEM NO.	INTERVAL	ITEM TO BE INSPECTED	PROCEDURES	NOT FULLY MISSION CAPABLE IF:
21	Semi-Annual	Batteries	<p style="text-align: center;"><u>WARNING</u></p> <ul style="list-style-type: none"> • Do not perform battery system checks or inspections while smoking or near fire, flames, or sparks. Batteries may explode causing damage to vehicle, injury, or death to personnel. • Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry or disconnected battery ground cable contacts battery terminal, a direct short will result, causing injury to personnel, or damage to equipment. <p style="text-align: center;">NOTE</p> <p>Refer to TM 9-6140-200-14 for more specific details on battery maintenance.</p> <p>a. Inspect battery box and battery tray bolts for corrosion and debris. If any corrosion is evident, wipe bolts and/or washers clean. If corrosion cannot be removed or the surface of bolts are pitted, replace bolts and/or washers (para. 4-80).</p> <p>b. Clean slave receptacle and coat with corrosion preventive compound (Appendix C, Item 24).</p> <p>c. Check and record specific gravity of each cell.</p> <p>d. Inspect battery cables for frays, splits, or looseness.</p> <p style="text-align: center;"><u>SPECIAL PURPOSE KITS</u></p>	<p>a. Corrosion has made holes in metal battery box.</p> <p>b. Terminals corroded.</p> <p>c. If cell is below 1.225 specific gravity.</p> <p>d. Cables frayed, split, or loose.</p>
22	Semi-Annual	Cargo Shell Door	Check adjustment of cargo shell door (paragraph 11-13).	
23	Semi-Annual	Rear Cargo Door	Check rear cargo door for proper operation. Rotate gas springs (para. 11-21) 180 degrees every six months and move left spring to right side and right spring to left side.	

Table 2-1. Unit Level Preventive Maintenance Checks and Services HMMWV (Cont'd)

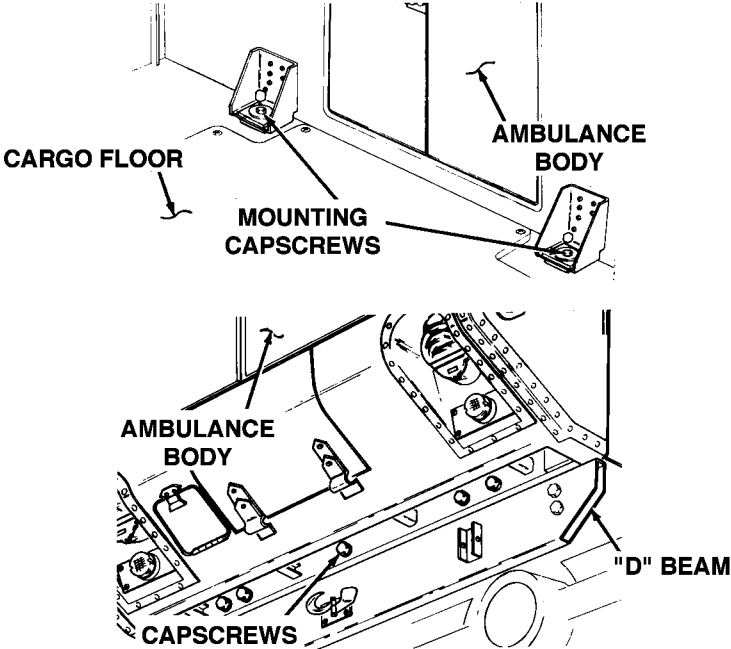
ITEM NO.	INTERVAL	ITEM TO BE INSPECTED	PROCEDURES	NOT FULLY MISSION CAPABLE IF:
24	Semi-Annual	Ambulance (M996, M996A1, M997, M997A1, and M997A2)	<p>a. Check DC outlets for proper operation. Using multimeter, check for voltage at DC receptacles. If engine is running, voltage should be 27-28 volts. If engine is not running, voltage should be 24.2-25.2 volts. Reefer to para. 2-39, electrical troubleshooting, if voltage is not within the specified range.</p> <p>b. Inspect and tighten two mounting capscrews securing ambulance body to cargo floor to 90 lb-ft (122 N•m). Tighten seven capscrews securing ambulance body to "D" beam to 90 lb-ft (122 N•m).</p> 	<p>a. No DC voltage at outlet, or not within range.</p> <p>b. Body not securely mounted to floor.</p>
25	Semi-Annual	DeepWater Forging Kit	<p>c. (M997, M997A1, and M997A2 only) Inspect compressor for security of mounting and oil leakage.</p> <p>a. Inspect vent tubes for bends, cracks, breaks, deterioration, and restrictions.</p> <p>b. Inspect vent tube mounting hardware for proper installation.</p> <p>c. Inspect intake and exhaust extensions for proper installation and leaks.</p>	<p>c. Any class III leak.</p> <p>c. Any exhaust extension leaks.</p>

Table 2-1. Unit Level Preventive Maintenance Checks and Services HMMWV (Cont'd)

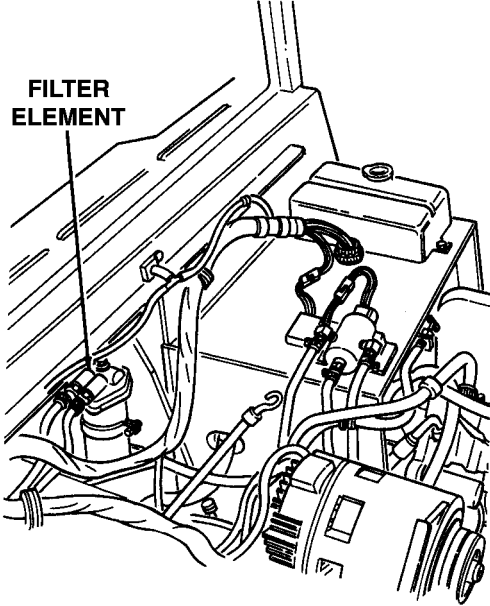
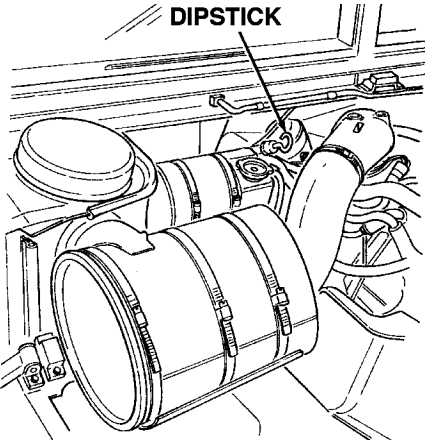
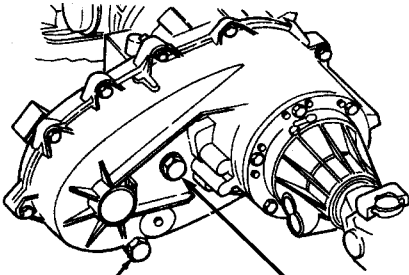
ITEM NO.	INTERVAL	ITEM TO BE INSPECTED	PROCEDURES	NOT FULLY MISSION CAPABLE IF:
26	Semi-Annual	Arctic Winterization Kit and/or Troop/Cargo Winterization Kit	<p>Inspect all fuel lines for loose connections, splits, cracks, and bends that could cause leaks. Tighten loose connections and replace damaged parts.</p> <p style="text-align: center;">NOTE</p> <p>If Annual/Biennial Service is being performed, then Final Road Test will be completed after last Annual/Biennial task is complete.</p>	Any class III leak.
27	Semi-Annual	Final Road Test	Check vehicle for proper operation and performance.	Vehicle fails to operate properly.
28	Annually	Fuel System	<p>Replace filter element every 6,000 miles (9,600 km) or annually, whichever occurs first. Replace water separator element if unserviceable (para. 3-33).</p> 	
29	Annually	Air-Intake System	Test CDR valve (para. 3-9).	
29.1	Annually	Dust Unloader	Visually inspect dust unloader for presence and for cuts, tears, obstructions, worn areas, enlarged gap, or if center opening exceeds 1/8 in. (3.175 mm).	Dust unloader missing or has cuts, tears, obstructions, worn areas, enlarged gap, or if center opening exceeds 1/8 in. (3.175 mm).

Table 2-1. Unit Level Preventive Maintenance Checks and Services HMMWV (Cont'd)

ITEM NO.	INTERVAL	ITEM TO BE INSPECTED	PROCEDURES	NOT FULLY MISSION CAPABLE IF:
30	Annually	Electrical Wiring	Inspect all wiring and wiring harness for frays, splits, missing insulation, or poor connections. Repair any worn wiring (para. 4-85). If wiring cannot be repaired, notify DS maintenance.	Broken, frayed, split wires or harness.
30.1	Annually	Engine Running Test	Observe engine and vehicle operation for rough idle, rough running, lack of power, and unusual noise or vibration (para. 2-18).	Vehicle fails to operate properly.
30.2	Annually	Transmission	<p>Perform AOAP sample.</p> <p>CAUTION</p> <p>Use Dexron® II or Dexron® III for 3L80 transmission. Use only Dexron® III for 4L80-E transmission. Failure to use only Dexron® III for 4L80E transmission will cause damage to transmission.</p> <p>NOTE</p> <ul style="list-style-type: none"> Oil and oil filter will be changed when they are known to be contaminated, clogged, or when service is recommended by AOAP laboratory. Replace transmission oil filter each time transmission is drained. Fill 3L80 transmission with 6 quarts (5.7 L) of Dexron® II or Dexron® III. Fill 4L80-E transmission with 7.7 quarts (7.3 L) of only Dexron® III. In arctic conditions, use OEA in both model transmissions. 	
31	Biennially	Transmission	<p>CAUTION</p> <p>Use Dexron® II or Dexron® III for 3L80 transmission. Use only Dexron® III for 4L80-E transmission. Failure to use only Dexron® III for 4L80E transmission will cause damage to transmission.</p> <p>NOTE</p> <ul style="list-style-type: none"> Change fluid every 12,000 miles (19,300 km) or biennially, whichever occurs first (para. 5-2a). Inspect either 3L80 or 4L80-E transmission drainplug for metal particles. Replace transmission oil filter each time transmission is drained. Fill 3L80 transmission with 6 quarts (5.7 L) of Dexron® II or Dexron® III. Fill 4L80-E transmission with 7.7 quarts (7.3 L) of only Dexron® III. In arctic conditions, use OEA in both model transmissions. 	

Table 2-1. Unit Level Preventive Maintenance Checks and Services HMMWV (Cont'd)

ITEM NO.	INTERVAL	ITEM TO BE INSPECTED	PROCEDURES	NOT FULLY MISSION CAPABLE IF:
31	Biennially	Transmission (Cont'd)	 <p>TRANSMISSION FILL AND LEVEL</p> <p>CAUTION</p> <ul style="list-style-type: none"> • If water or metal particles are detected during transfer case draining, notify Direct Support Maintenance personnel before refilling transfer case. • Use Dexron® II for filling transfer case. Failure to use Dexron® II will cause damage to transfer case. <p>NOTE</p> <ul style="list-style-type: none"> • Fill transfer case (model 218) with 3.5 quarts (3.3 L) of Dexron® II. • Fill transfer case (model 242) with 3.35 quarts (3.17 L) of Dexron® II. <p>Change fluid every 12,000 miles</p>	
32	Biennially	Transfer Case	 <p>TRANSFER CASE</p>	Metal particles are

SEMI-ANNUAL (3,000 MILE) PMCS PARTS LIST

ITEM NO.	PART NUMBER	NSN	NOMENCLATURE	QTY
1.	MS51943-31	5305-00-061-4650	Locknut	1
2.	5593033	5310-00-252-2999	Nut and Lockwasher Assembly	4
3.	MS21245-L10	5310-00-449-2381	Locknut	4
4.	MS35756-8	5315-00-616-5526	Woodruff Key	1
5.	MS24665-355	5315-00-012-0123	Cotter Pin	1
6.	MS51943-43	5310-00-061-4651	Locknut	1
7.	MS51943-35	5310-00-935-9021	Locknut	1
8.	MS51943-39	5310-00-488-3889	Locknut	4
9.	MS51967-18	5310-00-763-8919	Locknut	2
10.	MS35338-45	5310-00-407-9566	Lockwasher	2
11.	PH13	2940-00-082-6034	Filter, Fluid, Engine Oil	1

ANNUAL (6,000 MILE) PMCS PARTS LIST

ITEM NO.	PART NUMBER	NSN	NOMENCLATURE	QTY
1.	MS51943-31	5305-00-061-4650	Locknut	1
2.	5593033	5310-00-252-2999	Nut and Lockwasher Assembly	4
3.	MS21245-L10	5310-00-449-2381	Locknut	4
4.	MS35756-8	5315-00-616-5526	Woodruff Key	1
5.	MS24665-355	5315-00-012-0123	Cotter Pin	1
6.	MS51943-43	5310-00-061-4651	Locknut	1
7.	MS51943-35	5310-00-935-9021	Locknut	1
8.	MS51943-39	5310-00-488-3889	Locknut	4
9.	MS51967-18	5310-00-763-8919	Locknut	2
10.	MS35338-45	5310-00-407-9566	Lockwasher	2
11.	PH13	2940-00-082-6034	Filter, Fluid, Engine Oil	1
12.	5589121	4330-01-190-3579	Filter Element Kit, Fuel	1

BIENNIALY (12,000 MILE) PMCS PARTS LIST

ITEM NO.	PART NUMBER	NSN	NOMENCLATURE	QTY
1.	MS51943-31	5305-00-061-4650	Locknut	1
2.	271172	5310-00-152-0598	Assembled Locknut	4
3.	MS21245-L10	5310-00-449-2381	Locknut	4
4.	MS35756-8	5315-00-616-5526	Woodruff Key	1
5.	MS24665-355	5315-00-012-0123	Cotter Pin	1
6.	MS51943-43	5310-00-061-4651	Locknut	1
7.	MS51943-35	5310-00-935-9021	Locknut	1
8.	MS51943-39	5310-00-488-3889	Locknut	4
9.	MS51967-18	5310-00-763-8919	Locknut	2
10.	MS35338-45	5310-00-407-9566	Lockwasher	2
11.	PH13	2940-00-082-6034	Filter, Fluid, Engine Oil	1
12.	12337210	4330-01-121-6350	Parts Kit, Fluid, Transmission (3L80)	1
13.	8655625	5330-01-148-7492	Gasket (3L80)	1
14.	8684221	2520-01-398-4589	Parts Kit, Fluid, Transmission (4L80-E) (1995, 1996)	1
15.	8677743	5330-01-360-5271	Gasket (4L80-E)	1
16.	12354864	4330-01-438-3813	Parts Kit, Fluid, Transmission (4L80-E) (1997, 1998)	1

LUBRICATION TABLE

USAGE	FLUID/LUBRICANT	CAPACITIES	EXPECTED TEMPERATURE
Engine Oil	OE/HDO 30 OE/HDO 10 OEA	Crankcase: w/o filter 7 qt (6.6 L) w/filter 8 qt (7.6 L) Dry System 10 qt (9.5 L) (INC. oil cooler)	Above +15°F (-9°C) 40° to -15°F (4° to -26°C) 40° to -65°F (4° to -54°C)
Engine Coolant	Ethylene Glycol and Water 1/4 Ethylene Glycol/ 3/4 Water 2/5 Ethylene Glycol/ 3/5 Water 3/5 Ethylene Glycol/ 2/5 Water	Radiator: 5 qt (4.7 L) Complete System: 26 qt (24.6 L)	15°F (-9°C) and above 40° to -15°F (4° to -26°C) 40° to -65°F (4° to -54°C)
Brake System (All except M1097, "A1", "A2" series and M1123) (M1097, "A1", "A2" series and M1123)	Fluid Silicone BFS	Master Cylinder: 0.69 pt (0.33 L) Complete System: 1.2 pt (0.56 L) Master Cylinder: 1.12 pt (0.53 L) Complete System: 1.63 pt (0.78 L)	All Temperatures

OE/HDO 15/40 (Grade 15W-40) lubricant may be used when expected temperatures are above +5°F (-15°C). If OEA lubricant is required to meet the temperature ranges prescribed in the table, then the OEA lubricant is to be used in place of OE/HDO 10 lubricant for all temperature ranges. If operating conditions are severe or abnormal, service chassis lubrication points at 1,000 miles (1,600 kilometers).

LUBRICATION TABLE (Cont'd)

USAGE	FLUID/LUBRICANT	CAPACITIES	EXPECTED TEMPERATURE
Transmission (3L80) (4L80-E)	Dexron® II or Dexron® III Dexron® III only (Do not use Dexron® II) OEA	Dry: 11 qt (10.4 L) Drain & Refill: 6 qt (5.7 L) Dry: 13.5 qt (12.8L) Drain & Refill 7.7 qt (7.3 L)	All Temperatures Except Arctic Arctic Temperatures
Transfer (218) Case (242)	Dexron® II or Dexron® III	3.5 qt (3.3 L) 3.35 qt (3.17 L)	All Temperatures
Steering System	Dexron® II or Dexron® III	1 qt (0.95 L) w/Cooler 1.25 qt (1.18 L)	All Temperatures
Geared Hub (4)	Multipurpose Gear GO 80/90	1 pt ea. (0.47 L)	All Temperatures
Axles (2)	Multipurpose Gear GO 80/90	2 qt ea. (1.9 L)	All Temperatures
Ball Joints, Tie Rod Ends, Pitman Arm, Propeller Shafts, etc.	GAA	As Required	All Temperatures
Hinges, Cables, and Linkages	OE/HDO	As Required	All Temperatures

Section IV. ELECTRICAL/MECHANICAL SYSTEMS TROUBLESHOOTING

2-12. GENERAL

- a. This section provides information to diagnose and correct malfunctions of the electrical/mechanical system.
- b. Principles of operation showing system operation can be found in chapter 1. It should be used as a reference when performing electrical/mechanical troubleshooting.
- c. Each malfunction symptom given for an individual component or system is followed by step(s) you should take to determine the cause and corrective action you must take to remedy the problem.
- d. Before taking any action to correct a possible malfunction, the following rules should be followed:
 - (1) Question operator to obtain any information that might help you determine the cause of the problem.
 - (2) Never over look the chance that the problem could be of simple origin. The problem could be corrected with minor adjustment.
 - (3) Use all senses to observe and locate troubles.
 - (4) Use test instruments or gauges to help you determine and isolate problem.
 - (5) Always isolate the system where the malfunction occurs and then locate the defective component.
 - (6) Use standard automotive theories and principles when troubleshooting the vehicles covered in this manual.
- e. The STE/ICE-R is an integral part of these troubleshooting procedures. It should be used whenever possible, although other options are given, when available. The Vehicle Identification Number (VIN) assigned to the M998 series vehicles is 21 (14 is the temporary VIN). On page 2-753, you will find information on STE/ICE-R description and operation. Use this information to become familiar with STE/ICE-R operation and the equipment contained in the test set. On page 2-763 you will find STE/ICE-R setup and internal checks. These must be performed prior to performing tests.

2-13. ELECTRICAL/MECHANICAL SYSTEMS TROUBLESHOOTING

ELECTRICAL/MECHANICAL TROUBLESHOOTING

PARA NO.		PAGE NO.
2-14.	How to use this troubleshooting guide	2-32
2-15.	Glossary of abbreviations and commonly used terms.	2-38
2-16.	Electrical circuit description	2-39
2-17.	Startability tests	2-41
2-18.	Engine running tests	2-47
2-19.	Cooling system tests.	2-57
2-20.	Lubrication system tests.	2-65
2-21.	Electrical tests	2-71
2-22.	Fuel system tests	2-95
2-23.	Air intake/exhaust tests	2-137
2-24.	Compression/mechanical tests.	2-143
2-25.	Engine cooling tests	2-155
2-26.	Engine lubrication tests	2-187
2-27.	Alternator tests	2-194
2-28.	Protective control box /distribution box tests	2-227
2-29.	Battery circuit test	2-251
2-30.	Starter circuit tests	2-261
2-31.	Glowplugs circuit tests (protective control box).	2-303
2-31.1.	Glowplugs circuit tests (distribution box)	2-318.1
2-32.	Instrument tests	2-319
2-33.	Light tests	2-389
2-34.	Transmission system tests (3L80)	2-399
2-35.	Transmission system tests (4L80-E).	2-411
2-36.	Brake system tests.	2-445
2-37.	Steering system tests	2-459
2-38.	Drivetrain tests	2-479
2-39.	Ambulance electrical system tests	2-497
2-40.	Ambulance mechanical system tests	2-693
2-41.	Winch system tests.	2-715
2-42.	DCA troubleshooting	2-723
2-43.	STE/ICE-R test procedures	2-733
2-44.	Vehicle testing	2-761

2-14. HOW TO USE THIS TROUBLESHOOTING GUIDE

NOTE TO THE RECIPIENT OF THIS MANUAL

There are 16 foldouts that are supplied with this manual. Take the foldouts and place them after the last page of diagnostics at the end of the paragraph. That way, the foldout will be with diagnostics for that system. Use the cross-reference information listed below to guide you in the placement of the foldouts.

<u>SYSTEM LEVEL TESTS</u>	<u>PARAGRAPH</u>	<u>FOLDOUT NUMBER</u>
FUEL	2-22	FO-1
AIR INTAKE/EXHAUST	2-23	FO-2
COMPRESSION/MECHANICAL	2-24	FO-3
ENGINE COOLING	2-25	FO-4
ENGINE LUBRICATION	2-26	FO-5
ALTERNATOR	2-27	FO-6
PROTECTIVE CONTROL BOX/ DISTRIBUTION BOX	2-28	
BATTERY CIRCUIT	2-29	FO-7
STARTER CIRCUIT	2-30	FO-8
GLOWPLUGS (PROTECTIVE CONTROL BOX)	2-31	FO-9
GLOWPLUGS (DISTRIBUTION BOX)	2-31.1	
INSTRUMENTS	2-32	FO-10
LIGHTS	2-33	FO-11
TRANSMISSION (3L80)	2-34	FO-12
TRANSMISSION (4L80-E)	2-35	
BRAKES	2-36	FO-13
STEERING	2-37	FO-14
DRIVETRAIN	2-38	FO-15
AMBULANCE ELECTRICAL SYSTEM	2-39	
AMBULANCE MECHANICAL SYSTEM	2-40	
WINCH SYSTEM	2-41	
DCA TROUBLESHOOTING	2-42	FO-16

2-14. HOW TO USE THIS TROUBLESHOOTING GUIDE (Cont'd)

THERE ARE 5 TOP LEVEL TESTS.

USE THESE FOR GENERAL SYMPTOMS (HARD-TO-START, RUNS ROUGH, ETC).

THERE ARE 21 SYSTEM LEVEL TESTS.

THESE ARE USED BY THE TOP LEVEL TESTS BUT YOU CAN GO STRAIGHT TO THEM IF YOU KNOW WHAT YOU'RE DOING.

TROUBLESHOOTING PAGES.

THE LAYOUT IS SHOWN ON THE NEXT PAGE. THEY ARE SET UP SO THAT YOU DON'T READ ANY MORE THAN YOU HAVE TO. AFTER YOU HAVE FOUND THE FAULT, CORRECT IT AND MAKE SURE THE SYSTEM IS WORKING PROPERLY. CONTINUE IF THERE ARE ADDITIONAL PROBLEMS.

TOP LEVEL TESTS

PAGE

ENGINE STARTING	2-41
ENGINE RUNNING	2-47
COOLING	2-57
LUBRICATION	2-65
ELECTRICAL	2-71

SYSTEM LEVEL TESTS

PAGE

FUEL	2-95
AIR INTAKE/EXHAUST	2-137
COMPRESSION/MECHANICAL	2-143
ENGINE COOLING	2-155
ENGINE LUBRICATION	2-187
ALTERNATOR	2-194
PROTECTIVE CONTROL BOX/ DISTRIBUTION BOX	2-227
BATTERY CIRCUIT	2-251
STARTER CIRCUIT	2-261
GLOWPLUGS (PCB)	2-303
GLOWPLUGS (DISTRIBUTION BOX)	2-318.1
INSTRUMENTS	2-319
LIGHTS	2-389
TRANSMISSION (3L80)	2-399
TRANSMISSION (4L80-E)	2-11
BRAKES	2-445
STEERING	2-459
DRIVETRAIN	2-79
AMBULANCE ELECTRICAL	2-497
AMBULANCE MECHANICAL	2-693
WINCH	2-715
DCA TROUBLESHOOTING	2-723

2-14. HOW TO USE THIS TROUBLESHOOTING GUIDE (Cont'd)

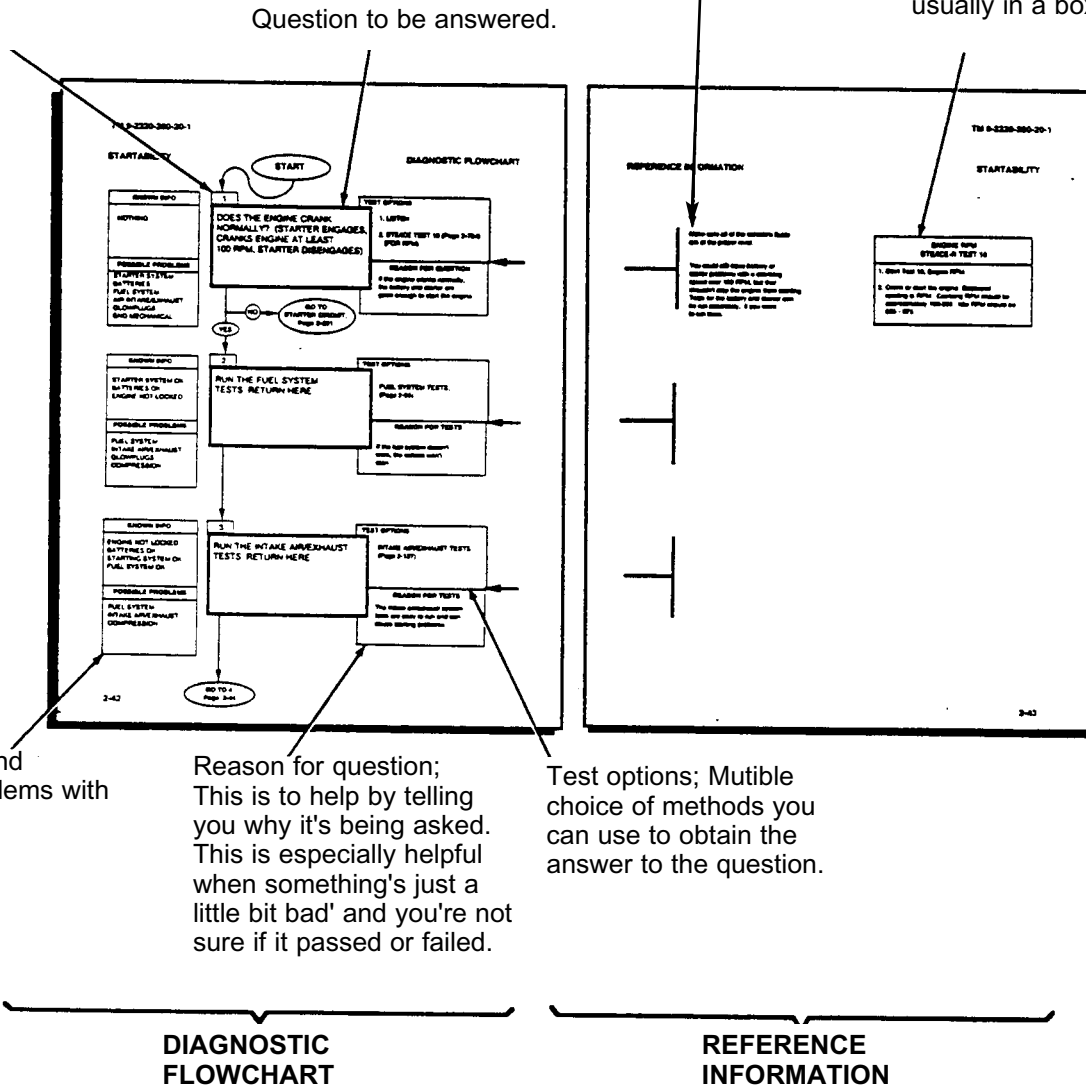
PAGE LAYOUT

All diagnostic logic and flowcharts are on the left hand page, with supporting information, help, test, instructions and vehicle operation on the right.

Question number, so you know where you are and where to go when entering or leaving a test chain.

Notes, warnings and cautions about a particular question.

Instructions for how to perform a test or make a measurement, usually in a box.



Known info and possible problems with the system.

Reason for question; This is to help by telling you why it's being asked. This is especially helpful when something's just a little bit bad' and you're not sure if it passed or failed.

Test options; Mutive choice of methods you can use to obtain the answer to the question.

HOW TO TROUBLESHOOT

PICK THE TESTS: Select either a top level or a system level test.

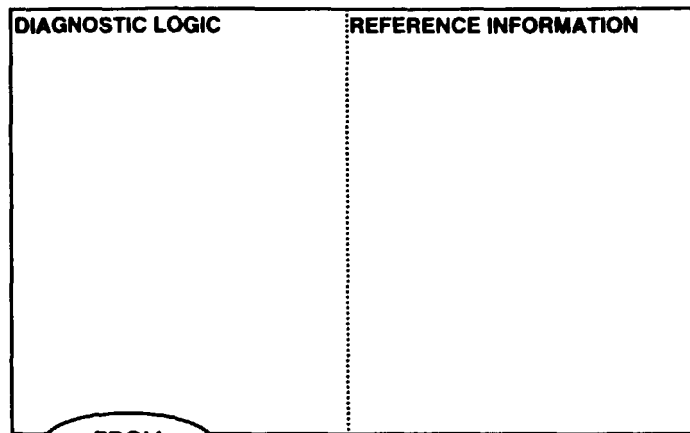
DIAGNOSTIC PROCEDURE Just answer the questions on the left hand page and follow the YES or NO path. Helpful information about the question is also on the right hand page. If you aren't sure about a question or procedure, look on the right page for notes, instructions and help.

2-14. HOW TO USE THIS TROUBLESHOOTING GUIDE (CONT'D)

PAGE LAYOUT

Diagnostic logic is on the left hand page.

Related and helpful information is on the right hand page.



DIAGNOSTIC PROCEDURE

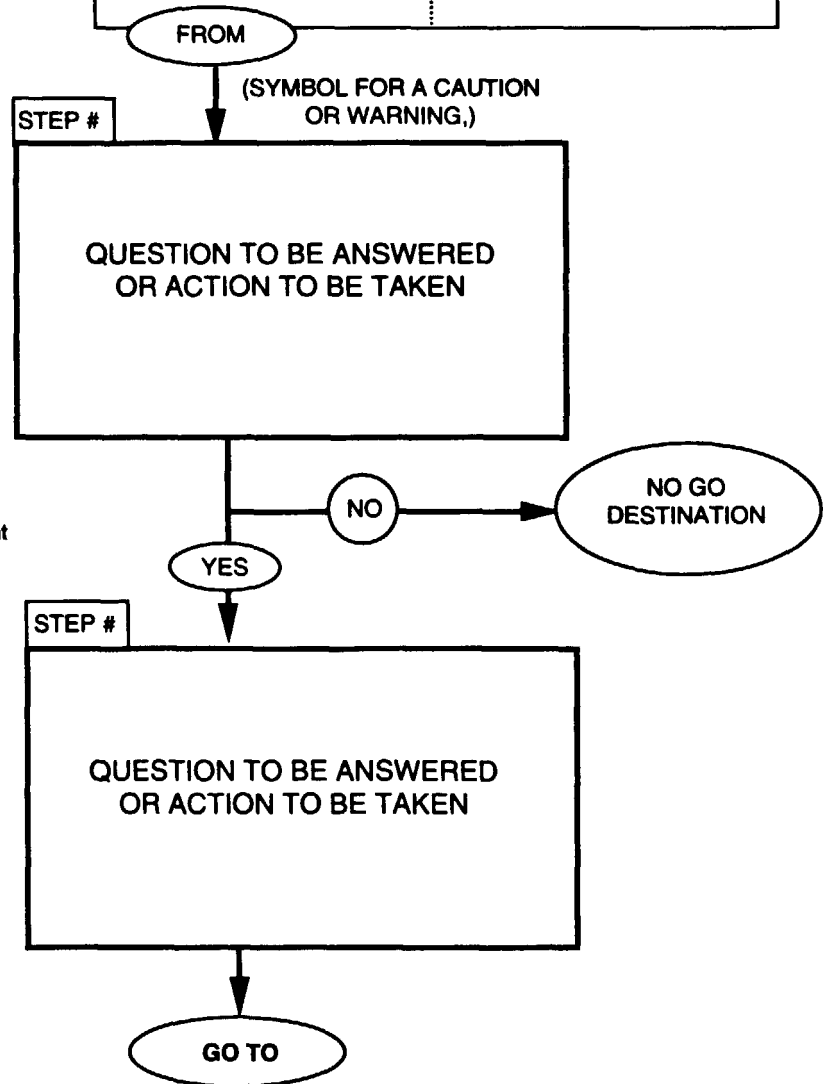
Just answer the questions on the left hand page. Follow the YES or NO path to the next step. Everything else on both pages is information to support the question. As a rule, the most important information (warnings, cautions, etc) is closest to the question, less important information is farther away.



Is the symbol for a WARNING statement. If you see this symbol above a question, look on the right hand page for the text of the message. The WARNING message on the right hand page will also have the symbol above it.



Is the symbol for a CAUTION statement. If you see this symbol above a question, look on the right hand page for the text of the message. The CAUTION message on the right hand page will also have the symbol above it.



2-14. HOW TO USE THIS TROUBLESHOOTING GUIDE (CONT'D)

INFORMATION ABOUT THE QUESTION

TEST OPTIONS:

This box lists at least one way of getting the answer to the question. When there is more than one way to get the answer, the different options will be given. Usually the easiest or best option is first.

TEST OPTIONS

REASON FOR QUESTION:

If you know why the question is being asked, it should be easier to understand the diagnostic logic and easier to answer the question. This is especially helpful when a measurement is 'just a little bad'. Knowing why the question is being asked should help you decide if the answer should be 'YES' or 'NO'.

REASON FOR QUESTION

INFORMATION ABOUT THE DIAGNOSTIC LOGIC

KNOWN INFO

This box indicates what is known about the vehicle's condition. As you follow a test chain, parts will be listed here after they have checked ok. Sometimes this box will indicate a fault that you know exists, such as a shorted or open circuit, or a component that doesn't work. **DO NOT USE THIS BOX TO PICK A 'JUMP-IN' POINT. ALWAYS RUN A COMPLETE CHAIN WHEN INSTRUCTED TO DO SO.**

KNOWN INFO

POSSIBLE PROBLEMS

This box is the opposite of 'KNOWN INFO'. Possible causes of the problem are listed here until tested and shown to be ok.

POSSIBLE PROBLEMS

2-14. HOW TO USE THIS TROUBLESHOOTING GUIDE (CONT'D)

INFORMATION ABOUT THE QUESTION

← All warnings and cautions are given next to (or as close as possible to) the arrow pointing to the particular question. Look for the symbol that is in the box for the question in order to locate the particular note. Helpful notes, test procedures, or other information related to the question are provided here. These notes are provided as supporting information only, you don't usually need them to answer the question. The more skilled you become, the less you'll have to read these.

Any cross references to other manuals will be located in this area.



NOTES, WARNINGS AND CAUTIONS ARE IN BOLD FACE TYPE.

Additional information, notes and/or suggestions are in normal type so as not to draw too much attention.

TEST PROCEDURES

These are special notes about how to make measurements with the test equipment. Occasionally, if space is limited on a page, the easiest procedure will be listed with a page reference for the other procedures if you would rather use them. The procedures presume a basic working knowledge of the equipment to be used, but references are included for the less experienced operator.

TYPE OF MEASUREMENT TYPE OF EQUIPMENT
Procedure for performing the measurement using the type of equipment listed above.

PICTURES

The pictures are supposed to make it easier to find what you're looking for, such as a pin in a connector or a particular wire or component.

PICTURES ARE PROVIDED WHEREVER POSSIBLE.

2-15. GLOSSARY OF ABBREVIATIONS AND COMMONLY USED TERMS

PCB - Protective Control Box, located on the firewall above the brake pedal.

STE/ICE-R - Simplified Test Equipment for Internal Combustion Engines - Reprogrammable, a testing system used for performing tests and measurements on the vehicle. In addition to acting as a conventional digital multimeter to measure voltage, current and resistance, it is also capable of measuring pressure, speed, compression unbalance, engine power, and some specialized battery and starter evaluations. It is powered from the vehicle batteries. The complete system includes a vehicle test meter (VTM), a transducer kit (TK), cables, transit case and technical publications.

DCA - Diagnostic Connector Assembly, an electrical harness on the vehicle which allows the STE/ICE-R to be powered and to make measurements of key vehicle signals from a single connection. In addition to many basic electrical signals such as starter voltage and current, it includes engine speed and fuel supply pressure. The STE/ICE-R can make TK measurements at the same time that it is connected to the DCA.

VTM - Vehicle Test Meter, a box which performs the measurement and analysis functions of the STE/ICE-R systems.

TK (and TK mode) - Transducer Kit, a collection of transducers, adapters and fittings which permit the STE/ICE-R to be used as a general purpose measurement system for any application. This allows the STE/ICE-R to be used anywhere that you want to measure voltage, current, resistance, pressure, or speed. TK mode of operation is what you are doing when you use this kit (as opposed to DCA mode where you are using the vehicle's built-in sensors to make measurements).

Compression unbalance - A STE/ICE-R test that gives an indication of any engine cylinders that have lower compression than the average. It does this by monitoring the battery voltage during cranking. As each cylinder goes into compression, the extra load on the starter shows up as a drop in voltage. This works well for finding one or more cylinders that have a compression problem, but don't forget that it doesn't give the average compression. If all cylinders are low by the same amount, this test doesn't find it.

Troubleshooting - the process of making measurements and observing the operation of the vehicle to find out if anything is wrong with it and then to locate any problem that exists.

Diagnostics - Troubleshooting by following an exact procedure.

Test Chain - a series of tests to be followed in a particular order or sequence. It is referred to as a "chain" of tests because they are all connected one after another like the links of a chain.

System - a collection of devices which are all related to each other because they depend on each other to do some function or job. For instance, the function of the fuel system is to inject fuel into the cylinders at the correct time in the correct amount and with the correct quality. The collection of devices that are required to do this include the fuel pump, fuel lines, lift pump, fuel filter, injection pump, and injectors.

2-15. GLOSSARY OF ABBREVIATIONS AND COMMONLY USED TERMS (CONT'D)

Functional flow schematic - a diagram which is much like a normal electrical circuit diagram, except that its purpose is to show the flow of information through the system (or the flow of a signal or the flow of some material such as the fuel). This kind of diagram shows how each component or device depends on the others. It is called functional flow because it shows the function (purpose of each component) and how the output of one component "flows" into the next. For troubleshooting, the functional flow schematic is better than the usual circuit diagram because it allows you to quickly see how the system works and what to expect when you make measurements on a system that has faults. You can't expect the output of a device to be good when it has a bad input.

2-16. ELECTRIC CIRCUIT DESCRIPTION

An electrical circuit is a collection of electrical devices which are connected in a loop from a positive voltage source (the battery positive) to a negative source (the battery negative). It must be continuous, with no breaks (no opening in the loop) so that electrical current can flow from the positive to the negative. You can think of it like the plumbing in your house. There must be a source of water under pressure or nothing will flow through the pipes. Water pressure is like the positive voltage of the battery. There may be branches (tees) in the pipes going to several different places, but if you don't connect the pipes, you don't get water. The same thing is true with the electrical circuit. If the wires aren't connected, no electricity will flow through them.

In the plumbing of a house, all of the water must go to the drain (you won't permit it to be spilled on the floor). With the vehicle electrical circuit, the drain is the negative terminal of the battery. With the water pipes, the water always flows from high pressure to low pressure (another way of saying that water always flows downhill). The electrical current is the same as the water flow - it always goes from positive to negative voltage. Voltage is to electricity what pressure is to water. Just like the pressure in the water pipe, the greater the voltage, the more electricity will flow through the wires. Unlike the water pipes that will spill the water if they break, you can't "spill" the electricity. The closest thing to this in an electrical circuit is when two wires touch that aren't supposed to and the current flows to some place that it shouldn't (this is called a "short circuit" or a "short"). Shorts often happen where the wire touches the vehicle body (the body is connected to the negative terminal of the battery). Since the current always flows through the easiest path to negative, it will bypass the rest of the circuit where it was supposed to go, and go through the short directly to the battery. Because this new path to the battery negative is shorter the malfunction is called a "short circuit" or a "short".

If you put a valve in a water pipe, you can control how much water flows by closing the valve. What you are doing is pinching off the pipe with the valve which restricts the flow. If you shut it off completely, you can stop all water from flowing. In the electrical circuit, a resistor acts like a valve. If you make the resistor extremely large, you can stop the current from flowing. The resistance is measured in "ohms".

2-16. ELECTRIC CIRCUIT DESCRIPTION (CONT'D)

When there is no electrical connection, such as when a wire is disconnected, the resistance is infinite (too large to be measured). No current will flow through the wires, because the circuit is no longer continuously connected. This is referred to as an "open circuit" or simply an "open". Remember that an electrical circuit is formed by continuous loops of devices connected together. When you are troubleshooting you are often asked to check for "continuity", which simply means that you need to find out if there is a continuous path from one place in the circuit to another. Since you are trying to see if the path is continuous, you must check wires and switches rather than any special or active devices. You will usually just measure the resistance between two points. If the resistance is zero (or the value of any resistance that is supposed to be there), then there is continuity. In the case of looking for a short, this may mean that you have found the short. If the resistance is off-scale on the meter (infinite resistance) then there is no connection and you have found an open. A continuity test is the same whether you are looking for an open or a short, the only difference being what resistance values you are looking for and where you make the measurements.

You are familiar with the typical light switch which allows you to turn a light on and off. A switch of any kind in an electrical circuit is simply a way of opening the loop so that no current will flow through it. Something to remember while troubleshooting is that everything on the positive side of the switch still has full battery voltage while everything from the switch on through the rest of the circuit is (or should be) connected to the battery negative terminal and you will measure zero volts. This is easy to remember if you think of the faucet on a sink. If you shut off the faucet, there is no water flowing into the sink, but the water in the pipe is still under pressure.

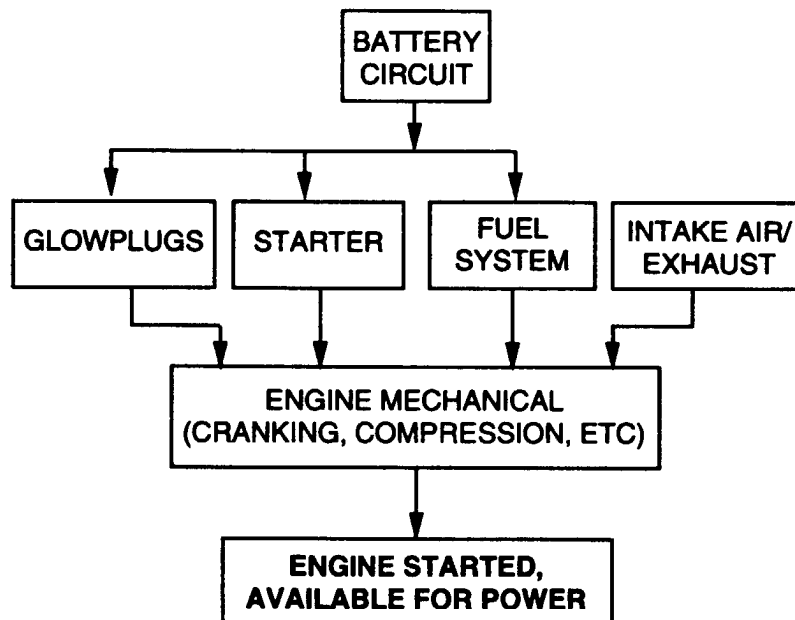
Sometimes a switch is turned on and off automatically. An example is a "circuit breaker" which is a device that measures how much current is flowing through it. If the current goes too high (possibly damaging equipment or melting the wires) then it opens an internal switch to stop the current flow. A "relay" is another form of switch that is turned on and off under remote control using a signal in another wire. When a device which requires a very large amount of current (such as the starter motor), must be turned on and off, a "power relay" is used. The idea is to use a small switch to turn on a larger switch. Thus, you don't have very large wires going all over the vehicle or large switches on the instrument panel. In the case of the starter's power relay, it is also called a "solenoid". A solenoid is any device that changes the electrical current into a forward and backward motion. It is something like an electrical motor except that instead of continuously going around in the same direction, it goes in or out. For the starter, the solenoid is used to "push" a very large switch into the "on" position.

When testing a circuit, you will need to know how much current is flowing. Current is easily measured with the STE/ICE-R. A device called a "shunt" is connected to the negative terminal of the battery. A shunt is a very precise resistor designed so that for every 1000 amps of current that flow through it there is a drop of .1 volts from one side of it to the other (different shunts may have different values). By measuring the voltage across the shunt you know how much current is flowing through the circuit. The shunt is placed on the negative side because it is safer (less chance of accidents which may short out the batteries). Since all of the current eventually goes through the negative battery terminal anyway, the shunt gives the same measurement as if it were connected to the positive terminal. You can think of the shunt as doing the same thing as the water meter in your house. As you turn devices such as lights on or off, you can use the shunt to measure how much current they are using.

2-17. STARTABILITY TESTS

This is a top level test for problems with an engine that doesn't start, or starts but immediately stops, or is very hard to start. If the engine starts but doesn't run well after starting, try the "STARTABILITY" tests first.

FOR THE ENGINE TO START, ALL OF THE BASIC SYSTEMS SHOWN BELOW MUST BE WORKING. THESE STARTABILITY TESTS WILL HELP YOU TO VERIFY THE CONDITION OF EACH OF THESE SYSTEMS.

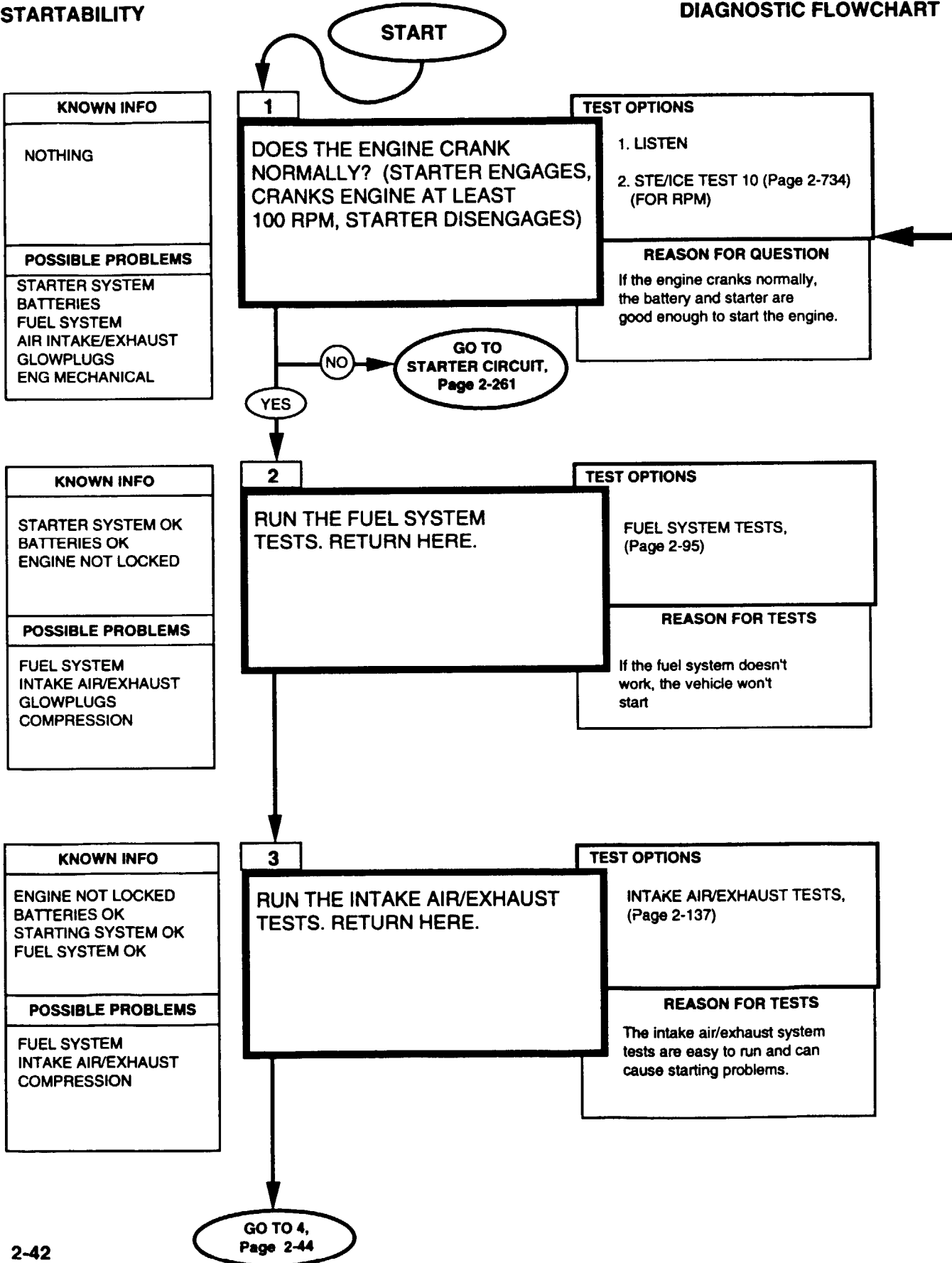


A functional flow schematic is not applicable to this section. However, so that you may refer to sections as you need them, a quick index to the systems required for starting is given here.

PARAGRAPH	PAGE
BATTERY CIRCUIT	2-251
GLOWPLUGS CIRCUIT	2-303
STARTER CIRCUIT	2-261
FUEL SYSTEM	2-95
INTAKE AIR/EXHAUST	2-137
COMPRESSION/MECHANICAL	2-143

STARTABILITY

DIAGNOSTIC FLOWCHART



REFERENCE INFORMATION

STARTABILITY

Make sure all of the vehicle's fluids are at the proper level.

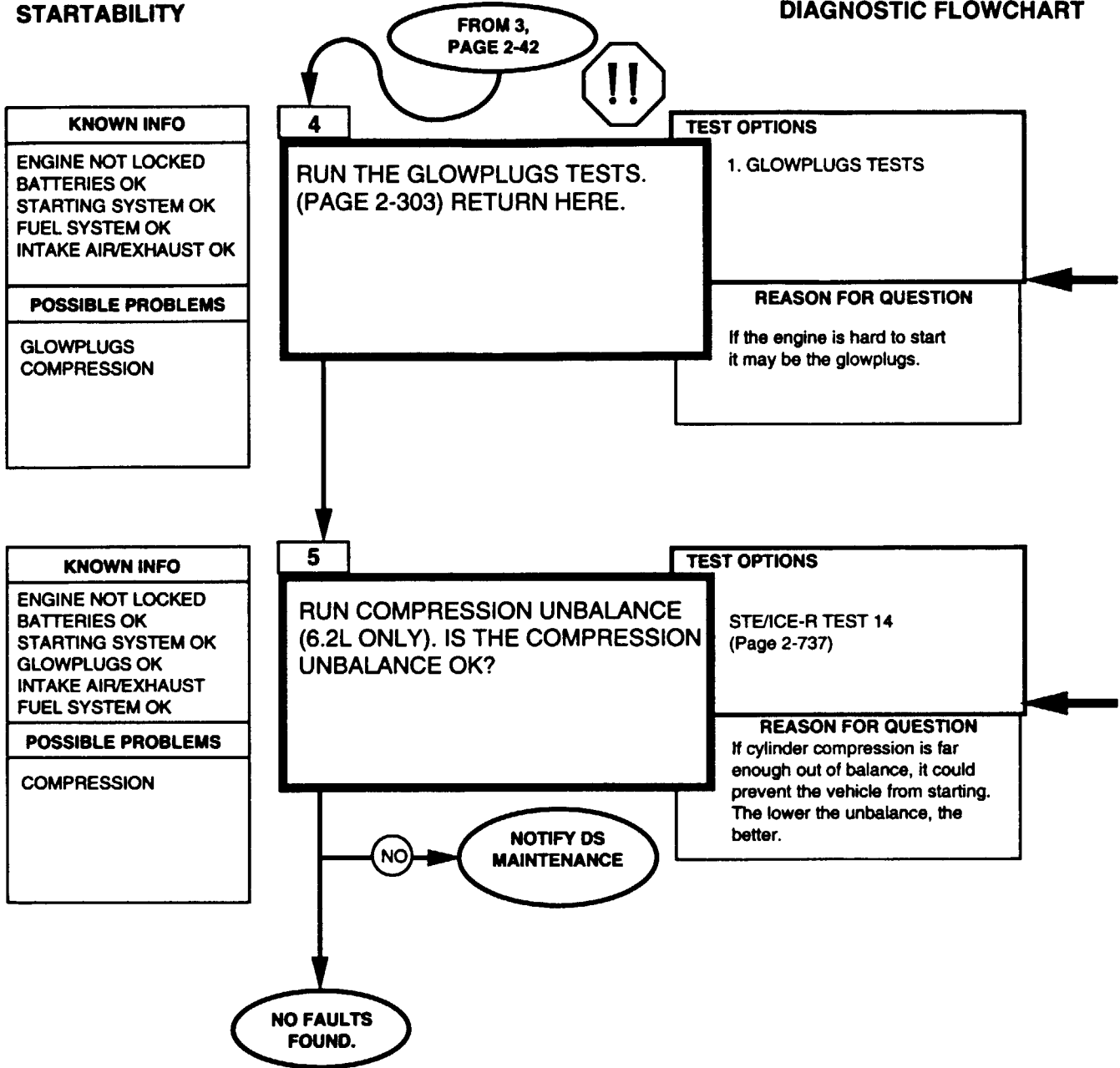
You could still have battery or starter problems with a cranking speed over 100 RPM, but that shouldn't stop the engine from starting. Tests for the battery and starter can be run separately, if you want to run them.

**ENGINE RPM
STE/CE-R TEST 10**

1. Start Test 10, Engine RPM.
2. Crank or start the engine. Displayed reading is RPM. Cranking RPM should be approximately 100-200. Idle RPM should be 625 - 675.

STARTABILITY

DIAGNOSTIC FLOWCHART



REFERENCE INFORMATION

STARTABILITY



WARNING

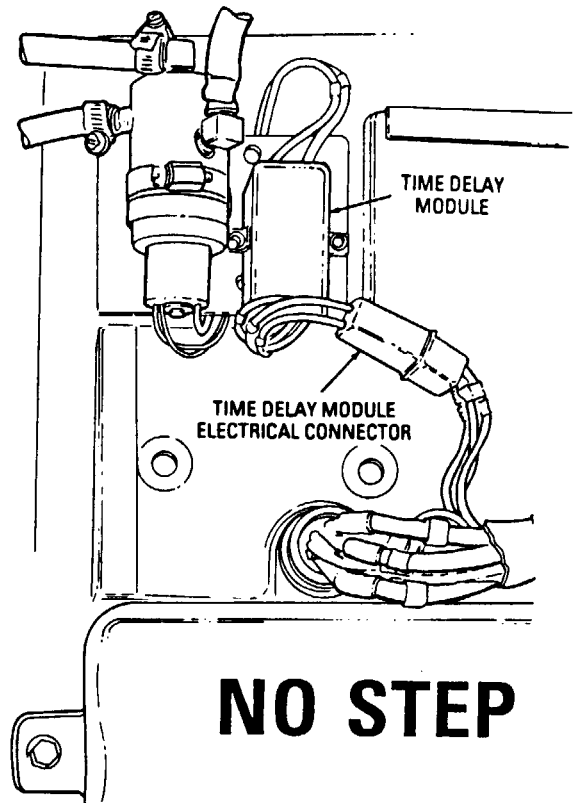
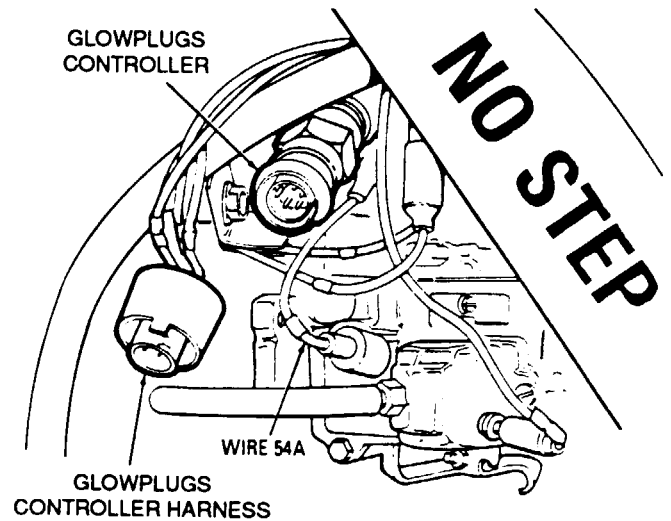
A HOT ENGINE MAY CAUSE SERIOUS BURNS. Always use caution when approaching a hot engine.

NOTE

When using the vehicle's temperature gage to determine engine temperature, don't forget to turn the rotary switch to "RUN". The gages don't work when power is off.

The colder the engine (and air temperature), the more you need the glowplugs for starting. There are some times when you don't need to run the glowplugs test. If the engine is warm and the problem is there on a hot day, then the problem is probably NOT the glowplugs or cold start advance, and these tests may be bypassed. If it's colder than 50°F, run the glowplugs test, because just a few bad glowplugs can make a minor starting problem much worse.

If the vehicle passes the STE/ICE-R compression unbalance test, it may still have a compression problem, but it would mean that every cylinder has low compression. This is possible, but not too likely. If you're confident that everything else is working properly, notify DS maintenance.



**COMPRESSION UNBALANCE
STE/ICE-R TEST 14**

1. Run tests 72,73 and 74 to verify that the batteries are OK.

CAUTION

THE GLOWPLUGS CONTROLLER AND THE CONTROL VALVE ELECTRICAL CONNECTOR MUST BE DISCONNECTED PRIOR TO RUNNING THIS TEST.

2. Disconnect wire 54A at injection pump to prevent starting.
3. Disconnect glowplugs controller and control valve electrical connector. (to keep waveform clean).
4. Start Test 14, compression unbalance.
5. Wait for the GO message. Crank the engine.
6. Release the rotary switch when the VTM displays OFF. A number less than 25% is passing.

2-18. ENGINE RUNNING TESTS

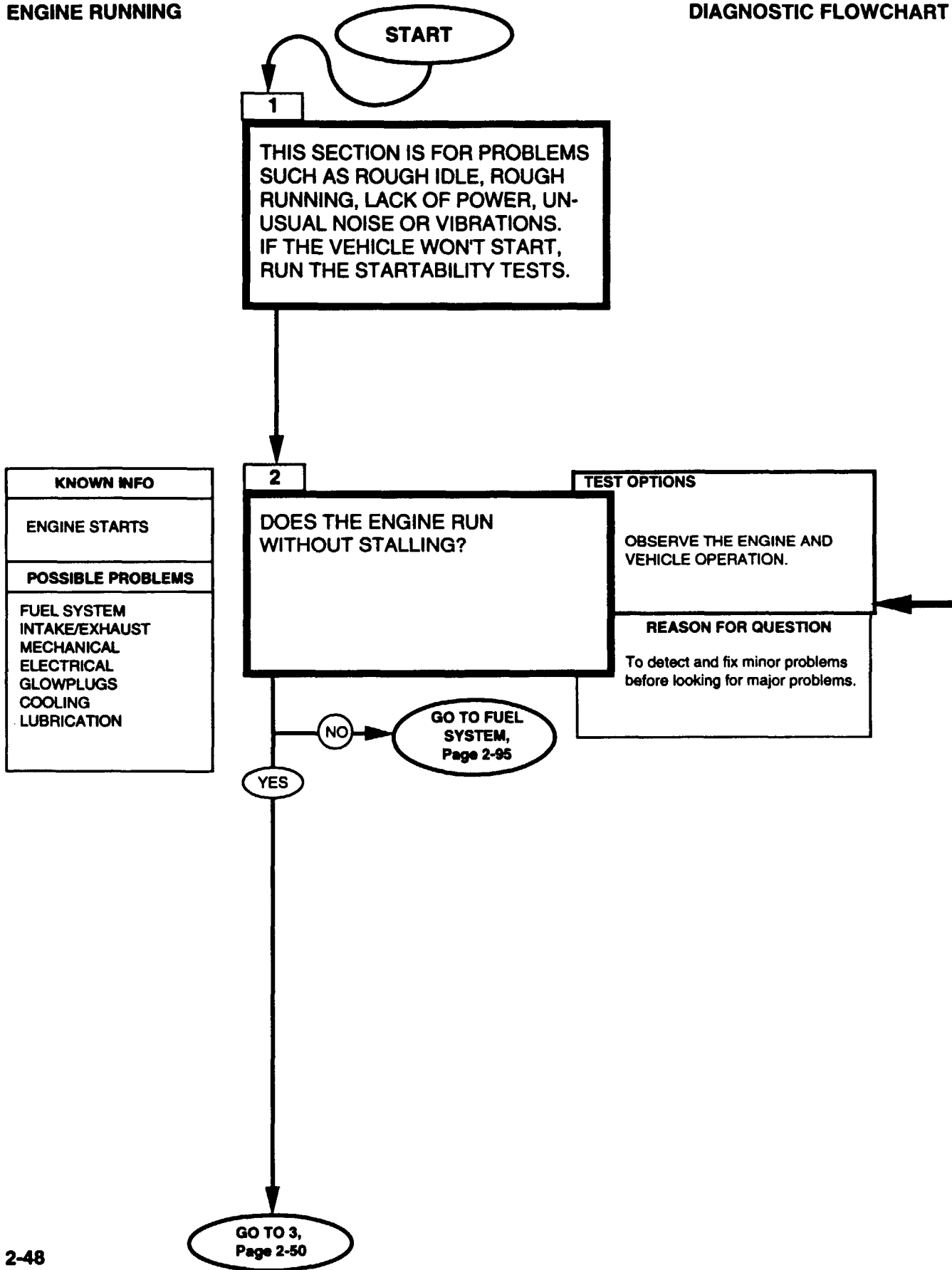
This is a top level test for problems with an engine that starts but doesn't run well after starting. This includes an engine that starts but doesn't stay running for very long. If the engine doesn't start, or starts but immediately stops, or is very hard to start, try the "STARTABILITY" tests first.

A functional flow schematic is not applicable to this section. However, so that you may refer to sections as you need them, a quick index to the systems relating to engine running is given here.

PARAGRAPH	PAGE
FUEL SYSTEM	2-95
INTAKE AIR/EXHAUST	2-137
COMPRESSION/MECHANICAL	2-143

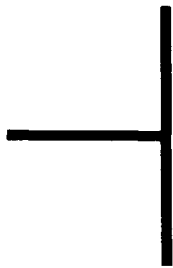
ENGINE RUNNING

DIAGNOSTIC FLOWCHART



REFERENCE INFORMATION

ENGINE RUNNING

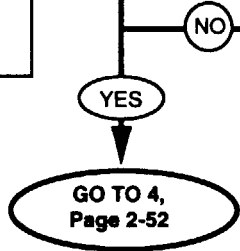
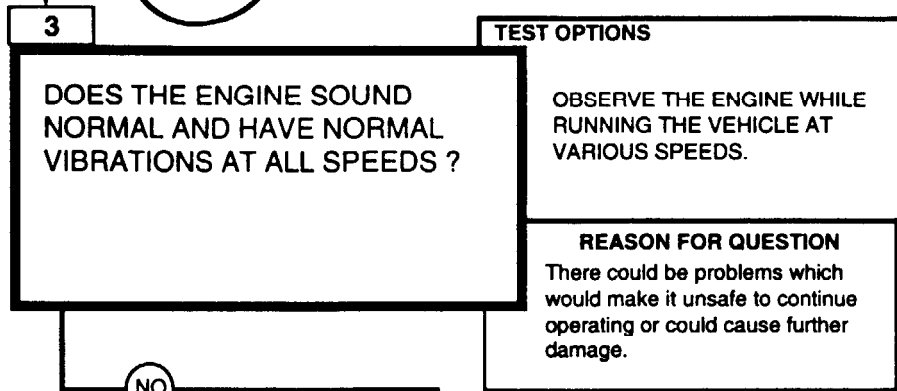


This is a check for all of those problems which can cause the engine to stop when it shouldn't. This includes fuel, air, and electrical problems. If the engine starts and then stops immediately, run the STARTABILITY tests first.

ENGINE RUNNING

DIAGNOSTIC FLOWCHART

KNOWN INFO
ENGINE STARTS AND STAYS RUNNING. FUEL SYSTEM OK INTAKE/EXHAUST OK
POSSIBLE PROBLEMS
MECHANICAL ELECTRICAL GLOWPLUGS COOLING LUBRICATION



**RUN THE FUEL SYSTEM TESTS, Page 2-95.
IF NO FAULTS FOUND, GO TO
COMPRESSION/MECHANICAL, Page 2-143.**

REFERENCE INFORMATION

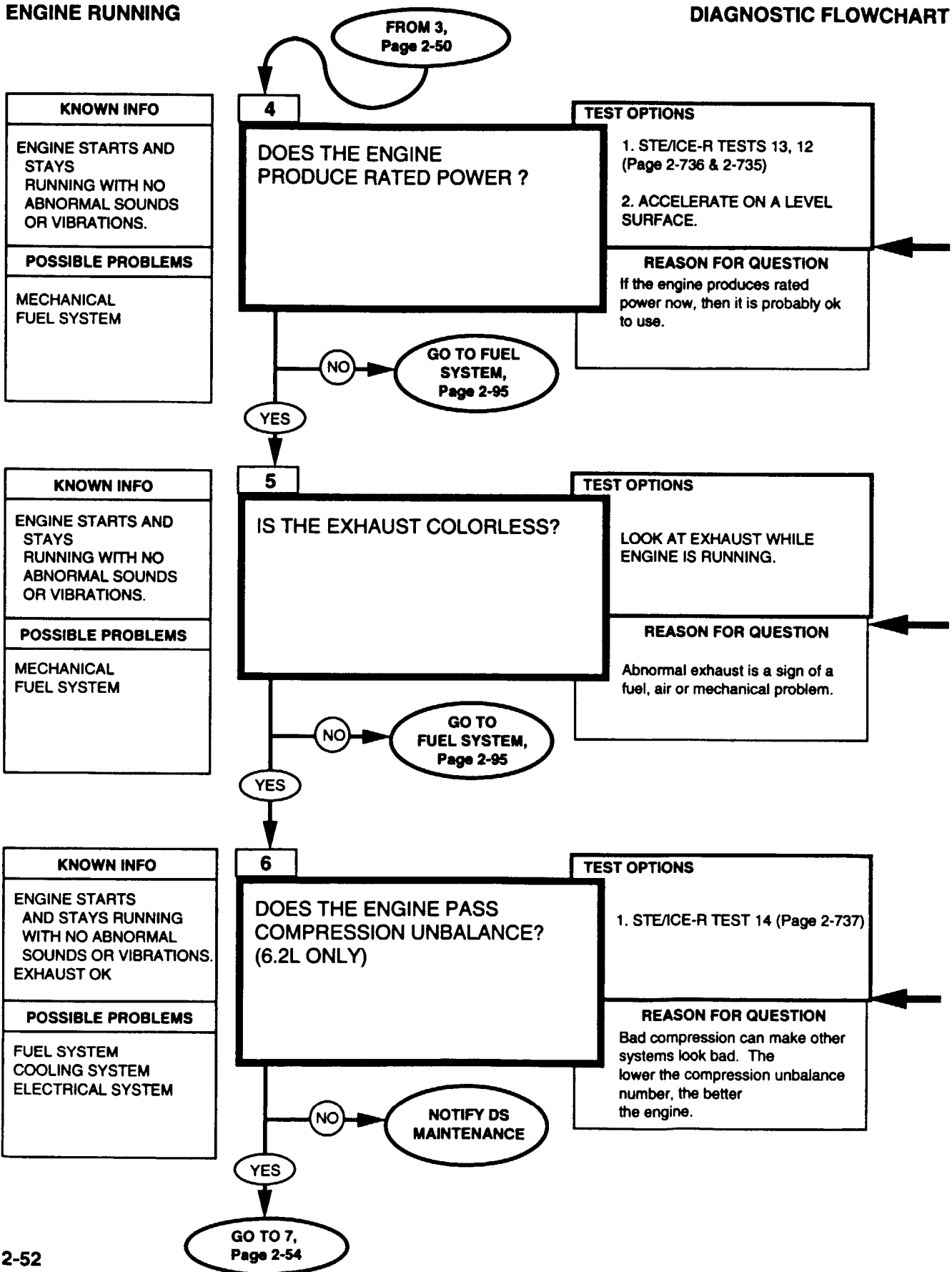
ENGINE RUNNING



Listen for noises from the engine that aren't usually there when the engine is running normally. Also be alert for unusual vibrations while the engine is idling and while you accelerate to a safe and reasonable speed.

ENGINE RUNNING

DIAGNOSTIC FLOWCHART



REFERENCE INFORMATION

ENGINE RUNNING

If STE/ICE-R is not available, accelerate under full power to a safe and reasonable speed on a level surface. For STE/ICE-R test #12, a number higher than 6700 is passing. For test #13, a number higher than 75 is passing.

It is normal for the engine to emit some black smoke when accelerating after idling for a while. Under most other conditions, exhaust smoke is usually from one of three sources;

- BLUE smoke is usually oil.
- BLACK smoke is too much fuel or too little air. (Often caused by advanced injection timing).
- WHITE smoke is usually water. (Often caused by retarded injection timing).

If the smoking is continuous or appears under a particular condition, the smoke probably indicates a problem and should be investigated.

If STE/ICE-R is not available, there is no easy way to test compression. In this case, go on to the next step but remember that compression may be a problem.

**ENGINE POWER TEST (PERCENT)
STE/ICE-R TEST #13**

1. Set TEST SELECT switches to 13.
2. Press and release TEST button.
3. Wait for prompting message CIP to appear.
4. When CIP appears on display, press down sharply on engine accelerator and hold it to the floor. When VTM displays OFF, release accelerator.
5. A number will be displayed after the engine has returned to idle speed. This number is the test result in units of per cent of nominal rated power.

**ENGINE POWER TEST (RPM/SEC)
STE/ICE-R TEST #12**

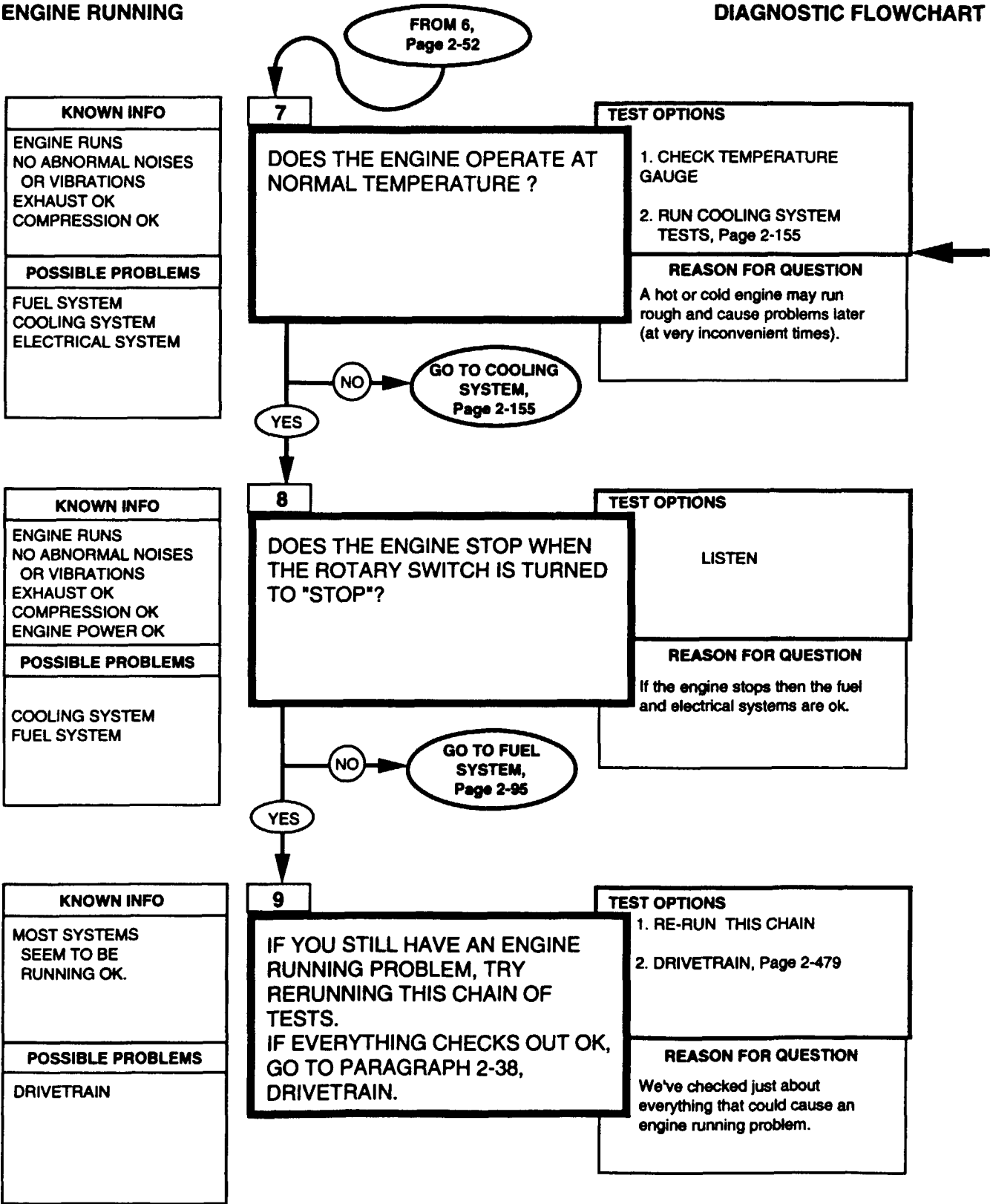
1. Set TEST SELECT switches to 12.
2. Press and release TEST button.
3. Wait for prompting message CIP to appear.
4. When CIP appears on display, press down sharply on engine accelerator and hold it to the floor. When VTM displays a number, release accelerator.
5. A number will be displayed after the engine has returned to idle speed. This number is the test result in units of rpm's per second.

**COMPRESSION UNBALANCE
STE/ICE-R TEST 14**

1. Run tests 72,73 and 74 to verify that the batteries are ok.
2. THE GLOWPLUG CONTROLLER AND THE CONTROL VALVE ELECTRICAL CONNECTOR MUST BE DISCONNECTED PRIOR TO RUNNING THIS TEST.
3. Disconnect wire 54A at injection pump to prevent starting.
4. Disconnect glowplug controller and control valve electrical connector. (to keep waveform clean).
5. Start Test 14, compression unbalance.
6. Wait for the GO message. Crank the engine.
7. Release the rotary switch when the VTM displays OFF. A number less than 25% is passing.

ENGINE RUNNING

DIAGNOSTIC FLOWCHART



REFERENCE INFORMATION

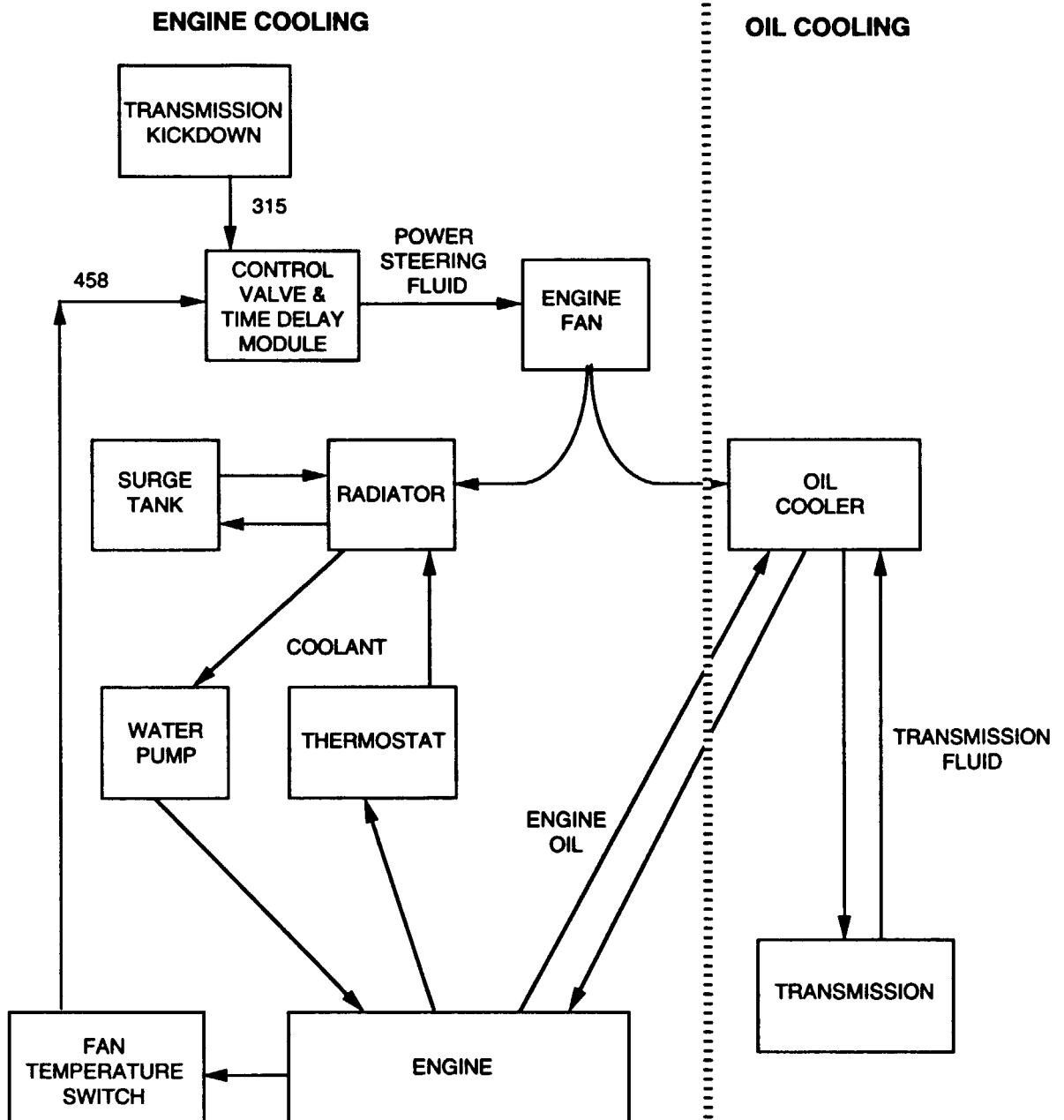
ENGINE RUNNING



Because the Cooling System tests can take a long time (mostly letting a cold engine warm up), you don't have to run them unless there is or may be a problem in the cooling system.

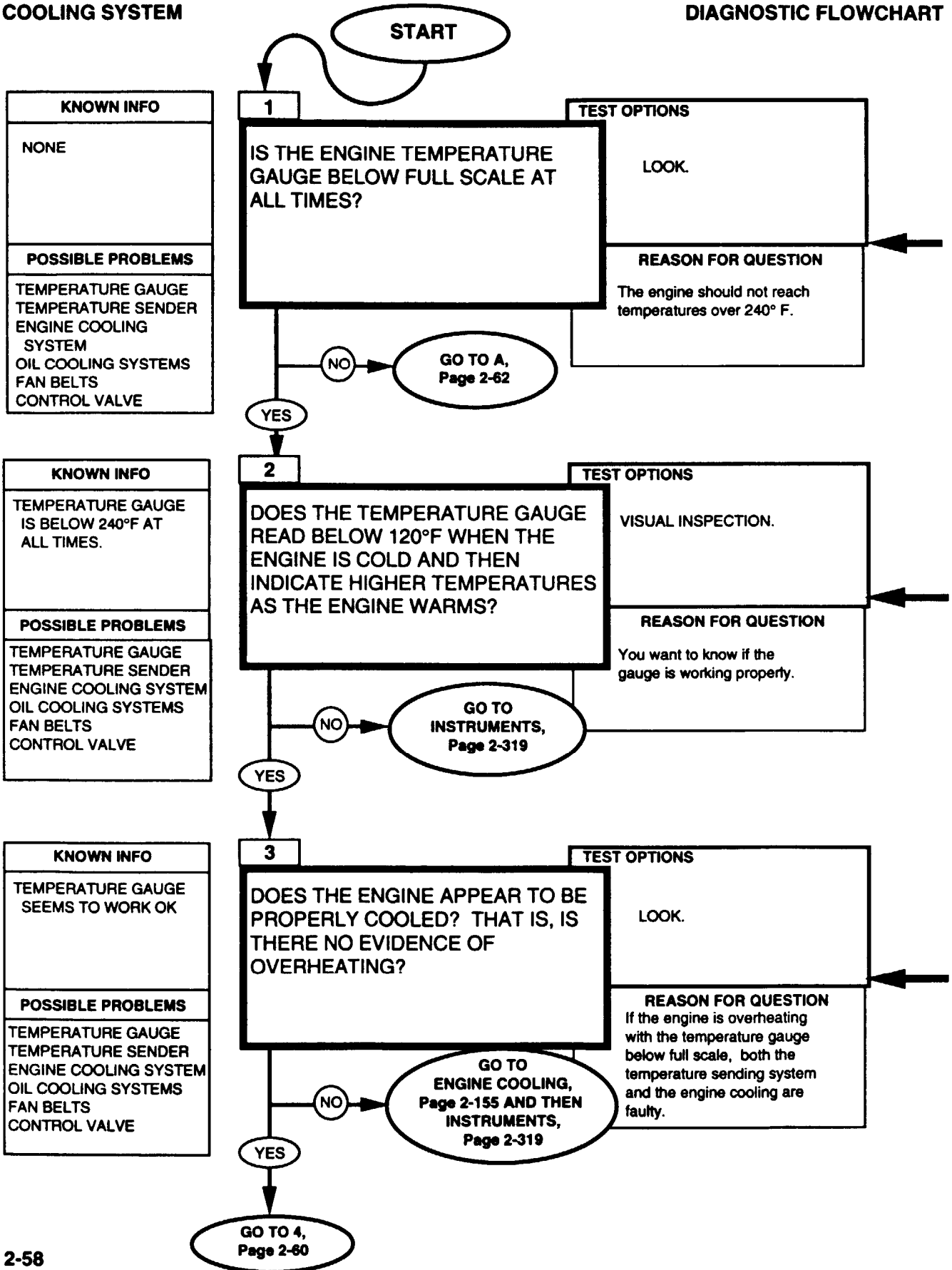
2-19. COOLING SYSTEM TESTS

This paragraph is a top level test for problems with either the watercooling system or the oil cooling system. Just follow the path, answering the questions. Additional information and notes are given on the facing page when necessary. The Cooling System consists of the oil and water radiators, the engine fan and its controller, the water pump, and the internal coolant passages in the engine.



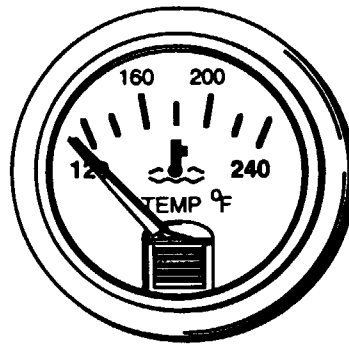
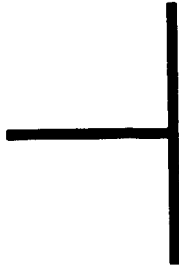
COOLING SYSTEM

DIAGNOSTIC FLOWCHART

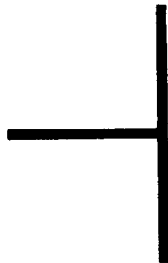


REFERENCE INFORMATION

COOLING SYSTEM



TEMPERATURE GAUGE



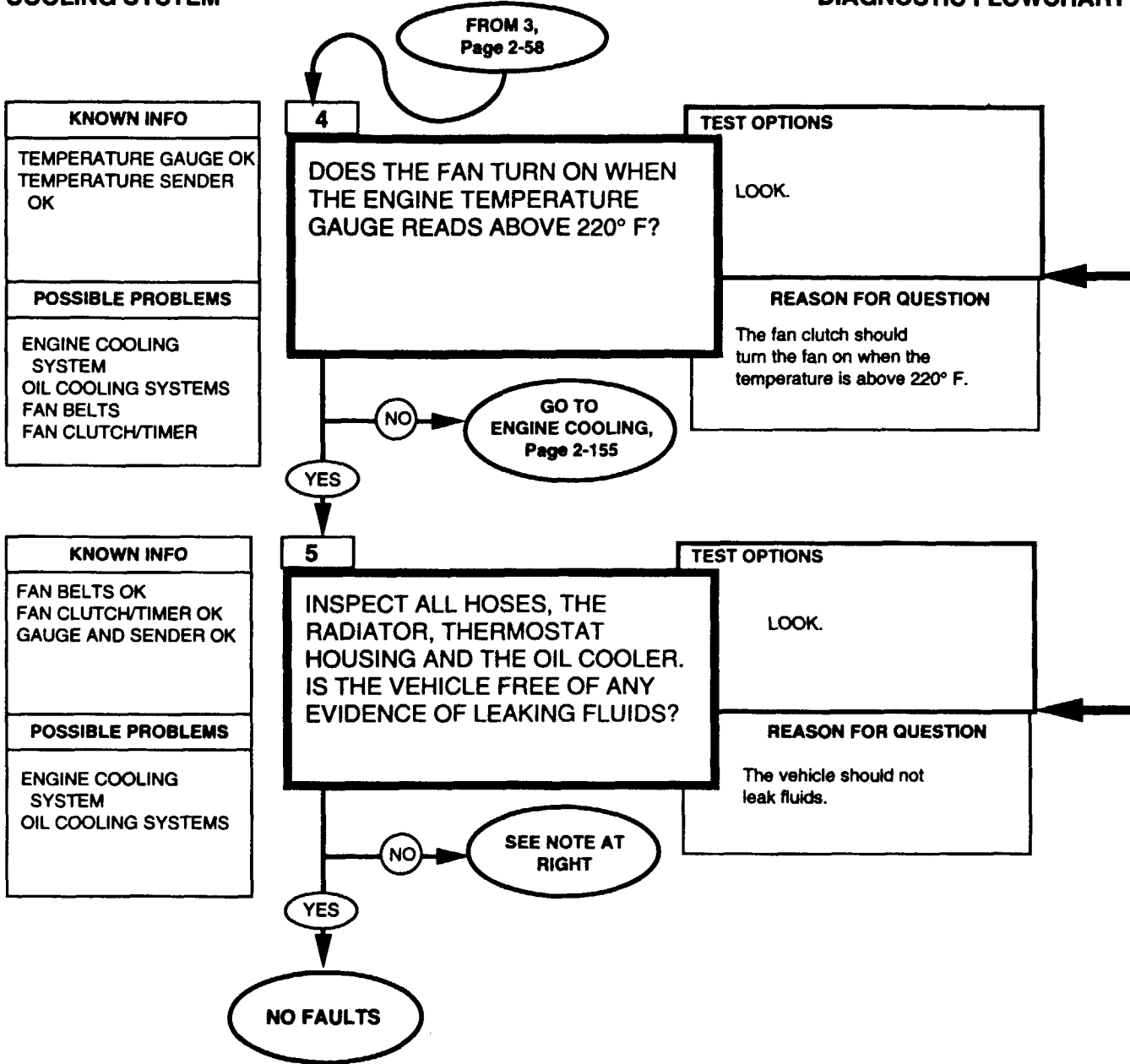
The question describes how the gauge should work. If you aren't sure if its working properly, you may want to run the instruments test anyway.




Look for boiling coolant, a blown surge tank pressure cap or leaking hoses to tell you if the engine is overheating.

COOLING SYSTEM

DIAGNOSTIC FLOWCHART



REFERENCE INFORMATION**COOLING SYSTEM**

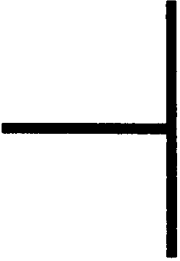
220° F is the approximate temperature at which the fan should turn itself on.

The fan will turn on and off as the engine temperature varies.

NOTE

If the leaking fluid is red, go to the transmission Paragraph 2-34, Page 2-399 or Paragraph 2-35, Page 2-411.

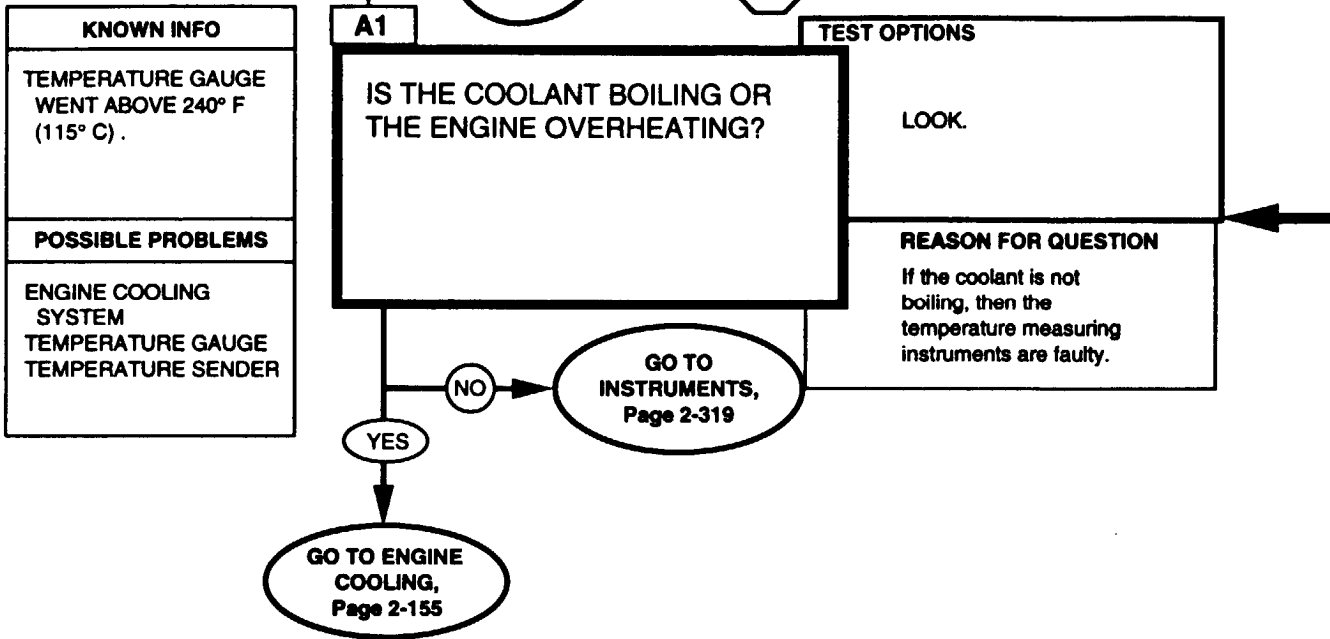
If the leaking fluid is yellow/green, go to engine cooling, Paragraph 2-25, Page 2-155.



If the oil cooler is leaking, try to determine where the leak is coming from. The oil cooler in front of the radiator cools both engine oil and transmission fluid (top half-transmission fluid, bottom half-engine oil). If the leak is in the oil cooler, go to transmission or engine cooling. If the leak is elsewhere, go to lubrication, Paragraph 2-20, Page 2-65.

COOLING SYSTEM

DIAGNOSTIC FLOWCHART



REFERENCE INFORMATION

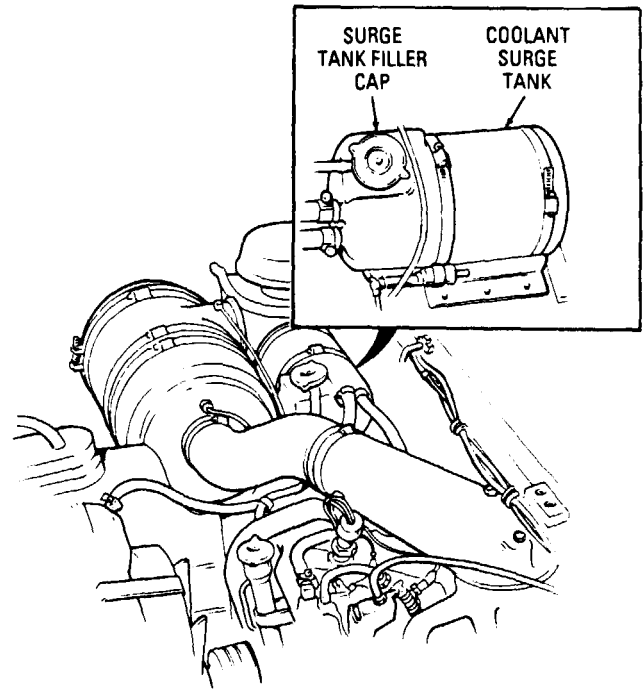
COOLING SYSTEM



WARNING

USE CAUTION WHEN INSPECTING HOT ENGINE PARTS TO AVOID BURNS. NEVER REMOVE THE PRESSURE CAP OF A HOT ENGINE.

The coolant surge tank is clear, so you can see what is happening.



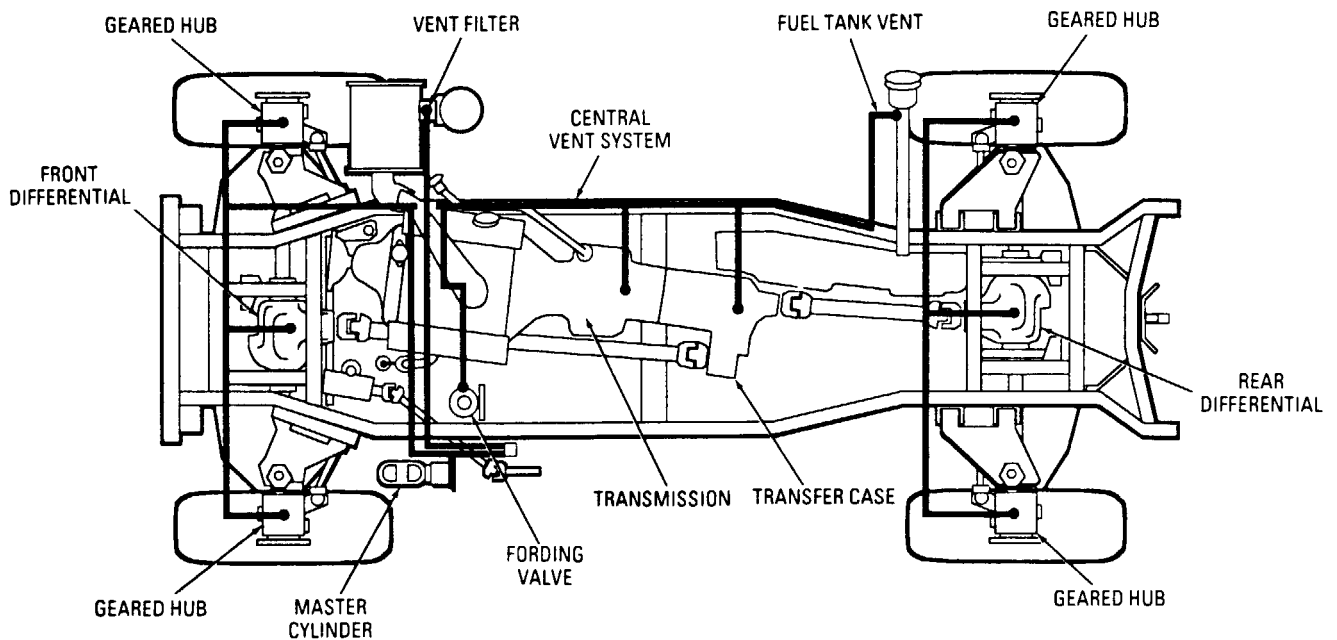
2-20. LUBRICATION SYSTEM TESTS

This paragraph is a top level test for all of the lubrication systems in the vehicle. Just follow the path, answering the questions. Additional information and notes are given on the facing page when necessary.

The HMMWV includes a venting system that is also checked in this paragraph. The purpose of the vent system is to allow vapor to escape to the atmosphere under normal operation, and to prevent venting during deep water fording operations. If the vents were left open, water would enter the engine and other systems and cause damage. The location of the vent lines is shown below. The location of the other parts in the lubrication system are shown in other lower level paragraph as required.

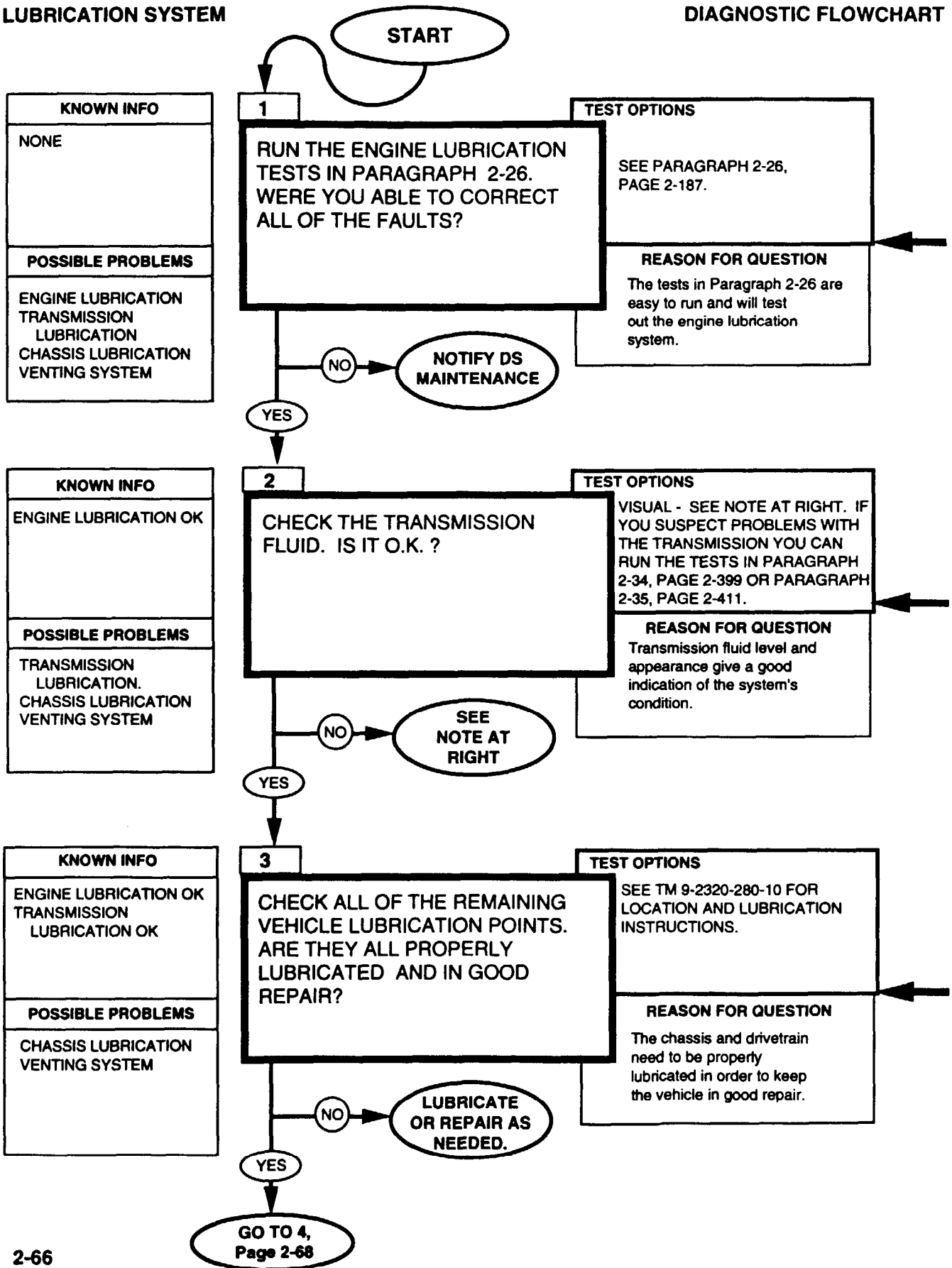
NOTE

Bold lines represent ventilation system.



LUBRICATION SYSTEM

DIAGNOSTIC FLOWCHART



REFERENCE INFORMATION

LUBRICATION SYSTEM

The tests in para. 2-26 test the oil level, cleanliness, leaks in the system, and the CDR valve. Return here when you've fixed everything you can or if no faults were found.

PROCEDURE FOR CHECKING TRANSMISSION FLUID

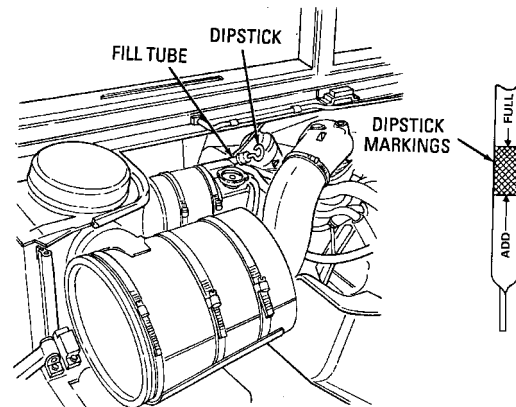
1. Start engine.
2. Hold down brake pedal and move transmission shift lever through all ranges including reverse.
3. Engage parking brake and place shift lever in neutral. Check fluid level on dipstick.
4. Proper level is between "FULL" and "ADD" marks on dipstick.

NOTE

CHECK FLUID FOR A BURNT SMELL, GRIT, DISCOLORATION, AIR BUBBLES, OR A MILKY APPEARANCE.

- Burnt smell, discoloration, or grit indicates worn or damaged internal components. Notify DS maintenance.
- Bubbles indicate an overfilled system or air leaks in the system. Drain the fluid and refill to proper level. Refer to (para. 5-2).
- Milky appearance is due to water in the system. Drain the fluid from the entire transmission and transmission cooling system and install a new filter. Refer to (para 5-2).
- Check fill tube for indications of fluid being blown out. If fluid is being blown out, check vent line for obstructions, and refill transmission to proper level. Refer to (para. 5-2).
- Transmission fluid coming out of dipstick filler tube indicates a restriction in the ventilation system. Check for clogged, melted, or crushed lines and/or fittings between transmission and atmosphere vent on air cleaner canister. Replace where needed. Refer to (para. 5-16).

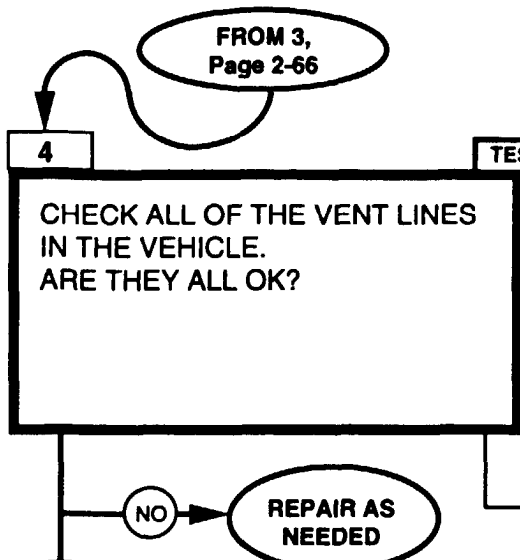
Among the items are the driveshafts, suspension, differentials, and geared hubs.



LUBRICATION SYSTEM

DIAGNOSTIC FLOWCHART

KNOWN INFO
ENGINE LUBRICATION OK TRANSMISSION LUBE OK CHASSIS AND DRIVELINE LUBE OK
POSSIBLE PROBLEMS
VENT SYSTEM FORDING VALVE



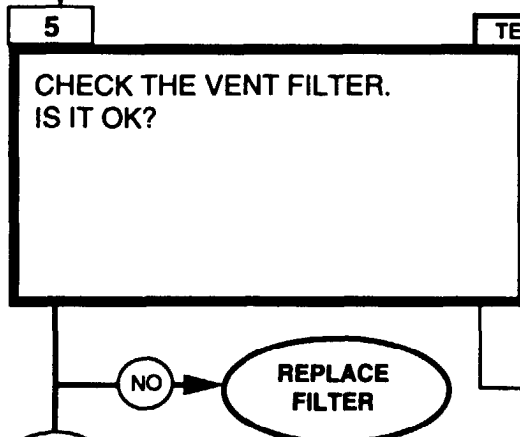
TEST OPTIONS

SEE THE FOLDOUT PAGE IN THIS PARAGRAPH FOR LOCATIONS OF THE VENT LINES.

REASON FOR QUESTION

Make sure that the vent system is intact. The vent system is used during deep fording operations.

KNOWN INFO
ENGINE LUBRICATION OK TRANSMISSION LUBE OK CHASSIS AND DRIVE LINE LUBE OK VENT LINES OK
POSSIBLE PROBLEMS
VENT FILTER FORDING VALVE



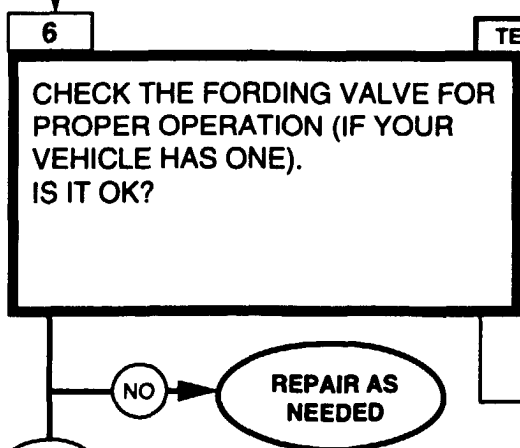
TEST OPTIONS

VISUAL INSPECTION - THE VENT FILTER IS LOCATED BEHIND THE COOLANT SURGE TANK.

REASON FOR QUESTION

A clogged vent filter will cause the fuel tank to be at a vacuum. This could lead to problems with the fuel system.

KNOWN INFO
ENGINE LUBRICATION OK TRANSMISSION LUBE OK CHASSIS AND DRIVE LINE LUBE OK VENT LINES OK VENT FILTER OK
POSSIBLE PROBLEMS
FORDING VALVE



TEST OPTIONS

VISUAL INSPECTION - TEST OPERATION IN BOTH POSITIONS.

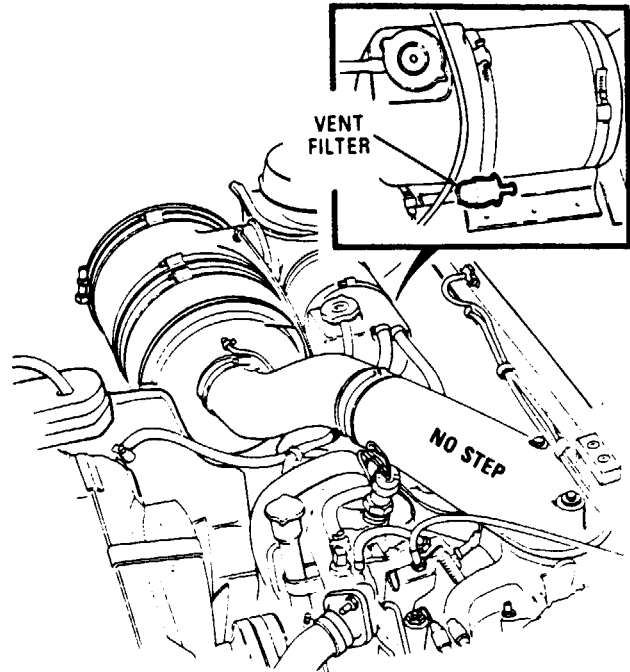
REASON FOR QUESTION

The fording control valve regulates the venting of vapors to the atmosphere.

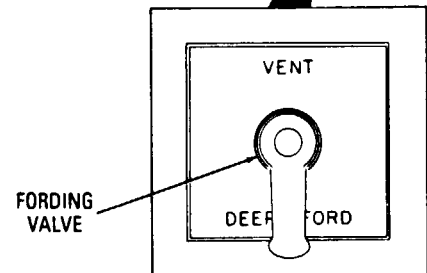
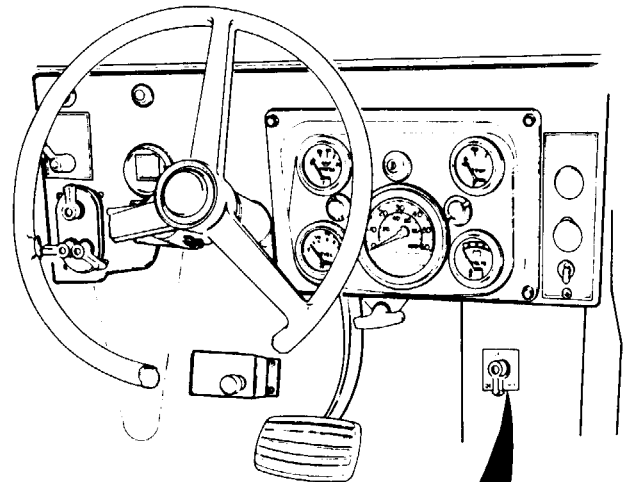
REFERENCE INFORMATION

LUBRICATION SYSTEM

There are vent lines attached to all parts of the vehicle with a lubrication reservoir. These parts are the engine, transmission, transfer case, differentials, geared hubs, and the fuel tank. Removal procedures for the vent lines are given in the repair procedure for the particular component to which the line is attached.



Replace the fording valve.
Refer to (para 12-9).



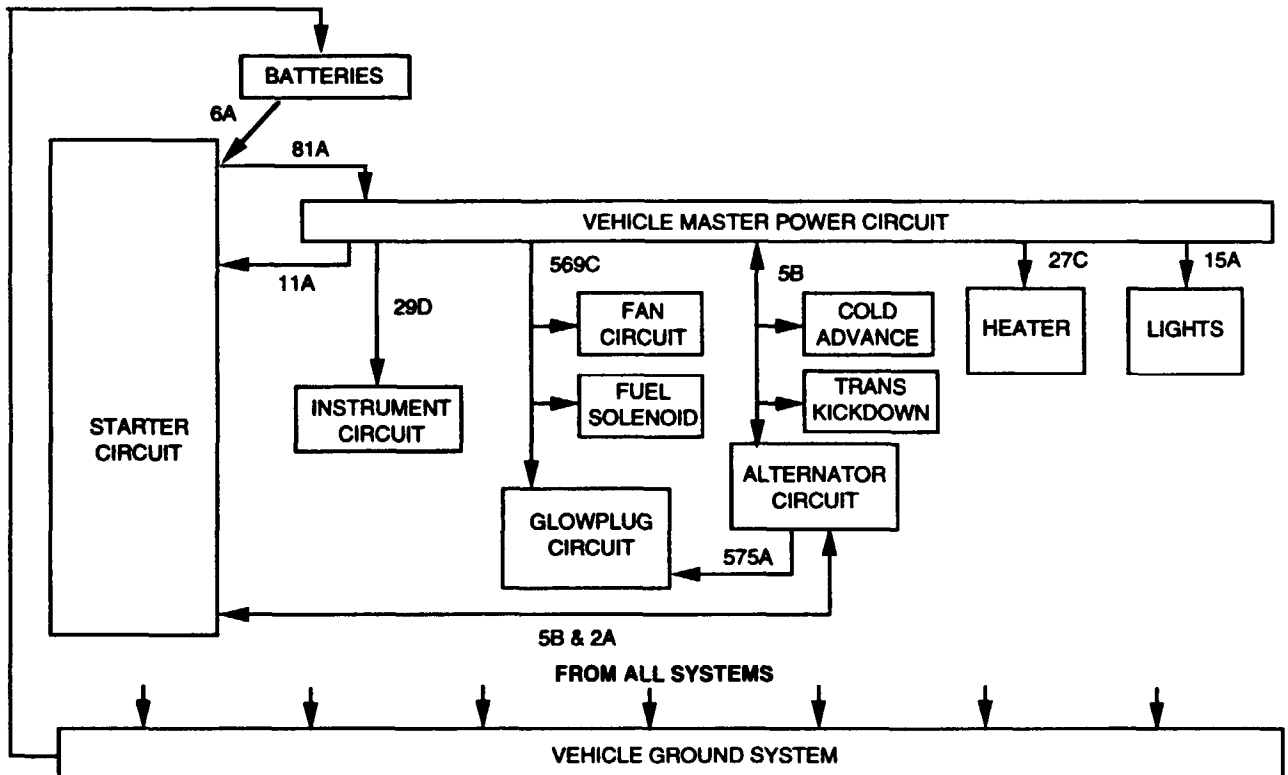
2-21. ELECTRICAL TESTS

Most of the electrical circuits in the vehicle are included in one of the major systems covered by this manual. This is a top level paragraph to help you pick the right one. A number of schematics are also included to help you find the problem. If you go through the flowchart and can't solve the problem, use the schematics to find wires which may be causing trouble.

The Electrical System consists of the batteries, which produce electrical power by a chemical reaction between the lead plates and the electrolyte solution (a mixture of acid and water). This power is carried by wires and cables to those parts of the vehicle which require electrical power. The batteries get recharged by the alternator, which generates electrical power by using some of the engine's mechanical power, produced when the engine is running. If you are not too confident about electrical concepts and terminology, you should read Paragraph 2-16, page 2-39.

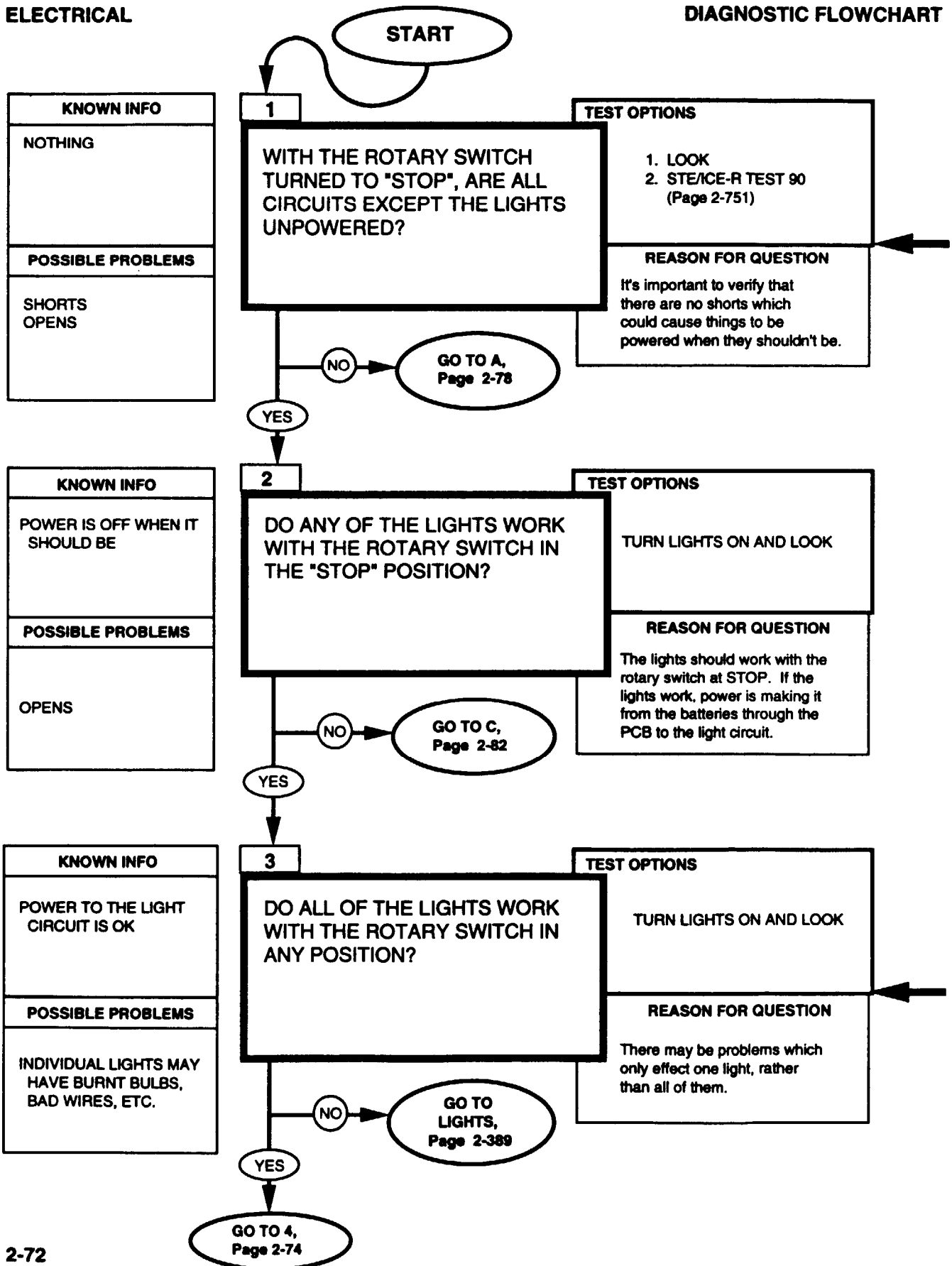
All electrical systems require a connection to ground (called grounding), which is the completion of the circuit to the battery negative. Pages 2-66, 2-67 and 2-68 are diagrams of the grounding. If your vehicle exhibits strange symptoms that seem to defy all efforts to fix them, the vehicle may have a grounding problem. Grounding problems cause strange symptoms usually because more than one circuit is using the same ground, or because a circuit has more than one ground. For example, looking at the body ground diagram, if wire 58D (a ground for the instruments) is disconnected from the left side cylinder head, the instruments may still function due to the separate ground, but they would probably be erratic and inaccurate. Usually the problem will be a loose or corroded connection between the circuit, through body ground to battery negative terminal. Be sure to check continuity to battery negative cable rather than simply to the vehicle body or engine block.

After the grounding diagrams are functional flow schematics of the major systems in the vehicle. The shaded areas are the wires and components of the vehicle master power distribution. These are designed to help you find the system giving you problems.



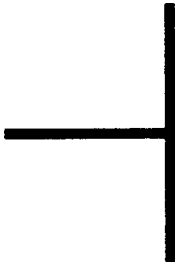
ELECTRICAL

DIAGNOSTIC FLOWCHART



REFERENCE INFORMATION

ELECTRICAL



The lights are the only circuit on the vehicle which should work or be drawing any power when the switch is in the STOP position. Check the instruments, try turning on the heater fan, listen for any relay clicking or other sign (includes engine running) that power is on when it shouldn't be. It's best if you use the STE/ICE-R in TK mode to verify that there is no current draw from the batteries. You can't use the DCA mode for this because it will measure this current during the calibration part of the test and think that this is just an offset in the sensor.

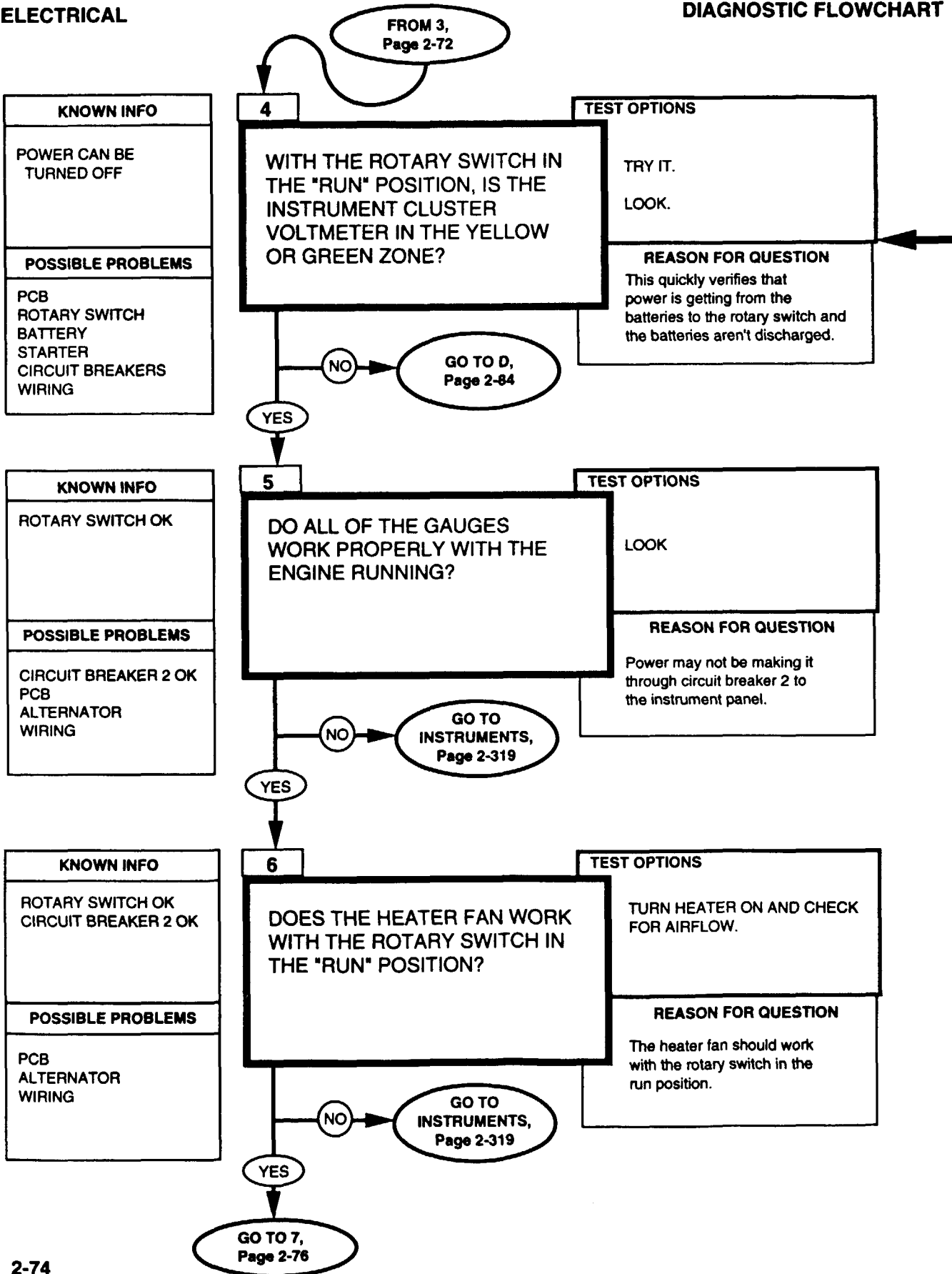
<p>0-1500 AMPS DC STE/ICE-R TEST 90</p>
<ol style="list-style-type: none"> 1. Connect probe. 2. Start Test 90, DC amps. 3. Displayed reading is in amps.



The lights should work with the rotary switch in any position.

ELECTRICAL

DIAGNOSTIC FLOWCHART



REFERENCE INFORMATION

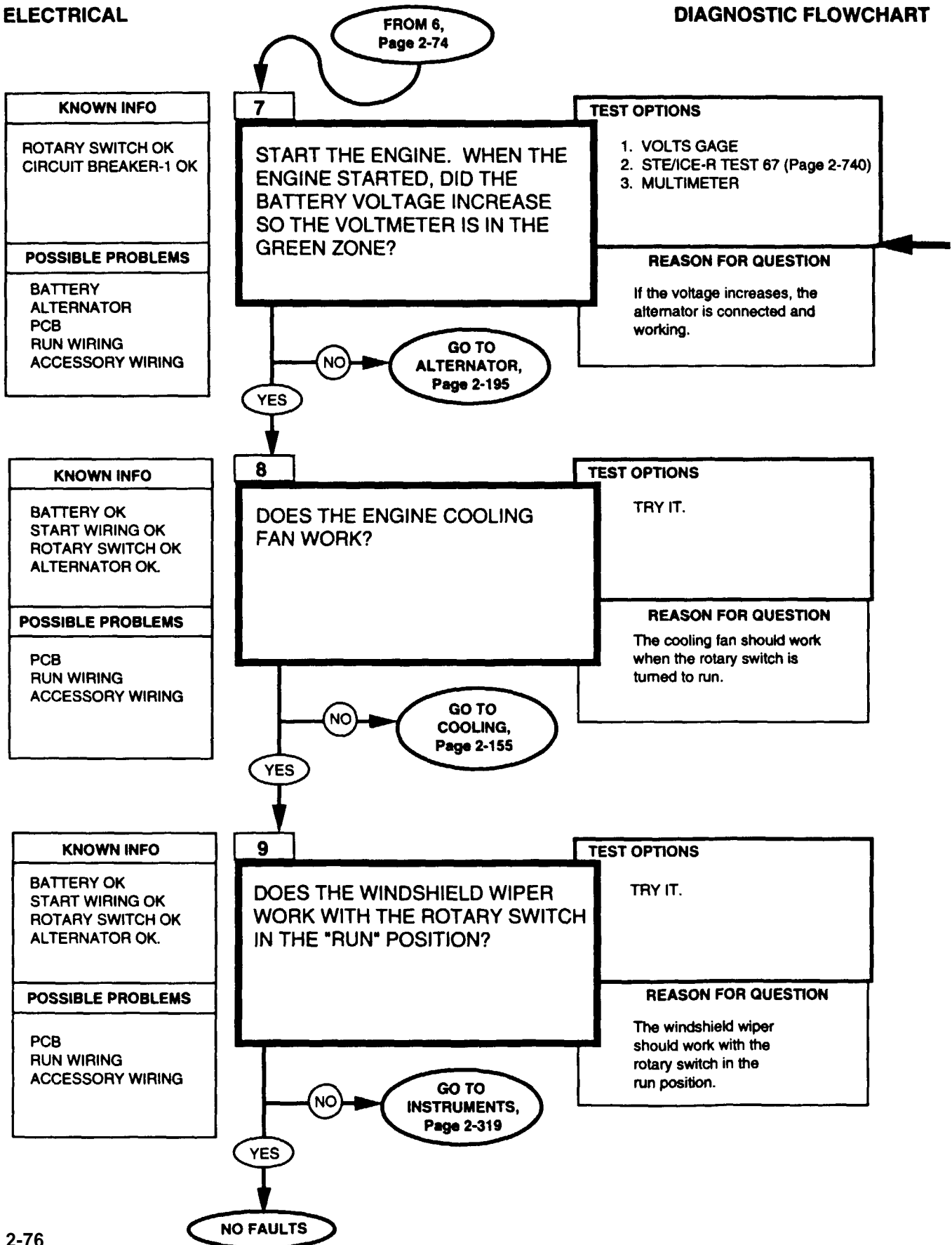
ELECTRICAL



With engine off, turn switch. If the voltmeter is slightly in the yellow zone, you can continue down the YES path, but beware of possible test failures due to the low battery charge.

ELECTRICAL

DIAGNOSTIC FLOWCHART



REFERENCE INFORMATION

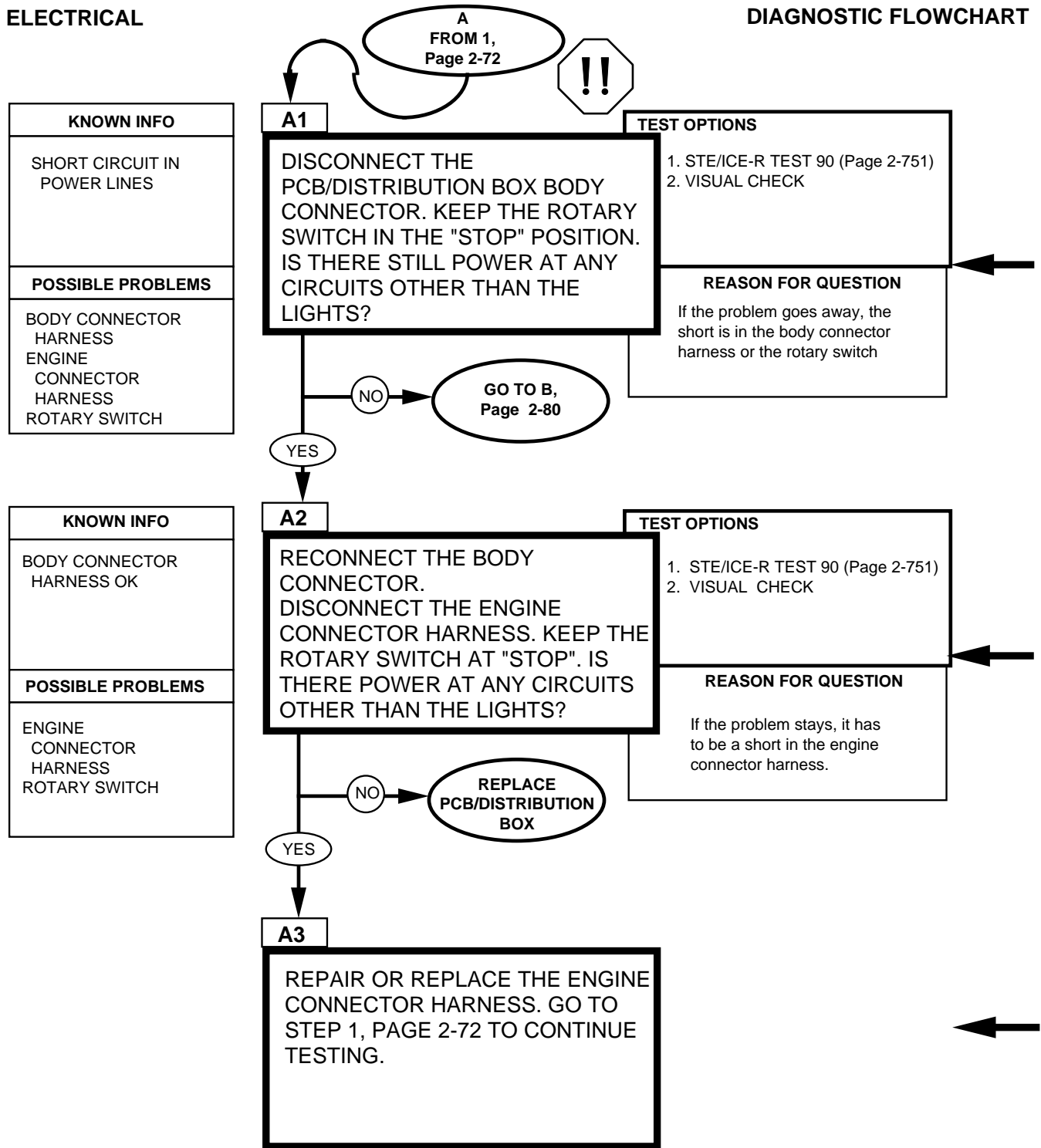
ELECTRICAL



BATTERY VOLTAGE STE/CE-R TEST 67
<ol style="list-style-type: none">1. Start Test 67, battery voltage.2. Displayed reading is in volts. Batteries should be 23-25.5 volts. Batteries voltage will drop when glowplugs turn on.

ELECTRICAL

DIAGNOSTIC FLOWCHART



REFERENCE INFORMATION

ELECTRICAL

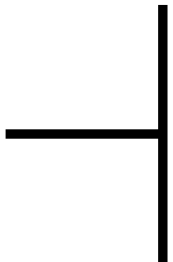
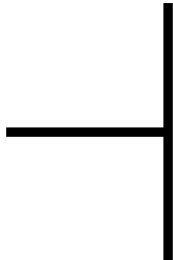


WARNING

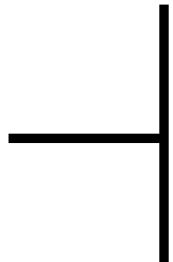
DISCONNECT NEGATIVE BATTERY CABLE BEFORE DISCONNECTING AND RECONNECTING PROTECTIVE CONTROL BOX/DISTRIBUTION BOX HARNESS.

There is battery voltage at the PCB/distribution box at all times. Failure to disconnect battery cable will result in damage to equipment or injury to personnel.

0-1500 AMPS DC STE/ICE-R TEST 90
1. Connect probe.
2. Start Test 90, DC amps.
3. Displayed reading is in amps.



Replace PCB, refer to (para. 4-5).
Replace distribution box, refer to (para. 4-5.1).

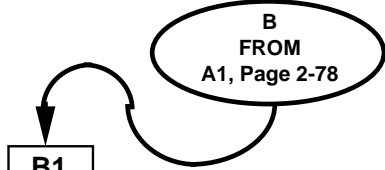


Repair harness, refer to (para. 4-85).
Replace harness. Notify DS maintenance.

ELECTRICAL

DIAGNOSTIC FLOWCHART

KNOWN INFO
SHORT ON BODY CONNECTOR SIDE OF PCB/DISTRIBUTION BOX
POSSIBLE PROBLEMS
ROTARY SWITCH PCB/DISTRIBUTION BOX BODY CONNECTOR BODY CONNECTOR CABLE HARNESS



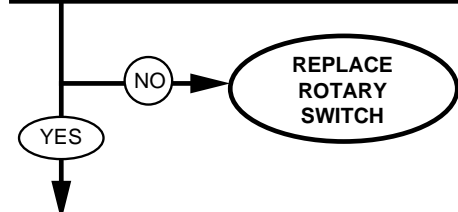
B1

IS THERE AN OPEN CIRCUIT FROM PIN B TO PIN R AND FROM PIN B TO PIN S ON THE ROTARY SWITCH (WITH THE SWITCH IN THE "STOP" POSITION)?

TEST OPTIONS
1. STE/ICE-R TEST 91 (Page 2-752) 2. MULTIMETER

REASON FOR QUESTION

Checking the rotary switch first makes it easier to check the other possible problems.



KNOWN INFO
ROTARY SWITCH OK
POSSIBLE PROBLEMS
PCB/DISTRIBUTION BOX BODY CONNECTOR BODY CONNECTOR CABLE HARNESS

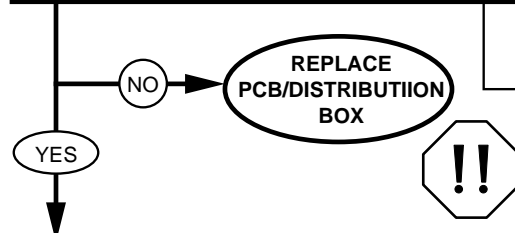
B2

IS THERE ABOUT 0 VOLTS AT PINS A,B,D,G AND H OF THE PCB/DISTRIBUTION BOX BODY CONNECTOR?

TEST OPTIONS
1. STE/ICE-R TEST 89 (Page 2-750) 2. MULTIMETER

REASON FOR QUESTION

If there is voltage at any of these pins then the PCB/distribution box must have a short in it.

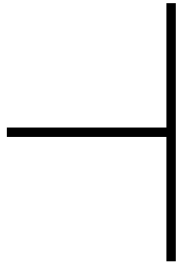


B3

REPAIR OR REPLACE THE BODY CONNECTOR HARNESS. GO TO A2, PAGE 2-78, TO CONTINUE TESTING.

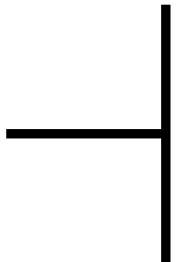
REFERENCE INFORMATION

ELECTRICAL



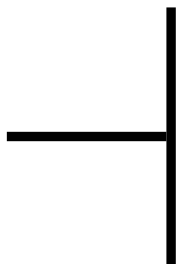
Replace rotary switch. Refer to (para. 4-7).

0-4500 OHMS STE/ICE-R TEST 91
<p>1. Connect RED clip and BLACK clip to the terminations indicated in the question. RED to the first, BLACK to the second.</p> <p>2. Start Test 91, 0-4500 ohms.</p> <p>3. Displayed reading is in ohms. Less than 5 ohms is continuity. If the resistance is over 4500 ohms, STE/ICE displays "9.9.9.9."</p>



Replace PCB. Refer to (para. 4-5).
Replace distribution box. Refer to (para. 4-5.1).

0-45 DC VOLTS STE/ICE-R TEST 89
<p>1. Connect RED clip to the indicated test point, BLACK clip to negative or ground.</p> <p>2. Start Test 89, DC volts.</p> <p>3. Displayed reading is in volts.</p>



Repair or replace harness.
Notify DS maintenance.



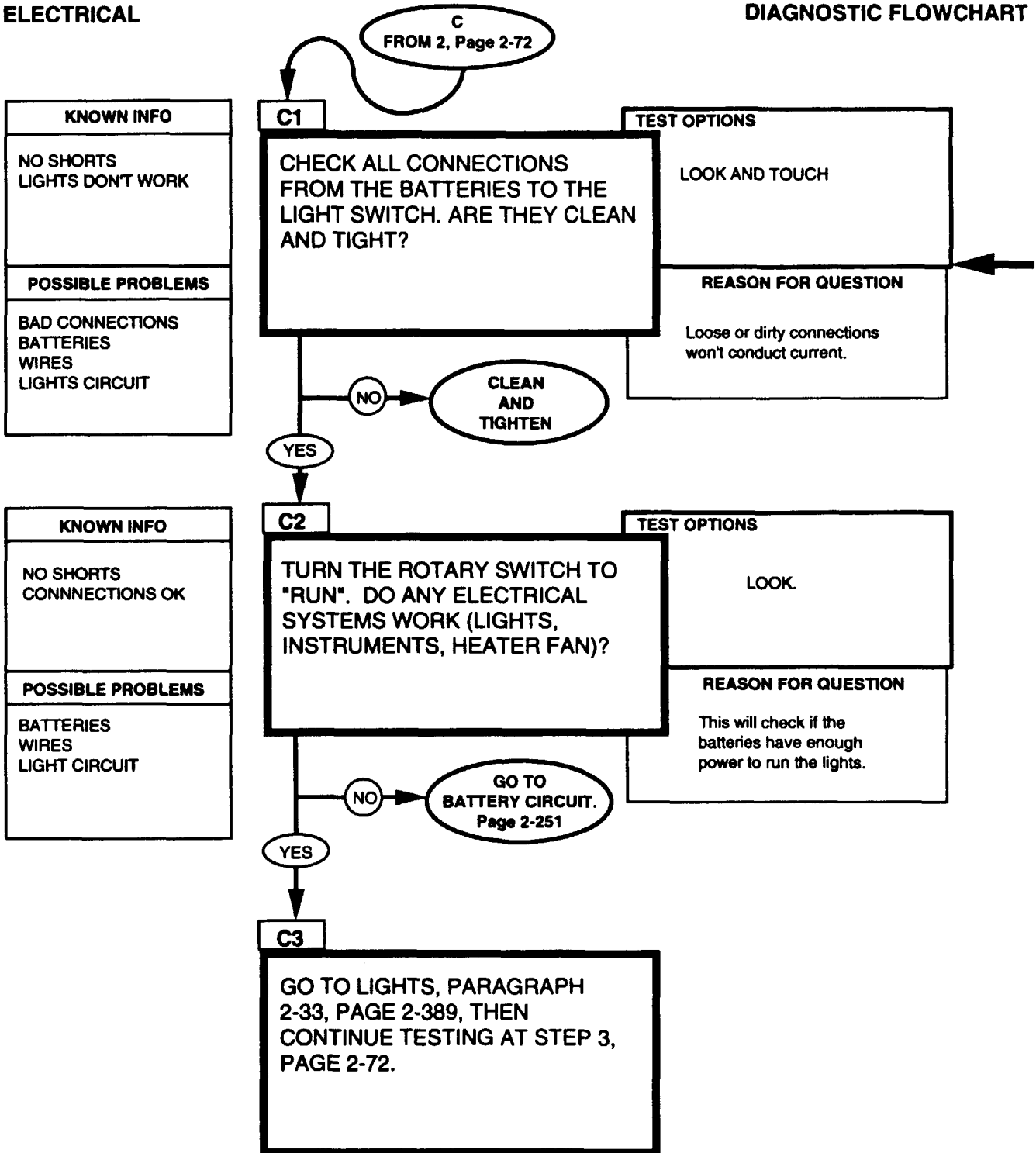
WARNING

DISCONNECT NEGATIVE BATTERY CABLE BEFORE DISCONNECTING AND RECONNECTING PROTECTIVE CONTROL BOX/DISTRIBUTION BOX HARNESS.

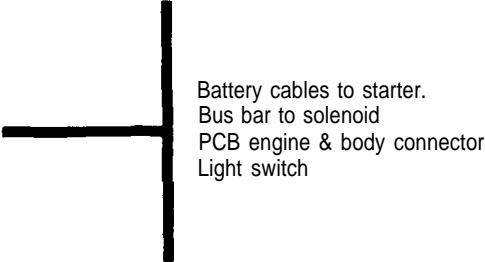
There is battery voltage at the PCB/distribution box at all times. Failure to disconnect battery cable will result in damage to equipment or injury to personnel.

ELECTRICAL

DIAGNOSTIC FLOWCHART

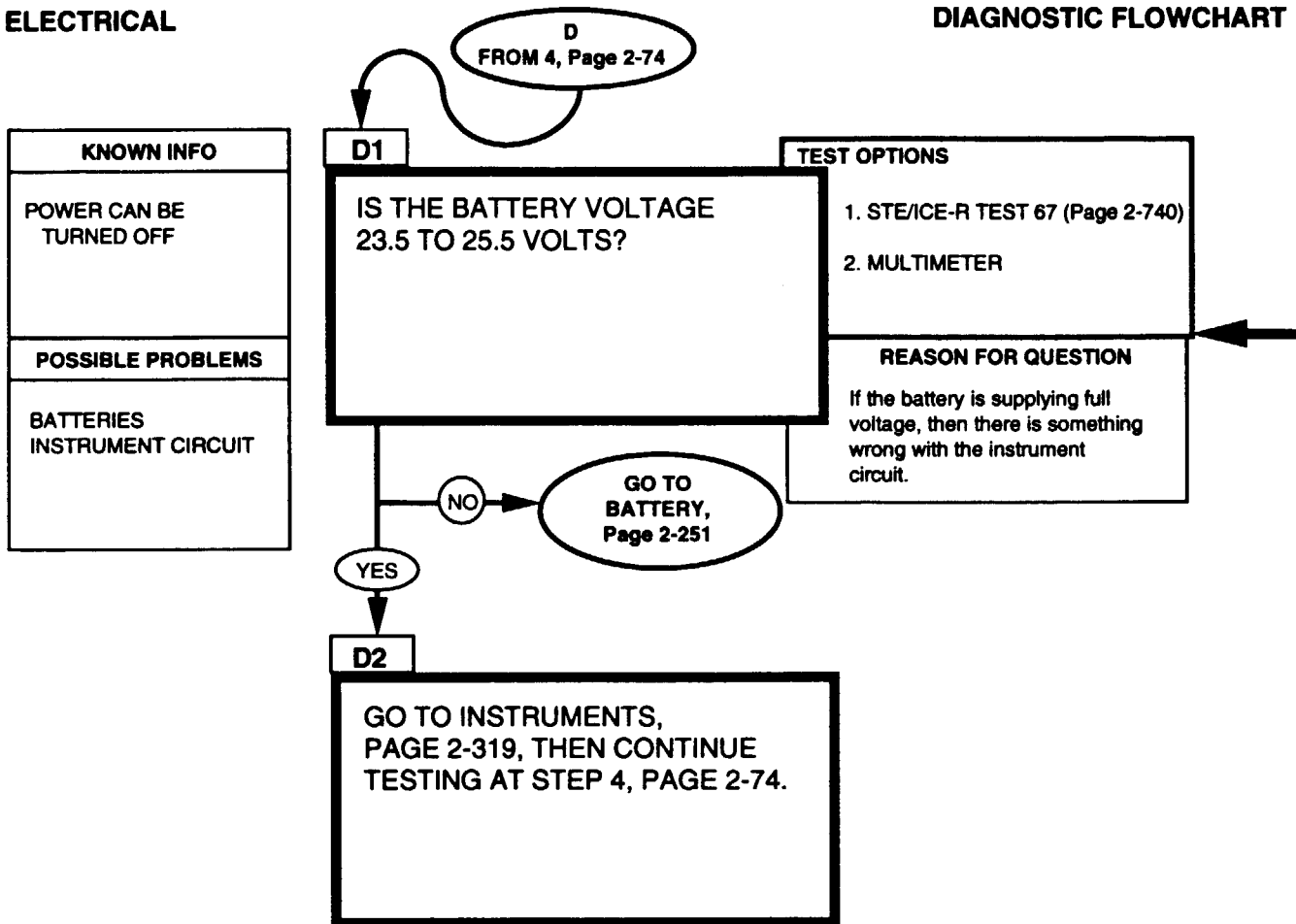


REFERENCE INFORMATION



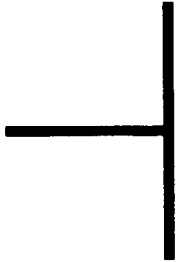
ELECTRICAL

DIAGNOSTIC FLOWCHART



REFERENCE INFORMATION

ELECTRICAL

**BATTERY VOLTAGE
STE/ICE-R TEST 67**

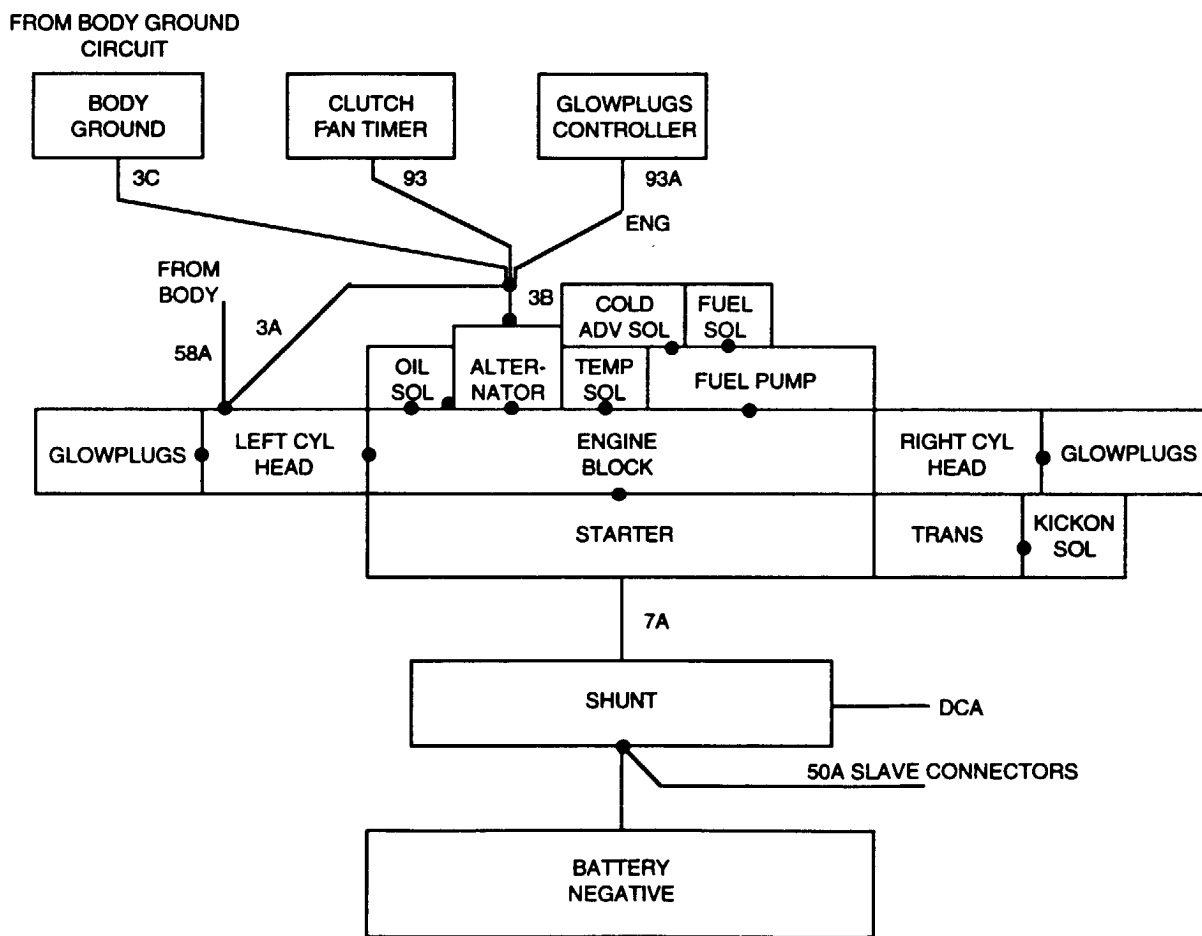
1. Start Test 67, battery voltage.
2. Displayed reading is in volts. Batteries should be 23-25.5 volts. Batteries' voltage will drop when glowplugs turn on.

**BATTERY VOLTAGE
MULTIMETER**

1. Set the voltmeter to a DC volts scale of at least 40 volts.
2. Connect the RED lead to positive and the BLACK lead to negative.
3. Be sure to read the correct scale.

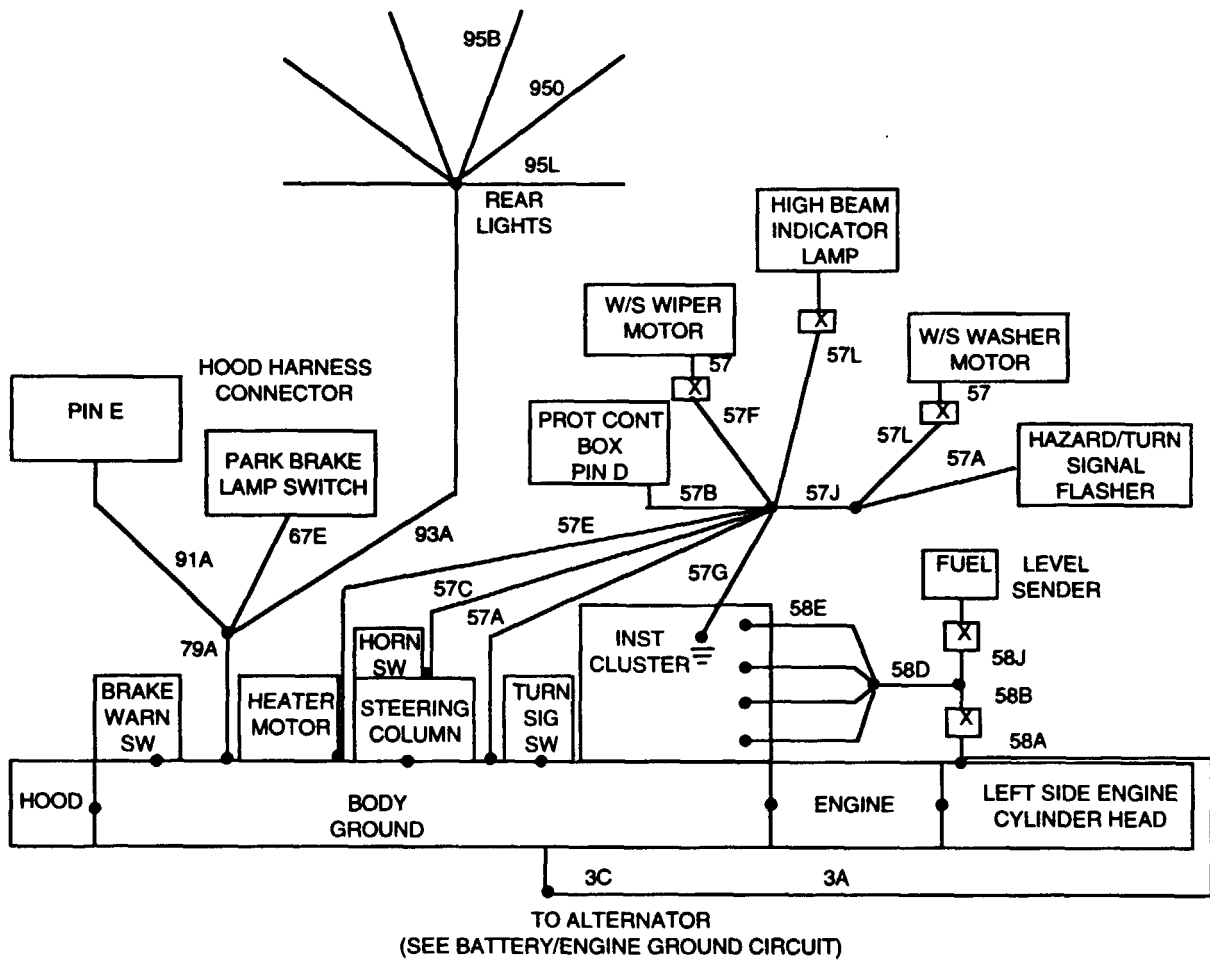
ELECTRICAL

BATTERY/ENGINE GROUND CIRCUIT



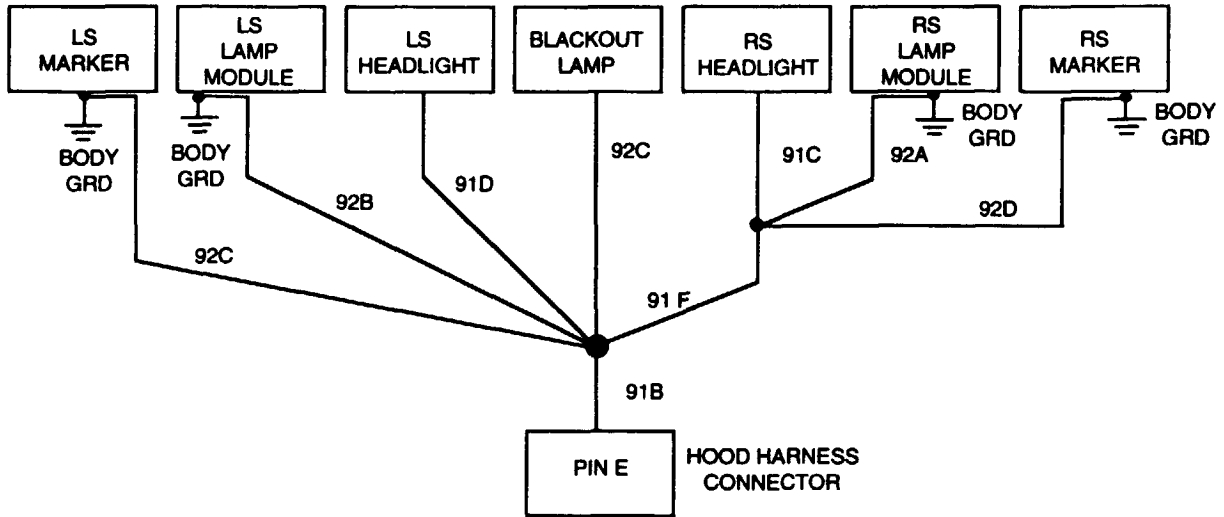
ELECTRICAL

BODY GROUND CIRCUIT



ELECTRICAL

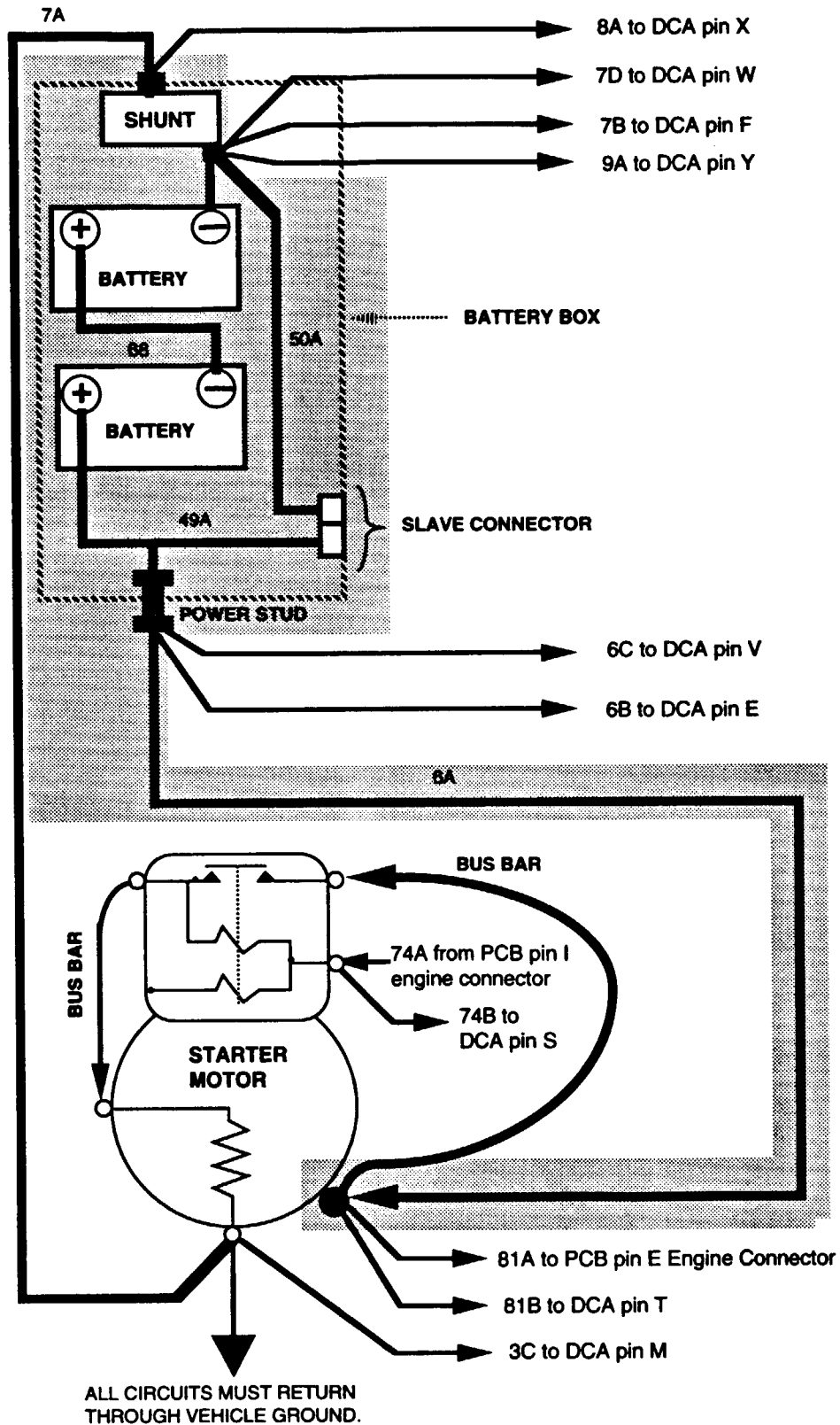
FRONT HOOD/LIGHTS GROUND CIRCUIT



BATTERY CIRCUIT INTERFACE

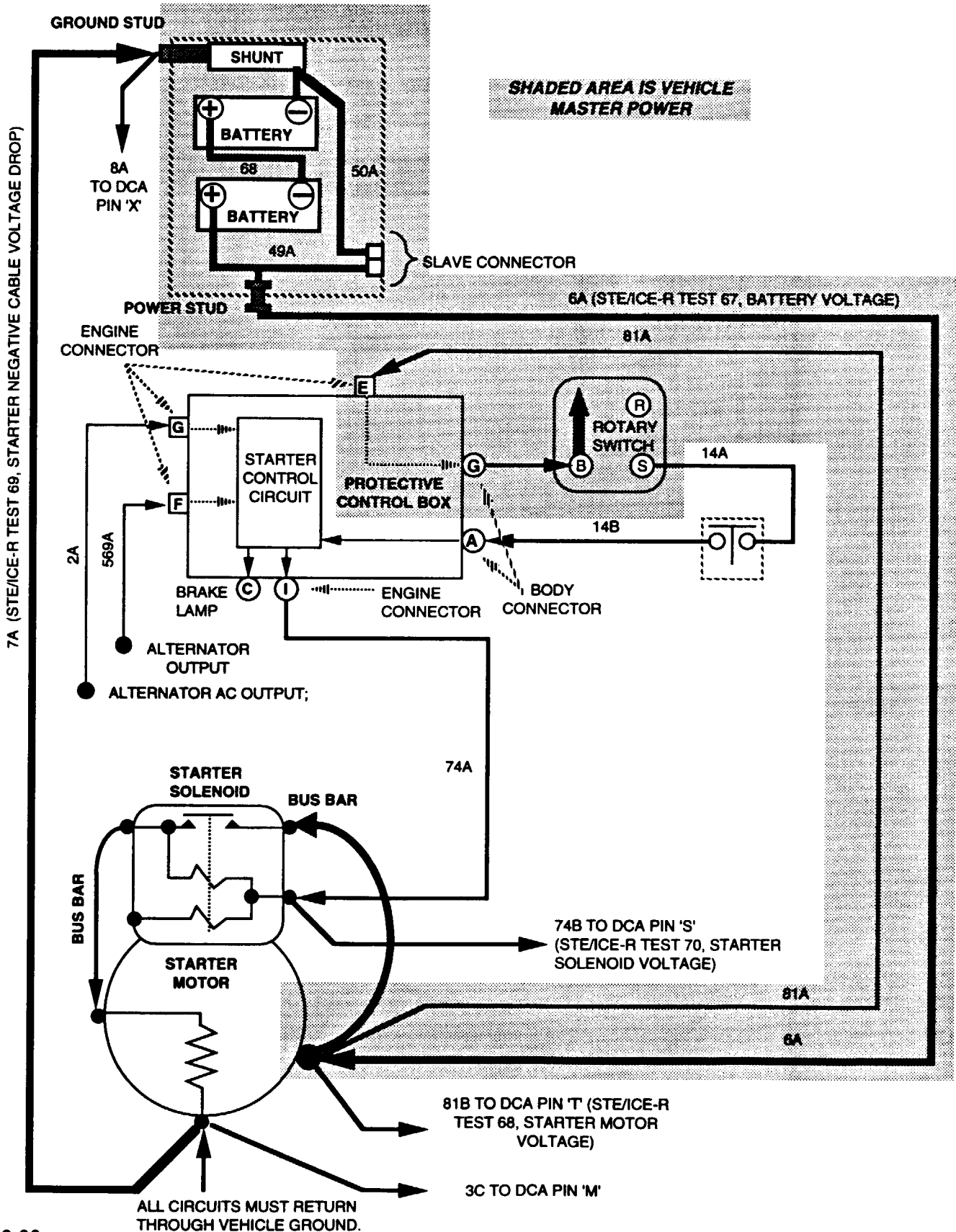
ELECTRICAL

SHADED AREA IS VEHICLE MASTER POWER



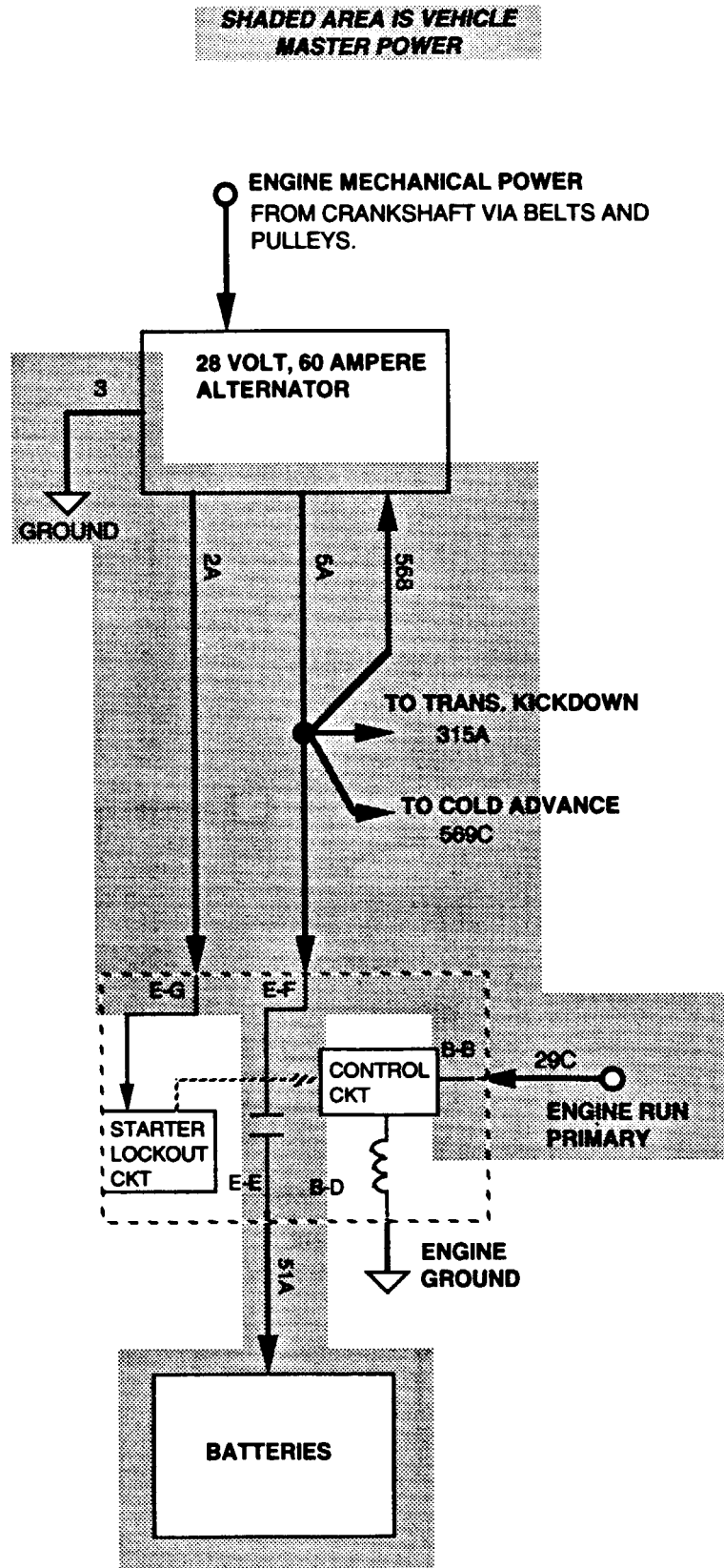
ELECTRICAL

STARTER CIRCUIT INTERFACE



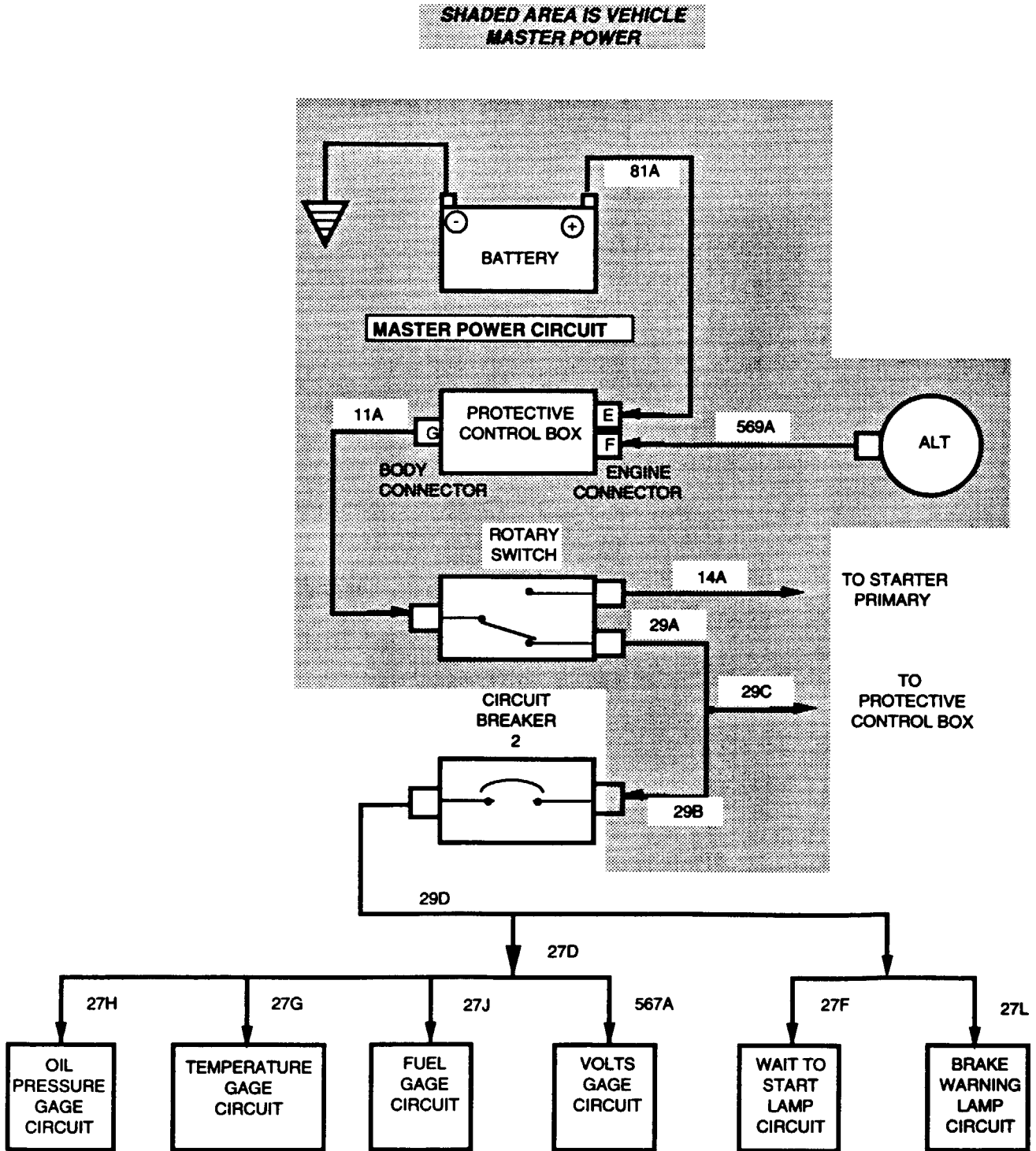
ALTERNATOR INTERFACE

ELECTRICAL



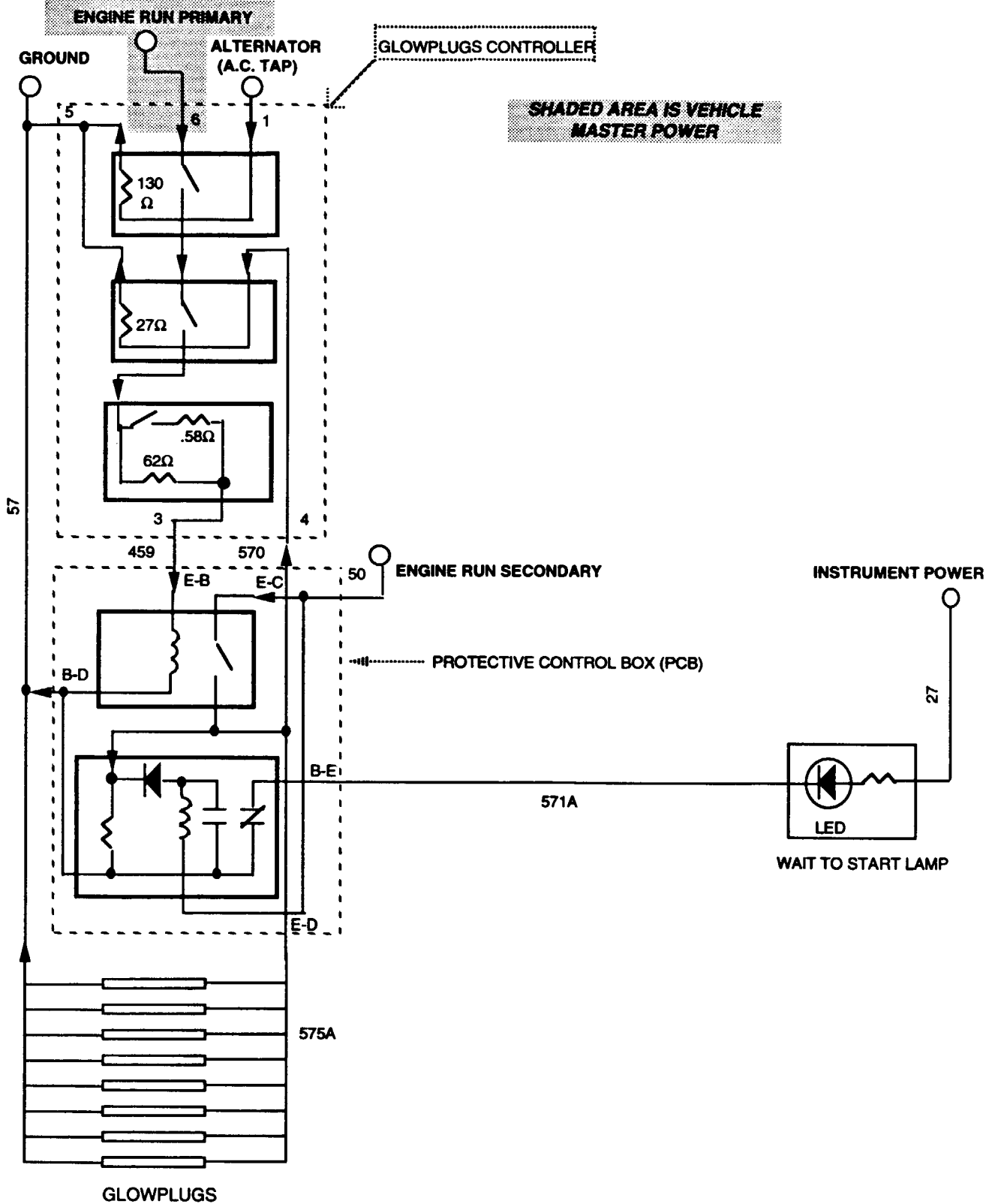
ELECTRICAL

INSTRUMENTS CIRCUIT INTERFACE



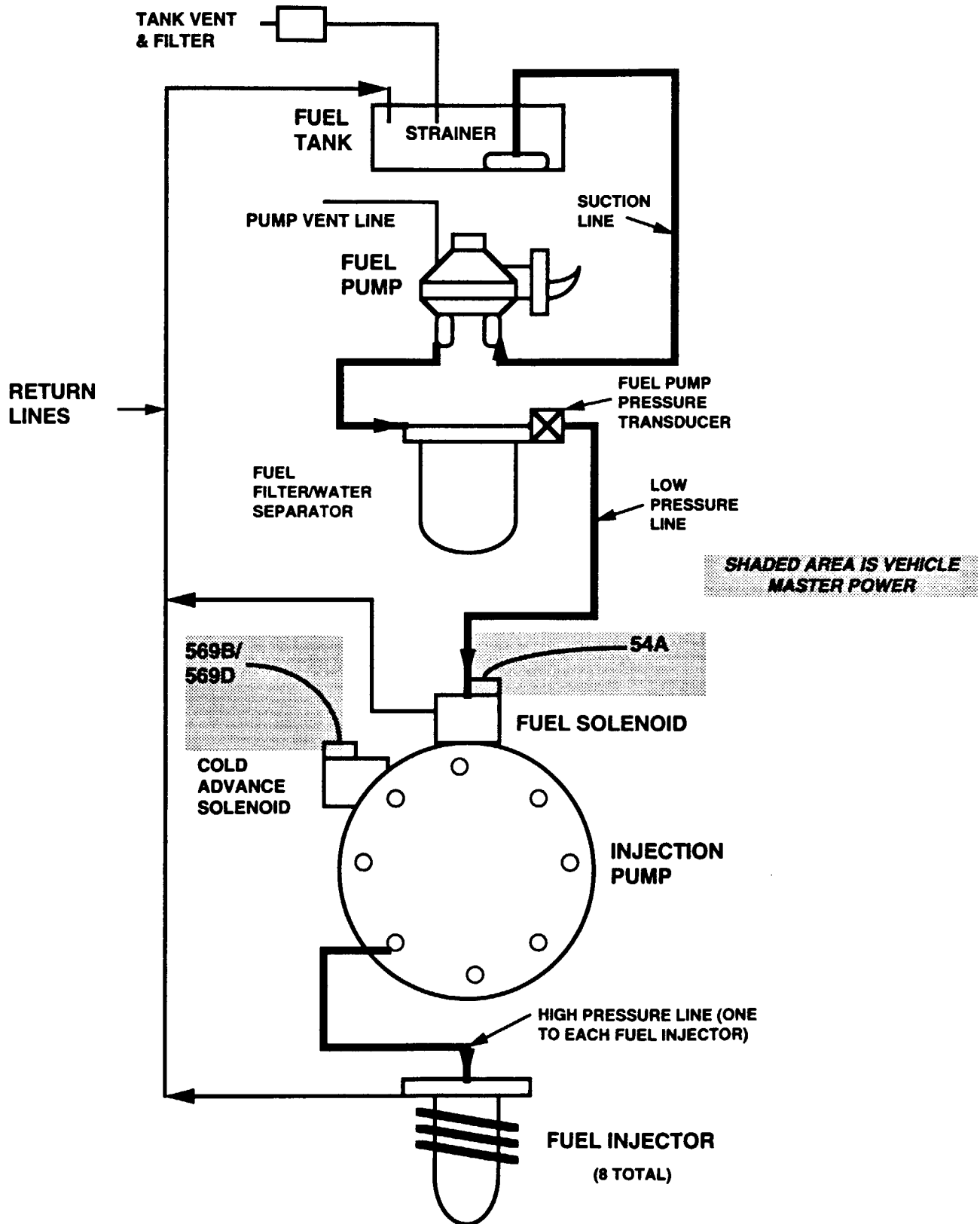
GLOWPLUG CKT INTERFACE

ELECTRICAL



ELECTRICAL

FUEL SYSTEM INTERFACE

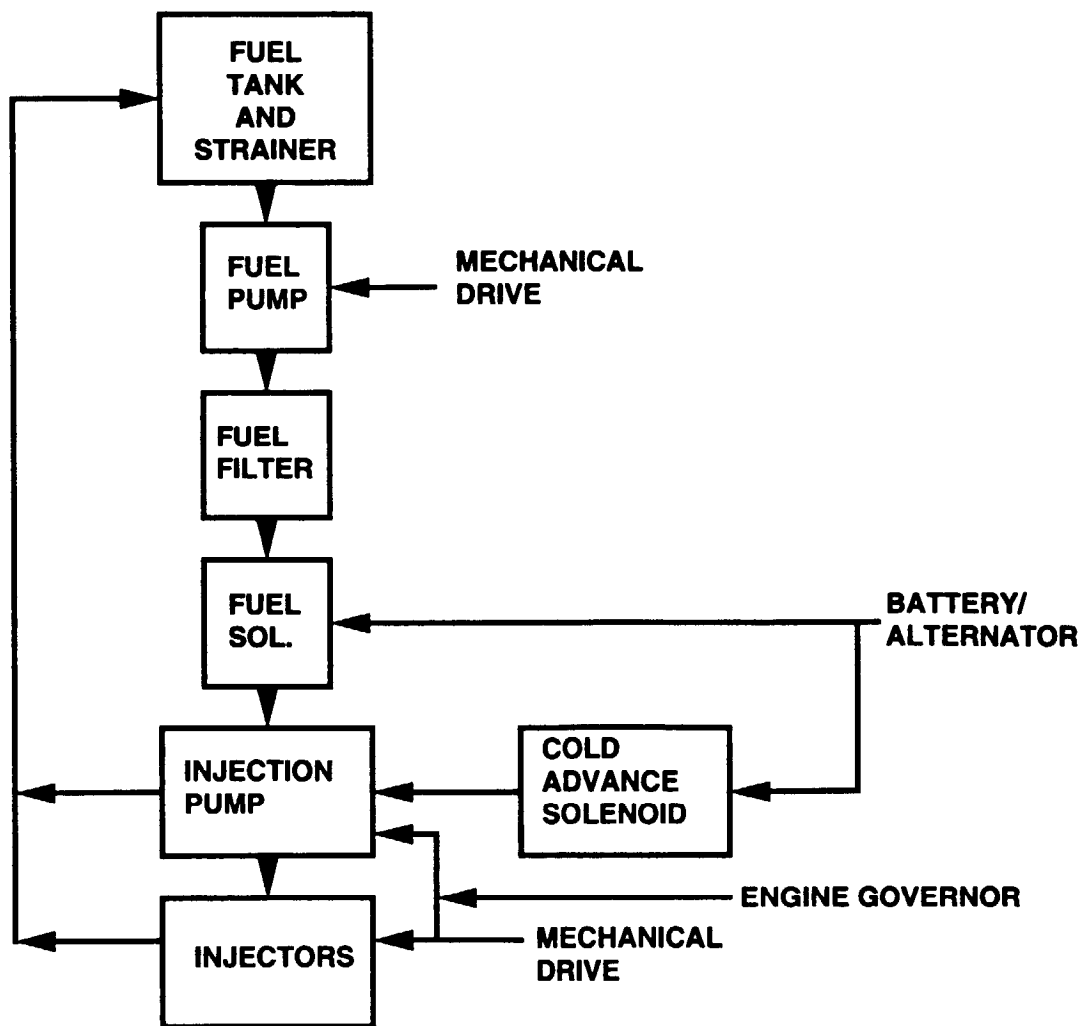


2-22. FUEL SYSTEM TESTS

These Fuel System tests can be run any time you think there maybe a problem with the fuel system or if you were sent here from another test.

If you are running this test because the engine runs rough remember that air intake and exhaust as well as internal mechanical problems can also cause this condition.

At the bottom of this page is a simplified block diagram which shows how the different fuel system components relate to each other. Refer to fold-out page FO-1, leave open for reference while you are testing.

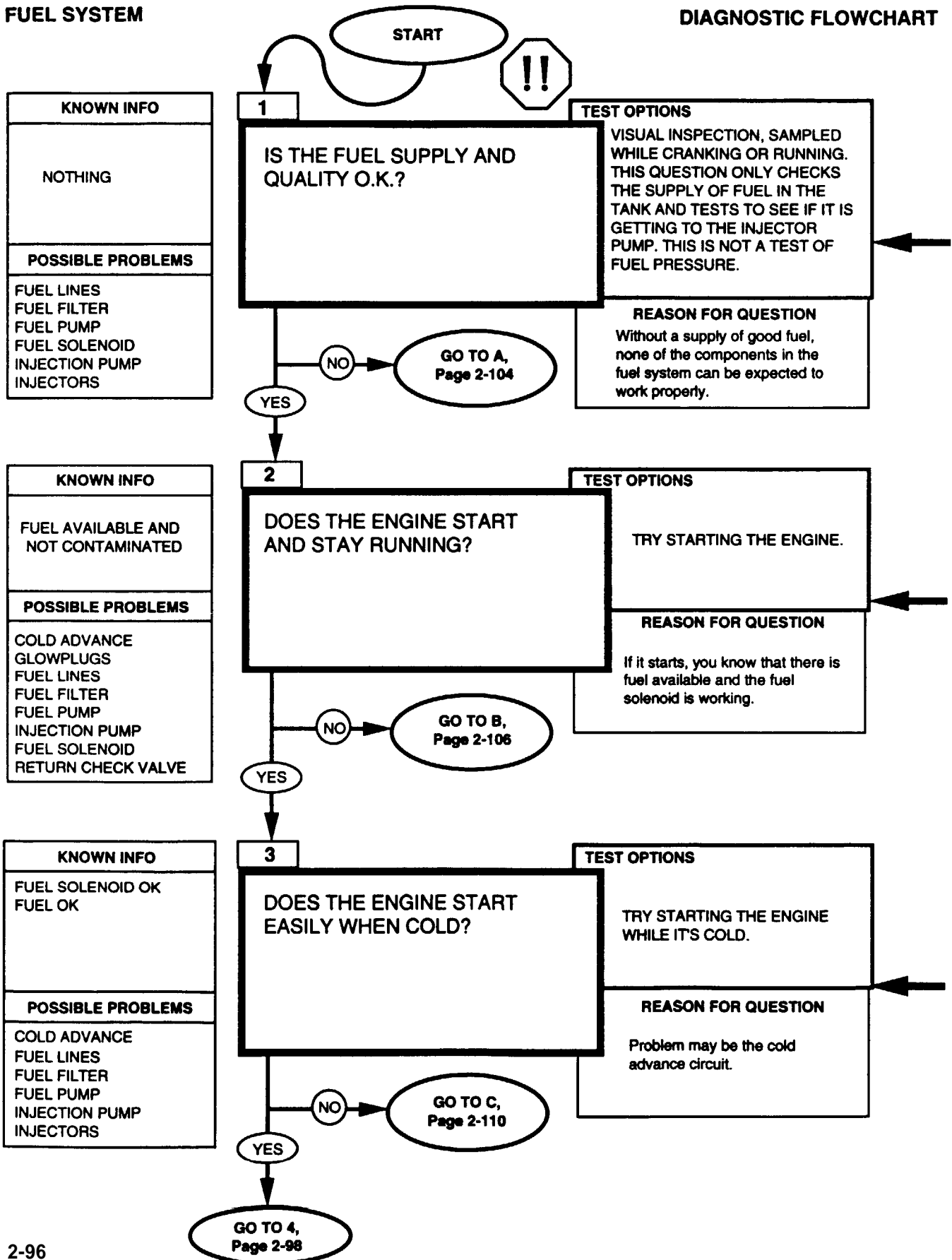


General Information

This set of tests maybe used when the engine is hard starting, has low power or runs rough. Just follow the path, answering the questions. Additional information and notes are given on the facing page (like this one) when necessary. It is recommended that you refer to your fold-out diagram now because it will help you follow the testing.

FUEL SYSTEM

DIAGNOSTIC FLOWCHART



REFERENCE INFORMATION

MAKE SURE ALL ELECTRICAL CONNECTIONS ARE CLEAN AND TIGHT. CHECK FUEL SOLENOID, COLD ADVANCE SOLENOID, BATTERIES, ROTARY SWITCH, ETC.

1. While cranking or running the engine open the drain fitting end drain some fuel into a clear container.
2. The fuel should come out of the open drain valve in a steady stream, if it doesn't, than ANSWER NO TO THIS QUESTION.
 - NOTE: Nothing will come out unless the engine is running or cranking.
3. Close the drain valve and turn the rotary switch to STOP.
4. Check the fuel that came out to be sure that it isn't contaminated with water or dirt.
5. If the fuel didn't come out in a steady stream or if it is contaminated then ANSWER NO TO THIS QUESTION.

If you have trouble starting the engine you should have entered here byway of the Statability tests. If you didn't begin there, go beck to Page 2-41 and the the Startability top level teat.

At this point you don't care how well it starts or runs but just that it will run.

THE ANSWER TO THIS QUESTION IS NO if the engine seems to start but stops almost immediately.

Engine temperature may be determined from vehicle temp. gauge (Rotary Switch must be in RUN position) or by touching **the engine**. **If it is too hot to touch comfortably** than it is above 120° F (49° C).

Hard stating can be caused by other things such as fuel in the lines leaking back into the tank while the engine is shut down. This will occur if there is an air leak in the lines.

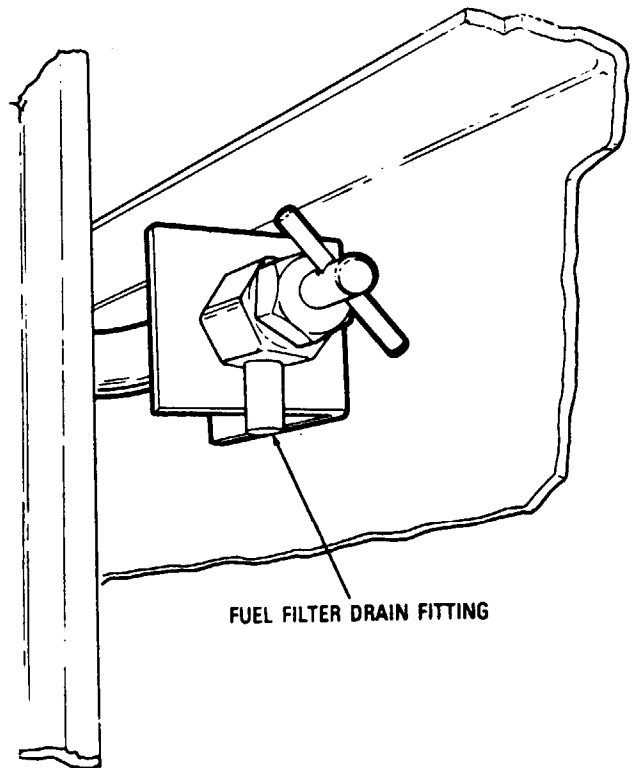


WARNING

Diesel fuel is highly flammable. Do not perform any procedures near fire, flames, or sparks. Severe injury or death will result

WARNING

A hot engine may cause serious bums. Always use caution when approaching a hot engine.



FUEL FILTER DRAIN FITTING

FUEL SYSTEM

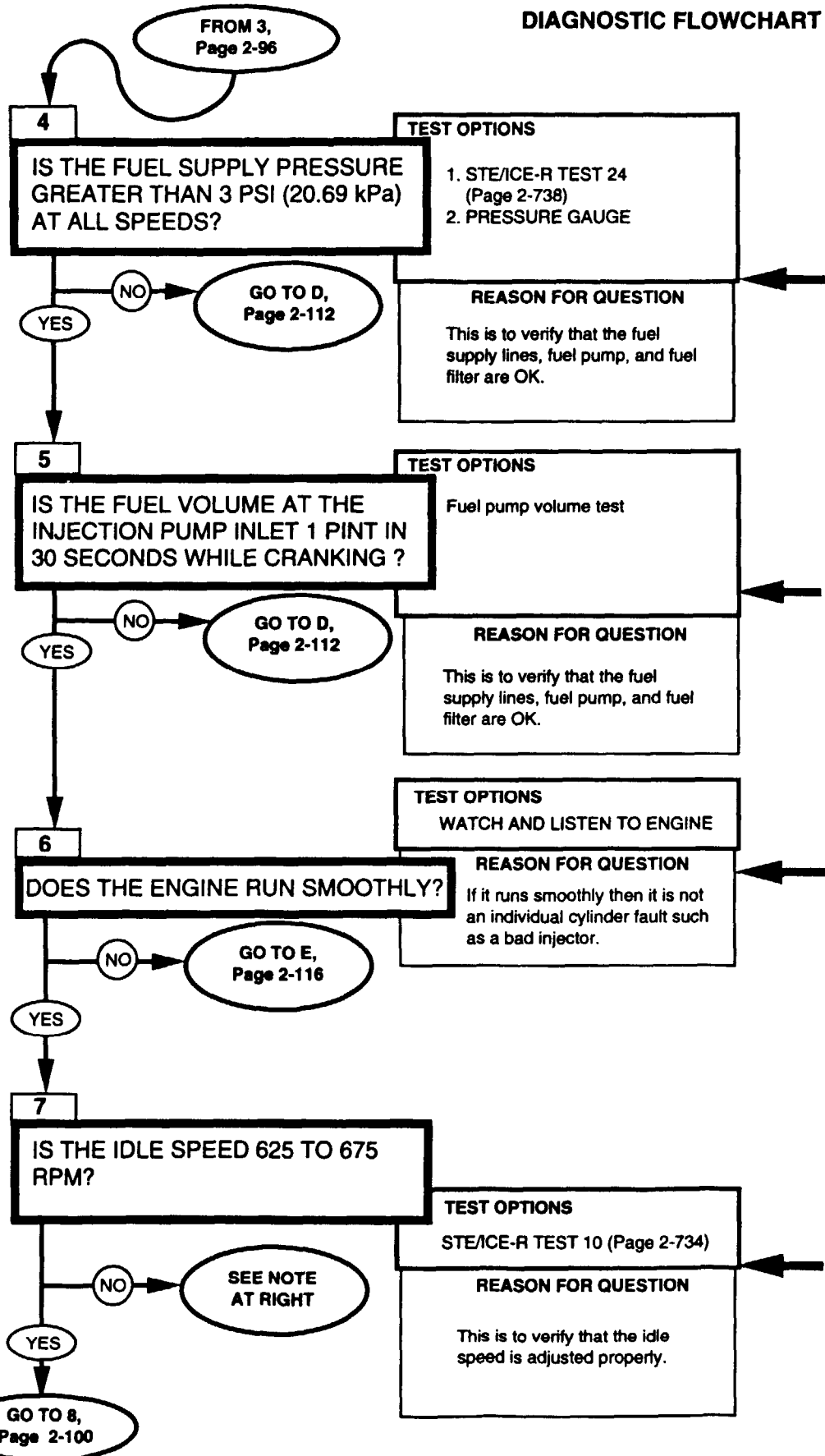
DIAGNOSTIC FLOWCHART

KNOWN INFO
FUEL SOLENOID OK COLD ADVANCE OK
POSSIBLE PROBLEMS
FUEL LINES FUEL FILTER FUEL PUMP

KNOWN INFO
FUEL SOLENOID OK COLD ADVANCE OK
POSSIBLE PROBLEMS
FUEL LINES FUEL FILTER FUEL PUMP

KNOWN INFO
FUEL PUMP AND FILTER OK
POSSIBLE PROBLEMS
INJECTION PUMP INJECTORS FUEL SUPPLY LINES FUEL RETURN LINES RETURN CHECK VALVE

KNOWN INFO
FUEL LINES, PUMP AND FILTER OK
POSSIBLE PROBLEMS
INJECTION PUMP INJECTORS EXHAUST RESTRICTED



REFERENCE INFORMATION

FUEL SYSTEM

Watch the fuel pump pressure while slowly accelerating the engine from idle to maximum speed. The pressure should always be greater than zero. If

pressure, check to be sure it is still above zero even during maximum acceleration (maximum engine power). You can use STE/ICE test 24 with control function 02 (minimum).

NOTE

Rapidly accelerating the engine with the transmission in neutral doesn't work for this engine because the fuel supply can't increase as fast as the engine can accelerate so you won't get good test results.

Proper engine performance is dependent upon the availability of the correct fuel volume to the injection pump.

Pay attention to when the engine runs rough. If it runs rough only while warming up after a cold start it may be a glowplug problem and you should run the Glowplug Circuit tests. Rough running may also be caused by air leaks in the fuel supply lines. Air in the fuel should purge itself while idling. If rough running occurs after a period of high speed or high power running but seems to go away after idling, then look for air leaks in the fuel supply lines and fittings. If rough running occurs while driving but idles ok, check the fuel return check valve for any malfunctions (refer to para. 3-35).

NOTE

Try to adjust the engine idle speed by turning the idle speed screw (refer to para 3-44). Continue testing if you can adjust the speed properly. If you cannot, notify DS maintenance.

Engine must be at normal operating temperature when making speed checks. Air filter must be in place and all accessories (lights, heater fan, etc...) must be turned off.

This engine has a min-max governor which controls engine speed at both idle and full throttle.

FUEL PUMP VOLUME TEST
<ol style="list-style-type: none"> 1. Disconnect fuel line at injection pump inlet and route fuel line into a suitable, 1 quart container. 2. Crank the engine for 30 seconds. 3. If the pump and lines are ok, you should get about 1 pint (1/2 quart) (.5 L) in 30 seconds.

FUEL PUMP PRESSURE STE/ICE-R TEST#24
(STE/ICE already connected to DCA and turned on)
<ol style="list-style-type: none"> 1. Select Fuel Supply Pressure test, Test 24. 2. Perform CAL. 3. Crank (or start) the engine.
NOTE : STE/ICE-R can display a pressure below 0. Be sure to notice if the display is negative.

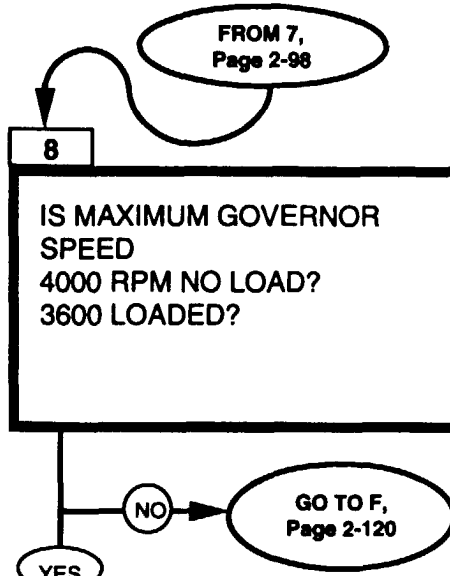
FUEL PUMP PRESSURE TEST PRESSURE GAGE
<ol style="list-style-type: none"> 1. Connect a Tee into the fuel line between the fuel filter outlet and the injection pump inlet. 2. Attach gauge to Tee. 3. Crank (or Start) engine.

ENGINE RPM STE/ICE-R TEST 10
<ol style="list-style-type: none"> 1. Start Test 10, Engine RPM. 2. Crank or start the engine. Displayed reading is RPM. Cranking RPM should be at least 100 RPM. Idle RPM should be 625 - 675.

FUEL SYSTEM

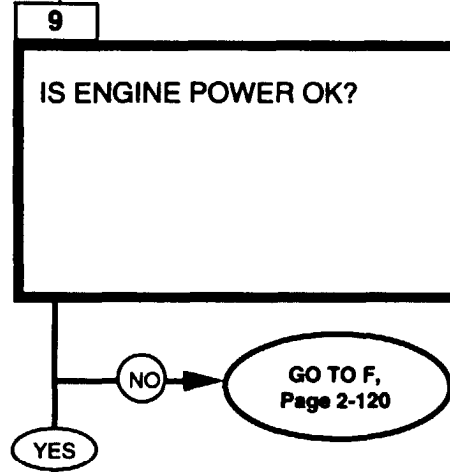
DIAGNOSTIC FLOWCHART

KNOWN INFO
FUEL LINES, PUMP AND FILTER OK.
POSSIBLE PROBLEMS
INJECTION PUMP INJECTORS EXHAUST RESTRICTED



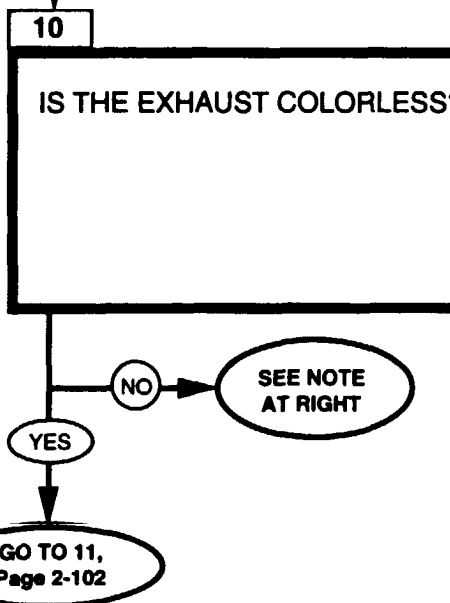
TEST OPTIONS
STE/ICE-R TEST 10 (Page 2-734)
REASON FOR QUESTION
Verify governor speed

KNOWN INFO
FUEL PUMP OK FUEL FILTER OK
POSSIBLE PROBLEMS
INJECTION PUMP INJECTORS RETURN CHECK VALVE



TEST OPTIONS
1. STE/ICE-R TEST 13 (Page 2-736) 2. ROAD TEST
REASON FOR QUESTION
Some fuel system faults and bad fuel may cause low power and have passed the earlier tests.

KNOWN INFO
INJECTION PUMP OK
POSSIBLE PROBLEMS
INJECTORS AIR CLEANER PUMP TIMING CDR VALVE RETURN CHECK VALVE



TEST OPTIONS
VISUAL INSPECTION
REASON FOR QUESTION
Exhaust smoke may indicate conditions such as oil, water or excessive fuel entering the cylinders.

REFERENCE INFORMATION

FUEL SYSTEM

Governor no-load speed is with the transmission in neutral. Loaded speed is with the transmission in gear and the vehicle moving. It is the maximum rpm's the engine will develop. The engine will surge at governor speed since the governor will try to lower the engine speed and the accelerator is trying to increase it.

ENGINE RPM STE/ICE-R TEST 10
<ol style="list-style-type: none"> 1. Start Test 10, Engine RPM. 2. Crank or start the engine. Displayed reading is RPM. Cranking RPM should be approximately 100-200. Idle RPM should be 625 - 675.

A number over 75 is passing for STE/ICE-R test 13. If the vehicle seems to be low on power while driving you have to check for other things which could cause this such as the transmission. To try a road test, accelerate the vehicle from 0 to a safe and reasonable speed on a reasonably level road.

ENGINE POWER TEST (PERCENT) STE/ICE-R TEST #13
<ol style="list-style-type: none"> 1. Set TEST SELECT switches to 13. 2. Press and release TEST button. 3. Wait for prompting message CIP to appear. 4. When CIP appears on display, press down sharply on engine accelerator and hold it to the floor. When VTM displays OFF, release accelerator. 5. A number will be displayed after the engine has returned to idle speed. This number is the test result in units of per cent of nominal rated power.

NOTE

If the exhaust is not colorless it must be either white, blue or black. If exhaust color is:

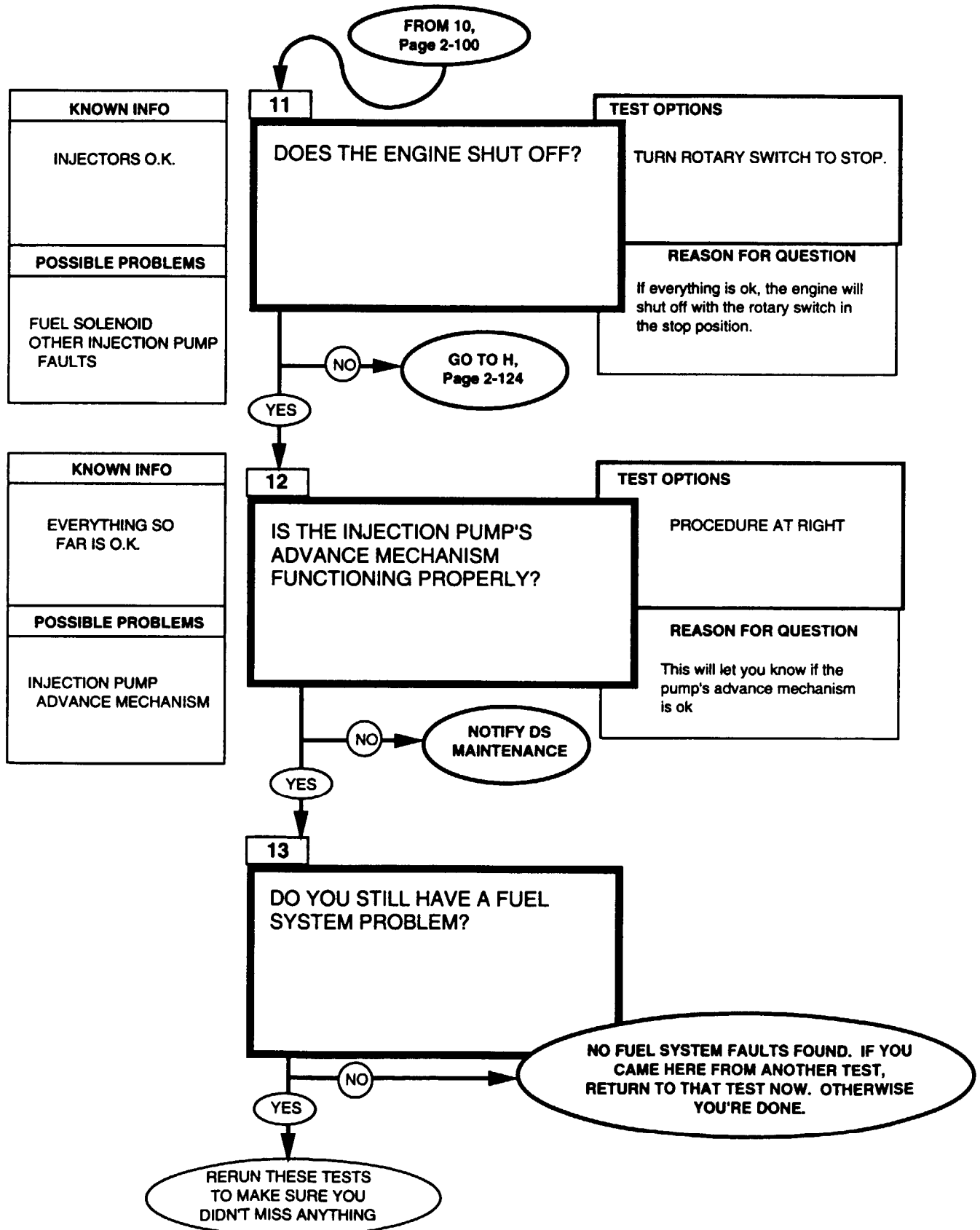
WHITE Go to G, Page 2-122. Also could be injector timing. Notify DS maintenance.

BLUE Blue smoke is a sign of oil entering the combustion chambers. It usually enters past the piston rings or intake valve stem seals. This is an internal engine problem that can't be handled at this level of maintenance. You may want to run the Engine Running Mechanical tests, Page 2-47, before you notify DS Maintenance.

BLACK Air Intake/exhaust, Page 2-137.


FUEL SYSTEM

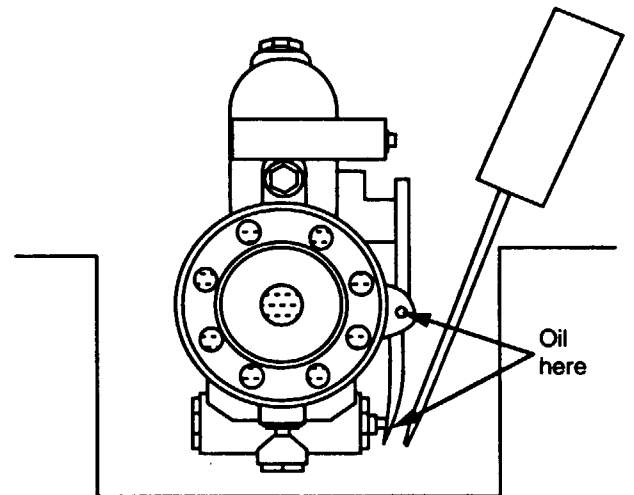
DIAGNOSTIC FLOWCHART



REFERENCE INFORMATION

FUEL SYSTEM

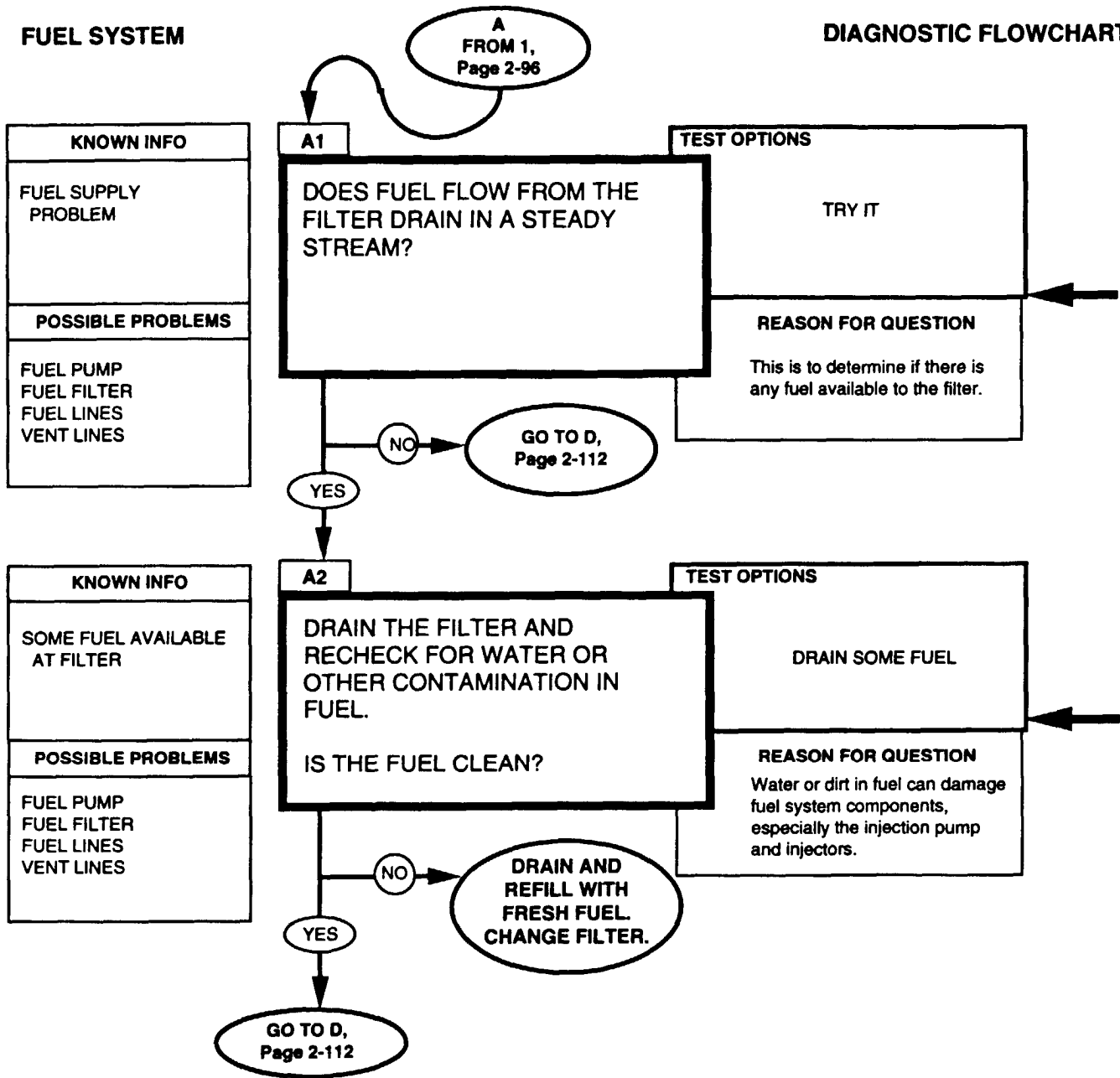
- 
1. Note engine rpm reading (STE/ICE-R TEST 10)
 2. Gently depress rocker arm on pump towards injection pump
 3. If mechanism is functioning properly rpms will decrease.
 4. If mechanism doesn't move freely, try putting a drop of oil in the two spots indicated. Gently try to depress rocker arm again.



Injection pump as seen from rear of engine. Gently press screwdriver against arm. Use a ten inch screwdriver

FUEL SYSTEM

DIAGNOSTIC FLOWCHART

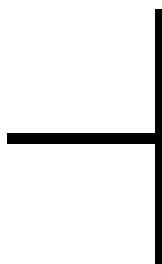


REFERENCE INFORMATION

FUEL SYSTEM



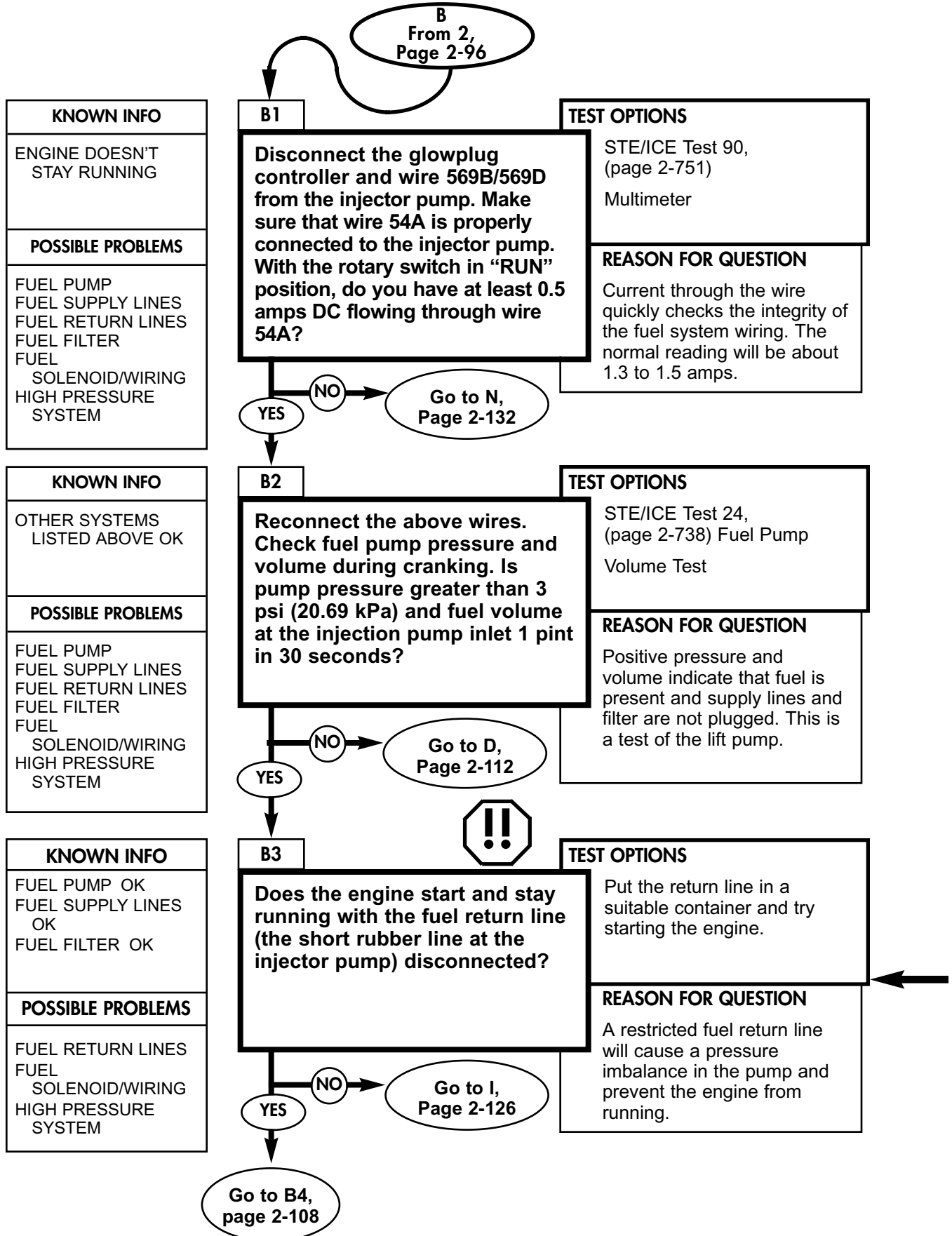
If no fuel arrives when cranking engine, the diaphragm in the lift pump may be ruptured, allowing the fuel to drain back into the tank.



There may be some water or dirt trapped in the filter already that didn't come from the fuel that is in the tank now. Open the filter drain valve and crank the engine for approximately 5 seconds to purge the filter, then take a fuel sample in a clear container. Inspect the sample for water and dirt. Replace fuel filter, refer to (para 3-33).

FUEL SYSTEM

DIAGNOSTIC FLOWCHART



REFERENCE INFORMATION

FUEL SYSTEM

NOTE

When using a multimeter to measure current through wire 54A, disconnect the wire. Set the ammeter to a scale of at least 5 amps DC. Connect the red lead of the multimeter to wire 54A and the black lead to ground. With the rotary switch in the RUN position, measure current. Be sure to read the correct scale. Return the switch to the STOP position. Disconnect the multimeter and reconnect wire 54A.

**FUEL PUMP PRESSURE
STE/ICE-R TEST #24**

1. Select Fuel Supply Pressure Test (Test #24). Perform CAL.
2. Crank (or start) engine.

FUEL PUMP VOLUME TEST

1. Disconnect fuel line at injection pump inlet and route fuel line into a suitable, 1 quart container.
2. Crank the engine for 30 seconds.
3. If the pump and lines are ok, you should get about 1 pint (1/2 quart) (0.5L) in 30 seconds.



WARNING

Diesel fuel is highly flammable. Do not perform any procedures near fire, flames, or sparks. Severe injury or death may result.

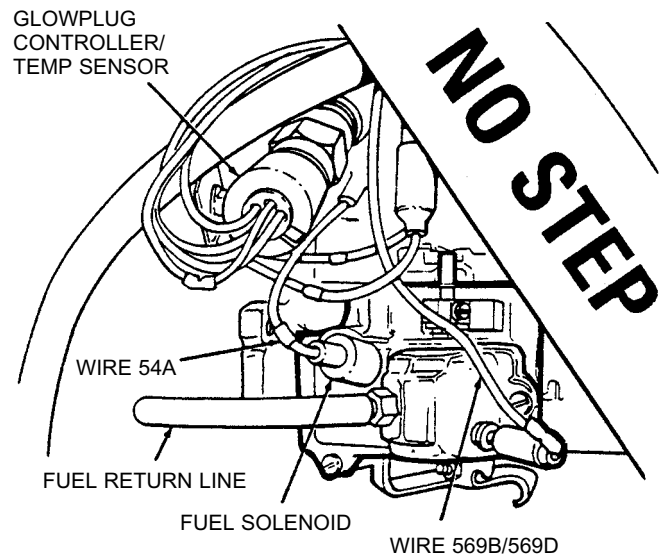
1. Disconnect the return line and direct it into a suitable container.
2. Watch the fuel flow from the return line as you or an assistant try to start the engine.

**5 AMPS DC
STE/ICE-R TEST 89**

1. Connect RED clip to the indicated test point; BLACK clip to negative or ground.
2. Start Test 90.
3. Displayed reading is in amps.

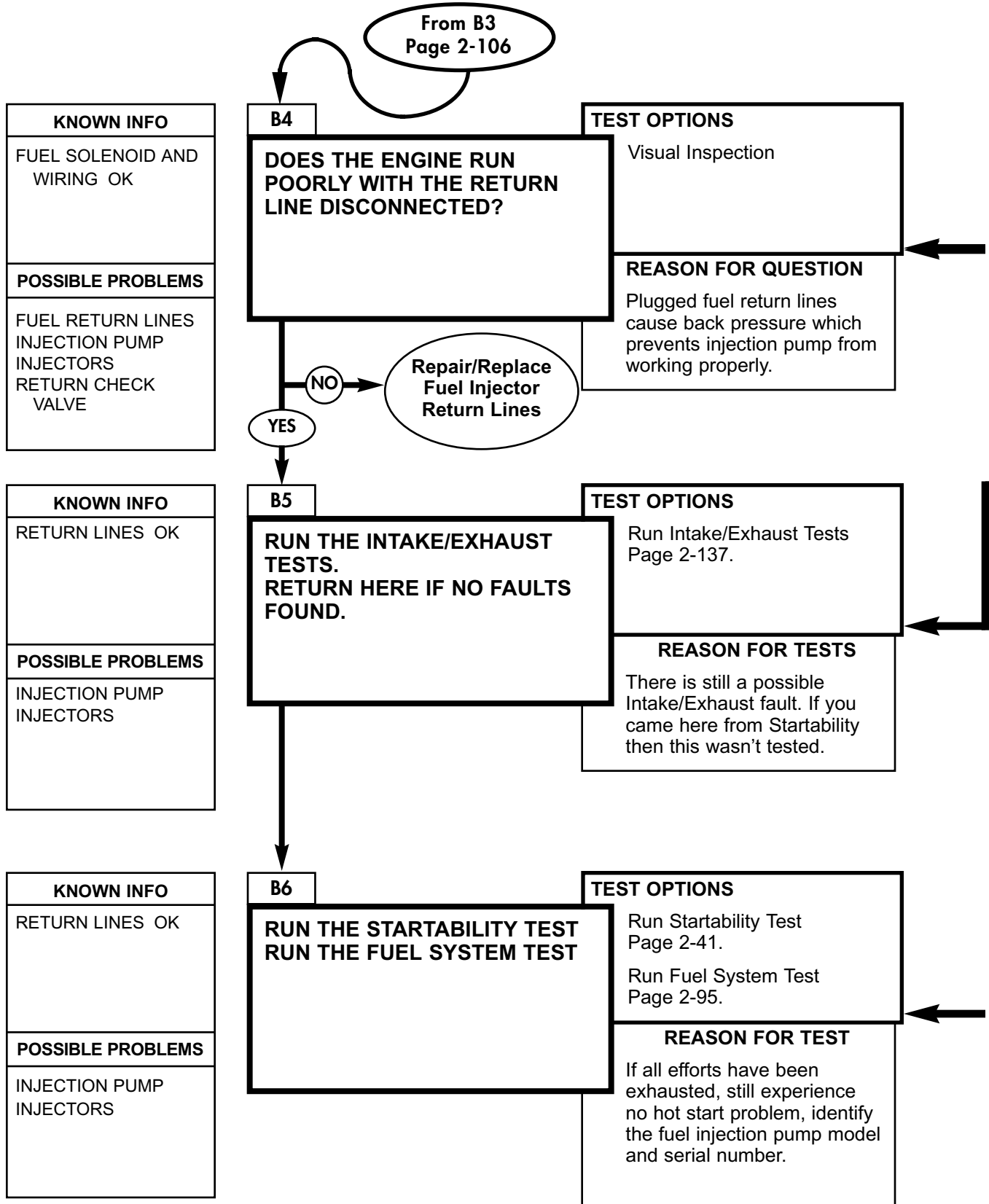
**FUEL PUMP PRESSURE TEST
PRESSURE GAUGE**

1. Connect a tee into the fuel line between the fuel filter outlet and the injection pump inlet.
2. Attach gauge to tee.
3. Crank (or Start) engine.



FUEL SYSTEM

DIAGNOSTIC FLOWCHART



REFERENCE INFORMATION

FUEL SYSTEM

Return lines should be inspected for kinks or crushed lines or anything that might restrict fuel flow.

Inspect fuel return check valve for any restrictions. Replace valve (para. 3-35).
 Replace fuel lines. Refer to (para. 3-25).

If you came here from the Startability Tests, return to STEP 5, Page 2-44.

If you haven't run the Startability Tests yet, go to STEP 1, Page 2-42.

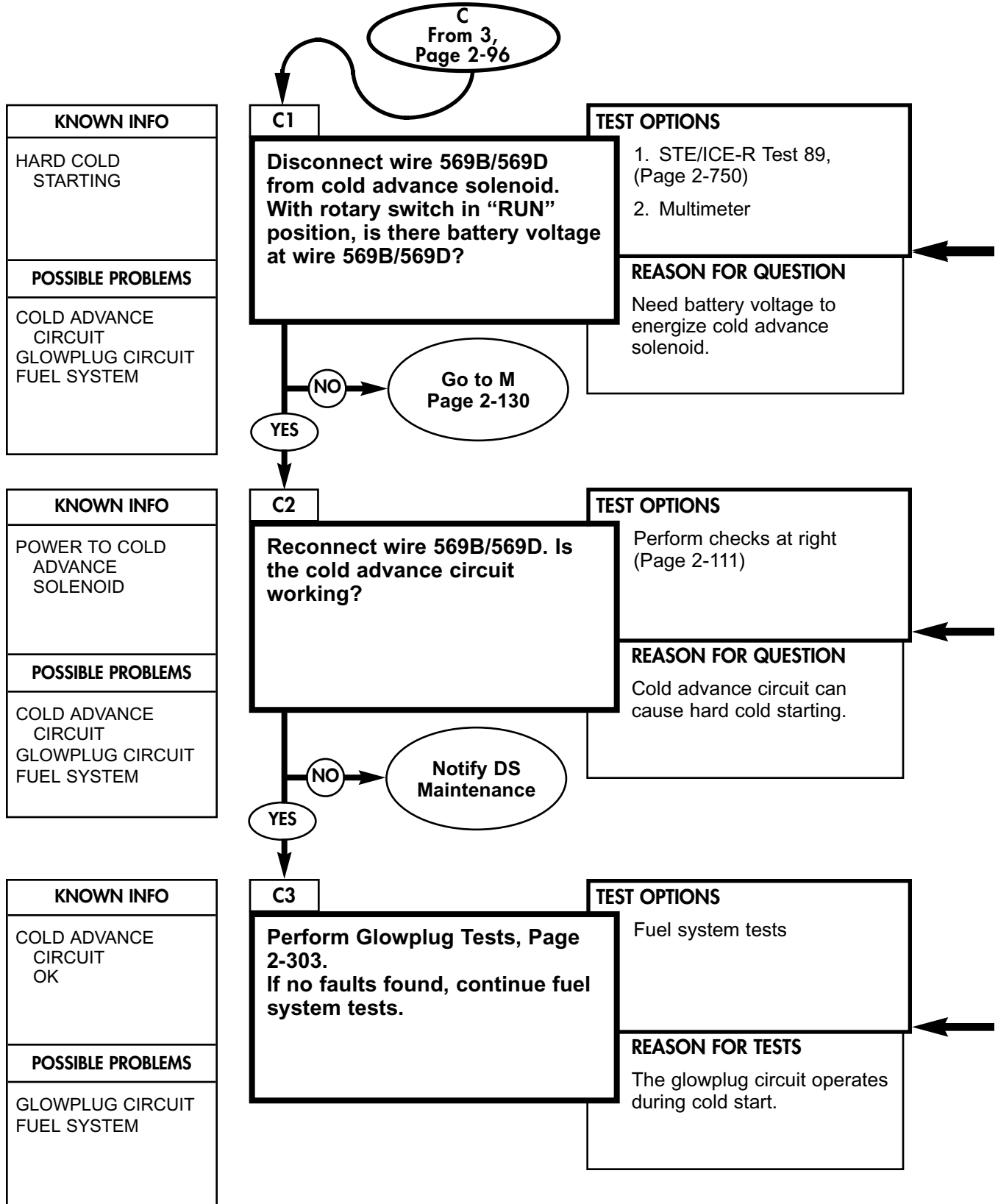
During high temperature and humidity, early model vehicles can experience difficulty starting while using JP-8 fuel. High temperatures can cause restrictive clearances in some older fuel injection head and rotor assemblies. The engine must be allowed to cool to allow adequate clearance of the pumping plungers to ensure adequate fuel delivery for starting. If this condition persists, run the startability tests. If vehicle passes all startability tests and troubleshooting procedures and still experiences difficulty in hot starting, identify the fuel injection pump and serial numbers.

All fuel injection pumps with P/N DB2831-5209, NSN 2910-01-467-9029 incorporated the improved head and rotor assembly, P/N 31506. If your serial number is less than shown in the Serial Number Break Column of the table below, the manufacturer recommends the fuel injection pump to be replaced, tagged as a "no hot restart" condition, and forward for rebuild. Notify direct support maintenance.

Model Pump P/N (NSN)	Serial Number Break	Original P/N	New P/N (NSN)
DB2829-4523 (2910-01-199-2355)	7539307	23122 or 28396	31816/4320-01-317-0692
DB2829-4879 (2910-01-326-9221)	80644583	23122 or 28396	31816/4320-01-317-0692
DB2831-5149 (2910-01-414-1272)	776848	29124	31506/2910-01-414-5382
DB2831-5149 (2910-01-434-8597)	776848	29124	31506/2910-01-414-5382

FUEL SYSTEM

DIAGNOSTIC FLOWCHART



REFERENCE INFORMATION

FUEL SYSTEM

The engine temperature must be below 90° F (32°C) to get voltage here. If the engine is warm, either wait for it to cool, or go to step C3 at the bottom of the pegs and remember that the cold advance maybe the problem if everything else checks out OK.

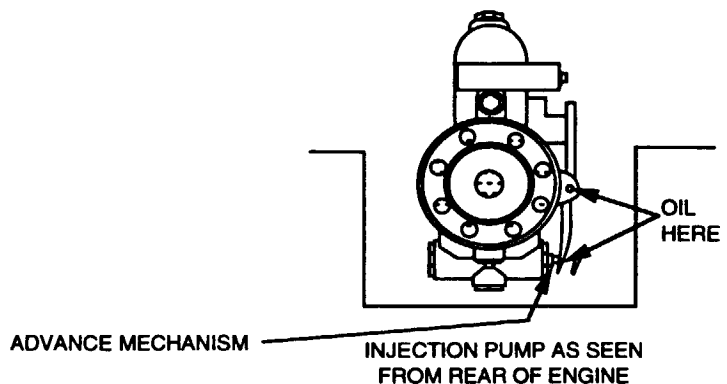
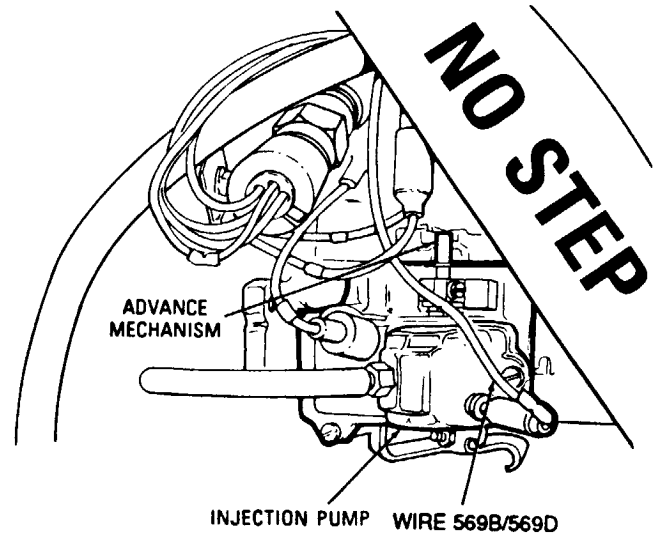
The Glowplugs or the Intake/Exhaust System may be faulty, so you should test them first.

The cold advance circuit advances the fuel injection pump timing approximately 3 to 5 degrees during cold start up. If engine temperature is less than 90°F (32°C), then Advance circuit operation maybe checked as follows:

1. Start the engine.
2. Disconnect wire 569B/569D from the Advance Solenoid. If the circuit is working correctly, then engine RPM should decrease.
3. Look at the advance mechanism on the right side of the fuel injection pump while you connect and disconnect 569D/569B with the engine running. The advance mechanism should move about 1/4 inch.
4. If the advance mechanism is stuck, apply some oil at the points shown and try again.

Remember to reconnect any wires that were disconnected during troubleshooting.

<p>0-45 DC VOLTS STE/ICE-R TEST 89</p>
<ol style="list-style-type: none"> 1. Connect RED clip to positive, BLACK clip to negative or ground. 2. Start Test 89, DC volts. 3. Displayed reading is in volts.
<p>BATTERY VOLTAGE MULTIMETER</p>
<ol style="list-style-type: none"> 1. Set the voltmeter to a DC volts scale of at least 40 volts. 2. Connect the RED lead to positive and the BLACK lead to negative. 3. Be sure to read the correct scale.



FUEL SYSTEM

DIAGNOSTIC FLOWCHART

D
FROM 4, 5, Page 2-98;
A1, A2, Page 2-104;
B2, Page 2-106

KNOWN INFO
LOW FUEL PUMP PRESSURE
POSSIBLE PROBLEMS
FUEL PUMP FUEL FILTER FUEL LINES VENT LINES FUEL PRESSURE TRANSDUCER

D1

LISTEN FOR A HISS WHEN YOU REMOVE THE FILLER CAP.

CAN YOU REMOVE THE FILLER CAP WITHOUT HEARING A HISS?

TEST OPTIONS
VISUAL INSPECTION
REASON FOR QUESTION
A plugged vent line will eventually cause enough negative pressure in the tank to prevent fuel flow.

NO → REPLACE VENT FILTER/ REPAIR LINE

YES →

KNOWN INFO
VENT LINES OK LOW FUEL PUMP PRESSURE
POSSIBLE PROBLEMS
FUEL PUMP FUEL LINES FUEL FILTER FUEL PRESSURE TRANSDUCER

D2

IS THE TEMPERATURE ABOVE 20°F (-7°C) ?

TEST OPTIONS
VISUAL INSPECTION
REASON FOR QUESTION
When the temperature is less than 20°F (-7°C) wax flakes can build up on the fuel tank strainer or in the fuel filter.

NO → CHECK FOR A WAX BUILDUP IN TANK STRAINER OR FILTER. USE AN ANTIWAX AGENT IF AVAILABLE. BLEED FUEL SYSTEM AND CONTINUE TESTING

YES →

KNOWN INFO
FUEL FILTER OK NO WAX BUILD-UP VENT LINES OK LOW FUEL PUMP PRESSURE FUEL LINES
POSSIBLE PROBLEMS
FUEL PUMP FUEL PRESSURE TRANSDUCER

D3

IF YOU USED THE DCA TO MEASURE FUEL SUPPLY PRESSURE, IS THE STE/ICE-R, DCA AND TRANSDUCER OK?

TEST OPTIONS
DCA TROUBLESHOOTING (Page 2-723)
USE A PRESSURE GAUGE TO MEASURE FUEL SUPPLY
REASON FOR QUESTION
Before condemning fuel pump, make sure that the pressure transducer is working.

NO → REPAIR/REPLACE AS NECESSARY

YES →

GO TO D4, Page 2-114

REFERENCE INFORMATION

FUEL SYSTEM

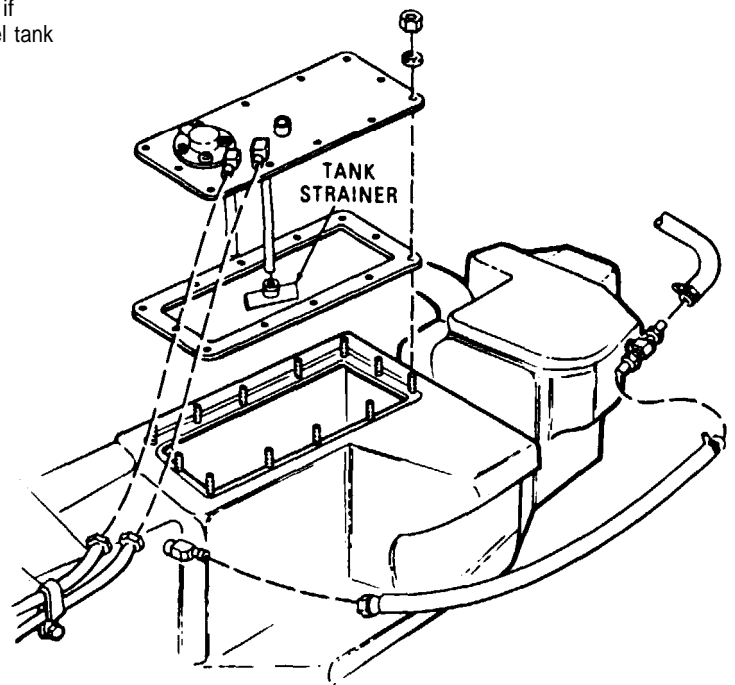
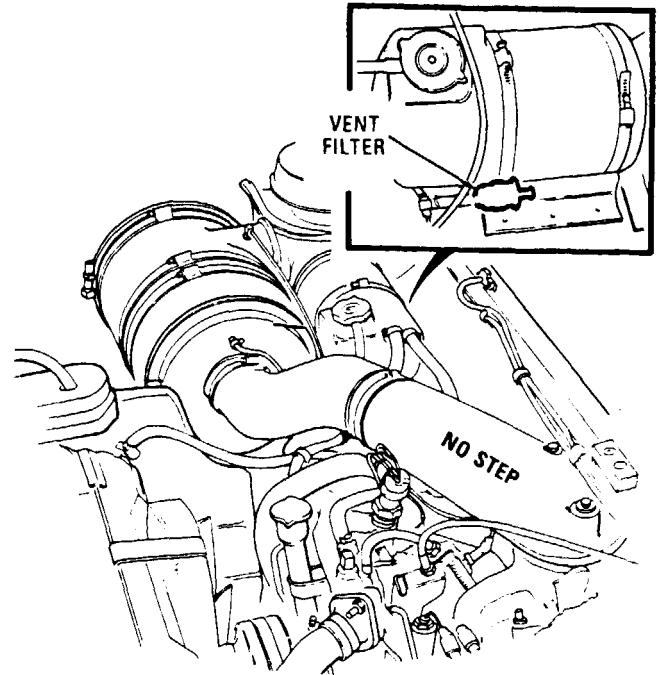
If you hear a hissing noise while removing the fuel filter cap then either the vent filter is plugged, the vent line is restricted, or the vent valve is restricted. The vent filter is located behind the coolant surge tank.

Replace vent lines or vent line filter, refer to (para. 3-27.)

Replace vent valve, refer to (para. 3-24.)

Diesel fuel is sensitive to temperature. All diesel fuel has a certain amount of paraffin-like components which have high energy value and help improve fuel economy. When temperatures are less than 20°F (-7°C) these components begin turning into wax flakes that can build upon the fuel tank strainer or in the fuel filter. If wax build-up is found, replace the fuel in the tank with a winter grade of fuel if available. You will have to remove the fuel tank if you need to inspect the tank strainer.

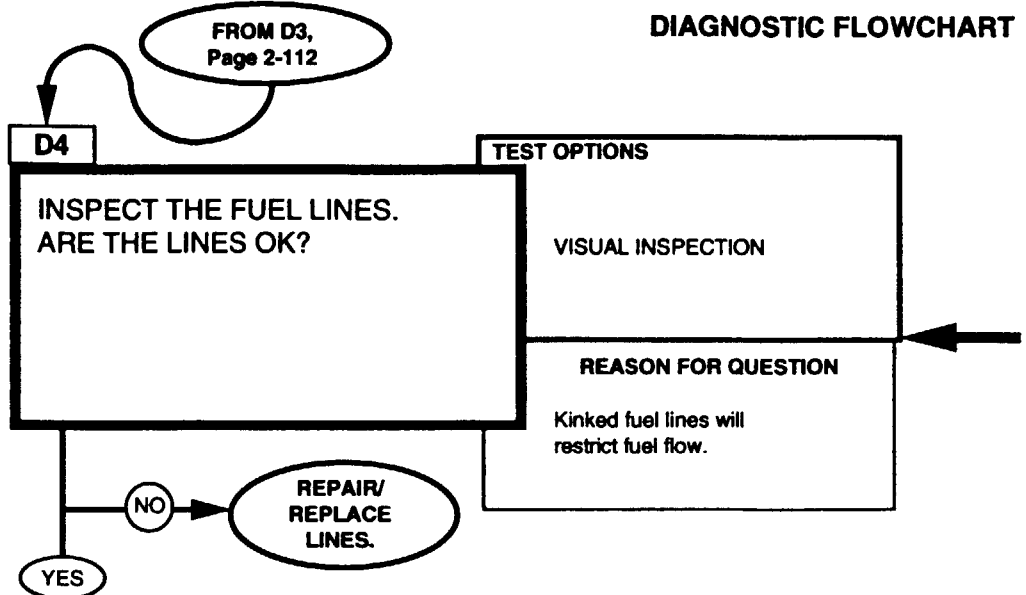
Replace fuel tank, refer to (para. 3-24.)



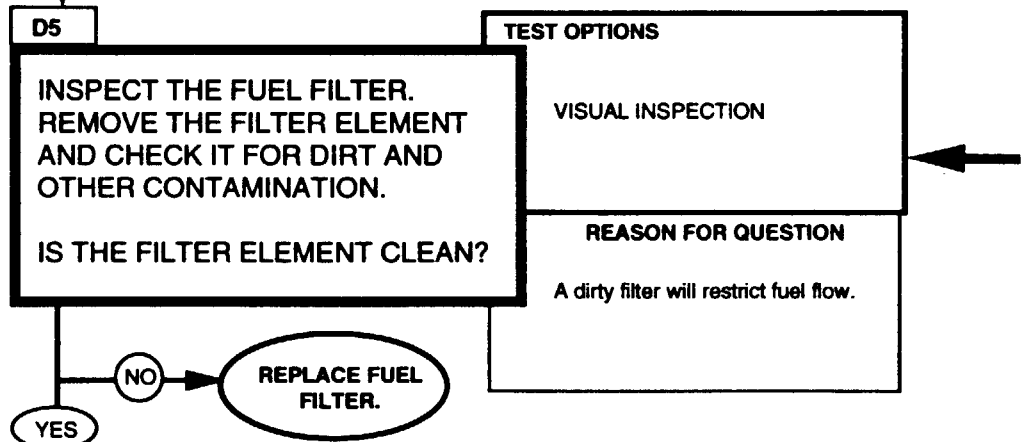
FUEL SYSTEM

DIAGNOSTIC FLOWCHART

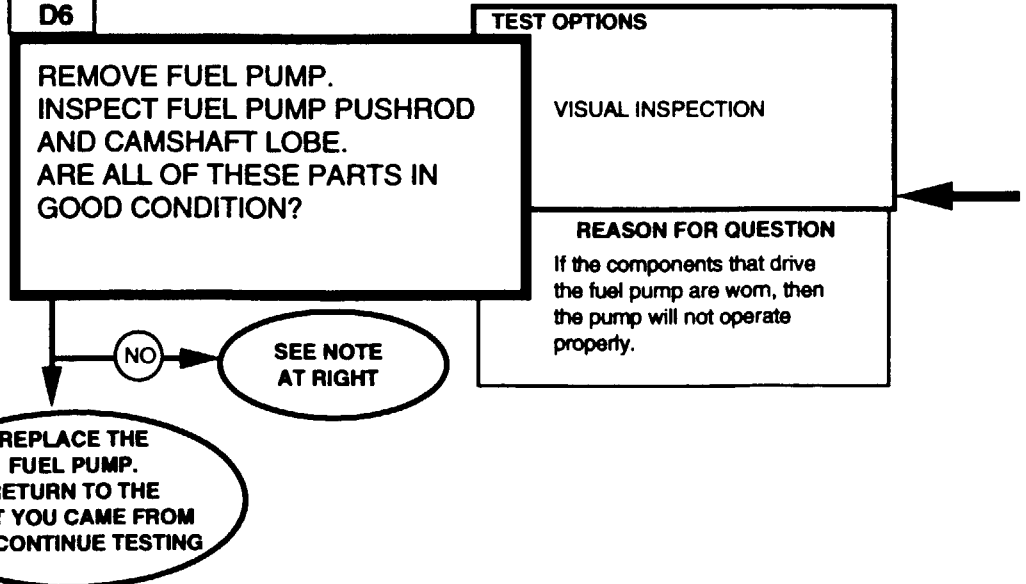
KNOWN INFO
FUEL FILTER OK NO WAX BUILD-UP VENT LINES OK LOW FUEL PUMP PRESSURE
POSSIBLE PROBLEMS
FUEL PUMP FUEL LINES FUEL PRESSURE TRANSDUCER



KNOWN INFO
NO WAX BUILD-UP VENT LINES OK LOW FUEL PUMP PRESSURE
POSSIBLE PROBLEMS
FUEL PUMP FUEL LINES FUEL FILTER FUEL PRESSURE TRANSDUCER



KNOWN INFO
FUEL LINES OK FUEL FILTER OK NO WAX BUILD-UP VENT LINES OK LOW FUEL PUMP PRESSURE TRANSDUCER OK
POSSIBLE PROBLEMS
FUEL PUMP



REFERENCE INFORMATION

Fuel lines should be inspected for kinks, cracks or anything that would restrict fuel flow or allow air to enter the lines. Be sure to check the lines all the way back to the tank and remember that there is a strainer inside the tank which can become plugged. You will have to remove the tank if it becomes necessary to check this.

Replace fuel lines, refer to (para 3-25)

Poor starting and excessive smoke after start up can be the result of a restricted fuel supply. This restriction most likely will be from a plugged fuel filter but can also be caused by a pinched or kinked fuel line. After the engine warms up, it generally will run satisfactorily. If the restriction gets progressively worse, top speed and performance will be affected also.

FUNGUS

In warm or humid weather, fungi and/or bacteria in the fuel can cause fuel system damage by plugging the fuel lines, filter, or injection nozzles.

For removal, replacement and torques, refer to (para 3-33) or notify DS maintenance.

Excessive roughness on any of these parts is an indication of wear. The pushrod should slide smoothly in the engine block. If you notice any roughness on the end of the pushrod be sure to check the lobe on the camshaft.

NOTE

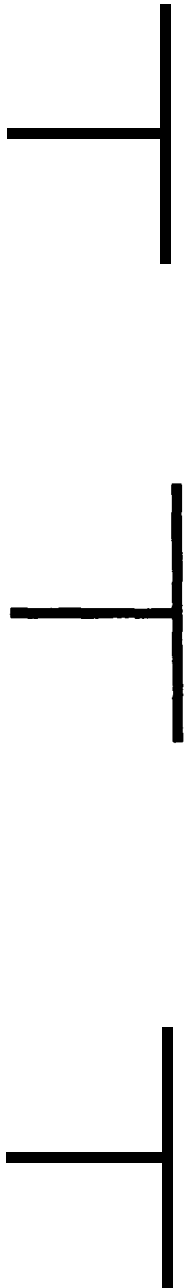
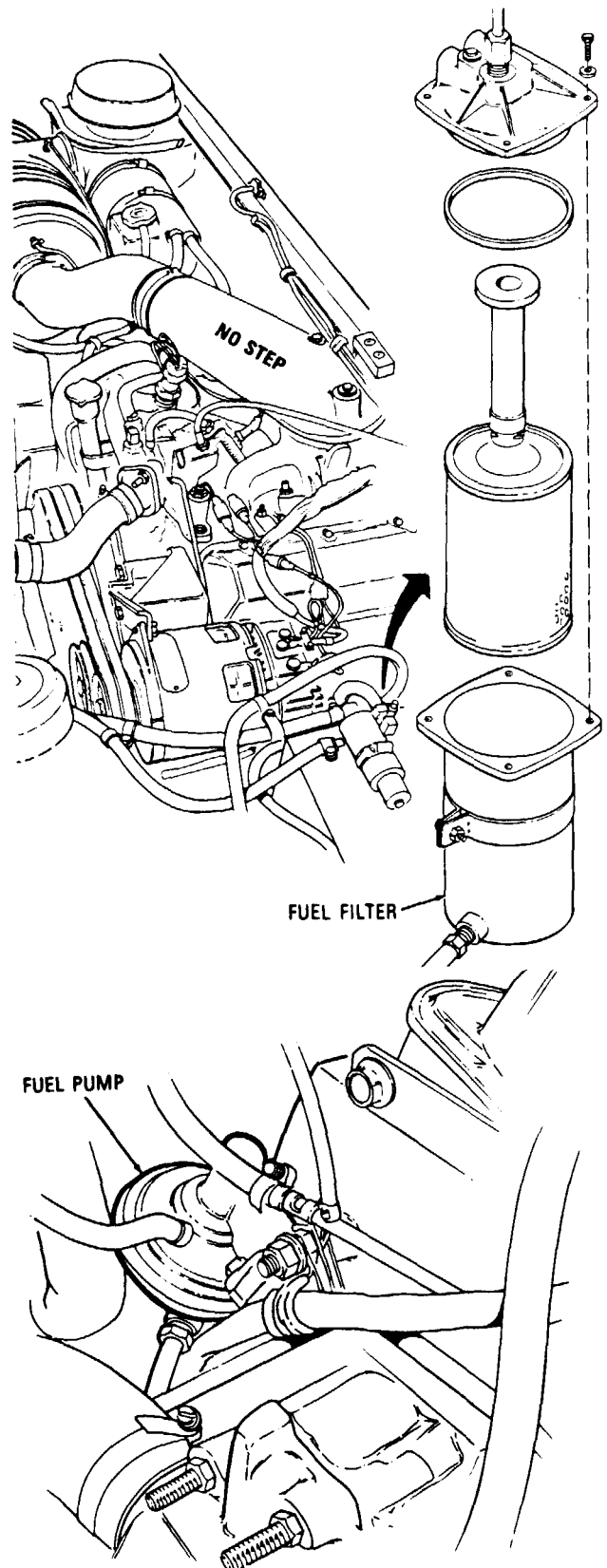
If the pump or rod is worn, replace. Refer to (para 3-23). If the lobe on the camshaft is worn, notify DS maintenance.

Rerun Test Chain

You may have corrected some problems but there may be others including the fuel pump.

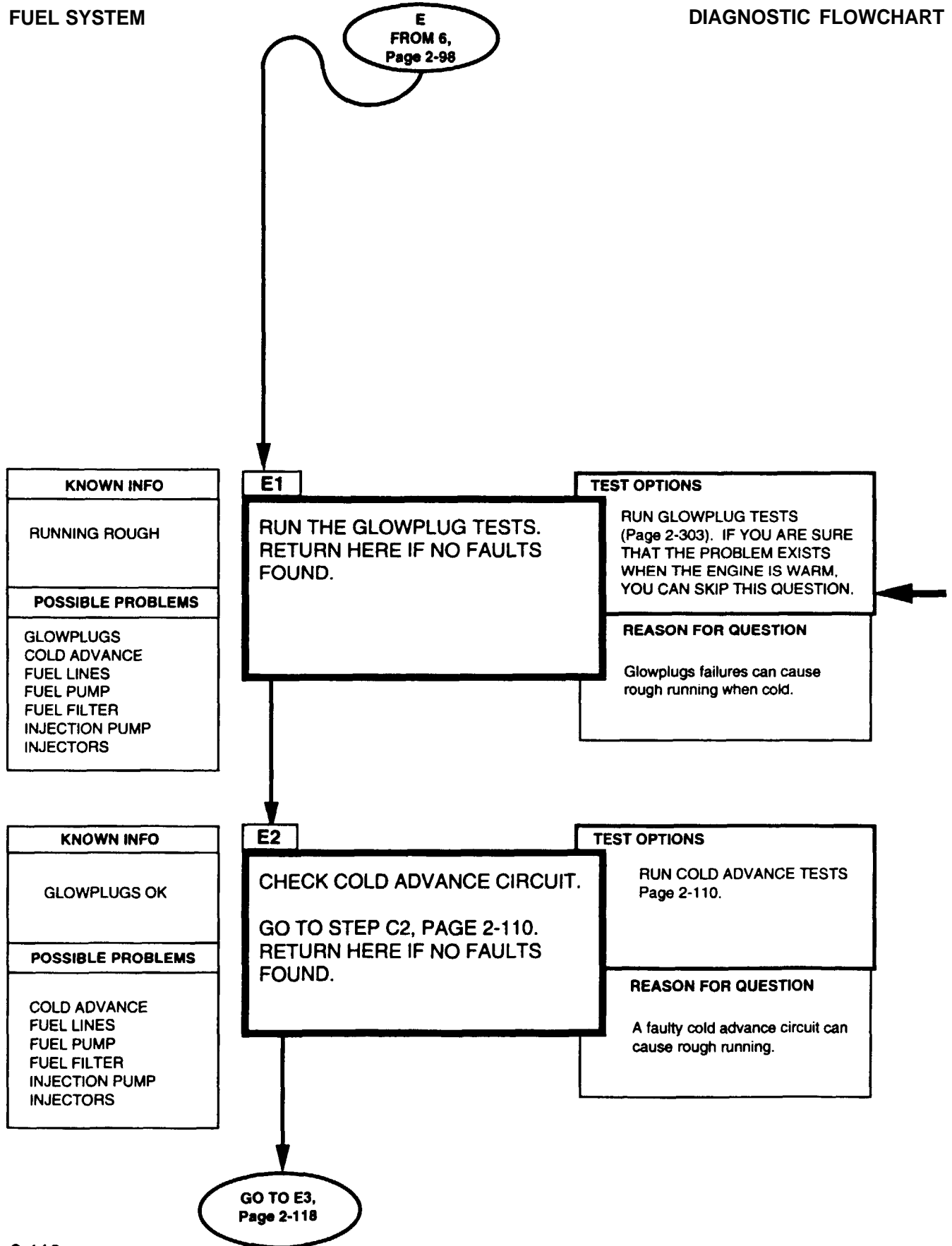
For removal, replacement and torques, refer to (para 3-23).

FUEL SYSTEM



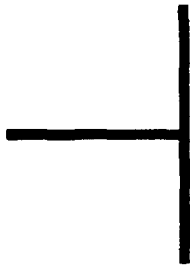
FUEL SYSTEM

DIAGNOSTIC FLOWCHART



REFERENCE INFORMATION

FUEL SYSTEM

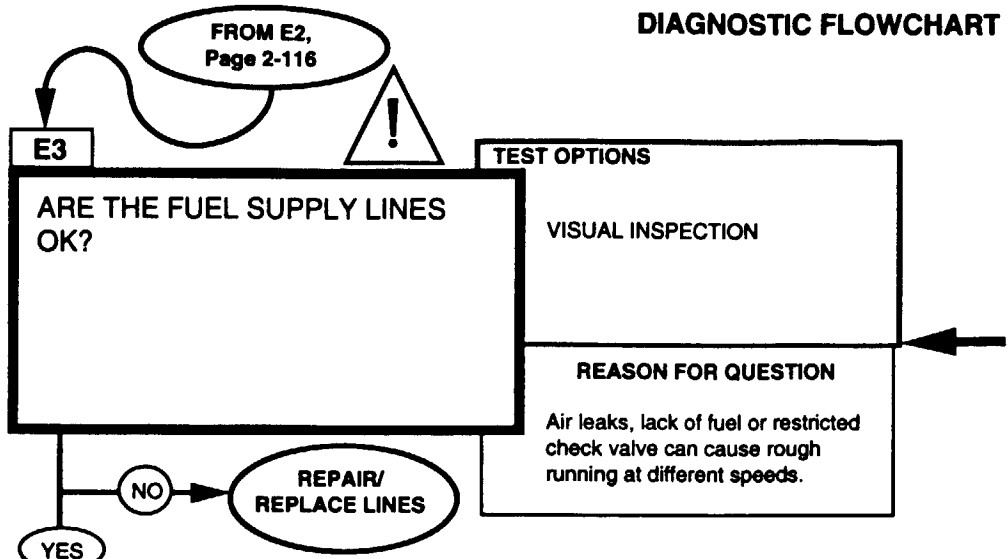


Injection pump timing that is too far advanced can cause glowplugs failure because it increases cylinder temperature. Usually several but not all glowplugs will fail.

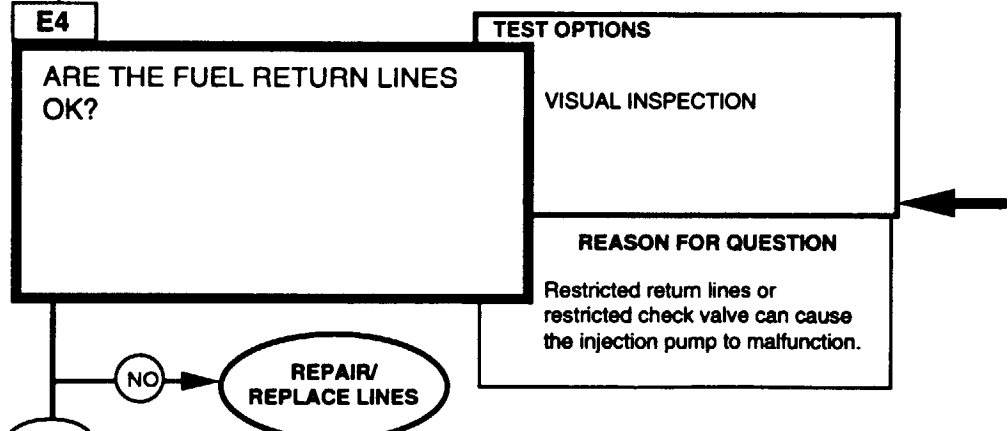
FUEL SYSTEM

DIAGNOSTIC FLOWCHART

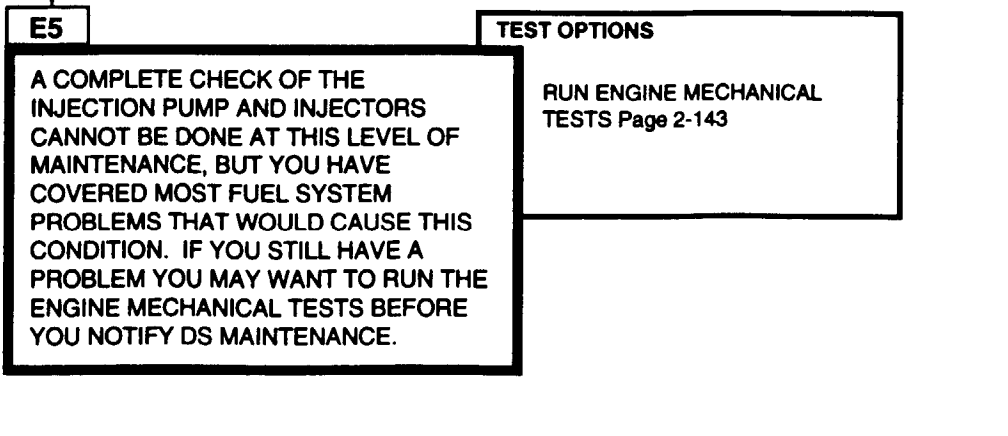
KNOWN INFO
COLD ADVANCE OK
POSSIBLE PROBLEMS
FUEL LINES FUEL PUMP FUEL FILTER INJECTION PUMP INJECTORS RETURN CHECK VALVE



KNOWN INFO
SUPPLY LINES OK
POSSIBLE PROBLEMS
FUEL LINES FUEL PUMP FUEL FILTER INJECTION PUMP INJECTORS RETURN CHECK VALVE



KNOWN INFO
FUEL PUMP OK
POSSIBLE PROBLEMS
INJECTION PUMP INJECTORS



REFERENCE INFORMATION

FUEL SYSTEM



CAUTION

Be sure to keep the line clear of moving engine parts (fan, pulleys, etc...) and **DO NOT** place the line on the exhaust manifold.

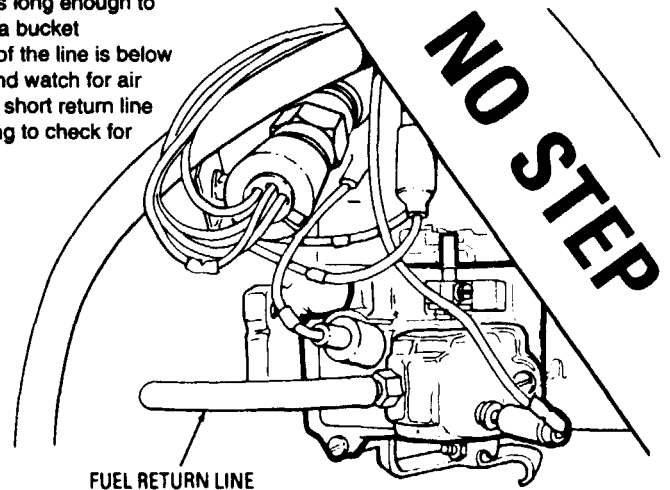
Replace fuel lines (refer to para 3-25).

Check the fitter vent screw for tightness. Check the supply lines for kinks, cracks, leaks, or loose connections that could restrict fuel flow or allow air to enter the system. Remember that under certain operating conditons parts of the fuel system can be under vacuum so that loose connections that may not leak fuel can let air in.

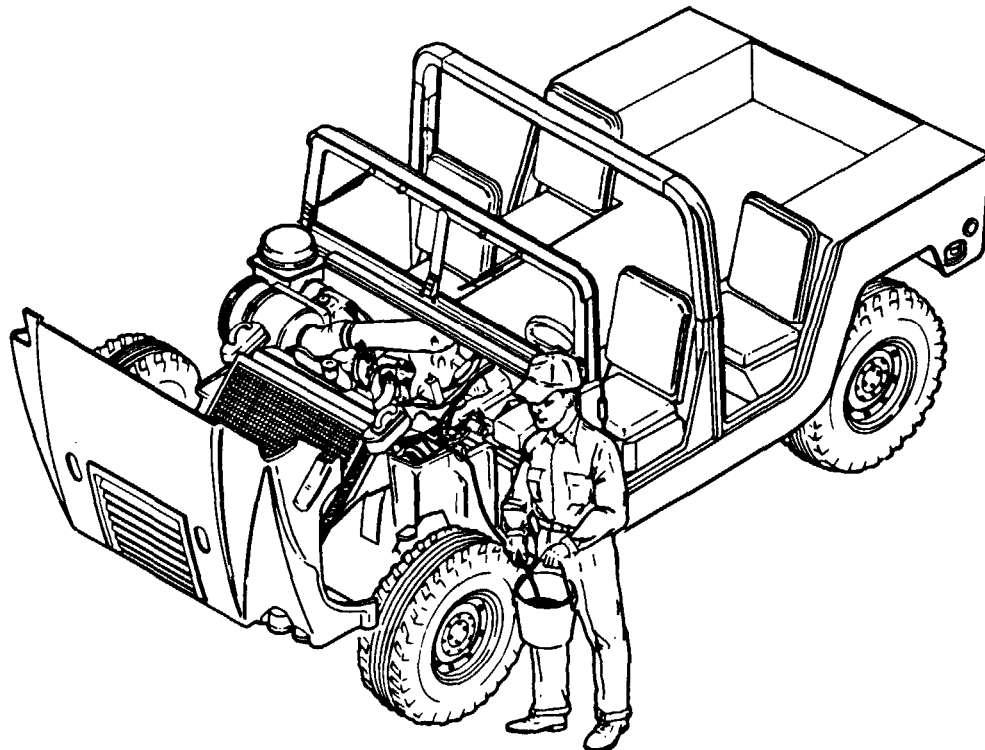
To test for air leaks in the supply lines, disconnect the return line from the injection pump and connect a line that is long enough to reach the ground. Place the end of the line into a bucket containing diesel fuel, making sure that the end of the line is below the level of fuel in the bucket. Run the engine and watch for air bubbles in the bucket. You can also replace the short return line from the injector pump with a clear piece of tubing to check for bubbles.

Inspect the return lines for kinks or any other blockage that may restrict fuel flow. Inspect fuel return check valve for any restrictions (refer to para. 3-25).

Replace fuel line (refer to para 3-25).



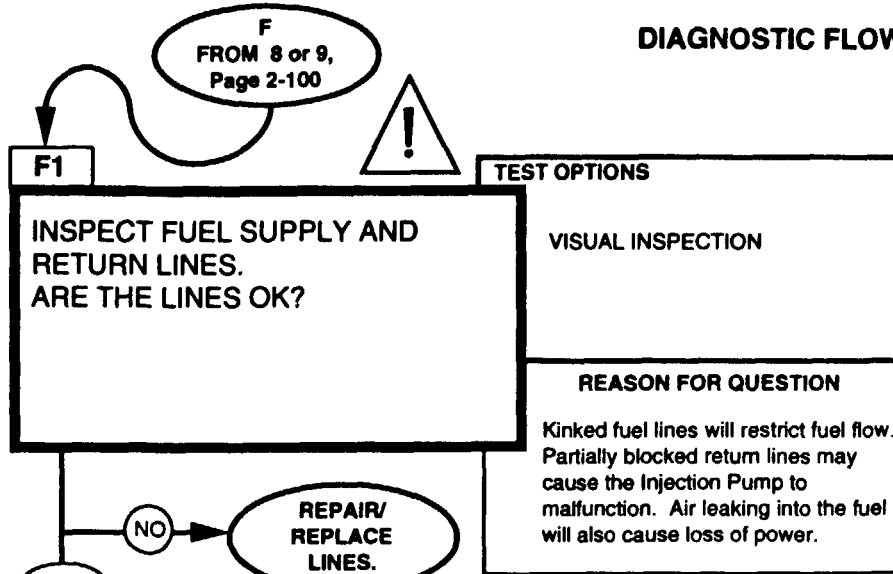
FUEL RETURN LINE



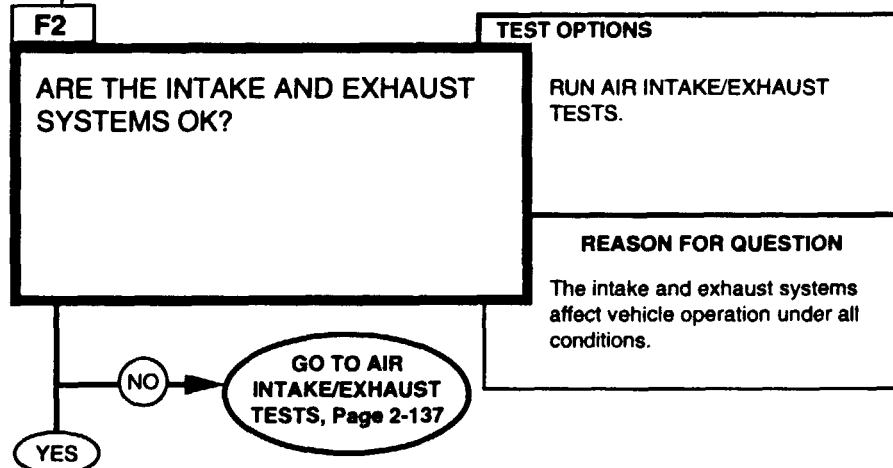
FUEL SYSTEM

DIAGNOSTIC FLOWCHART

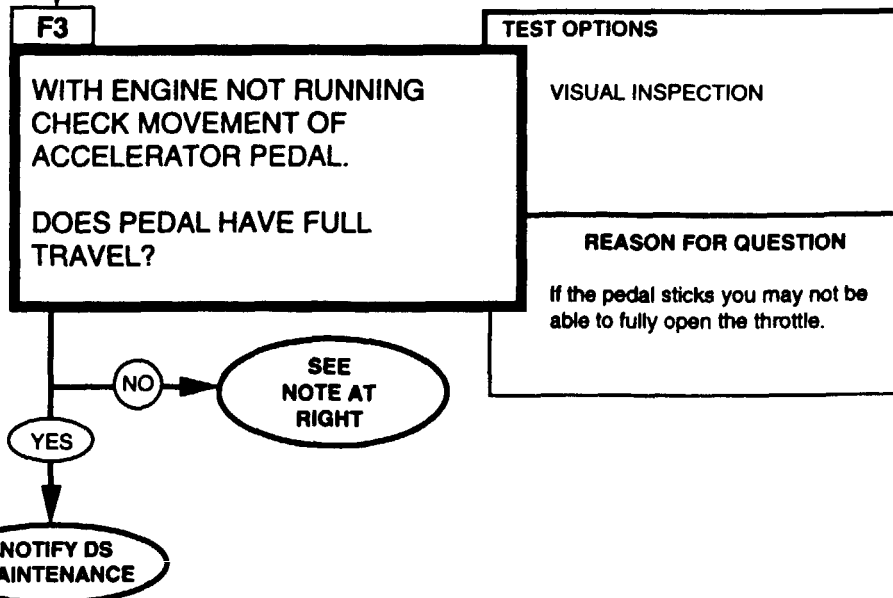
KNOWN INFO
FUEL FILTER OK
POSSIBLE PROBLEMS
FUEL PUMP ACCELERATOR LINKAGE FUEL LINES INJECTION PUMP INJECTORS INTAKE/EXHAUST RETURN CHECK VALVE



KNOWN INFO
FUEL LINES OK FUEL FILTER OK
POSSIBLE PROBLEMS
INTAKE/EXHAUST FUEL PUMP ACCELERATOR LINKAGE INJECTION PUMP INJECTORS



KNOWN INFO
FUEL PUMP OK FUEL LINES OK FUEL FILTER OK
POSSIBLE PROBLEMS
ACCELERATOR LINKAGE INJECTION PUMP INJECTORS



REFERENCE INFORMATION

FUEL SYSTEM



CAUTION

Be sure to keep the line clear of moving engine parts (fan, pulleys, etc...) and DO NOT place the line on the exhaust manifold.

Fuel lines should be inspected for kinks, cracks, or anything that would restrict fuel flow or allow air into the lines. Be sure to check the lines all the way back to the tank and remember that there is a strainer inside the tank which can also become plugged.

To test for air leaks in the supply lines, disconnect the return line from the injection pump and connect a line that is long enough to reach the ground. Place the end of the line into a bucket containing diesel fuel, making sure that the end of the line is below the level of fuel in the bucket. Run the engine and watch for air bubbles in the bucket. Replace fuel line, refer to (para 3-25).

An important function of all hoses, lines and fittings is to carry fuel without admitting air to the system. When the fuel tank cap is in place and the fuel pump and injection pump are drawing fuel through the lines a low vacuum of 0-1 PSI is created. This occurs because the fuel which the engine uses must be replaced by air. During this vacuum condition, the slightest leak, which may not leak fuel out, could draw air into the system and, depending on the volume of air, cause a wide variety of engine malfunctions.

COLD WEATHER OPERATION

Diesel fuel is sensitive to temperature. All diesel fuel has a certain amount of wax-like components which have high energy value and help improve fuel economy. When temperatures are less than 20°F (-7°C) these components begin turning into flakes that can build up on the fuel tank strainer or in the fuel filter.

FUNGUS

In warm or humid weather, fungi and/or bacteria can cause fuel system damage by plugging the fuel lines, filter, or injection nozzles.

ODOR

Old fuel smells like varnish.

Check the accelerator pedal for full movement with no sticking or binding. If you have sticking or binding, lubricate accelerator pedal bushing and bearing with seasonal grade OE oil (TM 9-2320-280-10). If you do not have full pedal travel then disconnect the accelerator linkage from the fuel injection pump and recheck the travel. If you now have full travel then the problem is in the fuel injection pump and cannot be handled at this level of maintenance.

Operation of the injection pump and injectors cannot be verified at this level of maintenance.

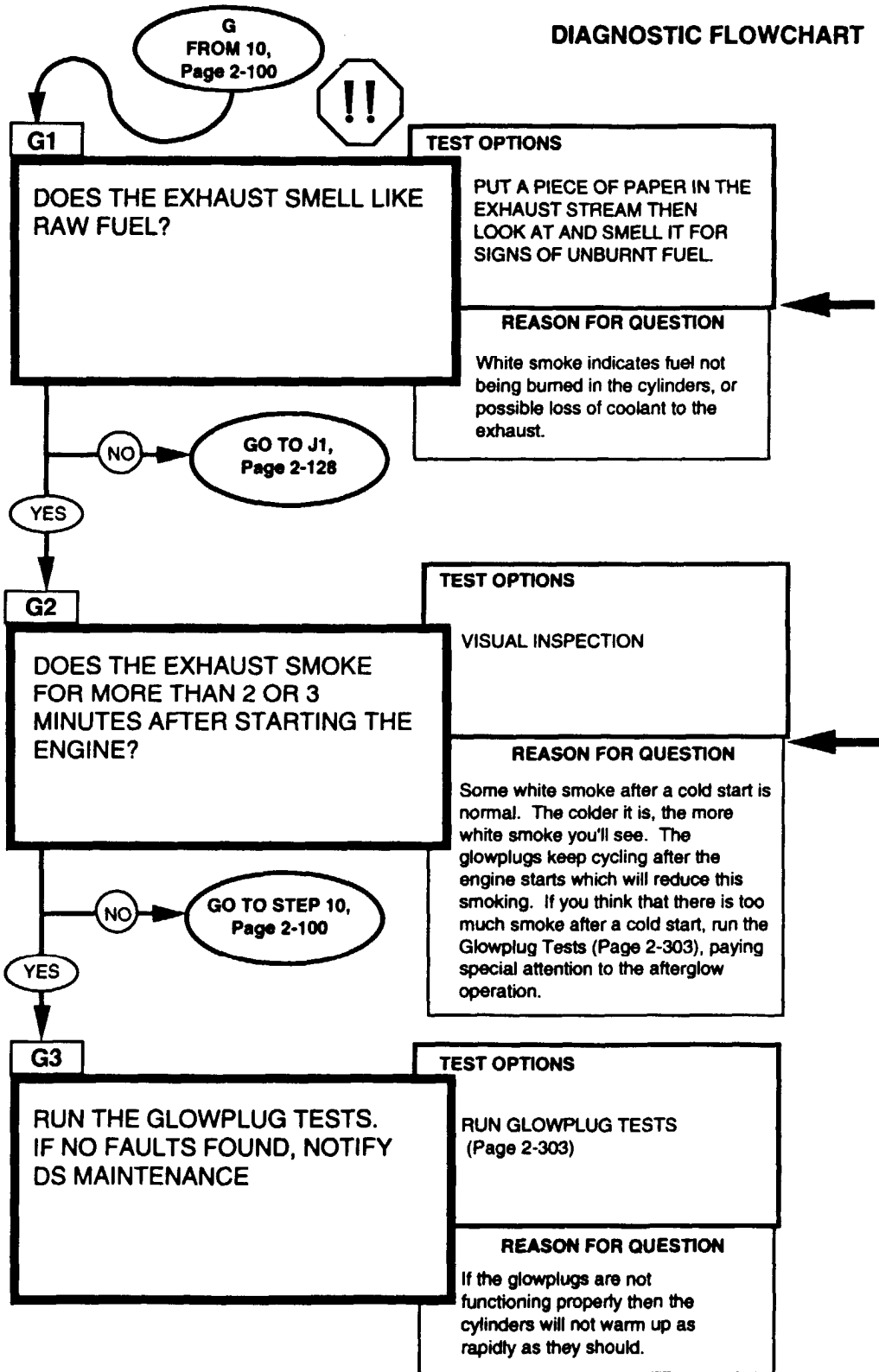
FUEL SYSTEM

DIAGNOSTIC FLOWCHART

KNOWN INFO
WHITE SMOKE
POSSIBLE PROBLEMS
INJECTION TIMING INTERNAL ENGINE PROBLEMS FUEL QUALITY

KNOWN INFO
WHITE SMOKE
POSSIBLE PROBLEMS
INJECTION TIMING INTERNAL ENGINE PROBLEMS FUEL QUALITY RETURN CHECK VALVE

KNOWN INFO
GLOWPLUGS OK WHITE SMOKE
POSSIBLE PROBLEMS
ENGINE MECHANICAL



REFERENCE INFORMATION

FUEL SYSTEM

**WARNING**

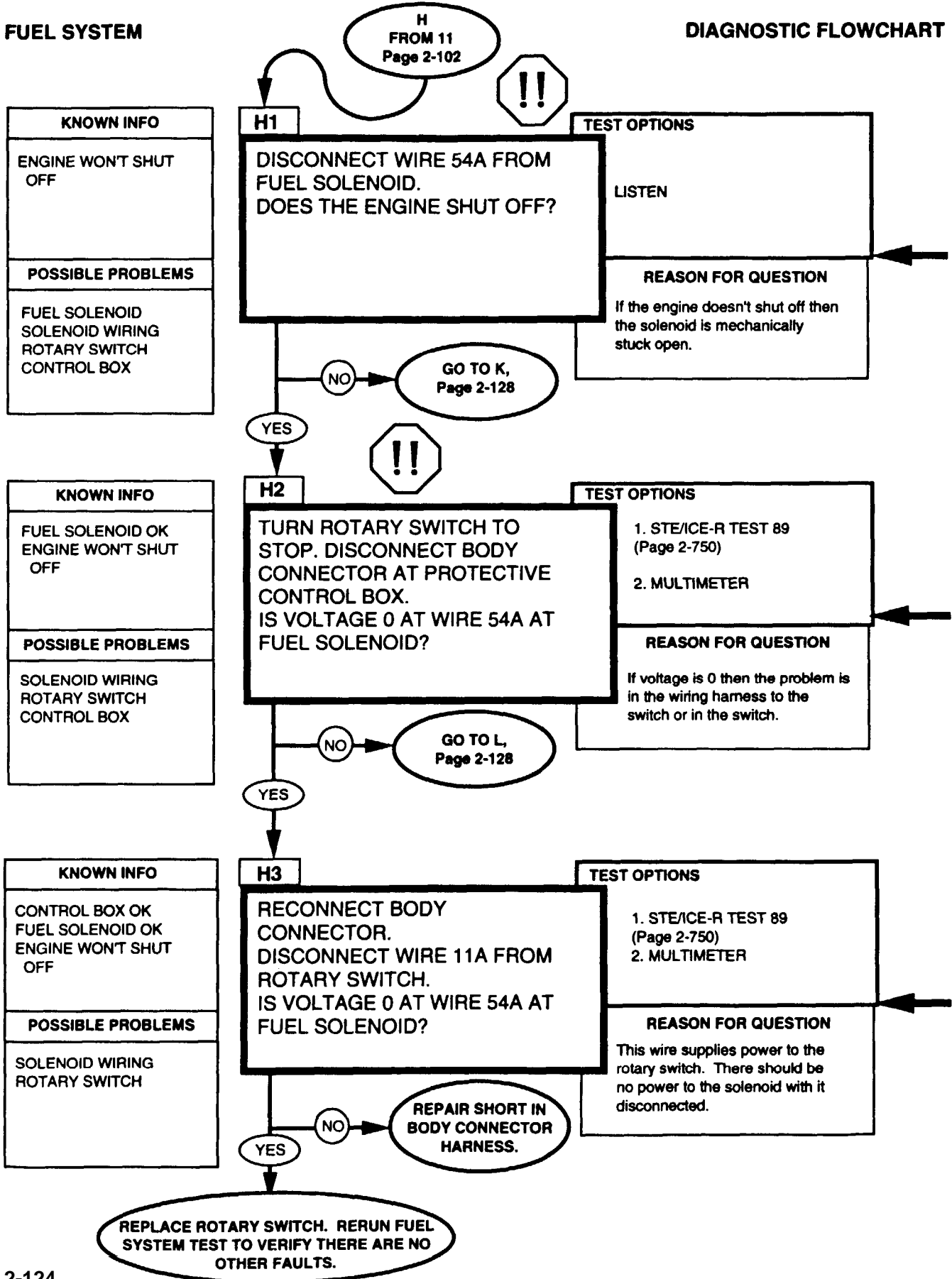
Be careful when performing this test. Exhaust gas can be extremely hot and severe burns can result.

Put a piece of paper in the exhaust stream for a few moments with the engine at idle. Then look at the paper to see if there is any condensed fuel on it. Then smell the paper to see if it smells like raw fuel. If it smells like fuel then the engine could be very cold or else it has a DS level fuel system fault or compression fault.

White smoke for a short time after start up, especially on a cold day, is a normal condition. It is caused by incomplete combustion of the fuel because of low cylinder temperature. It should clear up in a few minutes. If not you may have a bad head gasket, cracked block, or a restricted check valve. Check for restricted check valve (para. 3-35).

FUEL SYSTEM

DIAGNOSTIC FLOWCHART



REFERENCE INFORMATION

FUEL SYSTEM



WARNING

Keep hands away from engine fan! Moving fan blades can cause serious injury. Use extreme caution when engine is running.

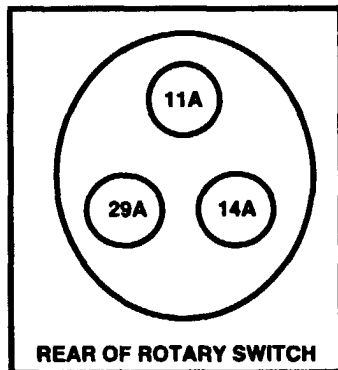


WARNING

Disconnect negative battery cable before disconnecting and reconnecting protective control box harness.

There is battery voltage at the PCB at all times. Failure to disconnect battery cable will result in damage to equipment or injury to personnel.

Rotary Switch must remain in STOP position for the rest of these tests.



REAR OF ROTARY SWITCH

NOTE

Carefully inspect the body connector end of the harness for a short. Check for pushed out pins, broken or stripped insulation or any other bare wires. If everything checks out OK, you have to replace the harness.

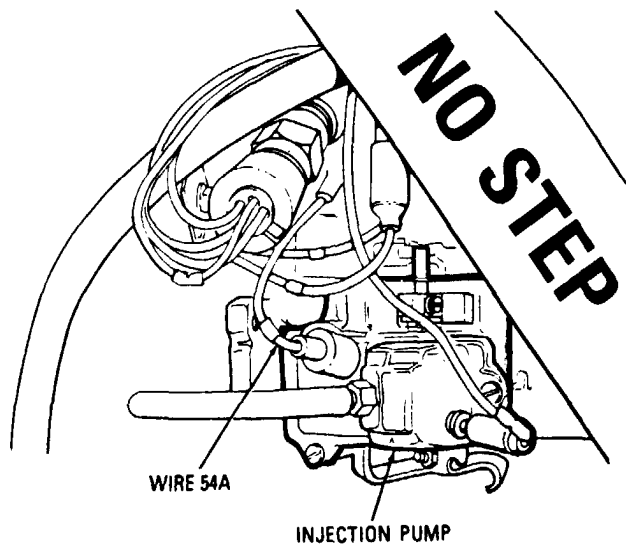
Remember to reconnect any wires that may have been disconnected during troubleshooting.

For repair instructions (HARNESS REPAIR), refer to (para 4-85).

For repair/replace instructions (ROTARY SWITCH), refer to (para 4-7).

<p>0-45 DC VOLTS STE/ICE-R TEST 89</p>
<ol style="list-style-type: none"> 1. Connect RED clip to positive, BLACK clip to negative or ground. 2. Start Test 89, DC volts. 3. Displayed reading is in volts.

<p>DC VOLTAGE MULTIMETER</p>
<ol style="list-style-type: none"> 1. Set the voltmeter to a DC volts scale of at least 40 volts. 2. Connect the RED lead to positive and the BLACK lead to negative. 3. Be sure to read the correct scale.



FUEL SYSTEM

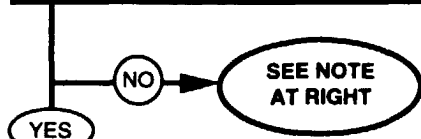
DIAGNOSTIC FLOWCHART

KNOWN INFO
FUEL SUPPLY OK FUEL RETURN OK SOLENOID WIRING
POSSIBLE PROBLEMS
FUEL SOLENOID INJECTION PUMP INJECTORS



I1
DID A STREAM OF FUEL COME OUT OF THE INJECTOR PUMP RETURN LINE WHILE IT WAS CRANKING?

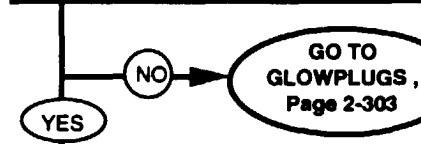
TEST OPTIONS
VISUAL INSPECTION
REASON FOR QUESTION
To see if there is fuel available to the injection pump.



KNOWN INFO
FUEL AVAILABLE TO THE INJECTION PUMP
POSSIBLE PROBLEMS
FUEL SOLENOID INJECTION PUMP INJECTORS GLOWPLUGS COLD ADVANCE

I2
IS THE GLOWPLUG CIRCUIT OK? (IF YOU DON'T KNOW, RUN THE GLOWPLUG TESTS, RETURN HERE IF NO FAULTS FOUND).

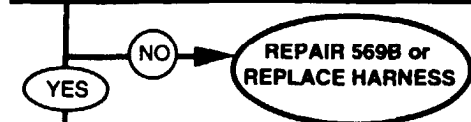
TEST OPTIONS
GLOWPLUGS TEST (Page 2-303)
REASON FOR QUESTION
On a cool day a faulty glowplug circuit will prevent the engine from starting.



KNOWN INFO
GLOWPLUGS OK
POSSIBLE PROBLEMS
FUEL SOLENOID INJECTION PUMP INJECTORS COLD ADVANCE

I3
DISCONNECT WIRE 569B FROM THE COLD ADVANCE SOLENOID.
WITH ROTARY SWITCH IN THE "RUN" POSITION, DO YOU HAVE BATTERY VOLTAGE AT WIRE 569B?

TEST OPTIONS
STE/ICE-R TEST 89 (Page 2-750)
MULTIMETER
REASON FOR QUESTION
On a cold day a faulty cold advance circuit will prevent the engine from starting.



**FAULTY INJECTION PUMP
 NOTIFY DS
 MAINTENANCE**

REFERENCE INFORMATION

FUEL SYSTEM

NOTE

Check the rubber return line from the injection pump to the steel tubing return line.

If the rubber line is not clogged go to D1, page 2-112.

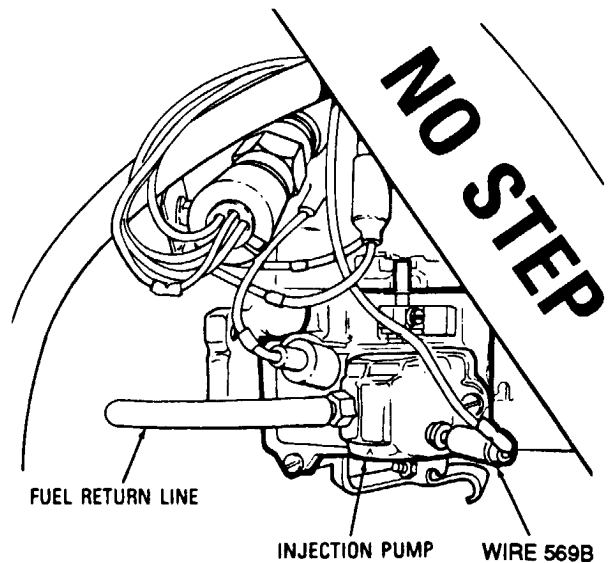
If the line is clogged, then replace it. Start the engine and see if it stays running. If it doesn't start or stay running then return to J1 and continue testing. There may be another fuel system fault preventing fuel from reaching this point.

<p>0-45 DC VOLTS STE/ICE-R TEST 89</p>
<ol style="list-style-type: none"> 1. Connect RED clip to the indicated test point, BLACK clip to negative or ground. 2. Start Test 89, DC volts. 3. Displayed reading is in volts.

<p>BATTERY VOLTAGE MULTIMETER</p>
<ol style="list-style-type: none"> 1. Set the voltmeter to a DC volts scale of at least 40 volts. 2. Connect the RED lead to positive and the BLACK lead to negative. 3. Be sure to read the correct scale.

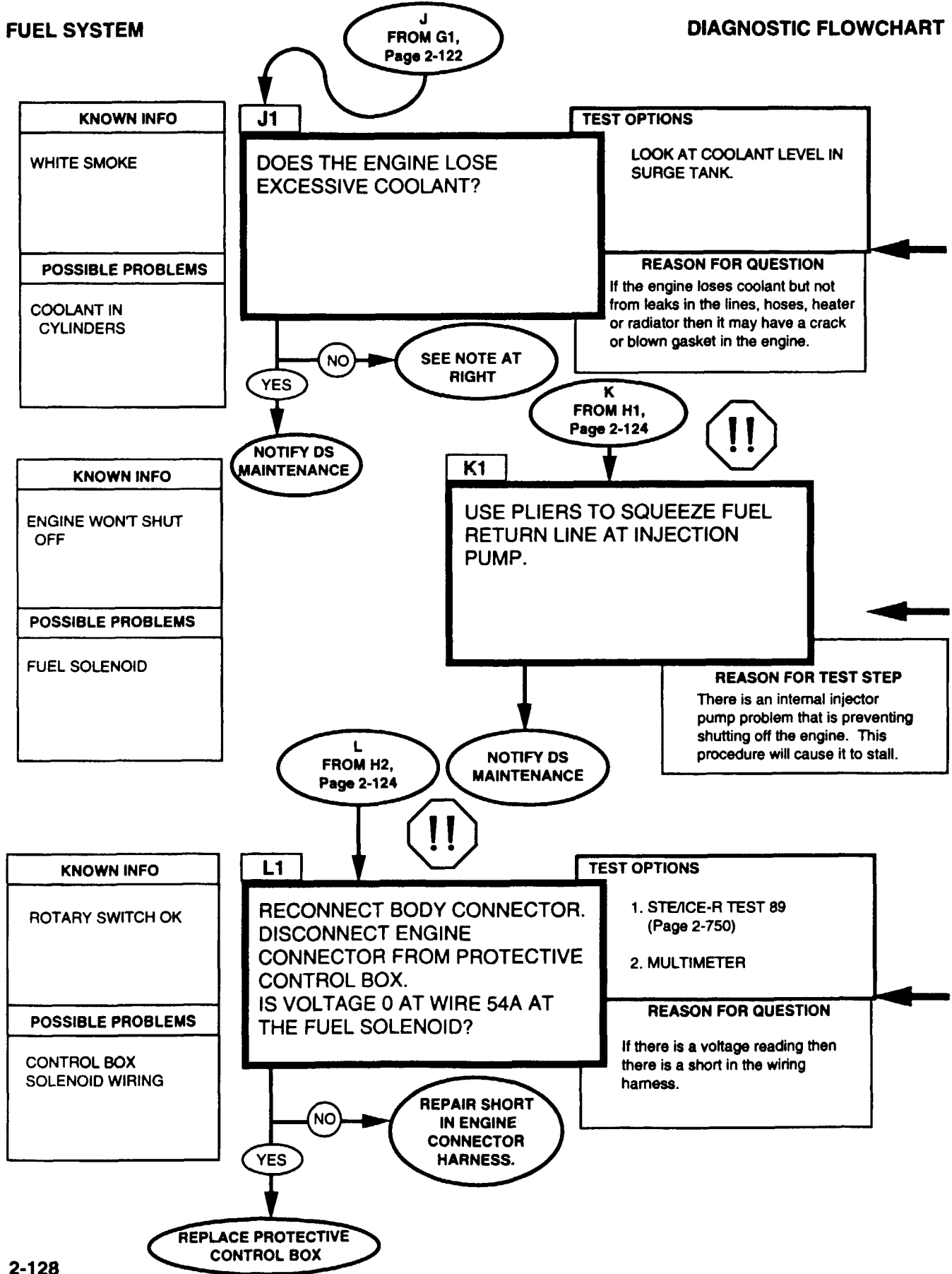
If the cold advance solenoid is getting power then the only possibilities that would keep the engine from starting are that fuel is not reaching the cylinders due to a fault in the high pressure side of the fuel system or nearly all the cylinders have very low compression. It is unlikely that all the cylinders would lose compression at the same time, but you may want to run a Compression Unbalance test (STE/ICE-R Test #14) to check this.

For repair/replace instructions, refer to (para 4-85).



FUEL SYSTEM

DIAGNOSTIC FLOWCHART



REFERENCE INFORMATION

FUEL SYSTEM

NOTE

If you are getting white smoke due to coolant entering the cylinders then you should notice a loss of coolant in the radiator or bubbles in the radiator tank while the engine is running. You may need to fill the radiator to proper level and recheck a day later to determine if there is a coolant loss.

If you don't detect coolant loss then you may have missed a fuel problem. Rerun the fuel system tests paying attention for a raw exhaust smell.

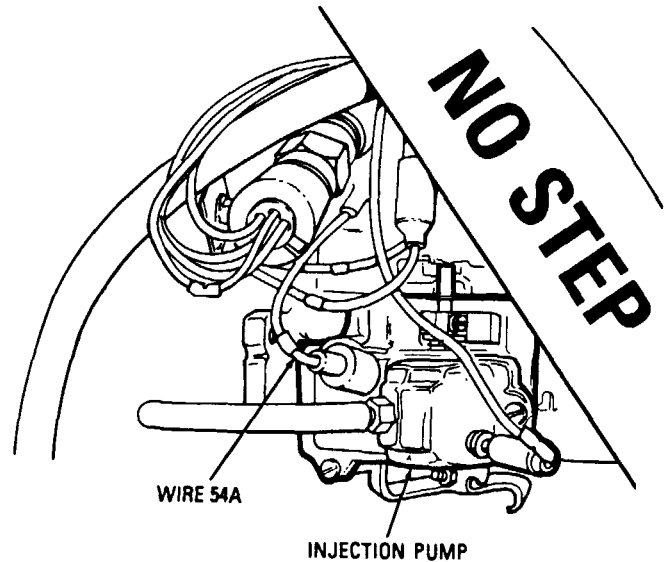
If you still find nothing you may have a small or inconsistent leak. Notify DS maintenance.



WARNING

Keep hands away from engine fan! Moving fan blades can cause serious injury. Use extreme caution when engine is running.

If the engine doesn't shut off with the solenoid disconnected then fuel is still reaching the cylinders- probably because the fuel solenoid is stuck open. When you squeeze the return line tight enough to prevent fuel flowing through it, you create a pressure imbalance inside the injection pump that will cause the engine to stall.



WARNING

Disconnect negative battery cable before disconnecting and reconnecting protective control box harness.

There is battery voltage at the PCB at all times. Failure to disconnect battery cable will result in damage to equipment or injury to personnel.

Remember to reconnect any wires that may have been disconnected during troubleshooting.

For repair/replace instructions (HARNES), refer to (para 4-85).

For repair/replace instructions (PCB), refer to (para 4-5).

**0-45 DC VOLTS
STE/CE-R TEST 89**

1. Connect RED clip to the indicated test point, BLACK clip to negative or ground.
2. Start Test 89, DC volts.
3. Displayed reading is in volts.

**BATTERY VOLTAGE
MULTIMETER**

1. Set the voltmeter to a DC volts scale of at least 40 volts.
2. Connect the RED lead to positive and the BLACK lead to negative.
3. Be sure to read the correct scale.

FUEL SYSTEM

DIAGNOSTIC FLOWCHART

KNOWN INFO
ENGINE CRANKS NO VOLTAGE AT ADVANCE SOLENOID.
POSSIBLE PROBLEMS
PCB COLD ADVANCE SWITCH WIRING

M1

WITH ROTARY SWITCH IN "RUN" POSITION, DO YOU HAVE BATTERY VOLTAGE AT WIRE 5A AT THE ALTERNATOR OUTPUT?

TEST OPTIONS

1. STE/ICE-R TEST 89 (Page 2-750)
2. MULTIMETER

REASON FOR QUESTION

With rotary switch in run position, W5A is connected to battery voltage through the PCB and it supplies power to the cold advance switch.

NO → RUN ALTERNATOR DIAGNOSTICS

YES

KNOWN INFO
PCB OK ENGINE CRANKS NO VOLTAGE AT ADVANCE SOLENOID
POSSIBLE PROBLEMS
COLD ADVANCE SWITCH WIRING

M2

DISCONNECT WIRE 569C AT COLD ADVANCE SWITCH. WITH ROTARY SWITCH IN "RUN" POSITION, DO YOU HAVE BATTERY VOLTAGE AT WIRE 569C?

TEST OPTIONS

1. STE/ICE-R TEST 89 (Page 2-750)
2. MULTIMETER

REASON FOR QUESTION

If you have no voltage here then the problem may be the cold advance switch

NO → REPAIR 569C/ REPLACE HARNESS

YES

KNOWN INFO
PCB OK ENGINE CRANKS NO VOLTAGE AT ADVANCE SOLENOID
POSSIBLE PROBLEMS
COLD ADVANCE SWITCH WIRING

M3

RECONNECT WIRE 569C. DISCONNECT WIRE 569B FROM COLD ADVANCE SWITCH WITH ROTARY SWITCH IN "RUN" POSITION. DO YOU HAVE BATTERY VOLTAGE AT SWITCH LEAD?

TEST OPTIONS

1. STE/ICE-R TEST 89 (Page 2-750)
2. MULTIMETER

REASON FOR QUESTION

If you don't have voltage here then the problem is the switch.

NO → REPLACE COLD ADVANCE SWITCH

YES

REPAIR 569B/ REPLACE HARNESS

M FROM C1, Page 2-110

REFERENCE INFORMATION

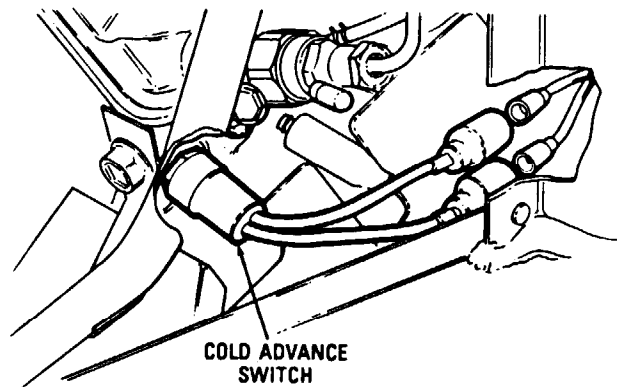
FUEL SYSTEM

0-45 DC VOLTS STE/ICE-R TEST 89
<ol style="list-style-type: none"> 1. Connect RED clip to positive, BLACK clip to negative or ground. 2. Start Test 89, DC volts. 3. Displayed reading is in volts.

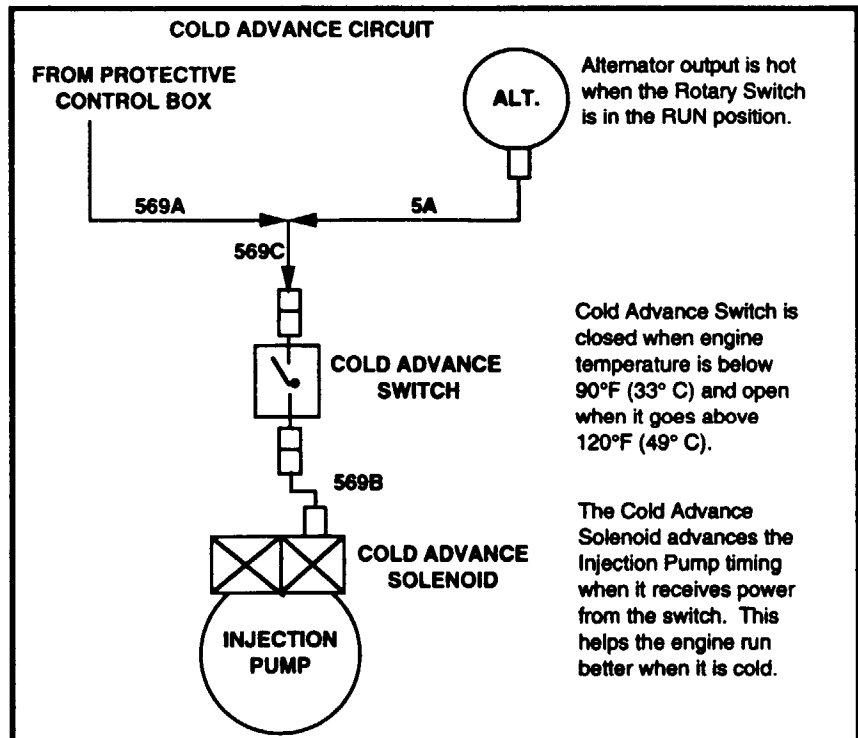
You should only run the engine long enough to determine the gage reading because engine temperature must stay below 90° F (33° C) for the Cold Advance Circuit to function.

BATTERY VOLTAGE MULTIMETER
<ol style="list-style-type: none"> 1. Set the voltmeter to a DC volts scale of at least 40 volts. 2. Connect the RED lead to positive and the BLACK lead to negative. 3. Be sure to read the correct scale.

1. Shut off engine
2. Disconnect wire 569C at Cold Advance Switch.
3. Turn Rotary Switch to Run position.
4. Check for battery voltage at wire 569C.



Repair wire or replace harness, refer to (para 4-85).



NOTE

Engine temp must be less than 90°F (33° C) when testing the switch.

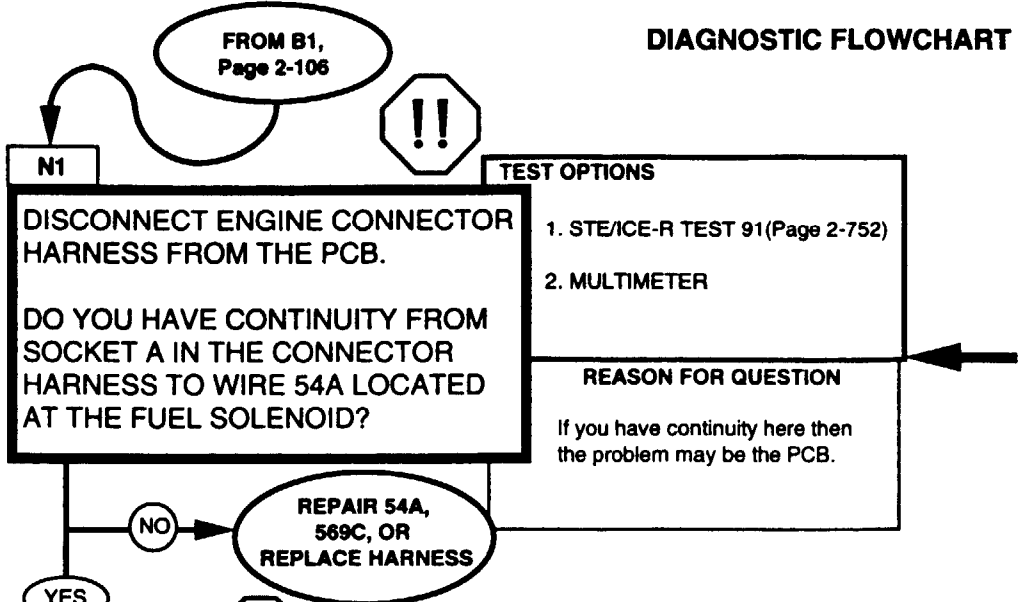
For repair/replace instructions, (COLD ADVANCE SWITCH), refer to (para 4-27).

For repair/replace instructions, (HARNESS), refer to (para 4-85).

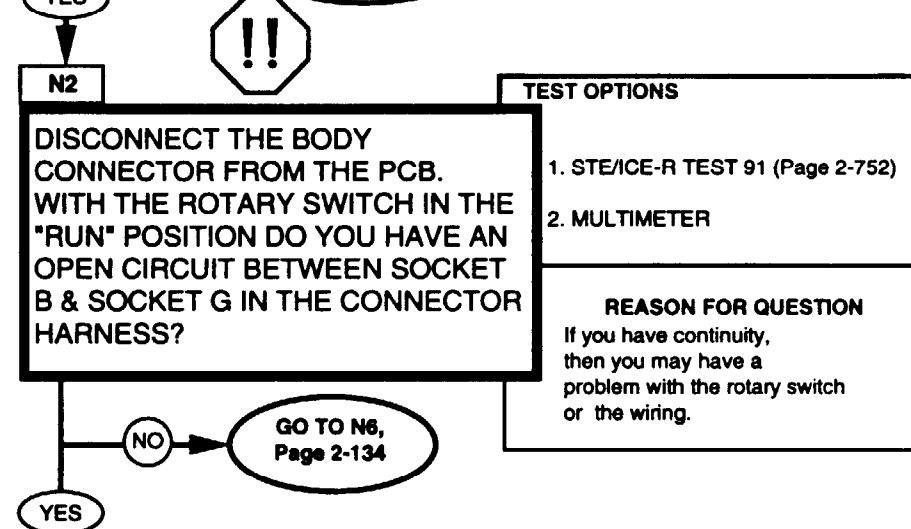
FUEL SYSTEM

DIAGNOSTIC FLOWCHART

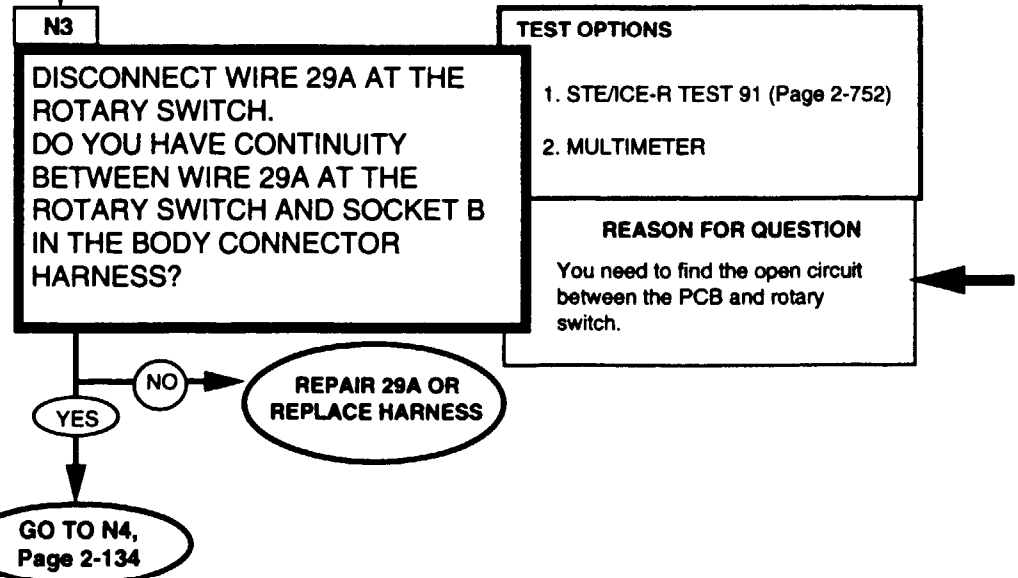
KNOWN INFO
NO VOLTAGE AT FUEL SOLENOID
POSSIBLE PROBLEMS
PCB ROTARY SWITCH WIRING



KNOWN INFO
WIRING TO FUEL SOLENOID OK
POSSIBLE PROBLEMS
PCB ROTARY SWITCH WIRING



KNOWN INFO
WIRING TO FUEL SOLENOID OK
POSSIBLE PROBLEMS
PCB ROTARY SWITCH WIRING



REFERENCE INFORMATION

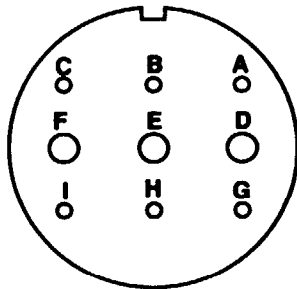


WARNING

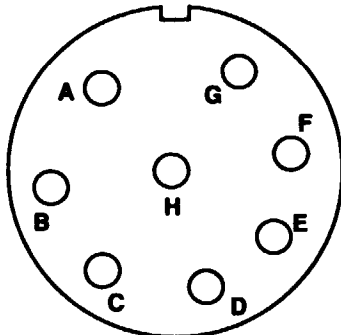
Disconnect negative battery cable before disconnecting and reconnecting protective control box harness.

There is battery voltage at the PCB at all times. Failure to disconnect battery cable will result in damage to equipment or injury to personnel. Repair wiring, refer to (para 4-85).

Inspect wiring to be sure that all the wires are connected in their proper places.



PCB ENGINE CONNECTOR (ON LEFT FENDER LINER)

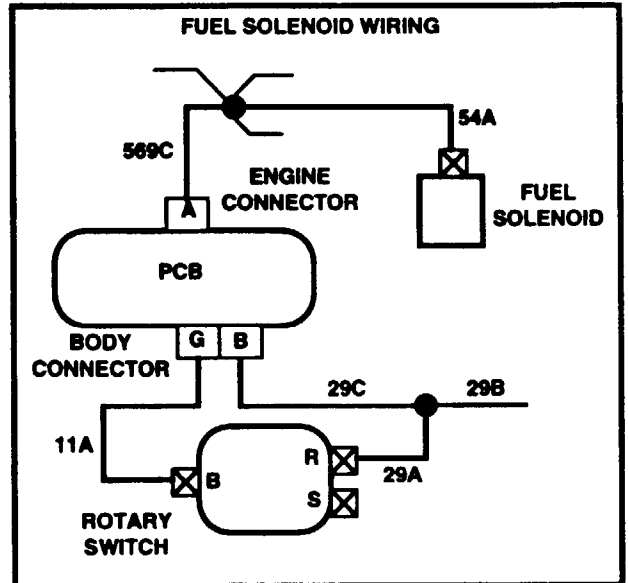


PCB BODY CONNECTOR (LOCATED UNDER DASHBOARD)

Repair wiring, refer to (para 4-85).

Remember to reconnect any wires that were disconnected during troubleshooting.

FUEL SYSTEM

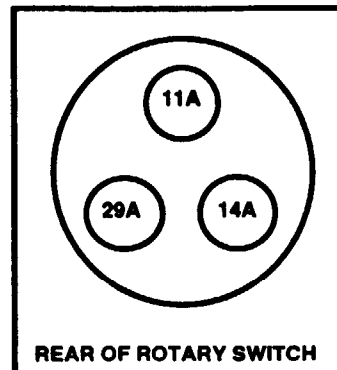


**0-4500 OHMS
STE/ICE-R TEST 91**

1. Connect RED clip and BLACK clip to the terminations indicated in the question. RED to the first, BLACK to the second.
2. Start Test 91, 0-4500 ohms.
3. Displayed reading is in ohms. Less than 5 ohms is continuity. If the resistance is over 4500 ohms STE/ICE displays "9.9.9.9."

**CONTINUITY (RESISTANCE)
MULTIMETER**

1. Set the voltmeter to an ohms scale of about 1000 ohms.
2. Connect the RED and BLACK leads to the connections stated in the question.
3. Be sure to read the correct scale. Less than 5 ohms indicates continuity. For an open circuit, the meter should peg full scale (needle all the way to the left).



REAR OF ROTARY SWITCH

FUEL SYSTEM

DIAGNOSTIC FLOWCHART

KNOWN INFO
29C OK
POSSIBLE PROBLEMS
PCB ROTARY SWITCH WIRING



N4

DISCONNECT WIRE 11A FROM THE ROTARY SWITCH.

DO YOU HAVE CONTINUITY BETWEEN WIRE 11A AT THE SWITCH AND SOCKET G IN THE BODY CONNECTOR HARNESS?

TEST OPTIONS

1. STE/ICE-R TEST 91 (Page 2-752)
2. MULTIMETER

REASON FOR QUESTION

If this wire is ok then the problem may be in the rotary switch.



KNOWN INFO
WIRING OK
POSSIBLE PROBLEMS
PCB ROTARY SWITCH

N5

WITH THE ROTARY SWITCH IN THE "RUN" POSITION, DO YOU HAVE CONTINUITY BETWEEN THE TERMINALS FOR WIRES 11A & 29A ON THE ROTARY SWITCH?

TEST OPTIONS

1. STE/ICE-R TEST 91 (Page 2-752)
2. MULTIMETER

REASON FOR QUESTION

If the rotary switch is ok then the problem is the PCB.



KNOWN INFO
ROTARY SWITCH OK
POSSIBLE PROBLEMS
PCB

N6

RECONNECT THE BODY CONNECTOR HARNESS THEN THE ENGINE CONNECTOR HARNESS.

DO YOU HAVE CONTINUITY BETWEEN WIRE 29A AT THE ROTARY SWITCH AND WIRE 54A AT THE FUEL SOLENOID?

TEST OPTIONS

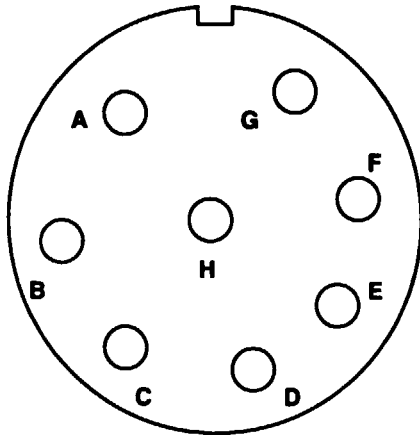
1. STE/ICE-R TEST 91 (Page 2-752)
2. MULTIMETER

REASON FOR QUESTION

If there is no continuity then there is an open inside the PCB.

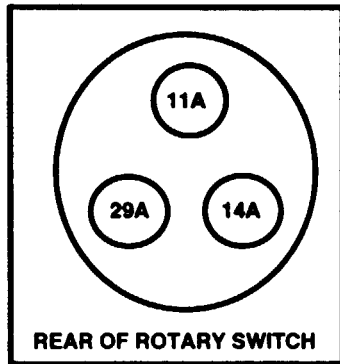


REFERENCE INFORMATION



PCB BODY CONNECTOR

For repair/replace instructions (HARNESS), refer to (para 4-85).



REAR OF ROTARY SWITCH

For repair/replace instructions (ROTARY SWITCH), refer to (para 4-7).



WARNING

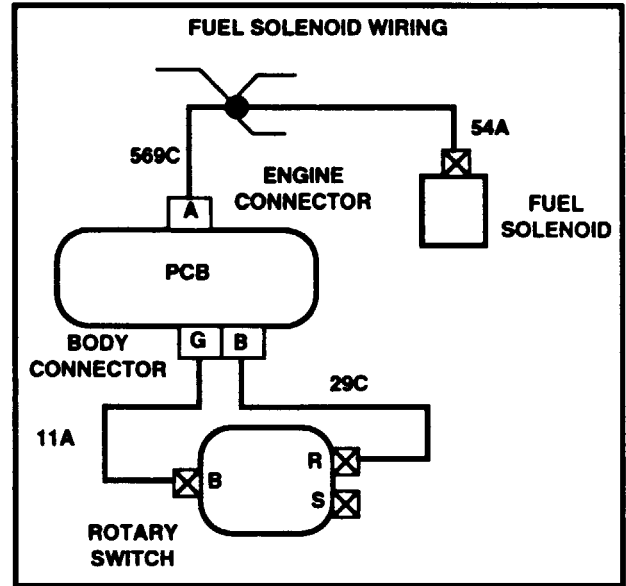
Disconnect negative battery cable before disconnecting and reconnecting protective control box harness.

There is battery voltage at the PCB at all times. Failure to disconnect battery cable will result in damage to equipment or injury to personnel.

Be sure to reconnect the wires at the rotary switch and the fuel solenoid.

For repair/replace instructions (PCB), refer to (para 4-5).

FUEL SYSTEM



<p>0-4500 OHMS STE/ICE-R TEST 91</p>
<ol style="list-style-type: none"> 1. Connect RED clip and BLACK clip to the terminations indicated in the question. 2. Start Test 91, 0-4500 ohms. 3. Displayed reading is in ohms. Less than 5 ohms is continuity. If the resistance is over 4500 ohms, STE/ICE displays "9.9.9.9."

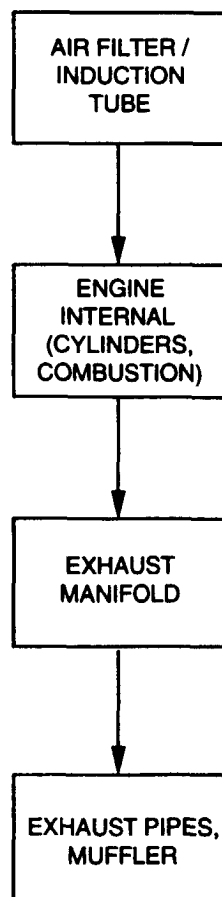
<p>CONTINUITY (RESISTANCE) MULTIMETER</p>
<ol style="list-style-type: none"> 1. Set the voltmeter to an ohms scale of about 1000 ohms. 2. Connect the RED and BLACK leads to the connections stated in the question. 3. Be sure to read the correct scale. Less than 5 ohms indicates continuity. For an open circuit, the meter should peg full scale (needle all the way to the left).

2-23. AIR INTAKE/EXHAUST TESTS

These Air Intake/Exhaust System tests can be run anytime you think there maybe a problem with the air intake or exhaust systems, or if you were sent here from another test.

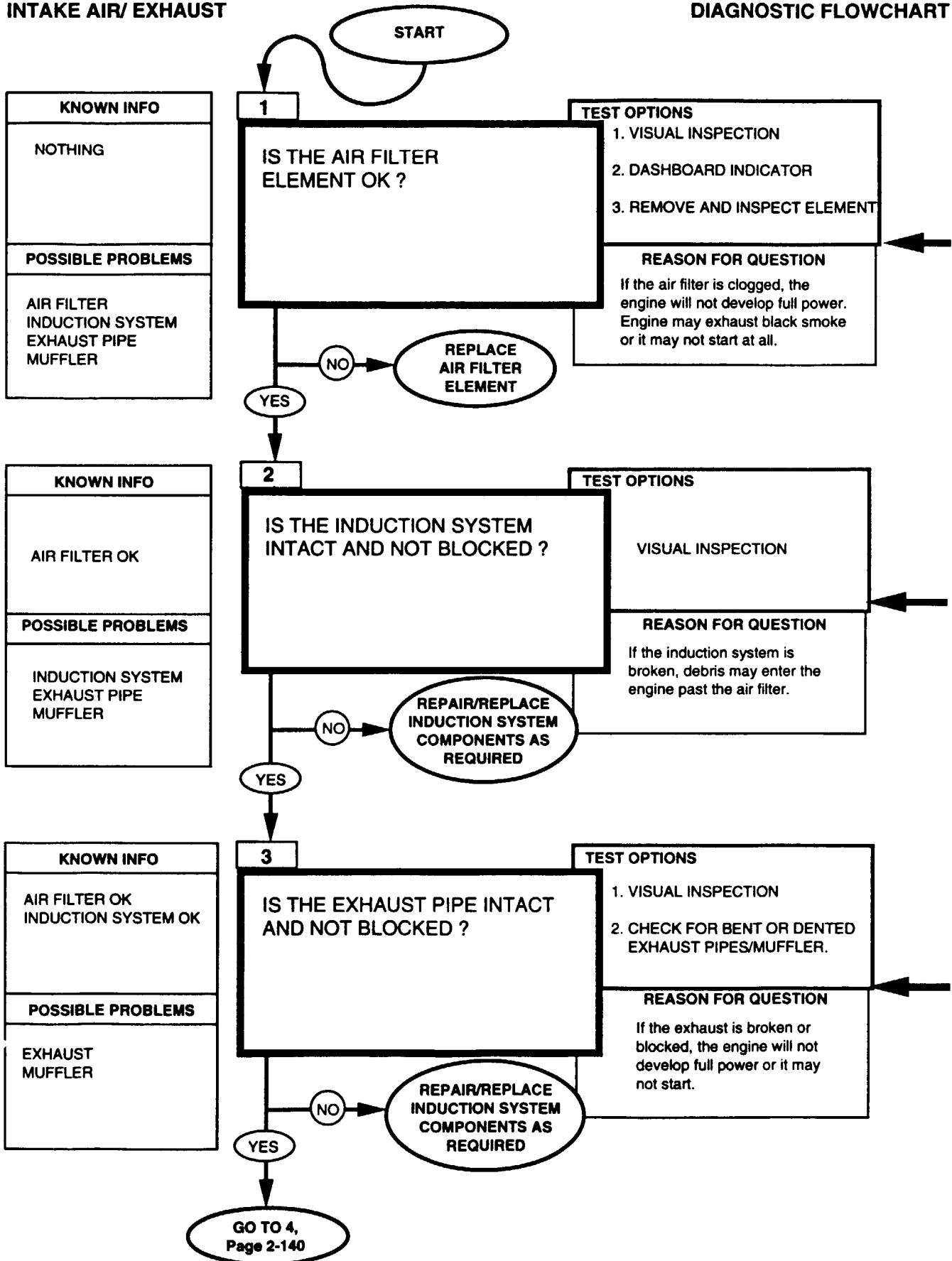
At the bottom of this page is a simplified block diagram of the Intake Air/Exhaust System. A detailed functional flow is not applicable to this system.

The Air Intake/Exhaust System is a very simple system that can cause very annoying problems. Whether the vehicle is hard to start or runs rough or never develops full power, it's worth the few minutes that it takes to check the components of this system. You can run through the diagnostic logic for this system almost anytime you open the hood or check the underside of your vehicle.



INTAKE AIR/ EXHAUST

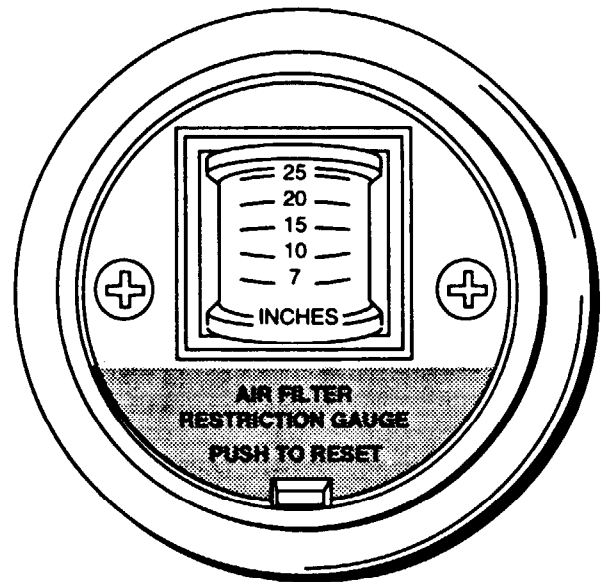
DIAGNOSTIC FLOWCHART



REFERENCE INFORMATION

INTAKE AIR/ EXHAUST

First, check the Air Filter Restriction gauge on the dashboard, just to the left of the steering wheel and make a note of its reading. Open the air cleaner cannister, remove the air cleaner element and inspect it for dirt and other contaminants. Replace air filter, refer to (para 3-13). A clean air filter is white. If the condition of the filter does not agree with the gauge on the dashboard, make a note to check the gauge, see Instruments section, page 2-319.



Make sure that all mounting bolts are in place and tight. Look for obvious things like a crushed or cracked air filter or air induction tube, check gaskets where possible. Replace induction system components, refer to (para 3-12).

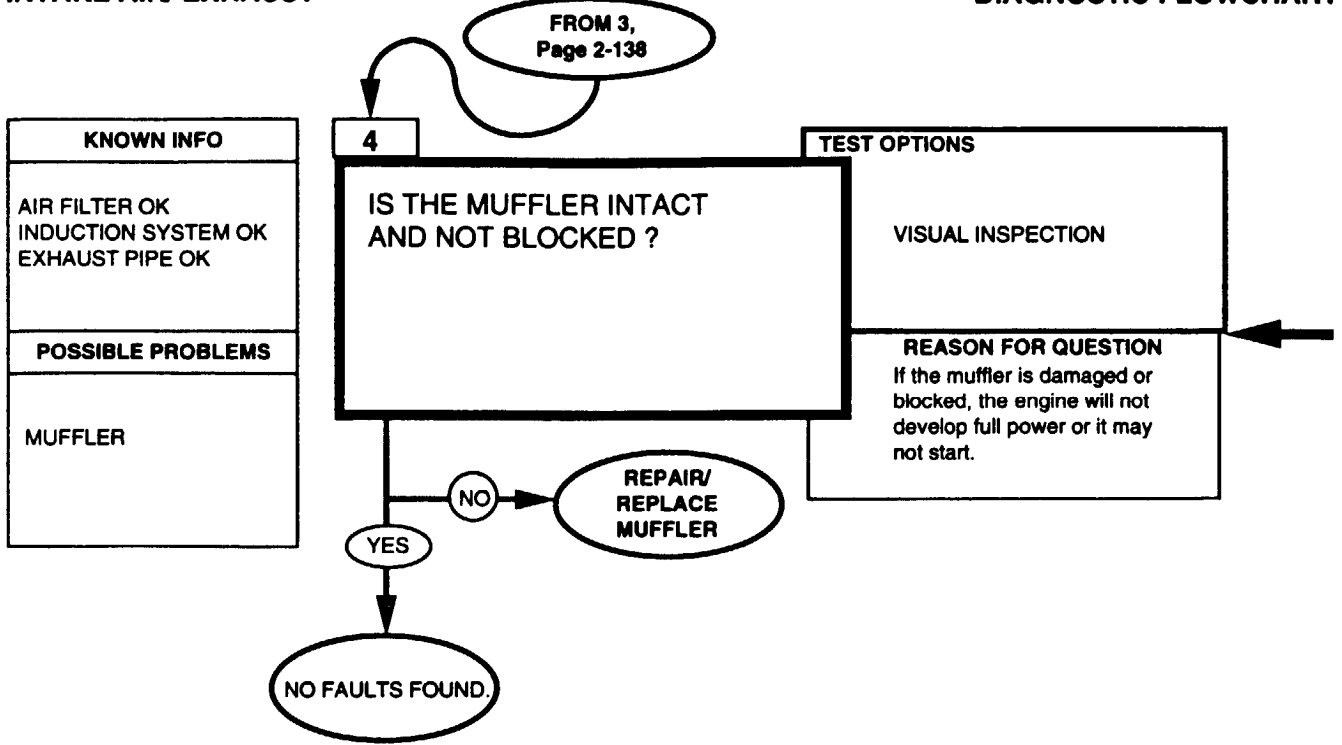
Look for damage caused by rocks such as bent pipes or holes and loose or broken clamps.

Small dents (depth less than 1/4 the diameter of the exhaust pipes) should not cause the pipes to be replaced as long as the pipes are intact.

Replace induction system components, refer to (para 3-12).


INTAKE AIR/ EXHAUST

DIAGNOSTIC FLOWCHART



REFERENCE INFORMATION

INTAKE AIR/ EXHAUST



Look for damage caused by rocks such as bent pipes or holes, loose or broken clamps.

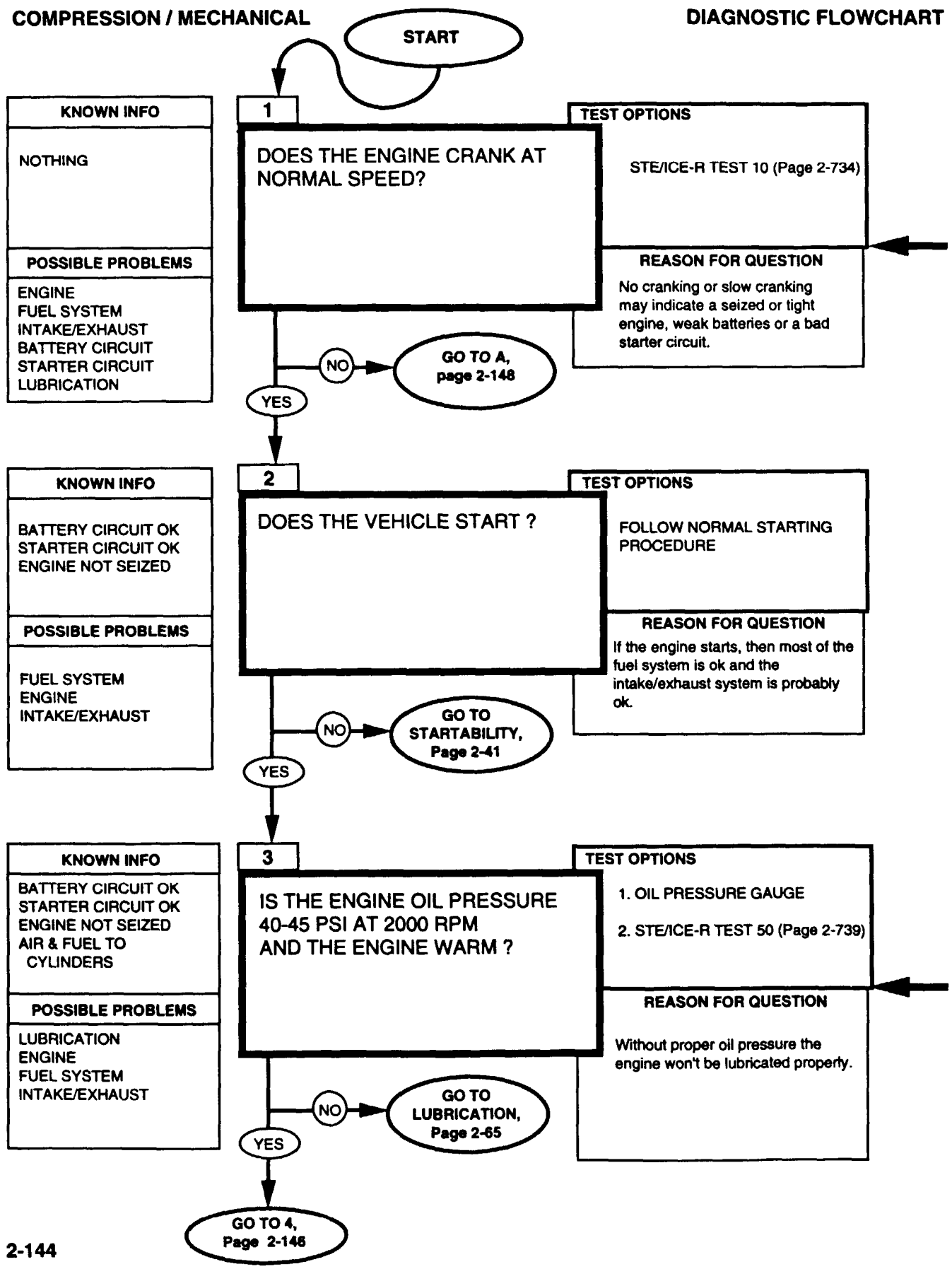
Replace muffler, refer to (para 3-48).

2-24. COMPRESSION/MECHANICAL TESTS

The main intent of this paragraph is to determine if the engine has internal compression or mechanical problems and to fix everything possible without having to notify DS maintenance.

COMPRESSION / MECHANICAL

DIAGNOSTIC FLOWCHART



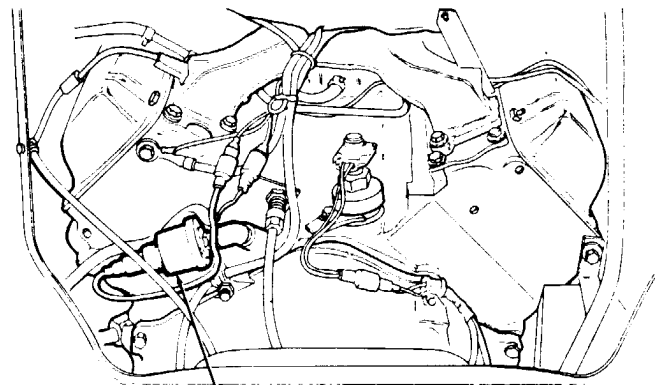
REFERENCE INFORMATION

A healthy engine should crank at least 100 RPM when it's cold and at least 180-200 RPM when it's warm.

If the engine doesn't crank at normal speed then it could be due to a Starter or Battery Circuit fault or it may be due to an internal engine problem.

COMPRESSION / MECHANICAL

ENGINE RPM STE/ICE-R TEST 10
<ol style="list-style-type: none"> 1. Start Test 10, Engine RPM. 2. Crank or start the engine. Displayed reading is RPM. Cranking RPM should be approximately 100-200. Idle RPM should be 625 - 675.



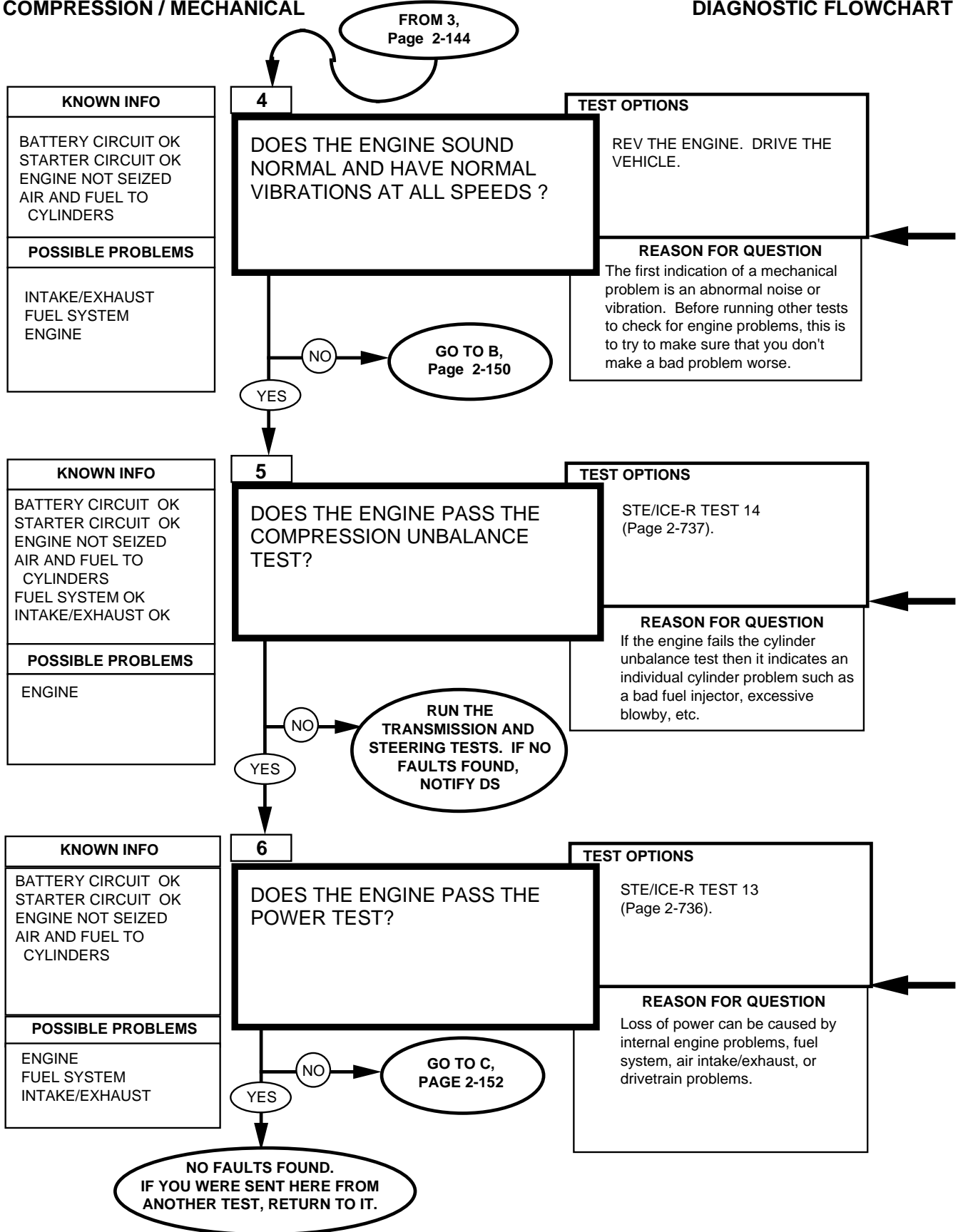
OIL PRESSURE SENDING UNIT

OIL PRESSURE STE/ICE-R TEST 50
<ol style="list-style-type: none"> 1. Install STE/ICE-R 0 to 1000 PSI transducer (blue stripe) in place of oil pressure sending unit. 2. Connect to STE/ICE-R TK connector J2 or J3. 3. CAL with engine off. 4. Start engine. Run test 50. With the engine warm, oil pressure should be 10 psi minimum at idle and 40-45 psi at 2000 RPM. Pressure may go as high as 80 psi when the engine is cold.

Oil pressure may go as high as 80 psi if the engine is cold and should be 10 psi minimum at idle speed. You should check the oil pressure with the STE/ICE-R (test 50) using 1000 psi transducer (blue stripe). Check pressure at idle and at 2000 RPM. If pressure is low, check oil level and condition. Add or change oil as required.

COMPRESSION / MECHANICAL

DIAGNOSTIC FLOWCHART



REFERENCE INFORMATION

COMPRESSION / MECHANICAL

This is not to evaluate driving performance. If the engine or the vehicle makes strange noises or vibrations at idle speed, don't rev the engine. If there is a problem internal to the engine, revving the engine could cause major damage (like a rod coming through the engine block).

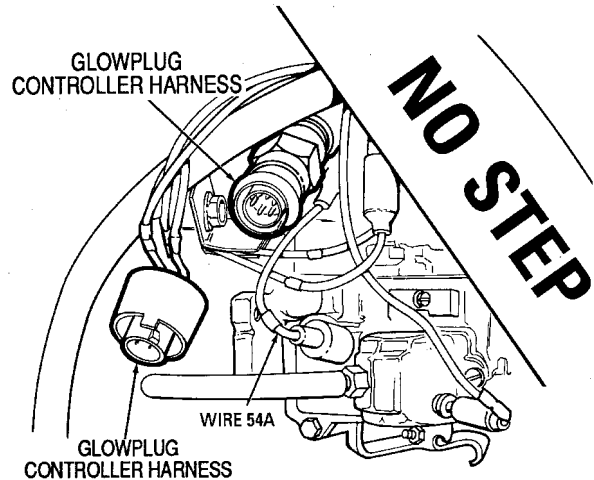
**COMPRESSION UNBALANCE
STE/ICE-R TEST 14**

1. Run tests 72, 73, and 74 to verify that the batteries are ok.
2. Disconnect wire 54A at injection pump to prevent starting.

CAUTION

The glowplug controller and the control valve electrical connector must be disconnected prior to running this test.

3. Disconnect glowplug controller and control valve electrical connector.
4. Start Test 14, Compression Unbalance.
5. Wait for the GO message. Crank the engine.
6. Release the rotary switch when the VTM displays OFF. A number less than 25% is passing.

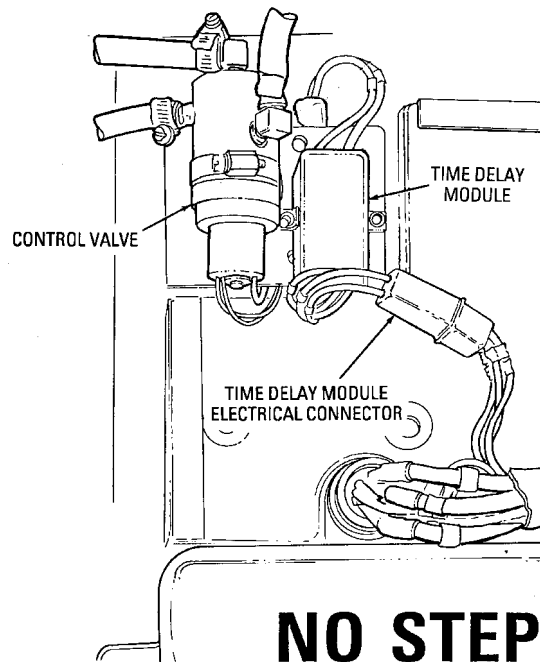


If the vehicle passes the STE/ICE-R Compression Unbalance Test, it may still have a compression problem, but it would mean that every cylinder has low compression. This is possible, but not too likely. If you don't find a problem and suspect compression, notify DS maintenance to measure compression.

If STE/ICE-R is not available, accelerate under full power to a reasonable speed on a flat, level, paved surface. You have to decide from your own experience whether or not the engine is developing full power. A number greater than 75 is passing for test # 13.

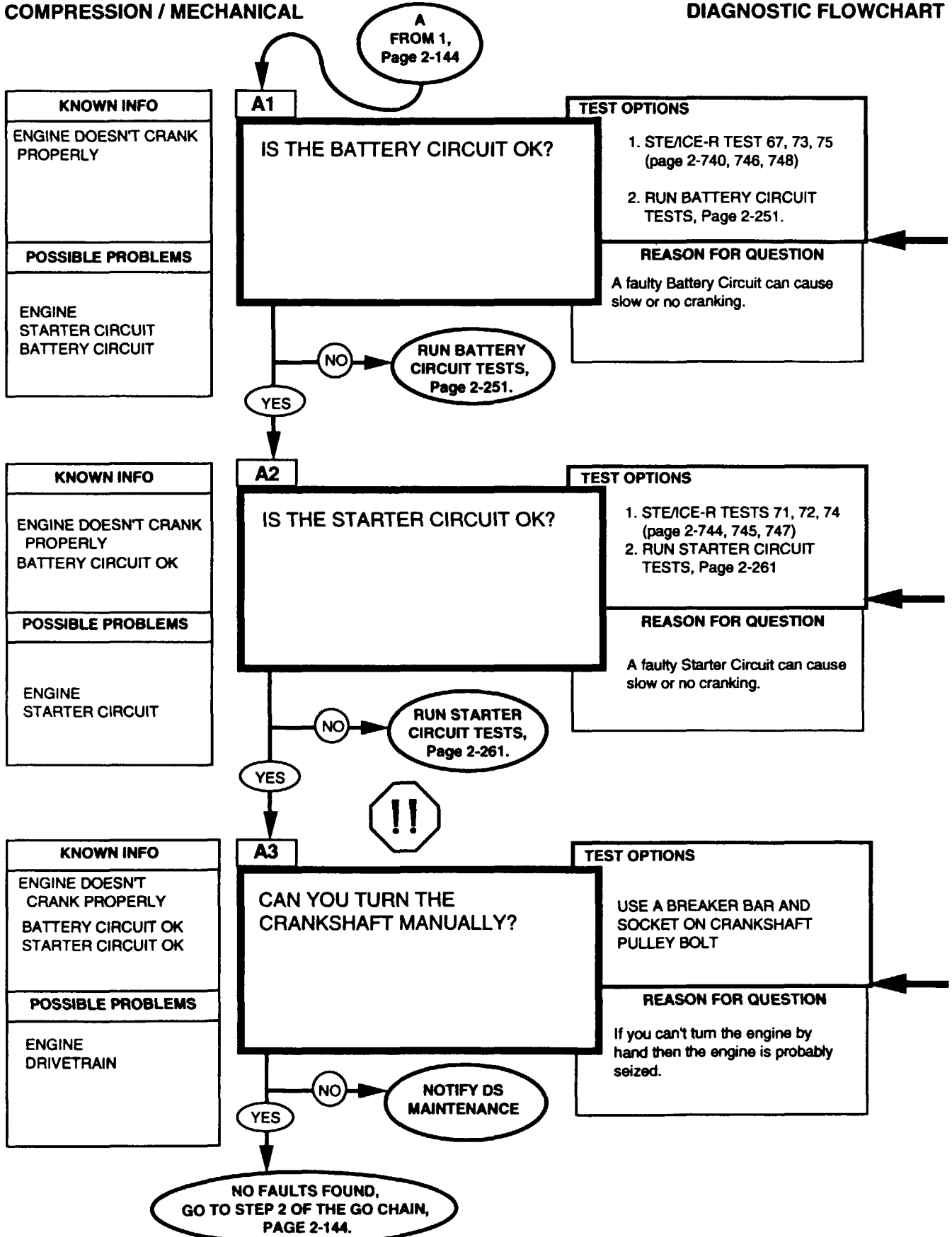
**POWER TEST (% POWER)
STE/ICE-R TEST 13**

1. Start and idle engine.
2. Run STE/ICE-R test #10 to set idle and governor speed as necessary.
3. Start STE/ICE-R test #13.
4. When CIP appears on the display, press down sharply on the accelerator and hold it to the floor until the VTM displays OFF.
5. Displayed value is % POWER.



COMPRESSION / MECHANICAL

DIAGNOSTIC FLOWCHART



REFERENCE INFORMATION

COMPRESSION / MECHANICAL

**BATTERY VOLTAGE
STE/CE-R TEST 67**

1. Start Test 67, Battery Voltage.
2. Displayed reading is in volts. Batteries should be 23-25.5 volts. Batteries voltage will drop when glowplugs turn on.

**STARTER AVERAGE CURRENT
STE/CE-R TEST 71**

1. Start Test 71, Starter Average Current.
2. Displayed reading is in amps. The starter should draw at least 200 amps with a peak of over 400 amps.

The Starter Circuit Tests begin on page 2-261. Internal engine problems (tight main or rod bearings for example) or drivetrain problems could still cause the engine to crank slowly even if the Starter and Battery Circuits are OK.



WARNING

Be sure to disconnect fuel solenoid (wire 54A) to prevent accidental starting. Failure to do so may result in injury to personnel or damage to equipment.

A breaker bar and socket placed on the crankshaft pulley can be used to try to turn the crankshaft. The crankshaft pulley is located directly under the engine cooling fan. It can be reached from under the HMMWV.

If the engine won't turn, remove the glowplugs and try again. If the engine turns now, try cranking it and look for fuel at the eight glowplug holes. If you see fuel at any of the holes then the engine may have had hydrostatic lock. Crank the engine for about 15 seconds to clear the fuel then re-install the glowplugs and try to start the engine. If it still won't crank, notify DS maintenance.

**STARTER FIRST PEAK CURRENT
STE/CE-R TEST 72**

1. Disconnect wire 54A at injection pump to prevent starting.
2. Disconnect glowplugs controller and fan solenoid.
3. Start Test 72, starter first peak current.
4. Wait for the GO message. Crank the engine.
5. Result is displayed in amps. Starter first peak should be over 400 amps.

**BATTERY INTERNAL RESISTANCE
STE/CE-R TEST 73**

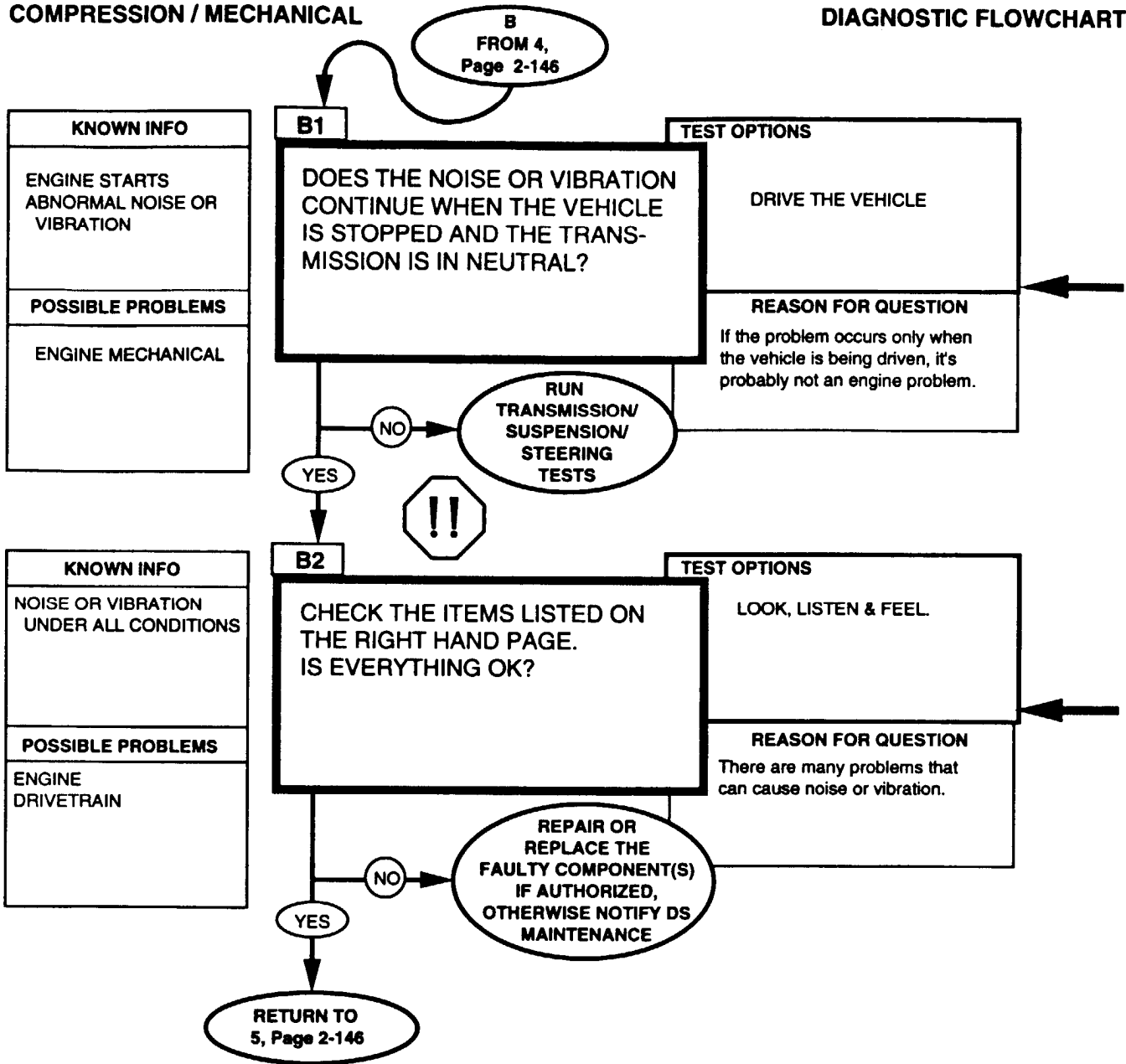
1. Disconnect wire 54A at injection pump to prevent starting.
2. Disconnect glowplugs controller and fan solenoid.
3. Start Test 73, Battery Internal Resistance.
4. Wait for the GO message. Crank the engine.
5. Result is displayed in milliohms. Battery resistance should be 25 milliohms max.

**STARTER CIRCUIT RESISTANCE
STE/CE-R TEST 74**

1. Disconnect wire 54A at injection pump to prevent starting.
2. Disconnect glowplugs controller and fan solenoid.
3. Start Test 74, Starter Circuit Resistance.
4. Wait for the GO message. Crank the engine.
5. Result is displayed in milliohms. Starter circuit resistance should be 25 milliohms max.

COMPRESSION / MECHANICAL

DIAGNOSTIC FLOWCHART



REFERENCE INFORMATION**COMPRESSION / MECHANICAL**

Try the following steps:

1. Determine what noises or vibrations are there when the engine is running with the transmission in neutral.
2. Keep the engine running, put the transmission in drive and take note of any changes in the noises or vibrations.
3. If it's safe to drive, drive the vehicle and take note of any changes in the noises or vibrations. Drive vehicle through all gears and ranges within speed rates listed in TM 9-2320-280-10.

**WARNING**

A hot engine may cause serious burns. Always use caution when approaching a hot engine.

Engine Mounts
 Transmission Mounts
 Cooling Fan
 Belts
 Water Pump
 Power Steering Pump
 Fuel Pump
 Alternator
 Air Induction Components
 Exhaust Components

COMPRESSION / MECHANICAL

DIAGNOSTIC FLOWCHART

C
FROM 6,
Page 2-146

KNOWN INFO
BATTERY AND STARTER CIRCUITS OK
POSSIBLE PROBLEMS
ENGINE DRIVETRAIN FUEL SYSTEM INTAKE/EXHAUST

C1

RUN A POWER TEST WITH THE AIR FILTER REMOVED. DOES THE TEST STILL FAIL?

TEST OPTIONS
AIR INTAKE/EXHAUST TESTS PAGE 2-137
REASON FOR QUESTION
Intake or exhaust restrictions will prevent the engine from producing full power. A NO answer means the test passed with no air filter.

NO → GO TO AIR INTAKE/EXHAUST TESTS, Page 2-137

YES

KNOWN INFO
BATTERY AND STARTER CIRCUITS OK
AIR INTAKE/EXHAUST OK
POSSIBLE PROBLEMS
ENGINE DRIVETRAIN FUEL SYSTEM

C2

HAVE YOU RUN THE FUEL SYSTEM TESTS YET?

TEST OPTIONS
FUEL SYSTEM TESTS PAGE 2-95
REASON FOR QUESTION
Many fuel system faults will allow the engine to start and run but prevent it from producing full power.

NO → GO TO FUEL SYSTEM TESTS, Page 2-95

YES


KNOWN INFO
BATTERY AND STARTER CIRCUITS OK
AIR INTAKE/EXHAUST OK
FUEL SYSTEM OK
POSSIBLE PROBLEMS
ENGINE DRIVETRAIN

C3

IF EVERYTHING CHECKS OUT OK TO THIS POINT, THEN YOU PROBABLY HAVE AN ENGINE MECHANICAL PROBLEM THAT CAN'T BE HANDLED AT THIS LEVEL OF MAINTENANCE.


REFERENCE INFORMATION

COMPRESSION / MECHANICAL



If faults are found and corrected go to
STEP 2 of the GO CHAIN.

If no faults are found go to B2,
page 2-150.



If faults are found and corrected go to
STEP 2 of the GO CHAIN.

If no faults are found go to B2,
page 2-150.

2-25. ENGINE COOLING TESTS

These Engine Cooling tests may be run any time you think you have an engine cooling problem or if you were sent here by another test chain. Just follow the path, answering the questions. Additional information and notes are given on the facing page when necessary. Please note that this paragraph is NOT for diagnoses of problems with the temperature sending unit or the gauge.

Once you are sure that the cooling system is OK, run the instruments test in Paragraph 2-32 to find out if the gauge is OK.

Fold-out FO-4 contains a functional diagram of the engine cooling system. This page may be left open for reference while testing.

The engine cooling system is a pressure type cooling system with thermostatic control of coolant circulation. The cooling system dissipates heat generated from combustion and maintains the engine operating temperature at its most efficient level. When the engine is cold and the thermostat is closed, coolant is recirculated through the water pump and engine. As the engine coolant reaches 190°F (87.7°C), the thermostat opens allowing coolant to flow through the radiator before returning to the water pump and engine. Any air or vapor in the cooling system will be forced to the surge tank under the liquid level and leave through a vent tube. As the system cools, the extra coolant in the tank will be drawn back to the radiator. Normally a 50-50 mixture of water and ethylene glycol base antifreeze will be used. The fan is activated when coolant temperature reaches 215°F (102°C). A separate oil cooler is mounted in front of the radiator. This cooler is divided into two parts. The top half is for transmission oil. The bottom half is for engine oil. When the cooling system pressure reaches approximately 15 psi (103 kPa), a valve in the surge tank cap opens and lets excess pressure escape to the atmosphere.

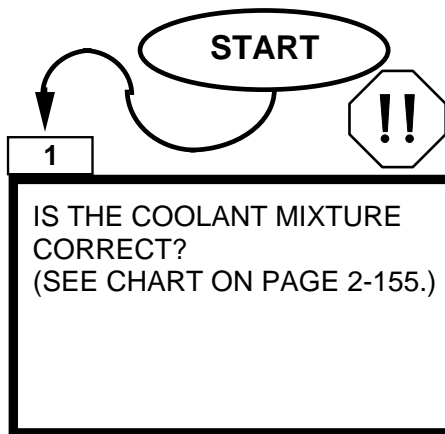
ETHYLENE GLYCOL MIXTURE TABLE

LOWEST EXPECTED AMBIENT TEMPERATURE		ETHYLENE GLYCOL (-60°F, -51.1°C) INHIBITED (MIL-A-46153)		ARCTIC GRADE ANTIFREEZE (-90°F) (-67.7°C) MIL-A-11755
°F	°C	PINTS PER GALLON OF COOLANT CAPACITY	SPECIFIC GRAVITY (68°F) (20°C)	
+20	-6.7	1-1/2	1.022	Freezing point of -90°F (-67.7°C). Issued ready for use and must not be mixed with any other liquid.
+10	-12.2	2	1.036	
0	-17.7	2-3/4	1.047	
-10	-23.3	3-1/4	1.055	
-20	-28.8	3-1/2	1.062	
-30	-34.4	4	1.067	
-40	-40.0	4-1/4	1.073	
-50	-45.5	4-1/2		
-55	-48.3	4-3/4		
BELOW -60	BELOW -51.1	USE ARCTIC GRADE ANTIFREEZE (-90°F) (-67.7°C)		

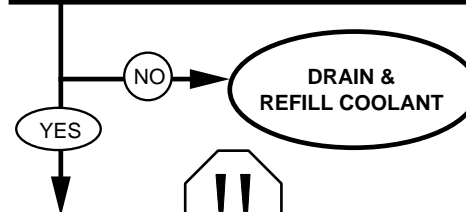
ENGINE COOLING

DIAGNOSTIC FLOWCHART

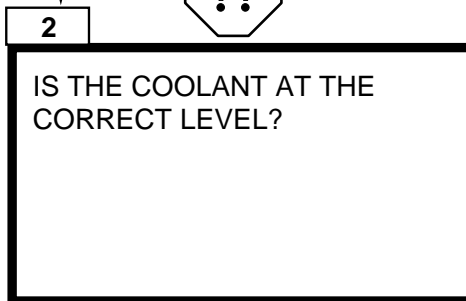
KNOWN INFO
NONE
POSSIBLE PROBLEMS
COOLING COMPONENTS ENGINE FAN BELTS WATER PUMP AND PULLEY



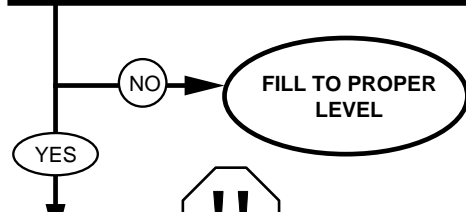
TEST OPTIONS
COOLANT MIXTURE TEST KIT NSN 6630-00-169-1506. COOLANT TESTER NSN 6630-00-105-1418.
REASON FOR QUESTION
The cooling system will not operate properly if the mixture is incorrect.



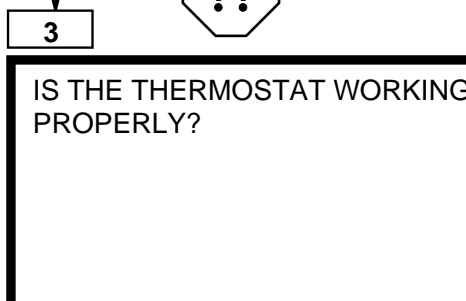
KNOWN INFO
COOLANT QUALITY OK
POSSIBLE PROBLEMS
COOLANT LEVEL COOLING COMPONENTS ENGINE FAN BELTS WATER PUMP AND PULLEY



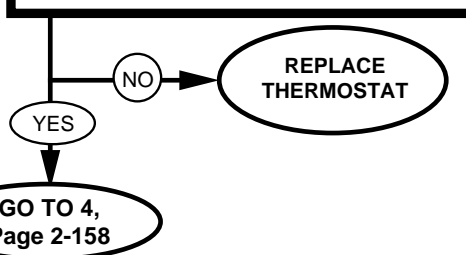
TEST OPTIONS
VISUAL INSPECTION.
REASON FOR QUESTION
Low coolant levels may cause overheating.



KNOWN INFO
COOLANT OK
POSSIBLE PROBLEMS
THERMOSTAT COOLING COMPONENTS ENGINE FAN BELTS WATER PUMP AND PULLEY



TEST OPTIONS
FEEL FOR COOLANT IN UPPER RADIATOR HOSE WHEN ENGINE IS HOT, OR REMOVE THERMOSTAT. EXPOSE IT TO 190°F (88° C) AND SEE IF IT OPENS.
REASON FOR QUESTION
An improperly functioning thermostat can cause operating temperatures that are either too hot or too cold.



REFERENCE INFORMATION

ENGINE COOLING



WARNING

Do not remove surge tank filler cap before releasing internal pressure when engine temperature is above 190 °F (88°C). Steam or hot coolant under pressure will cause injury.

Drain and refill coolant, refer to (para 3-60).



WARNING

Do not remove surge tank filler cap before releasing internal pressure when engine temperature is above 190 °F (88°C). Steam or hot coolant under pressure will cause injury.

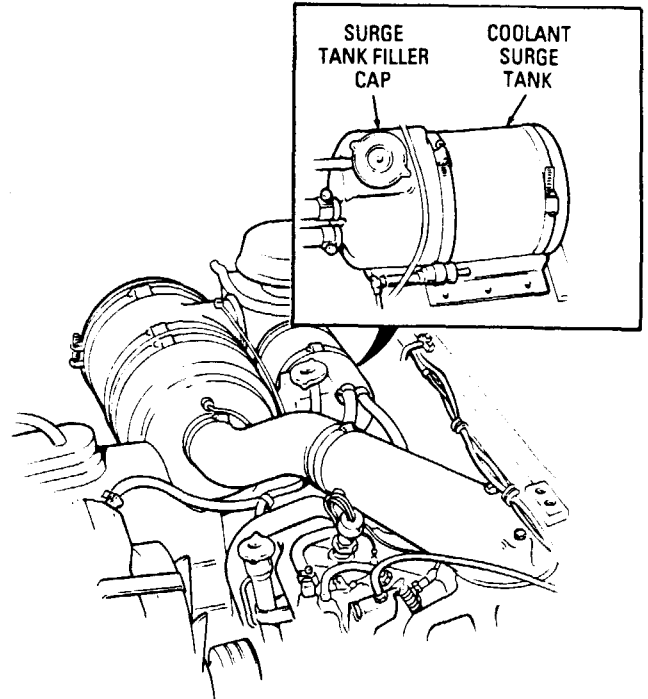
Fill coolant to proper level, refer to (para 3-60).



WARNING

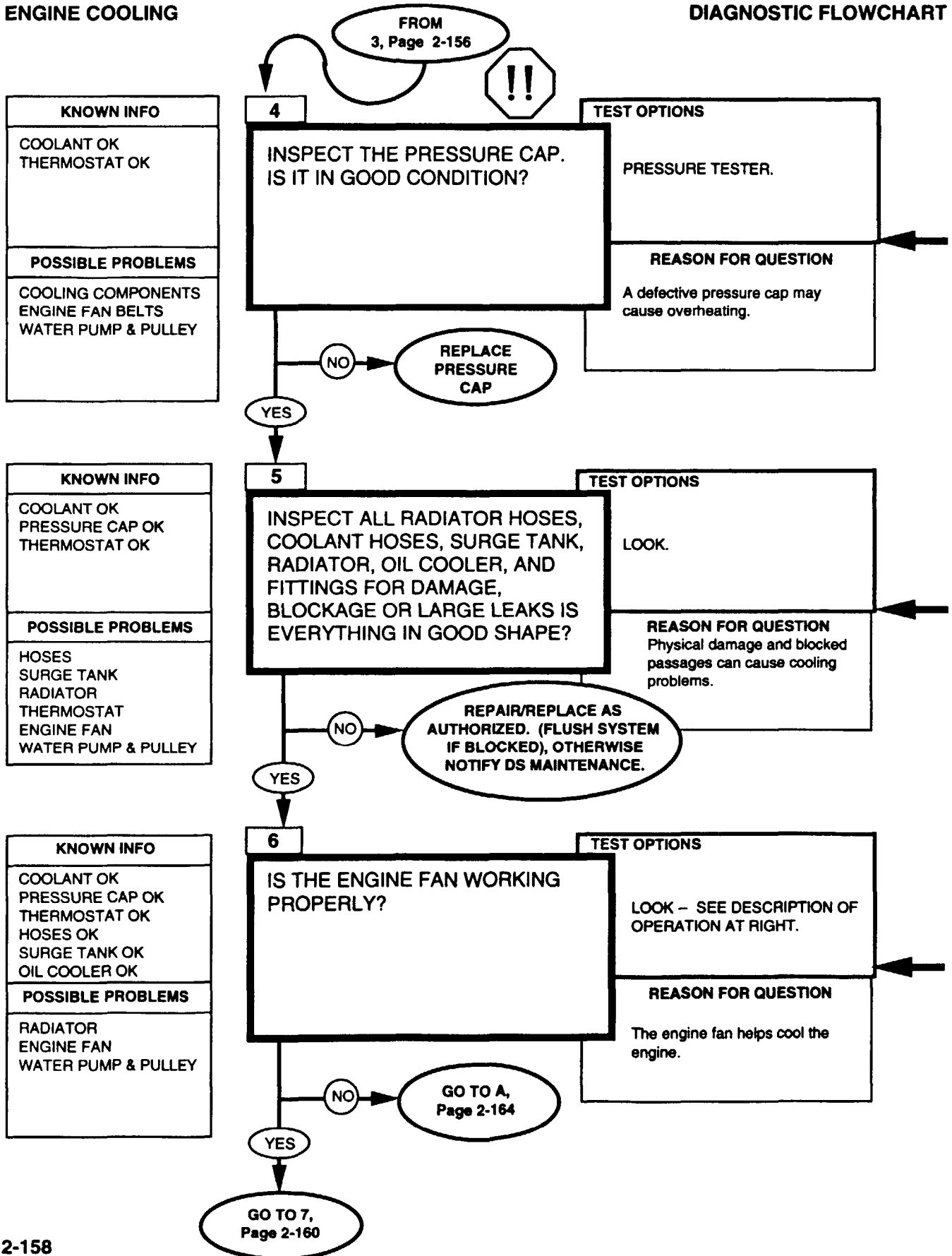
Always use caution when approaching a hot engine. Failure to do so may result in serious burns.

Remove and replace the thermostat, refer to (para 3-75).



ENGINE COOLING

DIAGNOSTIC FLOWCHART



REFERENCE INFORMATION

ENGINE COOLING

**WARNING**

Do not remove surge tank filler cap before releasing internal pressure when engine temperature is above 190 °F (88°C). Steam or hot coolant under pressure will cause injury. Check seal and spring on pressure cap.

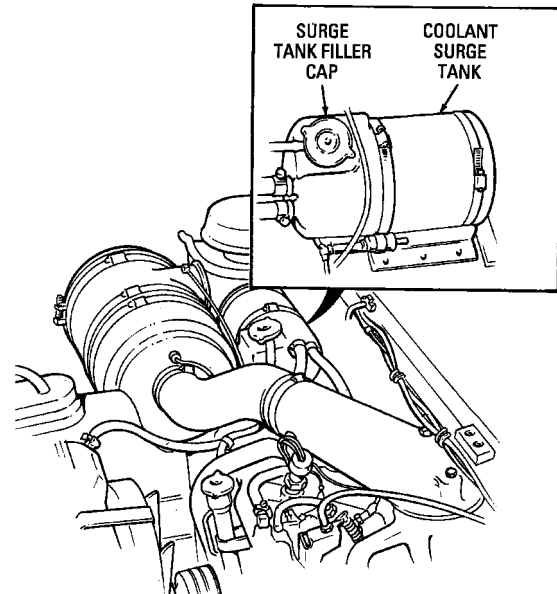
Replace pressure cap, refer to (para. 3-60).

Flush cooling system, refer to (para. 3-60).

For surge tank and radiator support replacement procedures, refer to (paras. 3-63 and 3-64).

For oil cooler and oil cooler hose replacement procedures, refer to (paras. 3-7 and 3-8).

Notify DS maintenance to repair radiators.

**ENGINE COOLING FAN DESCRIPTION OF OPERATION**

An external line from the power steering gear brings hydraulic fluid to the clutch fan solenoid through control valve (normally open) and then to the fan drive, keeping it disengaged. The action of the valve is controlled by the time delay module and the fan temperature switch.

During normal operation, the fan timer switch is closed. This keeps the control valve in the open position and the drive disengaged.

As the engine reaches a temperature of 215°F (102°C), the temperature switch opens and the control valve closes. This engages the fan. If the fan is engaged and the accelerator is floored, the transmission kickdown system disengages the fan drive for 20 seconds.

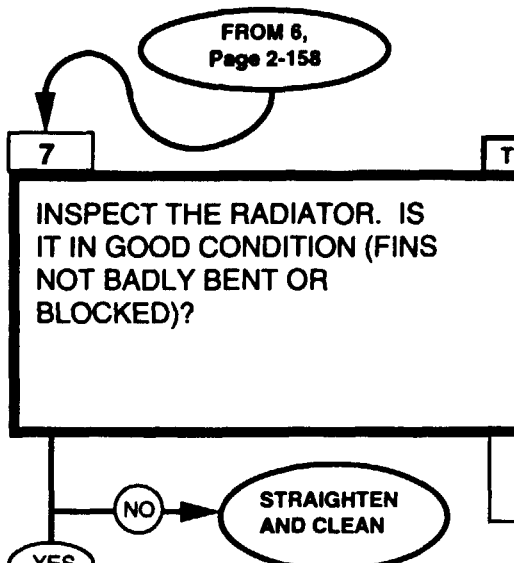
The easiest way to determine if the fan is engaged is to stand outside the driver's door and gently work the accelerator. If the fan is engaged, you will feel a breeze from the engine area. If the fan is not engaged, you won't feel the breeze.

If the vehicle's serial number is 68555 through 72541 or 100000 through 112867, and you see ADCO stamped on top of the time delay module, replace the module with part NSN 5945-01-193-7175, refer to (para. 4-31).

ENGINE COOLING

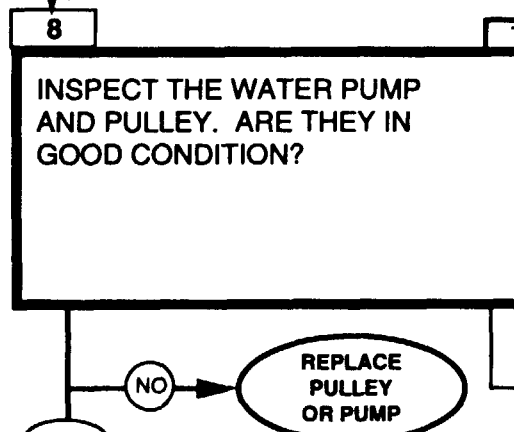
DIAGNOSTIC FLOWCHART

KNOWN INFO
COOLANT OK PRESSURE CAP OK HOSES OK SURGE TANK OK OIL COOLER OK ENGINE FAN OK
POSSIBLE PROBLEMS
RADIATOR WATER PUMP & PULLEY BELTS



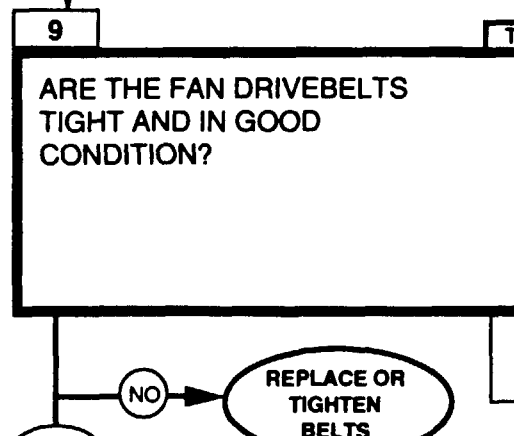
TEST OPTIONS
LOOK.
REASON FOR QUESTION
Bent or blocked fins prevent efficient cooling of the coolant.

KNOWN INFO
COOLANT OK PRESSURE CAP OK RADIATOR/HOSES OK SURGE TANK OK OIL COOLER OK ENGINE FAN OK
POSSIBLE PROBLEMS
WATER PUMP & PULLEY BELTS



TEST OPTIONS
LOOK AND LISTEN.
REASON FOR QUESTION
A bad pulley and water pump won't cool the engine efficiently.

KNOWN INFO
RADIATOR/HOSES OK SURGE TANK OK OIL COOLER OK ENGINE FAN OK PUMP & PULLEY OK
POSSIBLE PROBLEMS
BELTS INTERNAL ENGINE LEAKS



TEST OPTIONS
VISUAL INSPECTION. USE BELT TENSION GAUGE.
REASON FOR QUESTION
Loose belts will not drive the fan properly.

GO TO 10, Page 2-162

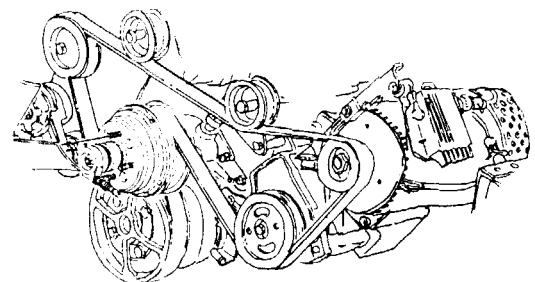
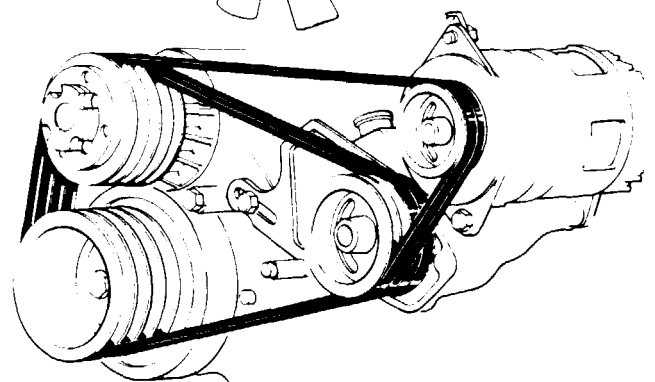
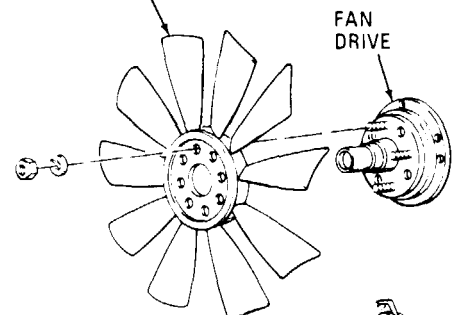
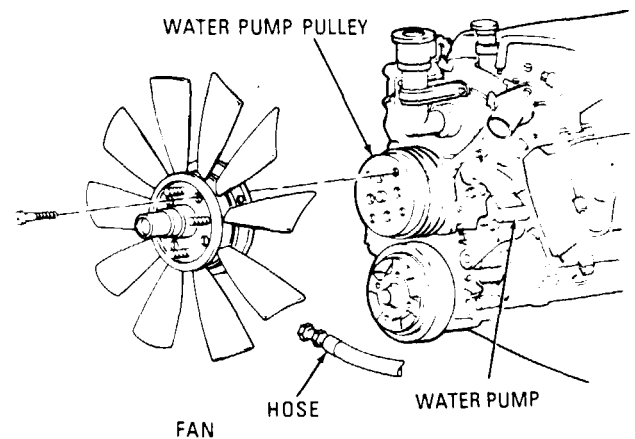
REFERENCE INFORMATION

ENGINE COOLING

Listen for noisy bearings in the water pump, or an in and out motion to the fan. You can also check the pump and pulley by trying to move it in and out or laterally with the engine off.

Replace the water pump pulley, refer to (para 3-76). A bad water pump needs to be replaced by DS maintenance.

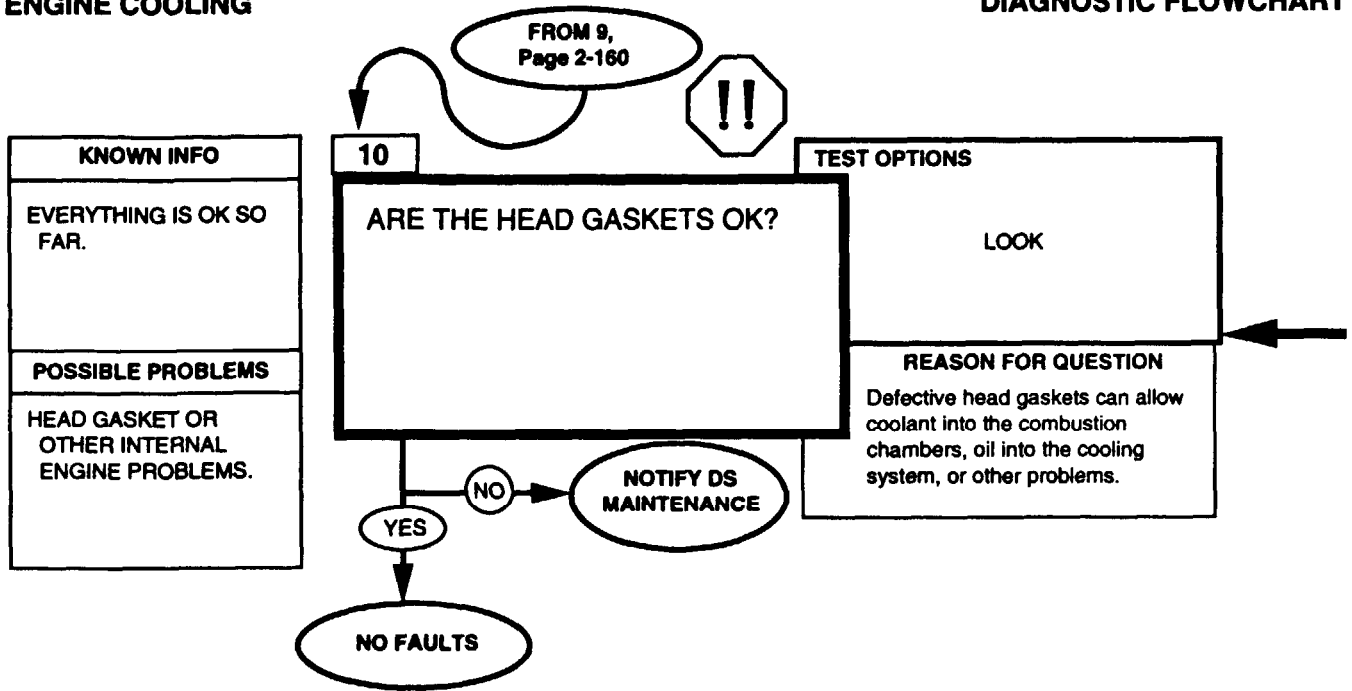
Replace belts, refer to (para. 3-81, all except "A2" vehicles) (para. 3-83, "A2" vehicles) or tighten belts, refer to (para. 3-82, all except "A2" vehicles).



**"A2"
CONFIGURATION**

ENGINE COOLING

DIAGNOSTIC FLOWCHART



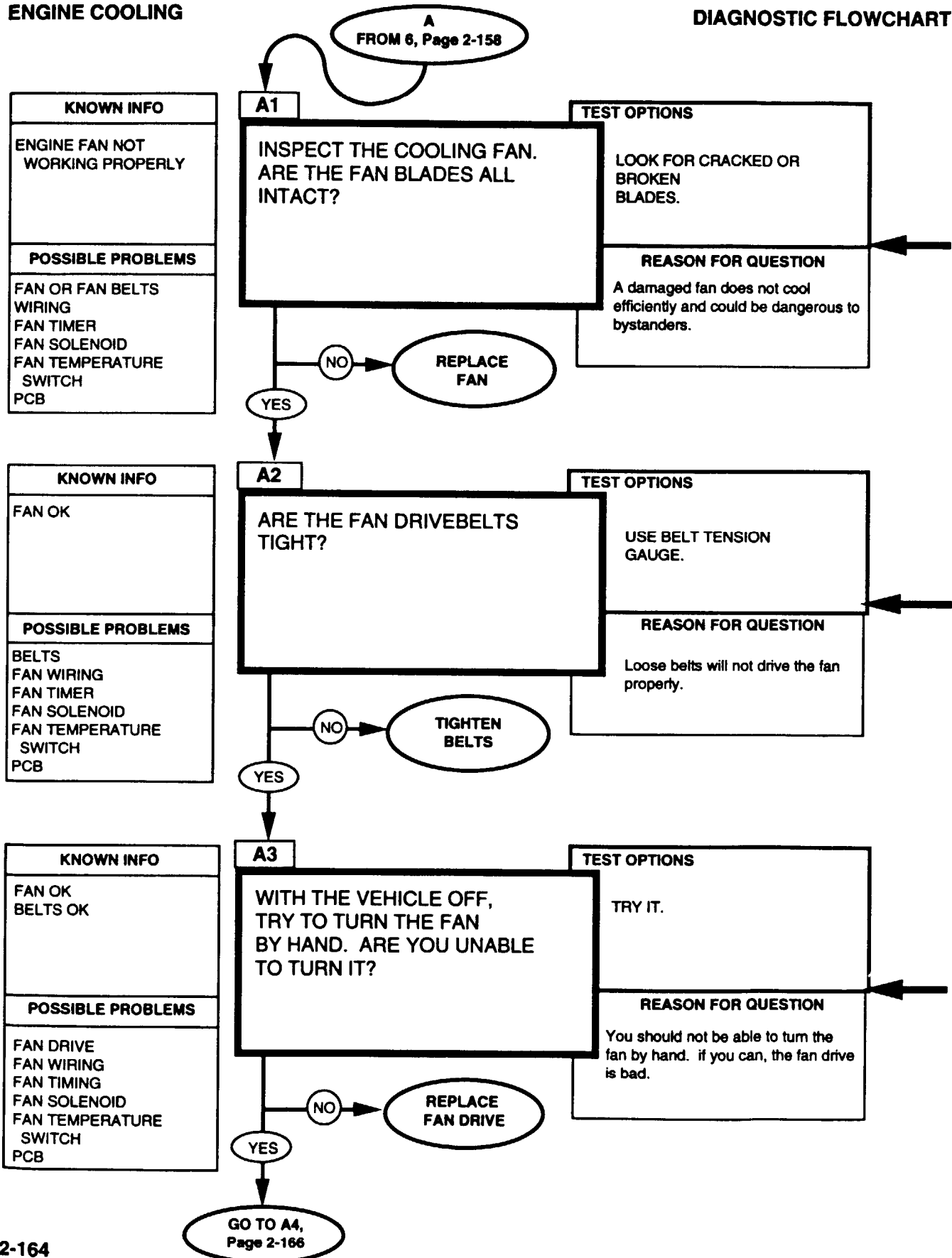
REFERENCE INFORMATION**ENGINE COOLING****WARNING**

Always use caution when approaching a hot engine. Failure to do so may result in serious burns.

Look for excessive white exhaust smoke, steam leaks in the engine compartment oil in the coolant. Other signs include excess condensation in the exhaust system, or white joints in the exhaust system. You can also feel the coolant hoses to see if they have high pressure caused by leaking combustion gasses. Also, if the glowplugs turn off very quickly after starting the engine, or if the engine overheats, or has excessive coolant consumption, you may have a head gasket problem.

ENGINE COOLING

DIAGNOSTIC FLOWCHART



REFERENCE INFORMATION

ENGINE COOLING

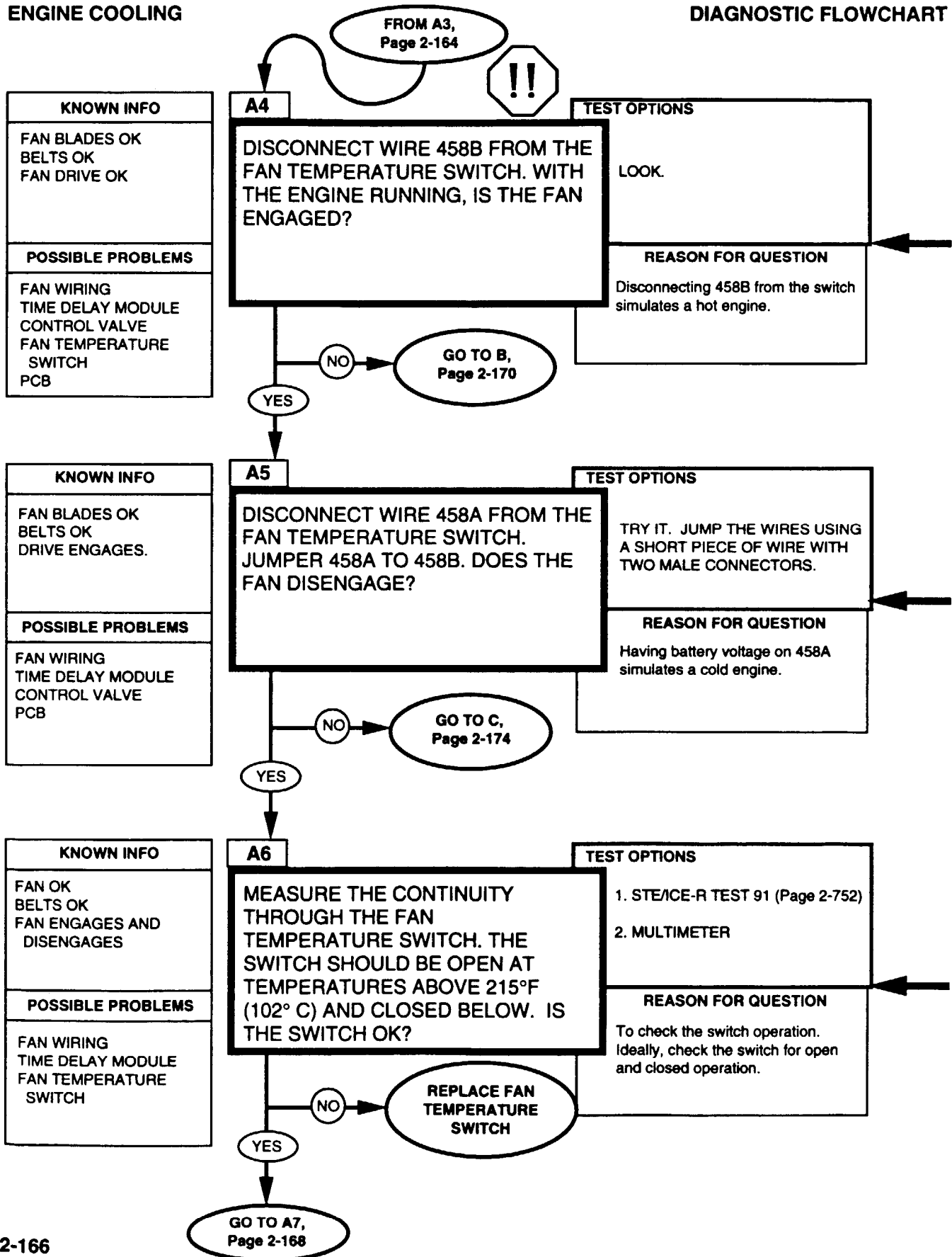
Replace fan, refer to (para 3-78).

Tighten belts, refer to (para 3-82)
(All except "A2" vehicles).

Replace fan drive, refer to (para 3-78).
A YES answer to this question means
that you were not able to turn the fan
by hand.

ENGINE COOLING

DIAGNOSTIC FLOWCHART



REFERENCE INFORMATION

ENGINE COOLING



WARNING

Keep hands and arms away from fan blades and drive belts when engine is running or serious injury may result.

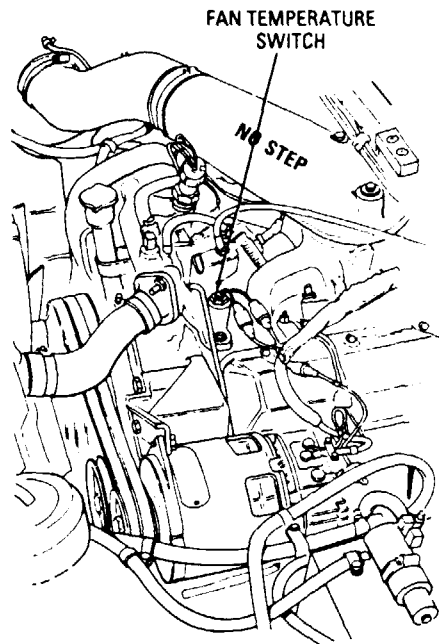
See page 2-159 for a description of the operation of the fan system and an easy way to tell if it's engaged or not.

See page 2-159 for a description of the operation of the fan system and an easy way to tell if it's engaged or not.

If you know the engine is cold and the fan temperature switch is good, you can reconnect 458B to the switch and see if the fan disengages.

Replace the switch, refer to (para 4-30).

You can also remove the switch to test it hot and cold.



**0-4500 OHMS
STE/ICE-R TEST 91**

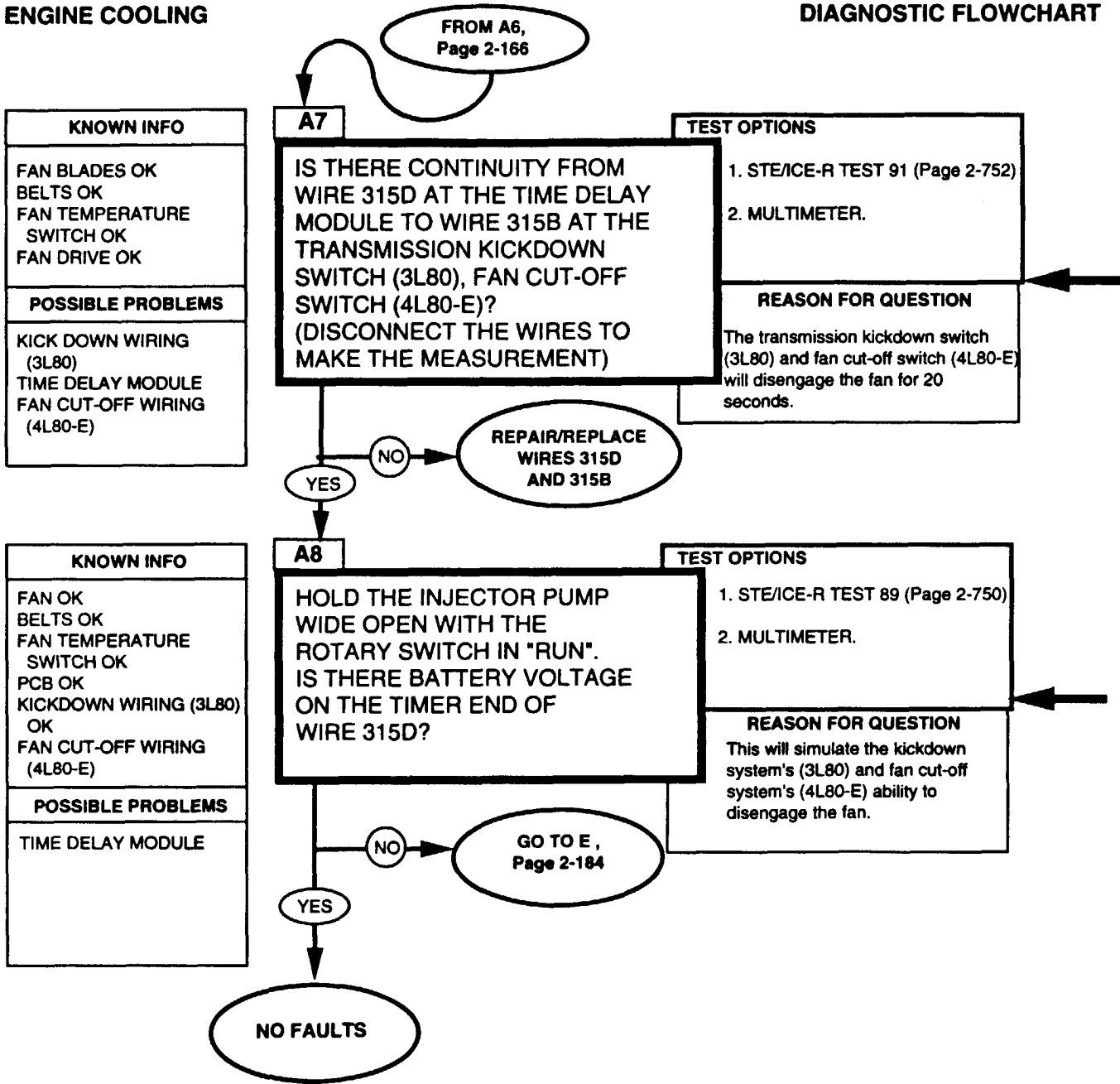
1. Connect RED clip and BLACK clip to the terminations indicated in the question. RED to the first, BLACK to the second.
2. Start Test 91, 0-4500 ohms.
3. Displayed reading is in ohms. Less than 5 ohms is continuity. If the resistance is over 4500 ohms, STE/ICE displays "9.9.9.9."

**CONTINUITY (RESISTANCE)
MULTIMETER**

1. Set the voltmeter to an ohms scale of about 1000 ohms.
2. Connect the RED and BLACK leads to the connections stated in the question.
3. Be sure to read the correct scale. Less than 5 ohms indicates continuity. For an open circuit, the meter should peg full scale (needle all the way to the left).

ENGINE COOLING

DIAGNOSTIC FLOWCHART



REFERENCE INFORMATION

ENGINE COOLING

**CONTINUITY (RESISTANCE)
MULTIMETER**

1. Set the voltmeter to an ohms scale of about 1000 ohms.
2. Connect the RED and BLACK leads to the connections stated in the question.
3. Be sure to read the correct scale. Less than 5 ohms indicates continuity. For an open circuit, the meter should peg full scale (needle all the way to the left).

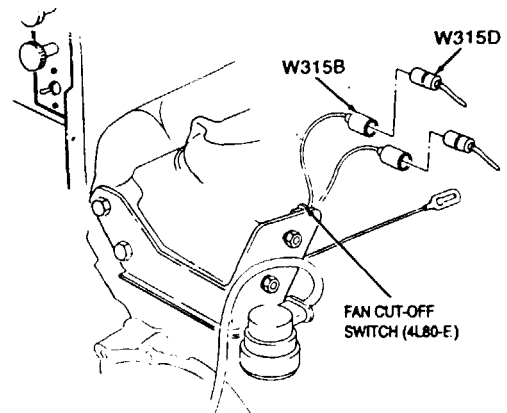
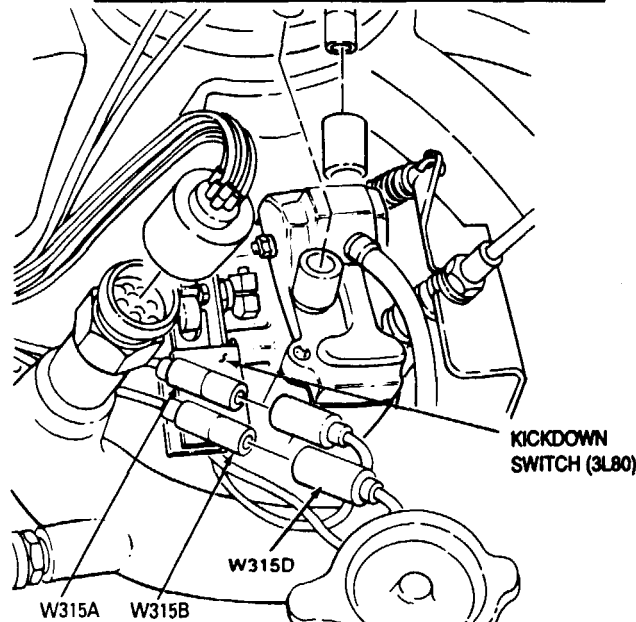
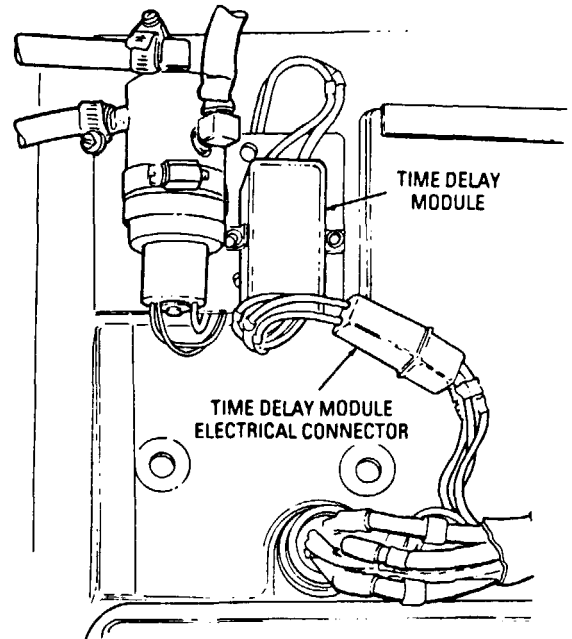
**0-4500 OHMS
STE/ICE-R TEST 91**

1. Connect RED clip and BLACK clip to the terminations indicated in the question. RED to the first, BLACK to the second.
2. Start Test 91, 0-4500 ohms.
3. Displayed reading is in ohms. Less than 5 ohms is continuity. If the resistance is over 4500 ohms, STE/ICE displays "9.9.9.9."

Disconnect the four-way connector at the time delay module and measure the voltage on wire 315D.

**0-45 DC VOLTS
STE/ICE-R TEST 89**

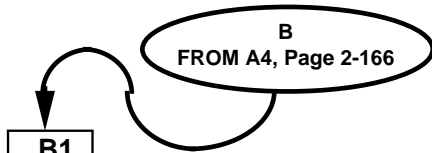
1. Connect RED clip to the indicated test point, BLACK clip to negative or ground.
2. Start Test 89, DC volts.
3. Displayed reading is in volts.



ENGINE COOLING

DIAGNOSTIC FLOWCHART

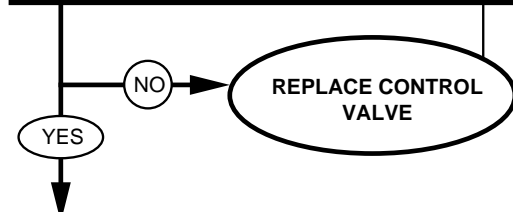
KNOWN INFO
FAN DRIVE OK FAN DOESN'T ENGAGE VIA WIRE 458
POSSIBLE PROBLEMS
FAN WIRING TIME DELAY MODULE FAN CONTROL VALVE PCB/DISTRIBUTION BOX



B1

DISCONNECT THE CONTROL VALVE ELECTRICAL CONNECTOR AT THE TIME DELAY MODULE. DOES THE FAN ENGAGE?

TEST OPTIONS
TRY IT.
REASON FOR QUESTION
With no power to the solenoid, the fan should engage.

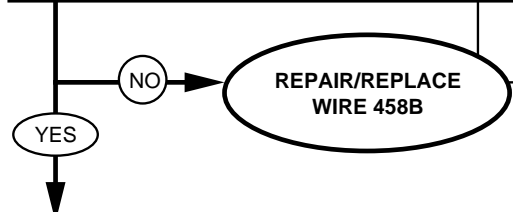


KNOWN INFO
FAN ENGAGES CONTROL VALVE OK
POSSIBLE PROBLEMS
WIRING

B2

DISCONNECT THE 4-WIRE CONNECTOR AT THE TIME DELAY MODULE. IS THERE CONTINUITY FROM 458B AT THE 4-WIRE HARNESS TO 458B AT THE FAN TEMPERATURE SWITCH?

TEST OPTIONS
1. STE/ICE-R TEST 91 (Page 2-752) 2. MULTIMETER
REASON FOR QUESTION
Wire 458B connects the switch and the timer.

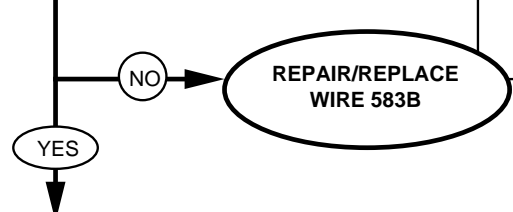


KNOWN INFO
FAN ENGAGES CONTROL VALVE OK
POSSIBLE PROBLEMS
WIRING

B3

WITH THE ROTARY SWITCH ON "RUN," IS THERE BATTERY VOLTAGE AT THE HARNESS SIDE OF WIRE 583B IN THE 4-WAY CONNECTOR OF THE TIME DELAY MODULE?

TEST OPTIONS
1. STE/ICE-R TEST 89 (Page 2-750) 2. MULTIMETER
REASON FOR QUESTION
Wire 583B connects battery voltage to the delay module.



GO TO B4,
Page 2-172

REFERENCE INFORMATION

ENGINE COOLING

**0-4500 OHMS
STE/ICE-R TEST 91**

1. Connect RED clip and BLACK clip to the terminations indicated in the question. RED to the first, BLACK to the second.
2. Start Test 91, 0-4500 ohms.
3. Displayed reading is in ohms. Less than 5 ohms is continuity. If the resistance is over 4500 ohms, STE/ICE displays "9.9.9.9."

**CONTINUITY (RESISTANCE)
MULTIMETER**

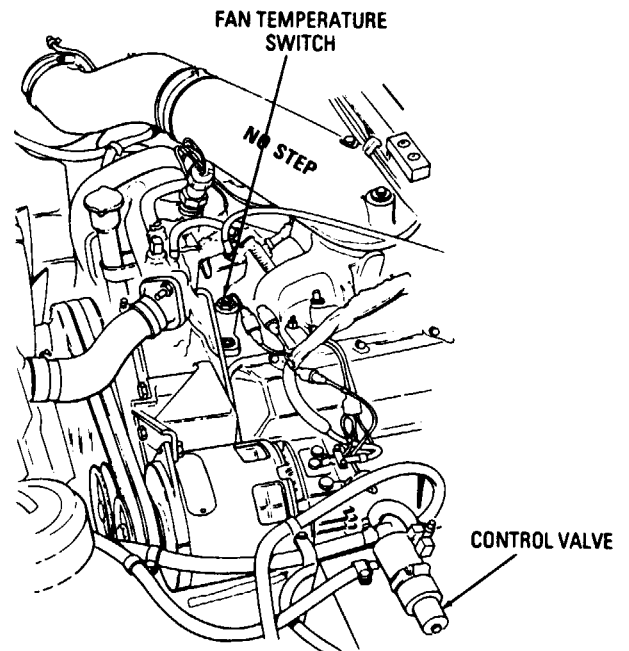
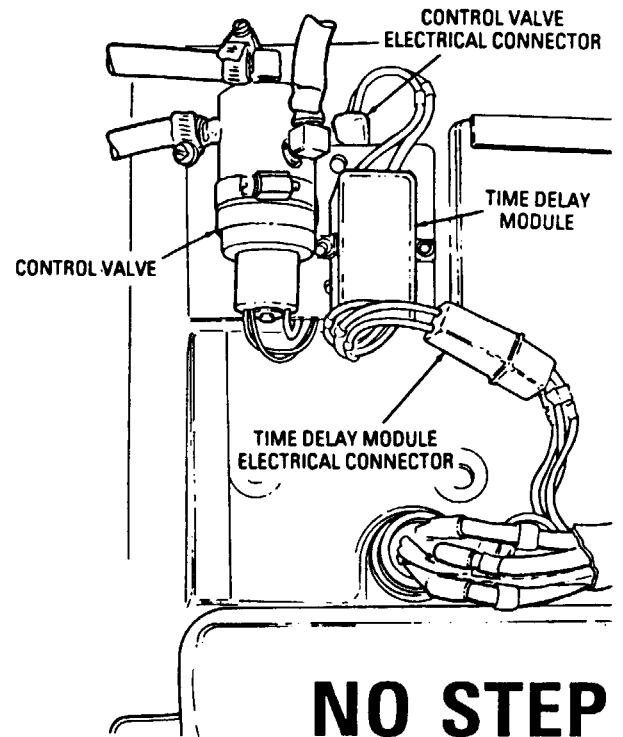
1. Set the voltmeter to an ohms scale of about 1000 ohms.
2. Connect the RED and BLACK leads to the connections stated in the question.
3. Be sure to read the correct scale. Less than 5 ohms indicates continuity. For an open circuit, the meter should peg full scale (needle all the way to the left).

**0-45 DC VOLTS
STE/ICE-R TEST 89**

1. Connect RED clip to the indicated test point, BLACK clip to negative or ground.
2. Start Test 89, DC volts.
3. Displayed reading is in volts.

**VOLTAGE
MULTIMETER**

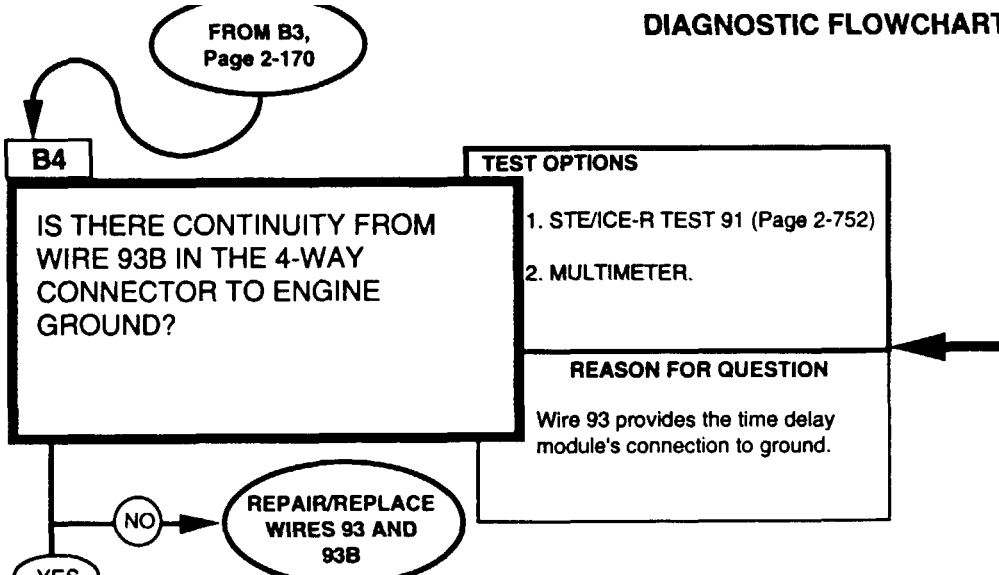
1. Set the voltmeter to a DC volts scale of at least 40 volts.
2. Connect the RED lead to positive and the BLACK lead to negative.
3. Be sure to read the correct scale.



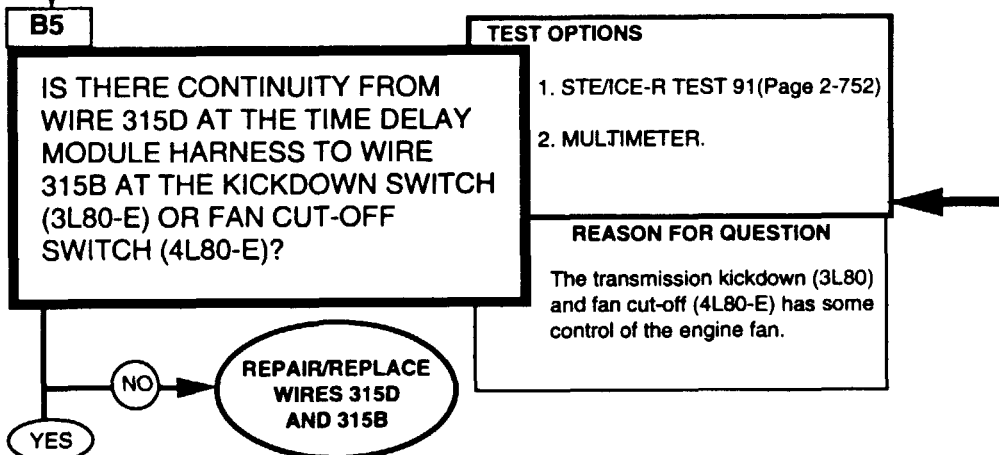
ENGINE COOLING

DIAGNOSTIC FLOWCHART

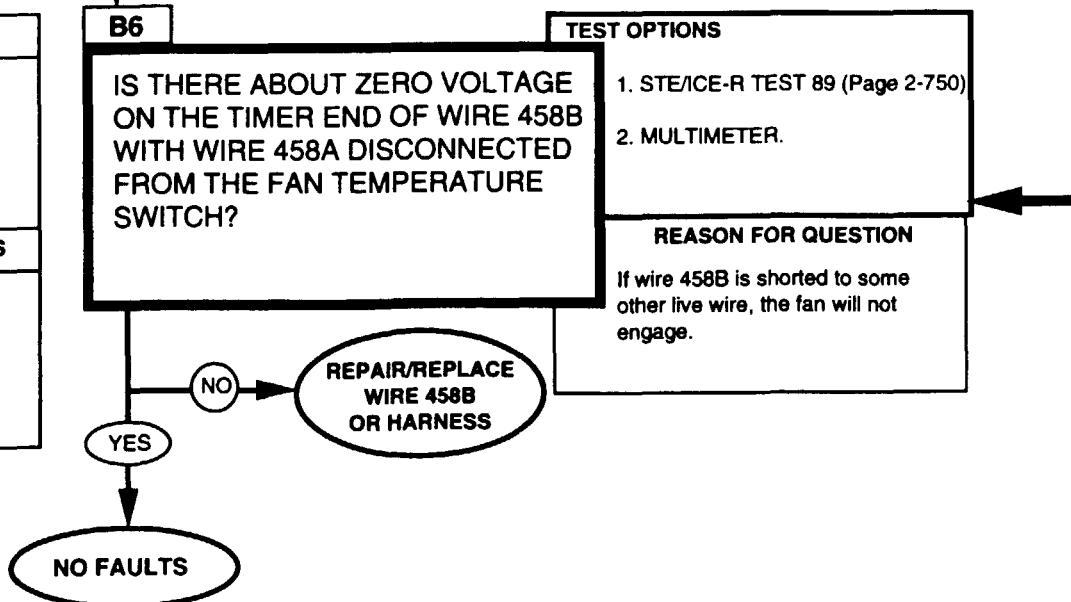
KNOWN INFO
FAN ENGAGES CONTROL VALVE OK
POSSIBLE PROBLEMS
WIRING



KNOWN INFO
FAN ENGAGES CONTROL VALVE OK
POSSIBLE PROBLEMS
WIRING



KNOWN INFO
FAN ENGAGES CONTROL VALVE OK
POSSIBLE PROBLEMS
WIRING



REFERENCE INFORMATION

ENGINE COOLING

**0-4500 OHMS
STE/ICE-R TEST 91**

1. Connect RED clip and BLACK clip to the terminations indicated in the question. RED to the first, BLACK to the second.
2. Start Test 91, 0-4500 ohms.
3. Displayed reading is in ohms. Less than 5 ohms is continuity. If the resistance is over 4500 ohms, STE/ICE displays "9.9.9.9."

**CONTINUITY (RESISTANCE)
MULTIMETER**

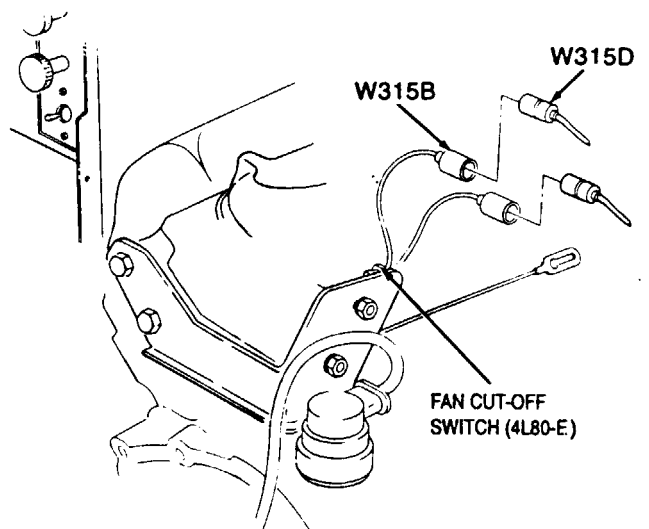
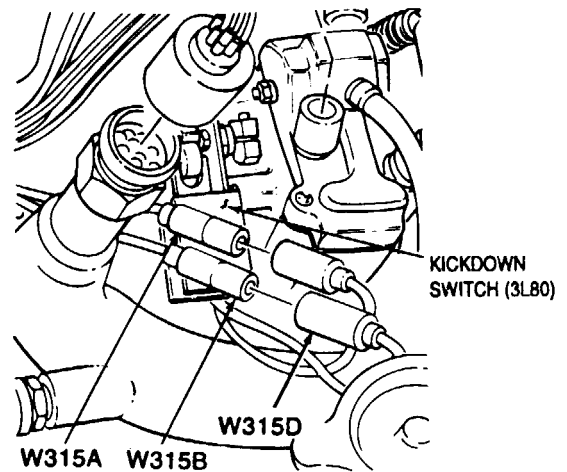
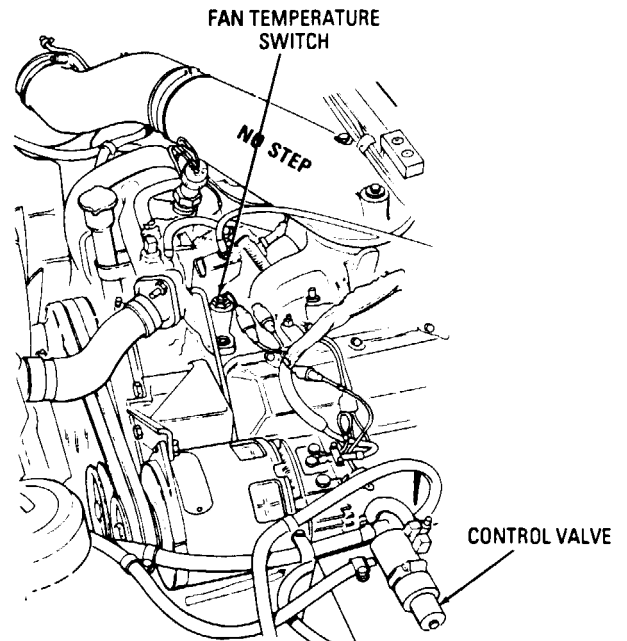
1. Set the voltmeter to an ohms scale of about 1000 ohms.
2. Connect the RED and BLACK leads to the connections stated in the question.
3. Be sure to read the correct scale. Less than 5 ohms indicates continuity. For an open circuit, the meter should peg full scale (needle all the way to the left).

**0-45 DC VOLTS
STE/ICE-R TEST 89**

1. Connect RED clip to the indicated test point, BLACK clip to negative or ground.
2. Start Test 89, DC volts.
3. Displayed reading is in volts.

**VOLTAGE
MULTIMETER**

1. Set the voltmeter to a DC volts scale of at least 40 volts.
2. Connect the RED lead to positive and the BLACK lead to negative.
3. Be sure to read the correct scale.



ENGINE COOLING

DIAGNOSTIC FLOWCHART

KNOWN INFO
DRIVE OK FAN ENGAGES BUT WON'T DISENGAGE
POSSIBLE PROBLEMS
PCB/DISTRIBUTION BOX TIME DELAY MODULE WIRING HYDRAULIC SYSTEM

C1

REMOVE THE JUMPER BETWEEN WIRE 458A AND WIRE 458B. TURN THE ROTARY SWITCH TO THE "RUN" POSITION. DOES WIRE 458A HAVE BATTERY VOLTAGE?

TEST OPTIONS

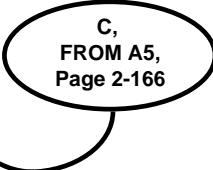
- STE/ICE-R TEST 89 (Page 2-750)
- MULTIMETER

REASON FOR QUESTION

Wire 458A connects battery voltage to the switch.

YES →

NO → GO TO D, Page 2-182



KNOWN INFO
DRIVE OK FAN ENGAGES BUT WON'T DISENGAGE
POSSIBLE PROBLEMS
PCB/DISTRIBUTION BOX TIME DELAY MODULE WIRING HYDRAULIC SYSTEM

C2

IS THERE CONTINUITY FROM WIRE 458B AT THE HARNESS SIDE OF THE TIME DELAY MODULE 4-WAY CONNECTOR TO WIRE 458B AT THE FAN TEMPERATURE SWITCH?

TEST OPTIONS

- STE/ICE-R TEST 91 (Page 2-752)
- MULTIMETER

REASON FOR QUESTION

Wire 458B connects the switch and the time delay module.

YES →

NO → REPAIR/REPLACE WIRES 458 & 458B

KNOWN INFO
DRIVE OK FAN ENGAGES BUT WON'T DISENGAGE
POSSIBLE PROBLEMS
PCB/DISTRIBUTION BOX TIME DELAY MODULE WIRING HYDRAULIC SYSTEM

C3

TURN THE ROTARY SWITCH TO RUN. IS THERE BATTERY VOLTAGE AT THE HARNESS SIDE OF WIRE 583B IN THE 4-WAY CONNECTOR OF THE TIME DELAY MODULE?

TEST OPTIONS

- STE/ICE-R TEST 89 (Page 2-750)
- MULTIMETER

REASON FOR QUESTION

Wire 583B connects battery voltage to the time delay module.

YES →

NO → REPAIR/REPLACE WIRE 583B



REFERENCE INFORMATION

ENGINE COOLING

**0-45 DC VOLTS
STE/ICE-R TEST 89**

1. Connect RED clip to the indicated test point, BLACK clip to negative or ground.
2. Start Test 89, DC volts.
3. Displayed reading is in volts.

**VOLTAGE
MULTIMETER**

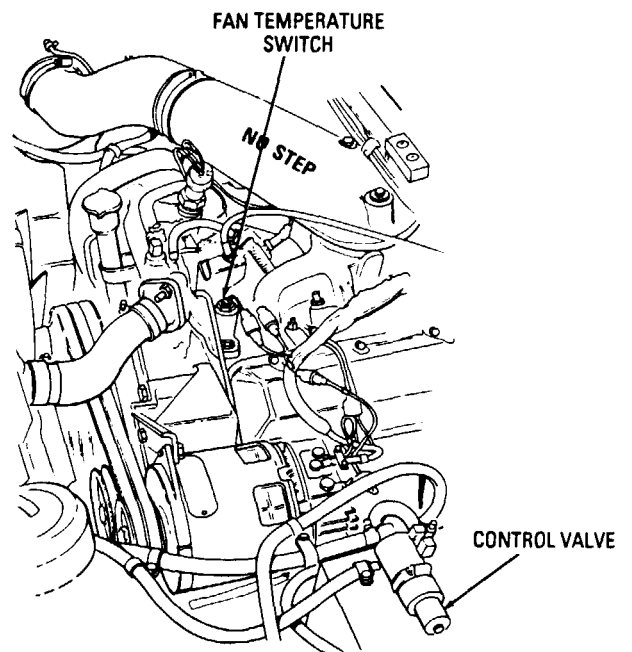
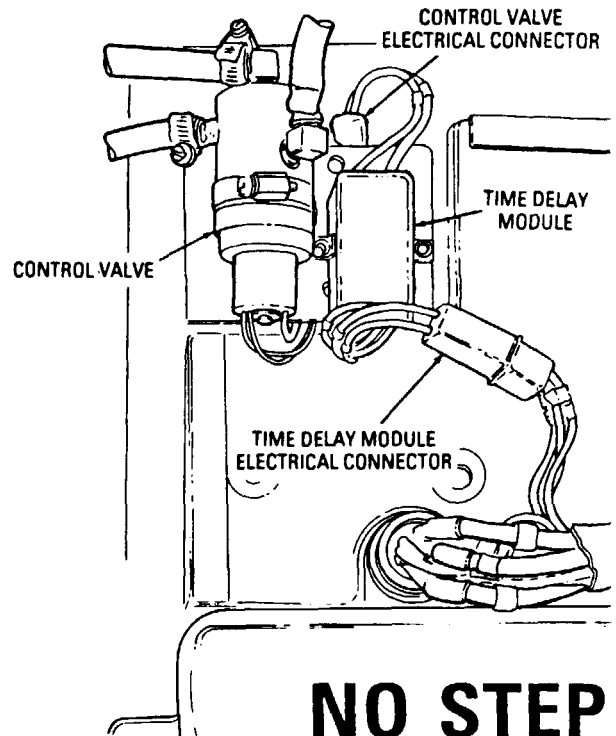
1. Set the voltmeter to a DC volts scale of at least 40 volts.
2. Connect the RED lead to positive and the BLACK lead to negative.
3. Be sure to read the correct scale.

**0-4500 OHMS
STE/ICE-R TEST 91**

1. Connect RED clip and BLACK clip to the terminations indicated in the question. RED to the first, BLACK to the second.
2. Start Test 91, 0-4500 ohms.
3. Displayed reading is in ohms. Less than 5 ohms is continuity. If the resistance is over 4500 ohms, STE/ICE displays "9.9.9.9."

**CONTINUITY (RESISTANCE)
MULTIMETER**

1. Set the voltmeter to an ohms scale of about 1000 ohms.
2. Connect the RED and BLACK leads to the connections stated in the question.
3. Be sure to read the correct scale. Less than 5 ohms indicates continuity. For an open circuit, the meter should peg full scale (needle all the way to the left).



ENGINE COOLING

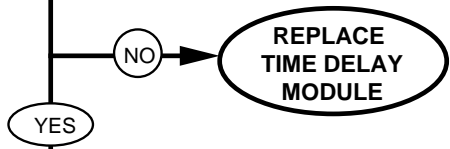
DIAGNOSTIC FLOWCHART

KNOWN INFO
ENGINE COOLANT TEMPERATURE BELOW NORMAL (215°F) (102°C)
POSSIBLE PROBLEMS
TIME DELAY MODULE

C3.1

TURN THE ROTARY SWITCH TO "RUN" POSITION. MEASURE THE VOLTAGE AT WIRE 583 ON THE 2-WAY HARNESS OF THE TIME DELAY MODULE (DO NOT DISCONNECT HARNESS). IS THERE BATTERY VOLTAGE?

TEST OPTIONS
MULTIMETER
REASON FOR QUESTION
WIRE 583 SHOULD INDICATE BATTERY VOLTAGE.

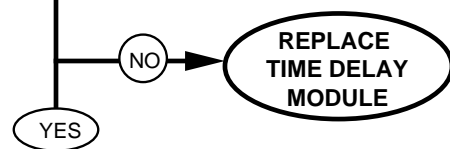


KNOWN INFO
ENGINE COOLANT TEMPERATURE BELOW NORMAL (215°F) (102°C)
POSSIBLE PROBLEMS
TIME DELAY MODULE

C3.2

MEASURE THE VOLTAGE AT WIRE 93 ON THE 2-WIRE HARNESS OF THE TIME DELAY MODULE (DO NOT DISCONNECT HARNESS). IS THERE BATTERY VOLTAGE?

TEST OPTIONS
MULTIMETER
REASON FOR QUESTION
WIRE 93 SHOULD INDICATE 0 VOLTAGE.

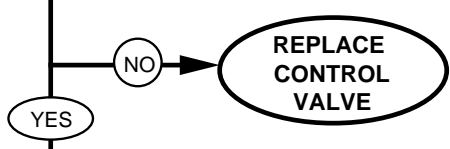


KNOWN INFO
FAN DRIVE OK FAN WON'T DISENGAGE
POSSIBLE PROBLEMS
TIME DELAY MODULE WIRING CONTROL VALVE HYDRAULIC SYSTEM

C4

DISCONNECT THE 2-WIRE COUPLING AT THE TIMER. MEASURE THE RESISTANCE THROUGH THE CONTROL VALVE ELECTRICAL CONNECTOR. IS IT ABOUT 65 OHMS?

TEST OPTIONS
MULTIMETER – WITH AN ANALOG MULTIMETER, YOU MAY GET 65 TO 100 OHMS ONE WAY AND UNDER 30 OHMS THE OTHER WAY. THIS IS OK.
REASON FOR QUESTION
The need to check out the windings in the control valve to see if they're OK.



GO TO C5, Page 2-178

REFERENCE INFORMATION

ENGINE COOLING

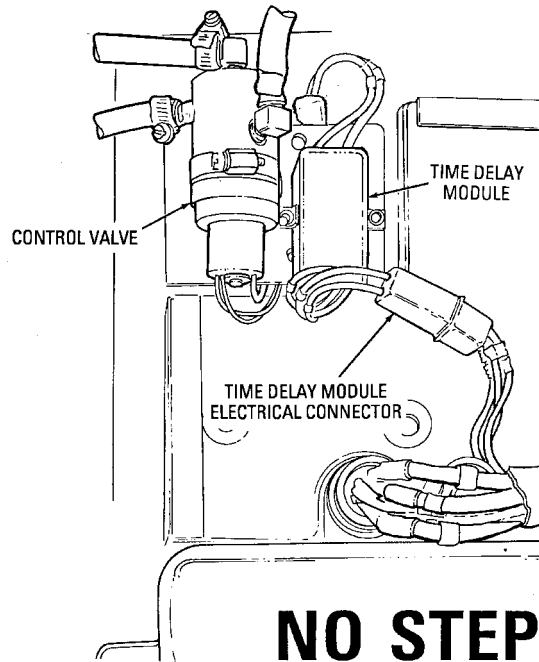
Replace time delay module, refer to (para. 4-31).

Replace time delay module, refer to (para. 4-31).

When checking coil resistance, use an analog type multimeter.

For an accurate ohms reading, perform this check when the system is at room temperature. Heat will increase resistance, resulting in a higher ohms reading.

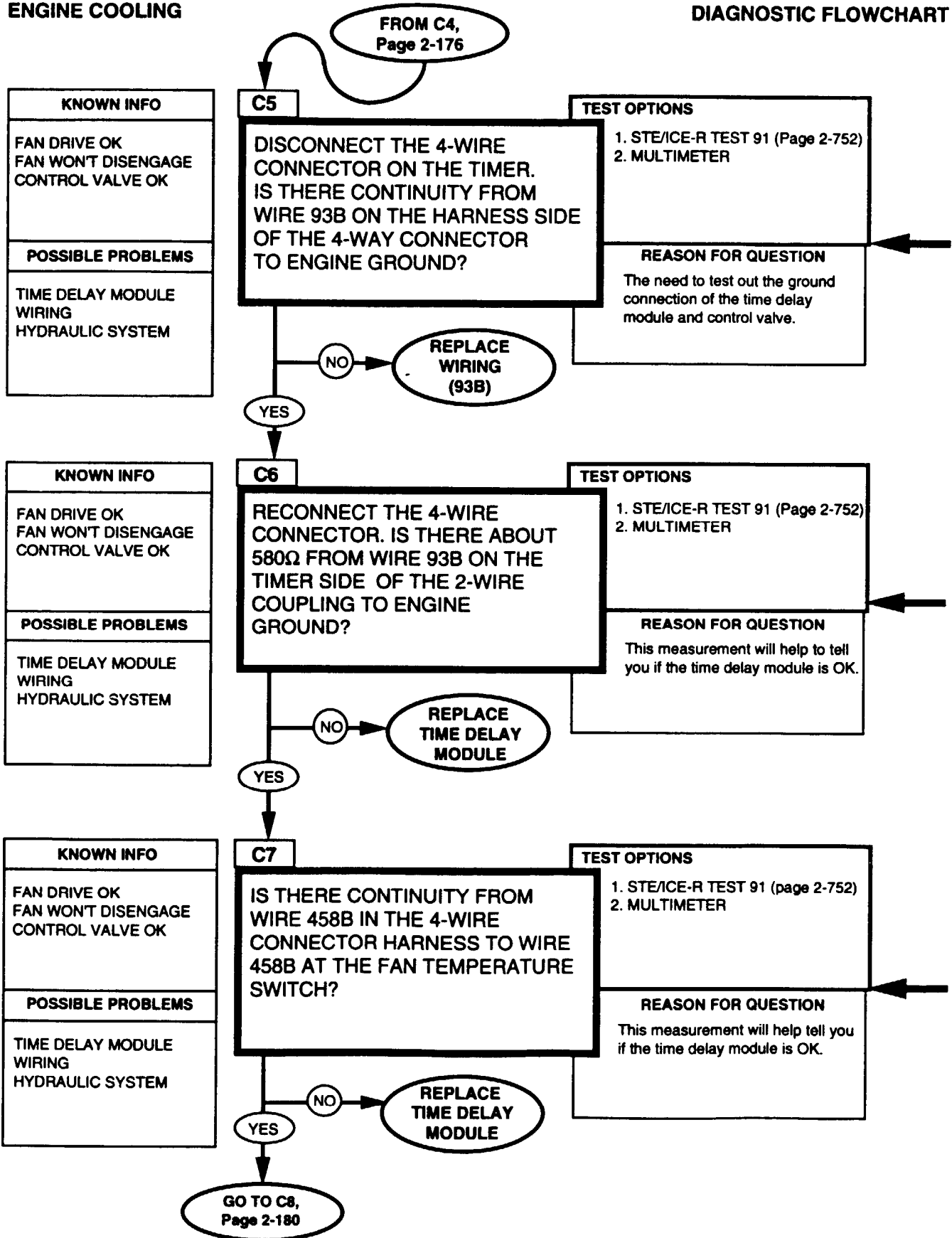
Replace the control valve, refer to (para. 8-26).



CONTINUITY (RESISTANCE) MULTIMETER
<p>1. Set the voltmeter to an ohms scale of about 1000 ohms.</p> <p>2. Connect the RED and BLACK leads to the connections stated in the question.</p> <p>3. Be sure to read the correct scale. Less than 5 ohms indicates continuity. For an open circuit, the meter should peg full scale (needle all the way to the left).</p>

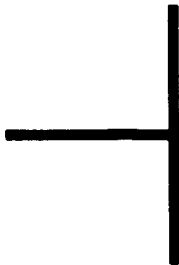
ENGINE COOLING

DIAGNOSTIC FLOWCHART



REFERENCE INFORMATION

ENGINE COOLING



Repair wire refe to (para. 4-85) or notify DS maintenance.

<p>0-4500 OHMS STE/ICE-R TEST 91</p>
<p>1. Connect RED clip and BLACK clip to the terminations indicated in the question. RED to the first, BLACK to the second.</p> <p>2. Start Test 91, 0-4500 ohms.</p> <p>3. Displayed reading is in ohms. Less than 5 ohms is continuity. If the resistance is over 4500 ohms, STE/ICE displays "9.9.9.9."</p>

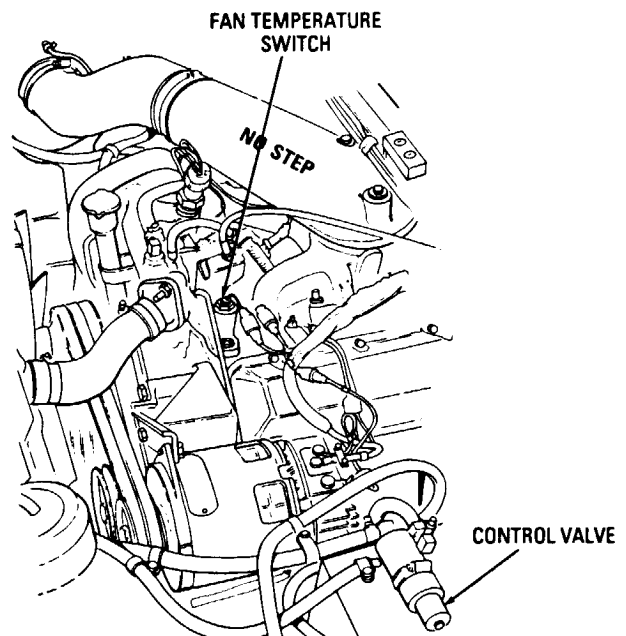


Replace the time delay rmodule, refer to (para 4-31).

<p>CONTINUITY (RESISTANCE) MULTIMETER</p>
<p>1. Set the voltmeter to an ohms scale of about 1000 ohms.</p> <p>2. Connect the RED and BLACK leads to the connections stated in the question.</p> <p>3. Be sure to read the correct scale. Less than 5 ohms indicates continuity. For an open circuit the meter should peg full scale (needle all the way to the left).</p>



Replace the time delay module, refer to (para 4-31).



ENGINE COOLING

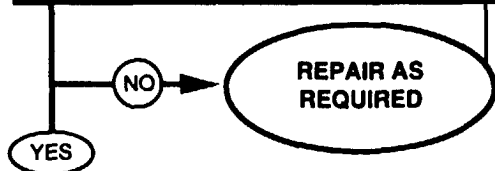
DIAGNOSTIC FLOWCHART

KNOWN INFO
FAN WON'T DISENGAGE WIRING OK
POSSIBLE PROBLEMS
LOW POWER STEERING PRESSURE LEAKS CONTROL VALVE



C8
LOOK FOR LEAKY HOSES GOING TO AND FROM THE CONTROL VALVE AND FAN DRIVE. ARE ALL OF THE HOSES LEAK-FREE?

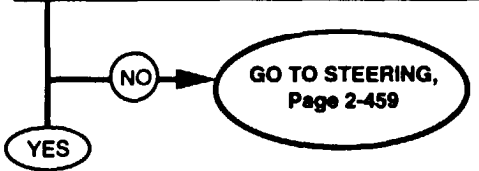
TEST OPTIONS
VISUAL INSPECTION.
REASON FOR QUESTION
Leaky hydraulic hoses may prevent the drive from disengaging.



KNOWN INFO
FAN WON'T DISENGAGE WIRING OK HOSES ARE LEAK-FREE
POSSIBLE PROBLEMS
LOW POWER STEERING PRESSURE CONTROL VALVE

C9
IS THE PRESSURE IN THE CONTROL VALVE SUPPLY HOSE AT LEAST 90 PSI?

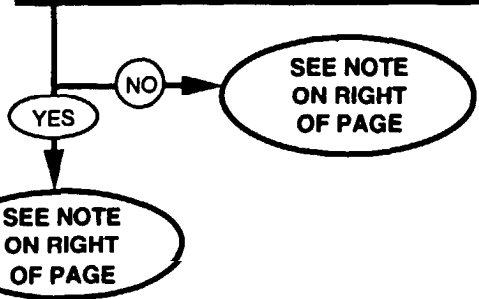
TEST OPTIONS
1. STE/ICE-R TEST 50 (Page 2-739) 2. PRESSURE GAUGE.
REASON FOR QUESTION
90 PSI is the minimum required to disengage the drive.



KNOWN INFO
FAN WON'T DISENGAGE WIRING OK HOSES ARE LEAK-FREE
POSSIBLE PROBLEMS
LOW POWER STEERING PRESSURE CONTROL VALVE FAN DRIVE

C10
CONNECT BOTH TIME DELAY MODULE ELECTRICAL CONNECTORS, JUMPER 458A TO 458B. IS THE PRESSURE IN THE FAN DRIVE HOSE AT LEAST 90 PSI?

TEST OPTIONS
1. STE/ICE-R TEST 50 (Page 2-739) 2. PRESSURE GAUGE.
REASON FOR QUESTION
Check to see if control valve is open.



REFERENCE INFORMATION

ENGINE COOLING

Replace hoses, refer to (para 8-26).

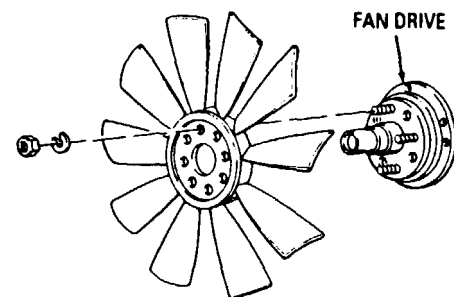
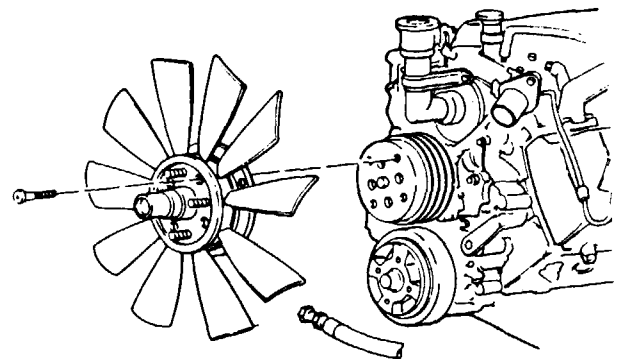
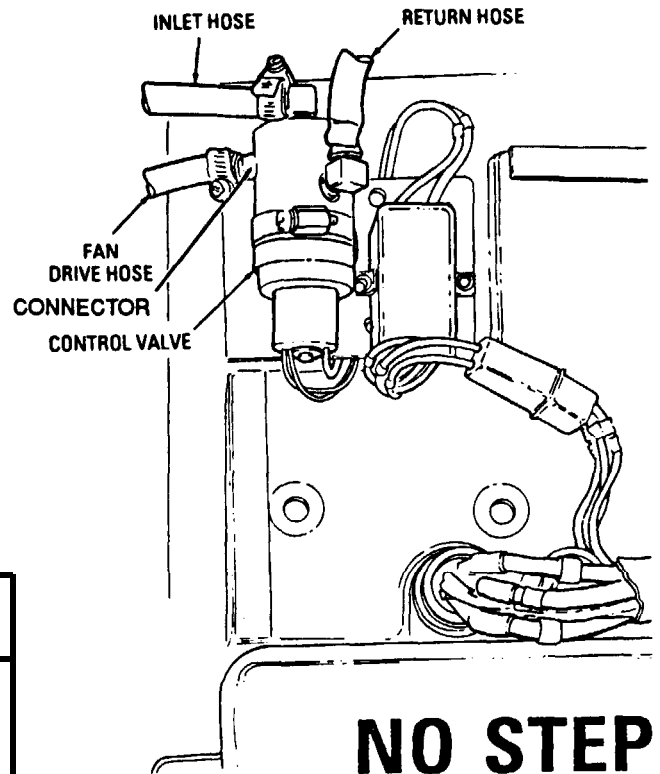
<p>STE/ICE-R TEST #50 0 TO 1000 PSIG PRESSURE</p>
<ol style="list-style-type: none"> 1. Connect transducer to valve after removing connector, refer to (para 8-26). Do offset test. 2. Connect BLUE pressure transducer to A W4 cable. Make sure the system under test is not pressurized. 3. Turn on system and read pressure.

Measure the pressure at the valve outlet. Remove the fan drive hose and connector from the valve body and screw transducer into the valve. Start the engine and look for leaks.

Replace control valve and/or fan drive, refer to (para 8-26 or 3-78). Check to sea if hoses are blocked prior to replacing parts, and perform back flush procedure (para 8-26).

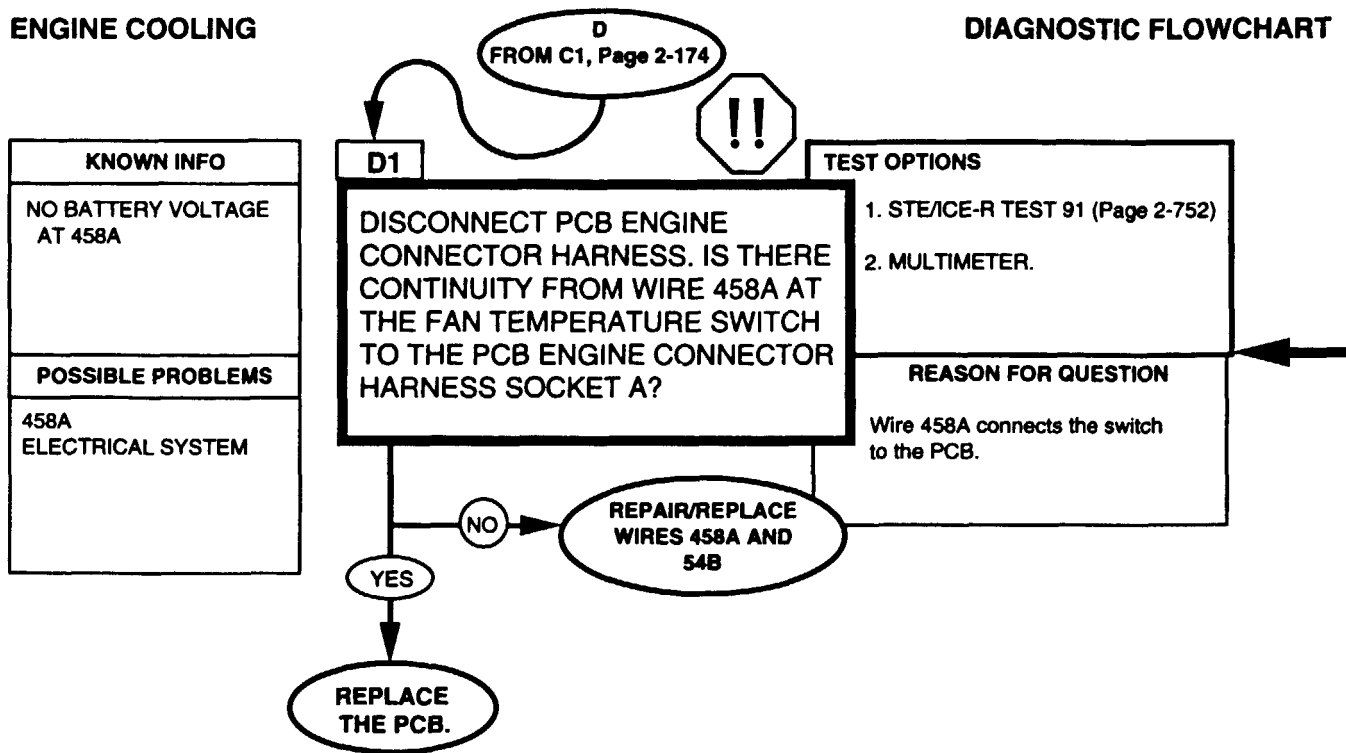
If pressure in the fan drive hose is not at least 90 psi, (620.5 kPa) perform back flush procedure (para 8-26). Recheck pressure. If pressure is not at least 90 psi, replace control valve.

If pressure in the fan drive hose is at least 90 psi, (620.5 kPa) check for blockage in hose between the control valve and fan drive. If hose is not blocked, replace fan drive (para. 3-78).



ENGINE COOLING

DIAGNOSTIC FLOWCHART



REFERENCE INFORMATION

ENGINE COOLING

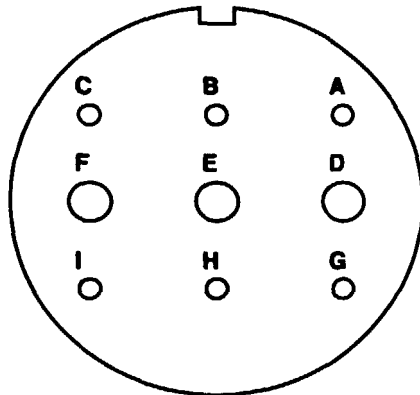


WARNING

DISCONNECT NEGATIVE BATTERY CABLE BEFORE DISCONNECTING AND RECONNECTING PROTECTIVE CONTROL BOX HARNESS.

There is battery voltage at the PCB at all times. Failure to disconnect battery cable will result in damage to equipment or injury to personnel.

Replace PCB, refer to (para 4-5).



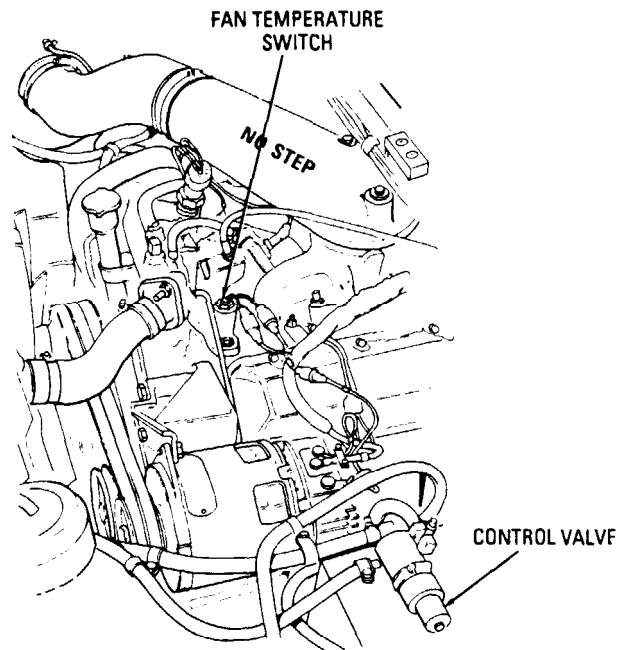
PCB ENGINE CONNECTOR

**0-4500 OHMS
STE/ICE-R TEST 91**

1. Connect RED dip and BLACK clip to the terminations indicated in the question. RED to the first, BLACK to the second.
2. Start Teat 91,0-4500 ohms.
3. Displayed reading is in ohms. Leas than 5 ohms is continuity. If the resistance is over 4500 ohms, STE/ICE displays "9.9.9.9."

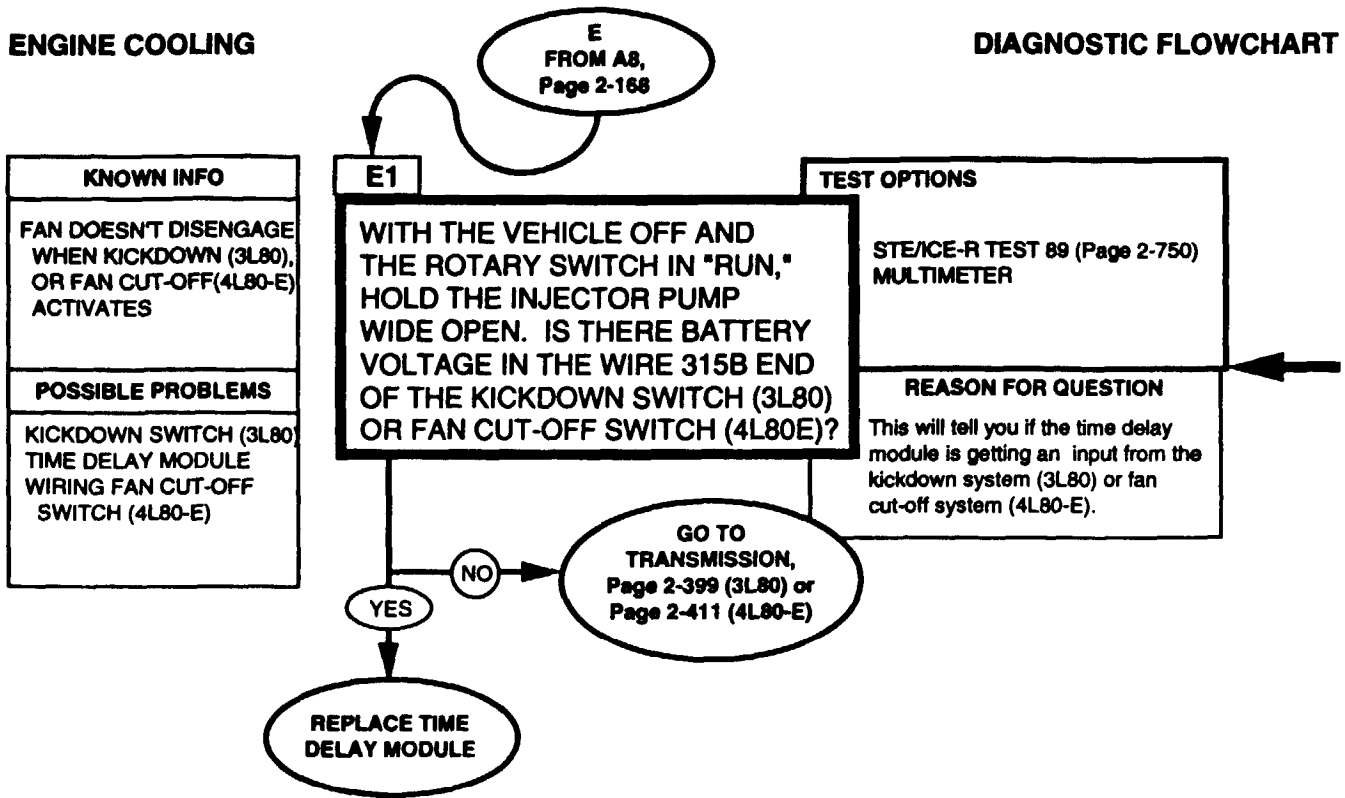
**CONTINUITY (RESISTANCE)
MULTIMETER**

1. Set the voltmeter to an ohms scale of about 1000 ohms.
2. Connect the RED and BLACK leads to the connections stated in the question.
3. Be sure to read the correct scale. Leas than 5 ohms indicates continuity. For an open circuit, the meter should peg full scale (needle all the way to the left).



ENGINE COOLING

DIAGNOSTIC FLOWCHART



REFERENCE INFORMATION

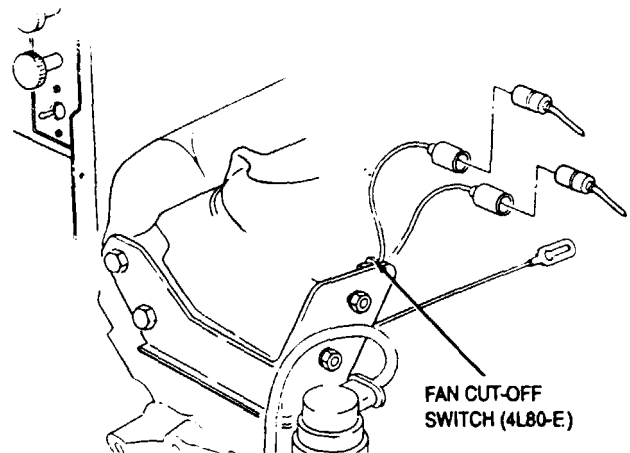
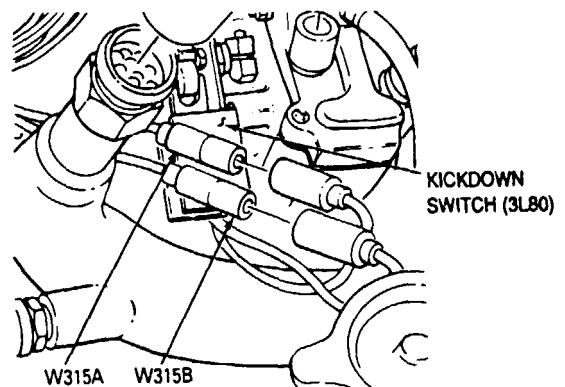
ENGINE COOLING



Replace time delay module, refer to (para 4-31).

0-45 DC VOLTS STE/ICE-R TEST 89
<ol style="list-style-type: none"> 1. Connect RED clip to the indicated test point, BLACK clip to negative or ground. 2. Start Test 89, DC volts. 3. Displayed reading is in volts.

VOLTAGE MULTIMETER
<ol style="list-style-type: none"> 1. Set the voltmeter to a DC volts scale of at least 40 volts. 2. Connect the RED lead to positive and the BLACK lead to negative. 3. Be sure to read the correct scale.



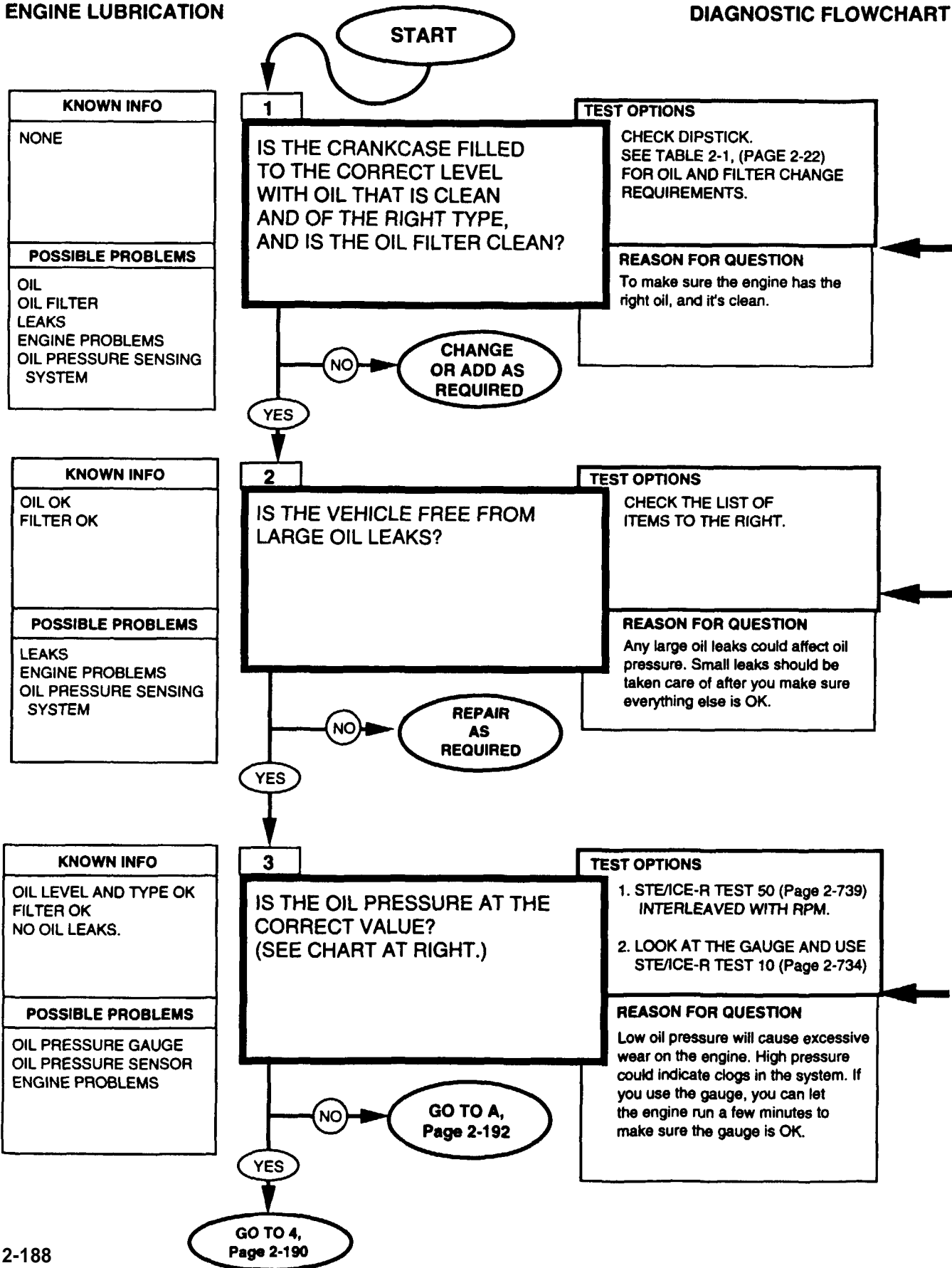
2-26. ENGINE LUBRICATION TESTS

These Engine Lubrication tests may be run any time there is an engine lubrication problem or if you were sent here by another test chain. Just follow the path, answering the questions. Additional information and notes are given on the facing page when necessary.

Fold-out page FO-5 shows the location of the major components of the Engine Lubrication system in case you are not familiar with them. This page may be left open for reference while testing.

ENGINE LUBRICATION

DIAGNOSTIC FLOWCHART

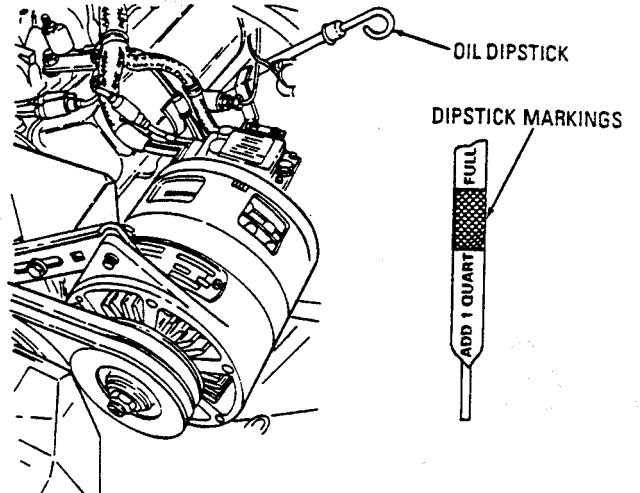


REFERENCE INFORMATION

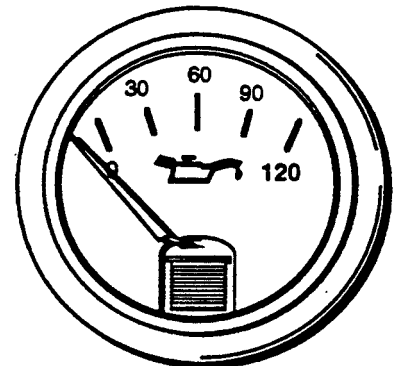
ENGINE LUBRICATION

Incorrect oil level and type can cause pressure problems, leaks, excessive blowby, and other problems.

Inspect the oil cooler, oil cooler supply return lines, CDR valve hoses, oil pan, and oil filter. Test CDR valve, (para. 3-9). See the location on parts page to find these parts.



ENGINE RPM STE/ICE-R TEST 10
<ol style="list-style-type: none"> 1. Start Test 10, Engine RPM. 2. Crank or start the engine. Displayed reading is RPM. Cranking RPM should be approximately 200. Idle RPM should be 625-675.



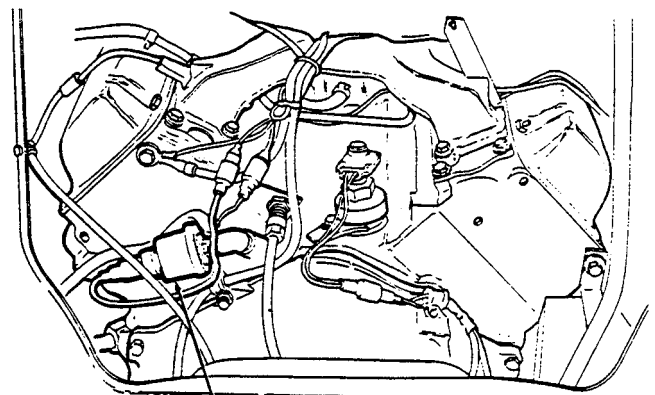
OIL PRESSURE GAUGE

OIL PRESSURE CHART

ENGINE RPM	APPROXIMATE OIL PRESSURE
STOP	0 PSI
6.2L IDLE (650 ± 25)	10-15 PSI
6.5L IDLE (700 ± 25)	10-15 PSI
6.5L DETUNED IDLE (700 ± 25)	10-15 PSI
2000	40-50 PSI

Remove sending unit, refer to (para. 4-25).

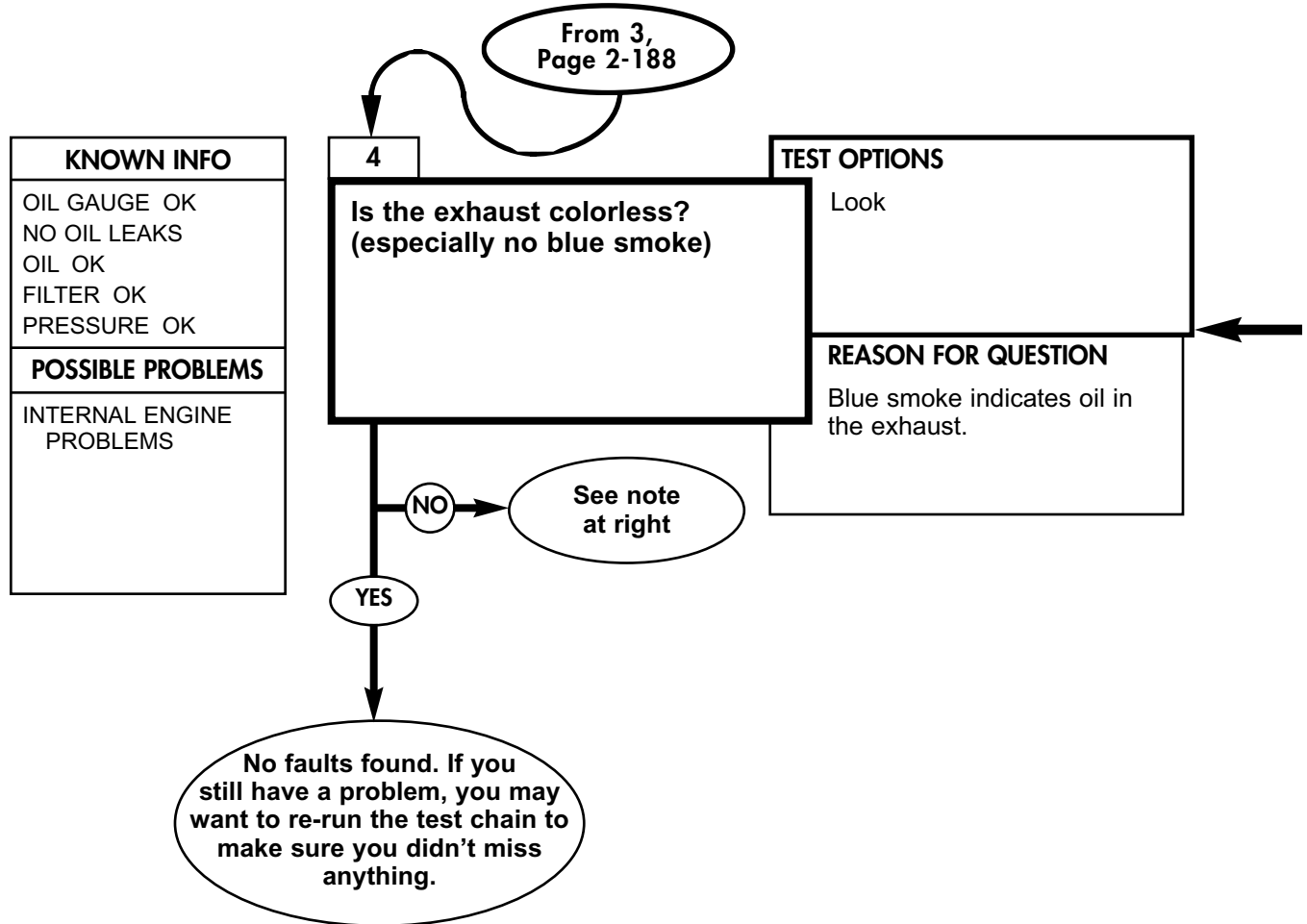
ENGINE RPM INTERLEAVE WITH 0-1000 PSI PRESSURE
<ol style="list-style-type: none"> 1. Connect BLUE Transducer in place of oil pressure sending unit. Dial test 50 (0-1000 psi). Perform offset test. 2. Dial test 01, interleave with RPM. Dial test 50. 3. Start engine and observe display. VTM will display RPM's, then PSI.



**OIL PRESSURE
SENDING UNIT**

ENGINE LUBRICATION

DIAGNOSTIC FLOWCHART



REFERENCE INFORMATION

ENGINE LUBRICATION

NOTE

If the exhaust is not colorless it must be either white, blue or black.
If exhaust color is:

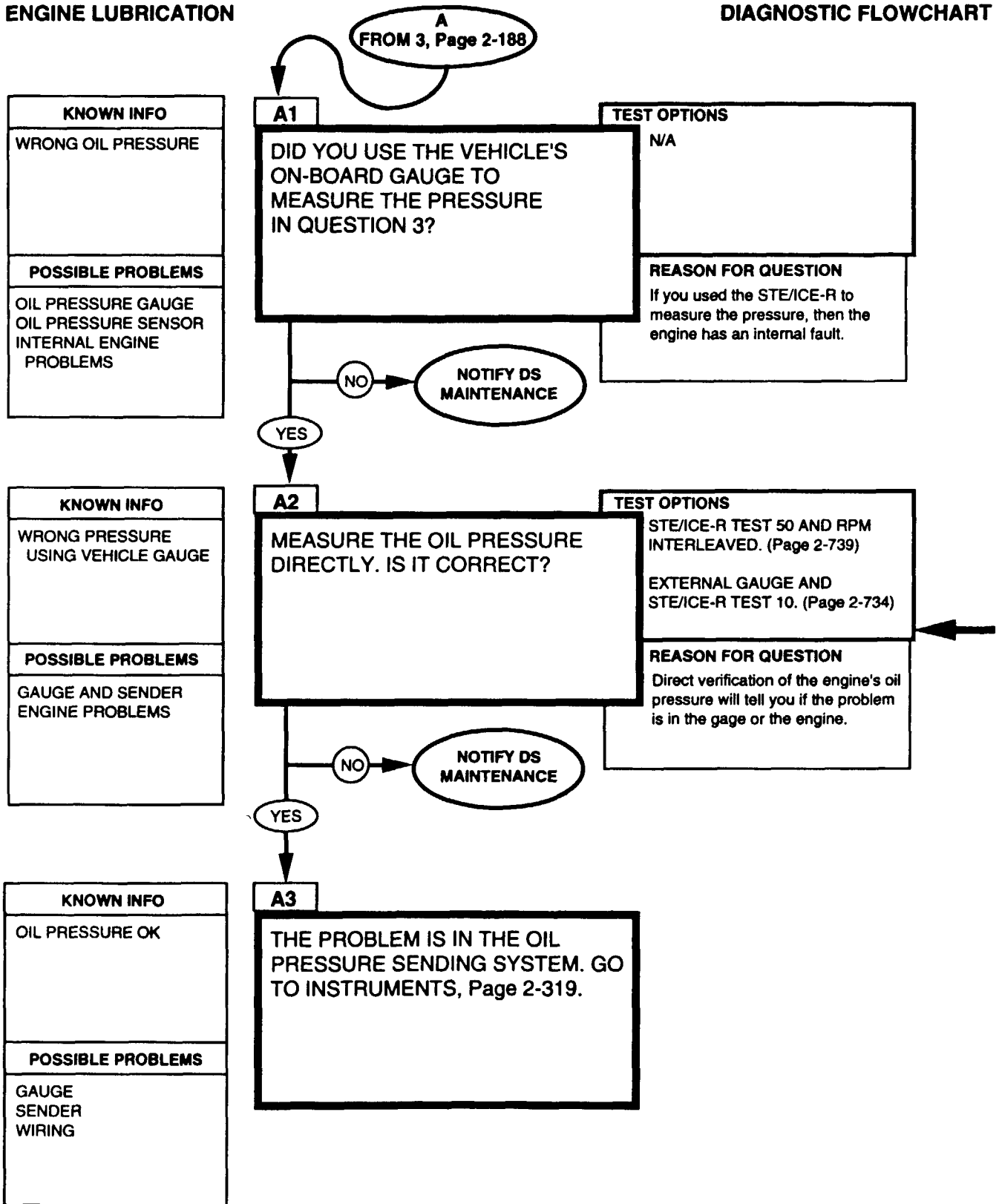
WHITE Go to fuel system, Paragraph 2-22. Could be injector timing, DS level fault.

BLUE Blue smoke is a sign of oil entering the combustion chambers. It usually enters past the piston rings or intake valve stem seals. This is an internal engine problem that can't be handled at this level of maintenance. You may want to run the Engine Mechanical Tests, Paragraph 2-18 before you notify DS Maintenance.

BLACK Intake/exhaust. Para. 2-23

ENGINE LUBRICATION

DIAGNOSTIC FLOWCHART

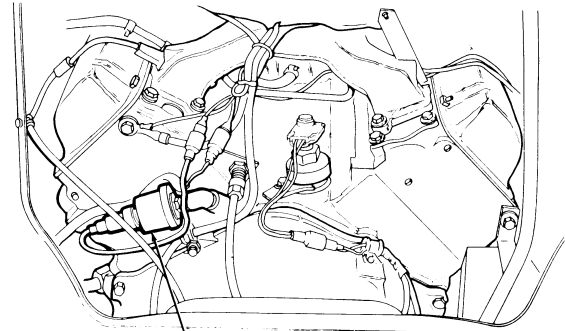


REFERENCE INFORMATION

ENGINE LUBRICATION

OIL PRESSURE CHART

ENGINE RPM	APPROXIMATE OIL PRESSURE
STOP	0 PSI
6.2L IDLE (650 ± 25)	10-15 PSI
6.5L IDLE (700 ± 25)	10-15 PSI
6.5L DETUNED IDLE (700 ± 25)	10-15 PSI
2000	40-50 PSI



OIL PRESSURE SENDING UNIT

Remove sending unit, refer to (para. 4-25)

**ENGINE RPM
INTERLEAVE WITH 0-1000 PSI PRESSURE**

1. Connect BLUE Transducer in place of oil pressure sending unit. Dial test 50 (0-1000 psi). Perform offset test.
2. Dial test 01, interleave with RPM. Dial test 50.
3. Start engine and observe display. VTM will display RPM's, then PSI.

2-27. ALTERNATOR TESTS

These Alternator tests can be run any time you think there may be a problem with the alternator or battery charging or if you were sent here from another system chain.

These tests are NOT for the batteries. These tests are strictly for the alternator, its operation, and its associated wiring. Tests for the batteries are in Battery Circuit, Paragraph 2-29.

A simplified block diagram for the alternator system is given on page 2-195. A detailed functional flow schematic is provided as foldout FO-6 to help you understand the system as you perform the tests.

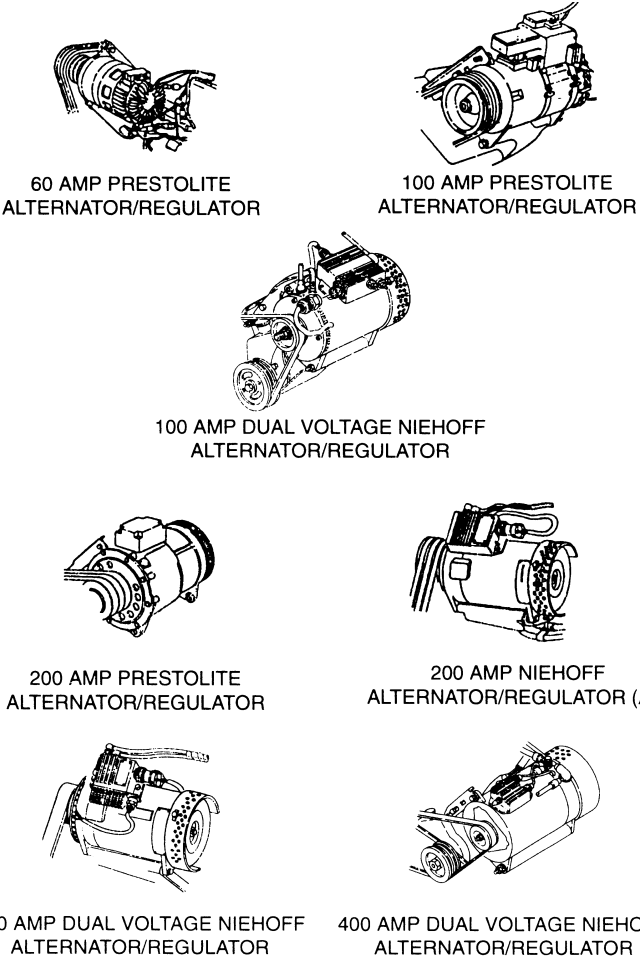
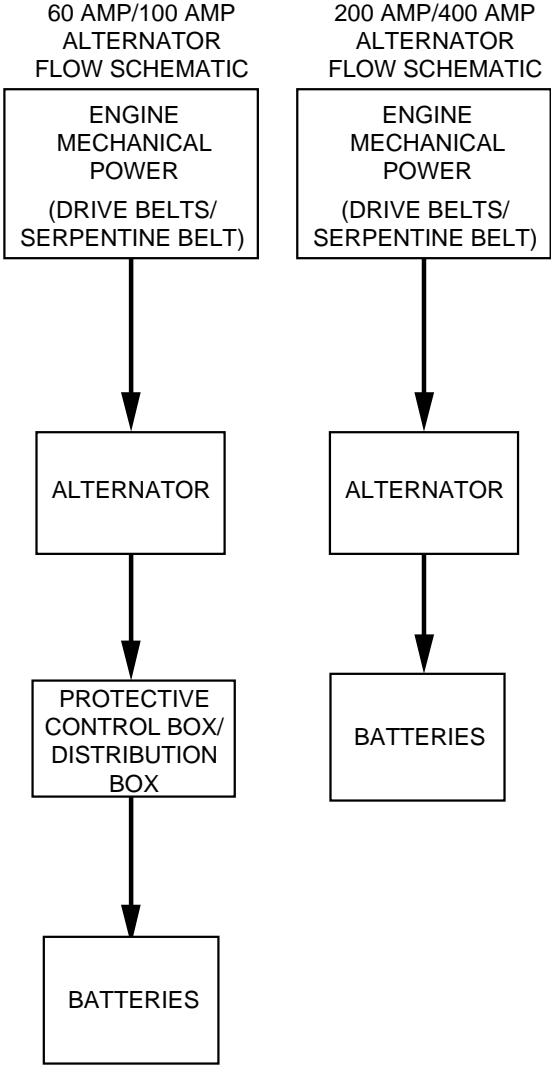
NOTE

Dual voltage 100, 200, and 400 amp alternators can be installed in a single voltage system. See Table 2-2 for hookup procedures.

After preliminary common tests, the model of alternator must be identified for specific testing to determine if alternator or regulator is defective.

Table 2-2. Adaption of dual voltage alternator on a single voltage system

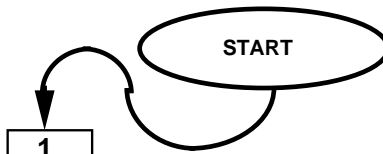
Dual Voltage Alternator	Single Voltage System
100 Amp	Ground wire afixed to regulator base and 14 volt power stud
200 Amp	Ground wire afixed to regulator base and 14 volt power stud
400 Amp	No ground wire afixed to regulator or 14 volt power stud



ALTERNATOR

DIAGNOSTIC FLOWCHART

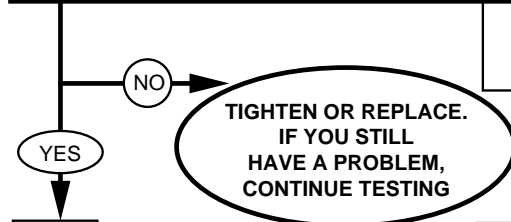
KNOWN INFO
NOTHING
POSSIBLE PROBLEMS
ALTERNATOR PROTECTIVE CONTROL BOX/DISTRIBUTION BOX WIRING BELTS



1

ARE ALTERNATOR DRIVEBELTS/
SERPENTINE BELT TIGHT AND IN
GOOD CONDITION (NO CRACKS,
FRAYS, OR GLAZE)?

TEST OPTIONS
VISUAL INSPECTION, USE BELT TENSION GAUGE/ CHECK TENSIONER POSITION
REASON FOR QUESTION
If belts are loose, worn, or if belt tensioner has fully retracted, the belts will not drive the alternator fast enough to recharge the batteries.

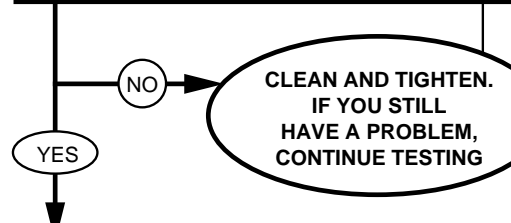


KNOWN INFO
BELTS OK
POSSIBLE PROBLEMS
WIRING ALTERNATOR PCB/DISTRIBUTION BOX

2

ARE ALL WIRE CONNECTIONS
TO ALTERNATOR CLEAN, TIGHT,
AND MAKING GOOD CONNECTION?

TEST OPTIONS
VISUAL INSPECTION
REASON FOR QUESTION
Loose or dirty connections can prevent a good alternator from charging the batteries.

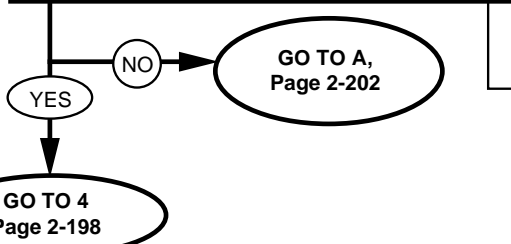


KNOWN INFO
BELTS OK WIRING CONNECTIONS OK
POSSIBLE PROBLEMS
ALTERNATOR PCB/DISTRIBUTION BOX WIRING

3

WITH ROTARY SWITCH IN "RUN"
POSITION (ENGINE NOT RUNNING),
DO YOU HAVE BATTERY VOLTAGE
AT ALTERNATOR OUTPUT
TERMINAL ?

TEST OPTIONS
1. STE/ICE-R TESTS 67 AND 89 (INTERLEAVE) (Pages 2-740, 750)
2. MULTIMETER
REASON FOR QUESTION
The alternator must be connected to batteries to be able to recharge the batteries.



REFERENCE INFORMATION

NOTE

Cracks, glaze, and frays indicate worn belts, which should be replaced (para. 3-81, all except M1123 and "A2" vehicles) (para. 3-83, M1123 and "A2" vehicles). Use a belt tension gauge to determine if the belts need to be tightened, refer to (para 3-82, all except M1123 and "A2" vehicles).

BAD CONNECTIONS ARE THE MOST COMMON PROBLEM!

Sometimes just disconnecting, cleaning, and reconnecting will solve a problem. BE THOROUGH! The time you save may be your own.

Refer to the functional flow schematic and check the following;

1. BATTERY - make sure all connections are clean and tight, including the shunt and power stud.
2. STARTER - check the high current (heavy gauge wire 6A) wire at the starter. Don't just check for voltage; a loose connection will have voltage but can't carry much current.

3. PCB/DISTRIBUTION BOX



WARNING

Disconnect negative battery cable before disconnecting and reconnecting PCB/distribution box harness.

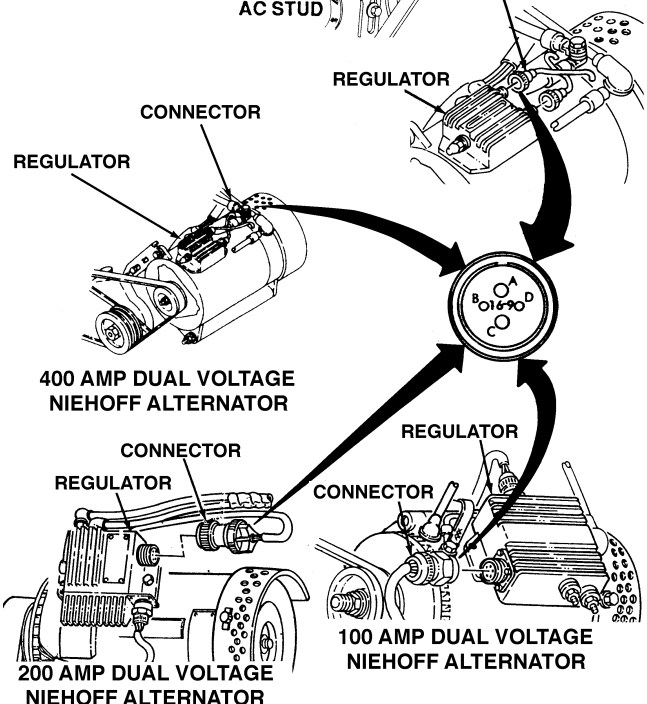
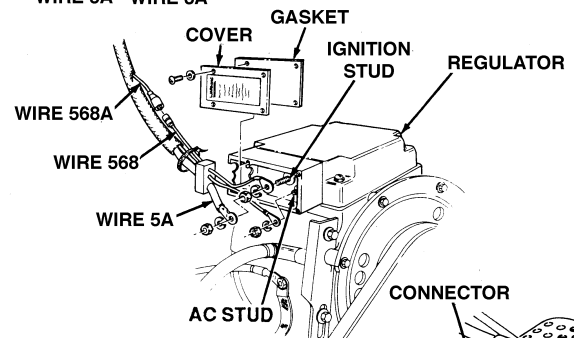
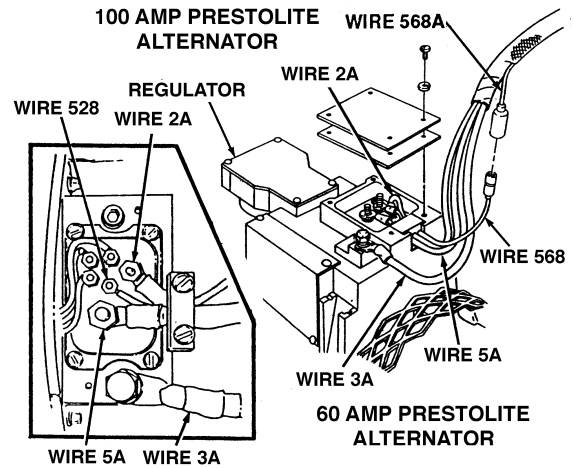
There is battery voltage at the PCB/distribution box at all times. Failure to disconnect battery cable will result in damage to equipment or injury to personnel.

Unscrew BOTH connectors and look for bent or broken pins, pins pushed out of their socket, or dirt and corrosion in the connections.

INTERLEAVE TESTS 67 AND 89 BATTERY VOLTAGE AND DC VOLTAGE

USE CONTROL FUNCTION 06 TO INTERLEAVE TESTS ON THE STE/ICE-R. DIAL 06, PRESS THE TEST BUTTON. WHEN PROMPTED BY THE VTM, DIAL IN TEST 67 AND PRESS THE BUTTON. WHEN PROMPTED AGAIN, DIAL IN TEST 89 AND PRESS THE BUTTON. VTM WILL DISPLAY RESULT FOR TEST 67, THEN 89 THEN 6789, AND THEN REPEAT. SEE TM 9-4910-571-12&P FOR MORE INFORMATION.

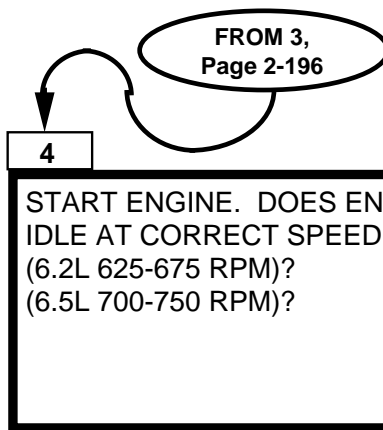
ALTERNATOR



ALTERNATOR

DIAGNOSTIC FLOWCHART

KNOWN INFO
BATTERIES OK BELTS OK ALTERNATOR CONNECTIONS OK PCB/DISTRIBUTION BOX OK
POSSIBLE PROBLEMS
ALTERNATOR ALTERNATOR DRIVE WIRING

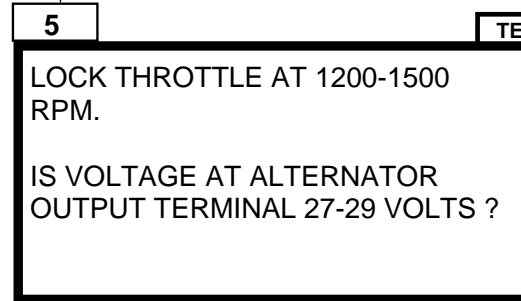


TEST OPTIONS
STE/ICE-R TEST 10 (Page 2-734)
REASON FOR QUESTION
If engine idles too low, alternator is not driven fast enough to charge batteries.

NO → ADJUST IDLE RPM
SEE NOTE AT RIGHT

YES

KNOWN INFO
BATTERIES OK BELTS OK ALTERNATOR CONNECTIONS OK PCB/DISTRIBUTION BOX OK ALTERNATOR DRIVE OK
POSSIBLE PROBLEMS
ALTERNATOR WIRING

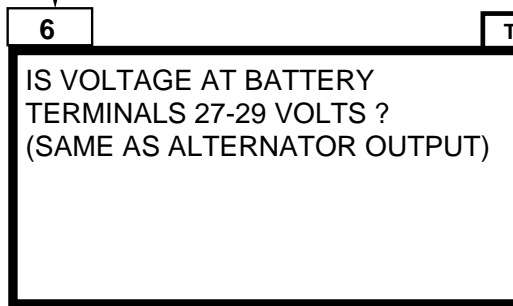


TEST OPTIONS
1. STE/ICE-R TEST 10 (interleave with control function 01 page 2-734) thru 89, page 750
2. MULTIMETER
REASON FOR QUESTION
Alternator voltage must be slightly higher than battery voltage to recharge batteries.

NO → GO TO B,
Page 2-204

YES

KNOWN INFO
BATTERIES OK BELTS OK ALTERNATOR CONNECTIONS OK PCB/DISTRIBUTION BOX OK ALTERNATOR DRIVE OK ALTERNATOR OUTPUT OK
POSSIBLE PROBLEMS
ALTERNATOR WIRING



TEST OPTIONS
1. STE/ICE-R TEST 67 (Page 2-740)
2. MULTIMETER
REASON FOR QUESTION
If battery voltage is much lower than alternator output, wiring resistance is too high.

NO → REPAIR/REPLACE
WIRING
SEE NOTE AT RIGHT

YES

GO TO 7,
Page 2-200

REFERENCE INFORMATION

ALTERNATOR

If the engine doesn't start on its own power, you should check the battery and starter circuits.

NOTE
 A charged battery in good condition is a prerequisite for testing an alternator/regulator system. If battery is suspect, substitute a known good battery in the vehicle.
 Output for 60 amp alternator is wire 5A and stud. All other alternators have a large stud on side of housing as output terminal to connect wire 6.

NOTES
 Check the wiring and the pins at sockets E & F at PCB/distribution box engine connector.
 Check the wiring and the pins at sockets D & G at PCB/distribution box body connector.
 Check and clean starter solenoid and battery box power stud.
 Check and clean battery cables and clamps.
 Look for loose, dirty, or broken connections and repair as necessary. If terminal voltage is still low, harness should be replaced. Notify DS maintenance.

NOTES ON IDLE ADJUSTMENT

If idle can be adjusted to within limits, go to step 5.
 If idle CANNOT be adjusted to within limits, you may have a problem with the fuel system. You can either continue here or run the fuel system tests and return here.

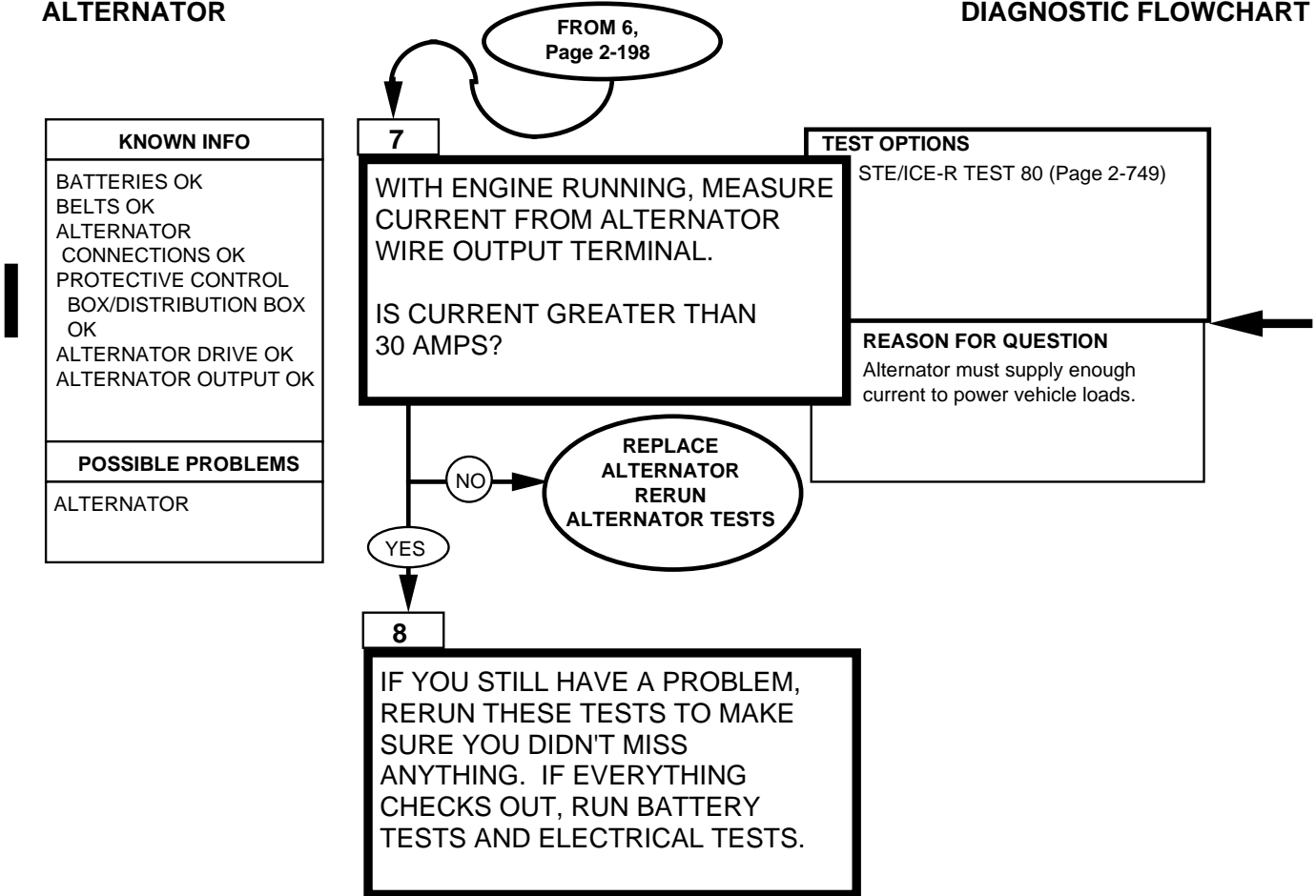
ENGINE RPM STE/ICE-R TEST 10
1. Start Test 10, Engine RPM. 2. Crank or start the engine. Displayed reading is RPM. Cranking RPM should be at least 100. Idle RPM should be 625 - 675.

0-45 DC VOLTS STE/ICE-R TEST 89
1. Connect RED clip to the indicated test point, BLACK clip to negative or ground. 2. Start Test 89, DC volts. 3. Displayed reading is in volts.

BATTERY VOLTAGE STE/ICE-R TEST 67
1. Start Test 67, battery voltage. 2. Displayed reading is in volts. Batteries should be 23-25.5 volts. Battery voltage will drop when glowplugs turn on.

ALTERNATOR

DIAGNOSTIC FLOWCHART



REFERENCE INFORMATION

ALTERNATOR

NOTE

Wire 5A is output path for 60 amp alternator. All other alternators have large stud on alternator case as output connector for wire 6. Alternator current will go up as you turn on vehicle accessories.

Turn on the lights, wipers, heater, etc. to make sure alternator can supply enough current to power the loads.

To replace 60 and 200 amp alternators, (refer to chapter 4). To replace 100 amp alternator, (refer to chapter 12).

To replace 100, 200, and 400 amp dual voltage alternators, (refer to chapter 4).

**BATTERY CURRENT
STE/ICE-R TEST 80**

1. Start Test 80, battery current.
2. Displayed reading is in amps. The reading will be greater than 30 amps, depending on how many accessories you have on.

ALTERNATOR

DIAGNOSTIC FLOWCHART

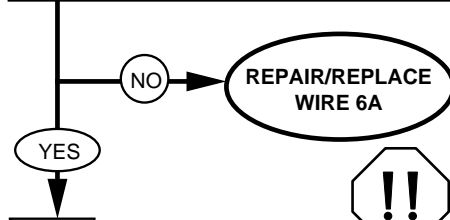
A
FROM 3,
Page 2-196

KNOWN INFO
BATTERY IS NOT CONNECTED TO ALTERNATOR WHEN ROTARY SWITCH IS IN RUN POSITION
POSSIBLE PROBLEMS
PCB/DISTRIBUTION BOX WIRING

A1

IS THE STARTER MOTOR VOLTAGE THE SAME AS BATTERY VOLTAGE?

TEST OPTIONS
1. STE/ICE-R TESTS 67, 68 (Pages 2-740 -741) 2. MULTIMETER
REASON FOR QUESTION
The cable connecting the batteries to the alternator goes to the starter first.

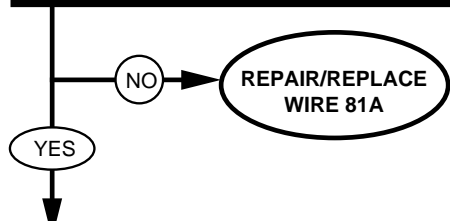


KNOWN INFO
BATTERY IS NOT CONNECTED TO ALTERNATOR WHEN ROTARY SWITCH IS IN RUN POSITION, BATTERIES CONNECTED TO STARTER
POSSIBLE PROBLEMS
PCB/DISTRIBUTION BOX WIRING

A2

DISCONNECT THE BATTERY NEGATIVE CABLE. DISCONNECT ENGINE CONNECTOR AT PCB/DISTRIBUTION BOX. RECONNECT THE BATTERY NEGATIVE CABLE. IS THERE BATTERY VOLTAGE AT SOCKET E OF THE PCB/DISTRIBUTION BOX ENGINE CONNECTOR HARNESS ?

TEST OPTIONS
1. STE/ICE-R TESTS 67, 89 (Pages 2-740, -750) 2. MULTIMETER
REASON FOR QUESTION
This checks the wire from the starter to the PCB/distribution box engine connector.

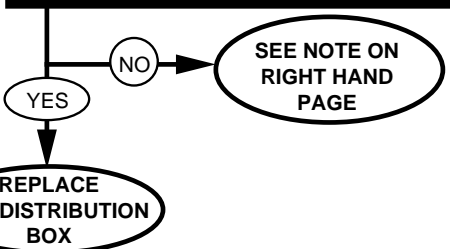


KNOWN INFO
BATTERY IS NOT CONNECTED TO ALTERNATOR WHEN ROTARY SWITCH IS IN RUN POSITION, BATTERIES CONNECTED TO STARTER
POSSIBLE PROBLEMS
PCB/DISTRIBUTION BOX WIRING

A3

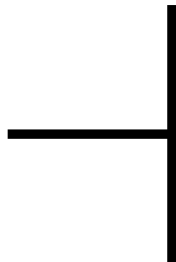
REMOVE THE BATTERY NEGATIVE CABLE. IS THERE CONTINUITY (LESS THAN 20 OHMS RESISTANCE) FROM SOCKET F OF PCB/DISTRIBUTION BOX ENGINE CONNECTOR HARNESS TO WIRE 5A END AT ALTERNATOR?

TEST OPTIONS
1. STE/ICE-R TEST 91 (Page 2-752) 2. MULTIMETER
REASON FOR QUESTION
If the box is connected to the alternator, then the relay in the PCB/distribution box is no good.



REFERENCE INFORMATION

ALTERNATOR



**INTERLEAVE TEST 67 AND 68.
BATTERY VOLTAGE AND DC VOLTAGE**

USE CONTROL FUNCTION 06 TO INTERLEAVE TESTS ON THE STE/ICE-R. DIAL 06, PRESS THE TEST BUTTON. WHEN PROMPTED BY THE VTM, DIAL IN TEST 67 AND PRESS THE BUTTON. WHEN PROMPTED AGAIN, DIAL IN TEST 68 AND PRESS THE BUTTON. VTM WILL DISPLAY RESULT FOR TEST 67, THEN 68 THEN 6768, AND THEN REPEAT. SEE TM 9-4910-571-12&P FOR MORE INFORMATION.



WARNING

DISCONNECT NEGATIVE BATTERY CABLE BEFORE DISCONNECTING AND RECONNECTING PROTECTIVE CONTROL BOX/DISTRIBUTION BOX HARNESS.

There is battery voltage at the PCB/distribution box at all times. Failure to disconnect battery cable will result in damage to equipment or injury to personnel.

NOTE

When checking for voltage or continuity in a harness connector (steps A2 and A3), check the wiring at the connector carefully for broken wires. Check to see that the connector pins are not bent, broken, or pushed out of place. Check that the connections are clean and tight. Use the STE/ICE-R in TK mode for this measurement. DO NOT USE THE DCA. Leave the negative battery cable off for the measurement. If there is an open circuit, the STE/ICE-R will measure close to 500 ohms. If you don't have continuity or voltage, and the wires and connections are all ok, then the harness must have a broken wire. In this case you have to replace the wiring harness. Replace harness, notify DS Maintenance.

Replace PCB, refer to (para. 4-5).
Replace distribution box, refer to (para. 4-5.1).

**INTERLEAVE TEST 67 AND 89.
BATTERY VOLTAGE AND DC VOLTAGE**

USE CONTROL FUNCTION 06 TO INTERLEAVE TESTS ON THE STE/ICE-R. DIAL 06, PRESS THE TEST BUTTON. WHEN PROMPTED BY THE VTM, DIAL IN TEST 67 AND PRESS THE BUTTON. WHEN PROMPTED AGAIN, DIAL IN TEST 89 AND PRESS THE BUTTON. VTM WILL DISPLAY RESULT FOR TEST 67, THEN 89 THEN 6789, AND THEN REPEAT. SEE TM 9-4910-571-12&P FOR MORE INFORMATION.

**0-4500 OHMS
STE/ICE-R TEST 91**

1. Connect RED clip and BLACK clip to the terminations indicated in the question. RED to the first, BLACK to the second.
2. Start Test 91, 0-4500 ohms.
3. Displayed reading is in ohms. Less than 5 ohms is continuity. If the resistance is over 4500 ohms, STE/ICE displays "9.9.9.9".

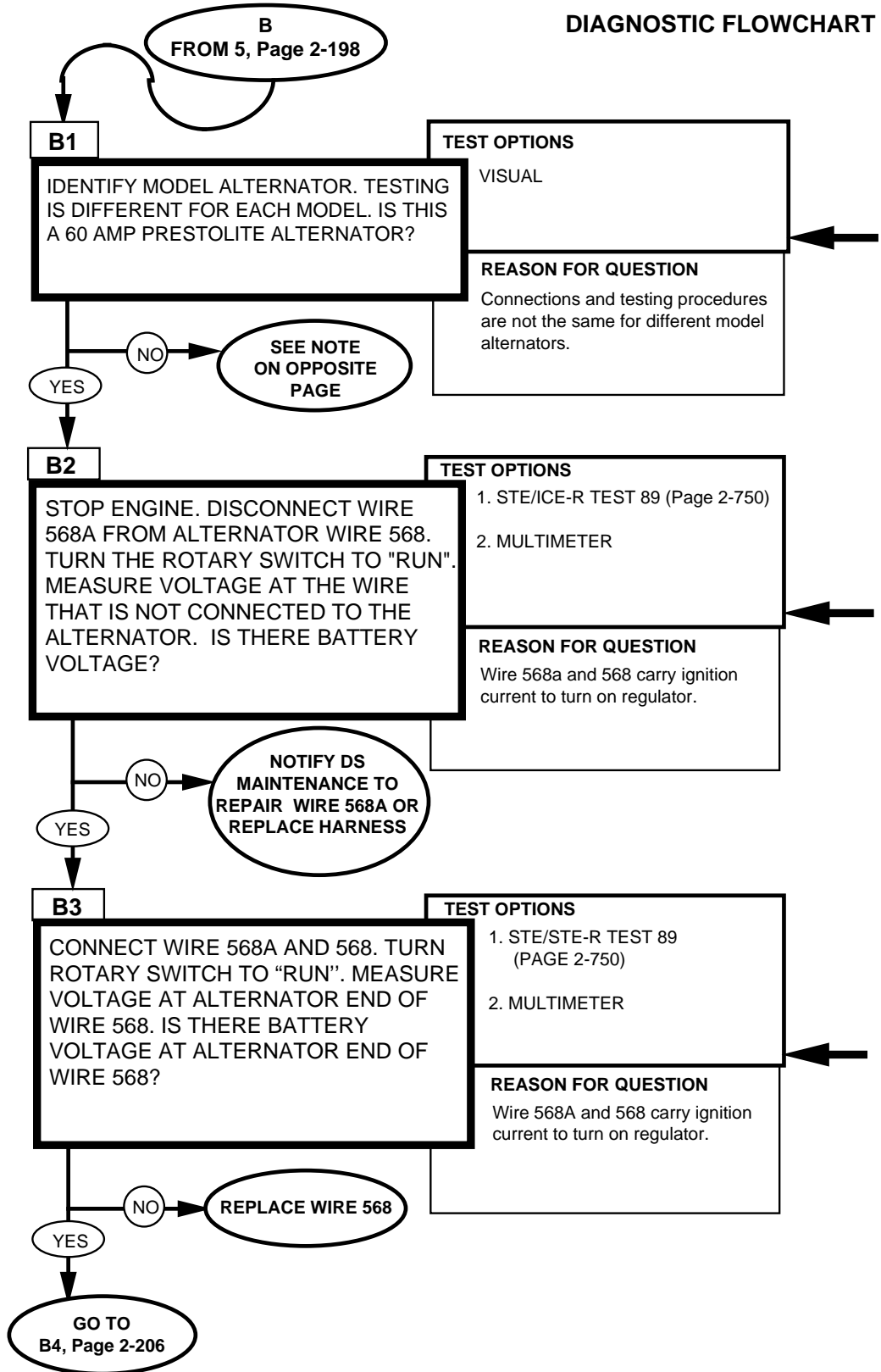
ALTERNATOR

DIAGNOSTIC FLOWCHART

KNOWN INFO
ALTERNATOR OUTPUT VOLTAGE IS NOT CORRECT
POSSIBLE PROBLEMS
ALTERNATOR WIRING

KNOWN INFO
ALTERNATOR OUTPUT VOLTAGE IS NOT CORRECT
POSSIBLE PROBLEMS
ALTERNATOR WIRING

KNOWN INFO
ALTERNATOR OUTPUT VOLTAGE IS NOT CORRECT
POSSIBLE PROBLEMS
ALTERNATOR



REFERENCE INFORMATION

ALTERNATOR

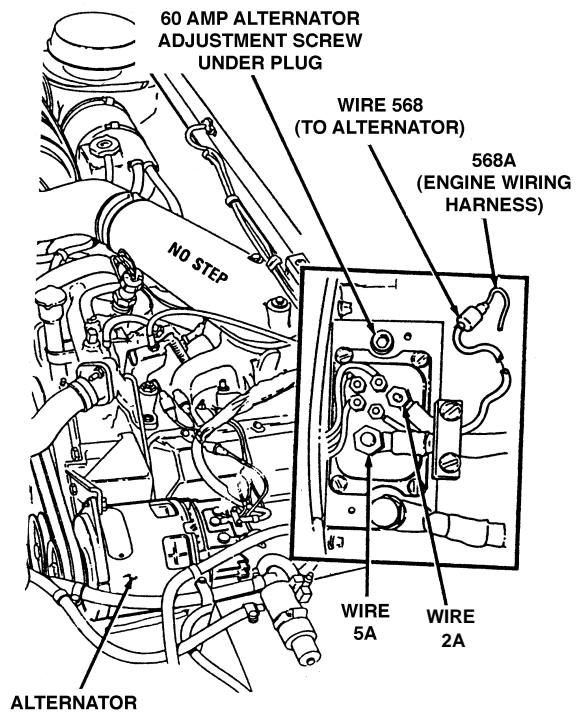
NOTE

For 60 amp Prestolite alternator, continue B.
 For 100 amp Prestolite alternator, go to C, page 2-208.
 For 200 amp Prestolite alternator, go to D, page 2-212.
 For 200 amp single voltage Niehoff alternator, go to E, page 2-218.
 For 100 amp single voltage Niehoff alternator, go to F, page 2-222.
 For 100 amp dual voltage Niehoff alternator, go to F.1, page 2-224.2.
 For 200 amp dual voltage Niehoff alternator, go to G, page 2-224.6.
 For 400 amp dual voltage Niehoff alternator, go to H, page 2-224.10.

0-45 DC VOLTS STE/ICE-R TEST 89
1. Connect RED clip to indicated test point, BLACK clip to negative or ground.
2. Start Test 89, DC volts.
3. Displayed reading is in volts.

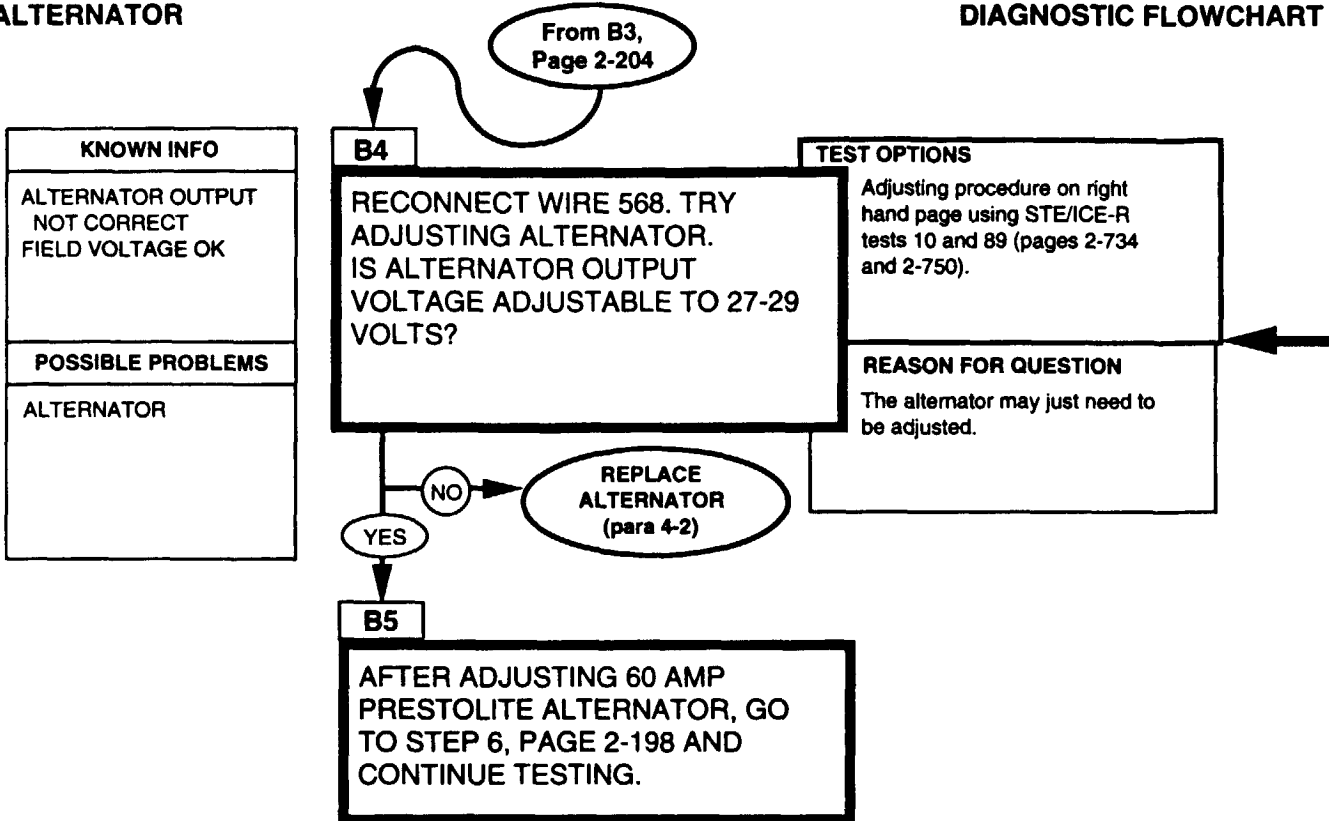
NOTE

Voltage on wire 568 signals regulator to turn on. Without voltage, regulator can't operate. Wire 568A is connected with wire 5A inside engine wire harness. If there is no loose end on wire 568A, wire harness repair is required. Notify DS Maintenance.



ALTERNATOR

DIAGNOSTIC FLOWCHART



REFERENCE INFORMATION

ALTERNATOR

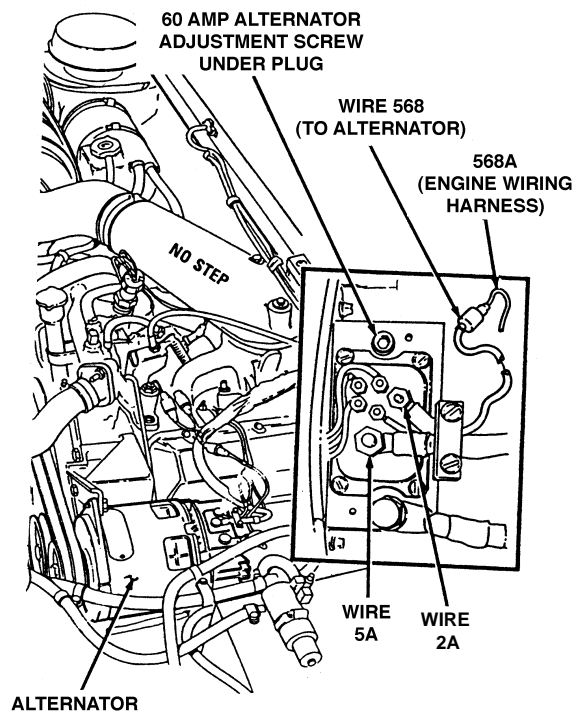
1. Turn engine off.
2. Remove protective cover from alternator wiring.
3. Remove the potting material.
4. Remove hex head plug to expose adjustment screw.
5. Start engine and lock throttle at 1200-1500 RPM by using STE/ICE-R test 10.
6. Connect the Red test lead to wire 5A and the Black lead to engine ground.
7. Monitor alternator output voltage with STE/ICE-R test 89.
8. Use a cross tip screwdriver to adjust the alternator output voltage 28.0 ± 0.5 Volts.
9. Unlock throttle, replace hex head plug, repot the area with silicon caulk, and replace the protective cover.

ENGINE RPM STE/ICE-R TEST 10
<ol style="list-style-type: none"> 1. Start Test 10, Engine RPM. 2. Crank or start the engine. Displayed reading is RPM. Cranking RPM should be approximately 100. Idle RPM should be 625-675.

0-45 DC VOLTS STE/ICE-R TEST 89
<ol style="list-style-type: none"> 1. Connect RED clip to the indicated test point, BLACK clip to negative or ground. 2. Start Test 89, DC volts. 3. Displayed reading is in volts.

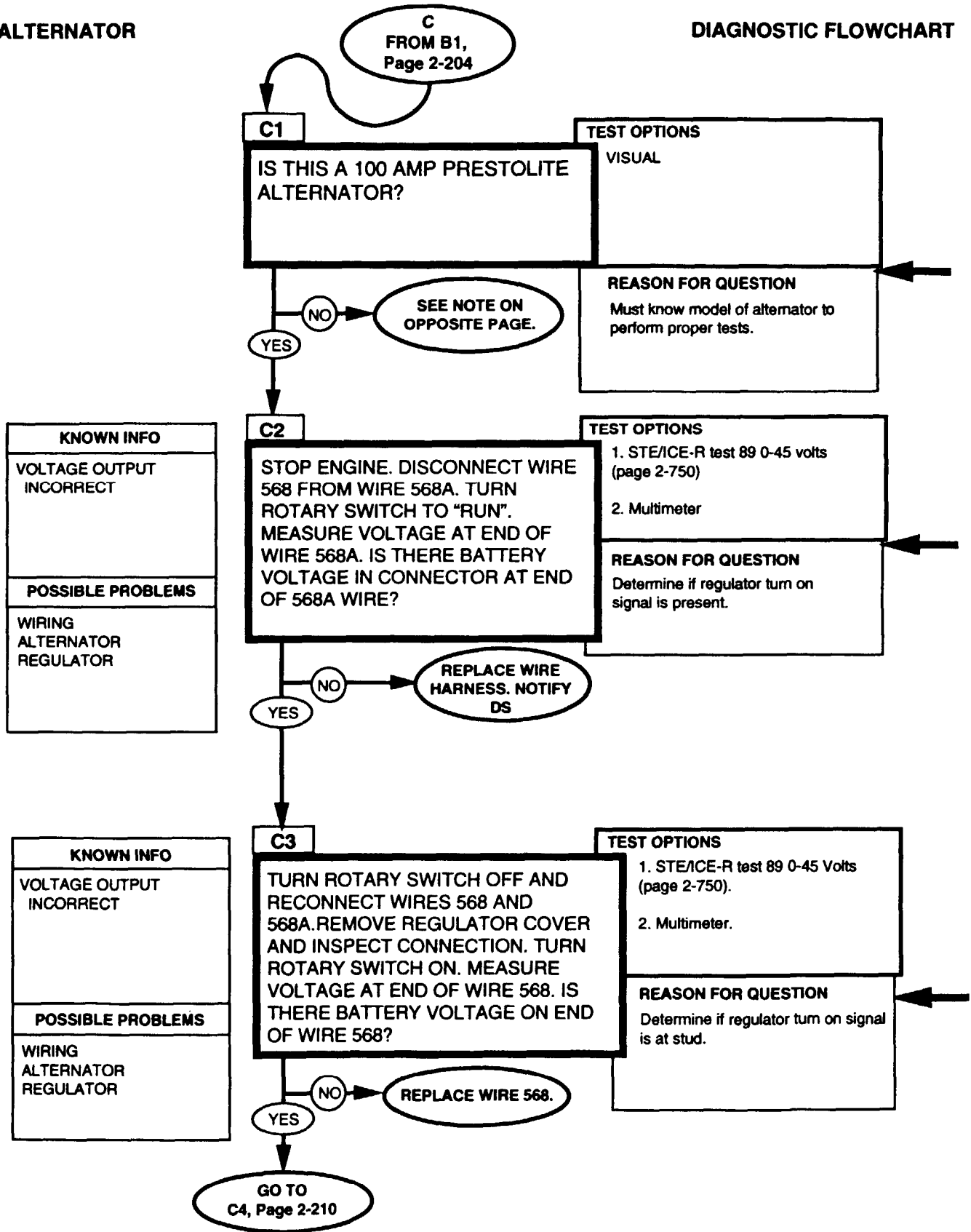
NOTE

Regulator cannot be tested independently from alternator on 60 amp alternator system.



ALTERNATOR

DIAGNOSTIC FLOWCHART



REFERENCE INFORMATION

ALTERNATOR

NOTE

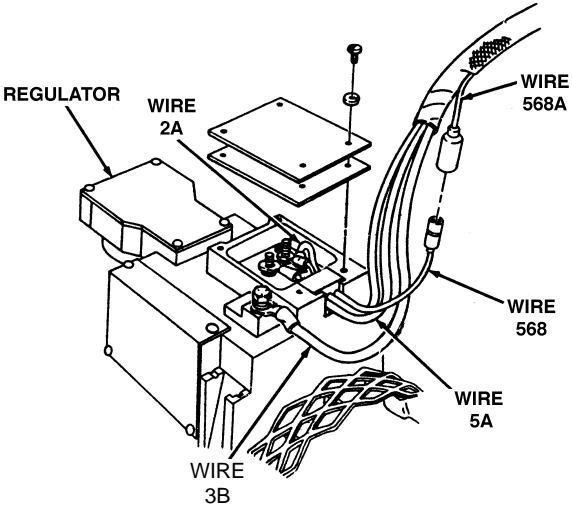
For 60 amp Prestolite alternator, go to B, page 2-204.
 For 100 amp Prestolite alternator, continue C.
 For 200 amp Prestolite alternator, go to D, page 2-212.
 For 200 amp single voltage Niehoff alternator, go to E, page 2-218.
 For 100 amp single voltage Niehoff alternator, go to F, page 2-222.
 For 100 amp dual voltage Niehoff alternator, go to F.1, page 2-224.2.
 For 200 amp dual voltage Niehoff alternator, go to G, page 2-224.6.
 For 400 amp dual voltage Niehoff alternator, go to H, page 2-224.10.

NOTE

Voltage on wire 568 signals regulator to turn on. Without voltage, regulator can't operate. Wire 568A is connected with wire 5A inside engine wire harness. If there is no loose end on wire 568A, wire harness repair is required. Notify DS Maintenance.

0-45 DC VOLTS STE/ICE-R TEST 89
<ol style="list-style-type: none"> 1. Connect RED clip to the indicated test point, BLACK clip to negative or ground. 2. Start Test 89, DC volts. 3. Displayed reading is in volts.

NEWER MODEL REGULATOR

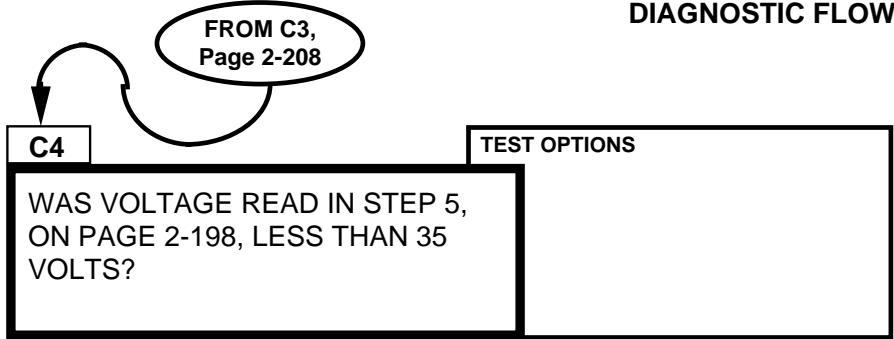


ALTERNATOR

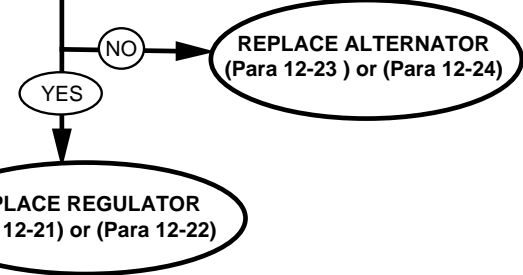
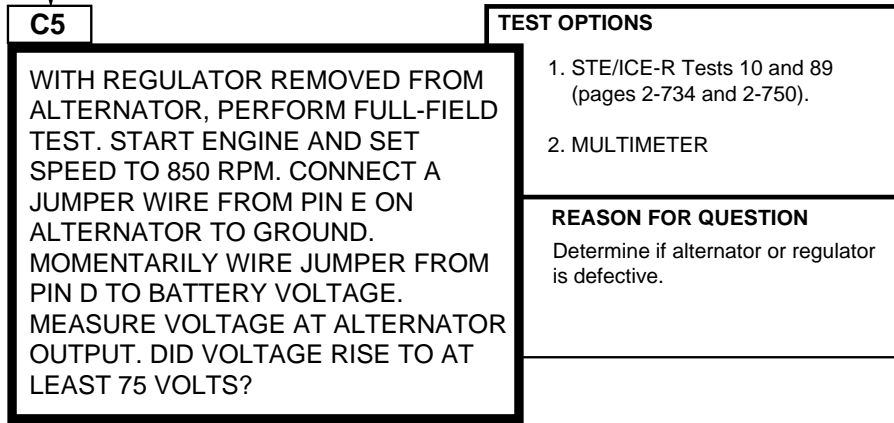
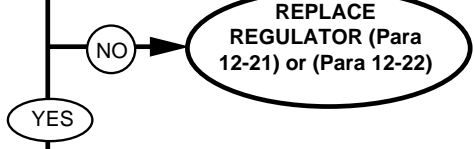
DIAGNOSTIC FLOWCHART

KNOWN INFO
VOLTAGE OUTPUT INCORRECT WIRING OR IGNITION OK
POSSIBLE PROBLEMS
ALTERNATOR REGULATOR

KNOWN INFO
VOLTAGE OUTPUT INCORRECT WIRING OR IGNITION OK
POSSIBLE PROBLEMS
ALTERNATOR REGULATOR



REASON FOR QUESTION
If voltage exceeded 35 volts, regulator over-voltage protection has failed.



REFERENCE INFORMATION

ALTERNATOR

CAUTION

Ensure all electrical loads are disconnected or turned off. Higher voltage could damage components in other devices.

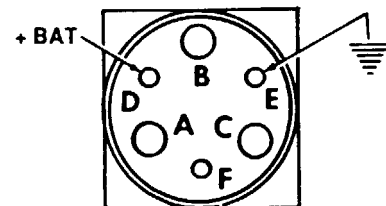
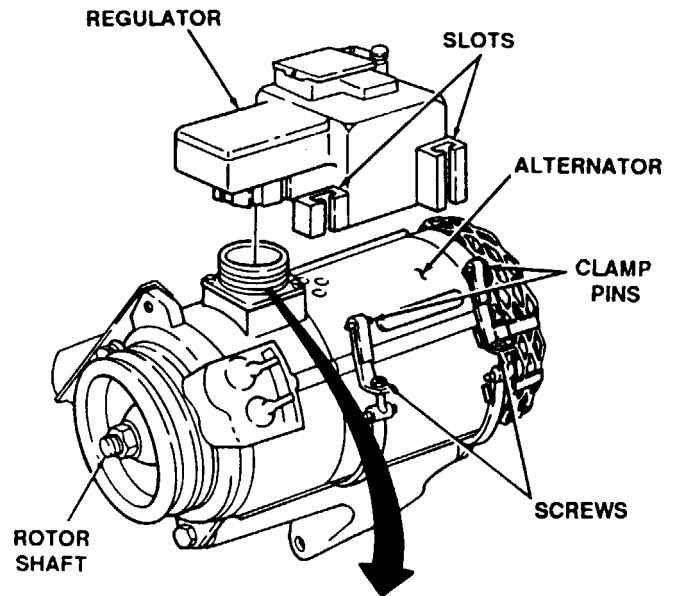
1. Disconnect battery ground cable.
2. Loosen screws.
3. Remove clamp pins from slots.
4. Loosen connector nut.
5. Remove regulator from alternator. Secure regulator out of the way.
6. Connect battery ground cable.

NOTE

Jumper wires must be able to handle 15 amp current (14 gauge or larger diameter).

NOTE

Multimeter set to read over 75 vdc.



**ENGINE RPM
STE/ICE-R TEST 10**

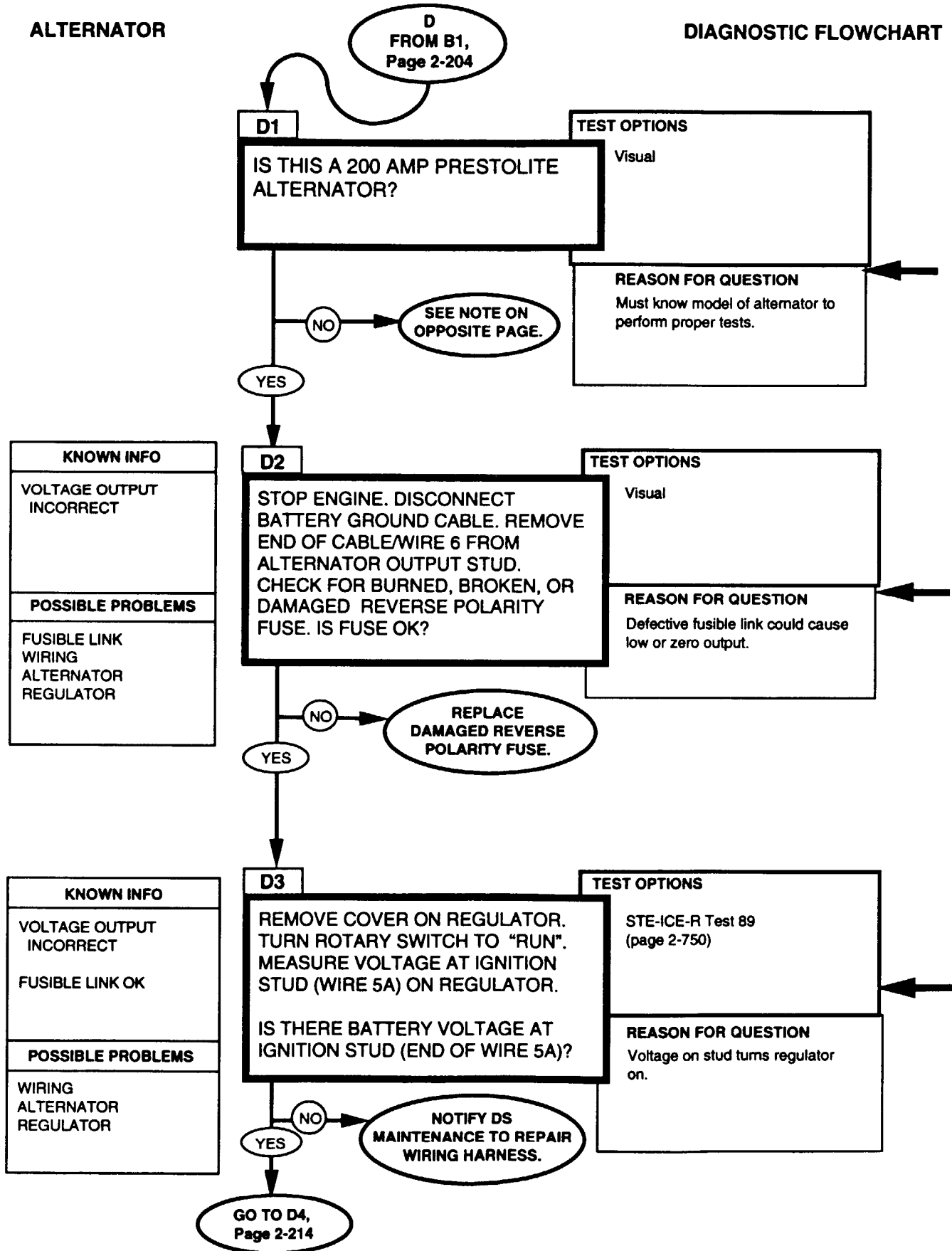
1. Start Test 10, Engine RPM.
2. Crank or start the engine. Displayed reading is RPM. Cranking RPM should be approximately 100. Set idle speed to 850 RPM.

**0-45 DC VOLTS
STE/ICE-R TEST 89**

1. Connect RED clip to indicated test point, BLACK clip to negative or ground.
2. Start Test 89, DC volts.
3. Displayed reading is in volts.

ALTERNATOR

DIAGNOSTIC FLOWCHART



REFERENCE INFORMATION

ALTERNATOR

NOTE

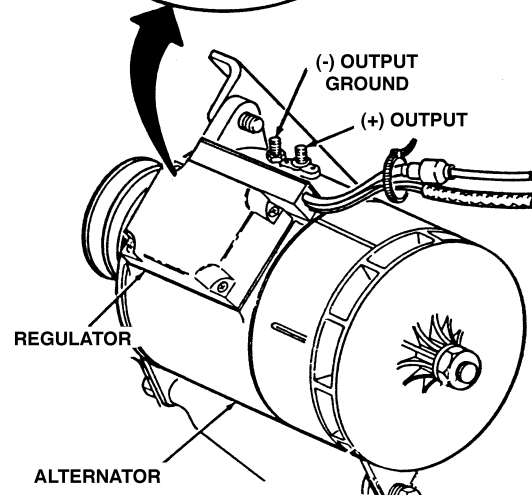
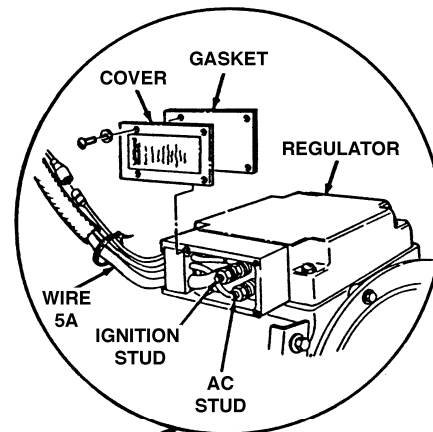
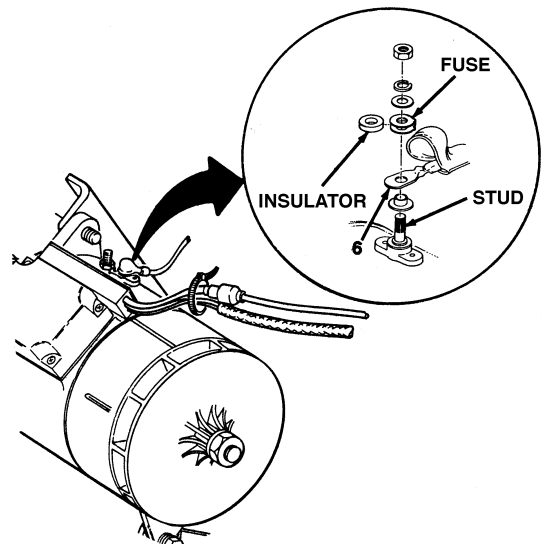
- For 60 amp Prestolite alternator, go to B, page 2-204.
- For 100 amp Prestolite alternator, go to C, page 2-208.
- For 200 amp Prestolite alternator, continue D.
- For 200 amp single voltage Niehoff alternator, go to E, page 2-218.
- For 100 amp single voltage Niehoff alternator, go to F, page 2-222.
- For 100 amp dual voltage Niehoff alternator, go to F.1, page 2-224.2.
- For 200 amp dual voltage Niehoff alternator, go to G, page 2-224.6.
- For 400 amp dual voltage Niehoff alternator, go to H, page 2-224.10.

Replacement of Reverse Polarity Fuse

1. Remove nut, lockwasher, washer, fuse, insulator and cable 6 from output stud.
2. Examine fuse for burns and breaks. Replace fuse and insulator if damaged.
3. Install new fuse and insulator on output stud with washer, lockwasher, and nut. Tighten nut 10-15 lb-in. (14-20 N•m).

1. Disconnect battery ground cable.
2. Remove four screws, lockwashers, gasket, and cover from regulator.
3. Remove potting material as necessary to gain access to studs.

<p>0-45 DC VOLTS STE/ICE-R TEST 89</p>
<ol style="list-style-type: none"> 1. Connect RED clip to the indicated test point, BLACK clip to negative or ground. 2. Start Test 89, DC volts. 3. Displayed reading is in volts.



ALTERNATOR

DIAGNOSTIC FLOWCHART

KNOWN INFO
VOLTAGE OUTPUT INCORRECT FUSIBLE LINK OK
POSSIBLE PROBLEMS
ALTERNATOR REGULATOR TEMPERATURE COMPENSATION ERROR

D4

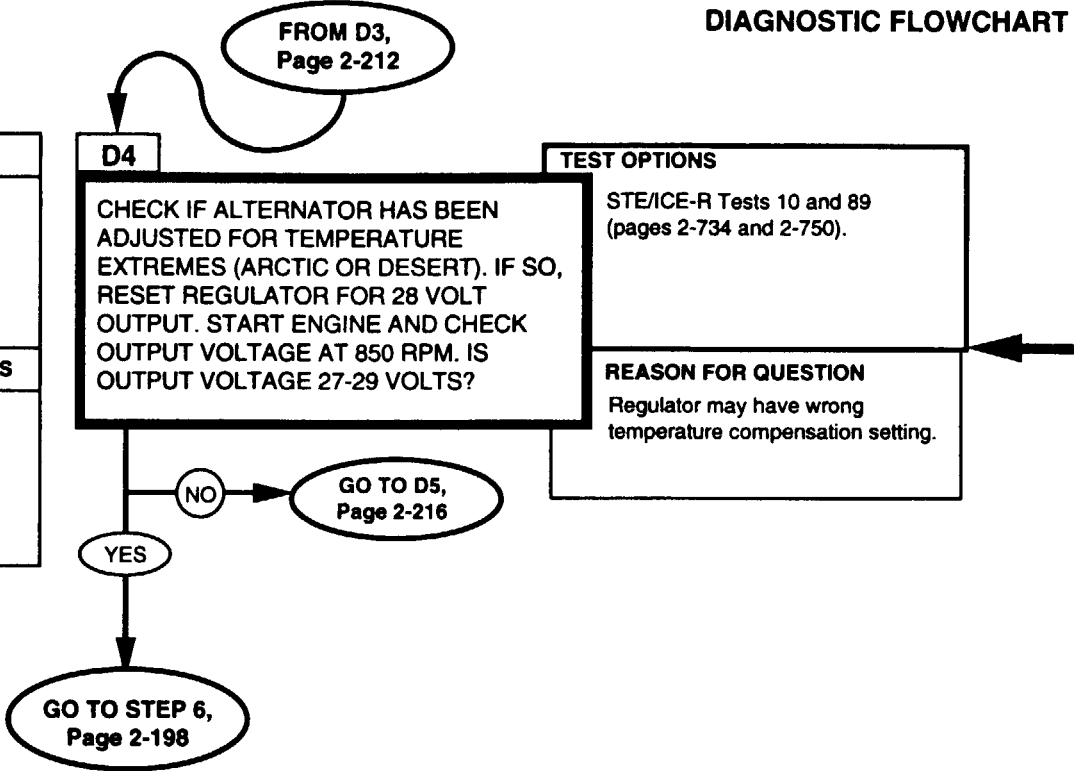
CHECK IF ALTERNATOR HAS BEEN ADJUSTED FOR TEMPERATURE EXTREMES (ARCTIC OR DESERT). IF SO, RESET REGULATOR FOR 28 VOLT OUTPUT. START ENGINE AND CHECK OUTPUT VOLTAGE AT 850 RPM. IS OUTPUT VOLTAGE 27-29 VOLTS?

TEST OPTIONS

STE/ICE-R Tests 10 and 89 (pages 2-734 and 2-750).

REASON FOR QUESTION

Regulator may have wrong temperature compensation setting.



REFERENCE INFORMATION

ALTERNATOR

TEMPERATURE-ENVIRONMENT ADJUSTMENT

1. Disconnect battery ground cable.
2. Remove four screws securing regulator to alternator.
3. Position regulator to allow access to the buss bar link. The buss bar link and voltage setting terminals are located under sealant. It may be necessary to scrape away some of the sealant to access the buss bar link and terminals.
4. To adjust the voltage setting to 27.2 volts (for hot or desert condition), loosen screw E0 and remove screws E1 and E2. Rotate bus bar link to E2. Reinstall screws E1 and E2 and tighten screw E0.
5. Apply RTV sealant to fully cover buss bar link and voltage setting terminals.
6. Install regulator to alternator with four screws.
7. Connect battery ground cable.
8. Check output voltage, it should read 27.2 volts.

NOTE

To reset alternator output voltage to 28 volts, the buss bar link should be connected between E0 and E1. The terminal connection E0 and E3 provides an output voltage of 28.8 volts (for arctic conditions). When operation in hot weather or arctic conditions cease, the alternator output voltage should be reset to its normal 28.0 volt setting.

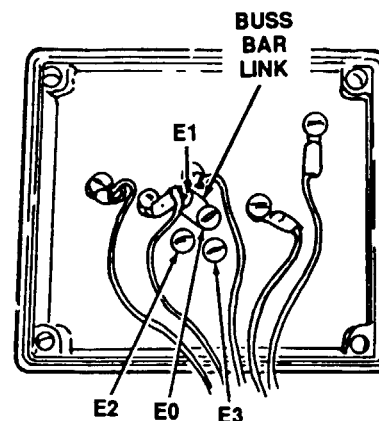
9. Mark the output voltage setting on the alternator and annotate the information in the vehicle log book for future reference.

NOTE

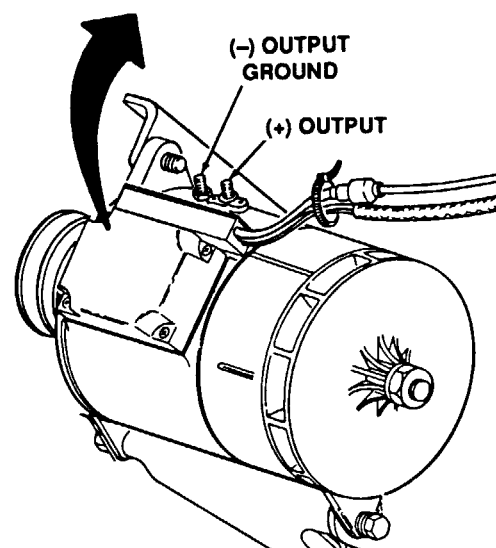
This procedure resets the alternator output approximately 0.8 volts on either side of 28 volts, but will not correct for larger errors.

NOTE

If an overcharge condition exists, wiring to regulator is satisfactory.



BOTTOM OF REGULATOR



200 AMP
PRESTOLITE ALTERNATOR

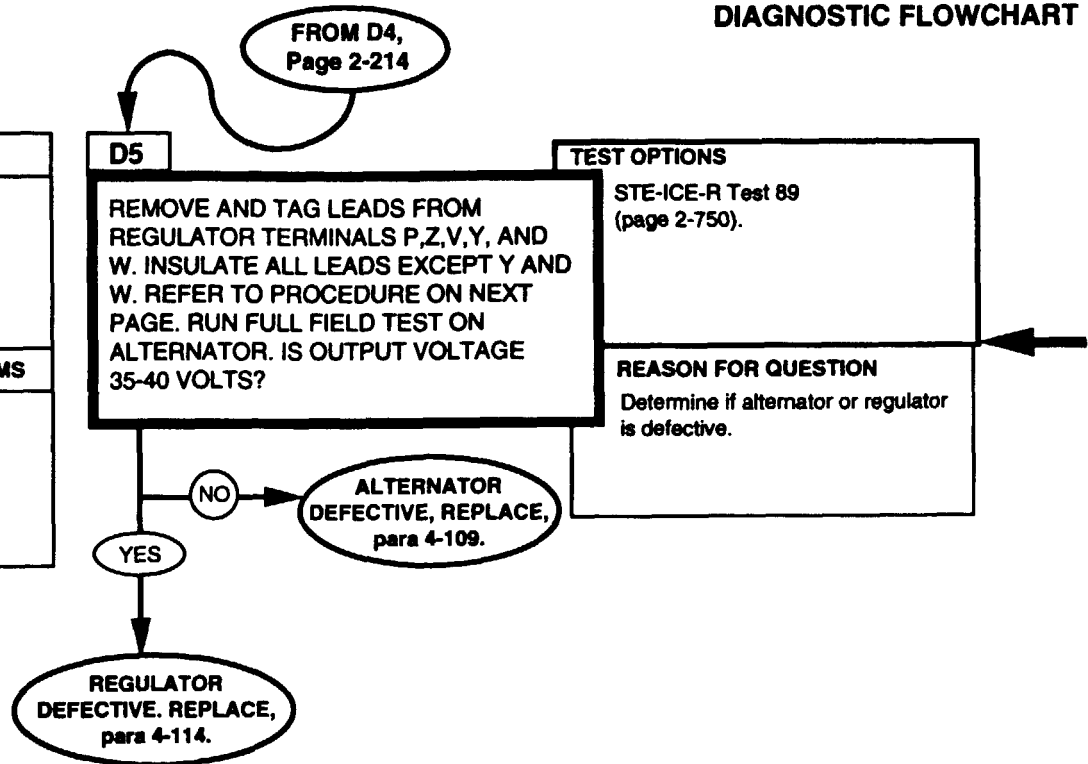
ENGINE RPM STE/ICE-R TEST 10
<ol style="list-style-type: none"> 1. Start test 10, Engine RPM. 2. Crank or start the engine. Displayed reading is RPM. Engine RPM should be 850.

0-45 DC VOLTS STE/ICE-R TEST 89
<ol style="list-style-type: none"> 1. Connect RED clip to the indicated test point, BLACK clip to negative or ground. 2. Start Test 89, DC volts. 3. Displayed reading is in volts.

ALTERNATOR

DIAGNOSTIC FLOWCHART

KNOWN INFO
VOLTAGE OUTPUT INCORRECT
POSSIBLE PROBLEMS
ALTERNATOR REGULATOR



REFERENCE INFORMATION

ALTERNATOR

FULL FIELD TEST

1. Disconnect battery ground cable.

NOTE

Tag leads before removal.

2. Remove five screws, lockwashers, and leads from bottom of regulator.
3. Insulate leads from V,P, and Z terminals.
4. Connect 6 volt lantern battery NSN 6135-00-643-1310, (or equivalent that can supply 1.0 amp current at 6 volts) with (+) battery and lead connector to W lead and (-) battery and lead connector to Y lead. Insulate all connections.
5. Monitor voltage across alternator output studs. Meter must be capable of reading 50 volts.

CAUTION

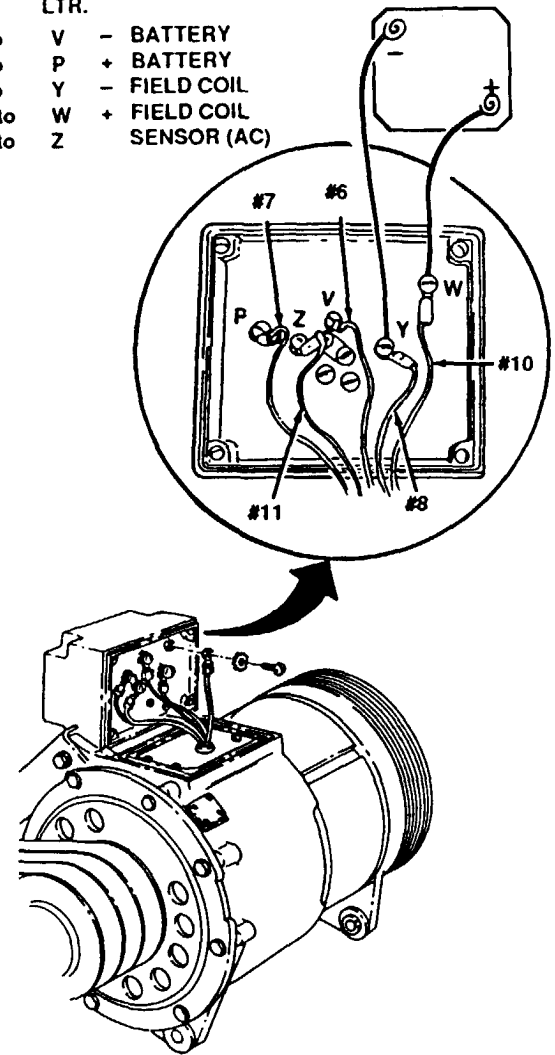
Ensure all vehicle and on board equipment are turned off. Higher voltages could damage components.

6. Connect battery ground cable.
7. Start vehicle and run engine to 900 rpm. Run only long enough to obtain a stable output voltage reading.
8. Stop engine, remove 6 volt battery and leads.

NOTE

If installing alternator, reconnect regulator (para 4-114).

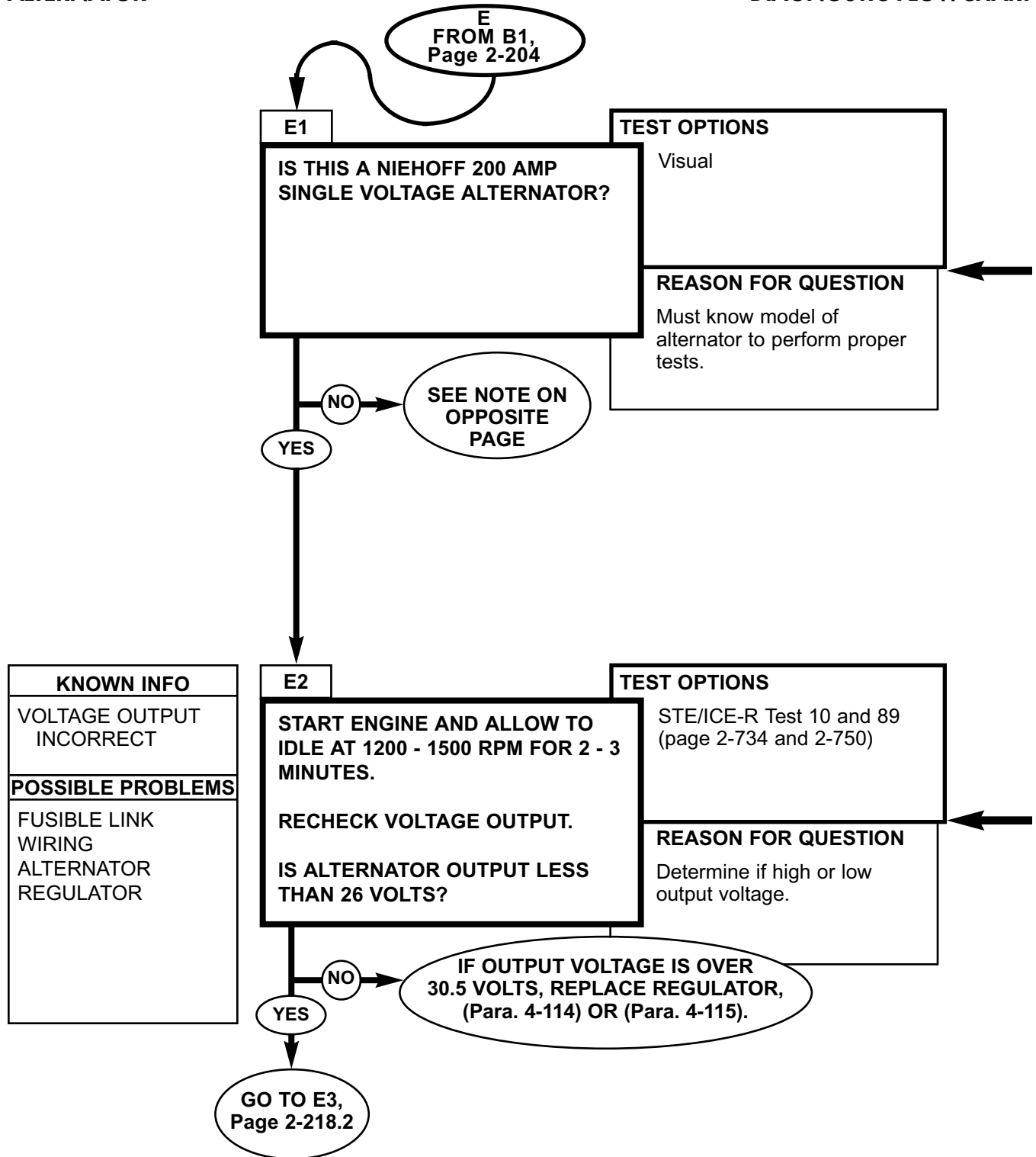
WIRE NO.	TERM. LTR.	FUNCTION
#6 to	V	- BATTERY
#7 to	P	+ BATTERY
#8 to	Y	- FIELD COIL
#10 to	W	+ FIELD COIL
#11 to	Z	SENSOR (AC)



<p>0-45 DC VOLTS STE/ICE-R TEST 89</p>
<ol style="list-style-type: none"> 1. Connect RED clip to the indicated test point, BLACK clip to negative or ground. 2. Start Test 89, DC volts. 3. Displayed reading is in volts.

ALTERNATOR

DIAGNOSTIC FLOWCHART



REFERENCE INFORMATION

ALTERNATOR

NOTE

For 60 amp Prestolite alternator, go to B, page 2-204.
 For 100 amp Prestolite alternator, go to C, page 2-208.
 For 200 amp Prestolite alternator, go to D, page 2-212.
 For 200 amp single voltage Niehoff alternator, continue with E.
 For 100 amp single voltage Niehoff alternator, go to F, page 2-222.
 For 100 amp dual voltage Niehoff alternator, go to F.1, page 2-224.2.
 For 200 amp dual voltage Niehoff alternator, go to G, page 2-224.6.
 For 400 amp dual voltage Niehoff alternator, go to H, page 2-224.10.

NOTE

The regulator for this model alternator has overvoltage protection. Any output voltage over 30.5 volts is an overvoltage.
 Output voltage of 26 - 30.5 is acceptable for this alternator.

**ENGINE RPM
STE/ICE-R TEST 10**

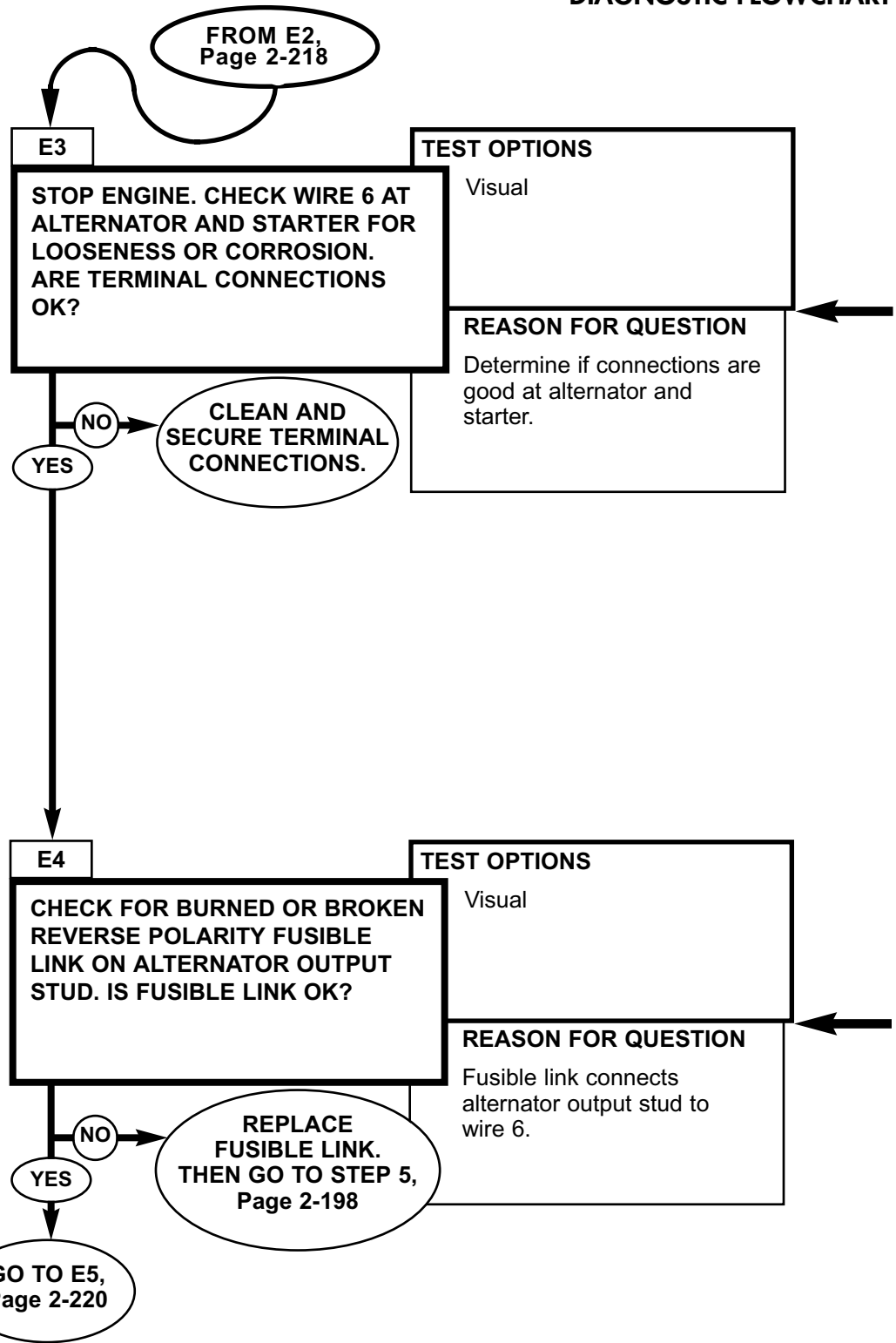
1. Start Test 10, Engine RPM.
2. Crank or start the engine. Displayed reading is RPM. Engine RPM should be 1200 - 1500.

**0-45 DC VOLTS
STE/ICE-R TEST 89**

1. Connect RED clip to the indicated test point, BLACK clip to negative or ground.
2. Start Test 89, DC volts.
3. Displayed reading is in volts.

ALTERNATOR

DIAGNOSTIC FLOWCHART



KNOWN INFO
VOLTAGE OUTPUT INCORRECT
POSSIBLE PROBLEMS
FUSIBLE LINK WIRING ALTERNATOR REGULATOR

REFERENCE INFORMATION

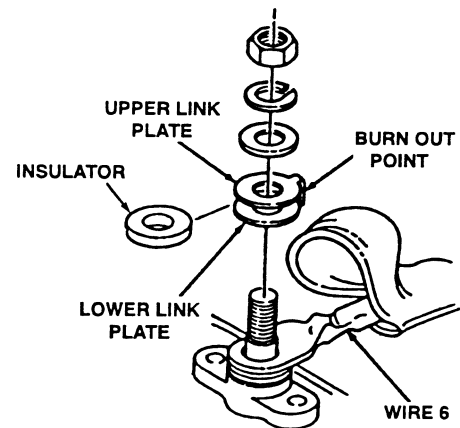
ALTERNATOR

NOTE

Wire 6 connects alternator output stud to starter terminal. A poor connection at these points will cause a low or no alternator output condition.

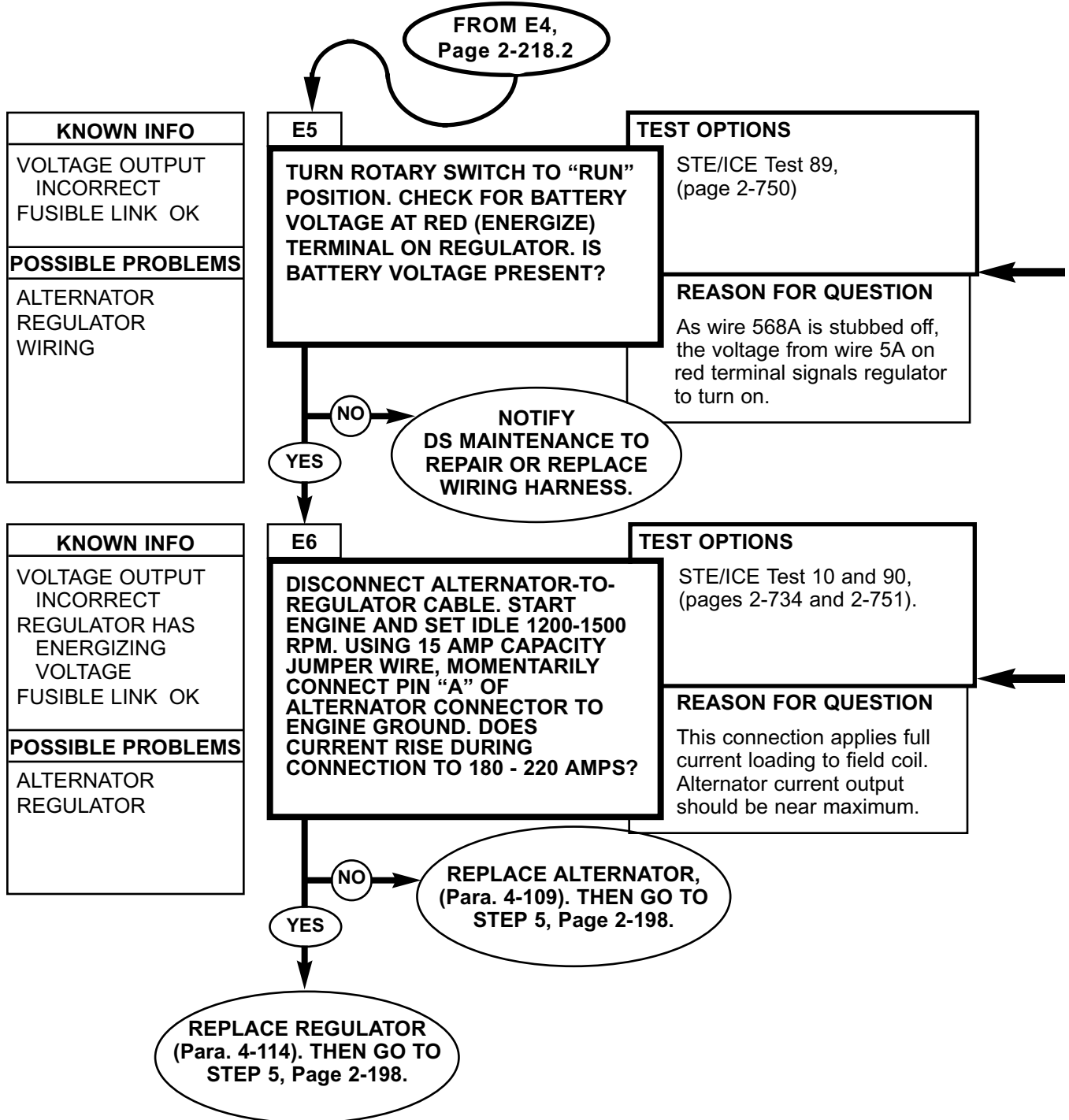
FUSIBLE LINK REPLACEMENT

1. Disconnect battery ground cable.
2. Remove boot from alternator output terminal.
3. Remove nut, lockwasher, washers, and fusible link from terminal.
4. Inspect fusible link.
5. Replace fusible link if damaged or appears burned.
6. Connect battery ground cable.



ALTERNATOR

DIAGNOSTIC FLOWCHART



REFERENCE INFORMATION

ALTERNATOR

1. Slide boot back from wire lug to expose red terminal.
2. Make contact at stud.

**0-45 DC VOLTS
STE/ICE-R TEST 89**

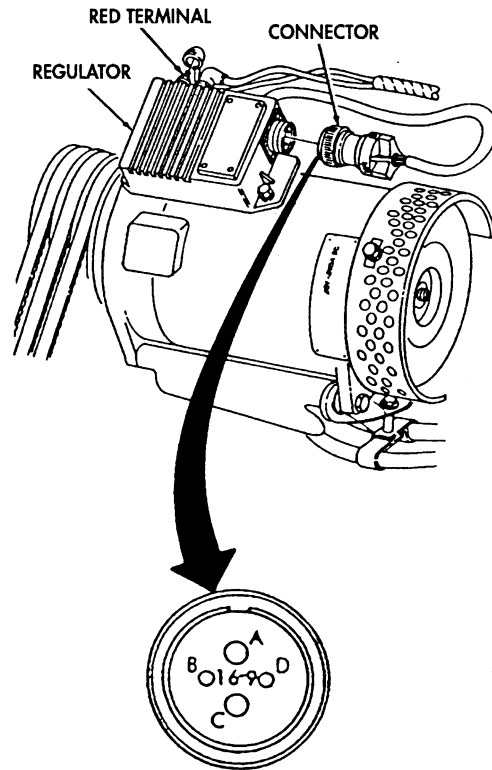
1. Connect RED clip to the indicated test point, BLACK clip to negative or ground.
2. Start Test 89, DC Volts.
3. Displayed reading is in volts.

**ENGINE RPM
STE/ICE-R TEST 10**

1. Start Test 10, Engine RPM.
2. Crank or start the engine. Displayed reading is RPM. Set engine to fast idle of 1200 - 1500 RPM.

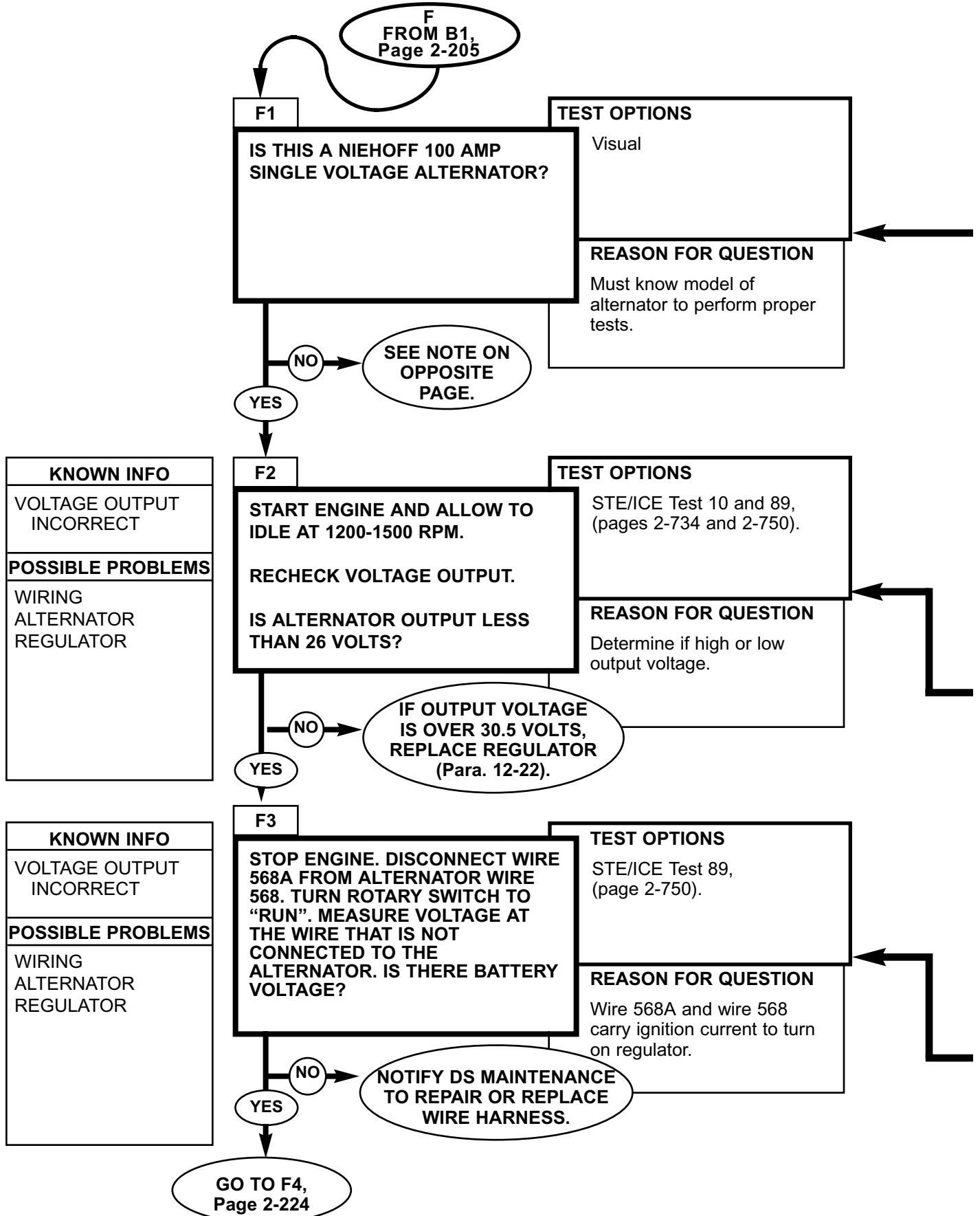
**0-1500 AMPS DC
STE/ICE-R TEST 90**

1. Connect probe.
2. Start Test 90, DC amps.
3. Displayed reading is in amps.



ALTERNATOR

DIAGNOSTIC FLOWCHART



REFERENCE INFORMATION

ALTERNATOR

NOTE

For 60 amp Prestolite alternator, go to B, page 2-204.
 For 100 amp Prestolite alternator, go to C, page 2-208.
 For 200 amp Prestolite alternator, go to D, page 2-212.
 For 200 amp single voltage Niehoff alternator, continue with E.
 For 100 amp single voltage Niehoff alternator, continue with F.
 For 100 amp dual voltage Niehoff alternator, go to F.1, page 2-224.2.
 For 200 amp dual voltage Niehoff alternator, go to G, page 2-224.6.
 For 400 amp dual voltage Niehoff alternator, go to H, page 2-224.10.

NOTE

The regulator for this model alternator has overvoltage protection. Any output voltage over 30.5 volts is an overvoltage.
 Output voltage of 25-30.5 is acceptable for this alternator.

**ENGINE RPM
STE/ICE-R TEST 10**

1. Start Test 10, Engine RPM.
2. Crank or start the engine. Displayed reading is RPM. Engine RPM should be 1200 - 1500.

**0-45 DC VOLTS
STE/ICE-R TEST 89**

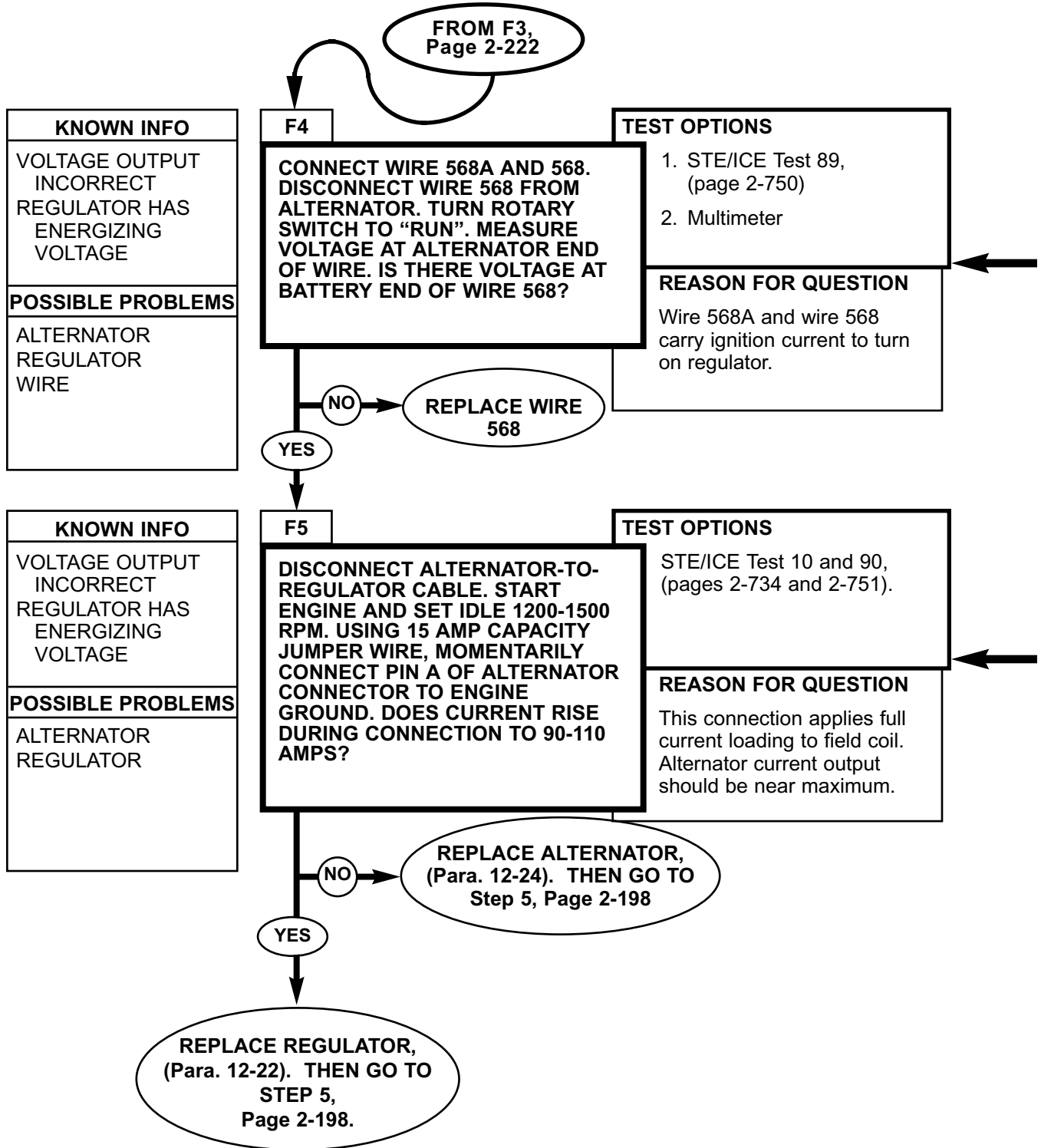
1. Connect RED clip to the indicated test point, BLACK clip to negative or ground.
2. Start Test 89, DC Volts.
3. Displayed reading is in volts.

NOTE

Voltage on wire 568 signals regulator to turn on. Without voltage, regulator can't operate. Wire 568A is connected with wire 5A inside engine wire harness. If there is no loose end on wire 568A, wire harness repair is required.

ALTERNATOR

DIAGNOSTIC FLOWCHART



REFERENCE INFORMATION

ALTERNATOR

1. Slide boot back from wire lug to expose red terminal.
2. Make contact at stud.

**0-45 DC VOLTS
STE/ICE-R TEST 89**

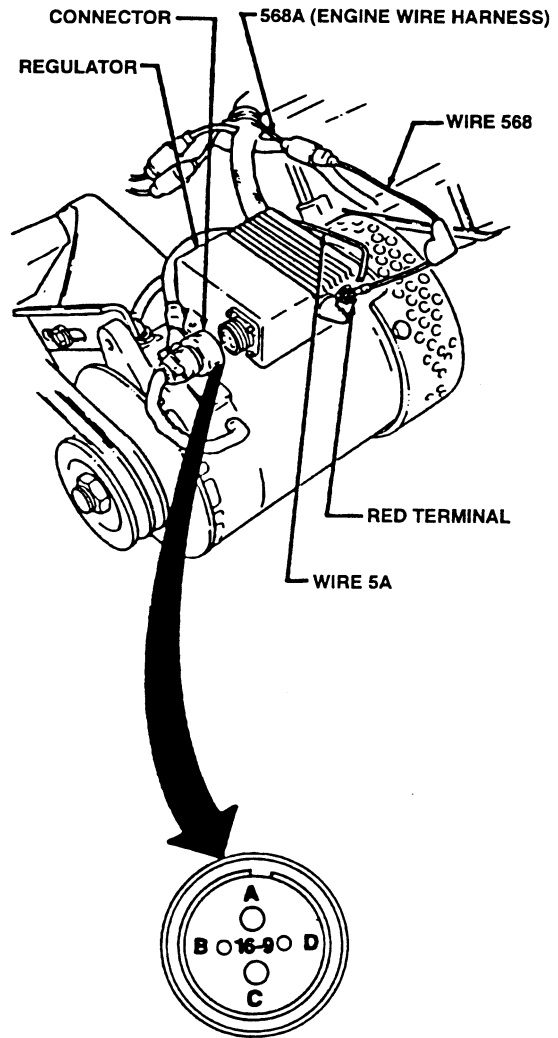
1. Connect RED clip to the indicated test point, BLACK clip to negative or ground.
2. Start Test 89, DC Volts.
3. Displayed reading is in volts.

**ENGINE RPM
STE/ICE-R TEST 10**

1. Start Test 10, Engine RPM.
2. Crank or start the engine. Displayed reading is RPM. Set engine to fast idle of 1200 - 1500 RPM.

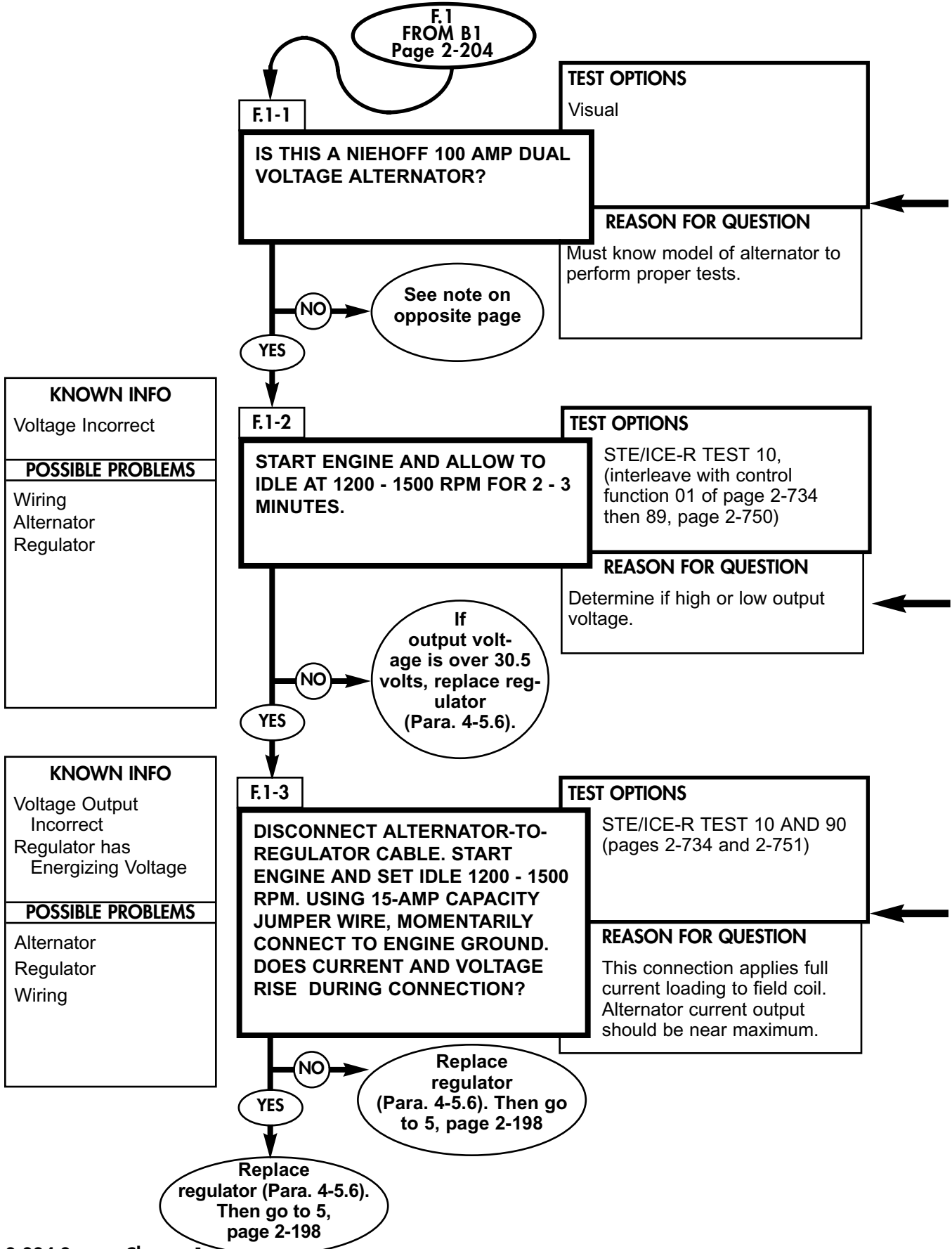
**0-1500 AMPS DC
STE/ICE-R TEST 90**

1. Connect probe.
2. Start Test 90, DC amps.
3. Displayed reading is in amps.



ALTERNATOR

DIAGNOSTIC FLOWCHART



REFERENCE INFORMATION

ALTERNATOR

NOTE

For 60 amp Prestolite alternator, go to B, page 2-204.
 For 100 amp Prestolite alternator, go to C, page 2-208.
 For 200 amp Prestolite alternator, go to D, page 2-212.
 For 200 amp single voltage Niehoff alternator, go to E, page 2-218.
 For 100 amp single voltage Niehoff alternator, go to F, page 2-222.
 For 100 amp dual voltage Niehoff alternator, continue with F.1.
 For 200 amp dual voltage Niehoff alternator, go to G, page 2-224.6.
 For 400 amp dual voltage Niehoff alternator, go to H, page 2-224.10.

NOTE

The regulator for this model alternator has overvoltage protection. Any output voltage over 30.5 volts is an overvoltage.

Output voltage of 26-30.5 is acceptable for this alternator.

NOTE

The regulator for this alternator has overvoltage protection. Any output voltage over 30.5 volts is an overvoltage.

Output voltage of 26-30.5 is acceptable for this alternator.

**ENGINE RPM
STE/ICE-R TEST 10**

1. Start test 10, Engine RPM.
2. Crank or start the engine. Displayed reading is RPM. Engine RPM should be 1200-1500.

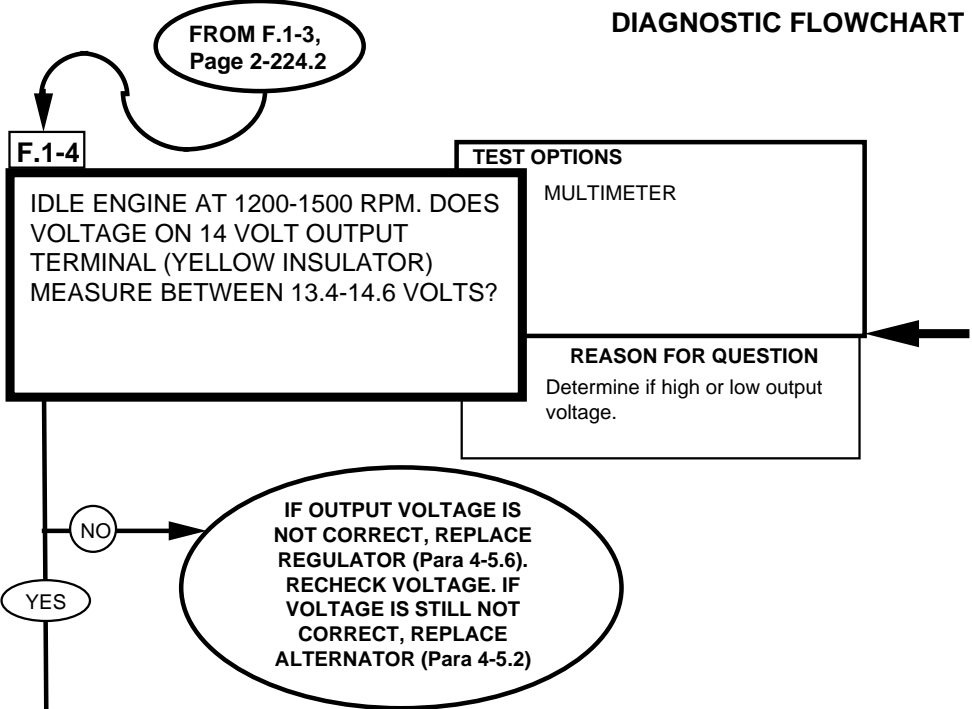
**0-1,500 AMPS DC
STE/ICE-R TEST 90**

1. Connect probe.
2. Start Test 90, DC amps.
3. Displayed reading is in amps.

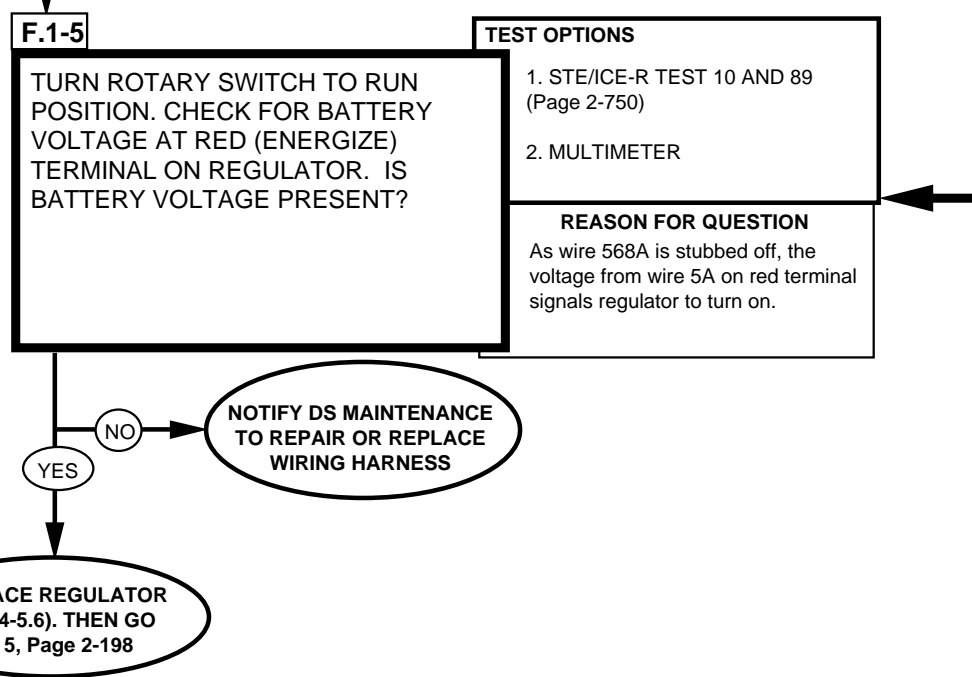
ALTERNATOR

DIAGNOSTIC FLOWCHART

KNOWN INFO
VOLTAGE OUTPUT INCORRECT REGULATOR HAS ENERGIZING VOLTAGE
POSSIBLE PROBLEMS
ALTERNATOR REGULATOR WIRING



KNOWN INFO
VOLTAGE OUTPUT INCORRECT REGULATOR HAS ENERGIZING VOLTAGE
POSSIBLE PROBLEMS
ALTERNATOR REGULATOR WIRING



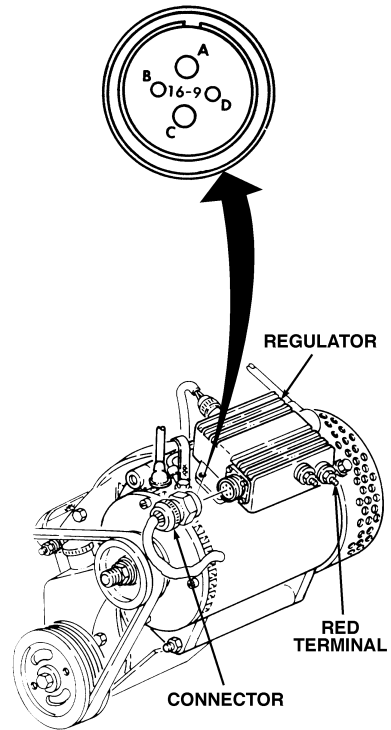
REFERENCE INFORMATION

ALTERNATOR

1. Slide boot back from wire lug to expose red terminal.
2. Make contact at stud.

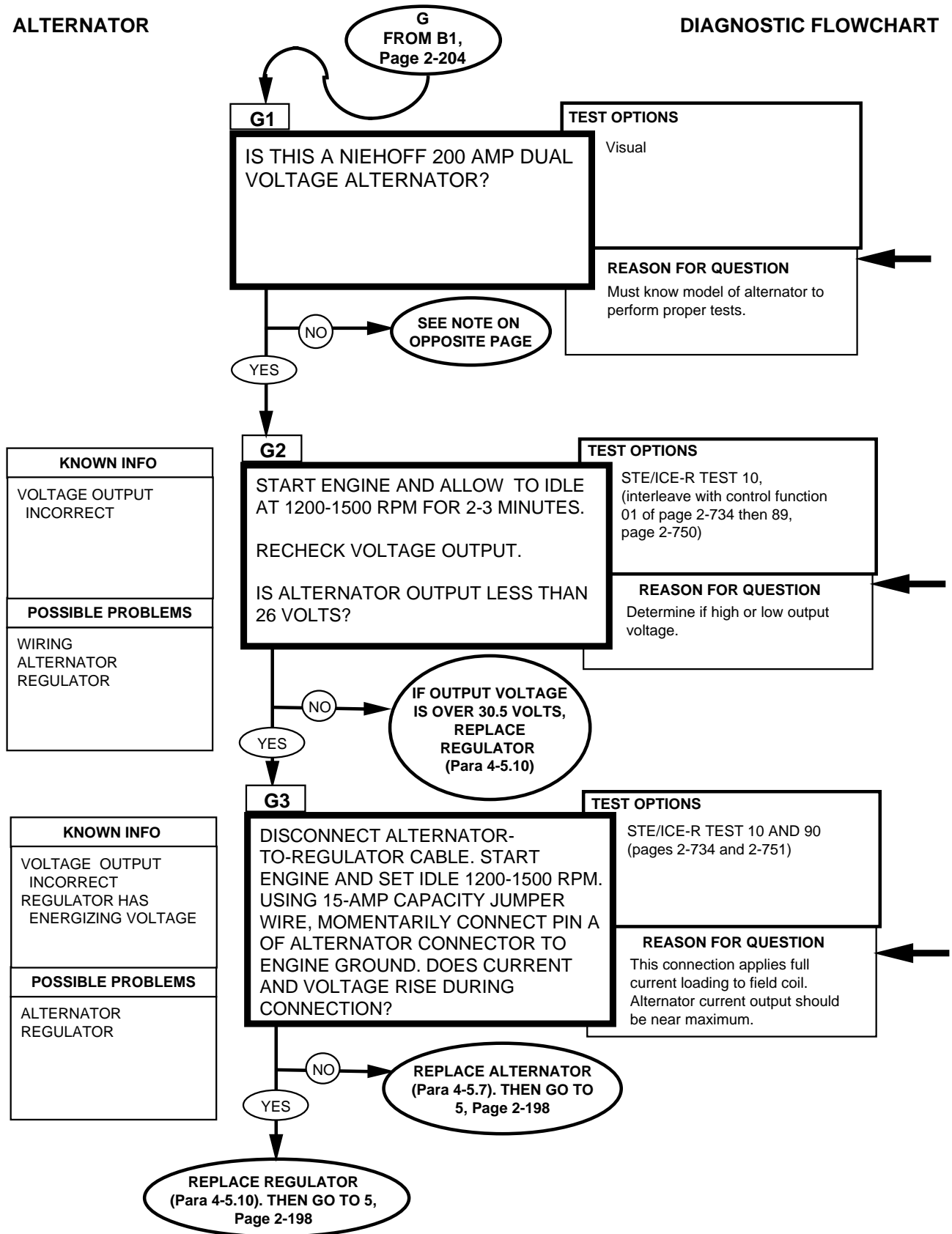
**0-45 DC VOLTS
STE/ICE-R TEST 89**

1. Connect RED clip to the indicated test point, BLACK clip to negative or ground.
2. Start Test 89, DC Volts.
3. Displayed reading is in volts.



ALTERNATOR

DIAGNOSTIC FLOWCHART



REFERENCE INFORMATION

ALTERNATOR

NOTE

For 60 amp Prestolite alternator, go to B, page 2-204.
 For 100 amp Prestolite alternator, go to C, page 2-208.
 For 200 amp Prestolite alternator, go to D, page 2-212.
 For 200 amp single voltage Niehoff alternator, go to E, page 2-218.
 For 100 amp single voltage Niehoff alternator, go to F, page 2-222.
 For 100 amp dual voltage Niehoff alternator, go to F.1, page 2-224.2.
 For 200 amp dual voltage Niehoff alternator, continue with G.
 For 400 amp dual voltage Niehoff alternator, go to H, page 2-224.10.

NOTE

The regulator for this model alternator has overvoltage protection. Any output voltage over 30.5 volts is an overvoltage.

Output voltage of 26-30.5 is acceptable for this alternator.

NOTE

The regulator for this alternator has overvoltage protection. Any output voltage over 30.5 volts is an overvoltage.

Output voltage of 26-30.5 is acceptable for this alternator.

**ENGINE RPM
STE/ICE-R TEST 10**

1. Start test 10, Engine RPM.
2. Crank or start the engine. Displayed reading is RPM. Engine RPM should be 1200-1500.

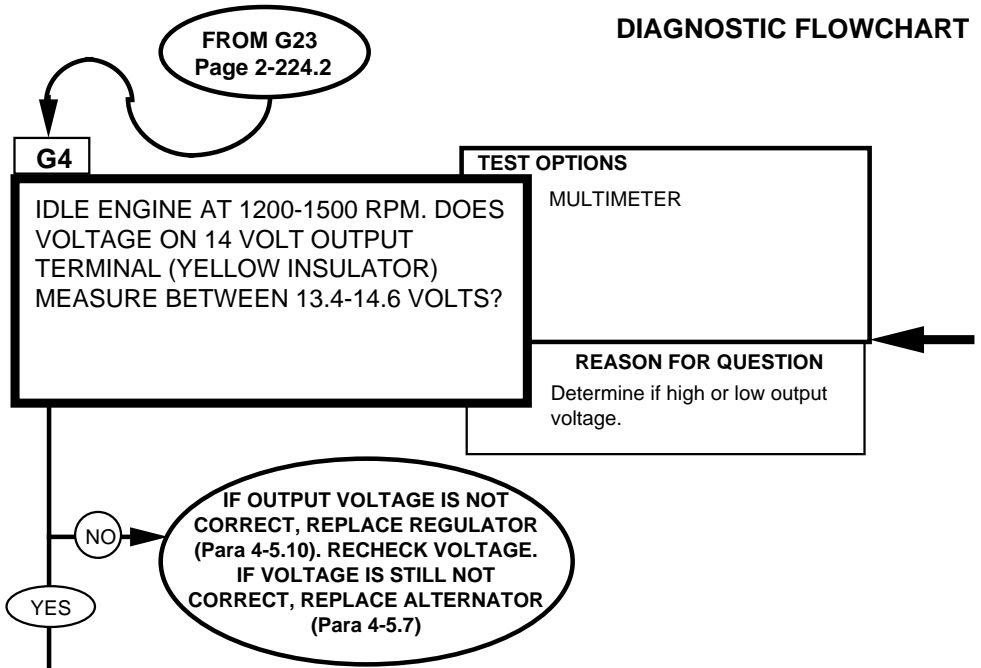
**0-45 DC VOLTS
STE/ICE-R TEST 89**

1. Connect RED clip to the indicated test point, BLACK clip to negative or ground.
2. Start Test 89, DC Volts.
3. Displayed reading is in volts.

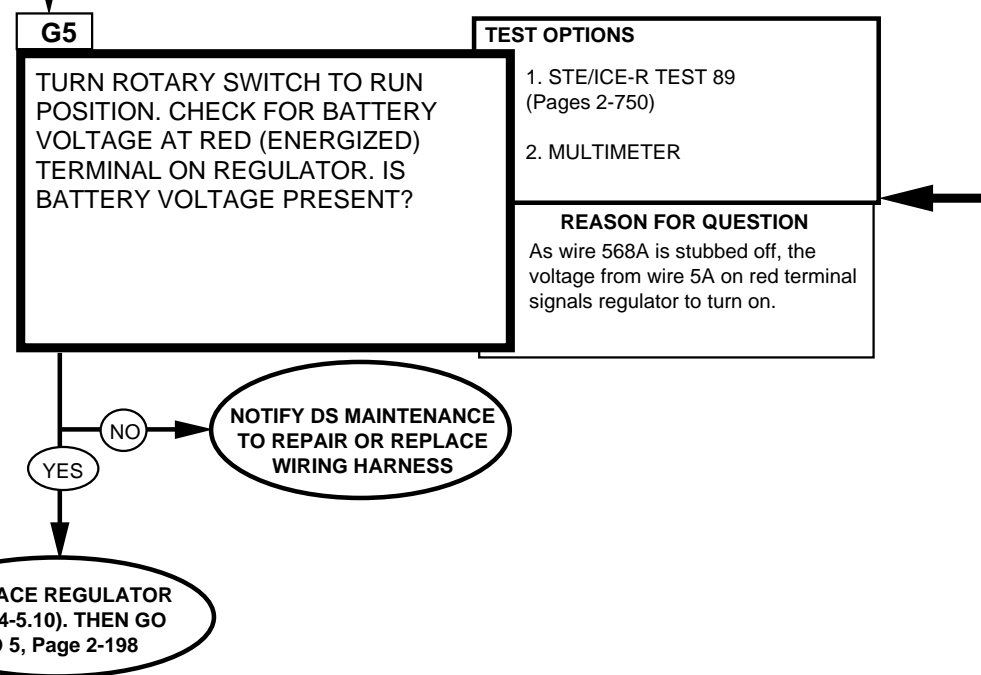
ALTERNATOR

DIAGNOSTIC FLOWCHART

KNOWN INFO
VOLTAGE OUTPUT INCORRECT REGULATOR HAS ENERGIZING VOLTAGE
POSSIBLE PROBLEMS
ALTERNATOR REGULATOR WIRING

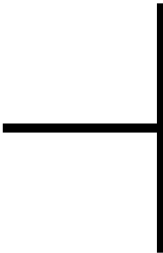


KNOWN INFO
VOLTAGE OUTPUT INCORRECT
POSSIBLE PROBLEMS
ALTERNATOR REGULATOR

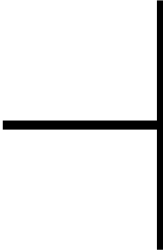
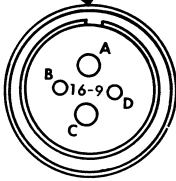
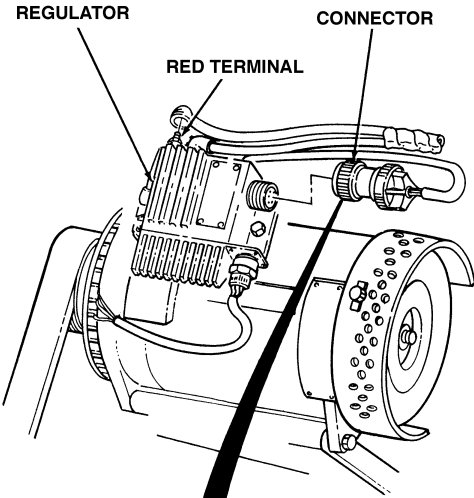


REFERENCE INFORMATION

ALTERNATOR



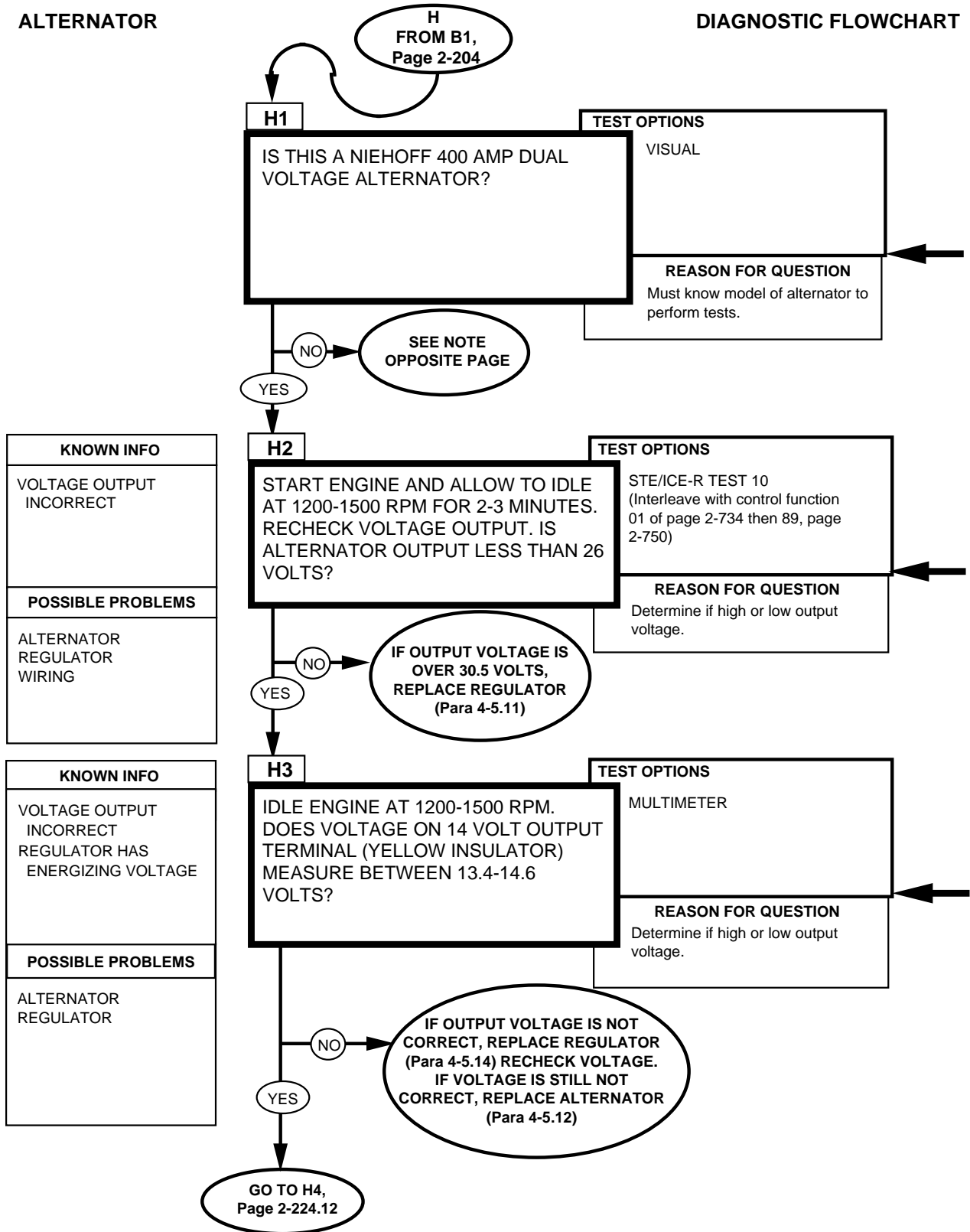
- 1. Slide boot back from wire lug to expose red terminal.
- 2. Make contact at stud.



<p>0-45 DC VOLTS STE/ICE-R TEST 89</p>
<ul style="list-style-type: none">1. Connect RED clip to the indicated test point, BLACK clip to negative or ground.2. Start Test 89, DC volts.3. Displayed reading is in volts.

ALTERNATOR

DIAGNOSTIC FLOWCHART



REFERENCE INFORMATION

ALTERNATOR

NOTE

For 60 amp Prestolite alternator, go to B, page 2-204.
 For 100 amp Prestolite alternator, go to C, page 2-208.
 For 200 amp Prestolite alternator, go to D, page 2-212.
 For 200 amp single voltage Niehoff alternator, go to E, page 2-218.
 For 100 amp single voltage Niehoff alternator, go to F, page 2-222.
 For 100 amp dual voltage Niehoff alternator, go to F.1, page 2-224.2.
 For 200 amp dual voltage Niehoff alternator, continue with G.
 For 400 amp dual voltage Niehoff alternator, go to H, page 2-224.10.

NOTE

The regulator for this model alternator has overvoltage protection. Any output voltage over 30.5 volts is an overvoltage.

Output voltage of 26-30.5 is acceptable for this alternator.

NOTE

The regulator for this alternator has overvoltage protection. Any output voltage over 30.5 volts is an overvoltage.

Output voltage of 26-30.5 is acceptable for this alternator.

**ENGINE RPM
STE/ICE-R TEST 10**

1. Start test 10, Engine RPM.
2. Crank or start the engine. Displayed reading is RPM. Engine RPM should be 1200-1500.

**0-45 DC VOLTS
STE/ICE-R TEST 89**

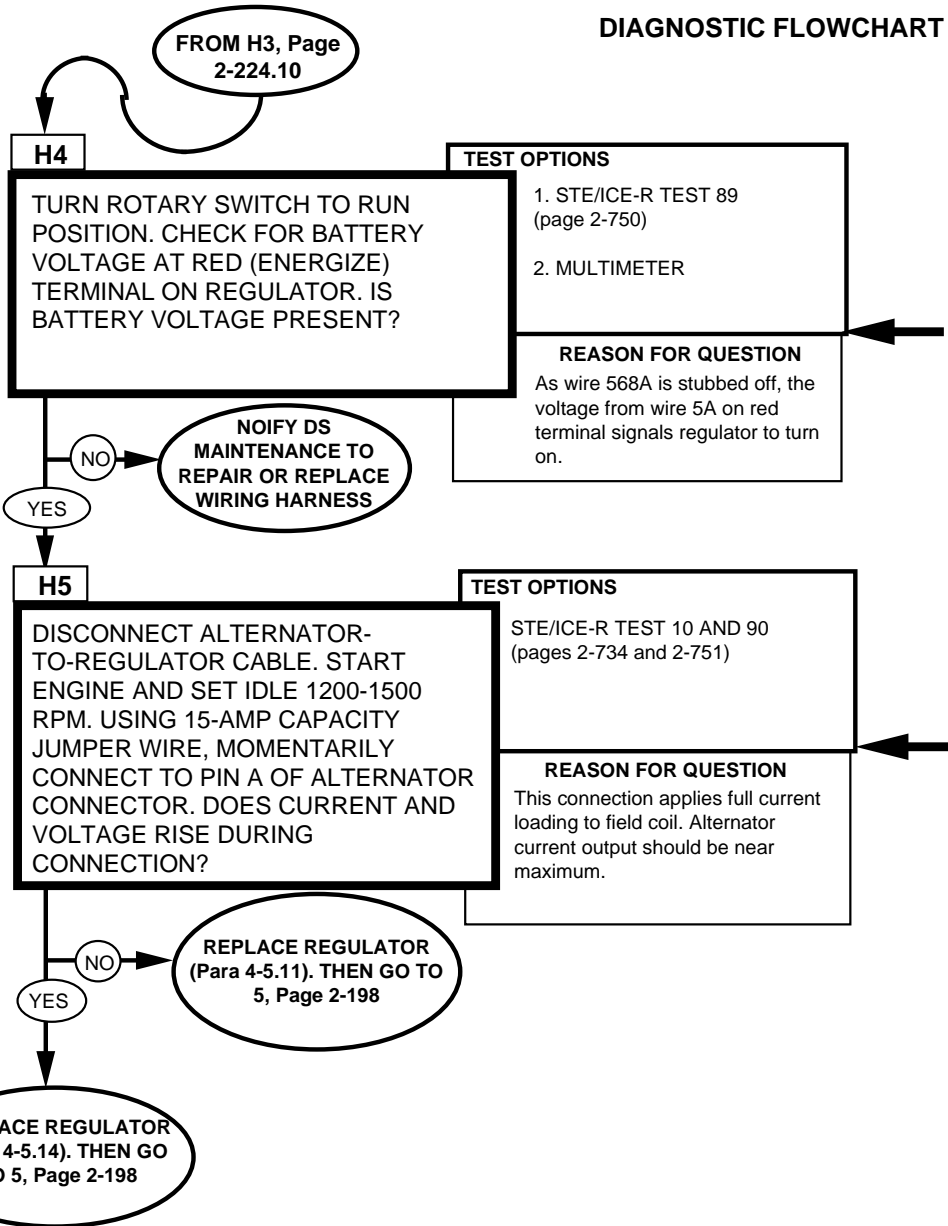
1. Connect RED clip to the indicated test point, BLACK clip to negative or ground.
2. Start Test 89, DC Volts.
3. Displayed reading is in volts.

ALTERNATOR

DIAGNOSTIC FLOWCHART

KNOWN INFO
VOLTAGE OUTPUT INCORRECT
POSSIBLE PROBLEMS
ALTERNATOR REGULATOR WIRING

KNOWN INFO
VOLTAGE OUTPUT INCORRECT
REGULATOR HAS ENERGIZING VOLTAGE
POSSIBLE PROBLEMS
ALTERNATOR REGULATOR



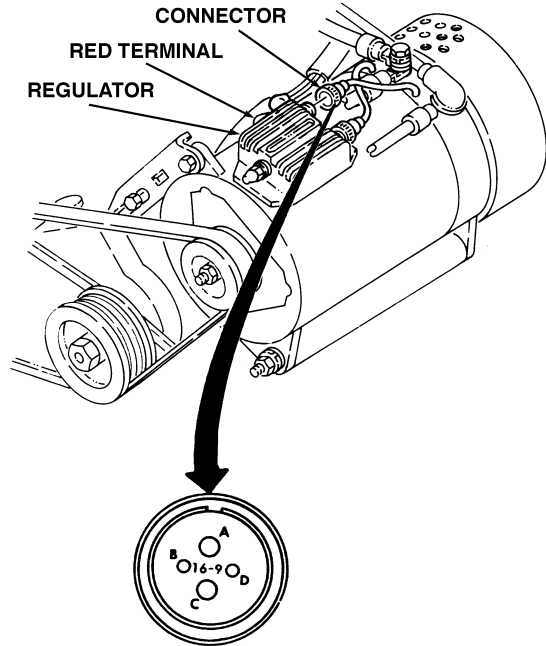
REFERENCE INFORMATION

ALTERNATOR

1. Slide boot back from wire lug to expose red terminal.
2. Make contact at stud.

**0-45 DC VOLTS
STE/ICE-R TEST 89**

1. Connect RED clip to the indicated test point, BLACK clip to negative or ground.
2. Start Test 89, DC Volts.
3. Displayed reading is in volts.



**ENGINE RPM
STE/ICE-R TEST 10**

1. Start Test 10, Engine RPM.
2. Crank or start the engine. Displayed reading is RPM. Set engine to fast idle of 1200-1500 RPM.

**0-1500 AMPS DC
STE/ICE-R TEST 90**

1. Connect probe.
2. Start Test 90, DC amps.
3. Displayed reading is in amps.

2-28. PROTECTIVE CONTROL BOX/DISTRIBUTION BOX TESTS

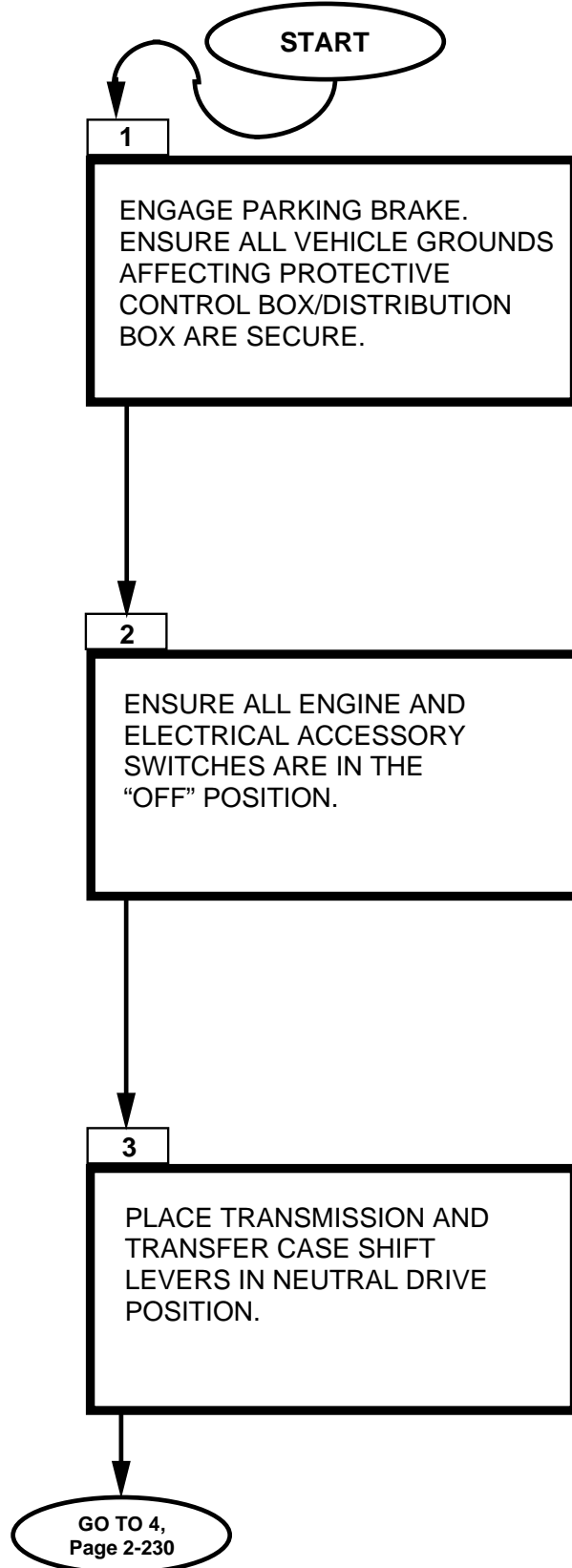
This protective control box /distribution box test can be run any time you think there may be a problem with the protective control box or distribution box, or if you were sent here from another system chain.

NOTE

- To perform PCB/distribution box diagnostics, a PCB test module is needed.
- For fabrication of PCB/distribution box test module, refer to Appendix D, Figs. 96-113, or requisitioned with NSN 6625-01-440-4522.

PROTECTIVE CONTROL BOX/DISTRIBUTION BOX

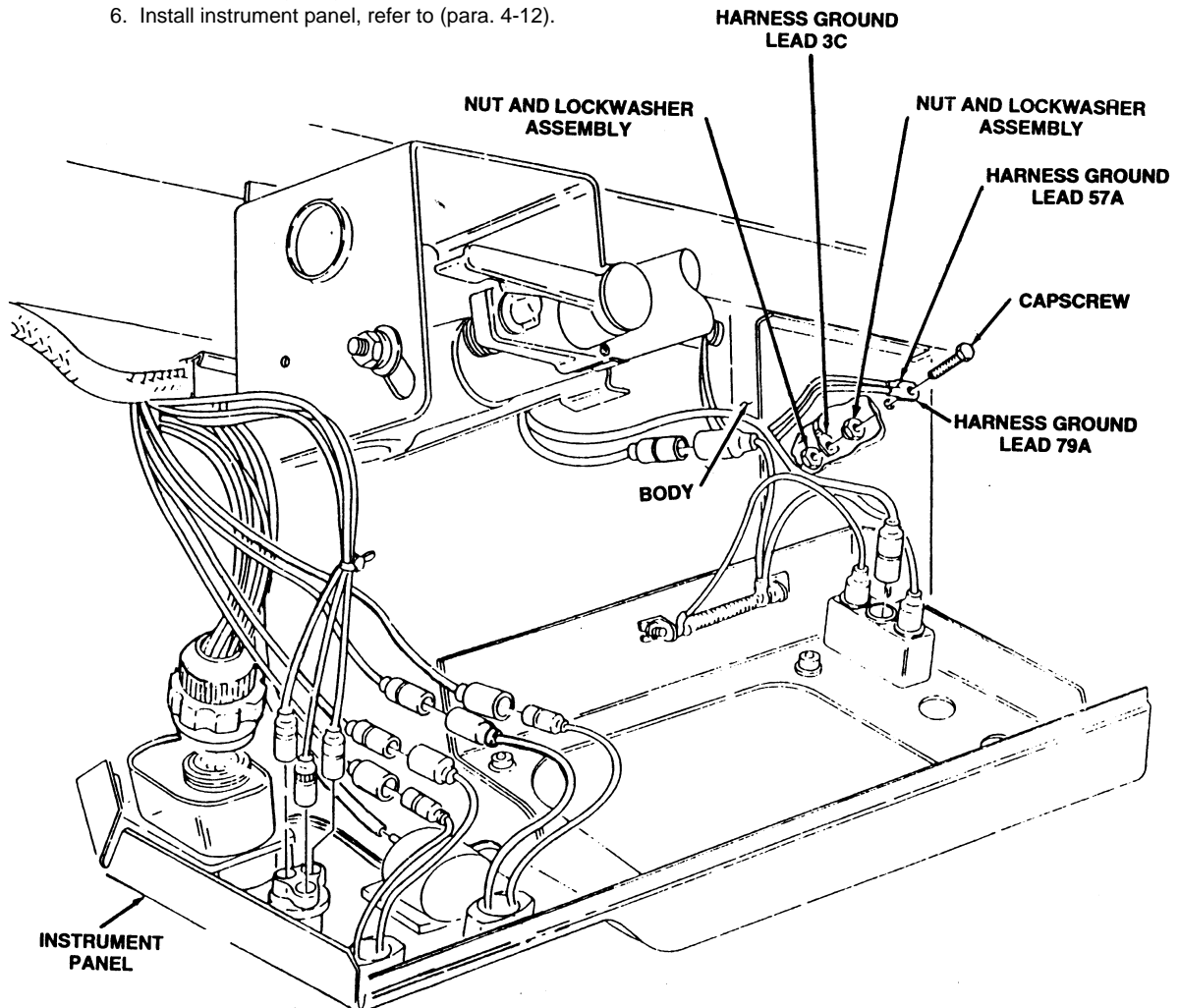
DIAGNOSTIC FLOWCHART



REFERENCE INFORMATION

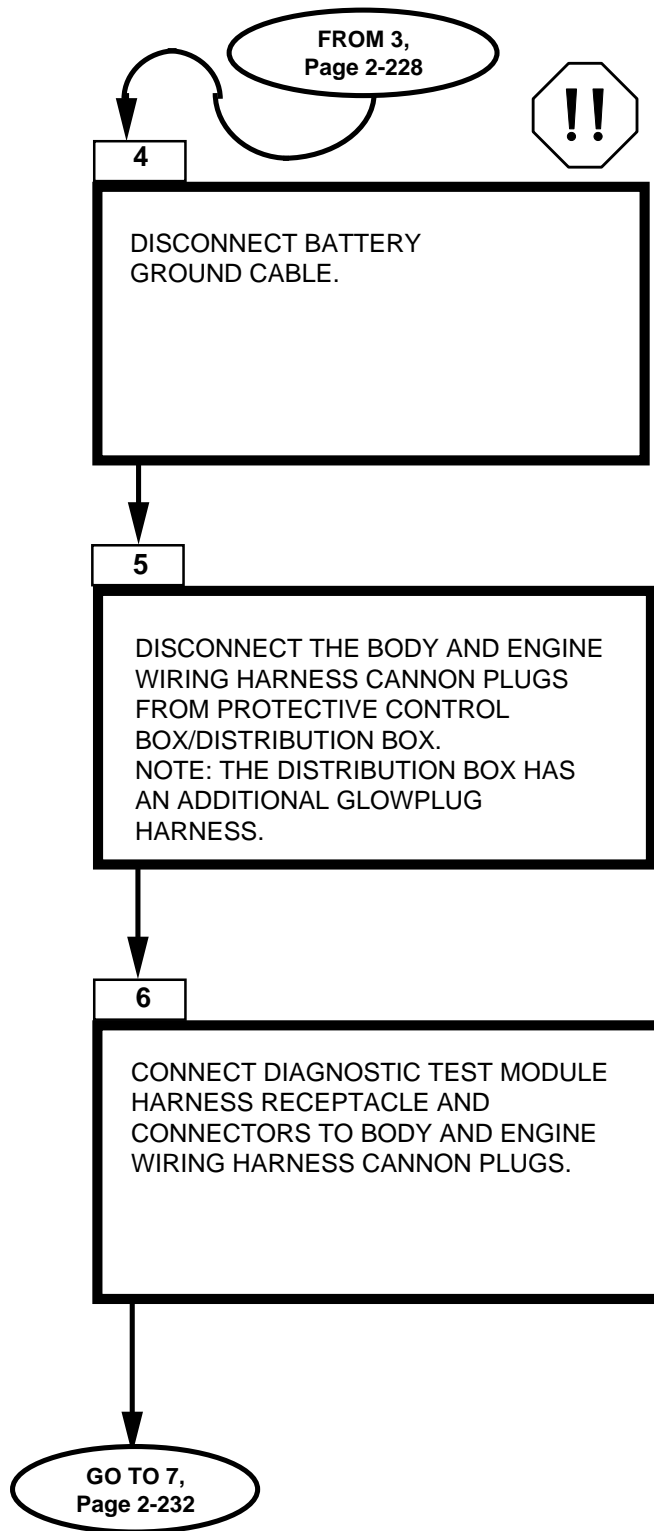
PROTECTIVE CONTROL BOX/DISTRIBUTION BOX

1. Remove instrument panel, refer to (para. 4-12).
2. Remove nut and lockwasher assembly and engine harness ground lead 3C from body. Remove nut and lockwasher assembly, cap screw, and harness ground leads 57A and 79A from body. Discard nut and lockwasher assemblies.
3. Inspect and clean wires and connection points.
4. Apply antiseize compound to harness ground leads 57A and 79A and install on body with cap screw and nut and lockwasher assembly. Apply antiseize compound to engine harness ground lead 3C and install on body with nut and lockwasher assembly.
5. Cover leads 3C, 57A, and 79A with RTV.
6. Install instrument panel, refer to (para. 4-12).



PROTECTIVE CONTROL BOX/DISTRIBUTION BOX

DIAGNOSTIC FLOWCHART



REFERENCE INFORMATION

PROTECTIVE CONTROL BOX/DISTRIBUTION BOX



WARNING

Disconnect negative battery cable before disconnecting and reconnecting protective control box/distribution box harness. Failure to do so may result in injury to personnel or damage to equipment.

PROTECTIVE CONTROL BOX/DISTRIBUTION BOX

DIAGNOSTIC FLOWCHART

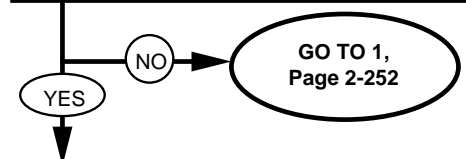
KNOWN INFO
NOTHING
POSSIBLE PROBLEMS
BATTERIES BAD LEAD 57B BAD GROUND PARKING BRAKE SWITCH BAD BODY HARNESS WIRES BAD GLOWPLUG CONTROLLER BAD ALTERNATOR BAD HARNESS WIRE 2A BAD IGNITION SWITCH BAD HARNESS WIRE 29A BAD HARNESS WIRE 29C BAD PROTECTIVE CONTROL BOX/ DISTRIBUTION BOX BAD



7

CONNECT BATTERY GROUND CABLE WITH IGNITION SWITCH IN THE "OFF" POSITION. ARE ANY LEDS "ON"? (REFER TO TABLE AT RIGHT)

TEST OPTIONS
1. TRY IT 2. VISUAL
REASON FOR QUESTION
If no LEDs are ON, that would indicate malfunctioning batteries.

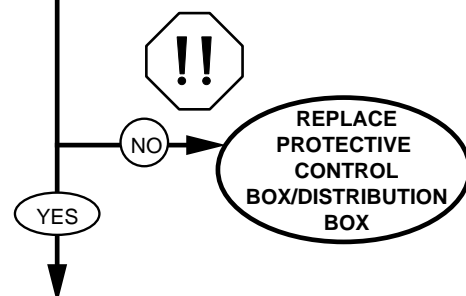


KNOWN INFO
BATTERIES OK
POSSIBLE PROBLEMS
LEAD 57B BAD GROUND PARKING BRAKE SWITCH BAD BODY HARNESS WIRES BAD ALTERNATOR BAD HARNESS WIRE 2A BAD IGNITION SWITCH BAD HARNESS WIRE 29A BAD HARNESS WIRE 29C BAD PROTECTIVE CONTROL BOX/ DISTRIBUTION BOX BAD

8

ARE LEDS 3 AND 4 "ON"?

TEST OPTIONS
VISUAL
REASON FOR QUESTION
If these LEDs are not ON, that would indicate protective control box (PCB)/distribution box malfunctions.

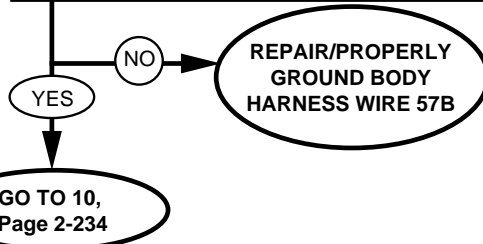


KNOWN INFO
BATTERIES OK
POSSIBLE PROBLEMS
LEAD 57B BAD GROUND PARKING BRAKE SWITCH BAD BODY HARNESS WIRES BAD ALTERNATOR BAD HARNESS WIRE 2A BAD IGNITION SWITCH BAD HARNESS WIRE 29A BAD HARNESS WIRE 29C BAD PROTECTIVE CONTROL BOX/ DISTRIBUTION BOX BAD

9

IS LED 7 "ON"?

TEST OPTIONS
VISUAL
REASON FOR QUESTION
If this LED is not ON, that would indicate a bad connection to ground.



REFERENCE INFORMATION

PROTECTIVE CONTROL BOX/DISTRIBUTION BOX

NOTE

This analyzer requires all glow plugs be serviceable and the batteries fully charged in order to operate properly. Prior to performing diagnostic checks ensure these two items are checked. If either of these two items are found to be faulty, repair/replace prior to beginning checks. Failure to do so will cause the analyzer to give false readings, therefore causing the needless replacement of serviceable components.



WARNING

Disconnect negative battery cable before disconnecting and reconnecting protective control box/distribution box harness. Failure to do so may result in injury to personnel or damage to equipment.

Replace protective control box, refer to (para. 4-5).
Replace distribution box, refer to (para. 4-5.1).

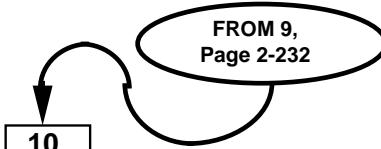
Repair lead connectors, refer to (para. 4-85).
Repair lead, refer to (para. 4-85).

IGNITION SWITCH POSITION	DIAGNOSTIC CHECKS (GO TASKS) (For vehicles with protective control box/distribution box)
OFF	LED's 1, 3, 4, 6, 7, "ON"; Remaining LED's "OFF" If all LED's are "OFF", battery power is not available. If LED 3 or 4 is "OFF", replace the PCB/distribution box. If LED 7 is "OFF", body harness wire 57B is not grounded.
RUN - (PCB) (ENGINE NOT RUNNING-PCB)	LED's 1,2,3,4,5,6,7,8,11,13 "ON". LED 13 "OFF" after a few seconds (glow plug warm up time). LED 13 "OFF" if engine is at operating temperature. LED 11 cycling "ON" and "OFF" (glow plug controller operation) LED's 9, 10, 12 "OFF". Release parking brake lever. LED 6 "OFF". Engage parking brake lever. LED 6 "ON". If all LED's are "OFF", no battery power is available. If LED 3 or 4 is "OFF", replace the PCB. If LED 7 is "OFF", harness wire 57B is not grounded If LED 2 is "OFF", and all glow plugs are serviceable, replace the PCB. If LED 5 is "OFF", replace the PCB is LED 13 is "ON". If LED's 5 and 13 are "OFF", the ignition switch is defective and/or harness wires 29A and 29C are defective. If LED 13 is "OFF" and LED 5 is "ON" and the engine is not at operating temperature from a previous run, replace the PCB. The PCB is operational if the engine is at operating temperature from a previous run. If LED 6 is "OFF" and the parking brake lever is engaged the parking brake switch is defective or the wires in the body harness are defective If LED 8 is "OFF", replace the PCB. If LED 11 is "OFF", check the glow plug controller. If the glow plug controller is functioning properly, replace the PCB.
RUN - (Distribution Box) (ENGINE NOT RUNNING-Distribution Box)	LED's 1, 2, 3, 4, 5, 6, 7, 8,13 "ON"; remaining LED's "OFF" LED 13 "OFF" after a few seconds (glow plug warm up time). LED 13 "OFF" if engine is at operating temperature. LED 6 "OFF" if parking brake lever is released. LED 6 "ON" if parking brake lever is engaged If LED 2, 3, 4, or 8 is "OFF", replace distribution box. If LED 7 is "OFF", body harness wire 57B is not grounded If LED 5 is "OFF", replace distribution box if LED 13 is "ON". If LED's 5 and 13 are "OFF", the ignition switch and/or harness wires 29A and 29C are defective. If LED 13 is "OFF" and LED 5 is "ON", and engine is not at operating temperature from a previous run, replace distribution box. Distribution box is operation if engine is at operating temperature from a previous run. If LED 6 is "OFF" and the parking brake lever is engaged the parking brake switch and/or the wires in the body harness are defective.
START (ENGINE CRANKING-PCB)	LED 10 momentarily "ON" and then remains "OFF" (starter motor frequency lockout). If LED 11 and 13 remain "ON" or engine does not crank; check battery voltage; charge is low. If LED 10 does not momentarily come "ON" and then stays "OFF", replace PCB.
START (ENGINE CRANKING-Distribution Box)	LED 10 momentarily "ON". If LED 13 is "ON" or engine does not crank; check battery voltage; charge is low. If LED 10 does not momentarily come "ON" and then stays "OFF", and ignition switch is operating properly, replace distribution box.
RUN (ENGINE RUNNING-PCB)	LED's 1,2,3,4,5,6,7,8,9,12 "ON" LED 11 cycling "ON" and "OFF" (glow plug controller operation); "OFF" time interval increases as engine warms up. LED 11 "OFF" (when engine is at operating temperature). LED 11 may remain "OFF" (when engine is at operating temperature from previous run). LED 13 "OFF" Release parking brake lever. LED 6 "OFF". Engage parking brake lever. LED 6 "ON". If LED 2, 3, 4, 5, or 8 is "OFF" and all glow plugs are serviceable replace the PCB. If LED 7 is "OFF", the body harness wire 57B is not grounded. If LED 9 is "OFF" and LED 12 is "ON", replace the PCB. If LED's 9 and 12 are "OFF", there is no alternator output (alternating current tap) available and/or the engine harness wire 2A is defective. If LED 11 is "OFF" and the engine is not at operating temperature, check the glow plug controller. If the glow plug controller is functioning properly, replace the PCB.
RUN (ENGINE RUNNING-Distribution Box)	LED's 1, 2, 3, 4, 5, 6, 7, 8, 12 "ON", remaining LED's "OFF" LED 6 "OFF" if parking brake lever is released. LED 6 "ON" if parking brake lever is released If LED's 2, 3, 4, 5 or 8 is "OFF" replace distribution box. If LED 7 is "OFF", body harness wire 57B is not grounded If LED 12 is "OFF", there is no alternator output (alternating current tap) available and/or engine harness wire 2A is defective.

PROTECTIVE CONTROL BOX/DISTRIBUTION BOX

DIAGNOSTIC FLOWCHART

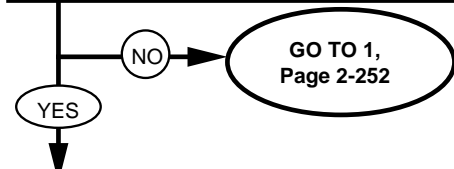
KNOWN INFO
BATTERIES OK LEAD 57B GROUND OK
POSSIBLE PROBLEMS
PARKING BRAKE SWITCH BAD BODY HARNESS WIRES BAD GLOWPLUG CONTROLLER BAD ALTERNATOR BAD HARNESS WIRE 2A BAD IGNITION SWITCH BAD HARNESS WIRE 29A BAD HARNESS WIRE 29C BAD PROTECTIVE CONTROL BOX/ DISTRIBUTION BOX BAD



10

WITH THE IGNITION SWITCH IN "RUN" (ENGINE NOT RUNNING) POSITION, ARE ANY LEDs "ON"? (REFER TO TABLE AT RIGHT)

TEST OPTIONS
1. TRY IT 2. VISUAL
REASON FOR QUESTION
If no LEDs are ON, that would indicate malfunctioning batteries.

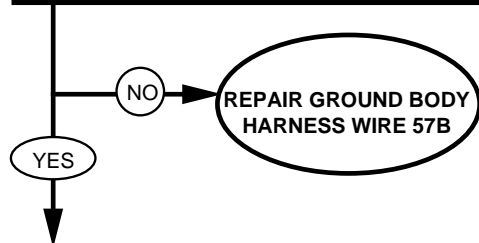


KNOWN INFO
BATTERIES OK LEAD 57B GROUND OK
POSSIBLE PROBLEMS
PARKING BRAKE SWITCH BAD BODY HARNESS WIRES BAD GLOWPLUG CONTROLLER BAD ALTERNATOR BAD HARNESS WIRE 2A BAD IGNITION SWITCH BAD HARNESS WIRE 29A BAD HARNESS WIRE 29C BAD PROTECTIVE CONTROL BOX/ DISTRIBUTION BOX BAD

11

IS LED 7 "ON"?

TEST OPTIONS
VISUAL
REASON FOR QUESTION
If these LEDs are not ON that would indicate a bad connection to ground.

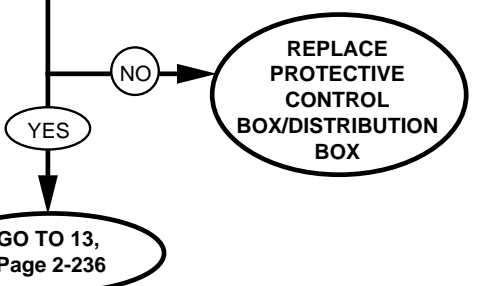


KNOWN INFO
BATTERIES OK LEAD 57B GROUND OK
POSSIBLE PROBLEMS
PARKING BRAKE SWITCH BAD BODY HARNESS WIRES BAD GLOWPLUG CONTROLLER BAD ALTERNATOR BAD HARNESS WIRE 2A BAD IGNITION SWITCH BAD HARNESS WIRE 29A BAD HARNESS WIRE 29C BAD PROTECTIVE CONTROL BOX/ DISTRIBUTION BOX BAD

12

ARE LEDs 2, 3, AND 4 "ON"?

TEST OPTIONS
VISUAL
REASON FOR QUESTION
If those LEDs are not ON, that would indicate a protective control box (PCB)/distribution box malfunction.



REFERENCE INFORMATION

PROTECTIVE CONTROL BOX/DISTRIBUTION BOX

NOTE

This analyzer requires all glow plugs be serviceable and the batteries fully charged in order to operate properly. Prior to performing diagnostic checks ensure these two items are checked. If either of these two items are found to be faulty, repair/replace prior to beginning checks. Failure to do so will cause the analyzer to give false readings, therefore causing the needless replacement of serviceable components.

Repair lead connectors, refer to (para. 4-85).
Repair lead, refer to (para. 4-85).



WARNING

Disconnect negative battery cable before disconnecting and reconnecting protective control box/distribution box harness. Failure to do so may result in injury to personnel or damage to equipment.

Replace protective control box, refer to (para. 4-5).
Replace distribution box, refer to (para. 4-5.1).

DIAGNOSTIC CHECKS (GO TASKS) (For Vehicles with protective control box/distribution box)	
OFF	LED's 1, 3, 4, 6, 7, "ON"; Remaining LED's "OFF" If all LED's are "OFF", battery power is not available. If LED 3 or 4 is "OFF", replace the PCB/distribution box. If LED 7 is "OFF", body harness wire 57B is not grounded.
RUN - (PCB) (ENGINE NOT RUNNING-PCB)	LED's 1,2,3,4,5,6,7,8,11,13 "ON". LED 13 "OFF" after a few seconds (glow plug warm up time). LED 13 "OFF" if engine is at operating temperature. LED 11 cycling "ON" and "OFF" (glow plug controller operation) LED's 9, 10, 12 "OFF". Release parking brake lever. LED 6 "OFF". Engage parking brake lever. LED 6 "ON". If all LED's are "OFF", no battery power is available. If LED 3 or 4 is "OFF", replace the PCB. If LED 7 is "OFF", harness wire 57B is not grounded If LED 2 is "OFF", and all glow plugs are serviceable, replace the PCB. If LED 5 is "OFF", replace the PCB is LED 13 is "ON". If LED's 5 and 13 are "OFF", the ignition switch is defective and/or harness wires 29A and 29C are defective. If LED 13 is "OFF" and LED 5 is "ON" and the engine is not at operating temperature from a previous run, replace the PCB. The PCB is operational if the engine is at operating temperature from a previous run. If LED 6 is "OFF" and the parking brake lever is engaged the parking brake switch is defective or the wires in the body harness are defective If LED 8 is "OFF", replace the PCB. If LED 11 is "OFF", check the glow plug controller. If the glow plug controller is functioning properly, replace the PCB.
RUN - (Distribution Box) (ENGINE NOT RUNNING-Distribution Box)	LED's 1, 2, 3, 4, 5, 6, 7, 8,13 "ON"; remaining LED's "OFF" LED 13 "OFF" after a few seconds (glow plug warm up time). LED 13 "OFF" if engine is at operating temperature. LED 6 "OFF" if parking brake lever is released. LED 6 "ON" if parking brake lever is engaged If LED 2, 3, 4, or 8 is "OFF", replace distribution box. If LED 7 is "OFF", body harness wire 57B is not grounded If LED 5 is "OFF", replace distribution box if LED 13 is "ON". If LED's 5 and 13 are "OFF", the ignition switch and/or harness wires 29A and 29C are defective. If LED 13 is "OFF" and LED 5 is "ON", and engine is not at operating temperature from a previous run, replace distribution box. Distribution box is operation if engine is at operating temperature from a previous run. If LED 6 is "OFF" and the parking brake lever is engaged the parking brake switch and/or the wires in the body harness are defective.
START (ENGINE CRANKING-PCB)	LED 10 momentarily "ON" and then remains "OFF" (starter motor frequency lockout). If LED 11 and 13 remain "ON" or engine does not crank; check battery voltage; charge is low. If LED 10 does not momentarily come "ON" and then stays "OFF", replace PCB.
START (ENGINE CRANKING-Distribution Box)	LED 10 momentarily "ON". If LED 13 is "ON" or engine does not crank; check battery voltage; charge is low. If LED 10 does not momentarily come "ON" and then stays "OFF", and ignition switch is operating properly, replace distribution box.
RUN (ENGINE RUNNING-PCB)	LED's 1,2,3,4,5,6,7,8,9,12 "ON" LED 11 cycling "ON" and "OFF" (glow plug controller operation): "OFF" time interval increases as engine warms up. LED 11 "OFF" (when engine is at operating temperature). LED 11 may remain "OFF" (when engine is at operating temperature from previous run). LED 13 "OFF" Release parking brake lever. LED 6 "OFF". Engage parking brake lever. LED 6 "ON". If LED 2, 3, 4, 5, or 8 is "OFF" and all glow plugs are serviceable replace the PCB. If LED 7 is "OFF", the body harness wire 57B is not grounded. If LED 9 is "OFF" and LED 12 is "ON", replace the PCB. If LED's 9 and 12 are "OFF", there is no alternator output (alternating current tap) available and/or the engine harness wire 2A is defective. If LED 11 is "OFF" and the engine is not at operating temperature, check the glow plug controller. If the glow plug controller is functioning properly, replace the PCB.
RUN (ENGINE RUNNING-Distribution Box)	LED's 1, 2, 3, 4, 5, 6, 7, 8, 12 "ON", remaining LED's "OFF" LED 6 "OFF" if parking brake lever is released. LED 6 "ON" if parking brake lever is released If LED's 2, 3, 4, 5 or 8 is "OFF" replace distribution box. If LED 7 is "OFF", body harness wire 57B is not grounded If LED 12 is "OFF", there is no alternator output (alternating current tap) available and/or engine harness wire 2A is defective.

PROTECTIVE CONTROL BOX/DISTRIBUTION BOX

DIAGNOSTIC FLOWCHART

KNOWN INFO
BATTERIES OK LEAD 57B GROUND OK
POSSIBLE PROBLEMS
PARKING BRAKE SWITCH BAD BODY HARNESS WIRES BAD GLOWPLUG CONTROLLER BAD ALTERNATOR BAD HARNESS WIRE 2A BAD IGNITION SWITCH BAD HARNESS WIRE 29A BAD HARNESS WIRE 29C BAD PROTECTIVE CONTROL BOX/ DISTRIBUTION BOX BAD

13

FROM 12
Page 2-234

**DID LED 13 COME "ON" WITH PCB?
IF ENGINE IS AT OPERATING
TEMPERATURE, LED 13 WILL NOT
COME ON. WITH DISTRIBUTION
BOX, LIGHT WILL COME ON WHEN
ENGINE IS AT OPERATING
TEMPERATURE.**

TEST OPTIONS
1. TRY IT 2. VISUAL
REASON FOR QUESTION
If this LED is not ON, that would indicate either malfunctioning ignition switch, damaged harness wires 29A and 29C, or malfunctioning protective control box (PCB)/distribution box.

NO → GO TO A1,
Page 2-248

YES →

KNOWN INFO
BATTERIES OK LEAD 57B GROUND OK IGNITION SWITCH OK HARNESS WIRE 29A OK HARNESS WIRE 29C OK
POSSIBLE PROBLEMS
PARKING BRAKE SWITCH BAD BODY HARNESS WIRES BAD GLOWPLUG CONTROLLER BAD ALTERNATOR BAD HARNESS WIRE 2A BAD PROTECTIVE CONTROL BOX/ DISTRIBUTION BOX BAD

14

IS LED 5 "ON"?

TEST OPTIONS
VISUAL
REASON FOR QUESTION
If this LED is not ON, that would indicate protective control box (PCB)/distribution box malfunctions.

NO → **REPLACE PROTECTIVE CONTROL BOX/DISTRIBUTION BOX**

YES →

KNOWN INFO
BATTERIES OK LEAD 57B GROUND OK IGNITION SWITCH OK HARNESS WIRE 29A OK HARNESS WIRE 29C OK
POSSIBLE PROBLEMS
PARKING BRAKE SWITCH BAD BODY HARNESS WIRES BAD GLOWPLUG CONTROLLER BAD ALTERNATOR BAD HARNESS WIRE 2A BAD PROTECTIVE CONTROL BOX/ DISTRIBUTION BOX BAD

15

IS LED 6 "ON"?

TEST OPTIONS
VISUAL
REASON FOR QUESTION
If this LED is not ON, that would indicate a parking brake switch or brake warning light malfunction, or damage to body harness wires.

NO → **REPLACE PARKING BRAKE SWITCH AND/OR REPAIR WIRES IN BODY HARNESS**

YES → GO TO 16,
Page 2-238

REFERENCE INFORMATION

PROTECTIVE CONTROL BOX/DISTRIBUTION BOX



WARNING

Disconnect negative battery cable before disconnecting and reconnecting protective control box/distribution box harness. Failure to do so may result in injury to personnel or damage to equipment.

Replace protective control box, refer to (para. 4-5).

Replace distribution box, refer to (para. 4-5.1).

Repair lead connectors, refer to (para. 4-85).

Repair leads, refer to (para. 4-85).

PROTECTIVE CONTROL BOX/DISTRIBUTION BOX

DIAGNOSTIC FLOWCHART

KNOWN INFO
BATTERIES OK LEAD 57B GROUND OK IGNITION SWITCH OK HARNESS WIRE 29A OK HARNESS WIRE 29C OK PARKING BRAKE SWITCH OK BODY HARNESS WIRES OK
POSSIBLE PROBLEMS
GLOWPLUG CONTROLLER BAD ALTERNATOR BAD HARNESS WIRE 2A BAD PROTECTIVE CONTROL BOX/ DISTRIBUTION BOX BAD



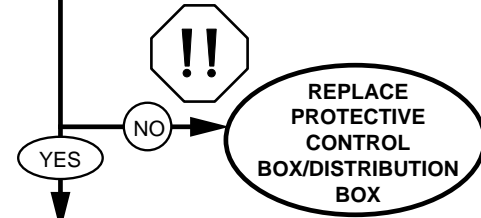
16

IS LED 8 "ON"?
FOR DISTRIBUTION BOX, IF YES, GO TO 18.

TEST OPTIONS

1. TRY IT
2. VISUAL

REASON FOR QUESTION
If this LED is not ON, that would indicate a protective control box/distribution box malfunction.



KNOWN INFO
BATTERIES OK LEAD 57B GROUND OK IGNITION SWITCH OK HARNESS WIRE 29A OK HARNESS WIRE 29C OK PARKING BRAKE SWITCH OK BODY HARNESS WIRES OK
POSSIBLE PROBLEMS
GLOWPLUG CONTROLLER BAD ALTERNATOR BAD HARNESS WIRE 2A BAD PROTECTIVE CONTROL BOX/ DISTRIBUTION BOX BAD

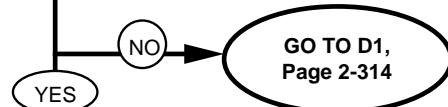
17

IS LED 11 "ON"?
DURING GLOW PLUG CYCLING, LED 11 MAY FLICKER.
NOTE: LED 11 IS NOT USED WITH THE DISTRIBUTION BOX

TEST OPTIONS

VISUAL

REASON FOR QUESTION
If this LED is not ON, that would indicate a glowplugs controller malfunction.



KNOWN INFO
BATTERIES OK LEAD 57B GROUND OK IGNITION SWITCH OK HARNESS WIRE 29A OK HARNESS WIRE 29C OK PARKING BRAKE SWITCH OK BODY HARNESS WIRES OK GLOWPLUG CONTROLLER OK
POSSIBLE PROBLEMS
ALTERNATOR BAD HARNESS WIRE 2A BAD PROTECTIVE CONTROL BOX/ DISTRIBUTION BOX BAD

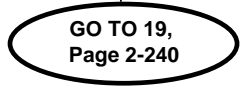
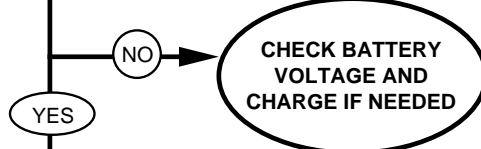
18

WITH THE IGNITION SWITCH IN THE "START" (ENGINE CRANKING) POSITION, DO LEDs 11 AND 13 GO "OUT", AND DOES ENGINE CRANK?
NOTE: LED 11 DOES NOT FUNCTION WITH DISTRIBUTION BOX.

TEST OPTIONS

1. TRY IT
2. VISUAL

REASON FOR QUESTION
If these LEDs do not go ON, that would indicate malfunctioning batteries.



REFERENCE INFORMATION

PROTECTIVE CONTROL BOX/DISTRIBUTION BOX



WARNING

Disconnect negative battery cable before disconnecting and reconnecting protective control box or distribution box harness. Failure to do so may result in injury to personnel or damage to equipment.

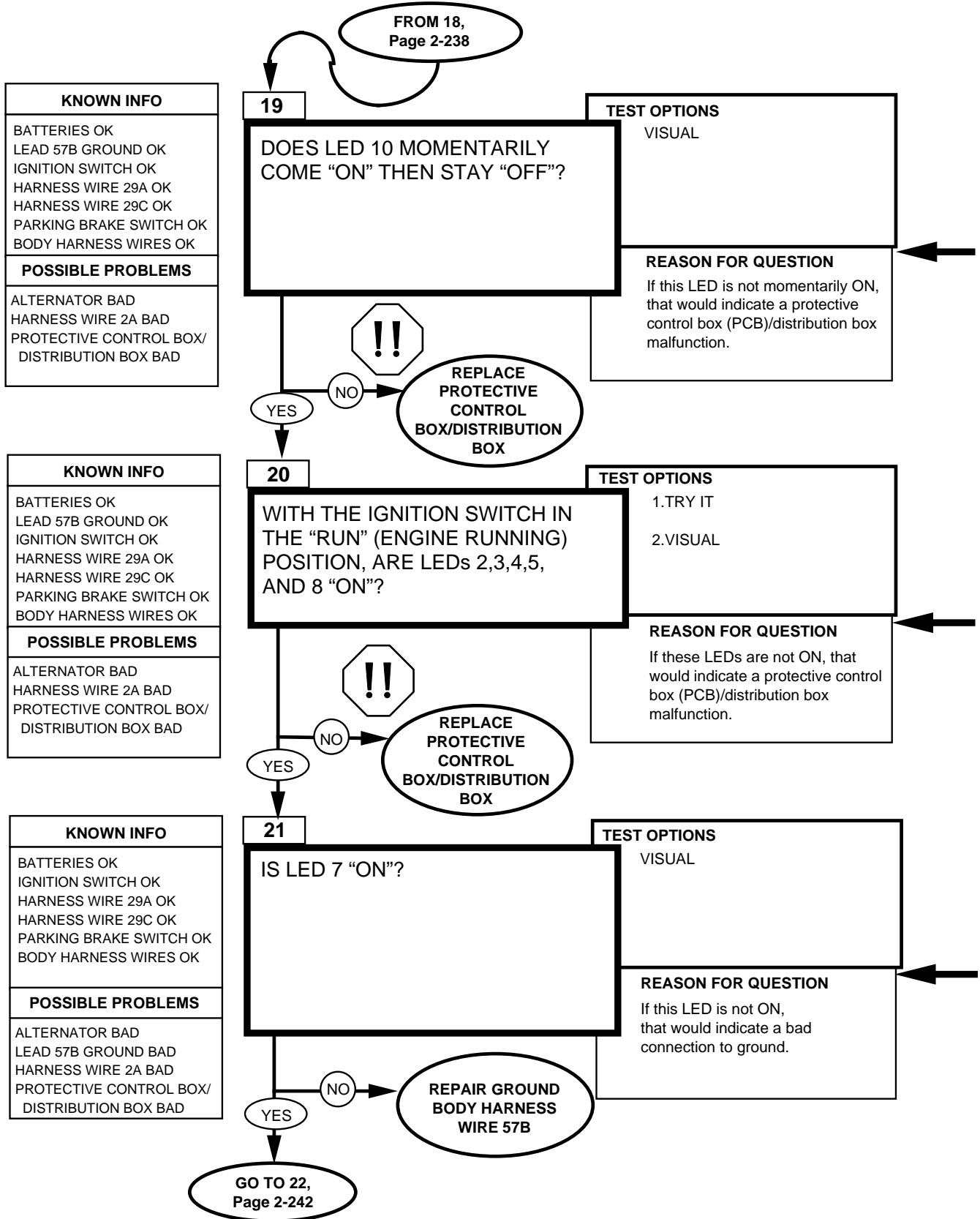
Replace protective control box, refer to (para. 4-5).
Replace distribution box, refer to (para. 4-5.1).

Replace glowplug controller. refer to (para. 4-29).

Service/repair batteries. refer to (para. 4-79).

PROTECTIVE CONTROL BOX/DISTRIBUTION BOX

DIAGNOSTIC FLOWCHART



REFERENCE INFORMATION

PROTECTIVE CONTROL BOX/DISTRIBUTION BOX



WARNING

Disconnect negative battery cable before disconnecting and reconnecting protective control box or distribution box harness. Failure to do so may result in injury to personnel or damage to equipment.

Replace protective control box, refer to (para. 4-5).
 Replace distribution box, refer to (para. 4-5.1).



WARNING

Disconnect negative battery cable before disconnecting and reconnecting protective control box or distribution box harness. Failure to do so may result in injury to personnel or damage to equipment.

Replace protective control box, refer to (para. 4-5).
 Replace distribution box, refer to (para. 4-5.1).

Repair lead connectors, refer to (para. 4-85).

Repair leads, refer to (para. 4-85).

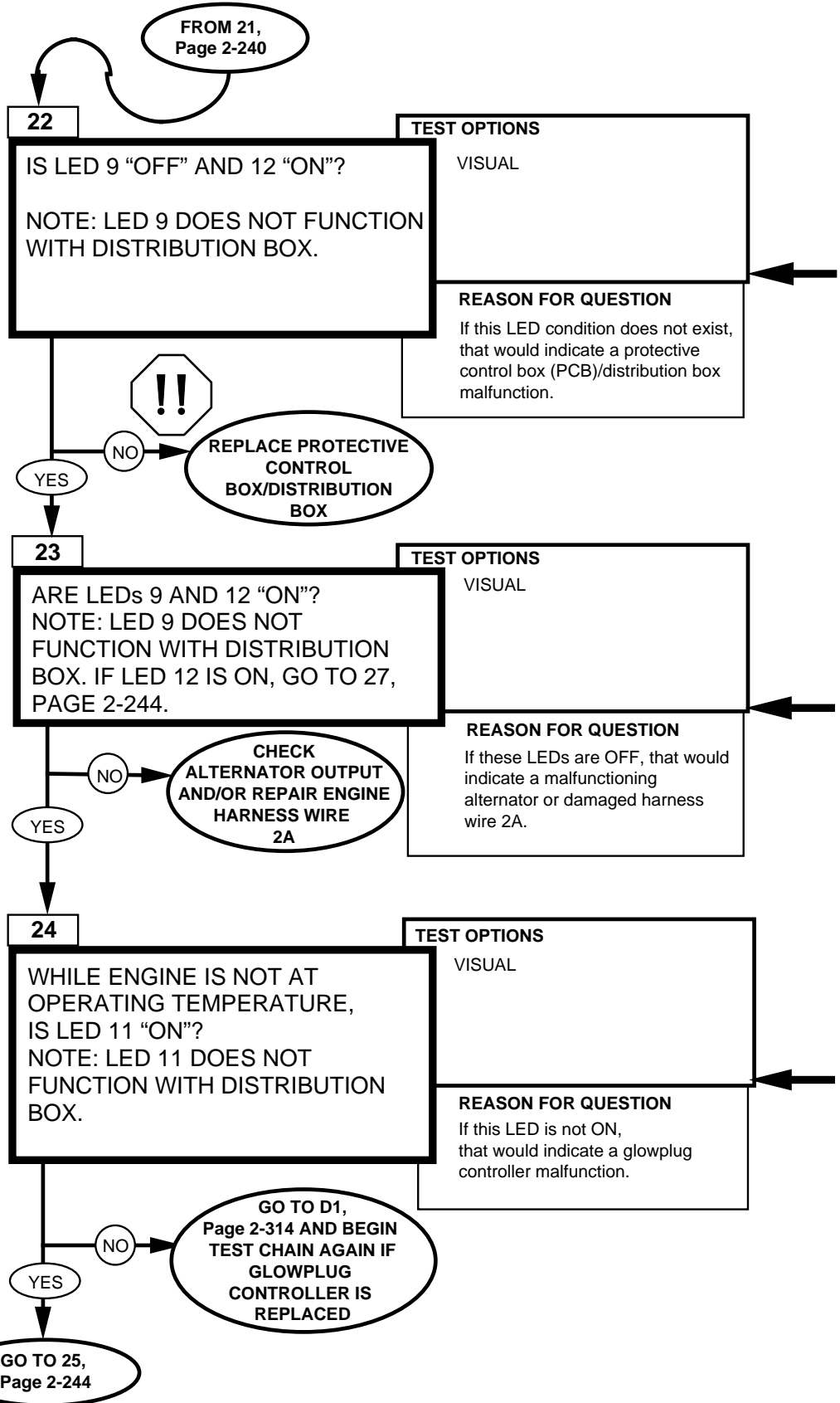
PROTECTIVE CONTROL BOX/DISTRIBUTION BOX

DIAGNOSTIC FLOWCHART

KNOWN INFO
BATTERIES OK LEAD 57B GROUND OK IGNITION SWITCH OK HARNESS WIRE 29A OK HARNESS WIRE 29C OK PARKING BRAKE SWITCH OK BODY HARNESS WIRES OK GLOWPLUG CONTROLLER OK
POSSIBLE PROBLEMS
ALTERNATOR BAD HARNESS WIRE 2A BAD PROTECTIVE CONTROL BOX/ DISTRIBUTION BOX BAD

KNOWN INFO
BATTERIES OK LEAD 57B GROUND OK IGNITION SWITCH OK HARNESS WIRE 29A OK HARNESS WIRE 29C OK PARKING BRAKE SWITCH OK BODY HARNESS WIRES OK GLOWPLUG CONTROLLER OK
POSSIBLE PROBLEMS
ALTERNATOR BAD HARNESS WIRE 2A BAD PROTECTIVE CONTROL BOX/ DISTRIBUTION BOX BAD

KNOWN INFO
BATTERIES OK LEAD 57B GROUND OK IGNITION SWITCH OK HARNESS WIRE 29A OK HARNESS WIRE 29C OK PARKING BRAKE SWITCH OK BODY HARNESS WIRES OK ALTERNATOR OK HARNESS WIRE 2A OK
POSSIBLE PROBLEMS
GLOWPLUG CONTROLLER BAD PROTECTIVE CONTROL BOX/ DISTRIBUTION BOX BAD



REFERENCE INFORMATION

PROTECTIVE CONTROL BOX/DISTRIBUTION BOX █



WARNING

Disconnect negative battery cable before disconnecting and reconnecting protective control box or distribution box harness. Failure to do so may result in injury to personnel or damage to equipment.

Replace protective control box, refer to (para. 4-5).

Replace distribution box, refer to (para. 4-5.1).

Repair lead connectors, refer to (para. 4-85).
Repair leads, refer to (para. 4-85).

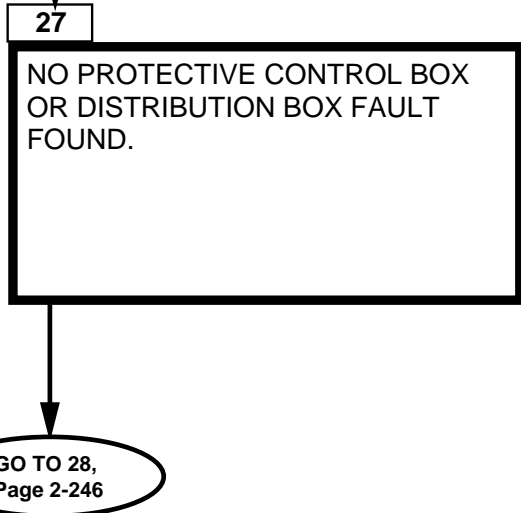
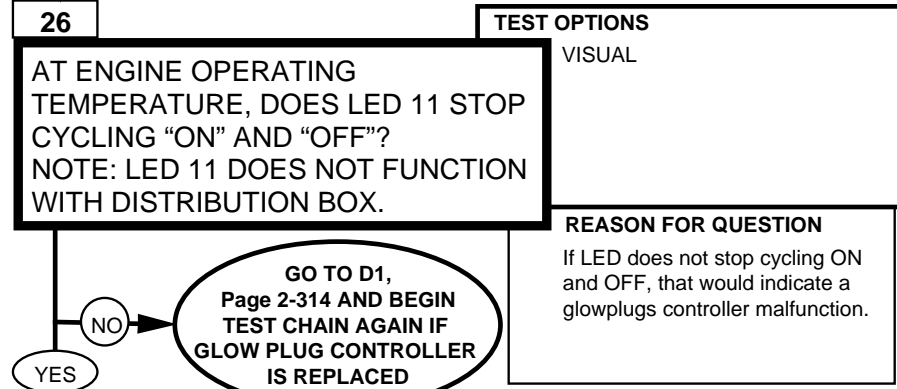
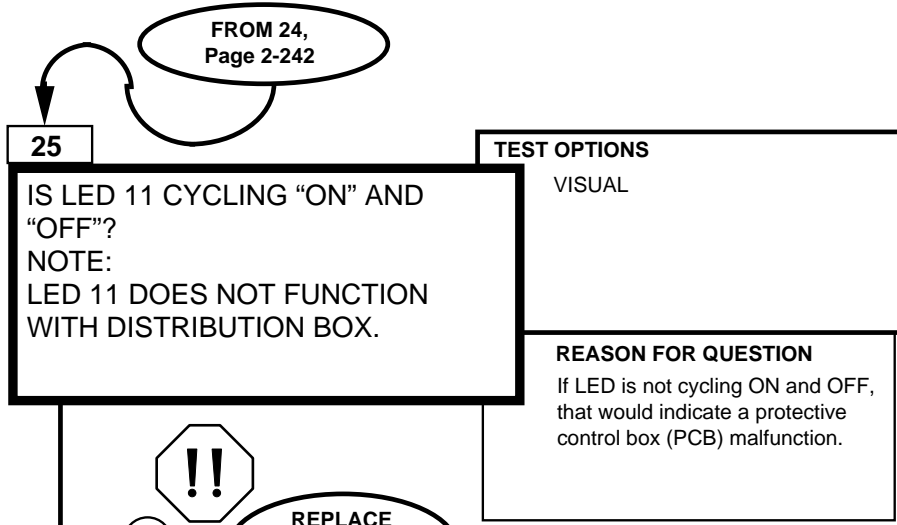
Repair glowplug controller, refer to (para. 4-29).

PROTECTIVE CONTROL BOX/DISTRIBUTION BOX

DIAGNOSTIC FLOWCHART

KNOWN INFO
BATTERIES OK LEAD 57B GROUND OK IGNITION SWITCH OK HARNESS WIRE 29A OK HARNESS WIRE 29C OK PARKING BRAKE SWITCH OK BODY HARNESS WIRES OK GLOWPLUG CONTROLLER OK ALTERNATOR OK HARNESS WIRE 2A OK
POSSIBLE PROBLEMS
PROTECTIVE CONTROL BOX BAD

KNOWN INFO
BATTERIES OK LEAD 57B GROUND OK IGNITION SWITCH OK HARNESS WIRE 29A OK HARNESS WIRE 29C OK PARKING BRAKE SWITCH OK BODY HARNESS WIRES OK ALTERNATOR OK HARNESS WIRE 2A OK PROTECTIVE CONTROL BOX OK
POSSIBLE PROBLEMS
GLOWPLUG CONTROLLER BAD



REFERENCE INFORMATION

PROTECTIVE CONTROL BOX/DISTRIBUTION BOX



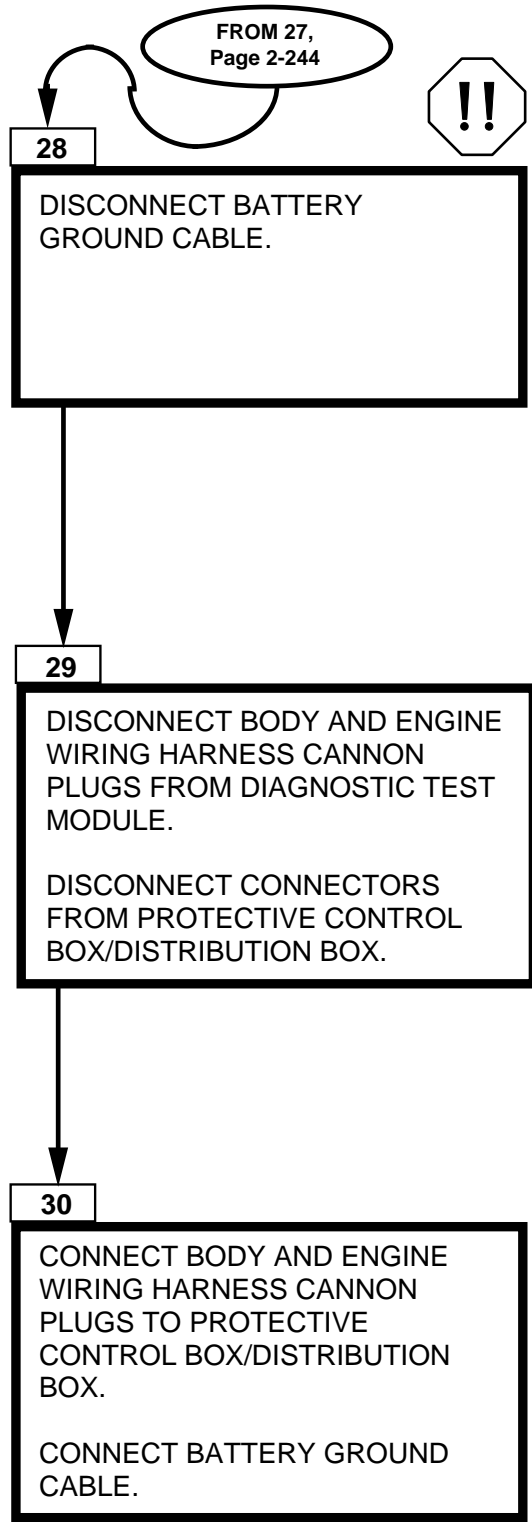
WARNING

Disconnect negative battery cable before disconnecting and reconnecting protective control box/distribution box harness. Failure to do so may result in injury to personnel or damage to equipment.

Replace protective control box, refer to (para. 4-5).

PROTECTIVE CONTROL BOX/DISTRIBUTION BOX

DIAGNOSTIC FLOWCHART



REFERENCE INFORMATION

PROTECTIVE CONTROL BOX/DISTRIBUTION BOX

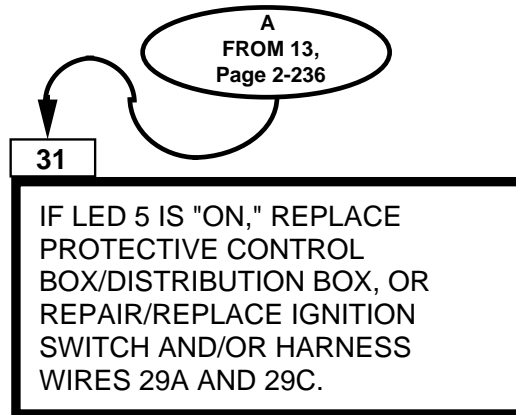


WARNING

Disconnect negative battery cable before disconnecting and reconnecting protective control box or distribution box harness. Failure to do so may result in injury to personnel or damage to equipment.

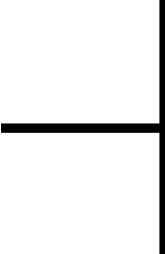
PROTECTIVE CONTROL BOX/DISTRIBUTION BOX

DIAGNOSTIC FLOWCHART



REFERENCE INFORMATION

PROTECTIVE CONTROL BOX/DISTRIBUTION BOX



Replace protective control box, refer to (para. 4-5).
Replace distribution box, refer to (para. 4-5.1).
Repair/replace rotary switch, refer to (para. 4-7).
Repair/replace leads 29A and 29C, refer to (para. 4-85).

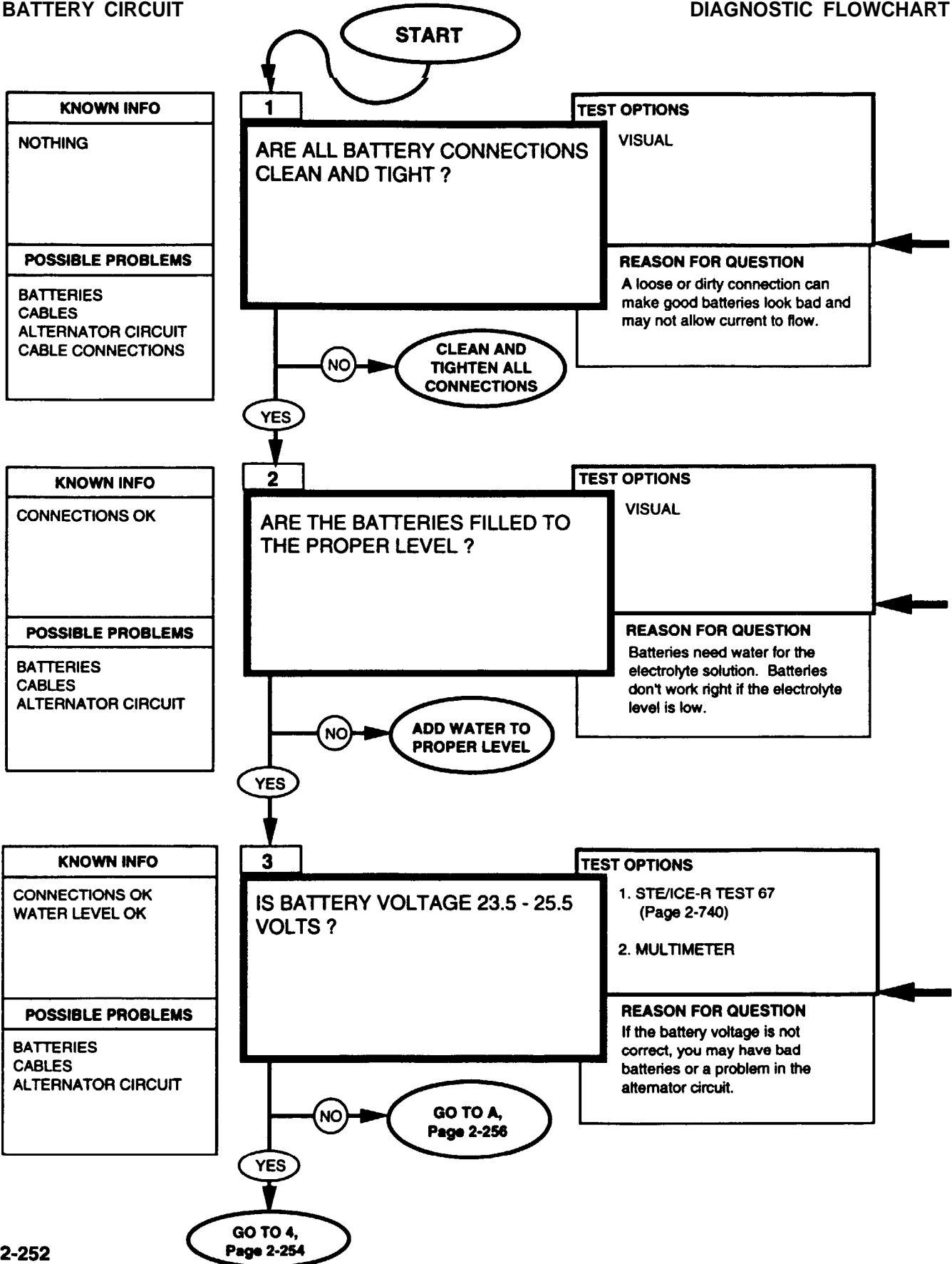
2-29. BATTERY CIRCUIT TEST

These Battery Circuit tests maybe run any time you think you have a battery problem of if you were sent here by another test chain. Just follow the path, answering the questions. Additional information and notes are given on the facing page when necessary.

The fold-out page shows the location of the major components of the Battery Circuit in case you are not familiar with them. Fold-out page FO-7 may be left open for reference while testing.

BATTERY CIRCUIT

DIAGNOSTIC FLOWCHART



REFERENCE INFORMATION

BATTERY CIRCUIT

BAD CONNECTIONS ARE THE MOST COMMON PROBLEM !

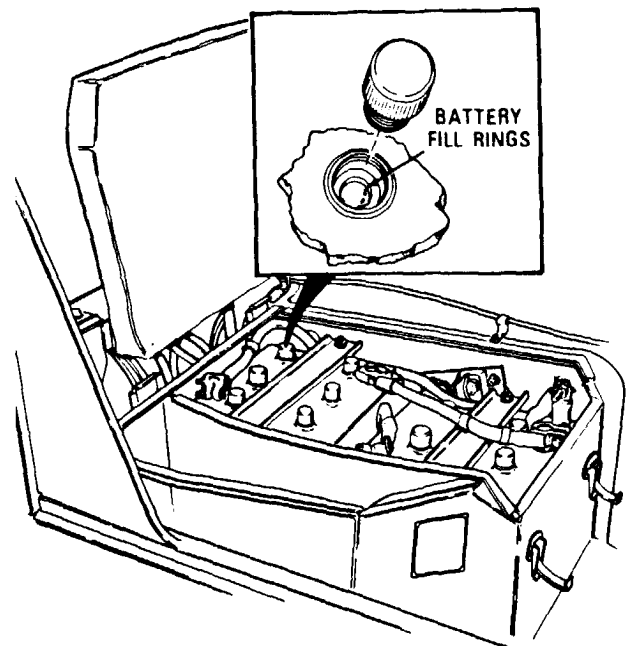
Sometimes, just disconnecting, cleaning and reconnecting will solve a problem. BE THOROUGH ! The time you save may be your own.

Refer to the functional flow schematic and check the following;

1. BATTERY - make sure all connections are clean and tight. This includes the interconnect cables, clamps, shunt, power stud and the slave connector. Also check wires 6A and 7A under vehicle where they enter shunt.
2. STARTER - check the high current (heavy gauge) wire at the starter. Don't just check for voltage; a loose connection will have voltage but can't carry much current.

There is a ring inside the battery fill plugs. The water level should be at the ring.

BATTERY VOLTAGE STE/CE-R TEST 67
<ol style="list-style-type: none"> 1. Start Test 67, battery voltage. 2. Displayed reading is in volts. Batteries should be 23-25.5 volts. Batteries voltage will drop when glowplugs turn on.



BATTERY CIRCUIT

DIAGNOSTIC FLOWCHART

KNOWN INFO
CONNECTIONS OK WATER LEVEL OK BATTERY VOLTAGE OK ALTERNATOR CIRCUIT OK
POSSIBLE PROBLEMS
BATTERIES CABLES

4

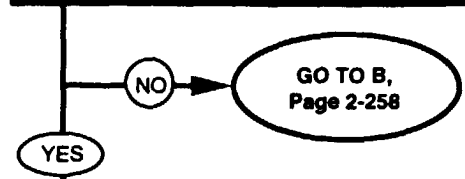
IS BATTERY PAIR RESISTANCE LESS THAN 25 MILLIOHMS AND BATTERY RESISTANCE CHANGE LESS THAN 50 MILLIOHMS/SECOND?

TEST OPTIONS

STE/ICE-R TESTS 73, 75
(Page 2-746, 748)

REASON FOR QUESTION

If either resistance reading is too high, the batteries are probably weak and may not produce enough power.



KNOWN INFO
BATTERIES OK ALTERNATOR CIRCUIT OK
POSSIBLE PROBLEMS
CABLES

5

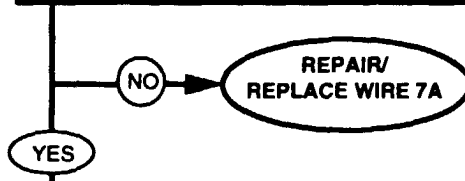
IS THE STARTER NEGATIVE CABLE VOLTAGE DROP LESS THAN 0.25 VOLTS ?

TEST OPTIONS

- STE/ICE-R TEST 69 (Page 2-742)
- MULTIMETER

REASON FOR QUESTION

A large voltage drop indicates high resistance. High resistance means less current flow.



KNOWN INFO
BATTERIES OK NEGATIVE CABLE OK ALTERNATOR CIRCUIT OK
POSSIBLE PROBLEMS
CABLES

6

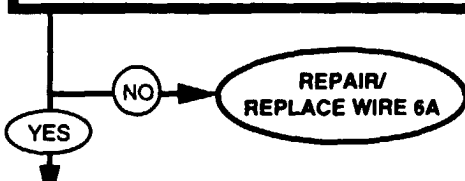
IS THE VOLTAGE DROP FROM THE POWER STUD TO THE STARTER LESS THAN 0.25 VOLTS ? TEST POINT IS THE POWER STUD, GROUND IS THE STARTER TERMINAL.

TEST OPTIONS

- STE/ICE-R TEST 89 (Page 2-750)
- MULTIMETER

REASON FOR QUESTION

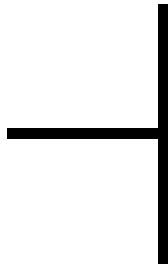
A large voltage drop indicates high resistance. High resistance means less current flow.



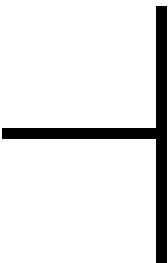
NO FAULTS FOUND IN BATTERY CIRCUIT

REFERENCE INFORMATION

BATTERY CIRCUIT



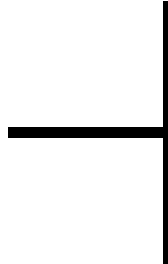
These tests check the strength of the batteries during engine cranking. If you don't have STE/ICE-R, skip this step, but remember that you haven't tested the batteries under load.



STARTER NEG. CABLE VOLTAGE DROP STE/ICE-R TEST 69
<ol style="list-style-type: none"> 1. Start Test 69, starter negative cable voltage drop. 2. Displayed reading is in volts. The cable voltage drop should be less than 0.25 volts maximum.

BATTERY INTERNAL RESISTANCE STE/ICE-R TEST 73
<ol style="list-style-type: none"> 1. Disconnect wire 54A at injection pump to prevent starting. 2. Disconnect glowplug controller and fan solenoid. 3. Start Test 73, battery internal resistance. 4. Wait for the GO message. Crank the engine. 5. Result is displayed in milliohms. Battery resistance should be 25 milliohms max.

BATTERY RESISTANCE CHANGE STE/ICE-R TEST 75
<ol style="list-style-type: none"> 1. Disconnect wire 54A at injection pump to prevent starting. 2. Disconnect glowplug controller and fan solenoid. 3. Start Test 75, battery resistance change. 4. Wait for the GO message. Crank the engine. 5. Result is displayed in milliohms/second. Battery resistance change should be 50 milliohms/second max.



0-45 DC VOLTS STE/ICE-R TEST 69
<ol style="list-style-type: none"> 1. Connect RED dip to the indicated test point, BLACK clip to negative or ground. 2. Start Test 89, DC Volts. 3. Displayed reading is in volts.

BATTERY CIRCUIT

DIAGNOSTIC FLOWCHART

KNOWN INFO
BATTERY VOLTAGE IS NOT CORRECT
POSSIBLE PROBLEMS
BATTERY OR BATTERIES CABLES ALTERNATOR

A1

DOES EACH BATTERY MEASURE 11-13 VOLTS?

TEST OPTIONS

1. STE/ICE-R TEST 89 (Page 2-750)
2. MULTIMETER

REASON FOR QUESTION
A good battery has 12 volts at 70° F (22° C).

A
FROM 3,
Page 2-252

NO → RECHARGE OR REPLACE BATTERY

YES

KNOWN INFO
BATTERIES OK
POSSIBLE PROBLEMS
CABLES

A2

CHECK THE VOLTAGE DROP ACROSS EACH CABLE IN THE BATTERY BOX (SEE NOTE AT RIGHT). ARE ALL VOLTAGE DROPS LESS THAN 0.25 VOLTS MAX?

TEST OPTIONS

1. STE/ICE-R TEST 89 (Page 2-750)
2. MULTIMETER

REASON FOR QUESTION
Everything else checks out OK. These cables are the only thing in the battery circuit we haven't tested.

NO → REPAIR/ REPLACE BAD CABLE OR CABLES

YES

KNOWN INFO
BATTERY VOLTAGE NOT CORRECT
POSSIBLE PROBLEMS
BATTERIES ALTERNATOR

A3

YOUR BATTERIES ARE OVER-CHARGED OR DISCHARGED. RUN THE ALTERNATOR TESTS. IF NO FAULTS ARE FOUND, REPLACE THE DEFECTIVE BATTERY OR BATTERIES.



REFERENCE INFORMATION

BATTERY CIRCUIT

Measure from the positive post to the negative post of each battery.

For battery replacement instructions, refer to (para. 4-79).

<p>0-45 DC VOLTS STE/ICE-R TEST 89</p>
<ol style="list-style-type: none"> 1. Connect RED clip to the indicated test point, BLACK clip to negative or ground. 2. Start Test 89, DC volts. 3. Displayed reading is in volts.

NOTE

Check these cables:
 WIRE 68, connecting the batteries together. Test point is the positive terminal of one of the batteries.

WIRE 49A, connecting the batteries to the power stud. Test point is the power stud.

Wire connecting the battery to the shunt. Test point is the shunt.

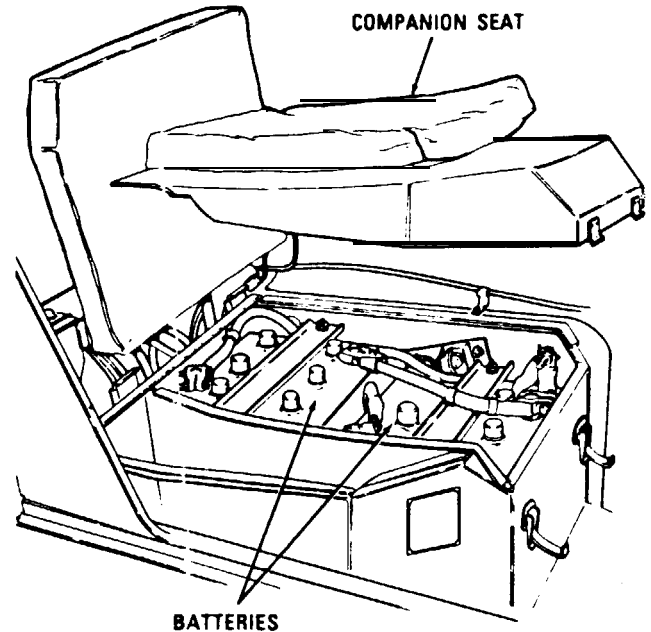
Wire connecting shunt to ground stud. Test point is the shunt.

For repair or replacement of cables, refer to (para. 4-73).

If you use STE/ICE-R test 67 in Step 3 on page 2-252, you may have a faulty DCA. Try running the tests using STE/ICE-R test 89 with the W2 cable.

See paragraph 4-79. (Also check each battery's specific gravity in accordance with TM 9-6140-200-14.)

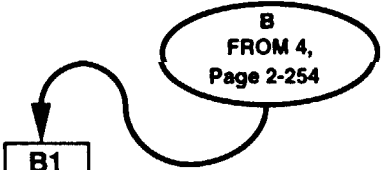
Replace battery refer to (para. 4-79).



BATTERY CIRCUIT

DIAGNOSTIC FLOWCHART

KNOWN INFO
BATTERY RESISTANCE NO GOOD
POSSIBLE PROBLEMS
BATTERIES CABLES



B1

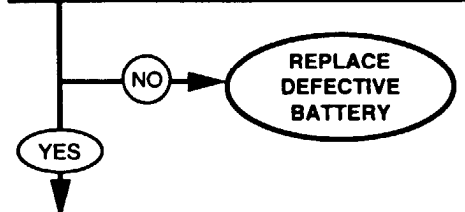
IS EACH BATTERY RESISTANCE LESS THAN 25 MILLIOHMS AND EACH BATTERY RESISTANCE CHANGE LESS THAN 50 MILLIOHMS/SECOND ?

TEST OPTIONS

REARRANGE BATTERY BOX TO TEST ONE BATTERY.

RUN STE/ICE-R TESTS 73,75. (Page 2-746, 748).

REASON FOR QUESTION
If either resistance reading is too high, the batteries are probably weak and may not produce enough power.



KNOWN INFO
BATTERIES OK
POSSIBLE PROBLEMS
CABLES

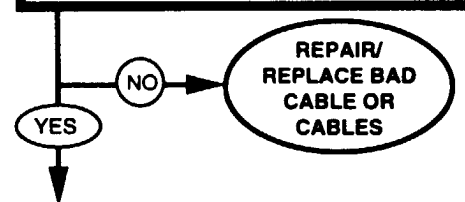
B2

CHECK THE VOLTAGE DROP ACROSS ALL CABLES IN THE BATTERY BOX (SEE NOTE AT RIGHT) AND THE POSITIVE AND NEGATIVE CABLES TO THE STARTER. ARE ALL VOLTAGE DROPS LESS THAN 0.25 VOLTS?

TEST OPTIONS

- STE/ICE-R TEST 89 (Page 2-750)
- STE/ICE-R TEST 74 (STARTER CKT RESISTANCE) OR TEST 69 (NEGATIVE CABLE DROP) OR TEST 68 (STARTER MOTOR VOLTAGE) (Page 2-750, 747, 742, 741)
- MULTIMETER

REASON FOR QUESTION
Everything else has checked OK. These cables are the only thing in the battery circuit we haven't tested.



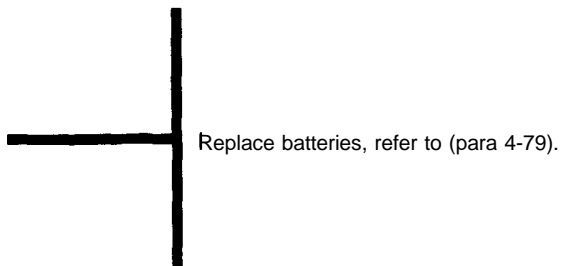
B3

NO FAULTS FOUND. (IF YOU USED TESTS 73 & 75 IN STEP 4, P. 2-254, YOU MAY HAVE A PROBLEM WITH THE DCA. CHECK THE DCA CONNECTIONS AND TRY RUNNING STEP 4 USING TESTS 77 & 79.) SEE NOTE TO RIGHT.

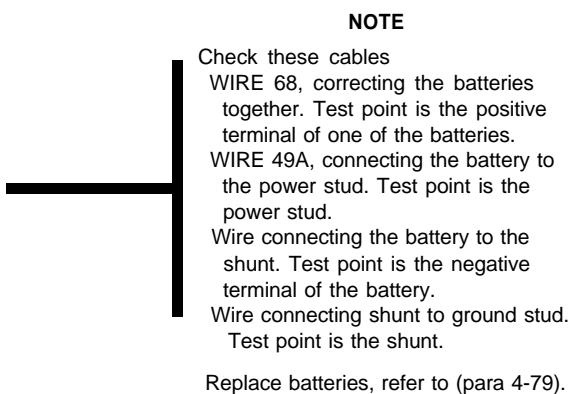


REFERENCE INFORMATION

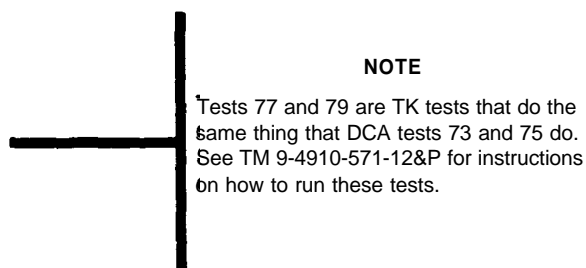
BATTERY CIRCUIT



BATTERY INTERNAL RESISTANCE STE/ICE-R TEST 73
<ol style="list-style-type: none"> 1. Disconnect wire 54A at injection pump to prevent starting. 2. Disconnect glowplug controller and fan solenoid (to keep waveform clean). 3. Start Test 73, battery internal resistance. 4. Wait for the GO message. Crank the engine. 5. Result is displayed in milliohms. Battery resistance should be 25 milliohms max.



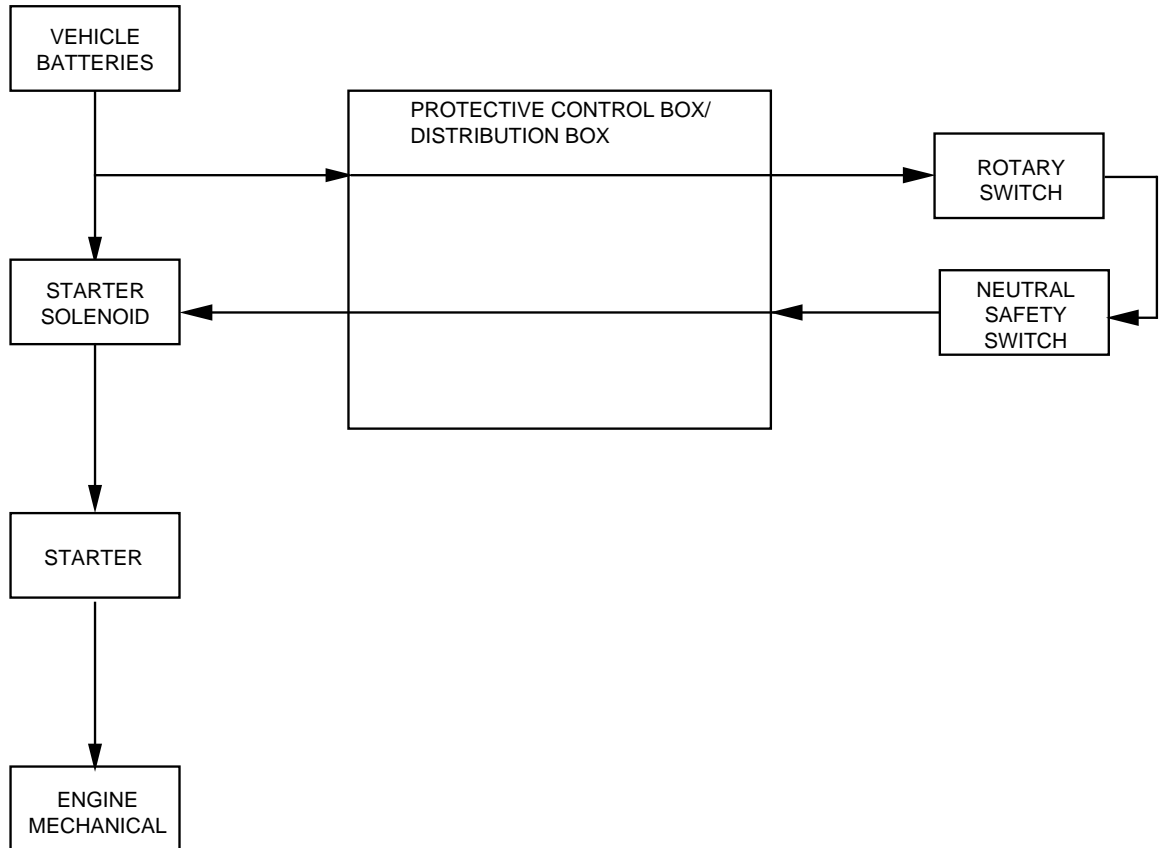
BATTERY RESISTANCE CHANGE STE/ICE-R TEST 75
<ol style="list-style-type: none"> 1. Disconnect wire 54A at injection pump to prevent starting. 2. Disconnect glowplug controller and fan solenoid (to keep waveform clean). 3. Start Test 75, battery resistance change. 4. Wait for the GO message. Crank the engine. 5. Result is displayed in milliohms/second. Battery resistance change should be 50 milliohms/second max.



0-45 DC VOLTS STE/ICE-R TEST 89
<ol style="list-style-type: none"> 1. Connect RED clip to the indicated test point, BLACK clip to negative or ground. 2. Start Test 89, DC volts. 3. Displayed reading is in volts.

2-30. STARTER CIRCUIT TESTS

STARTER CIRCUIT WITHOUT STARTER LOCKOUT



GENERAL DESCRIPTION

The Starter Circuit consists of the batteries, starter solenoid, starter motor, rotary switch, neutral safety switch, protective control box/distribution box, and related electrical wiring. The relationship of these parts is shown in the block diagram above, and a simplified functional flow schematic is provided on the foldout FO-8.

The starter solenoid and starter motor are enclosed in housings to protect them from dirt, icing conditions, and other road hazards.

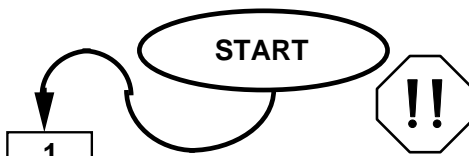
When the rotary switch is turned to "START," the starter solenoid is energized. The solenoid contacts close, sending battery power to the starter motor. The battery power causes the starter motor pinion gear to engage the engine flywheel ring gear and the engine cranks. When the engine starts, the rotary switch should be released, allowing it to return to the "RUN" position. This deenergizes the starter solenoid which, in turn, disengages the starter motor from the engine.

Solenoid current flows from the rotary switch through the neutral safety switch and protective control box/distribution box to the solenoid.

STARTER CIRCUIT

DIAGNOSTIC FLOWCHART

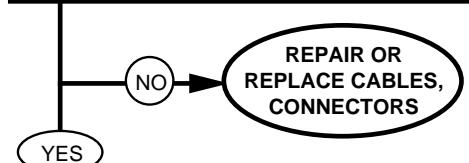
KNOWN INFO
ENGINE WON'T CRANK OR CRANKS SLOWLY
POSSIBLE PROBLEMS
WIRING BATTERIES STARTER SOLENOID ROTARY SWITCH ENGINE LOCKED PCB/DISTRIBUTION BOX



1

CHECK ALL CABLES AND CONNECTIONS (BATTERY, STARTER, SOLENOID, ROTARY SWITCH, PCB/DISTRIBUTION BOX). REPAIR, CLEAN, OR REPLACE AS REQUIRED.

TEST OPTIONS
VISUAL INSPECTION
REASON FOR QUESTION
Bad connections are a very common problem.

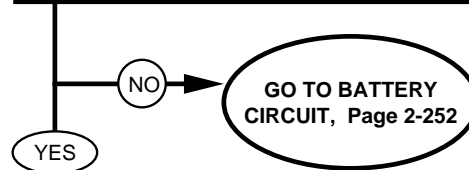


KNOWN INFO
CABLES & CONNECTORS APPEAR OK
POSSIBLE PROBLEMS
WIRING BATTERIES STARTER/SOLENOID ROTARY SWITCH ENGINE LOCK PCB/DISTRIBUTION BOX

2

CHECK BATTERY VOLTAGE WHILE TRYING TO CRANK THE ENGINE. IS THE BATTERY VOLTAGE AT LEAST 18 VOLTS?

TEST OPTIONS
1. STE/ICE-R TEST 67 (Page 2-740)
2. MULTIMETER
3. VOLTS GAUGE
REASON FOR QUESTION
If the engine cranks you know the engine is not locked and the rotary switch is OK.



REFERENCE INFORMATION

BAD CONNECTIONS ARE THE MOST COMMON PROBLEM!

Sometimes, just disconnecting, cleaning and reconnecting will solve a problem. **BE THOROUGH!** The time you save may be your own.

Refer to the functional flow schematic and check the following:

1. BATTERY - make sure all connections are clean and tight, including the shunt and power stud.
2. STARTER - check the high current (heavy gauge wire 6A) wire at the starter. Don't just check for voltage; a loose connection will have voltage but can't carry much current.



WARNING

Disconnect negative battery cable before disconnecting and reconnecting protective control box/distribution box harness.

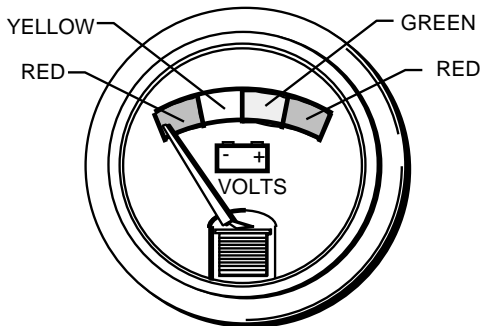
There is battery voltage at the PCB/distribution box at all times. Failure to disconnect battery cable will result in damage to equipment or injury to personnel.

2

3. PROTECTIVE CONTROL BOX/ DISTRIBUTION BOX - Unscrew BOTH connectors and look for bent or broken pins, pins pushed out of their socket, or dirt and corrosion in the connections.

4. ROTARY SWITCH - Check the wires at the switch. Don't just look. Feel the connections to make sure they're snug. Many problems can be solved by seeing with your fingers, not just your eyes.

A cold engine should crank at least 100 RPM.
A warm engine should crank at least 180 RPM.



VOLTS GAUGE

STARTER CIRCUIT

**BATTERY VOLTAGE
STE/ICE-R TEST 67**

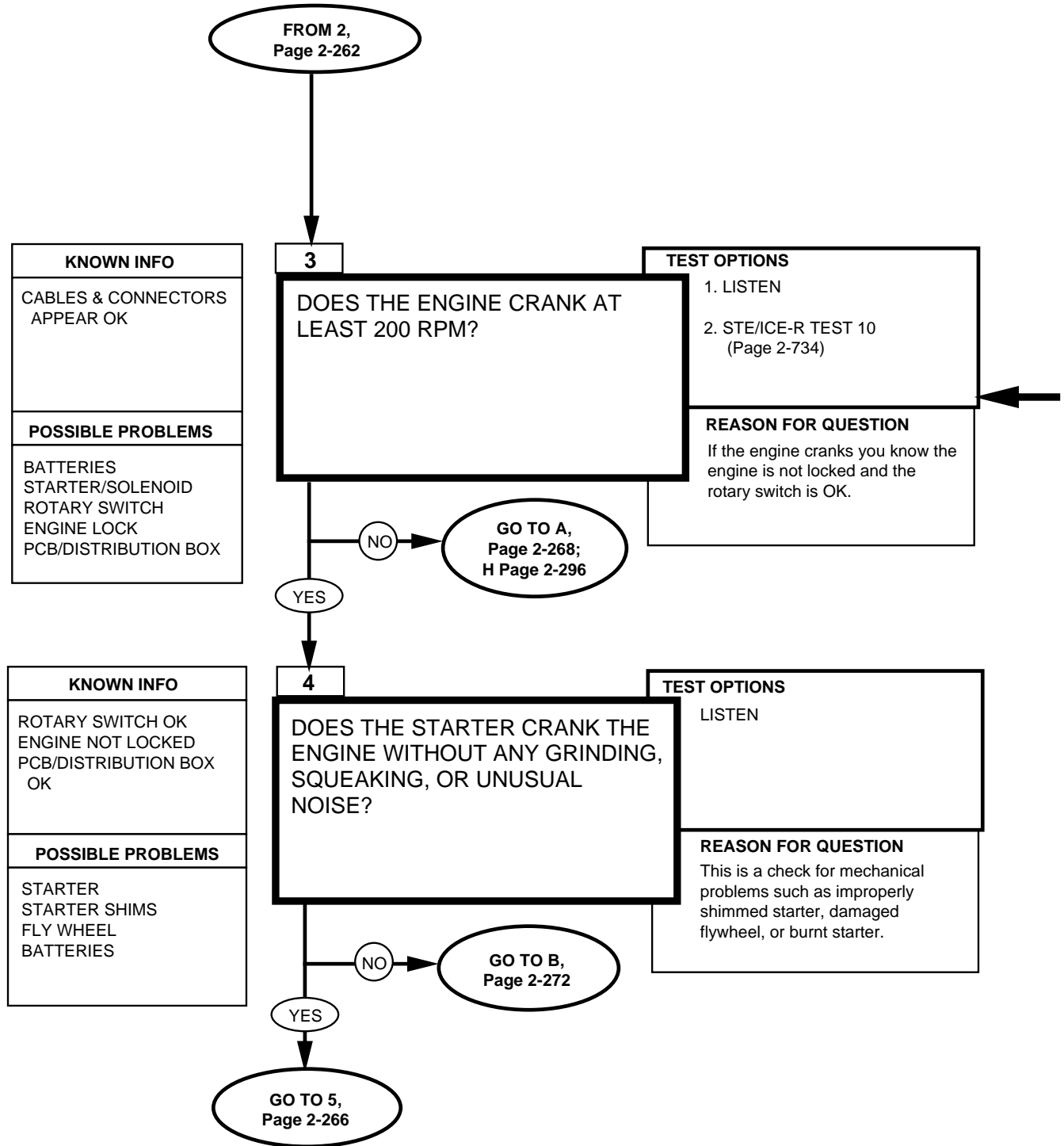
1. Start Test 67, battery voltage.
2. Displayed reading is in volts. Batteries should be 23-25.5 volts. Batteries voltage will drop when glowplugs turn on.

**BATTERY VOLTAGE
MULTIMETER**

1. Set the voltmeter to a DC volts scale of at least 40 volts.
2. Connect the RED lead to positive and the BLACK lead to negative.
3. Be sure to read the correct scale.

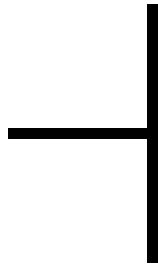
STARTER CIRCUIT

DIAGNOSTIC FLOWCHART



REFERENCE INFORMATION

STARTER CIRCUIT

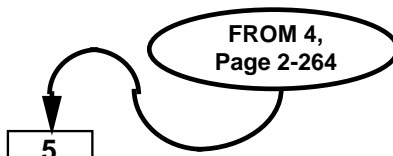


ENGINE RPM STE/ICE-R TEST 10
<ol style="list-style-type: none">1. Start Test 10, Engine RPM.2. Crank or start the engine. Displayed reading is RPM. Cranking RPM should be approximately 200. Idle RPM should be 625-675 (6.2L and 6.5L).

STARTER CIRCUIT

DIAGNOSTIC FLOWCHART

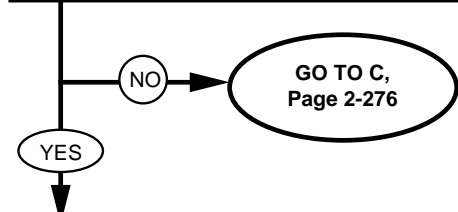
KNOWN INFO
CRANKS OK
POSSIBLE PROBLEMS
ROTARY SWITCH STARTER PCB/DISTRIBUTION BOX



5

DOES THE STARTER STOP CRANKING WHEN THE ROTARY SWITCH IS RETURNED TO THE "RUN" OR "STOP" POSITIONS?

TEST OPTIONS
LISTEN
REASON FOR QUESTION
The starter solenoid could be stuck or, more likely there may be a short to the solenoid.

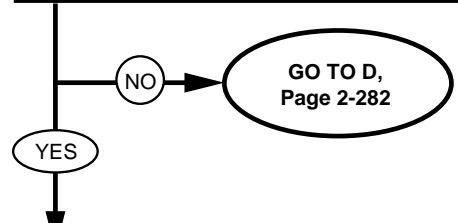


KNOWN INFO
ROTARY SWITCH OK ENGINE NOT LOCKED PCB/DISTRIBUTION BOX OK
POSSIBLE PROBLEMS
BATTERIES STARTER/SOLENOID

6

IS THE AVERAGE STARTER CURRENT BETWEEN 200 & 300 AMPS?

TEST OPTIONS
1. STE/ICE-R TEST 71 (Page 2-744) 2. MULTIMETER
REASON FOR QUESTION
This will tell if the starter is OK and if the batteries have enough power to crank the engine.

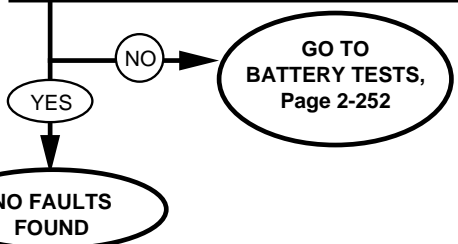


KNOWN INFO
ROTARY SWITCH OK ENGINE NOT LOCKED STARTER OK
POSSIBLE PROBLEMS
BATTERIES

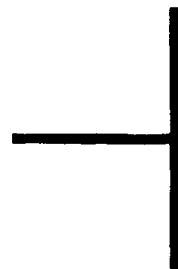
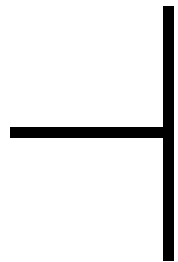
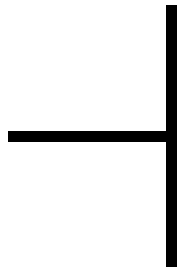
7

IS THE BATTERY VOLTAGE AT LEAST 18.5 VOLTS WHILE CRANKING?

TEST OPTIONS
1. STE/ICE-R TEST 67 (Page 2-740) 2. MULTIMETER
REASON FOR QUESTION
A good cranking voltage, combined with a good starter current shows that the batteries are OK.



REFERENCE INFORMATION



STARTER CIRCUIT

**STARTER AVERAGE CURRENT
STE/ICE-R TEST 71**

1. Start Test 71, starter average current.
2. Displayed reading is in amps. The starter should draw at least 200 amps with a peak of over 400 amps.

**BATTERY CURRENT
MULTIMETER**

1. Set the voltmeter to a DC volts scale of about 1 volt.
2. Connect the BLACK lead to the battery side of the current shunt and the RED lead to the other end of the current shunt.
3. Current shunt voltage is proportional to battery current, 100 millivolts. 1000 amps. To get current, multiply millivolts x 10.

**BATTERY VOLTAGE
STE/ICE-R TEST 67**

1. Start Test 67, battery voltage.
2. Displayed reading is in volts. Batteries should be 23-25.5 volts. Batteries voltage will drop when glowplugs turn on.

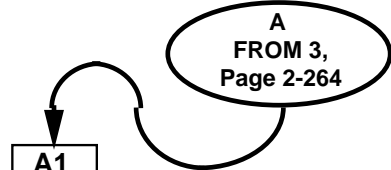
**BATTERY VOLTAGE
MULTIMETER**

1. Set the voltmeter to a DC volts scale of at least 40 volts.
2. Connect the RED lead to positive and the BLACK lead to negative.
3. Be sure to read the correct scale.

STARTER CIRCUIT

DIAGNOSTIC FLOWCHART

KNOWN INFO
ENGINE DOESN'T CRANK AT 200 RPM
POSSIBLE PROBLEMS
BATTERIES STARTER NEUTRAL SAFETY SWITCH CABLES/WIRING ENGINE MECHANICAL ROTARY SWITCH PCB/DISTRIBUTION BOX



A1

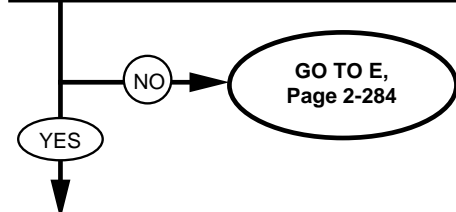
DOES THE ENGINE CRANK AT ALL?

TEST OPTIONS

LISTEN

REASON FOR QUESTION

If the engine cranks, then the rotary switch, neutral safety switch and PCB/distribution box are all working.



KNOWN INFO
ENGINE CRANKS SLOW
POSSIBLE PROBLEMS
BATTERIES STARTER ENGINE MECHANICAL CABLES/CONNECTIONS

A2

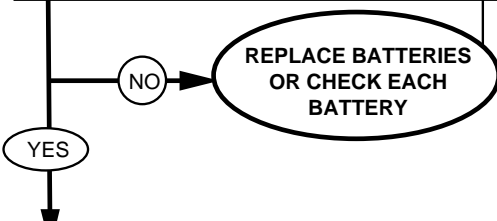
IS THE BATTERY VOLTAGE 23-25 VOLTS?

TEST OPTIONS

1. STE/ICE-R TEST 67 (Page 2-740)
2. MULTIMETER

REASON FOR QUESTION

If batteries are weak they can't provide enough current to crank the engine properly.



KNOWN INFO
BATTERY VOLTS OK STARTER OK
POSSIBLE PROBLEMS
WEAK BATTERIES ENGINE MECHANICAL CABLES/CONNECTORS STARTER

A3

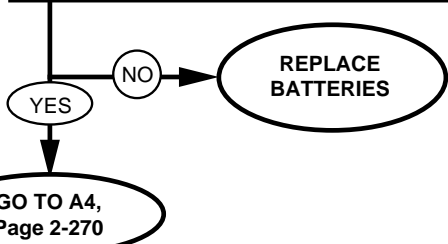
IS THE BATTERY VOLTAGE AT LEAST 18.5 VOLTS DURING CRANKING?

TEST OPTIONS

1. STE/ICE-R TEST 67 (Page 2-740)
2. MULTIMETER

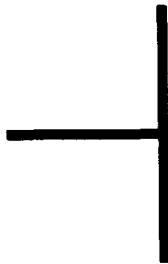
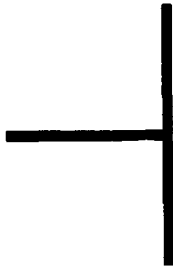
REASON FOR QUESTION

Batteries must be able to maintain voltage or the engine won't crank.



REFERENCE INFORMATION

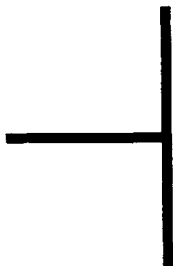
STARTER CIRCUIT



Connect red to
positive = power stud

Connect black to
negative = battery side of current shunt

Replace batteries, refer to (para 4-79).



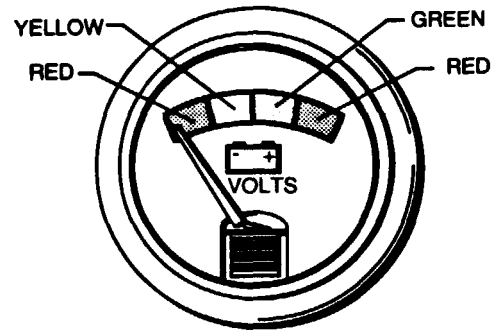
Connect red to
positive = power stud

Connect black to
negative = battery side of current shunt

Replace batteries, refer to (para 4-79).

BATTERY VOLTAGE STE/ICE-R TEST 67
<ol style="list-style-type: none"> 1. Start Test 67, battery voltage. 2. Displayed reading is in volts. Batteries should be 23-25.5 volts. Batteries voltage will drop when glowplugs turn on.

VOLTAGE MULTIMETER
<ol style="list-style-type: none"> 1. Set the voltmeter to a DC volts scale of at least 40 volts. 2. Connect the RED lead to positive and the BLACK lead to negative. 3. Be sure to read the correct scale.



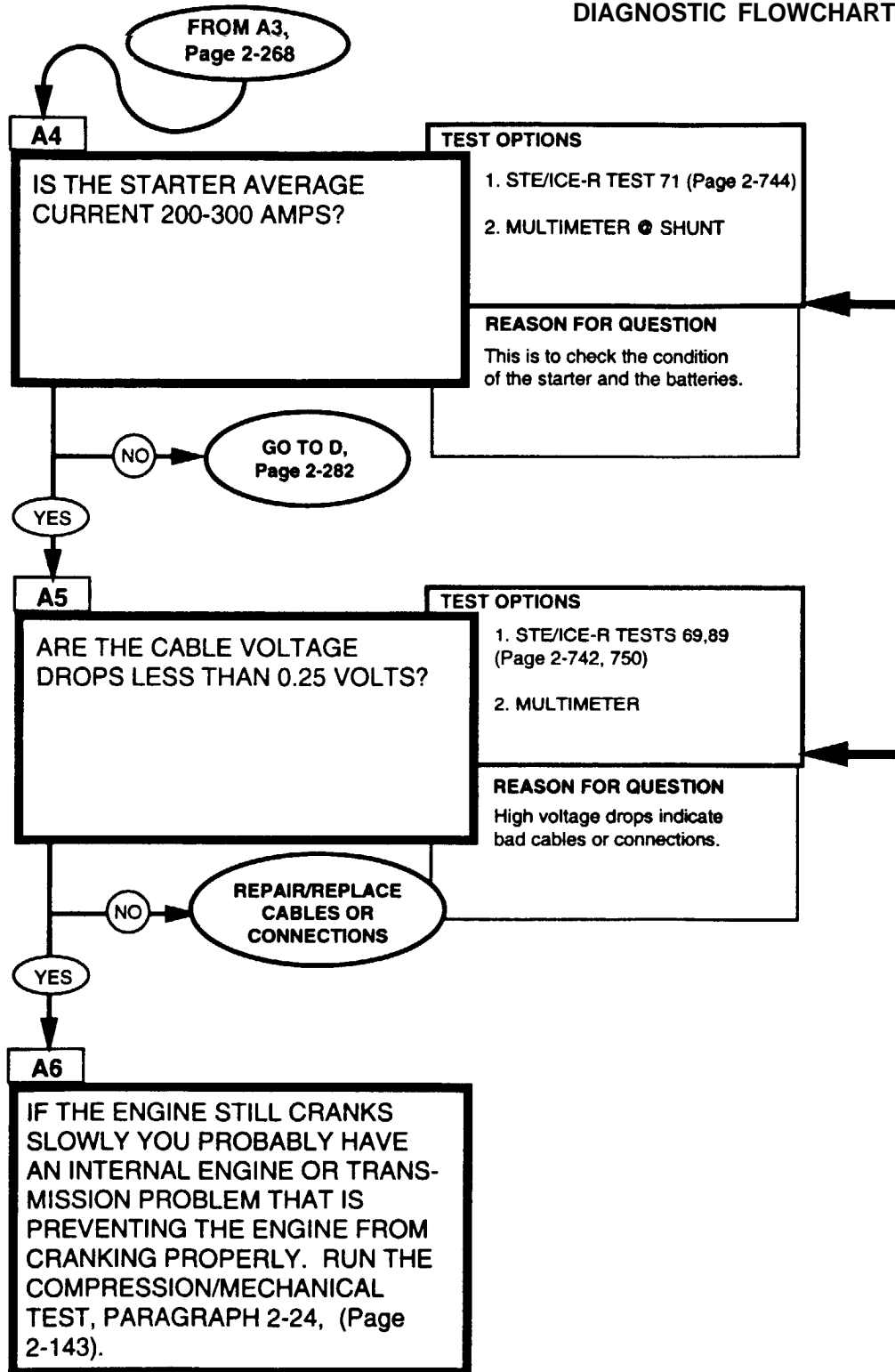
VOLTS GAUGE

STARTER CIRCUIT

DIAGNOSTIC FLOWCHART

KNOWN INFO
BATTERY VOLTAGE OK ENGINE CRANKS SLOW
POSSIBLE PROBLEMS
WEAK BATTERIES STARTER ENGINE MECHANICAL CABLES/CONNECTIONS

KNOWN INFO
BATTERIES OK STARTER OK
POSSIBLE PROBLEMS
CABLES/CONNECTIONS



REFERENCE INFORMATION

STARTER CIRCUIT

**STARTER AVERAGE CURRENT
STE/ICE-R TEST 71**

1. Start Test 71, starter average current.
2. Displayed reading is in amps. The starter should draw at least 200 amps with a peak of over 400 amps.

**STARTER NEG. CABLE VOLTAGE DROP
STE/ICE-R TEST 69**

1. Start Test 69, starter negative cable voltage drop.
2. Displayed reading is in volts. The cable voltage drop should be less than 0.25 volts max.

Check these cables;

Starter negative cable - STE/ICE-R test 69

Wire 68, connecting the batteries together.
Test point is the positive battery post.

Wire 49A, connecting battery to power stud.
Test point is the power stud.

Wire connecting battery to shunt (50A).
Test point is the positive battery post.

Power stud to starter motor (6A). Test
point is the power stud.

Replace or repair cables, refer to (para 4-73).

**0-45 DC VOLTS
STE/ICE-R TEST 89**

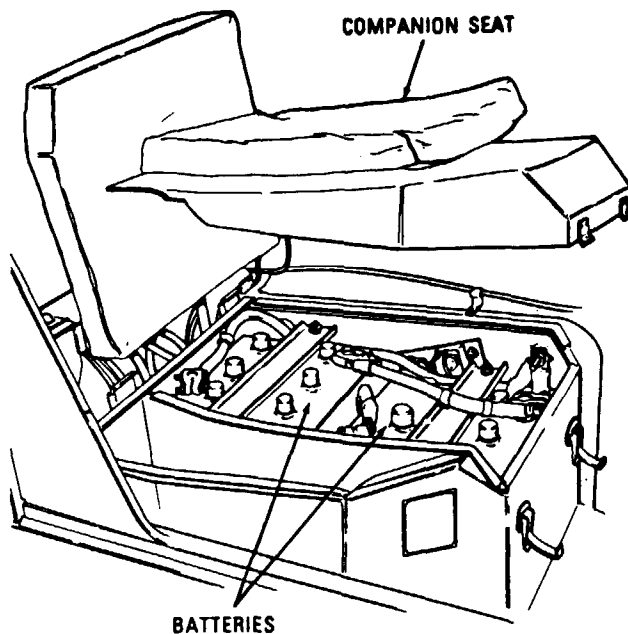
1. connect RED clip to the indicated test point, BLACK clip to negative or ground.
2. Start Test 89, DC Volts.
3. Displayed reading is in volts.

**BATTERY CURRENT
MULTIMETER**

1. Set the voltmeter to a DC volts scale of about 1 volt.
2. Connect the BLACK lead to the battery side of the current shunt and the RED lead to the other end of the current shunt.
3. Current shunt voltage is proportional to battery current, 100 millivolts = 1000 amps. To get current, multiply millivolts x 10.

**VOLTAGE
MULTIMETER**

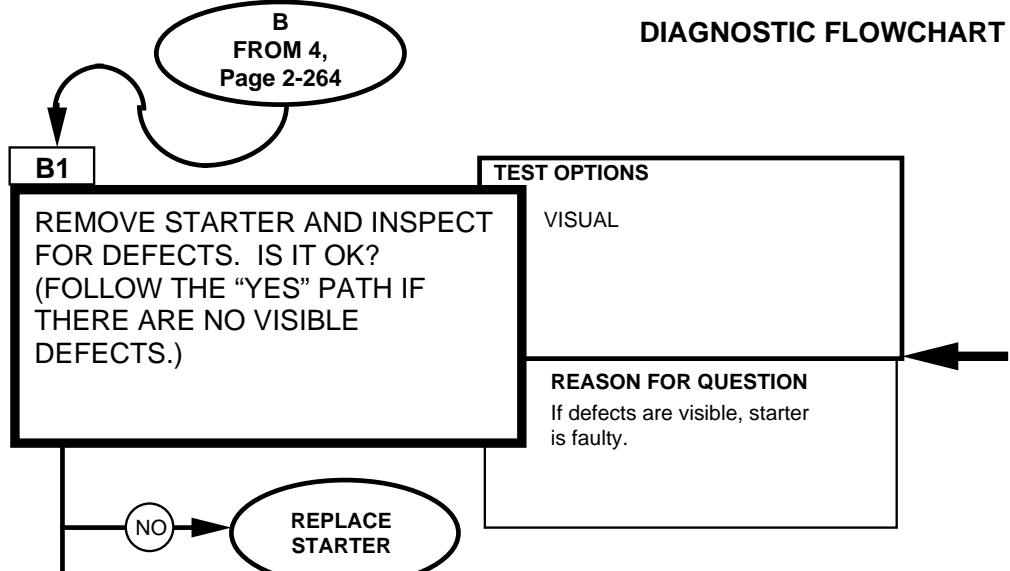
1. Set the voltmeter to a DC volts scale of at least 40 volts.
2. Connect the RED lead to positive and the BLACK lead to negative.
3. Be sure to read the correct scale.



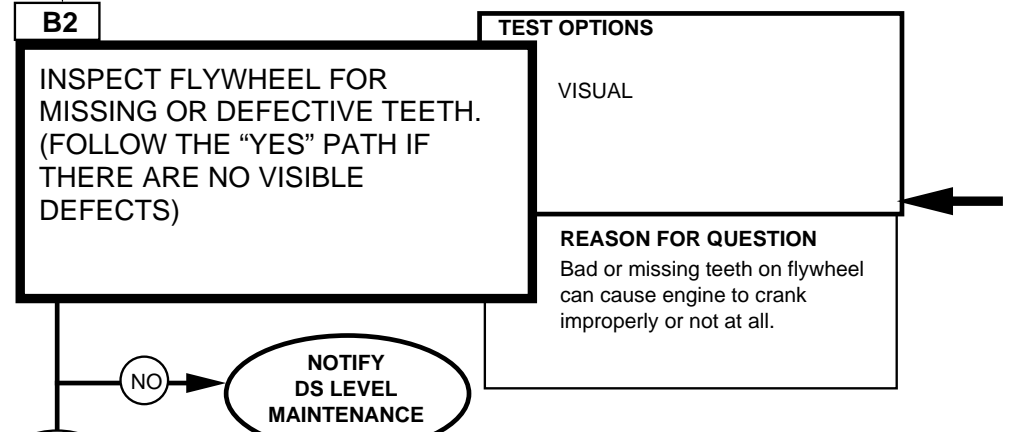
STARTER CIRCUIT

DIAGNOSTIC FLOWCHART

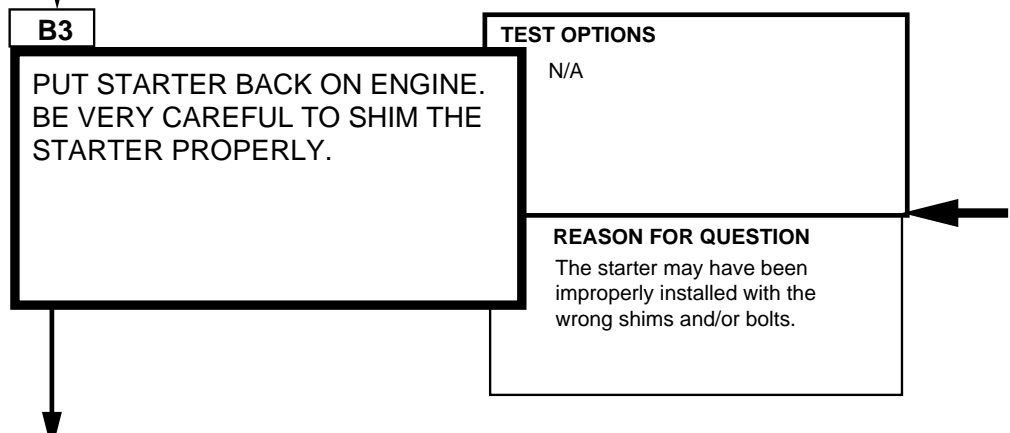
KNOWN INFO
BATTERIES OK PCB/DISTRIBUTION BOX OK NEUTRAL SAFETY SWITCH ROTARY SWITCH
POSSIBLE PROBLEMS
STARTER FLYWHEEL WIRING



KNOWN INFO
BATTERIES OK STARTER NOT VISIBLY DEFECTIVE
POSSIBLE PROBLEMS
STARTER FLYWHEEL WIRING

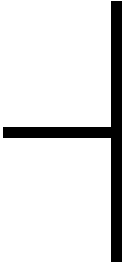


KNOWN INFO
BATTERIES OK FLYWHEEL OK STARTER NOT VISIBLY DEFECTIVE
POSSIBLE PROBLEMS
STARTER




REFERENCE INFORMATION

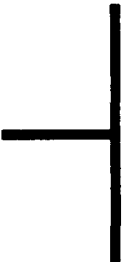
STARTER CIRCUIT



Remove Starter motor.
 Check the pinion and gear for missing or broken teeth, unusual wear, bent pieces, etc.
 Check the pinion by turning it on the screw shaft.
 Check the armature by prying the pinion with a screwdriver. The armature should turn freely.
 Replace starter, refer to (para 4-8).



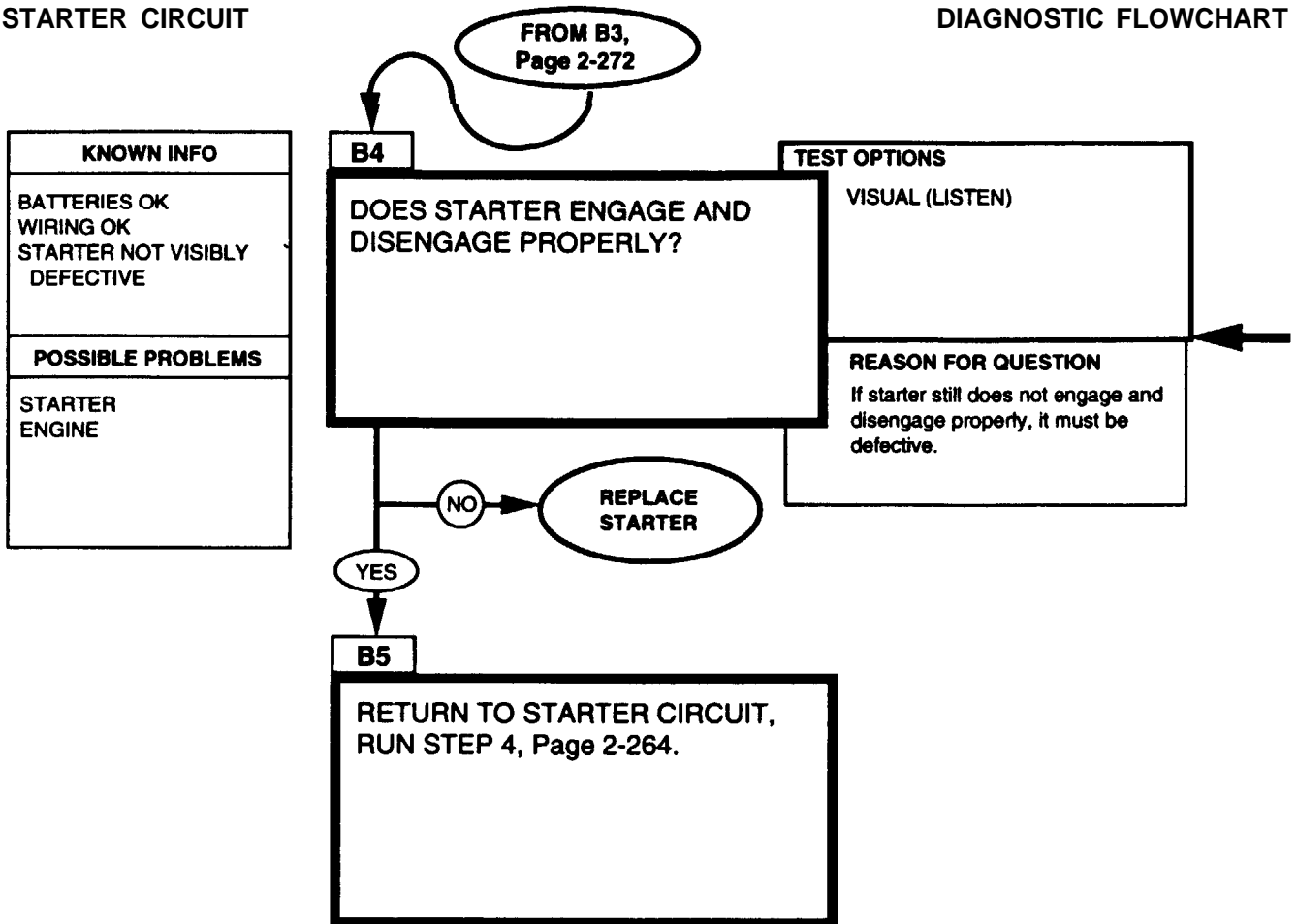
Disconnect the fuel solenoid, wire 54A, to prevent accidental starting. Rotate the engine with a breaker bar and socket on the crankshaft pulley to inspect the engine flywheel for missing or defective teeth.



Replace starter, refer to (para 4-8).

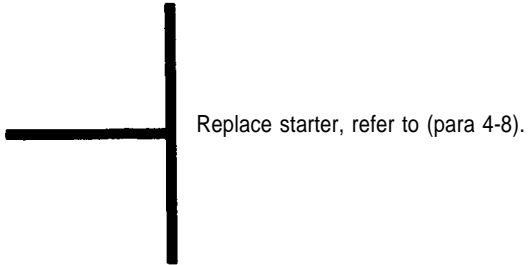
STARTER CIRCUIT

DIAGNOSTIC FLOWCHART



REFERENCE INFORMATION

STARTER CIRCUIT



STARTER CIRCUIT

DIAGNOSTIC FLOWCHART

C
FROM 5,
Page 2-266

KNOWN INFO
ENGINE WON'T STOP CRANKING
POSSIBLE PROBLEMS
ROTARY SWITCH PCB/DISTRIBUTION BOX WIRING STARTER

C1
DISCONNECT NEGATIVE BATTERY CABLE TO STOP CRANKING.

REASON FOR QUESTION
No matter what's wrong, the starter can't crank without battery power.

KNOWN INFO
ENGINE WON'T STOP CRANKING
POSSIBLE PROBLEMS
ROTARY SWITCH PCB/DISTRIBUTION BOX WIRING STARTER

C2
DISCONNECT WIRES AT ROTARY SWITCH. WITH SWITCH IN "OFF" POSITION, DO YOU GET:
OPEN CIRCUIT FROM B TO S?
OPEN CIRCUIT FROM B TO R?
OPEN CIRCUIT FROM R TO S?

TEST OPTIONS
1. STE/ICE-R TEST 91 (Page 2-752)
2. MULTIMETER

REASON FOR QUESTION
A good switch exhibits these open circuits in the "OFF" position.

NO → REPLACE SWITCH

YES

KNOWN INFO
ENGINE WON'T STOP CRANKING
POSSIBLE PROBLEMS
ROTARY SWITCH PCB/DISTRIBUTION BOX WIRING STARTER

C3
WITH ROTARY SWITCH IN "RUN" POSITION, DO YOU GET:
OPEN CIRCUIT FROM B TO S?
OPEN CIRCUIT FROM R TO S?
SHORT CIRCUIT FROM B TO R?

TEST OPTIONS
1. STE/ICE-R TEST 91 (Page 2-752)
2. MULTIMETER

REASON FOR QUESTION
A good switch has these opens and shorts.

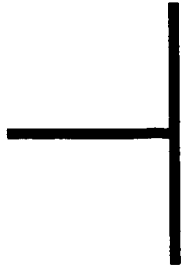
NO → REPLACE SWITCH

YES

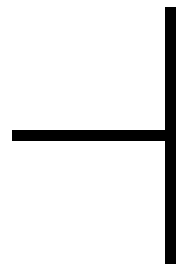
GO TO C4,
Page 2-278

REFERENCE INFORMATION

STARTER CIRCUIT



<p>0-4500 OHMS STE/ICE-R TEST 91</p>
<p>1. Connect RED clip and BLACK clip to the indicated test points in the question. RED to the first, BLACK to the second.</p> <p>2. Start Test 91, 0-4500 ohms.</p> <p>3. Displayed reading is in ohms. Less than 5 ohms is continuity. If the resistance is over 4500 ohms, STE/ICE displays "9.9.9.9."</p>

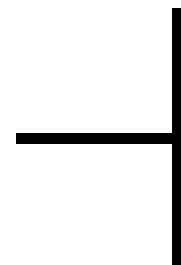


Don't forget that your vehicle batteries are disconnected, so you can't run the STE/ICE-R from the DCA, you have to use the power cable and connect directly to the batteries.

When the resistance is too high for STE/ICE-R to measure, as in the case of an open circuit, STE/ICE-R displays "9.9.9.9."

Replace rotary switch, refer to (para 4-7).

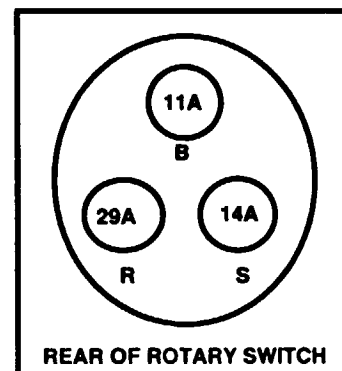
<p>CONTINUITY (RESISTANCE) MULTIMETER</p>
<p>1. Set the voltmeter to an ohms scale of about 1000 ohms.</p> <p>2. Connect the RED and BLACK leads to the connections stated in the question.</p> <p>3. Be sure to read the correct scale. Less than 5 ohms indicates continuity. For an open circuit, the meter should peg full scale (needle all the way to the left).</p>



Don't forget that your vehicle batteries are disconnected, so you can't run the STE/ICE-R from the DCA, you have to use the power cable and connect directly to the batteries.

When the resistance is too high for STE/ICE-R to measure, as in the case of an open circuit, STE/ICE-R displays "9.9.9.9."

Replace rotary switch, refer to (para 4-7).



STARTER CIRCUIT

DIAGNOSTIC FLOWCHART

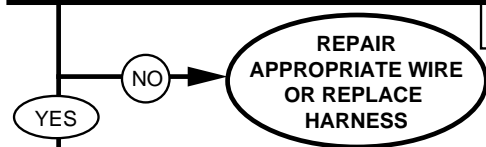
FROM C3,
Page 2-276

KNOWN INFO
ROTARY SWITCH OK
POSSIBLE PROBLEMS
PCB/DISTRIBUTION BOX WIRING STARTER

C4

RECONNECT ROTARY SWITCH. TURN SWITCH TO "STOP." CHECK FOR OPEN CIRCUIT IN THE PCB BODY CONNECTOR HARNESS BETWEEN THE FOLLOWING SOCKETS; G-A, G-B, A-B, F-A, AND F-B. ARE THEY ALL OPEN CIRCUITS ?

TEST OPTIONS
1. STE/ICE-R TEST 91 (Page 2-752) 2. MULTIMETER
REASON FOR QUESTION
Continuity between any of these pins indicates a short between the wires in body harness

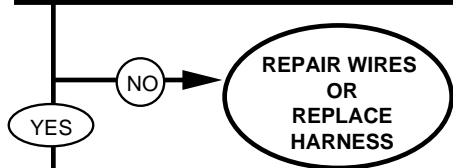


KNOWN INFO
ROTARY SWITCH OK BODY HARNESS OK
POSSIBLE PROBLEMS
PCB/DISTRIBUTION BOX WIRING STARTER

C5

RECONNECT BODY CONNECTOR. DISCONNECT ENGINE CONNECTOR. DISCONNECT WIRE 74A AT STARTER. IS THERE AN OPEN CIRCUIT FROM SOCKET E TO SOCKET I ENGINE CONNECTOR HARNESS?

TEST OPTIONS
1. STE/ICE-R TEST 91 (Page 2-752) 2. MULTIMETER
REASON FOR QUESTION
Continuity between these pins indicates a short in the engine harness.

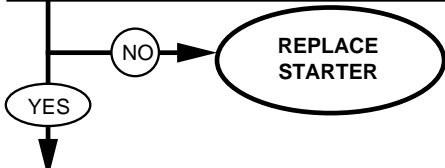


KNOWN INFO
ROTARY SWITCH OK BODY HARNESS OK
POSSIBLE PROBLEMS
PCB/DISTRIBUTION BOX WIRING STARTER

C6

IS THERE AN OPEN CIRCUIT FROM SOCKET E OF PCB/DISTRIBUTION BOX ENGINE CONNECTOR HARNESS TO ENGINE GROUND?

TEST OPTIONS
1. STE/ICE-R TEST 91 (Page 2-752) 2. MULTIMETER
REASON FOR QUESTION
Continuity indicates shorted connector in the starter solenoid.



GO TO C7,
Page 2-280

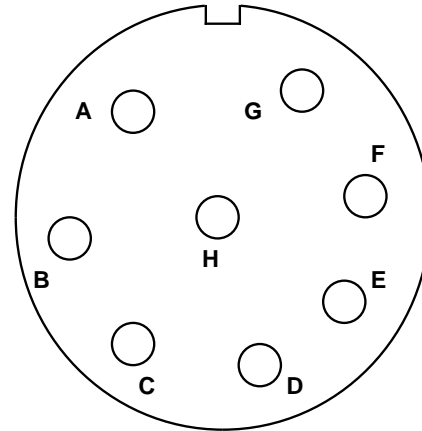
REFERENCE INFORMATION

STARTER CIRCUIT

Don't forget that your vehicle batteries are disconnected, so you can't run the STE/ICE-R from the DCA, you have to use the power cable and connect directly to the batteries.

When the resistance is too high for STE/ICE-R to measure, as in the case of an open circuit, STE/ICE-R displays "9.9.9.9."

Repair wiring or replace harness, refer to (para. 4-85).



PCB/DISTRIBUTION BOX BODY CONNECTOR

Check the wires at the connectors for shorts. If there are no visible shorts, you have to replace the harness.

Repair wiring or replace harness, refer to (para. 4-85).

Replace starter, refer to (para. 4-8).

**0-4500 OHMS
STE/ICE-R TEST 91**

1. Connect RED clip and BLACK clip to the indicated test points in the question. RED to the first, BLACK to the second.
2. Start Test 91, 0-4500 ohms.
3. Displayed reading is in ohms. Less than 5 ohms is continuity. If the resistance is over 4500 ohms, STE/ICE displays "9.9.9.9."

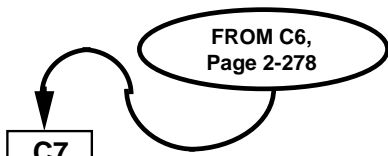
**CONTINUITY (RESISTANCE)
MULTIMETER**

1. Set the voltmeter to an ohms scale of about 1000 ohms.
2. Connect the RED and BLACK leads to the connections stated in the question.
3. Be sure to read the correct scale. Less than 5 ohms indicates continuity. For an open circuit, the meter should peg full scale (needle all the way to the left).

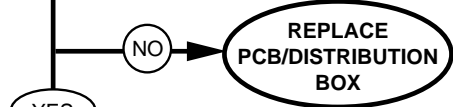
STARTER CIRCUIT

DIAGNOSTIC FLOWCHART

KNOWN INFO
ENGINE HARNESS OK
POSSIBLE PROBLEMS
PCB/DISTRIBUTION BOX BATTERY



C7	RECONNECT WIRE 74A TO STARTER. IS BATTERY VOLTAGE LESS THAN 20 VOLTS ?	TEST OPTIONS 1. STE/ICE-R TEST 67 (Page 2-740) 2. MULTIMETER
		REASON FOR QUESTION Low battery voltage may, under the proper conditions, cause the starter solenoid to remain energized.



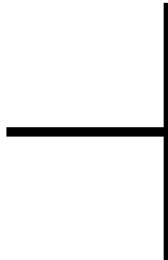
KNOWN INFO
ENGINE HARNESS OK
POSSIBLE PROBLEMS
PCB/DISTRIBUTION BOX BATTERY

C8	DISCONNECT BATTERY NEGATIVE CABLE. RECONNECT ENGINE CONNECTOR. REPLACE BATTERY NEGATIVE CABLE. REPLACE BATTERIES. TRY CRANKING ENGINE. IF IT WON'T STOP CRANKING, REPLACE PCB/DISTRIBUTION BOX. RE-RUN STARTER CIRCUIT TEST CHAIN (STEP 1, Page 2-262).
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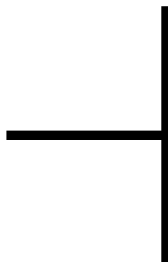
REFERENCE INFORMATION

STARTER CIRCUIT



Replace PCB, refer to (para. 4-5).
Replace distribution box (para. 4-5.1).

BATTERY VOLTAGE MULTIMETER
1. Set the voltmeter to a DC volts scale of at least 40 volts.
2. Connect the RED lead to positive and the BLACK lead to negative.
3. Be sure to read the correct scale.



Replace batteries, refer to (para. 4-79).
Replace distribution box (para. 4-5.1).

BATTERY VOLTAGE STE/ICE-R TEST 67
1. Start Test 67, battery voltage.
2. Displayed reading is in volts. Batteries should be 23-25.5 volts. Batteries voltage will drop when glowplugs turn on.

STARTER CIRCUIT

DIAGNOSTIC FLOWCHART

D
FROM 6, Page 2-266
OR A4, Page 2-270

KNOWN INFO
CURRENT DRAW TOO HIGH OR LOW.
POSSIBLE PROBLEMS
BATTERIES STARTER CABLES

D1

IS BATTERY VOLTAGE 23-25.5 VOLTS?

TEST OPTIONS

1. STE/ICE-R TEST 67 (Page 2-740)
2. MULTIMETER

REASON FOR QUESTION
Low voltage may indicate low battery capacity.

NO → RECHARGE OR REPLACE BATTERIES

YES →

KNOWN INFO
BATTERY VOLTAGE OK
POSSIBLE PROBLEMS
BATTERIES STARTER CABLES

D2

IS BATTERY INTERNAL RESISTANCE LESS THAN 25 MILLIOHMS AND BATTERY RESISTANCE CHANGE LESS THAN 50 MILLIOHMS/SECOND ?

TEST OPTIONS

STE/ICE-R TESTS 73,75 (Page 2-746, 748)

REASON FOR QUESTION
Battery resistance and resistance change is an indication of the ability of the battery to supply current.

NO → REPLACE BATTERIES

YES →

KNOWN INFO
BATTERIES OK
POSSIBLE PROBLEMS
STARTER CABLES

D3

ARE THE POSITIVE AND NEGATIVE CABLE DROPS 0.25 VOLTS EACH?

TEST OPTIONS

1. STE/ICE-R TESTS 69,89 (Page 2-742, 750)
2. MULTIMETER

REASON FOR QUESTION
High cable resistance may limit current flow.

NO → REPLACE CABLE

YES →

REPLACE STARTER

REFERENCE INFORMATION

STARTER CIRCUIT

Replace batteries, refer to (para 4-79).

**BATTERY VOLTAGE
STE/ICE-R TEST 67**

1. Start Test 67, battery voltage.
2. Displayed reading is in volts. Batteries should be 23-25.5 volts. Batteries voltage will drop when glowplugs turn on.

Replace batteries, refer to (para 4-79).

**BATTERY INTERNAL Resistance
STE/ICE-R TEST 73**

1. Disconnect wire 54A at injection pump to prevent starting.
2. Disconnect glowplug controller and fan solenoid (to keep waveform clean).
3. Start Test 73, battery internal resistance.
4. Wait for the GO message. Crank the engine.
5. Result is displayed in milliohms. Battery resistance should be 25 milliohms max.

Replace cables or starter, refer to (para 4-77 or 4-8).

**STARTER NEG. CABLE VOLTAGE DROP
STE/ICE-R TEST 69**

1. Start Test 69, starter negative cable voltage drop.
2. Displayed reading is in volts. The cable voltage drop should be less than 0.25 volts max.

**BATTERY VOLTAGE
MULTIMETER**

1. Set the voltmeter to a DC volts scale of at least 40 volts.
2. Connect the RED lead to positive and the BLACK lead to negative.
3. Be sure to read the correct scale.

**BATTERY RESISTANCE CHANGE
STE/ICE-R TEST 75**

1. Disconnect wire 54A at injection pump to prevent starting.
2. Disconnect glowplug controller and fan solenoid (to keep waveform clean).
3. Start Test 75, battery resistance change.
4. Wait for the GO message. Crank the engine.
5. Result is displayed in milliohms/second. Battery resistance change should be 50 milliohms/second max.

**0-45 DC VOLTS
STE/ICE-R TEST 89**

1. Connect RED clip to the indicated test point, BLACK clip to negative or ground.
2. Start Test 89, DC volts.
3. Displayed reading is in volts.

**VOLTAGE
MULTIMETER**

1. Set the voltmeter to a DC volts scale of at least 40 volts.
2. Connect the RED lead to positive and the BLACK lead to negative.
3. Be sure to read the correct scale.

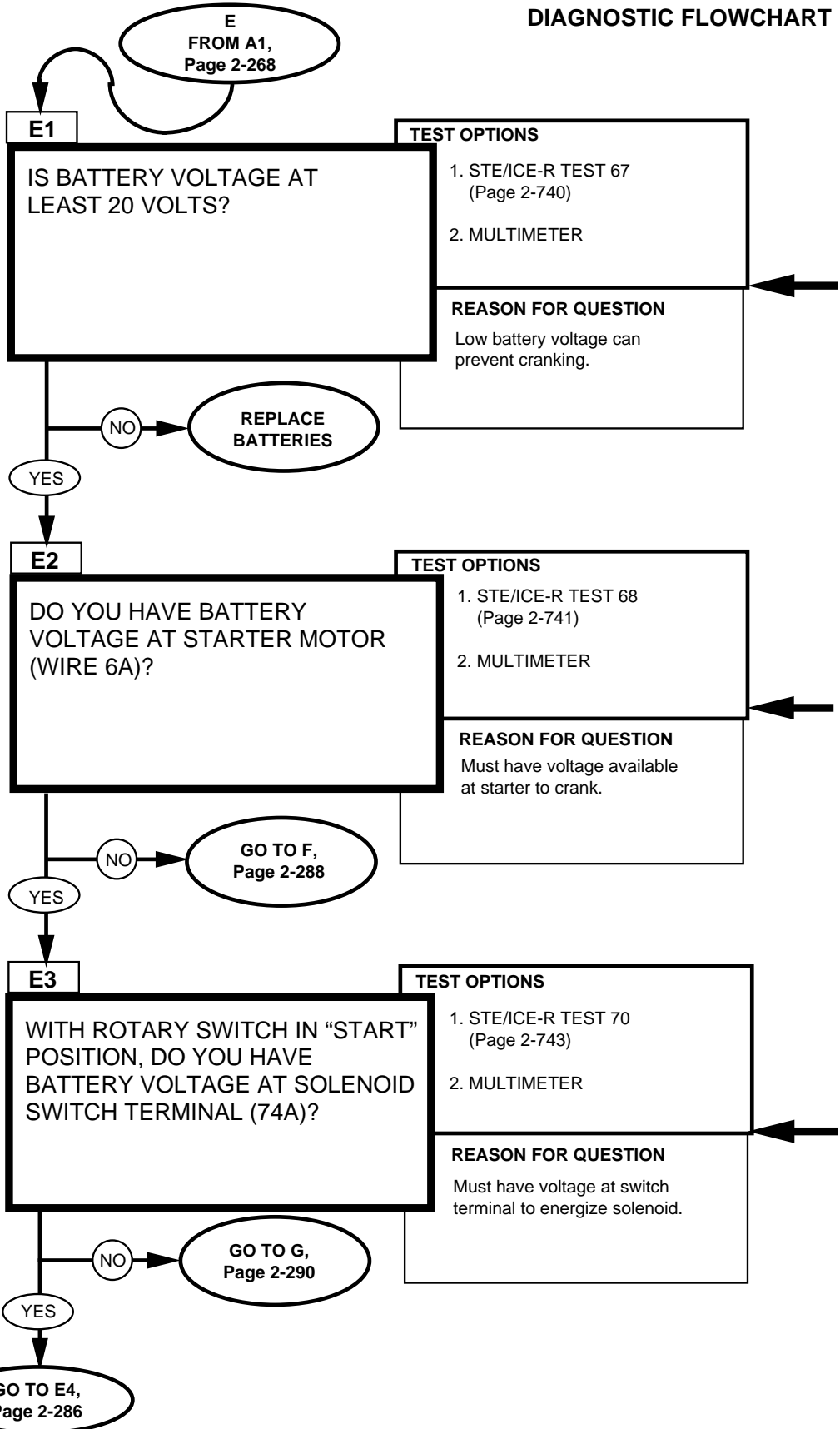
STARTER CIRCUIT

DIAGNOSTIC FLOWCHART

KNOWN INFO
ENGINE WON'T CRANK
POSSIBLE PROBLEMS
BATTERY STARTER PCB/DISTRIBUTION BOX ROTARY SWITCH NEUTRAL SAFETY SWITCH WIRING/CABLES LOCKED ENGINE

KNOWN INFO
BATTERY SHOULD AT LEAST CRANK ENGINE SLOWLY.
POSSIBLE PROBLEMS
STARTER PCB/DISTRIBUTION BOX ROTARY SWITCH NEUTRAL SAFETY SWITCH WIRING/CABLES LOCKED ENGINE

KNOWN INFO
VOLTAGE AVAILABLE AT STARTER
POSSIBLE PROBLEMS
BATTERY STARTER PCB/DISTRIBUTION BOX ROTARY SWITCH NEUTRAL SAFETY SWITCH WIRING/CABLES LOCKED ENGINE

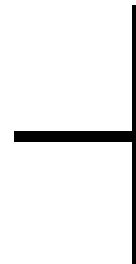
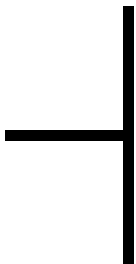


REFERENCE INFORMATION

STARTER CIRCUIT



Replace batteries, refer to (para 4-79).



<p>BATTERY VOLTAGE STE/ICE-R TEST 67</p>
<ol style="list-style-type: none"> 1. Start Test 67, battery voltage. 2. Displayed reading is in volts. Batteries should be 23-25.5 volts. Batteries voltage will drop when glowplugs turn on.

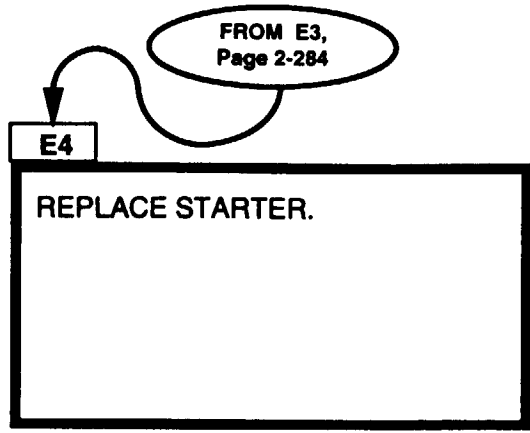
<p>BATTERY VOLTAGE MULTIMETER</p>
<ol style="list-style-type: none"> 1. Set the voltmeter to a DC volts scale at least 40 volts. 2. Connect the RED lead to positive and the BLACK lead to negative. 3. Be sure to read the correct scale.

<p>STARTER MOTOR VOLTAGE STE/ICE-R TEST 68</p>
<ol style="list-style-type: none"> 1. Start Test 68, starter motor voltage. 2. Displayed reading is in volts. Starter motor voltage should be the same as battery voltage, 23-25.5 volts. During cranking the starter motor voltage should be at least 18 volts.

<p>STARTER SOLENOID VOLTAGE STE/ICE-R TEST 70</p>
<ol style="list-style-type: none"> 1. Start Test 70, starter solenoid voltage. 2. Displayed reading is in volts. Starter solenoid voltage should be the same as battery voltage, 23-25.5 volts. During cranking the starter solenoid voltage should be at least 18 volts.

STARTER CIRCUIT

KNOWN INFO
ENGINE FREE
POSSIBLE PROBLEMS
STARTER

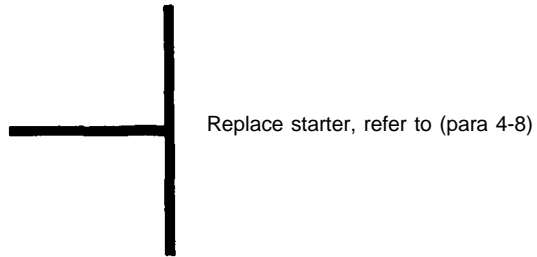


DIAGNOSTIC FLOWCHART



REFERENCE INFORMATION

STARTER CIRCUIT

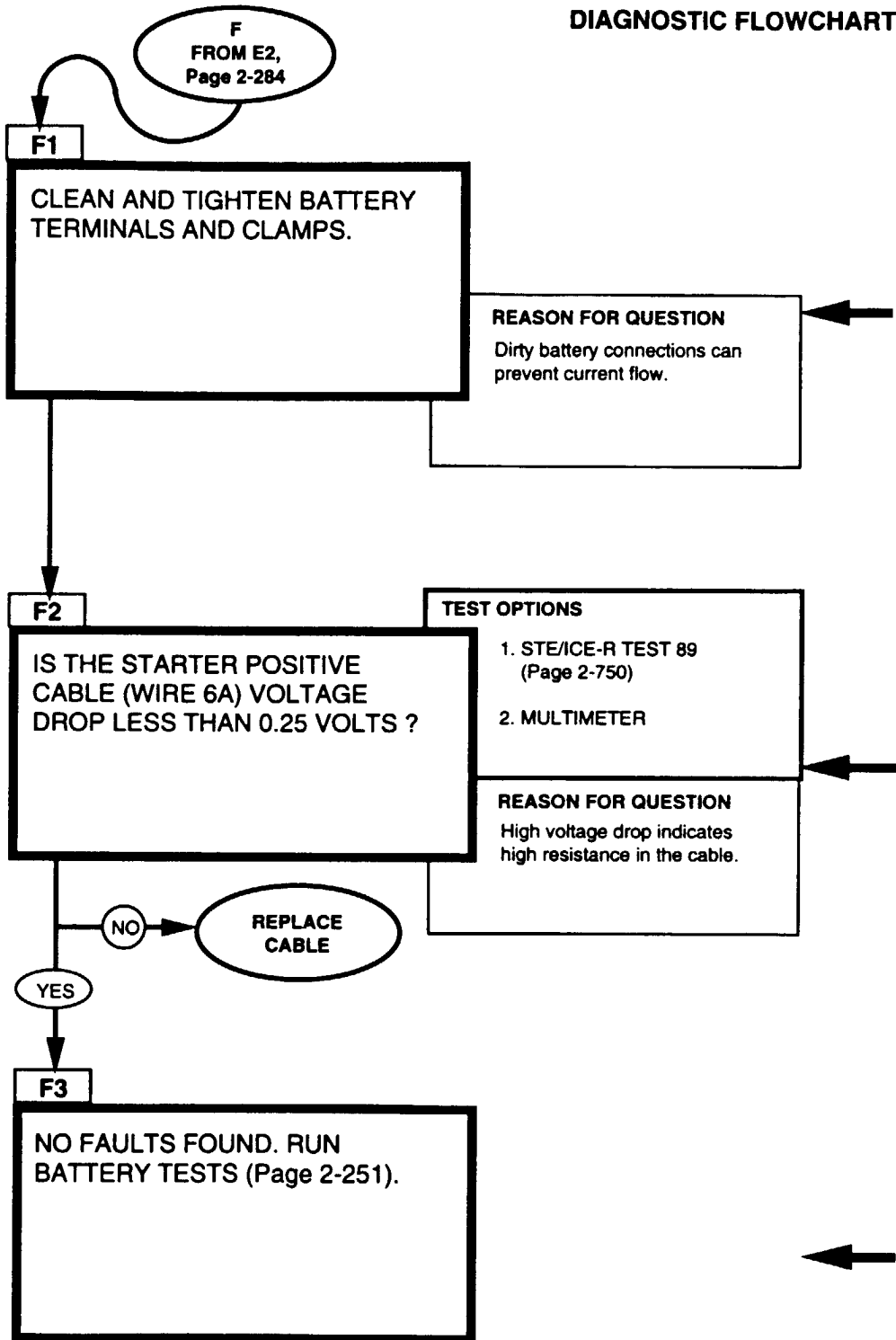


STARTER CIRCUIT

DIAGNOSTIC FLOWCHART

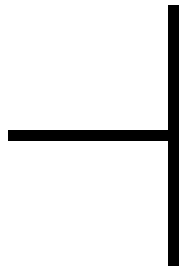
KNOWN INFO
BATTERY VOLTAGE NOT AVAILABLE AT SOLENOID STUD.
POSSIBLE PROBLEMS
CABLES, CONNECTIONS

KNOWN INFO
BATTERY CONNECTIONS OK
POSSIBLE PROBLEMS
CABLE



REFERENCE INFORMATION

STARTER CIRCUIT

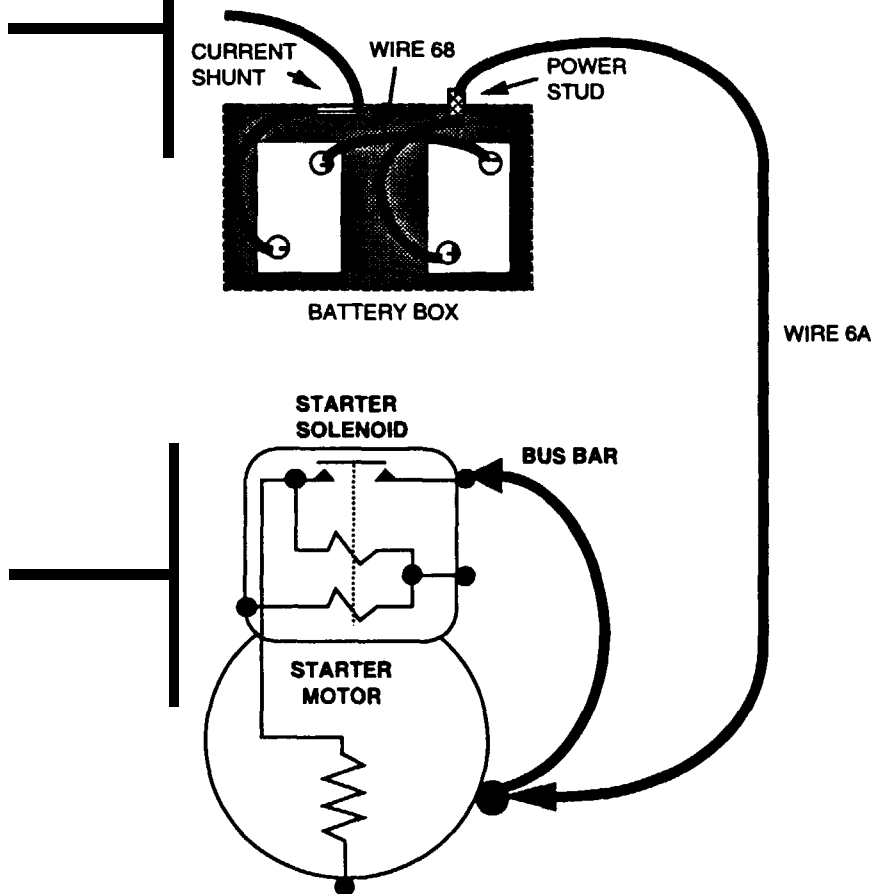


<p>0-45 DC VOLTS STE/CE-R TEST 89</p>
<p>1. Connect RED clip to the indicated test point, BLACK clip to negative or ground.</p> <p>2. Start Test 89, DC volts.</p> <p>3. Displayed reading is in volts.</p>

Replace cable, refer to (para 4-77).

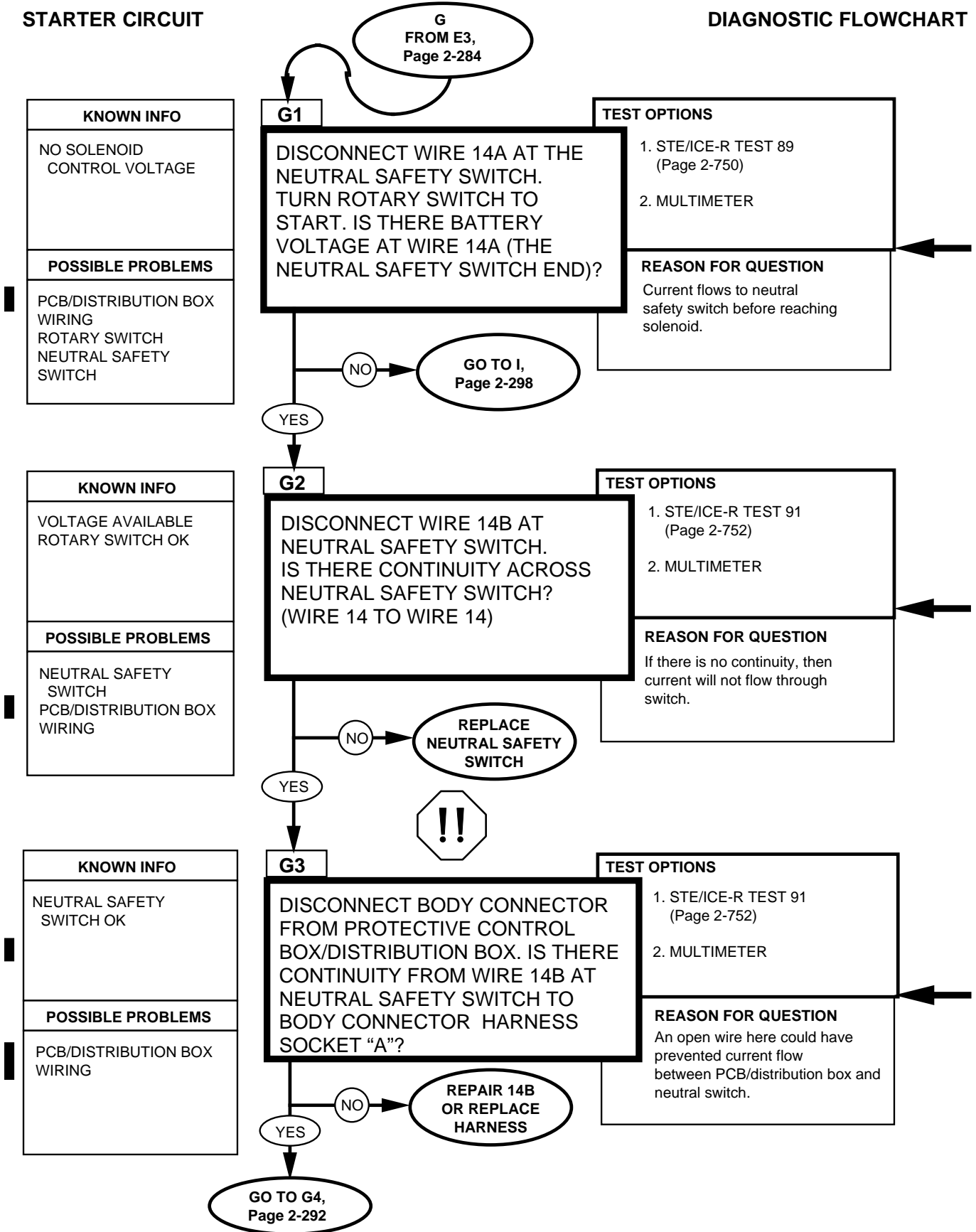
Put the red lead on the power stud, and the black on the terminal of the starter in order to measure the voltage along wire 6A.

<p>VOLTAGE MULTIMETER</p>
<p>1. Set the voltmeter to a DC volts scale of at least 40 volts.</p> <p>2. Connect the RED lead to positive and the BLACK lead to negative.</p> <p>3. Be sure to read the correct scale.</p>



STARTER CIRCUIT

DIAGNOSTIC FLOWCHART



REFERENCE INFORMATION

STARTER CIRCUIT

The connections for the neutral safety switch can be reached by removing the engine cover. The connections are near the gear shift lever.

Replace rotary switch, refer to (para. 4-7).



WARNING

Disconnect negative battery cable before disconnecting and reconnecting protective control box/distribution box harness.

There is battery voltage at the PCB/distribution box at all times. Failure to disconnect battery cable will result in damage to equipment or injury to personnel.

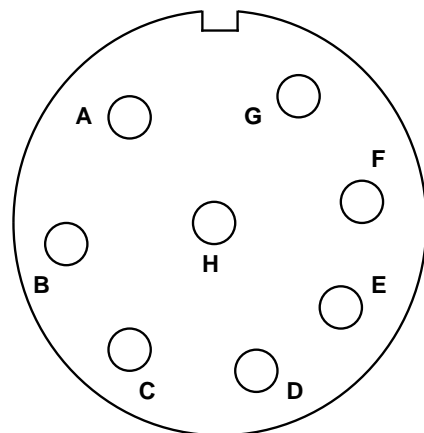
Repair wiring or replace switch, refer to (para. 4-7).

<p>0-45 DC VOLTS STE/ICE-R TEST 89</p>
<p>1. Connect RED clip to the indicated test point, BLACK clip to negative or ground.</p> <p>2. Start Test 89, DC volts.</p> <p>3. Displayed reading is in volts.</p>

<p>VOLTAGE MULTIMETER</p>
<p>1. Set the voltmeter to a DC volts scale of at least 40 volts.</p> <p>2. Connect the RED lead to positive and the BLACK lead to negative.</p> <p>3. Be sure to read the correct scale.</p>

<p>CONTINUITY (RESISTANCE) MULTIMETER</p>
<p>1. Set the voltmeter to an ohms scale of about 1000 ohms.</p> <p>2. Connect the RED and BLACK leads to the connections stated in the question.</p> <p>3. Be sure to read the correct scale. Less than 5 ohms indicates continuity. For an open circuit, the meter should peg full scale (needle all the way to the left).</p>

<p>0-4500 OHMS STE/ICE-R TEST 91</p>
<p>1. Connect RED clip and BLACK clip to the terminations indicated in the question. RED to the first, BLACK to the second.</p> <p>2. Start Test 91, 0-4500 ohms.</p> <p>3. Displayed reading is in ohms. Less than 5 ohms is continuity. If the resistance is over 4500 ohms, STE/ICE displays "9.9.9.9."</p>

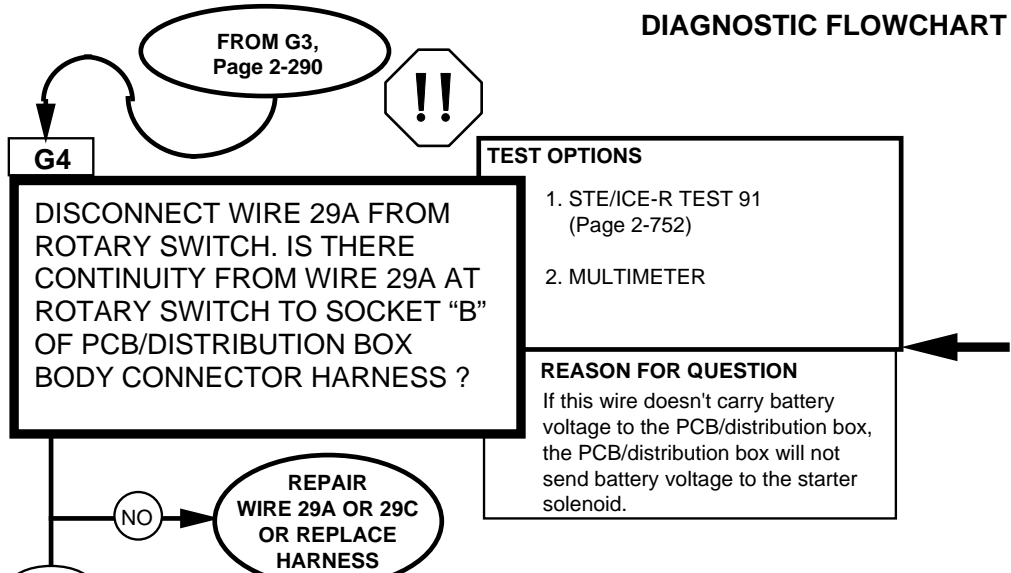


PCB/DISTRIBUTION BOX BODY CONNECTOR

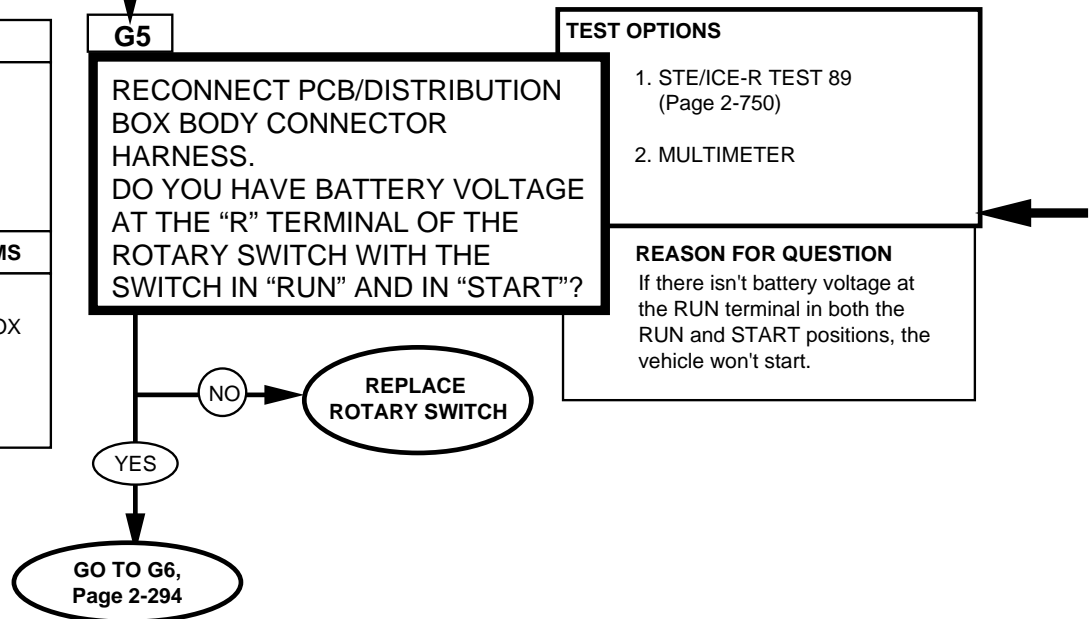
STARTER CIRCUIT

DIAGNOSTIC FLOWCHART

KNOWN INFO
NEUTRAL SAFETY SWITCH OK
POSSIBLE PROBLEMS
ROTARY SWITCH PCB/DISTRIBUTION BOX WIRING



KNOWN INFO
NEUTRAL SAFETY SWITCH OK
POSSIBLE PROBLEMS
ROTARY SWITCH PCB/DISTRIBUTION BOX WIRING



REFERENCE INFORMATION

STARTER CIRCUIT



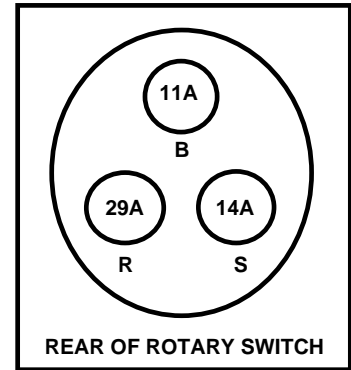
WARNING

Disconnect negative battery cable before disconnecting and reconnecting protective control box/distribution box harness.

There is battery voltage at the PCB/distribution box at all times. Failure to disconnect battery cable will result in damage to equipment or injury to personnel.

Check the wires and connections at both ends for broken wires or any kind of bad connection. Repair whatever you can. If the wires and connections seem OK, you have to replace the harness.

Repair wiring or replace harness, refer to (para. 4-85).



Replace rotary switch, refer to (para. 4-7).

<p>0-45 DC VOLTS STE/ICE-R TEST 89</p>
<p>1. Connect RED clip to the indicated test point, BLACK clip to negative or ground.</p> <p>2. Start Test 89, DC volts.</p> <p>3. Displayed reading is in volts.</p>

<p>0-4500 OHMS STE/ICE-R TEST 91</p>
<p>1. Connect RED clip and BLACK clip to the terminations indicated in the question. RED to the first, BLACK to the second.</p> <p>2. Start Test 91, 0-4500 ohms.</p> <p>3. Displayed reading is in ohms. Less than 5 ohms is continuity. If the resistance is over 4500 ohms, STE/ICE displays "9.9.9.9."</p>

<p>VOLTAGE MULTIMETER</p>
<p>1. Set the voltmeter to a DC volts scale of at least 40 volts.</p> <p>2. Connect the RED lead to positive and the BLACK lead to negative.</p> <p>3. Be sure to read the correct scale.</p>

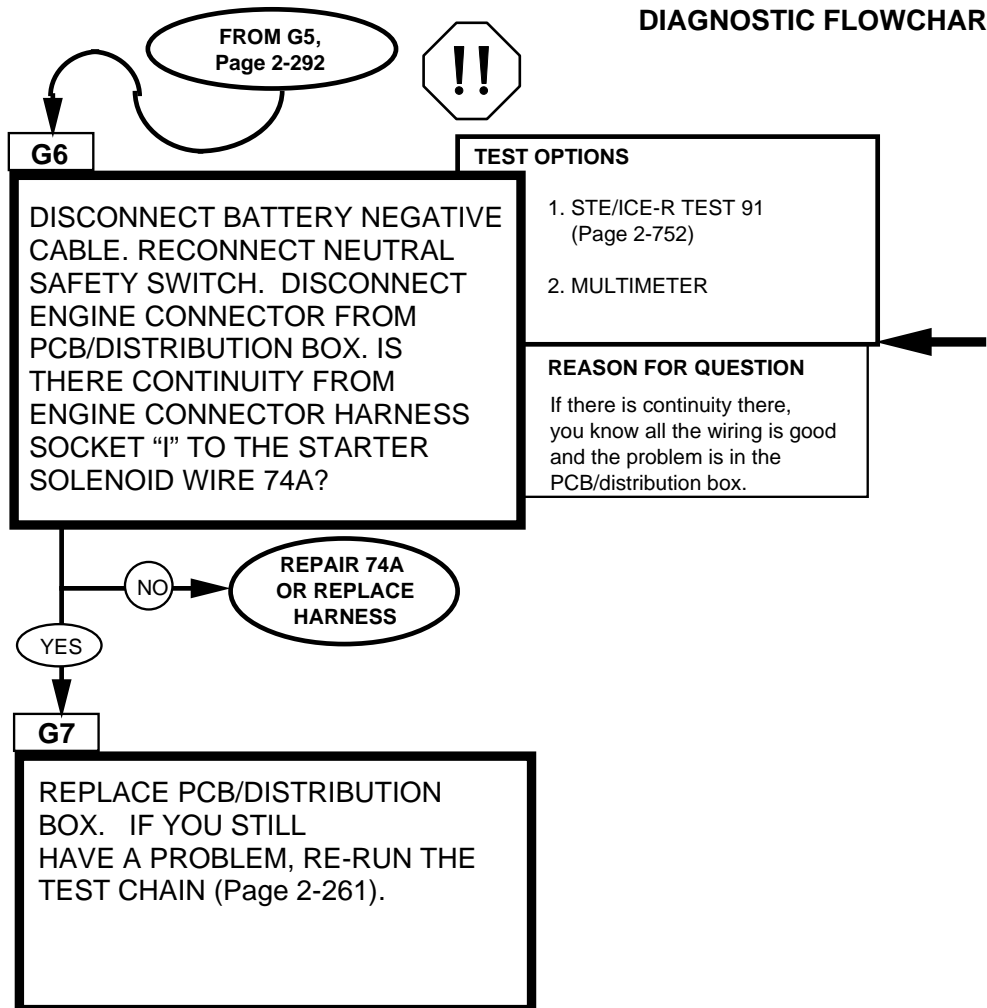
<p>CONTINUITY (RESISTANCE) MULTIMETER</p>
<p>1. Set the voltmeter to an ohms scale of about 1000 ohms.</p> <p>2. Connect the RED and BLACK leads to the connections stated in the question.</p> <p>3. Be sure to read the correct scale. Less than 5 ohms indicates continuity. For an open circuit, the meter should peg full scale (needle all the way to the left).</p>

STARTER CIRCUIT

DIAGNOSTIC FLOWCHART

KNOWN INFO
POWER AVAILABLE TO PCB/DISTRIBUTION BOX
POSSIBLE PROBLEMS
PCB/DISTRIBUTION BOX WIRING

KNOWN INFO
WIRING OK
POSSIBLE PROBLEMS
PCB/DISTRIBUTION BOX



REFERENCE INFORMATION

STARTER CIRCUIT



WARNING

Disconnect negative battery cable before disconnecting and reconnecting protective control box/distribution box harness.

There is battery voltage at the PCB/distribution box at all times. Failure to disconnect battery cable will result in damage to equipment or injury to personnel.

Replace PCB, refer to (para. 4-5).
 Replace distribution box, refer to (para. 4-5.1).

**0-4500 OHMS
 STE/ICE-R TEST 91**

1. Connect RED clip and BLACK clip to the terminals indicated in the question.
2. Start Test 91, 0-4500 ohms.
3. Displayed reading is in ohms. Less than 5 ohms is continuity. If the resistance is over 4500 ohms, STE/ICE-R displays "9.9.9.9."

**CONTINUITY (RESISTANCE)
 MULTIMETER**

1. Set the voltmeter to an ohms scale of about 1000 ohms.
2. Connect the RED and BLACK leads to the connections stated in the question.
3. Be sure to read the correct scale. Less than 5 ohms indicates continuity. For an open circuit, the meter should peg full scale (needle all the way to the left).

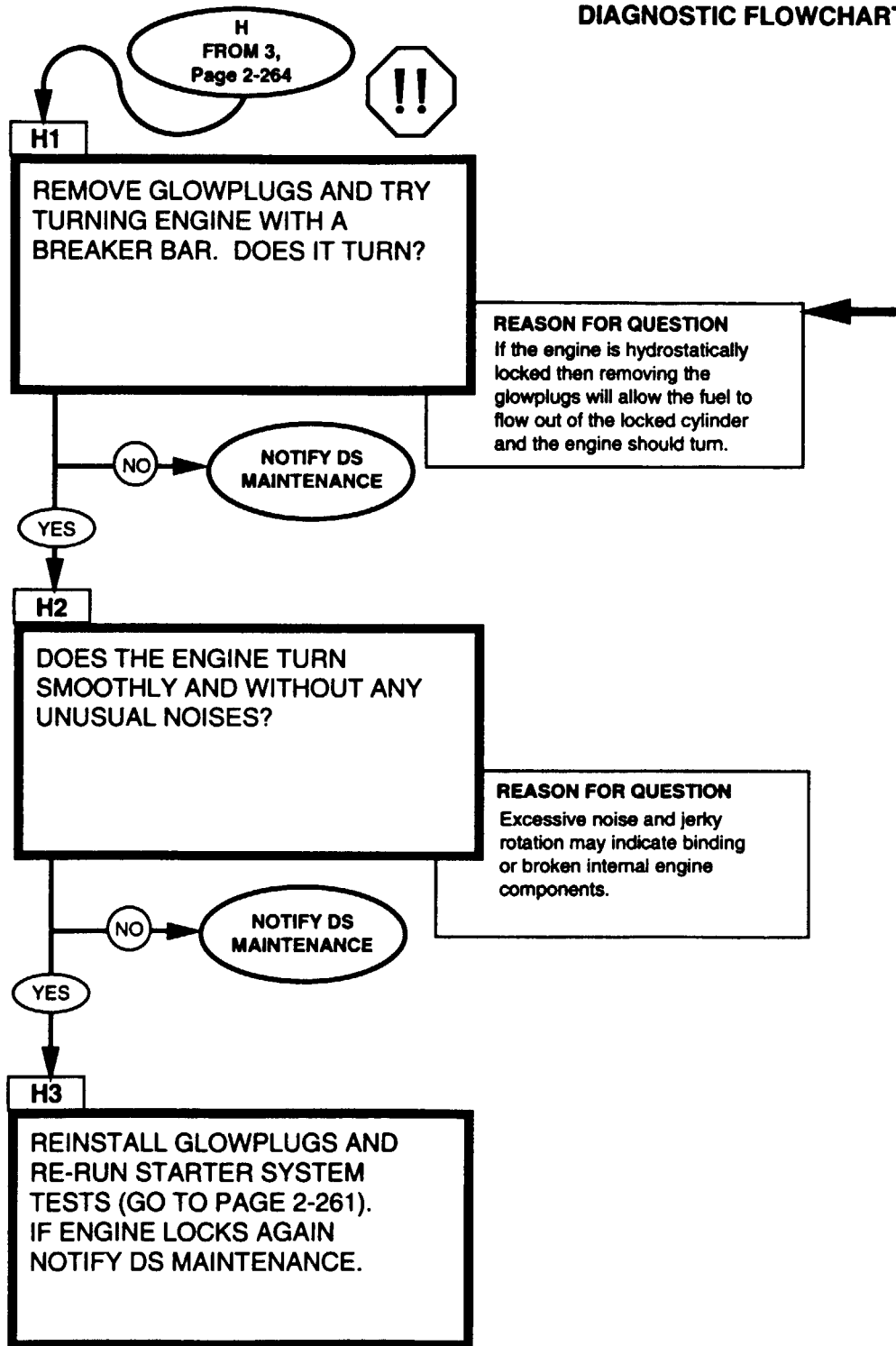
STARTER CIRCUIT

DIAGNOSTIC FLOWCHART

KNOWN INFO
CAN'T TURN ENGINE MANUALLY
POSSIBLE PROBLEMS
INTERNAL MECHANICAL PROBLEM HYDRAULIC LOCK

KNOWN INFO
HYDRAULIC LOCK REMOVED
POSSIBLE PROBLEMS
INTERNAL MECHANICAL PROBLEM

KNOWN INFO
ENGINE CAN ROTATE SMOOTHLY
POSSIBLE PROBLEMS



REFERENCE INFORMATION

STARTER CIRCUIT



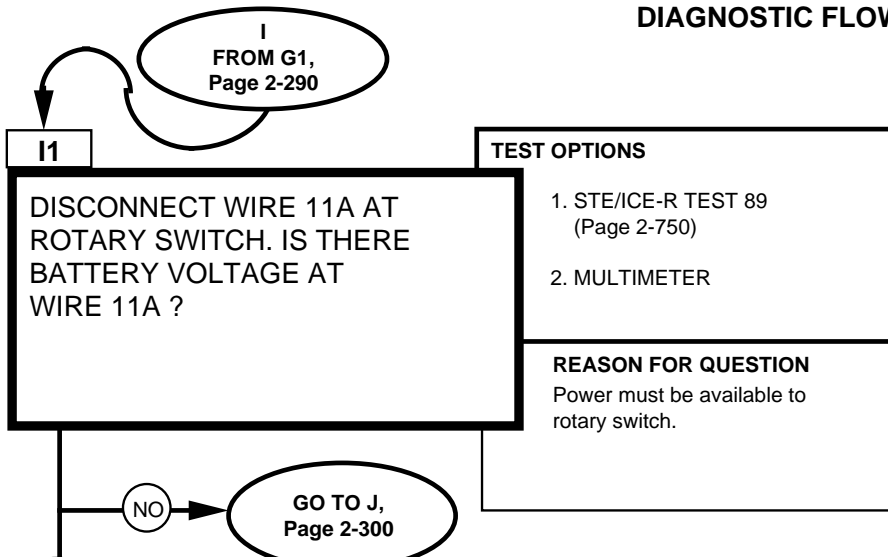
WARNING

Disconnect wire 54A to prevent accidental starting. Failure to do so may result in serious injury or death.

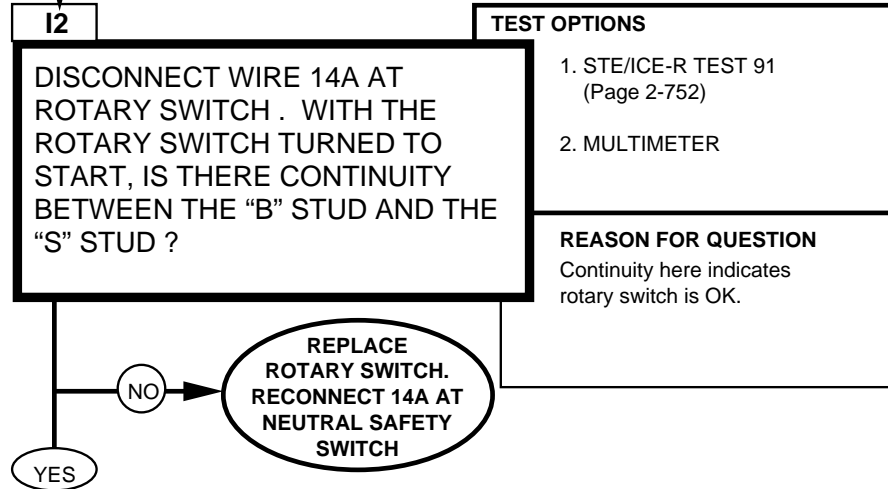
STARTER CIRCUIT

DIAGNOSTIC FLOWCHART

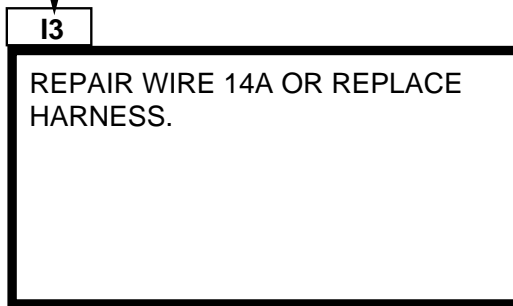
KNOWN INFO
NO VOLTAGE AVAILABLE AT NEUTRAL SAFETY SWITCH.
POSSIBLE PROBLEMS
ROTARY SWITCH PCB/DISTRIBUTION BOX WIRING



KNOWN INFO
BATTERY VOLTAGE AVAILABLE TO ROTARY SWITCH.
POSSIBLE PROBLEMS
ROTARY SWITCH PCB/DISTRIBUTION BOX WIRING

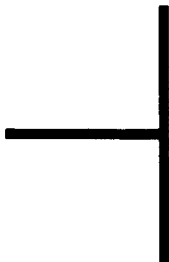


KNOWN INFO
ROTARY SWITCH OK
POSSIBLE PROBLEMS
WIRING



REFERENCE INFORMATION

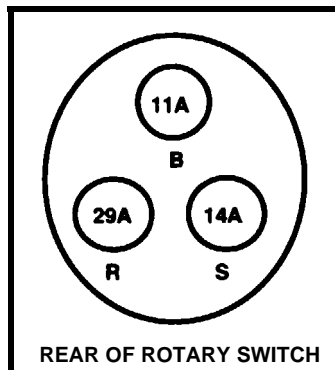
STARTER CIRCUIT



Replace rotary switch, refer to (para 4-7).



Repair wiring or replace harness, refer to (para 4-85).



**VOLTAGE
MULTIMETER**

1. Set the voltmeter to a DC volts scale of at least 40 volts.
2. Connect the RED lead to positive and the BLACK lead to negative.
3. Be sure to read the correct scale.

**CONTINUITY (RESISTANCE)
MULTIMETER**

1. Set the voltmeter to an ohms scale of about 1000 ohms.
2. Connect the RED and BLACK leads to the connections stated in the question.
3. Be sure to read the correct scale. Less than 5 ohms indicates continuity. For an open circuit, the meter should peg full scale (needle all the way to the left).

**0-45 DC VOLTS
STE/ICE-R TEST 89**

1. Connect RED clip to the indicated test point, BLACK clip to negative or ground.
2. Start Test 89, DC volts.
3. Displayed reading is in volts.

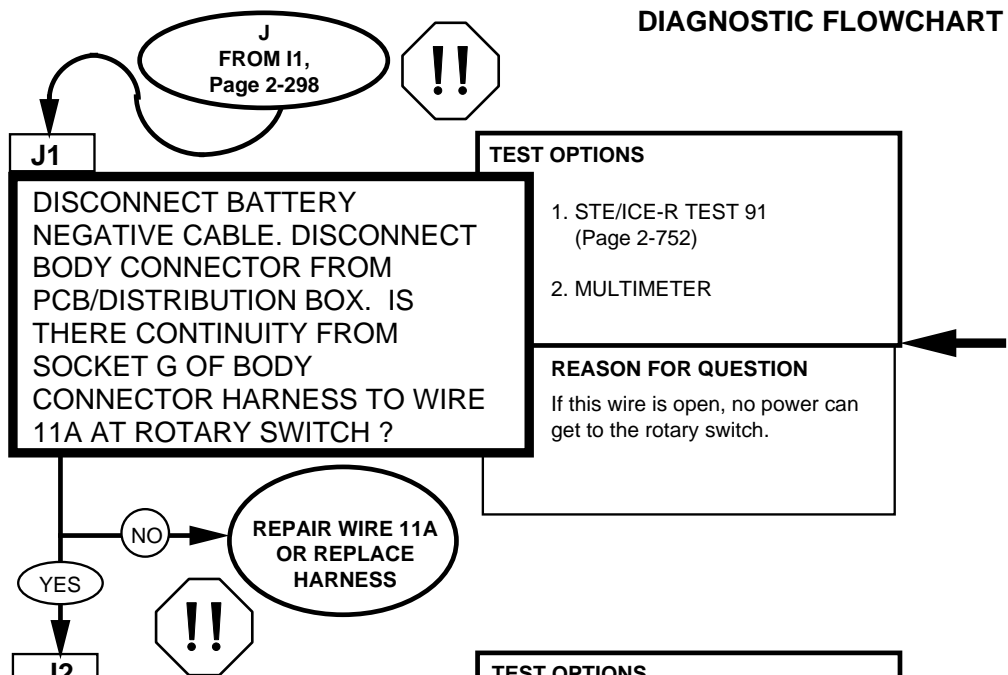
**0-4500 OHMS
STE/ICE-R TEST 91**

1. Connect RED clip and BLACK clip to the terminations indicated in the question. RED to the first, BLACK to the second.
2. Start Test 91, 0-4500 ohms.
3. Displayed reading is in ohms. Less than 5 ohms is continuity. If the resistance is over 4500 ohms, STE/ICE displays "9.9.9.9."

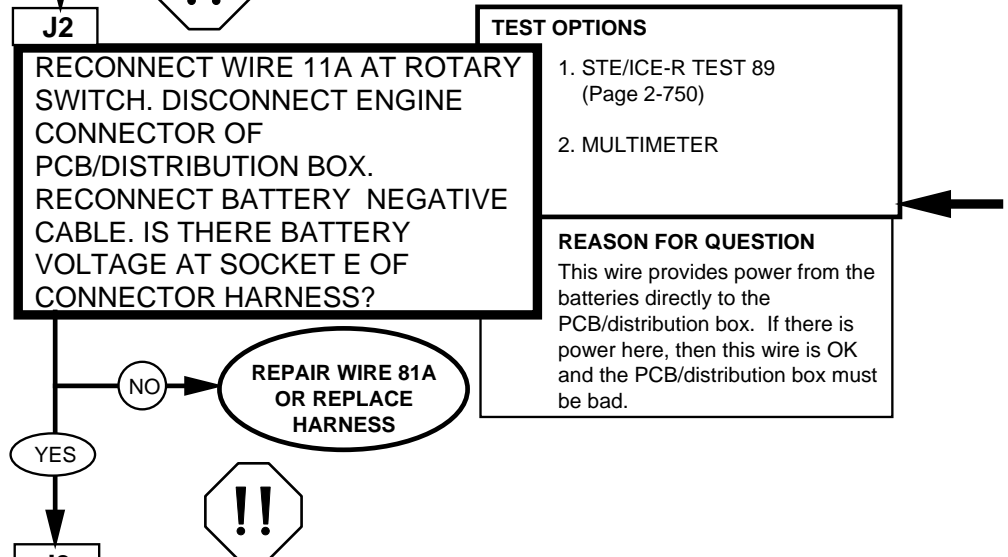
STARTER CIRCUIT

DIAGNOSTIC FLOWCHART

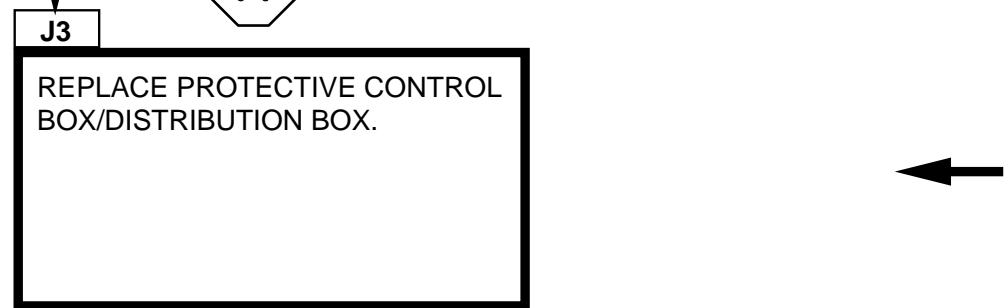
KNOWN INFO
NO VOLTAGE AT ROTARY SWITCH
POSSIBLE PROBLEMS
PCB/DISTRIBUTION BOX WIRING



KNOWN INFO
NO VOLTAGE AT ROTARY SWITCH WIRING TO ROTARY SWITCH OK
POSSIBLE PROBLEMS
PCB/DISTRIBUTION BOX WIRING



KNOWN INFO
WIRING OK
POSSIBLE PROBLEMS
PCB/DISTRIBUTION BOX



REFERENCE INFORMATION

STARTER CIRCUIT



WARNING

Disconnect negative battery cable before disconnecting and reconnecting PCB/distribution box harness.

There is battery voltage at the PCB/distribution box at all times. Failure to disconnect battery cable will result in damage to equipment or injury to personnel.

Replace harness or repair wiring, refer to (para. 4-85).

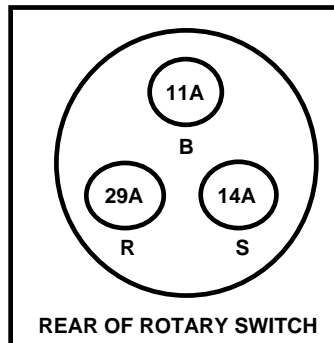


WARNING

Disconnect negative battery cable before disconnecting and reconnecting PCB/distribution box harness.

There is battery voltage at the PCB/distribution box at all times. Failure to disconnect battery cable will result in damage to equipment or injury to personnel.

Replace harness or repair wiring, refer to (para. 4-85).



WARNING

Disconnect negative battery cable before disconnecting and reconnecting PCB/distribution box harness.

There is battery voltage at the PCB/distribution box at all times. Failure to disconnect battery cable will result in damage to equipment or injury to personnel.

Replace PCB, refer to (para. 4-5).

Replace distribution box, refer to (para. 4-5.1)

VOLTAGE MULTIMETER

1. Set the voltmeter to a DC volts scale of at least 40 volts.
2. Connect the RED lead to positive and the BLACK lead to negative.
3. Be sure to read the correct scale.

CONTINUITY (RESISTANCE) MULTIMETER

1. Set the voltmeter to an ohms scale of about 1000 ohms.
2. Connect the RED and BLACK leads to the connections stated in the question.
3. Be sure to read the correct scale. Less than 5 ohms indicates continuity. For an open circuit, the meter should peg full scale (needle all the way to the left).

0-45 DC VOLTS STE/ICE-R TEST 89

1. Connect RED clip to the indicated test point, BLACK clip to negative or ground.
2. Start Test 89, DC volts.
3. Displayed reading is in volts.

0-4500 OHMS STE/ICE-R TEST 91

1. Connect RED clip and BLACK clip to the indicated terminals in the question. RED to the first, BLACK to the second.
2. Start Test 91, 0-4500 ohms.
3. Displayed reading is in ohms. Less than 5 ohms is continuity. If the resistance is over 4500 ohms, STE/ICE displays '9.9.9.9.'

2-31. GLOWPLUGS CIRCUIT TESTS (PROTECTIVE CONTROL BOX)

These tests of the Glowplugs Circuit can be run anytime you think there may be a problem with the glowplugs, or if you were sent here from another test.

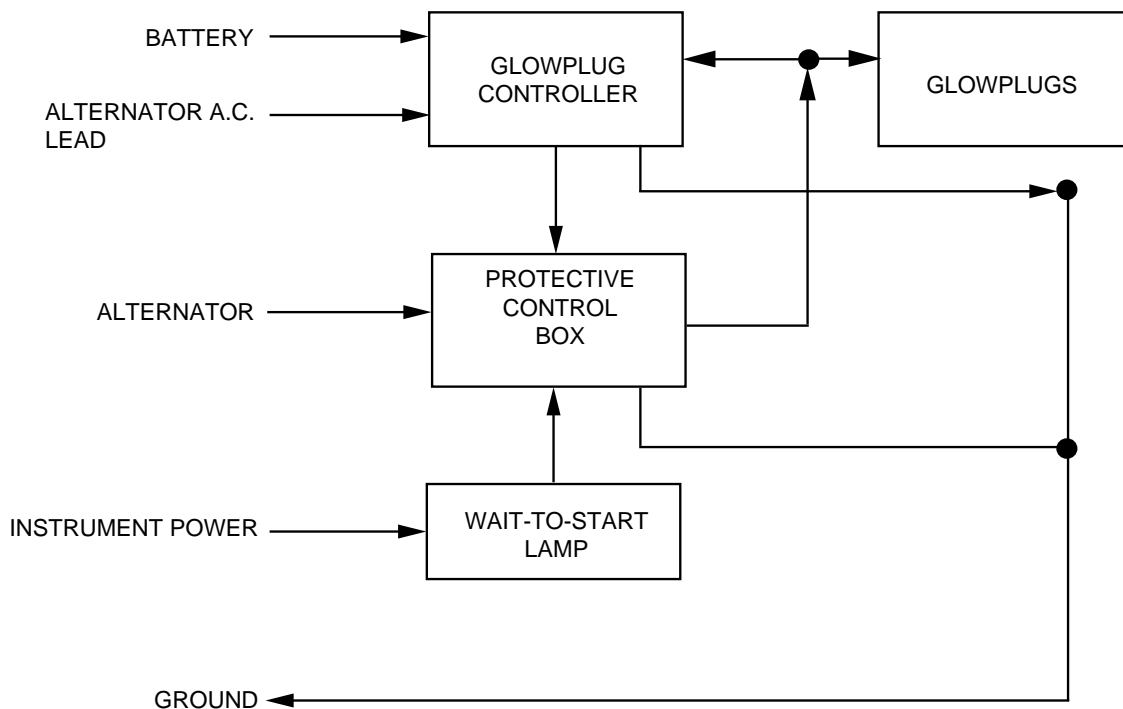
If you were sent from another test, be sure to mark where you came from so you will be able to return.

If you are running this test because the engine is hard to start when cold, remember that there is also a cold start advance circuit (part of the fuel system) which is not checked here.

For any starting problem, we recommend running the "STARTABILITY" test chain just to be sure you don't miss anything.

At the bottom of this page is a simplified block diagram which shows how the different parts of the glowplug circuit depend on each other and on other engine circuits.

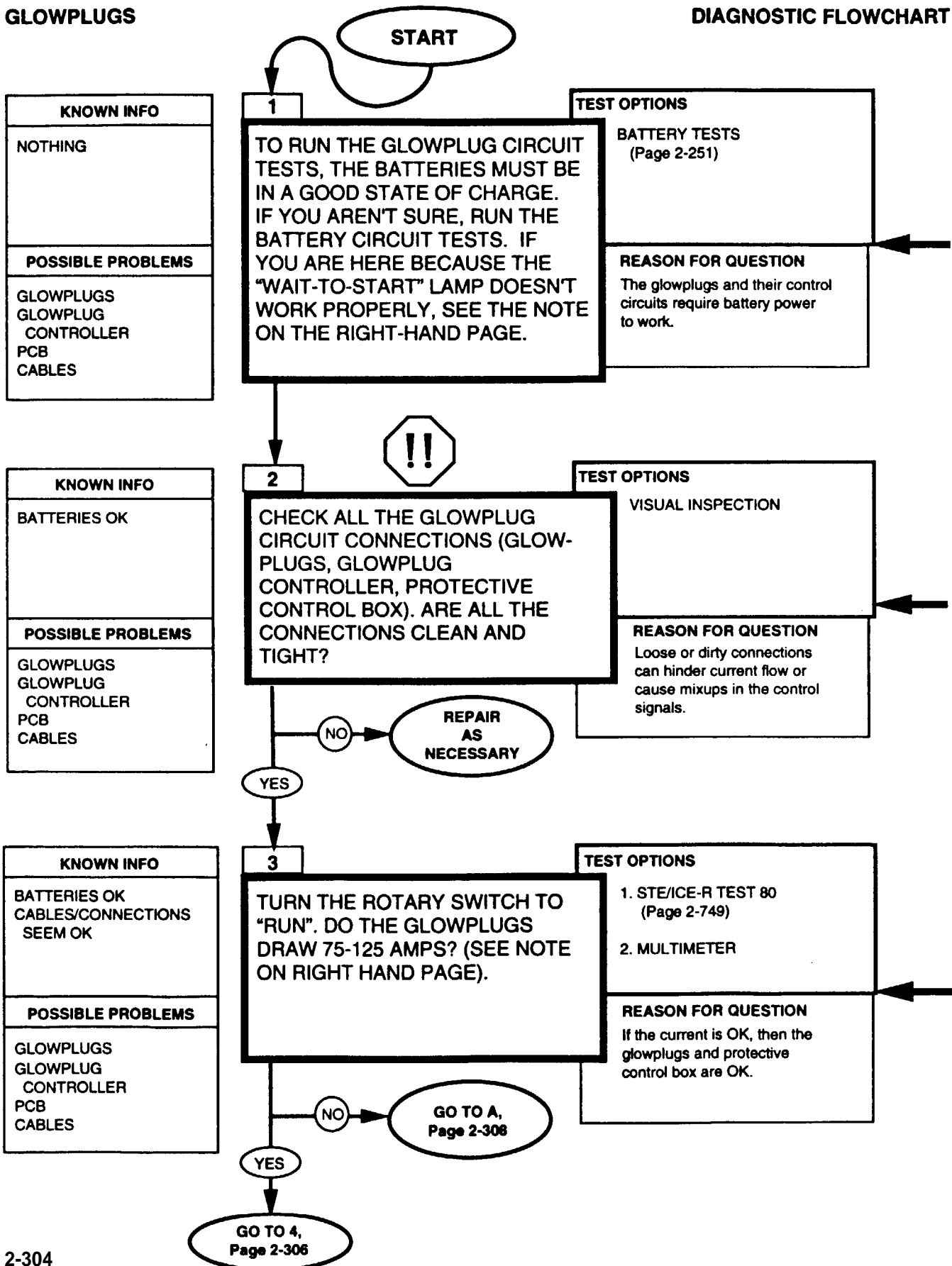
Refer to fold-out page FO-9 and leave it open for reference while performing these tests. The fold-out diagram is arranged to allow you to follow the diagnostic logic and understand what you are testing, when and why.



GLOWPLUGS CIRCUIT SIMPLIFIED BLOCK DIAGRAM FOR PROTECTIVE CONTROL BOX

GLOWPLUGS

DIAGNOSTIC FLOWCHART



REFERENCE INFORMATION

GLOWPLUGS

If the engine cranks ok (or starts), then the batteries are good enough for testing the glowplugs. If the engine starts, shut it off.

You can use STE/ICE Test 10 to measure cranking speed. The engine should crank at least 100 RPM in cold weather and at least 180 RPM in warm weather.



WARNING

Disconnect negative battery cable before disconnecting and reconnecting protective control box harness.

There is battery voltage at the PCS at all times. Failure to disconnect battery cable will result in damage to equipment or injury to personnel.

BAD CONNECTIONS ARE THE MOST COMMON PROBLEM!

Sometimes, just disconnecting, cleaning and reconnecting will solve a problem. BE THOROUGH ! The time you save may be your own. Refer to the functional flow schematic and check the following

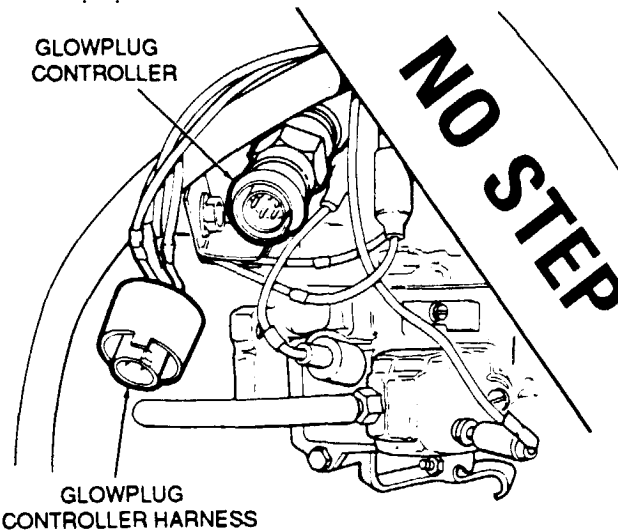
1. BATTERY - make sure all connections are dean and tight, including the shunt and power stud.
2. PROTECTIVE CONTROL BOX - unscrew BOTH connectors and look for bent or broken pins, pins pushed out of their socket, or dirt and corrosion in the connections.
3. GLOWPLUG CONTROLLER - pop the controller connector off (squeeze the sides) and check the pins in both the controller and the connector. Look for bent, broken or pushed out pins, dirt or corrosion. Check for broken wires at the connector. Take note that pin 2 of the glowplugs controller connector has no pin in it.
4. GLOWPLUGS - Check that all the glowplug wires are snug. Don't just look with your eyes. Many problems are solved by looking with your fingers to be sure a connection is snug.

NORMAL GLOWPLUG OPERATION

The glowplugs first come ON when the engine temperature is below 120 °F (49°C) and the rotary switch is turned to "RUN". They stay ON for up to 9 seconds and then go OFF. They will stay OFF for about 7-15 seconds then come ON again for about 1 second.

NOTE

The WAIT-TO-START lamp is NOT diagnosed in this section. If the lamp does not work properly, the glowplug circuit may be affecting its operation. Run these tests to check out the glowplug circuit. If the lamp still does not work properly, go to the INSTRUMENTS section for a full diagnosis of the lamp's problem.



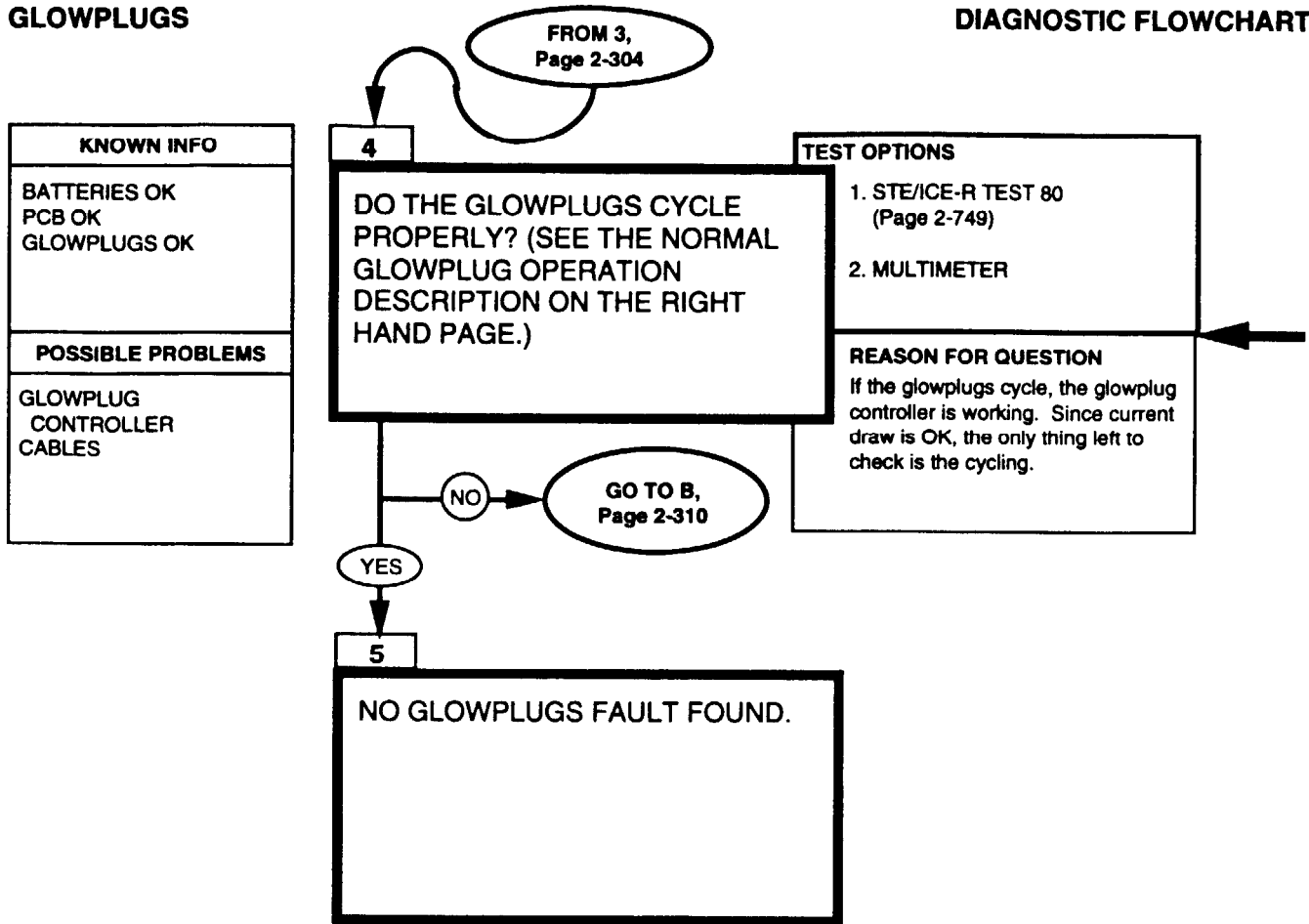
<p>BATTERY CURRENT MULTIMETER</p>
<ol style="list-style-type: none"> 1. Set the voltmeter to a DC volts scale of about 1 volt. 2. Connect the BLACK lead to the battery side of the current shunt and the RED lead to the other end of the current shunt. 3. Currant shunt voltage is proportional to battery current, 100 millivolts = 1000 amps. To get current, multiply millivolts x 10.
<p>BATTERY CURRENT STE/ICE-R TEST 80</p>
<ol style="list-style-type: none"> 1. Start Test 80, battery currant. 2. Displayed reading is in amps. The reading will be greater then 30 amps, depending on how many accessories you have on.

NOTE

To check for glowplug current draw, start STE/ICE-R Test 80, battery current. Turn off all accessories (lights, heater, wipers etc). STE/ICE-R should immediately measure at least 74 amps. Take note, however, that if all your glowplugs are working, the current draw should be close to or more than 100 amps, especially if it's cold. If it's near freezing and the glowplugs only draw 75-80 amps, you probably have a few bad glowplugs.

GLOWPLUGS

DIAGNOSTIC FLOWCHART



REFERENCE INFORMATION

GLOWPLUGS

NORMAL GLOWPLUG OPERATION

The glowplugs first come ON when the engine temperature is below 120 °F (49 °C) and the rotary switch is turned to RUN. They stay ON for up to 9 seconds and then go OFF. They will stay OFF for about 7-15 seconds then come ON again for about 1 second, than go OFF again. If you don't start the engine, the glowplugs should keep cycling like this, due to the glowplug cycle timer in the glowplugs controller. If you start the engine, they will cycle until the engine is warm, due to the afterglow cycle timer in the glowplug controller. When the engine gets up to 120 °F (49 °C), the glowplugs should stop cycling completely.

**ENGINE NOT RUNNING
ROTARY SWITCH IN RUN.**

If the glowplugs are cycling properly, you should hear a click from the protective control box (PCB) when the glowplugs turn on and when they turn off. This is the glowplug cycle timer, a thermal circuit breaker. A good way to check for cycling is STE/ICE-R test 80, battery current. When the glowplugs turn on, STE/ICE-R will measure 74-125 amps. When the glowplugs turn off, the STE/ICE-R will measure 3-8 amps.

**ENGINE RUNNING.
ROTARY SWITCH IN RUN**

If the glowplugs are cycling properly, you can hear a click from the protective control box (PCB) when the glowplugs turn on and when they turn off (you may have to duck your head under the dash). This is the afterglow cycle timer, a thermal circuit breaker. A good way to check for cycling is STE/ICE-R test 80, battery current. When the glowplugs turn on, STE/ICE-R will measure 74-125 amps. When the glowplugs turn off, STE/ICE-R will measure 3-8 amps. As the engine gets warmer, the glowplugs turn on less frequently and for less time.

NOTE

If you don't have a STE/ICE-R or a multimeter for measuring current, you can watch the vehicle volts gauge for indication of glowplug operation. The glowplugs drew so much current that the volts gage should jump about half-an-inch to the left when the glowplugs come on. Before starting the engine, you should hear the glowplug power relay click open and closed as the glowplugs cycle. (You can hear the relay after the engine has started by leaning your head under the dash near the protective control box.) This method won't tell you if all the glowplugs are working properly, but it at least shows that the glowplugs are trying to work and that the glowplug power relay is working.

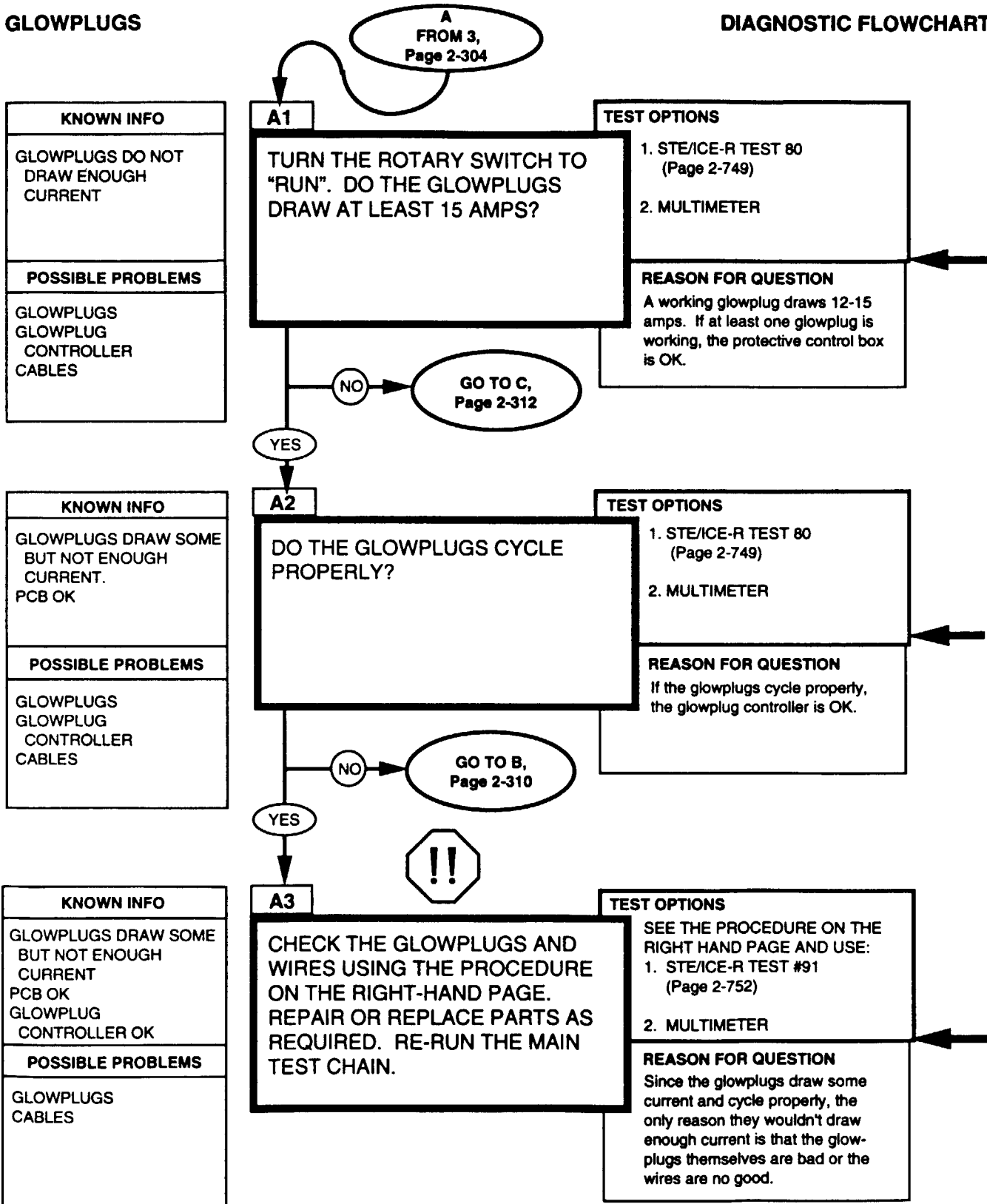
EXPECTED GLOWPLUG CURRENT
<p>ROTARY SWITCH IN RUN POSITION;</p> <p>GLOWPLUGS ON : 74 - 125 AMPS 74 is only for weak batteries. You should get at least 100 amps when glowplugs are working properly.</p> <p>GLOWPLUGS OFF : AT or NEAR ZERO With the rotary switch in the RUN position, other parts of the vehicle are drawing current. You might measure up to 8 amps.</p>

BATTERY CURRENT STE/ICE-R TEST 80
<ol style="list-style-type: none"> 1. Start Test 80, battery current. 2. Displayed reading is in amps. The reading will be greater than 30 amps, depending on how many accessories you have on.

BATTERY CURRENT MULTIMETER
<ol style="list-style-type: none"> 1. Set the voltmeter to a DC volts scale of about 1 volt. 2. Connect the BLACK lead to the battery side of the current shunt and the RED lead to the other end of the current shunt. 3. Current shunt voltage is proportional to battery current, 100 millivolts = 1000 amps. To get current, multiply millivolts x 10.

GLOWPLUGS

DIAGNOSTIC FLOWCHART



REFERENCE INFORMATION

Dead glowplugs draw virtually no current, but other parts of the vehicle are drawing some current, up to 8 amps. If any glowplugs are drawing any current, then the protective control box is probably OK.

For a good description of how glowplugs cycle and how to check for proper cycling, refer to page 2-307.



WARNING

Disconnect negative battery cable before disconnecting and reconnecting protective control box harness.

There is battery voltage at the PCB at all times. Failure to disconnect battery cable will result in damage to equipment or injury to personnel.

If most or all of the glowplugs are bad, you may also have a problem with the protective control box or the glowplug controller which caused them to go bad (usually they burn out from being on too long or not turning off at all). After replacing the bad glowplugs, rerun the glowplugs test chain paying special attention to the glowplugs cycling, especially that they turn OFF when they should.

Replace glowplugs, wires, or harness, refer to (para 3-38).

GLOWPLUGS

**BATTERY CURRENT
STEACE-R TEST 80**

1. Start Test 80, battery current.
2. Displayed reading is in amps. The reading will be greater than 30 amps, depending on how many accessories you have on.

**BATTERY CURRENT
MULTIMETER**

1. Set the voltmeter to a DC volts scale of about 1 volt.
2. Connect the BLACK lead to the battery side of the current shunt and the RED lead to the other end of the current shunt.
3. Current shunt voltage is proportional to battery current, 100 millivolts = 1000 amps. To get current, multiply millivolts x 10.

CHECKING GLOWPLUGS & THEIR WIRES

1. Disconnect ALL the glowplugs.



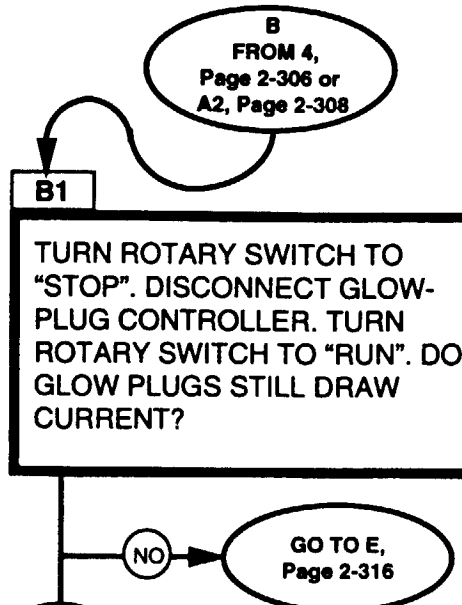
2. Disconnect the negative battery cable. Disconnect the PCB connector harness from the PCB. Reconnect the negative battery cable. Measure the resistance between pin Din the engine connector harness of the protective control box and ground. There should NOT be continuity (resistance reading off-the-scale). If there is continuity, repair or replace the harness.
3. Repeat the following for each glowplug
 - a. Reconnect the wiring harness to the glowplug while you repeat the resistance measurement described in step 2. When you reconnect the wire to the glowplug, the resistance should drop to between 1 and 2 ohms (glowplugs are typically 1.6 ohms).
 - b. If step a passed; disconnect the glowplug again, making sure the resistance goes off-scale again. Repeat step a for the next glowplug.
 - c. If step a failed; then either the glowplug or its wire is no good. Take the wire off the glowplug again and measure the resistance from the glowplug to the engine block. If the resistance is 1-2 ohms, then the cable is no good, otherwise replace the glowplug and check the cable for continuity, just to be sure.

4. Reconnect the PCB and all wires.

GLOWPLUGS

DIAGNOSTIC FLOWCHART

KNOWN INFO
GLOWPLUG CURRENT OK NOT CYCLING PROPERLY
POSSIBLE PROBLEMS
PCB



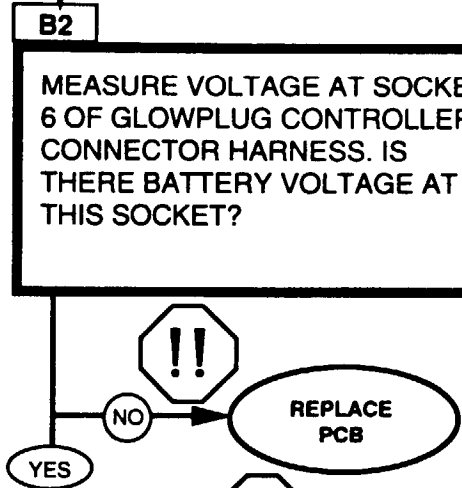
TEST OPTIONS

- STE/ICE-R TEST 80 (Page 2-749)
- MULTIMETER

REASON FOR QUESTION

If the glowplug controller is shorted, the glowplug power relay in the protective control box will always be closed.

KNOWN INFO
GLOWPLUG CURRENT OK GLOWPLUGS NOT CYCLING GLOWPLUGS DRAW CURRENT WITH CONTROLLER DISCONNECTED.
POSSIBLE PROBLEMS
WIRING SHORT PCB (GLOWPLUG POWER RELAY)

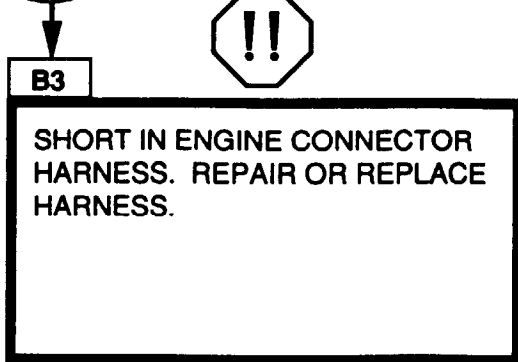


TEST OPTIONS

- STE/ICE-R TEST 89 (Page 2-750)
- MULTIMETER

REASON FOR QUESTION

If there is a short in the harness, this wire will have battery voltage.



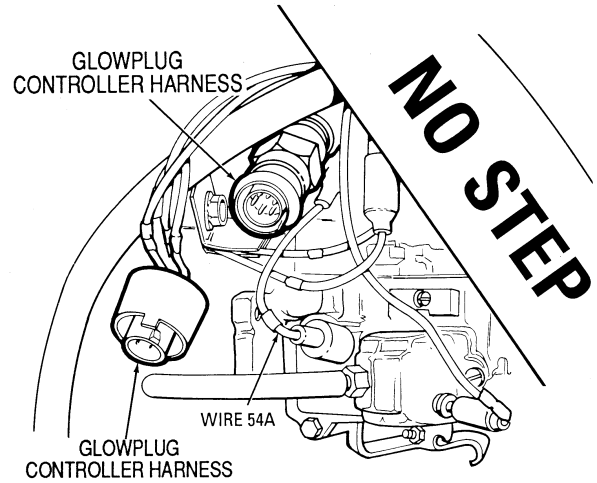
REFERENCE INFORMATION

GLOWPLUGS

NOTE

Ensure that alternator "AC" tap is functioning correctly by measuring DC volts at wire 2A. Reading should be between 9-16 Vdc. If this voltage is not present, glowplug system will never stop cycling.

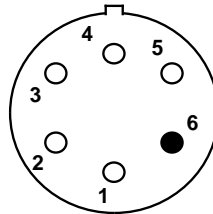
Refer to the functional flow schematic. If the glowplug controller is shorted (continuity from pin 6 to pin 3), the glowplug power relay will always be energized and the glowplugs will always be drawing current.



**BATTERY CURRENT
STE/ICE-R TEST 80**

1. Start Test 80, battery current.
2. Displayed reading is in amps. The reading will be greater than 30 amps, depending on how many accessories you have on.

Since the glowplugs draw current without the glowplug controller connected, there must be a short in the harness or a stuck relay in the protective control box (PCB). If there were a short in the harness directly to the glowplugs, the glowplugs would have burned out long ago and you wouldn't be here. The only other short in the harness that would make the glowplugs turn on without the glowplug controller installed would show up as battery voltage at pin 6 of the controller's connector.



Glowplug Controller Harness Schematic

Replace PCB, refer to (para. 4-5).

Check the end of the harness at the protective control box, glowplugs, etc. for shorts. Repair whatever you can. If you don't see anything wrong, the short must be in the main body of the harness, which means that you have to replace the harness.



WARNING

Disconnect negative battery cable before disconnecting and reconnecting protective control box.

There is battery voltage at the PCB at all times. Failure to disconnect battery cable will result in damage to equipment or injury to personnel.

For repair or replacement of wiring, refer to (para. 4-85).

**BATTERY CURRENT
MULTIMETER**

1. Set the voltmeter to a DC volts scale of about 1 volt.
2. Connect the BLACK lead to the battery side of the current shunt and the RED lead to the other end of the current shunt.
3. Current shunt voltage is proportional to battery current, 100 millivolts = 1000 amps. To get current, multiply millivolts x 10.

**0-45 DC VOLTS
STE/ICE-R TEST 89**

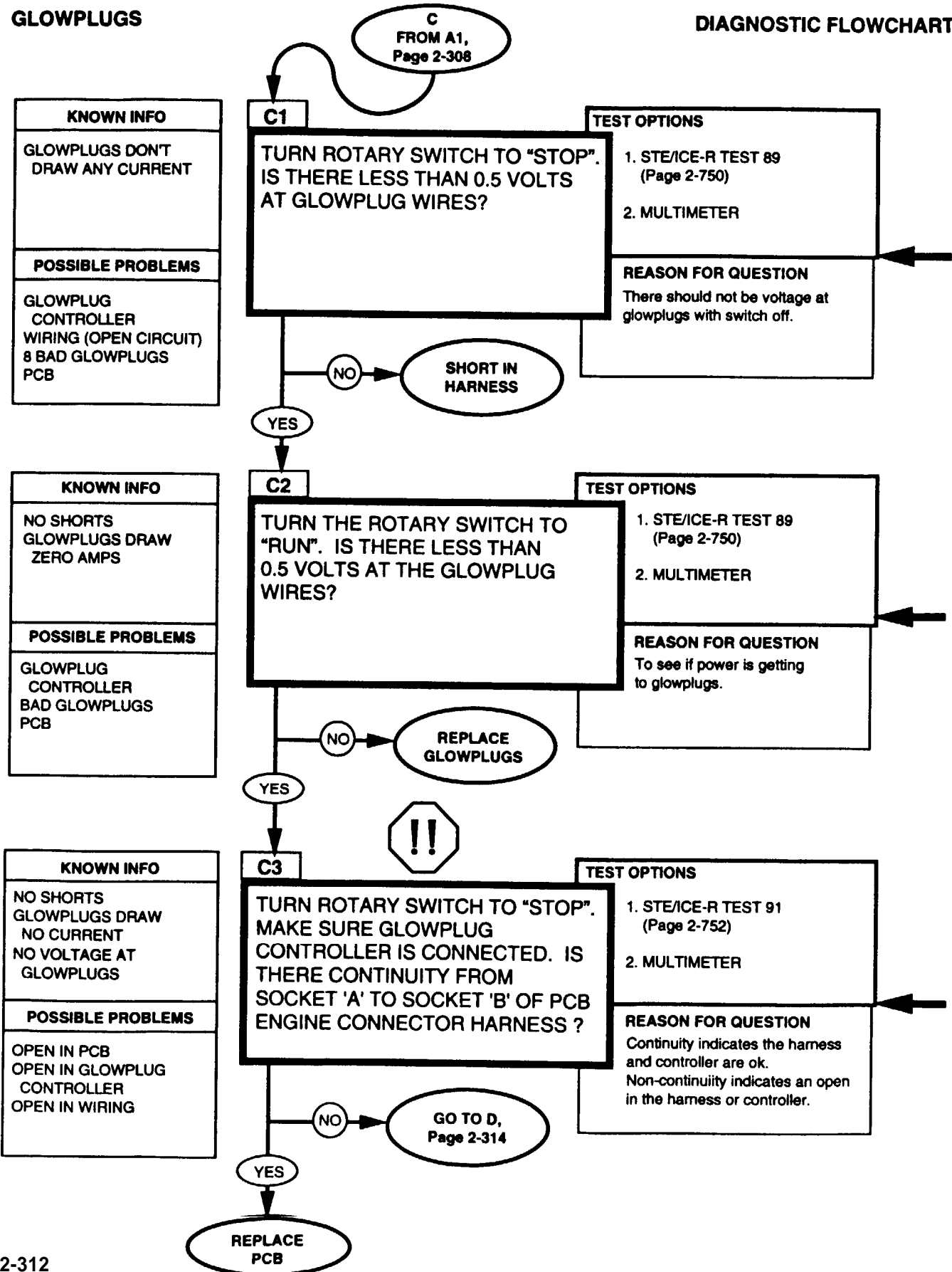
1. Connect RED clip to the indicated test point, BLACK clip to negative or ground.
2. Start Test 89, DC volts.
3. Displayed reading is in volts.

**VOLTAGE
MULTIMETER**

1. Set the voltmeter to a DC volts scale of at least 40 volts.
2. Connect the RED lead to positive and the BLACK lead to negative.
3. Be sure to read the correct scale.

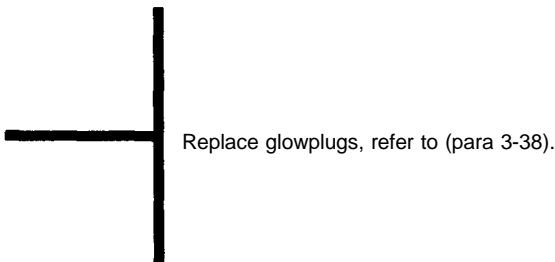
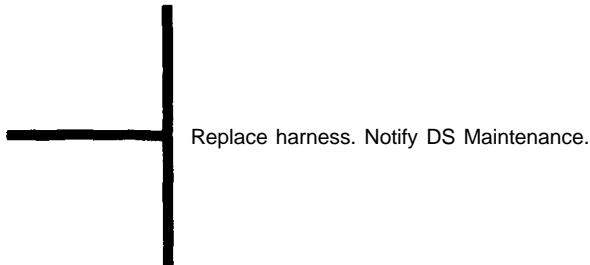
GLOWPLUGS

DIAGNOSTIC FLOWCHART



REFERENCE INFORMATION

GLOWPLUGS

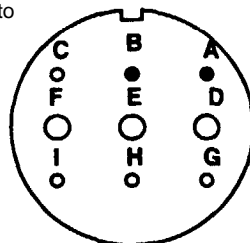


WARNING

Disconnect negative battery cable before disconnecting and reconnecting protective control box harness.

There is battery voltage at the PCB at all times. Failure to disconnect battery cable will result in damage to equipment or injury to personnel.

Replace PCB, refer to (para 4-5).



Engine Connector with pins 'A' & 'B' highlighted.

**0-45 DC VOLTS
STE/ICE-R TEST 89**

1. Connect RED clip to the indicated test point, BLACK clip to negative or ground.
2. Start Test 89, DC volts.
3. Displayed reading is in volts.

**VOLTAGE
MULTIMETER**

1. Set the voltmeter to a DC volts scale of at least 40 volts.
2. Connect the RED lead to positive and the BLACK lead to negative.
3. Be sure to read the correct scale.

**0-4500 OHMS
STE/ICE-R TEST 91**

1. Connect RED clip and BLACK clip to the indicated test points in the question. RED to the first, BLACK to the second.
2. Start Test 91, 0-4500 ohms.
3. Displayed reading is in ohms. Less than 5 ohms is continuity. If the resistance is over 4500 ohms, STE/ICE displays "9.9.9.9."

**CONTINUITY (RESISTANCE)
MULTIMETER**

1. Set the voltmeter to an ohms scale of about 1000 ohms.
2. Connect the RED and BLACK leads to the connections stated in the question.
3. Be sure to read the correct scale. Less than 5 ohms indicates continuity. For an open circuit, the meter should peg full scale (needle all the way to the left).

GLOWPLUGS

DIAGNOSTIC FLOWCHART

D
FROM C3,
Page 2-312; 17, Page 2-238;
24, Page 2-242; 26, Page 2-244;



KNOWN INFO
OPEN CIRCUIT IN GLOW-PLUG CONTROLLER OR WIRING
POSSIBLE PROBLEMS
WIRING GLOWPLUG CONTROLLER

D1
IS THERE CONTINUITY BETWEEN PCB ENGINE CONNECTOR HARNESS SOCKET "B" AND GLOWPLUG CONTROLLER HARNESS CONNECTOR SOCKET "3"?

TEST OPTIONS
1. STE/ICE-R TEST 91 (Page 2-752)
2. MULTIMETER

REASON FOR QUESTION
This checks the return wire from the glowplug controller to the protective control box.

NO → REPAIR/REPLACE WIRE 459B

YES

KNOWN INFO
OPEN CIRCUIT IN GLOW-PLUG CONTROLLER OR WIRING
POSSIBLE PROBLEMS
WIRING GLOWPLUG CONTROLLER

D2
IS THERE CONTINUITY BETWEEN PCB ENGINE CONNECTOR HARNESS SOCKET "A" AND GLOWPLUG CONTROLLER HARNESS CONNECTOR SOCKET "6" ?

TEST OPTIONS
1. STE/ICE-R TEST 91 (Page 2-752)
2. MULTIMETER

REASON FOR QUESTION
This checks the main power wire from the protective control box to the glowplug controller.

NO → REPLACE WIRE 543 &/OR 569B

YES

D3
REPLACE GLOWPLUG CONTROLLER. DOES THE ENGINE START EASILY WHEN COLD?

REASON FOR TESTS
You verified that the wiring is OK so the controller must be bad.

NO → GO TO C, Page 2-110

YES

NO FAULTS

REFERENCE INFORMATION

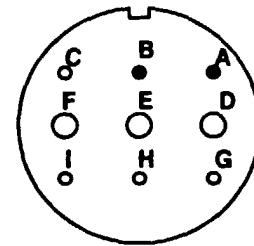
GLOWPLUGS



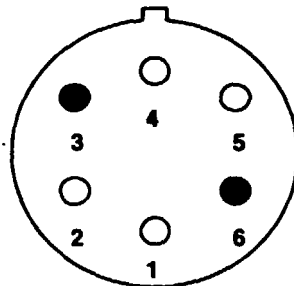
WARNING

Disconnect negative battery cable before disconnecting and reconnecting protective control box harness.

There is battery voltage at the PCB at all times. Failure to disconnect battery cable will result in damage to equipment or injury to personnel.



Engine Connector Harness with sockets "A" & "B" highlighted.

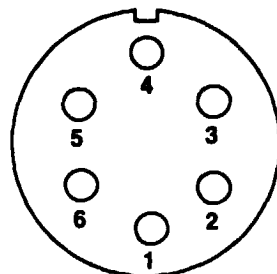


Glowplug Controller Harness with sockets 3 & 6 highlighted

NOTE

You will not be able to check the solid-state controller using the pin-to-pin resistance check. The solid-state controller is identified by a green finish and a larger case.

Replace glowplug controller, refer to (para 4-29).



Glowplug Controller

0-4500 OHMS STE/ICE-R TEST 91
1. Connect RED clip and BLACK clip to the indicated test points in the question. RED to the first, BLACK to the second.
2. Start Test 91, 0-4500 ohms.
3. Displayed reading is in ohms. Less than 5 ohms is continuity. If the resistance is over 4500 ohms, STE/ICE displays '9.9.9.9.'

CONTINUITY (RESISTANCE) MULTIMETER
1. Set the voltmeter to an ohms scale of about 1000 ohms.
2. Connect the RED and BLACK leads to the connections stated in the question.
3. Be sure to read the correct scale. Less than 5 ohms indicates continuity. For an open circuit, the meter should peg full scale (needle all the way to the left).

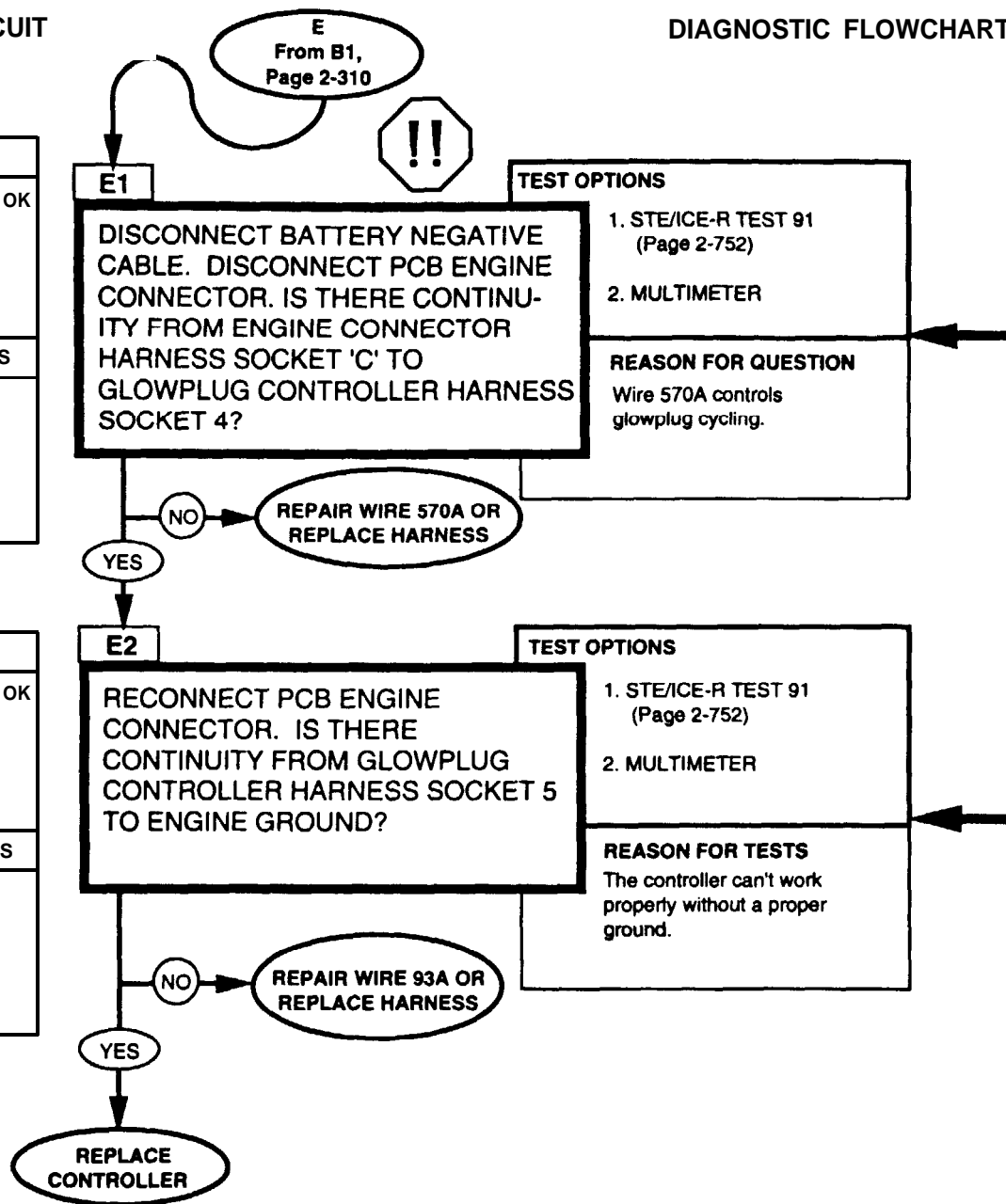
PIN-TO-PIN		RESISTANCE
1	5	130 Ω ± Ω
2	3	0.40 Ω TO 0.75 Ω
4	5	27 Ω ± 3 Ω
2	6	.45 Ω MAXIMUM

GLOWPLUGS CIRCUIT

DIAGNOSTIC FLOWCHART

KNOWN INFO
GLOWPLUG CURRENT OK PCB OK GLOWPLUGS NOT CYCLING
POSSIBLE PROBLEMS
WIRING GLOWPLUG CONTROLLER

KNOWN INFO
GLOWPLUG CURRENT OK PCB OK GLOWPLUGS NOT CYCLING
POSSIBLE PROBLEMS
WIRING GLOWPLUG CONTROLLER



REFERENCE INFORMATION

GLOWPLUGS CIRCUIT



WARNING

Disconnect negative battery cable before disconnecting and reconnecting protective control box harness.

There is battery voltage at the PCB at all times. Failure to disconnect battery cable will result in damage to equipment or injury to personnel.

Repair wiring or replace harness, refer to (para 4-34).

**0-4500 OHMS
STE/ICE-R TEST 91**

1. Connect RED clip and BLACK clip to the indicated test points in the question. RED to the first, BLACK to the second.
2. Start Test 91, 0-4500 ohms.
3. Displayed reading is in ohms. Less than 5 ohms is continuity. If the resistance is over 4500 ohms, STE/ICE displays "9.9.9.9."

Repair wiring or replace harness, refer to (para 4-85).

Replace glowplug controller, refer to (para 4-29).

**CONTINUITY (RESISTANCE)
Multimeter**

1. Set the voltmeter to an ohms scale of about 1000 ohms.
2. Connect the RED and BLACK leads to the connections stated in the question.
3. Be sure to read the correct scale. Less than 5 ohms indicates continuity. For an open circuit, the meter should peg full scale (needle all the way to the left).

2-31.1. GLOWPLUGS CIRCUIT TESTS (DISTRIBUTION BOX)

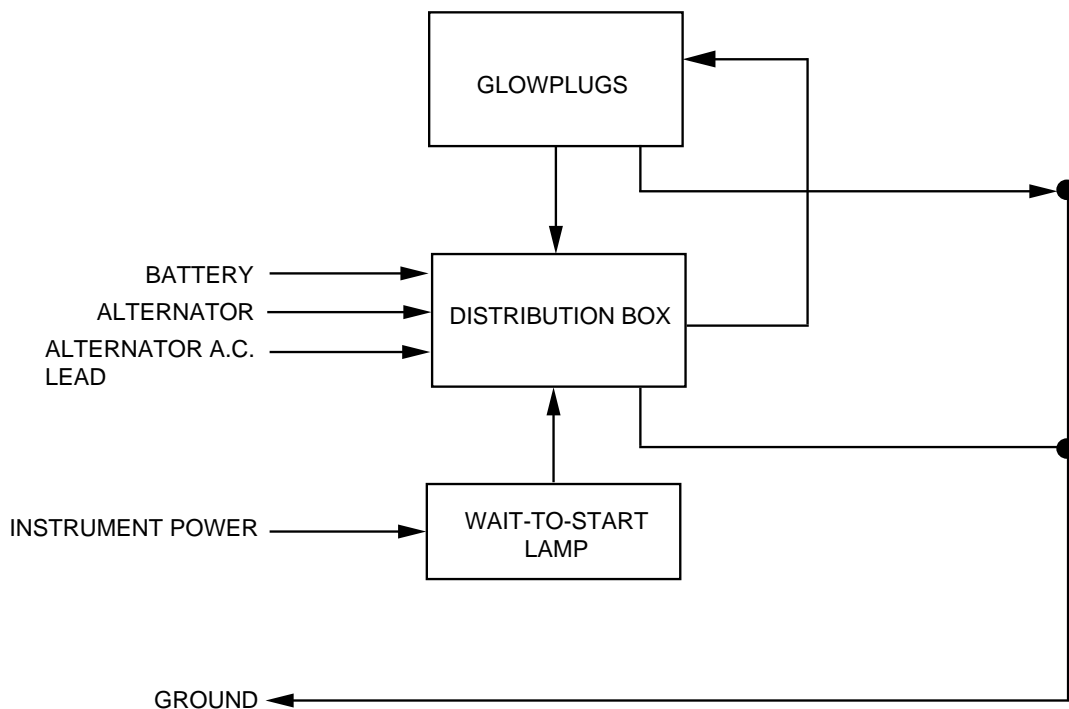
These tests of the Glowplugs Circuit can be run anytime you think there may be a problem with the glowplugs, or if you were sent here from another test.

If you were sent from another test, be sure to mark where you came from so you will be able to return.

If you are running this test because the engine is hard to start when cold, remember that there is also a cold start advance circuit (part of the fuel system) which is not checked here.

For any starting problem, we recommend running the "STARTABILITY" test chain just to be sure you don't miss anything.

At the bottom of this page is a simplified block diagram which shows how the different parts of the glowplug circuit depend on each other and on other engine circuits.



GLOWPLUGS CIRCUIT SIMPLIFIED BLOCK DIAGRAM FOR DISTRIBUTION BOX

GLOWPLUGS

DIAGNOSTIC FLOWCHART

KNOWN INFO
NOTHING
POSSIBLE PROBLEMS
GLOWPLUGS DISTRIBUTION BOX CABLES

1

START

TO RUN THE GLOWPLUG CIRCUIT TESTS, THE BATTERIES MUST BE IN A GOOD STATE OF CHARGE. IF YOU AREN'T SURE, RUN THE BATTERY CIRCUIT TESTS. IF YOU ARE HERE BECAUSE THE "WAIT-TO-START" LAMP DOESN'T WORK PROPERLY, SEE THE NOTE ON THE RIGHT-HAND PAGE.

TEST OPTIONS

BATTERY TESTS
(Page 2-251)

REASON FOR QUESTION
The glowplugs and their control circuits require battery power to work.

KNOWN INFO
BATTERIES OK
POSSIBLE PROBLEMS
GLOWPLUGS DISTRIBUTION BOX CABLES

2

!!!

CHECK ALL THE GLOWPLUG CIRCUIT CONNECTIONS (GLOW-PLUGS, GLOWPLUG HARNESS CONNECTIONS). ARE ALL THE CONNECTIONS CLEAN AND TIGHT?

TEST OPTIONS

VISUAL INSPECTION

REASON FOR QUESTION
Loose or dirty connections can hinder current flow or cause mixups in the control signals.

NO → REPAIR AS NECESSARY

YES →

KNOWN INFO
BATTERIES OK CABLES/CONNECTIONS SEEM OK
POSSIBLE PROBLEMS
GLOWPLUGS DISTRIBUTION BOX CABLES

3

MEASURE THE RESISTANCE FROM PINS A THROUGH H OF GLOWPLUG HARNESS AND GROUND. IS THE READING 2 TO 3 OHMS?

TEST OPTIONS

- STE/ICE-R TEST 80
(Page 2-749)
- MULTIMETER

REASON FOR QUESTION
If the resistance is OK, then the glowplugs and harness are OK.

NO → GO TO A, Page 2-318.6

YES → GO TO 4, Page 2-318.4

REFERENCE INFORMATION

GLOWPLUGS

If the engine cranks ok (or starts), then the batteries are good enough for testing the glowplugs. If the engine starts, shut it off.

You can use STE/ICE Test 10 to measure cranking speed. The engine should crank at least 100 RPM in cold weather and at least 180 RPM in warm weather.



WARNING

Disconnect negative battery cable before disconnecting and reconnecting distribution box harness.

There is battery voltage at the distribution box at all times. Failure to disconnect battery cable will result in damage to equipment or injury to personnel.

BAD CONNECTIONS ARE THE MOST COMMON PROBLEM!

Sometimes, just disconnecting, cleaning and reconnecting will solve a problem. BE THOROUGH! The time you save may be your own. Refer to the functional flow schematic and check the following;

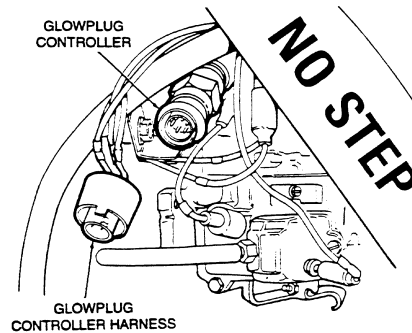
1. BATTERY - make sure all connections are clean and tight, including the shunt and power stud.
2. DISTRIBUTION BOX - unscrew the three connectors and look for bent or broken pins, pins pushed out of their socket, or dirt and corrosion in the connections.
3. GLOWPLUGS - Check that all the glowplug wires are snug. Don't just look with your eyes. Many problems are solved by looking with your fingers to be sure a connection is snug.

NORMAL GLOWPLUG OPERATION

The glowplugs are heated quickly for 5 to 20 seconds. This cycle is active while the "Wait-to-Start" light is on. The length of "on" time is dependent on battery voltage, the weaker the batteries the longer the "on" time. This cycle will only repeat if the run start switch has been off for more than 2 1/2 minutes. After the initial 5 to 20 seconds preglow, the system goes to afterglow. Afterglow provides lower voltage to the glowplugs to keep them at operating temperature for approximately 60 seconds.

NOTE

The "WAIT-TO-START" lamp is NOT diagnosed in this section. If the lamp does not work properly, the glowplug circuit may be affecting its operation. Run these tests to check out the glowplug circuit. If the lamp still does not work properly, go to the INSTRUMENTS section for a full diagnosis of the lamp's problem.



BATTERY CURRENT MULTIMETER

1. Set the voltmeter to a DC volts scale of about 1 volt.
2. Connect the BLACK lead to the battery side of the current shunt and the RED lead to the other end of the current shunt.
3. Current shunt voltage is proportional to battery current, 100 millivolts = 1000 amps. To get current, multiply millivolts x 10.

BATTERY CURRENT STE/ICE-R TEST 80

1. Start Test 80, battery current.
2. Displayed reading is in amps. The reading will be greater than 30 amps, depending on how many accessories you have on.

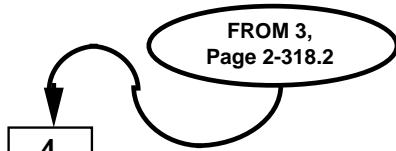
NOTE

To check for glowplug current draw, start STE/ICE-R Test 80, battery current. Turn off all accessories (lights, heater, wipers etc). STE/ICE-R should immediately measure at least 74 amps. Take note, however, that if all your glowplugs are working, the current draw should be close to or more than 100 amps, especially if it's cold. If it's near freezing and the glowplugs only draw 75-80 amps, you probably have a few bad glowplugs.

GLOWPLUGS

DIAGNOSTIC FLOWCHART

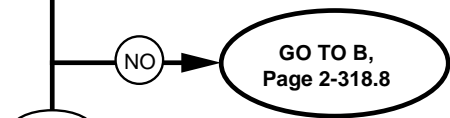
KNOWN INFO
BATTERIES OK GLOWPLUGS OK DISTRIBUTION BOX OK
POSSIBLE PROBLEMS
CABLES GLOWPLUG CONTROL CIRCUIT



DO THE GLOWPLUGS CYCLE PROPERLY? (SEE THE NORMAL GLOWPLUG OPERATION DESCRIPTION ON THE RIGHT HAND PAGE.)

- TEST OPTIONS**
1. STE/ICE-R TEST 80 (Page 2-749)
 2. MULTIMETER

REASON FOR QUESTION
If the glowplugs cycle, the glowplug controller is working. Since current draw is OK, the only thing left to check is the cycling.



5

NO GLOWPLUGS FAULT FOUND.

REFERENCE INFORMATION

GLOWPLUGS

NORMAL GLOWPLUG OPERATION

The glowplugs first come ON when the engine temperature is below 120 °F (49 °C) and the rotary switch is turned to RUN. They stay ON for up to 9 seconds and then go OFF. They will stay OFF for about 7-15 seconds then come ON again for about 1 second, then go OFF again. If you don't start the engine, the glowplugs should keep cycling like this, due to the glowplug cycle timer in the glowplugs controller. If you start the engine, they will cycle until the engine is warm, due to the afterglow cycle timer in the glowplug controller. When the engine gets up to 120 °F (49 °C), the glowplugs should stop cycling completely.

**ENGINE NOT RUNNING.
ROTARY SWITCH IN RUN.**

If the glowplugs are cycling properly, you should hear a click from the distribution box when the glowplugs turn on and when they turn off. This is the glowplug cycle timer, a thermal circuit breaker. A good way to check for cycling is STE/ICE-R test 80, battery current. When the glowplugs turn on, STE/ICE-R will measure 74-125 amps. When the glowplugs turn off, the STE/ICE-R will measure 3-8 amps.

**ENGINE RUNNING.
ROTARY SWITCH IN RUN**

If the glowplugs are cycling properly, you can hear a click from the distribution box when the glowplugs turn on and when they turn off (you may have to duck your head under the dash). This is the afterglow cycle timer, a thermal circuit breaker. A good way to check for cycling is STE/ICE-R test 80, battery current. When the glowplugs turn on, STE/ICE-R will measure 74-125 amps. When the glowplugs turn off, STE/ICE-R will measure 3-8 amps. As the engine gets warmer, the glowplugs turn on less frequently and for less time.

NOTE

If you don't have a STE/ICE-R or a multimeter for measuring current, you can watch the vehicle volts gauge for indication of glowplug operation. The glowplugs draw so much current that the volts gage should jump about half-an-inch to the left when the glowplugs come on. Before starting the engine, you should hear the glowplug power relay click open and closed as the glowplugs cycle. (You can hear the relay after the engine has started by leaning your head under the dash near the distribution box.) This method won't tell you if all the glowplugs are working properly, but it at least shows that the glowplugs are trying to work and that the glowplug power relay is working.

EXPECTED GLOWPLUG CURRENT

ROTARY SWITCH IN RUN POSITION;

GLOWPLUGS ON : 74 - 125 AMPS 74 is only for weak batteries. You should get at least 100 amps when glowplugs are working properly.

GLOWPLUGS OFF : AT or NEAR ZERO With the rotary switch in the RUN position, other parts of the vehicle are drawing current. You might measure up to 8 amps.

**BATTERY CURRENT
STE/ICE-R TEST 80**

1. Start Test 80, battery current.
2. Displayed reading is in amps. The reading will be greater than 30 amps, depending on how many accessories you have on.

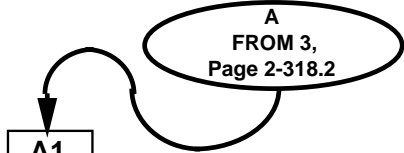
**BATTERY CURRENT
MULTIMETER**

1. Set the voltmeter to a DC volts scale of about 1 volt.
2. Connect the BLACK lead to the battery side of the current shunt and the RED lead to the other end of the current shunt.
3. Current shunt voltage is proportional to battery current, 100 millivolts = 1000 amps. To get current, multiply millivolts x 10.

GLOWPLUGS

DIAGNOSTIC FLOWCHART

KNOWN INFO
GLOWPLUGS DO NOT DRAW ENOUGH CURRENT
POSSIBLE PROBLEMS
GLOWPLUGS GLOWPLUG CONTROLLER CABLES



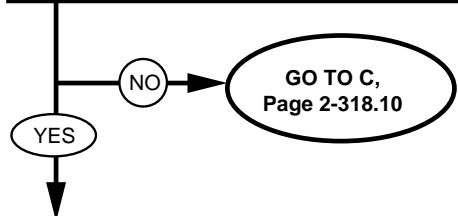
A1

TURN THE ROTARY SWITCH TO "RUN". DO THE GLOWPLUGS DRAW AT LEAST 15 AMPS?

TEST OPTIONS
1. STE/ICE-R TEST 80 (Page 2-749)
2. MULTIMETER

REASON FOR QUESTION

A working glowplug draws 12-15 amps. If at least one glowplug is working, the distribution box is OK.



KNOWN INFO
GLOWPLUGS DRAW SOME BUT NOT ENOUGH CURRENT DISTRIBUTION BOX OK
POSSIBLE PROBLEMS
GLOWPLUGS GLOWPLUG CONTROLLER CABLES

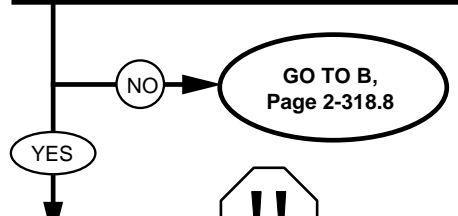
A2

DO THE GLOWPLUGS CYCLE PROPERLY?

TEST OPTIONS
1. STE/ICE-R TEST 80 (Page 2-749)
2. MULTIMETER

REASON FOR QUESTION

If the glowplugs cycle properly, the glowplug controller is OK.



KNOWN INFO
GLOWPLUGS DRAW SOME BUT NOT ENOUGH CURRENT DISTRIBUTION BOX OK GLOWPLUG CONTROLLER OK
POSSIBLE PROBLEMS
GLOWPLUGS CABLES

A3

CHECK THE GLOWPLUGS AND WIRES USING THE PROCEDURE ON THE RIGHT-HAND PAGE. REPAIR OR REPLACE PARTS AS REQUIRED. RERUN THE MAIN TEST CHAIN.

TEST OPTIONS
SEE THE PROCEDURE ON THE RIGHT HAND PAGE AND USE:
1. STE/ICE-R TEST #91 (Page 2-752)
2. MULTIMETER

REASON FOR QUESTION

Since the glowplugs draw some current and cycle properly, the only reason they wouldn't draw enough current is that the glowplugs themselves are bad or the wires are no good.

REFERENCE INFORMATION

Dead glowplugs draw virtually no current, but other parts of the vehicle are drawing some current, up to 8 amps. If any glowplugs are drawing any current, then the distribution box and glowplug circuit is probably OK.

For a good description of how glowplugs cycle and how to check for proper cycling, refer to page 2-307.



WARNING

Disconnect negative battery cable before disconnecting and reconnecting distribution box harness.

There is battery voltage at the distribution box at all times. Failure to disconnect battery cable will result in damage to equipment or injury to personnel.

If most or all of the glowplugs are bad, you may also have a problem with the distribution box or the glowplug controller which caused them to go bad (usually they burn out from being on too long or not turning off at all). After replacing the bad glowplugs, rerun the glowplugs test chain paying special attention to the glowplugs cycling, especially that they turn OFF when they should.

Replace glowplugs, wires, or harness, refer to (para. 3-38).

GLOWPLUGS

**BATTERY CURRENT
STE/ICE-R TEST 80**

1. Start Test 80, battery current.
2. Displayed reading is in amps. The reading will be greater than 30 amps, depending on how many accessories you have on.

**BATTERY CURRENT
MULTIMETER**

1. Set the voltmeter to a DC volts scale of about 1 volt.
2. Connect the BLACK lead to the battery side of the current shunt and the RED lead to the other end of the current shunt.
3. Current shunt voltage is proportional to battery current, 100 millivolts = 1000 amps. To get current, multiply millivolts x 10.

CHECKING GLOWPLUGS & THEIR WIRES

1. Disconnect ALL the glowplugs.



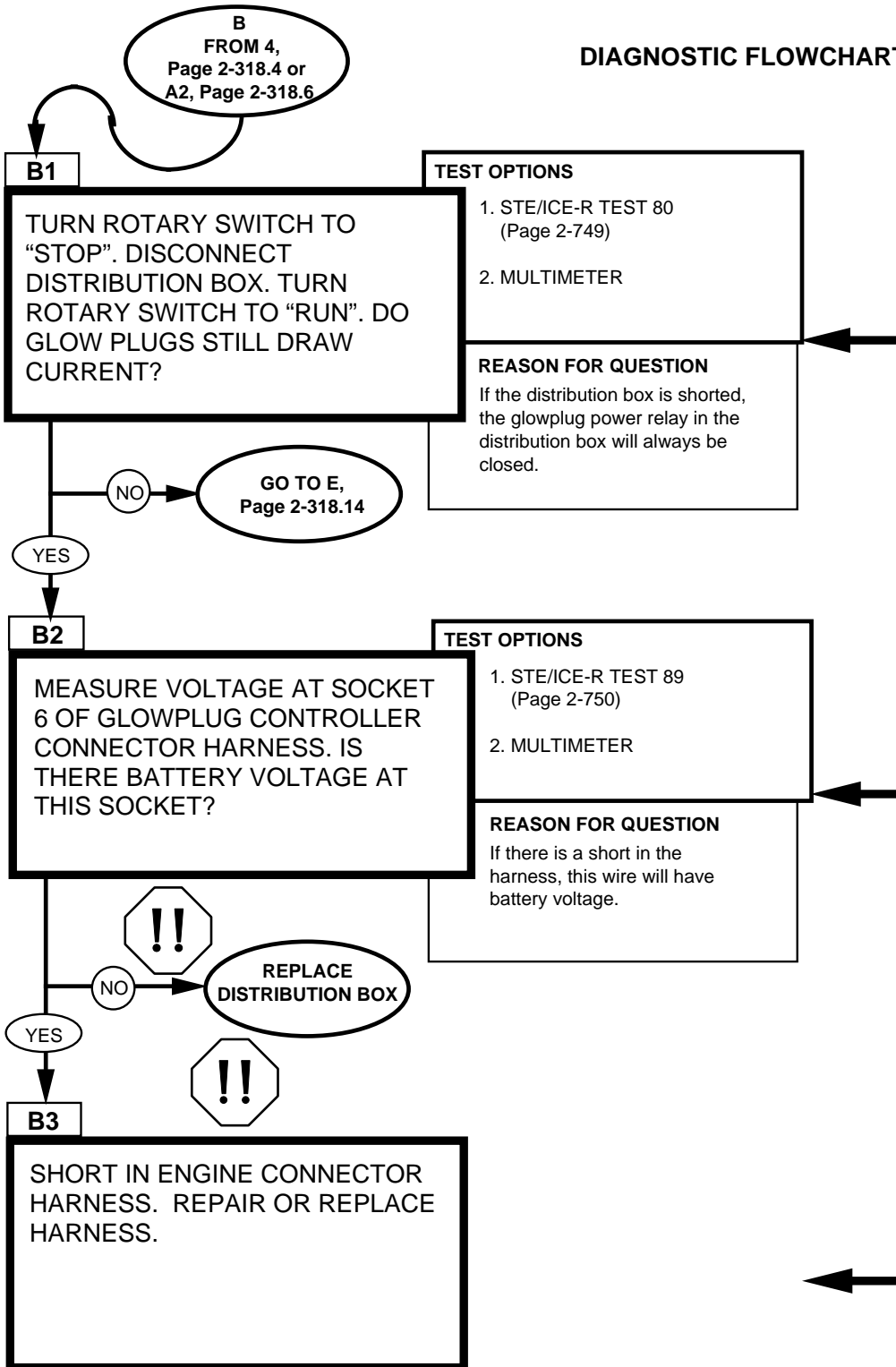
2. Disconnect the negative battery cable. Disconnect the distribution box connector harness from the distribution box. Reconnect the negative battery cable. Measure the resistance between pin D in the engine connector harness of the distribution box and ground. There should NOT be continuity (resistance reading off-the-scale). If there is continuity, repair or replace the harness.
3. Repeat the following for each glowplug:
 - a. Reconnect the wiring harness to the glowplug while you repeat the resistance measurement described in step 2. When you reconnect the wire to the glowplug, the resistance should drop to between 1 and 2 ohms (glowplugs are typically 1.6 ohms).
 - b. If step a passed; disconnect the glowplug again, making sure the resistance goes off-scale again. Repeat step a for the next glowplug.
 - c. If step a failed; then either the glowplug or its wire is no good. Take the wire off the glowplug again and measure the resistance from the glowplug to the engine block. If the resistance is 1 - 2 ohms, then the cable is no good, otherwise replace the glowplug and check the cable for continuity, just to be sure.
4. Reconnect the distribution box and all wires.

GLOWPLUGS

DIAGNOSTIC FLOWCHART

KNOWN INFO
GLOWPLUG CURRENT OK NOT CYCLING PROPERLY
POSSIBLE PROBLEMS
DISTRIBUTION BOX

KNOWN INFO
GLOWPLUG CURRENT OK GLOWPLUGS NOT CYCLING GLOWPLUGS DRAW CURRENT WITH DISTRIBUTION BOX DISCONNECTED.
POSSIBLE PROBLEMS
WIRING SHORT DISTRIBUTION BOX (GLOWPLUG POWER RELAY)



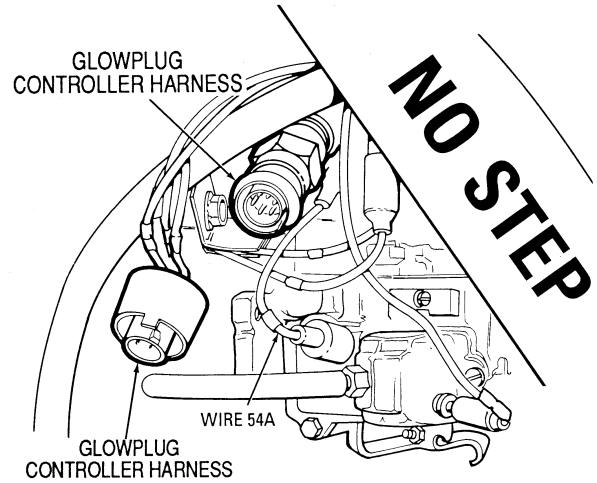
REFERENCE INFORMATION

GLOWPLUGS

NOTE

Ensure that alternator "AC" tap is functioning correctly by measuring DC volts at wire 2A. Reading should be between 9-16 Vdc. If this voltage is not present, glowplug system will never stop cycling.

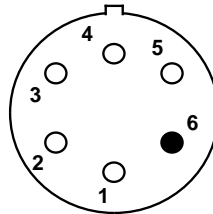
Refer to the functional flow schematic. If the distribution box is shorted (continuity from pin 6 to pin 3), the glowplug power relay will always be energized and the glowplugs will always be drawing current.



BATTERY CURRENT STE/ICE-R TEST 80

1. Start Test 80, battery current.
2. Displayed reading is in amps. The reading will be greater than 30 amps, depending on how many accessories you have on.

Since the glowplugs draw current without the distribution box connected, there must be a short in the harness or a stuck relay in the distribution box. If there were a short in the harness directly to the glowplugs, the glowplugs would have burned out long ago and you wouldn't be here. The only other short in the harness that would make the glowplugs turn on without the distribution box installed would show up as battery voltage at pin 6 of the controller's connector.



Glowplug Controller Harness Schematic

Replace distribution box, refer to (para. 4-5.1).

Check the end of the harness at the distribution box, glowplugs, etc. for shorts. Repair whatever you can. If you don't see anything wrong, the short must be in the main body of the harness, which means that you have to replace the harness.



WARNING

Disconnect negative battery cable before disconnecting and reconnecting distribution box harness.

There is battery voltage at the distribution box at all times. Failure to disconnect battery cable will result in damage to equipment or injury to personnel.

For repair or replacement of wiring, refer to (para. 4-85).

BATTERY CURRENT MULTIMETER

1. Set the voltmeter to a DC volts scale of about 1 volt.
2. Connect the BLACK lead to the battery side of the current shunt and the RED lead to the other end of the current shunt.
3. Current shunt voltage is proportional to battery current, 100 millivolts = 1000 amps. To get current, multiply millivolts x 10.

0-45 DC VOLTS STE/ICE-R TEST 89

1. Connect RED clip to the indicated test point, BLACK clip to negative or ground.
2. Start Test 89, DC volts.
3. Displayed reading is in volts.

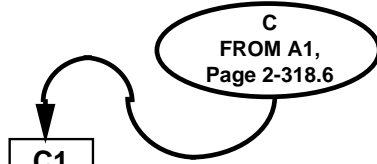
VOLTAGE MULTIMETER

1. Set the voltmeter to a DC volts scale of at least 40 volts.
2. Connect the RED lead to positive and the BLACK lead to negative.
3. Be sure to read the correct scale.

GLOWPLUGS

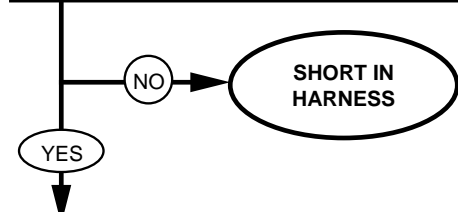
DIAGNOSTIC FLOWCHART

KNOWN INFO
GLOWPLUGS DON'T DRAW ANY CURRENT
POSSIBLE PROBLEMS
GLOWPLUG CONTROLLER WIRING (OPEN CIRCUIT) BAD GLOWPLUGS DISTRIBUTION BOX



C1
TURN ROTARY SWITCH TO "STOP". IS THERE LESS THAN 0.5 VOLTS AT GLOWPLUG WIRES?

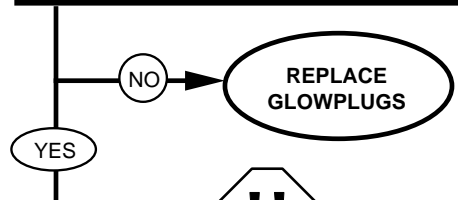
TEST OPTIONS
1. STE/ICE-R TEST 89 (Page 2-750) 2. MULTIMETER
REASON FOR QUESTION
There should not be voltage at glowplugs with switch off.



KNOWN INFO
NO SHORTS GLOWPLUGS DRAW ZERO AMPS
POSSIBLE PROBLEMS
GLOWPLUG CONTROLLER BAD GLOWPLUGS DISTRIBUTION BOX

C2
TURN THE ROTARY SWITCH TO "RUN". IS THERE LESS THAN 0.5 VOLTS AT THE GLOWPLUG WIRES?

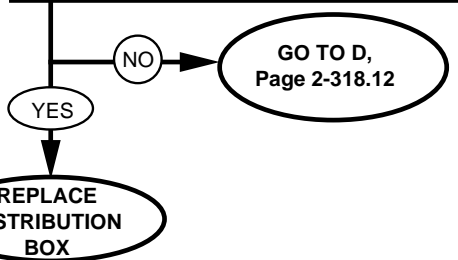
TEST OPTIONS
1. STE/ICE-R TEST 89 (Page 2-750) 2. MULTIMETER
REASON FOR QUESTION
To see if power is getting to glowplugs.



KNOWN INFO
NO SHORTS GLOWPLUGS DRAW NO CURRENT NO VOLTAGE AT GLOWPLUGS
POSSIBLE PROBLEMS
OPEN IN DISTRIBUTION BOX OPEN IN WIRING

C3
TURN ROTARY SWITCH TO "STOP". MAKE SURE GLOWPLUG CONTROLLER IS CONNECTED. IS THERE CONTINUITY FROM SOCKET 'A' TO SOCKET 'B' OF DISTRIBUTION BOX ENGINE CONNECTOR HARNESS ?

TEST OPTIONS
1. STE/ICE-R TEST 91 (Page 2-752) 2. MULTIMETER
REASON FOR QUESTION
Continuity indicates the harness and controller are ok. Non-continuity indicates an open in the harness or distribution box.



REFERENCE INFORMATION

GLOWPLUGS

Replace harness. Notify DS Maintenance.

Replace glowplugs, refer to (para. 3-38).

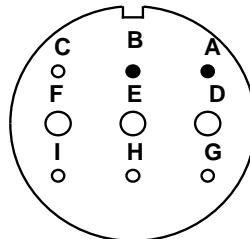


WARNING

Disconnect negative battery cable before disconnecting and reconnecting distribution box harness.

There is battery voltage at the distribution box at all times. Failure to disconnect battery cable will result in damage to equipment or injury to personnel.

Replace distribution box, refer to (para. 4-5.1).



Engine Connector with pins 'A' & 'B' highlighted.

**0-45 DC VOLTS
STE/ICE-R TEST 89**

1. Connect RED clip to the indicated test point, BLACK clip to negative or ground.
2. Start Test 89, DC volts.
3. Displayed reading is in volts.

**VOLTAGE
MULTIMETER**

1. Set the voltmeter to a DC volts scale of at least 40 volts.
2. Connect the RED lead to positive and the BLACK lead to negative.
3. Be sure to read the correct scale.

**0-4500 OHMS
STE/ICE-R TEST 91**

1. Connect RED clip and BLACK clip to the indicated test points in the question. RED to the first, BLACK to the second.
2. Start Test 91, 0-4500 ohms.
3. Displayed reading is in ohms. Less than 5 ohms is continuity. If the resistance is over 4500 ohms, STE/ICE displays "9.9.9.9."

**CONTINUITY (RESISTANCE)
MULTIMETER**

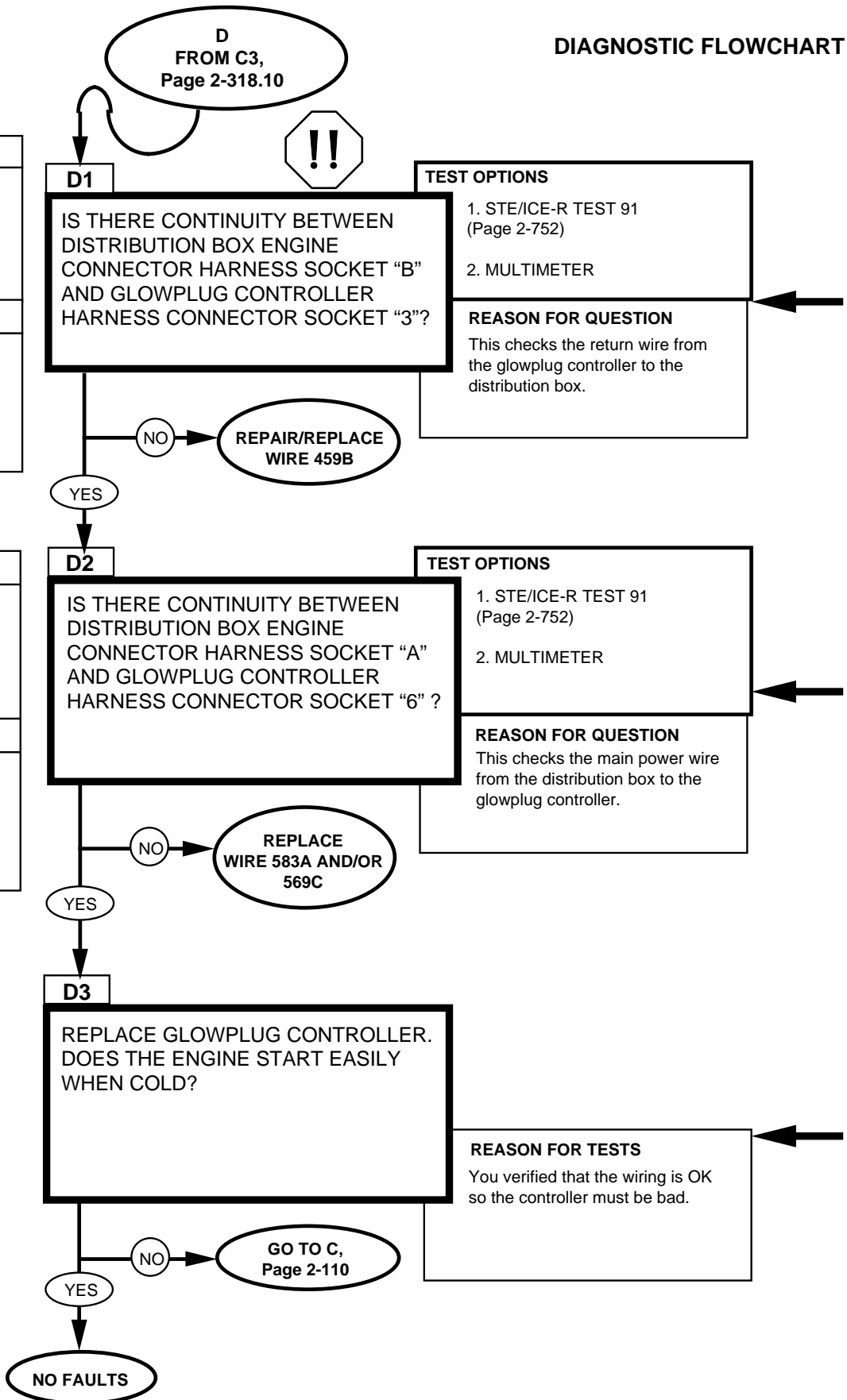
1. Set the voltmeter to an ohms scale of about 1000 ohms.
2. Connect the RED and BLACK leads to the connections stated in the question.
3. Be sure to read the correct scale. Less than 5 ohms indicates continuity. For an open circuit, the meter should peg full scale (needle all the way to the left).

GLOWPLUGS

DIAGNOSTIC FLOWCHART

KNOWN INFO
OPEN CIRCUIT IN GLOW-PLUG CONTROLLER OR WIRING
POSSIBLE PROBLEMS
WIRING GLOWPLUG CONTROLLER

KNOWN INFO
OPEN CIRCUIT IN GLOW-PLUG CONTROLLER OR WIRING
POSSIBLE PROBLEMS
WIRING GLOWPLUG CONTROLLER



REFERENCE INFORMATION

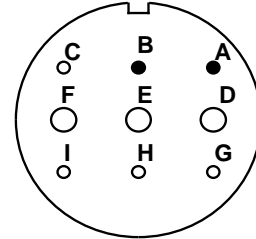
GLOWPLUGS



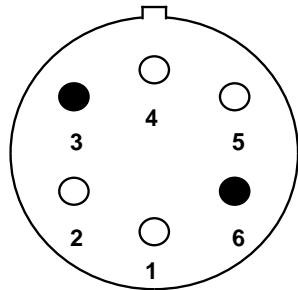
WARNING

Disconnect negative battery cable before disconnecting and reconnecting distribution box harness.

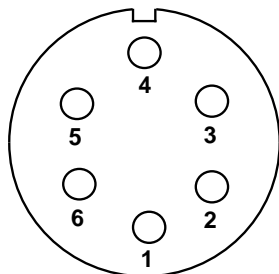
There is battery voltage at the distribution box at all times. Failure to disconnect battery cable will result in damage to equipment or injury to personnel.



Engine Connector Harness with sockets "A" & "B" highlighted.



Glowplug Controller Harness with sockets 3 & 6 highlighted



Glowplug Controller

**0-4500 OHMS
STE/ICE-R TEST 91**

1. Connect RED clip and BLACK clip to the indicated test points in the question. RED to the first, BLACK to the second.
2. Start Test 91, 0-4500 ohms.
3. Displayed reading is in ohms. Less than 5 ohms is continuity. If the resistance is over 4500 ohms, STE/ICE displays '9.9.9.9.'

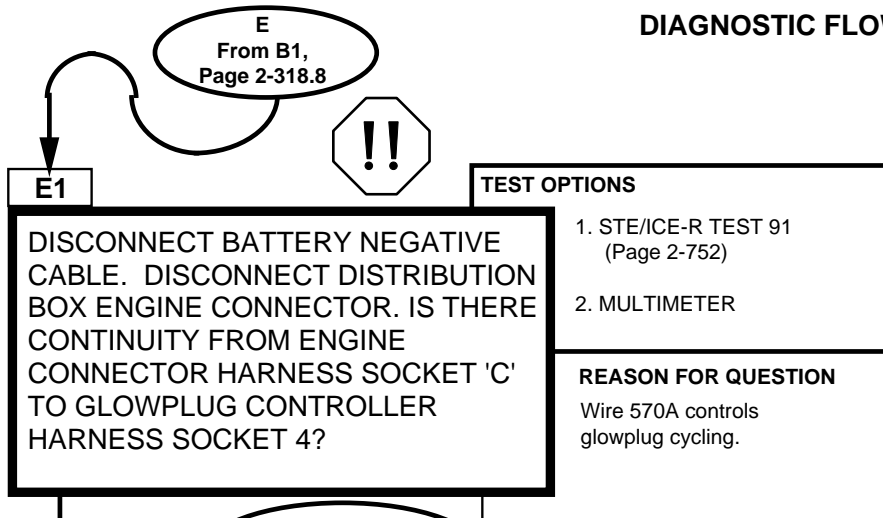
**CONTINUITY (RESISTANCE)
MULTIMETER**

1. Set the voltmeter to an ohms scale of about 1000 ohms.
2. Connect the RED and BLACK leads to the connections stated in the question.
3. Be sure to read the correct scale. Less than 5 ohms indicates continuity. For an open circuit, the meter should peg full scale (needle all the way to the left).

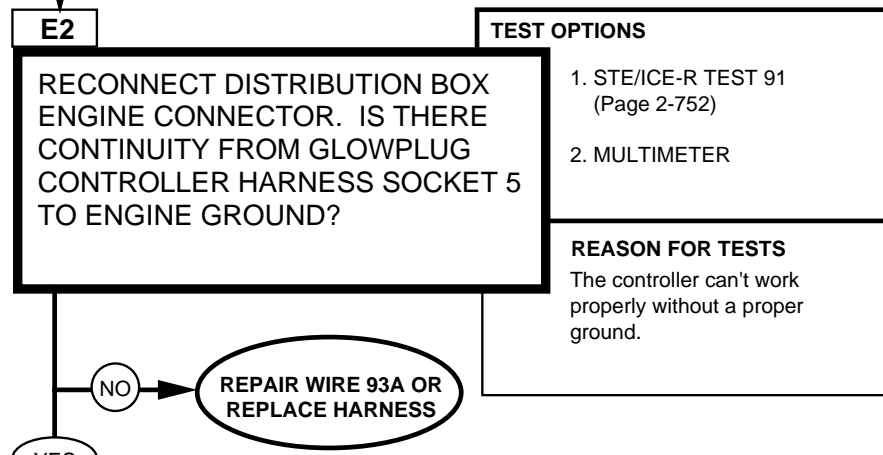
GLOWPLUGS CIRCUIT

DIAGNOSTIC FLOWCHART

KNOWN INFO
GLOWPLUG CURRENT OK DISTRIBUTION BOX OK GLOWPLUGS NOT CYCLING
POSSIBLE PROBLEMS
WIRING GLOWPLUG CONTROLLER



KNOWN INFO
GLOWPLUG CURRENT OK DISTRIBUTION BOX OK GLOWPLUGS NOT CYCLING
POSSIBLE PROBLEMS
WIRING GLOWPLUG CONTROLLER



REPLACE CONTROLLER

REFERENCE INFORMATION

GLOWPLUGS CIRCUIT



WARNING

Disconnect negative battery cable before disconnecting and reconnecting distribution box harness.

There is battery voltage at the distribution box at all times. Failure to disconnect battery cable will result in damage to equipment or injury to personnel.

Repair wiring or replace harness, refer to (para. 4-84).

Repair wiring or replace harness, refer to (para. 4-85).

Replace glowplug controller, refer to (para. 4-29).

**0-4500 OHMS
STE/ICE-R TEST 91**

1. Connect RED clip and BLACK clip to the indicated test points in the question. RED to the first, BLACK to the second.
2. Start Test 91, 0-4500 ohms.
3. Displayed reading is in ohms. Less than 5 ohms is continuity. If the resistance is over 4500 ohms, STE/ICE displays "9.9.9.9."

**CONTINUITY (RESISTANCE)
MULTIMETER**

1. Set the voltmeter to an ohms scale of about 1000 ohms.
2. Connect the RED and BLACK leads to the connections stated in the question.
3. Be sure to read the correct scale. Less than 5 ohms indicates continuity. For an open circuit, the meter should peg full scale (needle all the way to the left).

2-32. INSTRUMENT TESTS

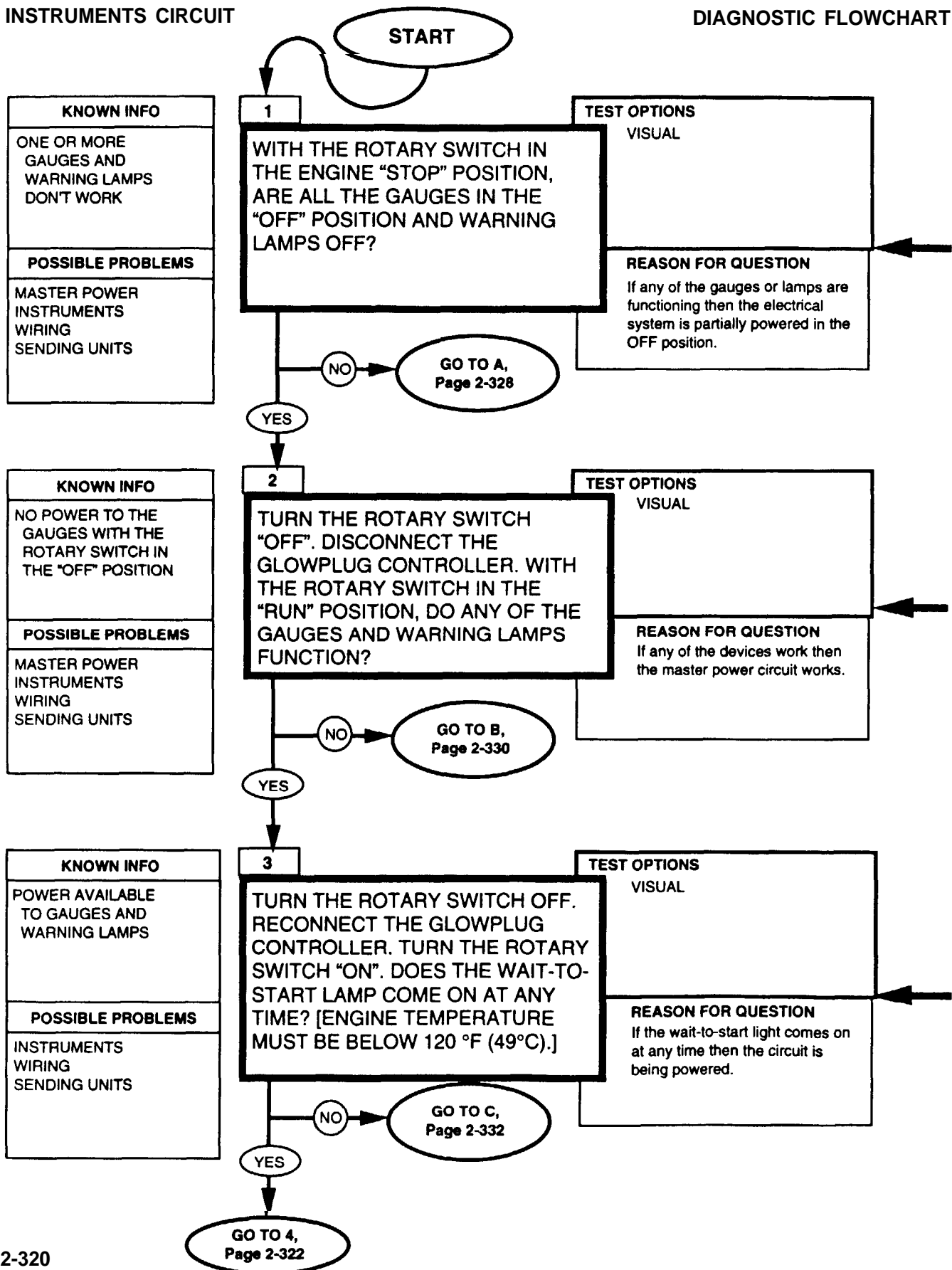
These Instrument Tests can be run any time you think there is a problem with the instruments or if you were sent here from another test.

If you get an unusual gauge reading it is a good idea to check out the system that the gauge monitors to be sure that it is a gauge problem and not a real problem in the engine or electrical system.

Refer to fold-out page FO-10 and leave fold-out open for reference during testing. Diagrams of the individual gauge circuits will be found on the page that deals with that circuit.

INSTRUMENTS CIRCUIT

DIAGNOSTIC FLOWCHART



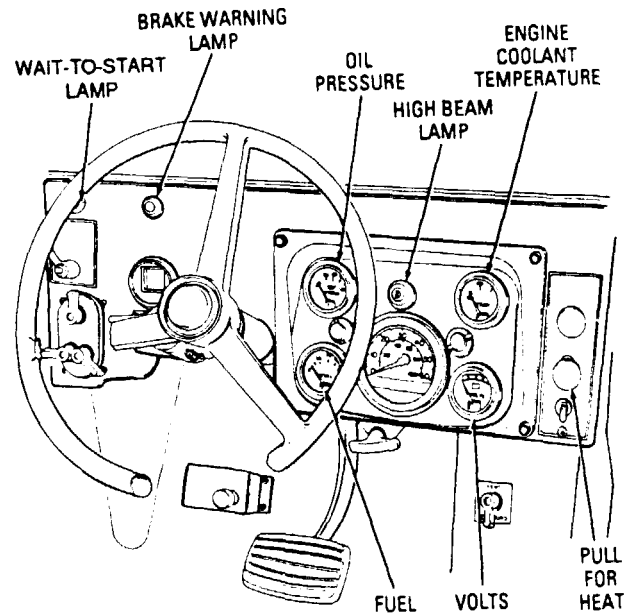
REFERENCE INFORMATION

INSTRUMENTS CIRCUIT

None of the following instruments and accessories should work when the rotary switch is in the STOP position:

- Volts gauge
- Wait-to-start lamp
- Temperature gauge
- oil pressure gauge
- Fuel gauge
- Windshield wiper/washer
- Brake warning lamp

If any of the instruments and accessories work when the rotary switch is in the RUN position, then power is available and the circuit breaker is OK.



NOTE

The wait-to-start lamp is not an accurate indication of glowplug operation. Make sure the glowplugs are operating properly BEFORE you check out the light. Go to the Glowplug Tests, page 2-303. Return here if the light still doesn't operate properly.

The wait-t-start lamp should come on when the engine is below 120°F (49° C) and the rotary switch is first turned to the RUN position.

INSTRUMENTS CIRCUIT

DIAGNOSTIC FLOWCHART

KNOWN INFO
WAIT-TO-START LAMP OK
POSSIBLE PROBLEMS
INSTRUMENTS WIRING SENDING UNITS



4

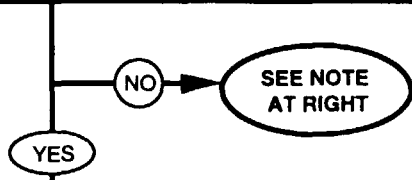
DOES THE BRAKE WARNING LAMP OPERATE PROPERLY?

TEST OPTIONS

VISUAL

REASON FOR QUESTION

If the brake warning lamp comes on at any time then the circuit is being powered.



KNOWN INFO
BRAKE LAMP OK
POSSIBLE PROBLEMS
INSTRUMENTS WIRING SENDING UNITS

5

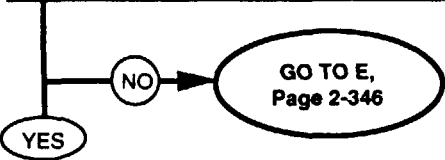
DOES THE VOLT GAUGE WORK?

TEST OPTIONS

VISUAL

REASON FOR QUESTION

If the volts gauge works then the power to the instruments is OK.



KNOWN INFO
VOLT GAUGE OK
POSSIBLE PROBLEMS
INSTRUMENTS WIRING SENDING UNITS

6

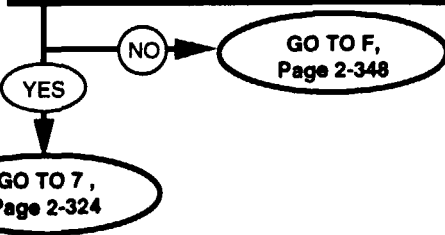
TURN ROTARY SWITCH TO "OFF" POSITION. DISCONNECT THE GLOW PLUG CONTROLLER. WITH THE ROTARY SWITCH IN THE "RUN" POSITION DOES THE WINDSHIELD WIPER WORK? TURN ROTARY SWITCH TO "OFF" POSITION. RECONNECT THE GLOWPLUG CONTROLLER.

TEST OPTIONS

VISUAL

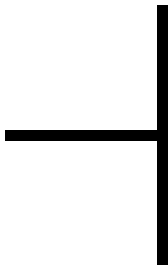
REASON FOR QUESTION

If the windshield wiper works then the power to the wiper is OK.

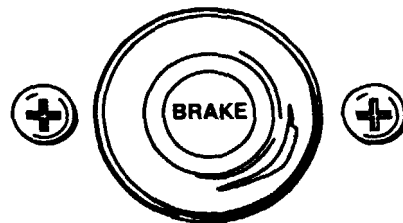


REFERENCE INFORMATION

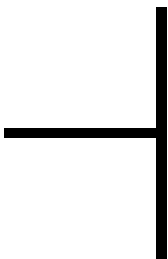
INSTRUMENTS CIRCUIT



The brake warning lamp should come on when the engine is cranking, when the parking brake is set, or when there is a failure in the brake system. If brake warning lamp stays on, go to 1, page 2-342. If the warning lamp does not come on, go to D, page 2-338.



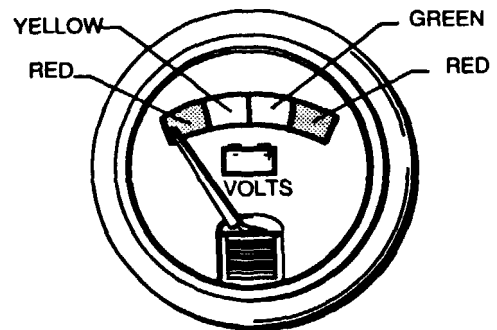
BRAKE WARNING LAMP



The volt gauge may be checked by running STE/ICE-R Test 67 with the engine running. The position in the center of the green area of the volt gauge marked GEN is approximately 26 volts.

The volt gauge is a galvanometer type gauge. It is conceivable that the coil in the gauge may have a broken wire that only opens when the gauge is heated up. If you are having an intermittent gauge problem, leave the vehicle running for awhile and watch the gauge.

If the charging system is ok, but the gauge is reading full scale one way or the other, then you may have this type of problem.



VOLT GAUGE

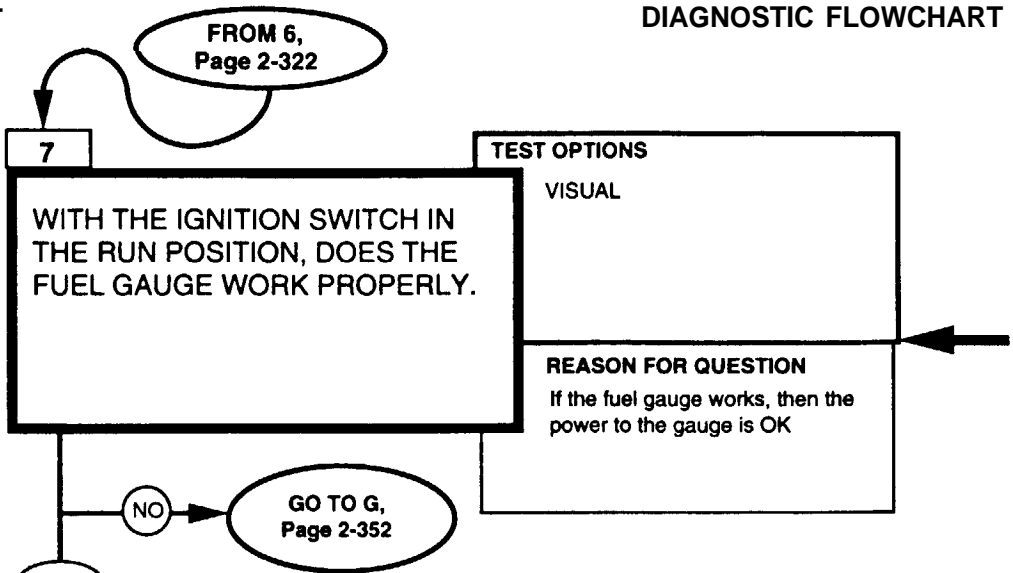


Rotary switch has to be in the RUN position for the windshield wiper or washer to operate.

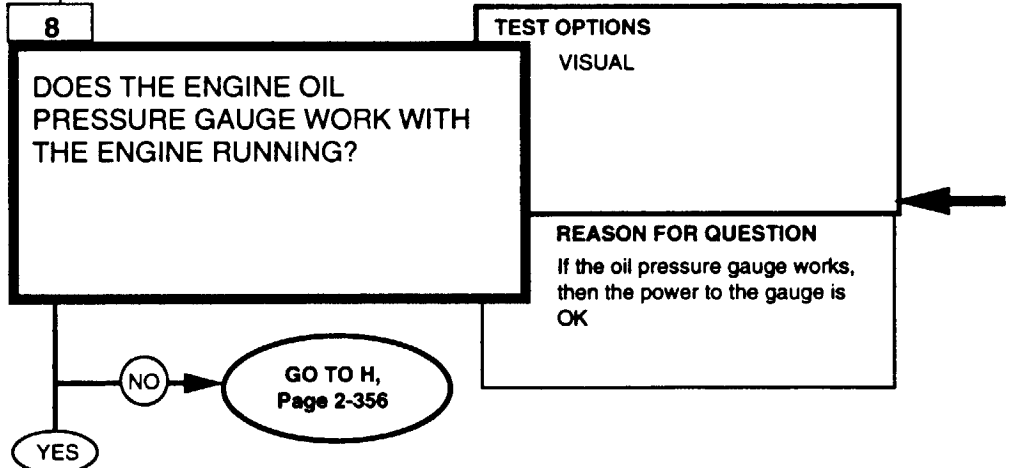
INSTRUMENTS CIRCUIT

DIAGNOSTIC FLOWCHART

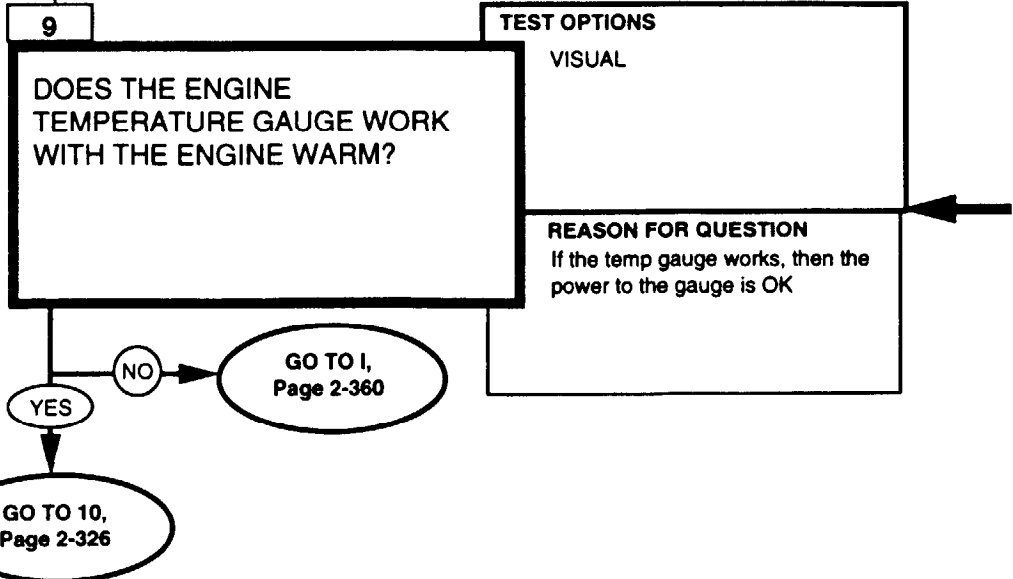
KNOWN INFO
WINDSHIELD WIPERS OK
POSSIBLE PROBLEMS
FUEL GAUGE OIL PRESSURE GAUGE TEMPERATURE GAUGE WIRING SENDING UNITS



KNOWN INFO
FUEL GAUGE OK
POSSIBLE PROBLEMS
FUEL GAUGE OIL PRESSURE GAUGE TEMPERATURE GAUGE WIRING SENDING UNITS



KNOWN INFO
OIL PRESSURE GAUGE OK
POSSIBLE PROBLEMS
TEMPERATURE GAUGE WIRING SENDING UNITS



REFERENCE INFORMATION

INSTRUMENTS CIRCUIT

NOTE

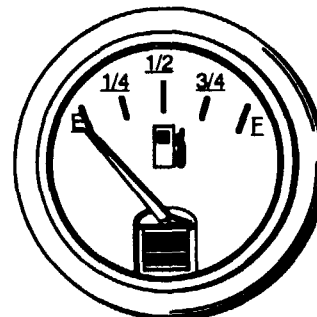
These gauges are galvanometer type gauges. It is conceivable that the coil in the gauge may have a broken wire that only opens when the gauge is warmed up. If you are having an intermittent gauge problem, leave the vehicle running for a while and watch the gauge. If the system the gauge monitors is OK, but the gauge is reading full scale one way or the other, then you may have this type of problem.

Fill the fuel tank if necessary to obtain a reading greater than empty.

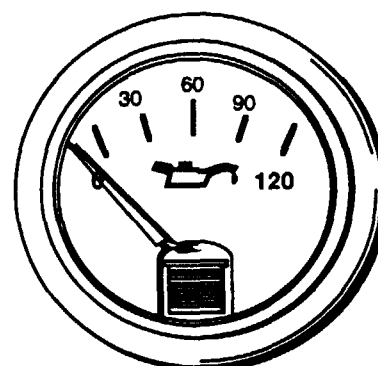
With the engine running, the oil pressure should be approximately 10 PSI at idle, 40-45 PSI at 2000 RPM, and it should be 0 when stopped.

Make sure shift lever is in neutral before running this test.

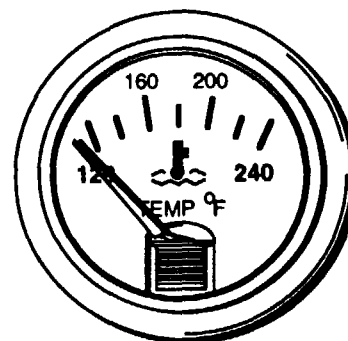
With the engine cold the gauge should read off scale to the left and when warm the reading should be 190°- 230°F (88° - 110° C).



FUEL GAUGE



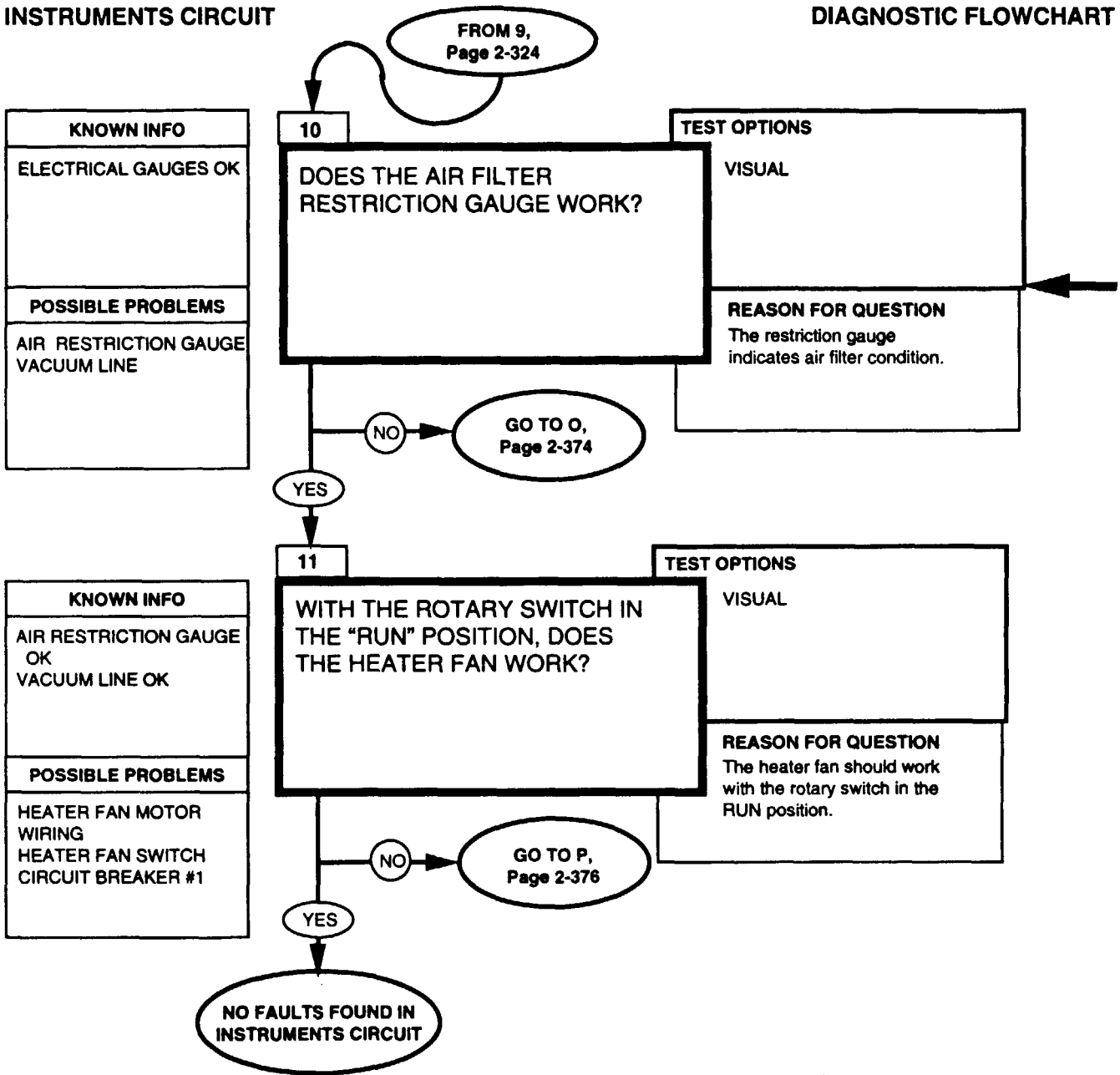
OIL PRESSURE GAUGE



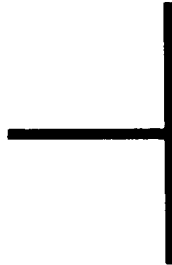
TEMPERATURE GAUGE

INSTRUMENTS CIRCUIT

DIAGNOSTIC FLOWCHART

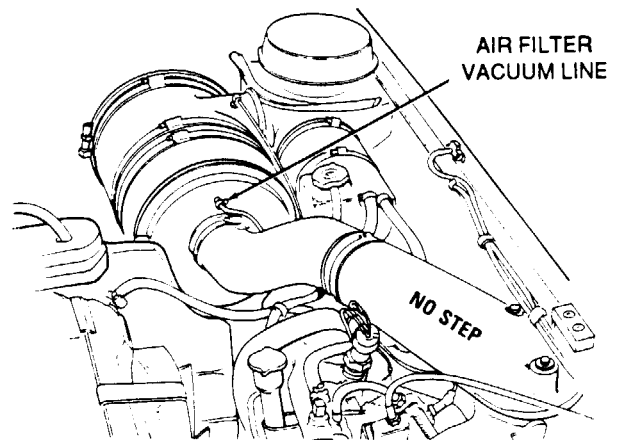
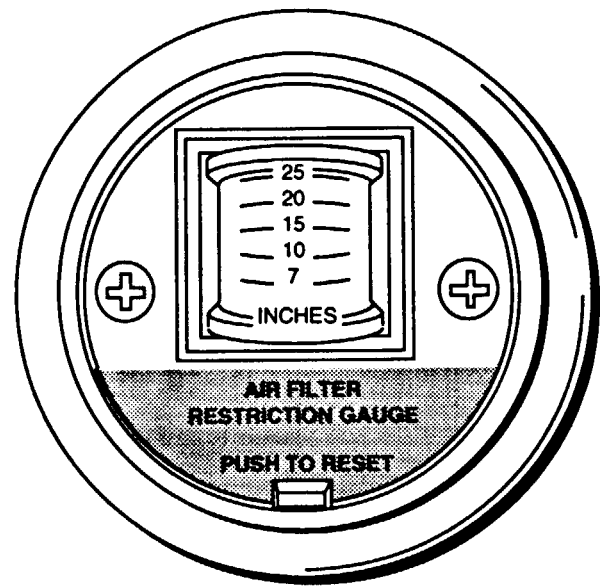


REFERENCE INFORMATION



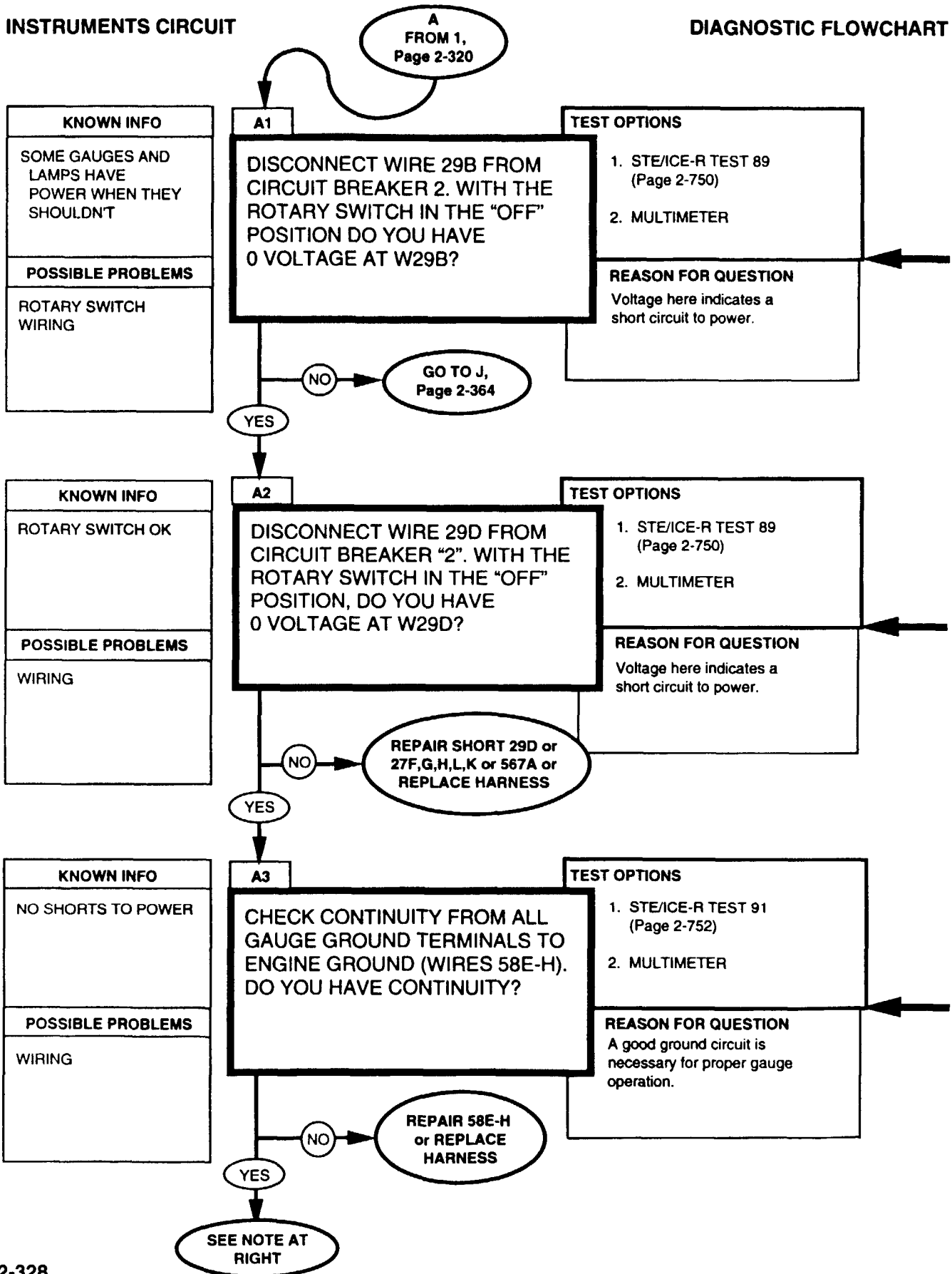
When vacuum is applied to the line at the air filter, the gauge should read yellow and hold the reading until it is released by pressing the reset button on the gauge.

INSTRUMENTS CIRCUIT



INSTRUMENTS CIRCUIT

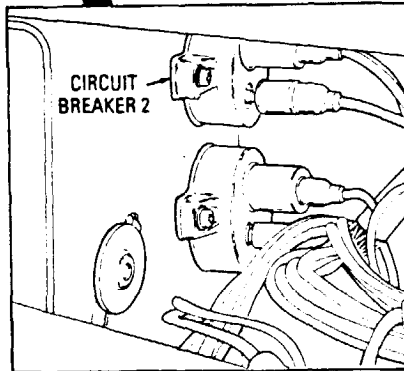
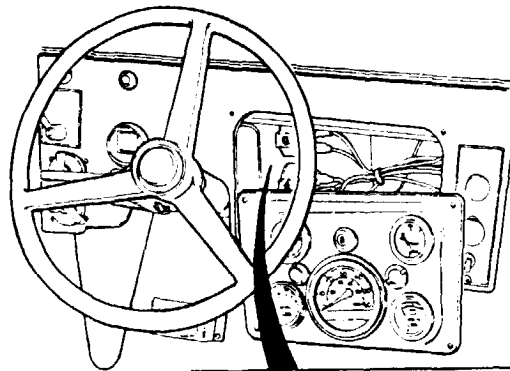
DIAGNOSTIC FLOWCHART



REFERENCE INFORMATION

INSTRUMENTS CIRCUIT

The easiest way to reach the circuit breaker and gauge wiring is to remove the gauge panel screws and pull the panel out far enough to work with the wiring.



Replace harness/or repair wiring, refer to (para 4-85).

Connect the Black test lead to a good engine ground and connect the Red test lead to each gauge ground terminal (the uninsulated screw) one at a time and note each reading.

NOTE

You have checked all the wiring that is common to all the gauges and warning lamps. Reconnect wires and return to step 2 of the go-chain, page 2-320, and continue testing.

**0-45 DC VOLTS
STE/ICE-R TEST 89**

1. Connect RED clip to the indicated test point, BLACK clip to negative or ground.
2. Start Test 89, DC volts.
3. Displayed reading is in volts.

**BATTERY VOLTAGE
MULTIMETER**

1. Set the voltmeter to a DC volts scale of at least 40 volts.
2. Connect the RED lead to positive and the BLACK lead to negative.
3. Be sure to read the correct scale.

**0-4500 OHMS
STE/ICE-R TEST 91**

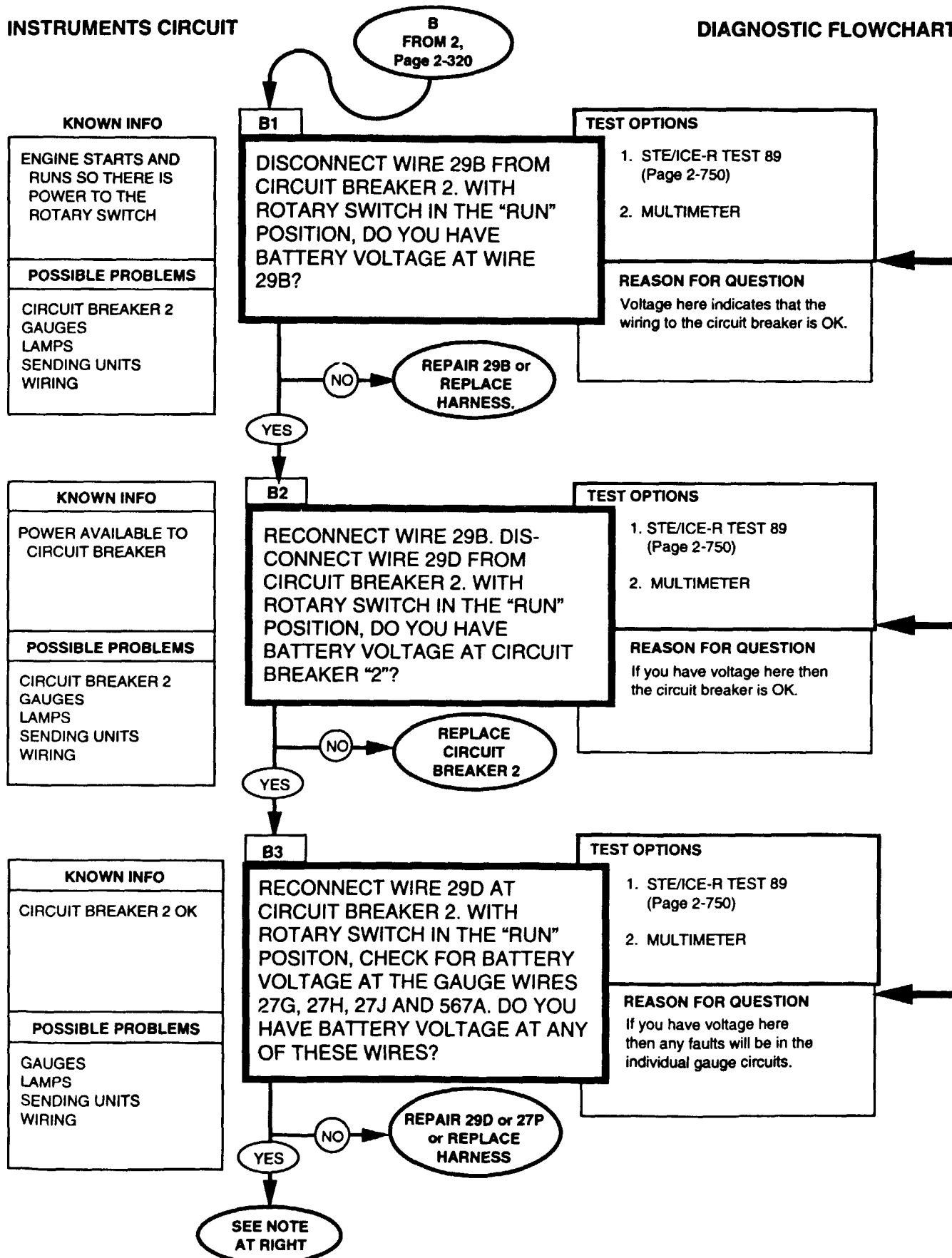
1. Connect RED clip and BLACK clip to the indicated terminals in the question. RED to the first, BLACK to the second.
2. Start Test 91, 0-4500 ohms.
3. Displayed reading is in ohms. Less than 5 ohms is continuity. If the resistance is over 4500 ohms, STE/ICE displays "9.9.9.9."

**CONTINUITY (RESISTANCE)
MULTIMETER**

1. Set the voltmeter to an ohms scale of about 1000 ohms.
2. Connect the RED and BLACK leads to the connections stated in the question.
3. Be sure to read the correct scale. Less than 5 ohms indicates continuity. For an open circuit, the meter should peg full scale (needle all the way to the left).

INSTRUMENTS CIRCUIT

DIAGNOSTIC FLOWCHART



REFERENCE INFORMATION

INSTRUMENTS CIRCUIT

The easiest way to reach the circuit breaker and gauge wiring is to remove the gauge panel screws and pull the panel out far enough to work with the wiring.

Replace harness/or repair wiring, refer to (para 4-85).

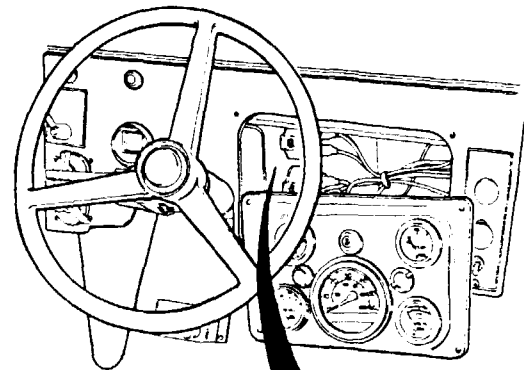
**0-45 DC VOLTS
STE/CE-R TEST 89**

1. Connect RED clip to the indicated test point, BLACK clip to negative or ground.
2. Start Test 89, DC volts.
3. Displayed reading is in volts.

**BATTERY VOLTAGE
MULTIMETER**

1. Set the voltmeter to a DC volts scale of at least 40 volts.
2. Connect the RED lead to positive and the BLACK lead to negative.
3. Be sure to read the correct scale.

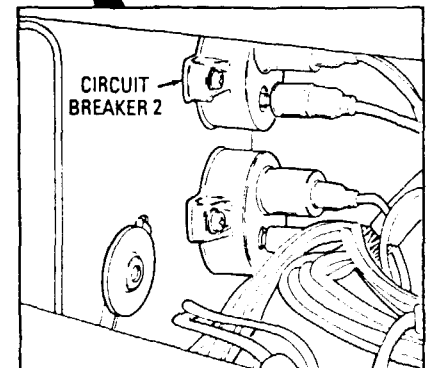
Replace circuit breaker, refer to (para 4-9).



Replace harness/or repair wiring, refer to (para 4-85).

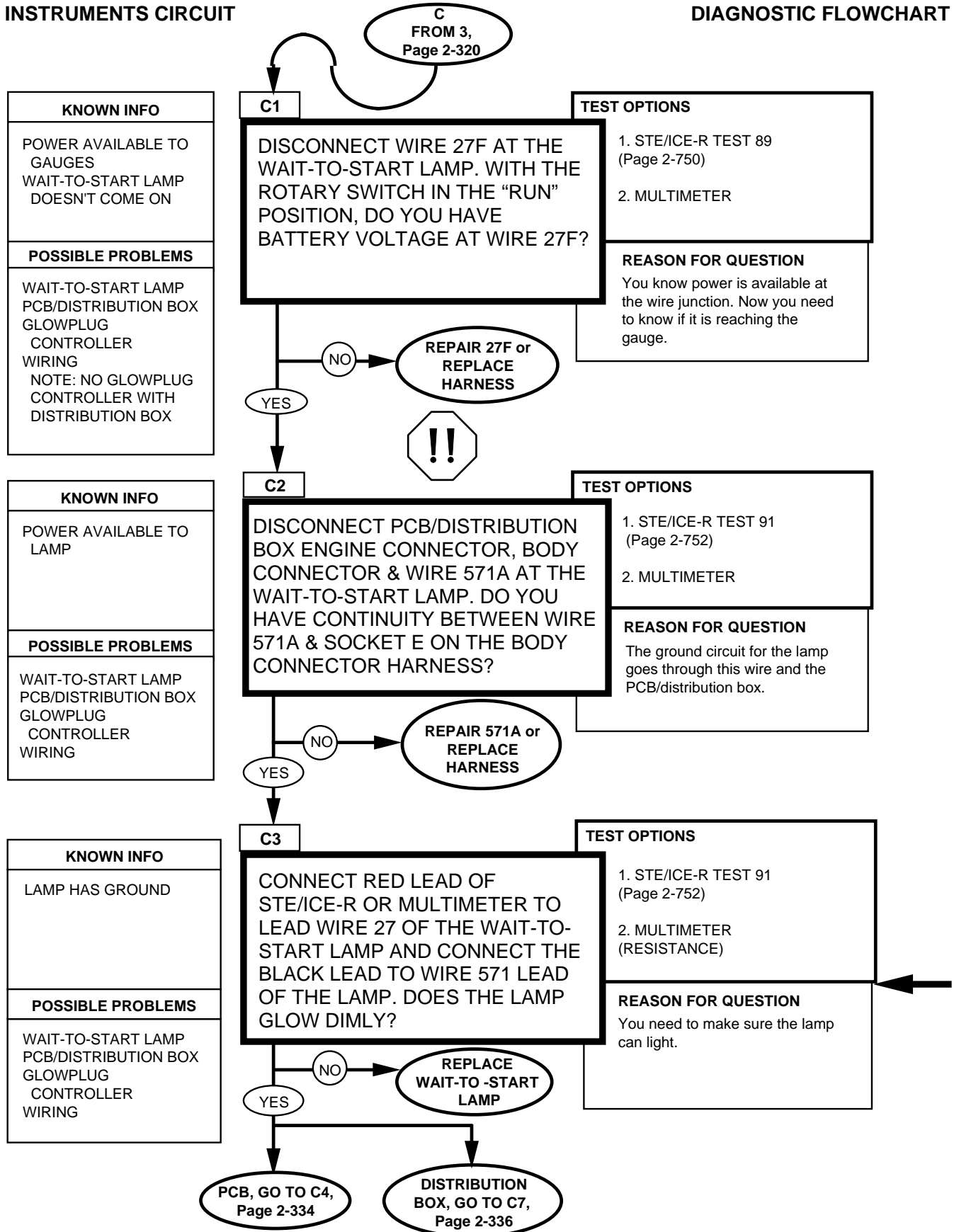
NOTE

You have checked all the common power wiring to all the gauges and warning lamps. Reconnect wires and return to step 3 of the go-chain, page 2-320, and continue testing.



INSTRUMENTS CIRCUIT

DIAGNOSTIC FLOWCHART



REFERENCE INFORMATION



WARNING

Disconnect negative battery cable before disconnecting and reconnecting protective control box/distribution box harness.

There is battery voltage at the PCB/distribution box at all times. Failure to disconnect battery cable will result in damage to equipment or injury to personnel.

1. Set the voltmeter to a DC volts scale of at least 40 volts.
2. Connect the RED lead to positive and the BLACK lead to negative.
3. Be sure to read the correct scale.

**0-4500 OHMS
STE/ICE-R TEST 91**

1. Connect RED clip and BLACK clip to the terminations indicated in the question. RED to the first, BLACK to the second.
2. Start Test 91, 0-4500 ohms.
3. Displayed reading is in ohms. Less than 5 ohms is continuity. If the resistance is over 4500 ohms, STE/ICE displays "9.9.9.9."

It is important to connect the leads as indicated because you are checking continuity across a diode. The lamp will glow dimly because you are supplying a small amount of power thru STE/ICE-R. You may have to shade the lamp with your hand to see if it glows.

NOTE

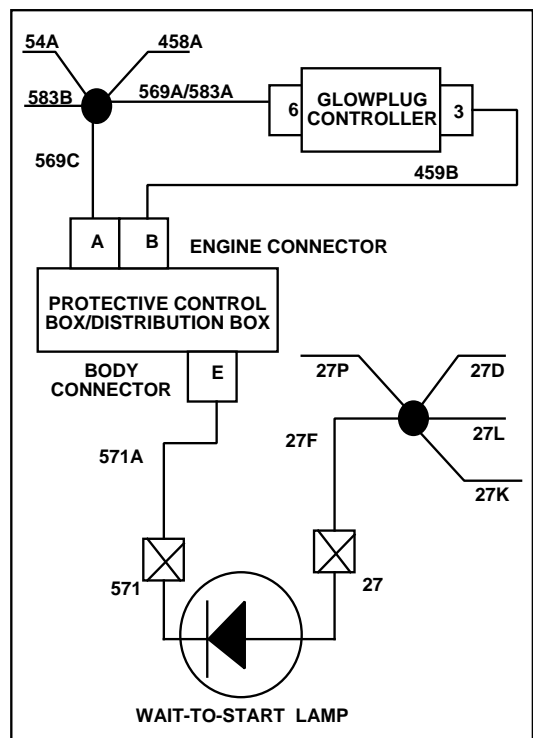
A multimeter may not supply enough power to light the lamp. In this case look for a much greater resistance when measuring with the leads connected in one direction than when they are connected in reverse.

Replace harness or lamp, refer to (para. 4-17).

INSTRUMENTS CIRCUIT

**0-45 DC VOLTS
STE/ICE-R TEST 89**

1. Connect RED clip to the indicated test point, BLACK clip to negative or ground.
2. Start Test 89, DC volts.
3. Displayed reading is in volts.



**CONTINUITY (RESISTANCE)
MULTIMETER**

1. Set the voltmeter to an ohms scale of about 1000 ohms.
2. Connect the RED and BLACK leads to the connections stated in the question.
3. Be sure to read the correct scale. Less than 5 ohms indicates continuity. For an open circuit, the meter should peg full scale (needle all the way to the left).

INSTRUMENTS CIRCUIT

DIAGNOSTIC FLOWCHART

KNOWN INFO
LAMP OK
POSSIBLE PROBLEMS
PCB/DISTRIBUTION BOX GLOWPLUG CONTROLLER WIRING

C4

FROM C3, Page 2-332

NOTE: FOR DISTRIBUTION BOX SKIP STEPS C4, C5, AND C6. DISCONNECT GLOWPLUG CONTROLLER. DO YOU HAVE CONTINUITY BETWEEN SOCKET "6" IN THE CONTROLLER HARNESS & SOCKET A IN THE ENGINE CONNECTOR HARNESS?

TEST OPTIONS

1. STE/ICE-R TEST 91 (Page 2-752)
2. MULTIMETER

REASON FOR QUESTION
This wire provides power to the controller.

NO → REPAIR 569A, 569C or REPLACE HARNESS

YES →

KNOWN INFO
LAMP OK
POSSIBLE PROBLEMS
PCB/DISTRIBUTION BOX GLOWPLUG CONTROLLER WIRING

C5

DO YOU HAVE CONTINUITY BETWEEN SOCKET "3" IN THE CONTROLLER HARNESS & SOCKET "B" IN THE ENGINE CONNECTOR HARNESS?

TEST OPTIONS

1. STE/ICE-R TEST 91 (Page 2-752)
2. MULTIMETER

REASON FOR QUESTION
This wire returns power for the lamp.

NO → REPAIR 459B or REPLACE HARNESS

YES →

KNOWN INFO
WIRING TO & FROM CONTROLLER OK
POSSIBLE PROBLEMS
PCB/DISTRIBUTION BOX GLOWPLUG CONTROLLER

C6

RECONNECT GLOWPLUG CONTROLLER. DO YOU HAVE CONTINUITY BETWEEN SOCKET "A" & SOCKET "B" IN THE ENGINE CONNECTOR HARNESS?

TEST OPTIONS

1. STE/ICE-R TEST 91 (Page 2-752)
2. MULTIMETER

REASON FOR QUESTION
If you don't have continuity here then you know that the controller is bad.

NO → REPLACE GLOWPLUG CONTROLLER

YES →

GO TO C7, Page 2-336

REFERENCE INFORMATION



WARNING

Disconnect negative battery cable before disconnecting and reconnecting protective control box/distribution box harness.

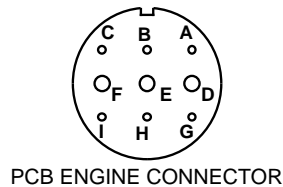
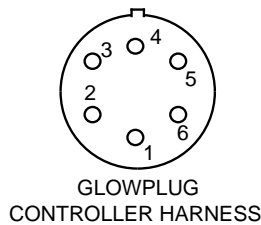
There is battery voltage at the PCB/distribution box at all times. Failure to disconnect battery cable will result in damage to equipment or injury to personnel.

<p>0-4500 OHMS STE/ICE-R TEST 91</p>
<p>1. Connect RED clip and BLACK clip to the terminations indicated in the question. RED to the first, BLACK to the second.</p> <p>2. Start Test 91, 0-4500 ohms.</p> <p>3. Displayed reading is in ohms. Less than 5 ohms is continuity. If the resistance is over 4500 ohms, STE/ICE displays "9.9.9.9."</p>

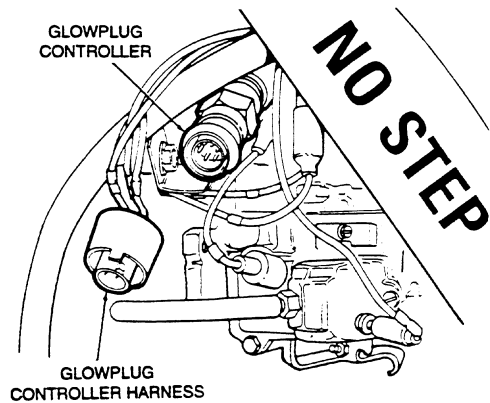
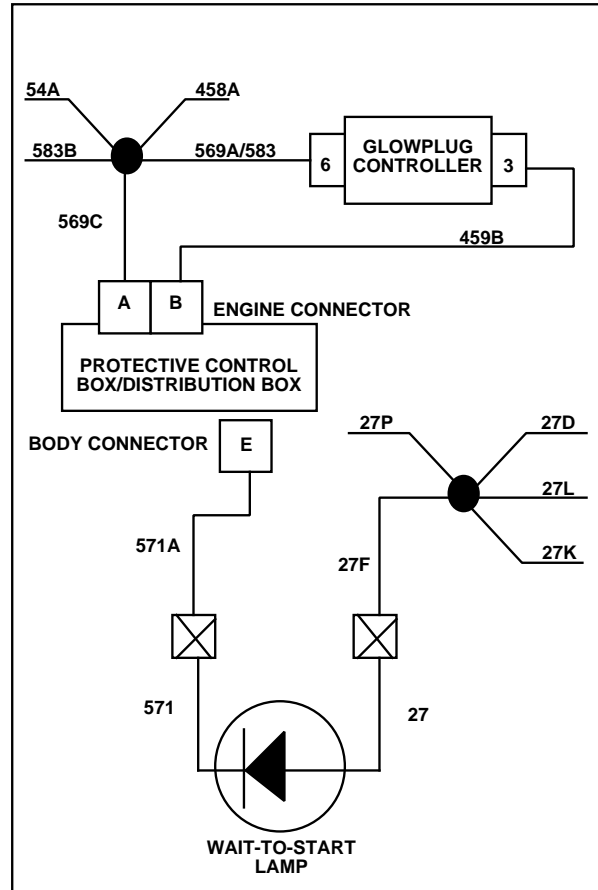
<p>CONTINUITY (RESISTANCE) MULTIMETER</p>
<p>1. Set the voltmeter to an ohms scale of about 1000 ohms.</p> <p>2. Connect the RED and BLACK leads to the connections stated in the question.</p> <p>3. Be sure to read the correct scale. Less than 5 ohms indicates continuity. For an open circuit, the meter should peg full scale (needle all the way to the left).</p>

Engine temperature must be below 120°F (49°C) in order to make this test, otherwise normal operation of the glowplug controller will cause the circuit to be open.

Replace harness and glowplug controller, refer to (para. 4-29).

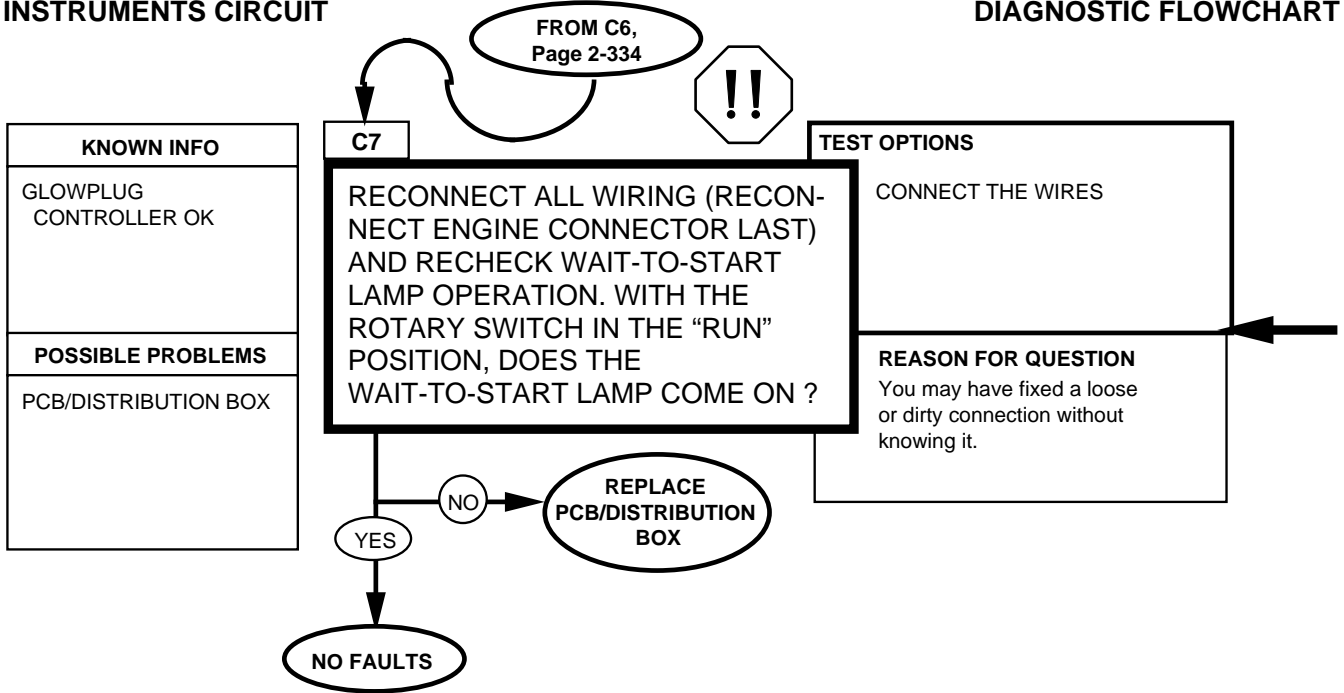


INSTRUMENTS CIRCUIT



INSTRUMENTS CIRCUIT

DIAGNOSTIC FLOWCHART



REFERENCE INFORMATION

**WARNING**

Disconnect negative battery cable before disconnecting and reconnecting protective control box/distribution box harness.

There is battery voltage at the PCB/distribution box at all times. Failure to disconnect battery cable will result in damage to equipment or injury to personnel.

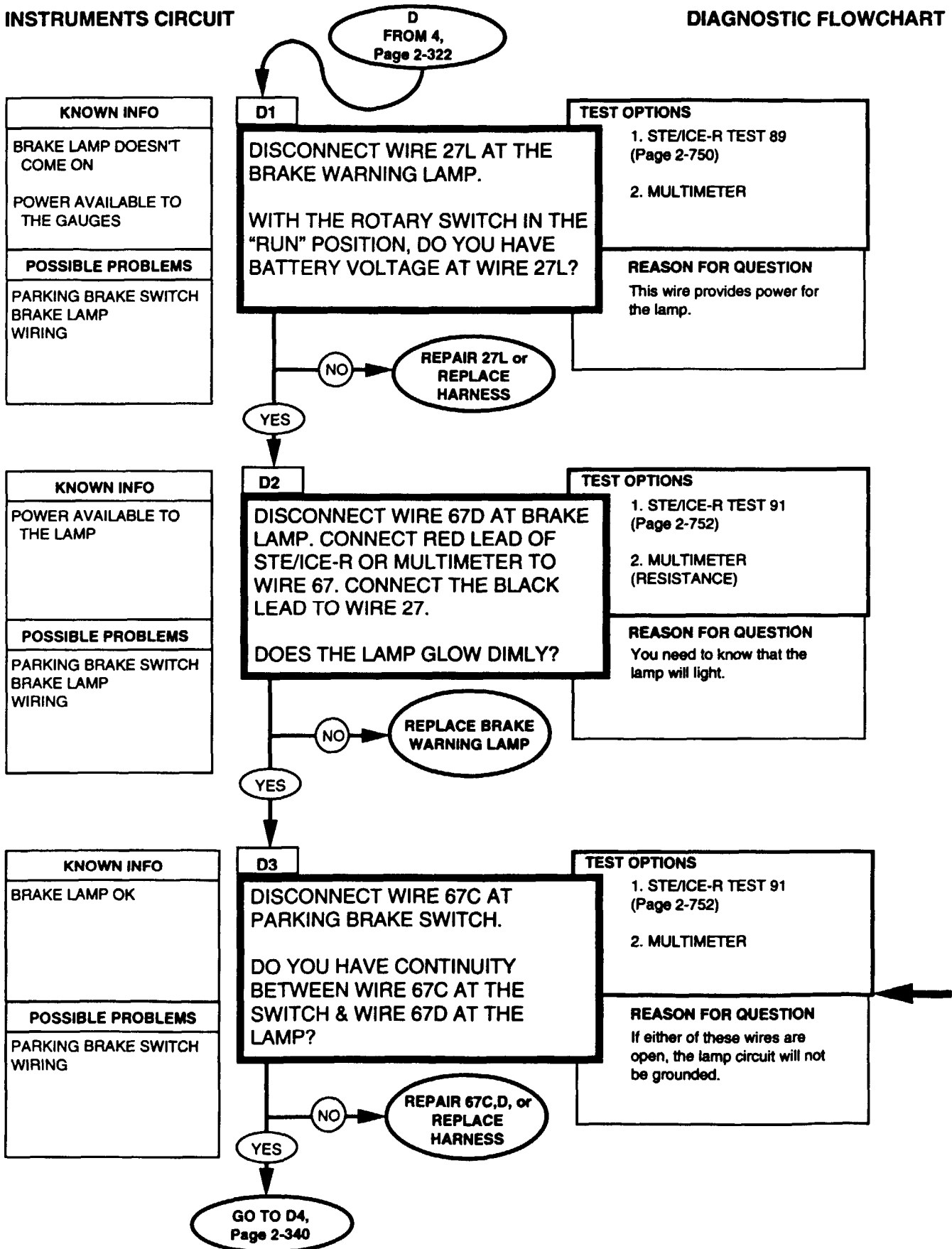
Engine temperature must be below 120°F (49° C) or the lamp may not come on.

Replace PCB, refer to (para. 4-5).
Replace distribution box (para. 4-5.1).

INSTRUMENTS CIRCUIT

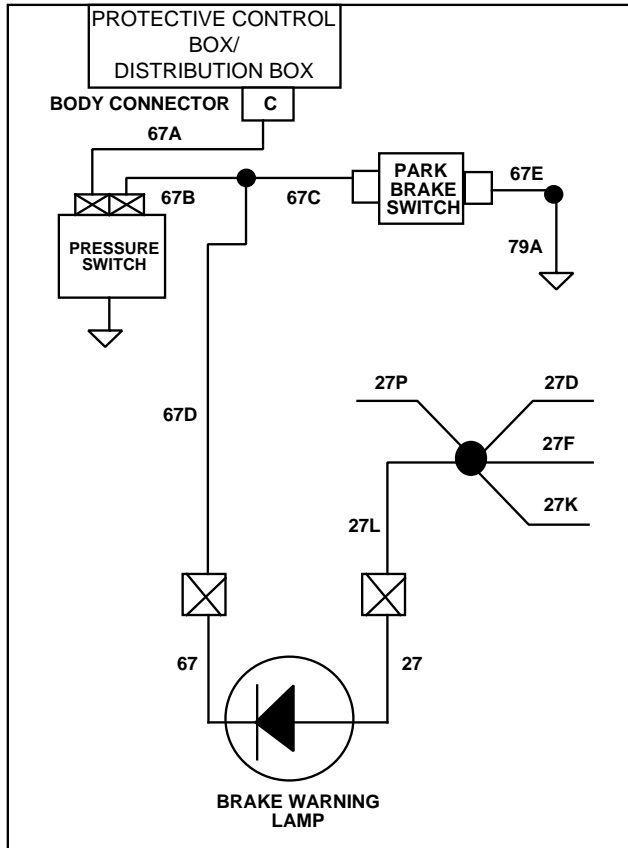
INSTRUMENTS CIRCUIT

DIAGNOSTIC FLOWCHART



REFERENCE INFORMATION

INSTRUMENTS CIRCUIT



**0-45 DC VOLTS
STE/ICE-R TEST 89**

1. Connect RED clip to the indicated test point, BLACK clip to negative or ground.
2. Start Test 89, DC volts.
3. Displayed reading is in volts.

**BATTERY VOLTAGE
MULTIMETER**

1. Set the voltmeter to a DC volts scale of at least 40 volts.
2. Connect the RED lead to positive and the BLACK lead to negative.
3. Be sure to read the correct scale.

**0-4500 OHMS
STE/ICE-R TEST 91**

1. Connect RED clip and BLACK clip to the indicated terminals in the question. RED to the first, BLACK to the second.
2. Start Test 91, 0-4500 ohms.
3. Displayed reading is in ohms. Less than 5 ohms is continuity. If the resistance is over 4500 ohms, STE/ICE displays "9.9.9.9."

**CONTINUITY (RESISTANCE)
MULTIMETER**

1. Set the voltmeter to an ohms scale of about 1000 ohms.
2. Connect the RED and BLACK leads to the connections stated in the question.
3. Be sure to read the correct scale. Less than 5 ohms indicates continuity. For an open circuit, the meter should peg full scale (needle all the way to the left).

It is important to connect the leads as indicated because you are checking continuity across a diode. The lamp will glow dimly because you are supplying a small amount of power thru STE/ICE-R. You may have to shade the lamp with your hand to see if it glows.

NOTE

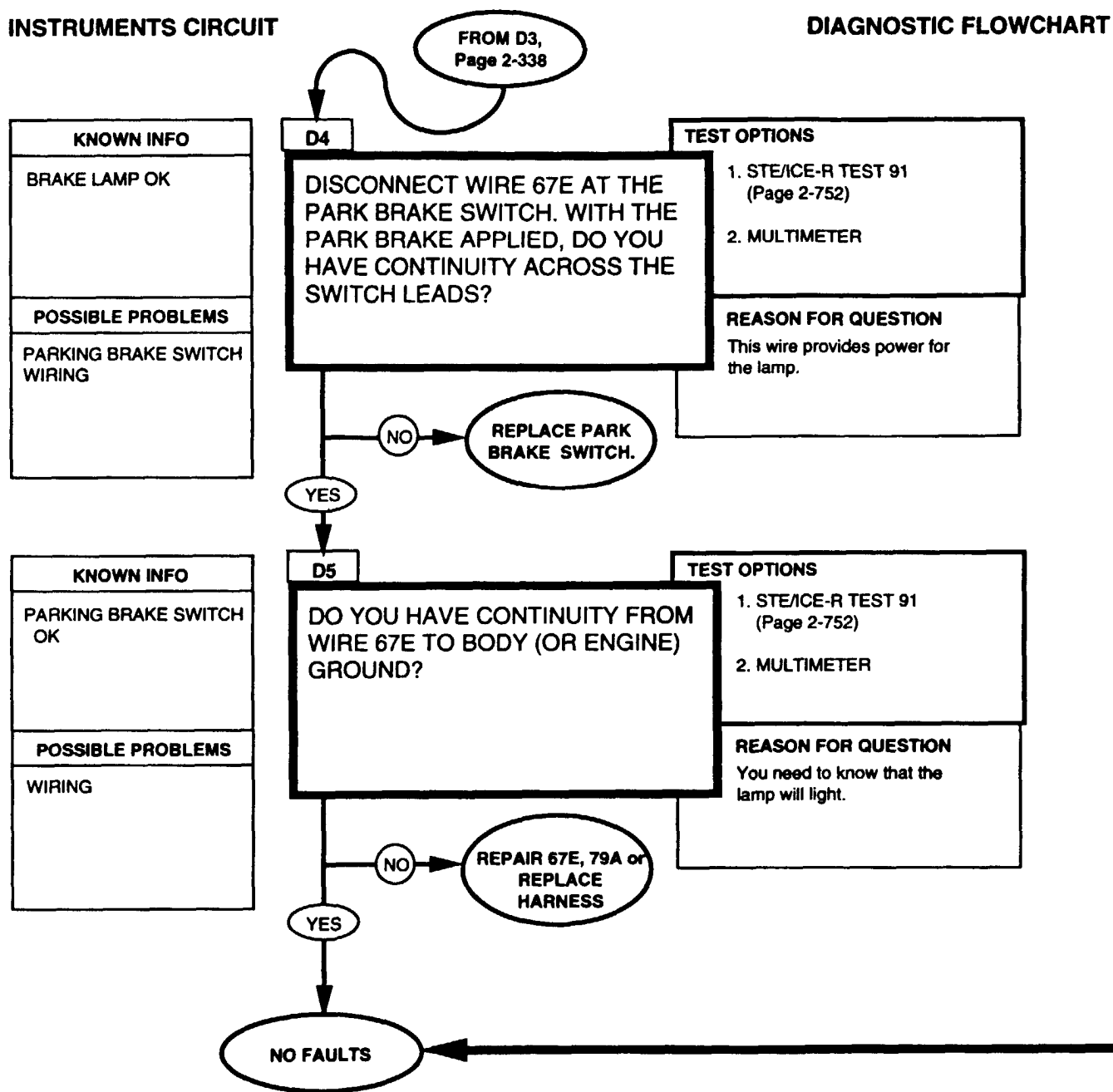
A multimeter may not supply enough power to light the lamp. In this case look for a much greater resistance when measuring with the leads connected in one direction than when they are connected in reverse.

Replace harness/or repair wiring, refer to (para. 4-85).

Replace brake warning lamp, refer to (para. 4-17).

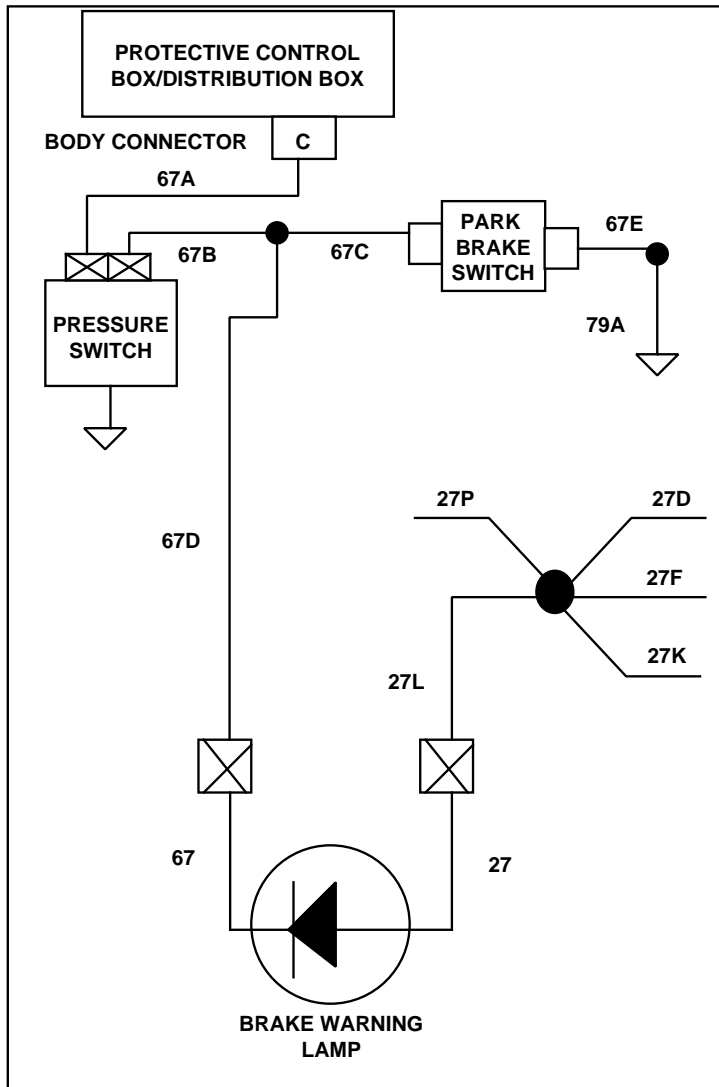
INSTRUMENTS CIRCUIT

DIAGNOSTIC FLOWCHART



REFERENCE INFORMATION

INSTRUMENTS CIRCUIT



**0-4500 OHMS
STE/ICE-R TEST 91**

1. Connect RED clip and BLACK clip to the terminations indicated in the question. RED to the first, BLACK to the second.
2. Start Test 91, 0-4500 ohms.
3. Displayed reading is in ohms. Less than 5 ohms is continuity. If the resistance is over 4500 ohms, STE/ICE displays '9.9.9.9.'

**CONTINUITY (RESISTANCE)
MULTIMETER**

1. Set the voltmeter to an ohms scale of about 1000 ohms.
2. Connect the RED and BLACK leads to the connections stated in the question.
3. Be sure to read the correct scale. Less than 5 ohms indicates continuity. For an open circuit, the meter should peg full scale (needle all the way to the left).

- Reconnect all wiring. Connect the glowplug controller last.
- Replace parking brake switch. Refer to (para. 4-19).
- Replace harness/or repair wiring. Refer to (para. 4-85).

INSTRUMENTS CIRCUIT

DIAGNOSTIC FLOWCHART

KNOWN INFO
BRAKE WARNING LIGHT WON'T GO OFF
POSSIBLE PROBLEMS
WIRING PARKING BRAKE SWITCH PCB/DISTRIBUTION BOX BRAKE WARNING PRESSURE SWITCH

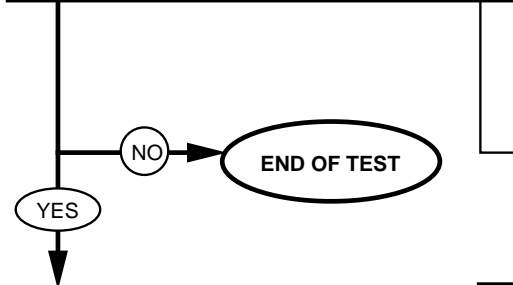
START

1

BLEED BRAKE SYSTEM. DOES THE LIGHT STAY "ON"?

TEST OPTIONS
NONE

REASON FOR QUESTION
If the lamp stays on, it could be that the hydraulic brake system has a fault and might require bleeding.



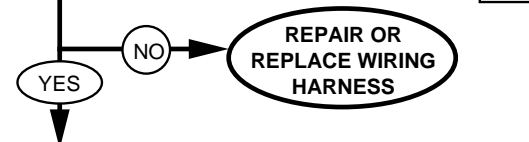
KNOWN INFO
BRAKE WARNING LIGHT WON'T GO OFF
POSSIBLE PROBLEMS
WIRING PARKING BRAKE SWITCH PCB/DISTRIBUTION BOX BRAKE WARNING PRESSURE SWITCH

2

DISCONNECT WIRE 67A AND 67B FROM BRAKE WARNING PRESSURE SWITCH, WIRE 67C FROM PARKING BRAKE SWITCH. DISCONNECT THE PCB/DISTRIBUTION BOX BODY HARNESS CONNECTOR. CONNECT A JUMPER WIRE BETWEEN WIRES 67A AND 67B. DOES THE LIGHT GO "OUT"?

TEST OPTIONS
1. STE/ICE-R TEST 89 (Page 2-750)
2. MULTIMETER

REASON FOR QUESTION
If the lamp stays on with the PCB/distribution box, valve switch and park brake switch disconnected, the problem is in the wiring.



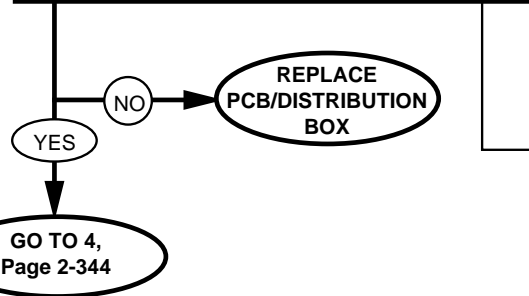
KNOWN INFO
WIRING OK
POSSIBLE PROBLEMS
BRAKE WARNING PRESSURE SWITCH PCB/DISTRIBUTION BOX PARKING BRAKE SWITCH

3

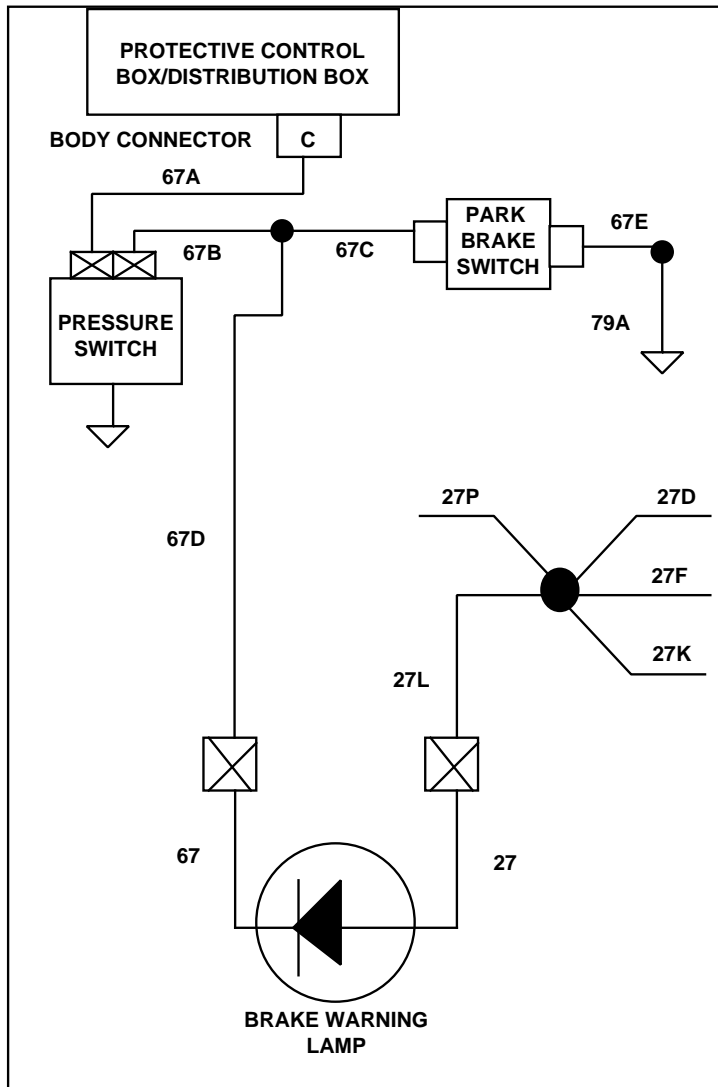
CONNECT PCB/DISTRIBUTION BOX BODY HARNESS. DOES THE LIGHT STAY "OFF"?

TEST OPTIONS
1. STE/ICE-R TEST 91 (Page 2-752)
2. MULTIMETER (RESISTANCE)

REASON FOR QUESTION
When the protective control box/distribution box is connected, the light should not come on. If it does, the PCB/distribution box is faulty.



REFERENCE INFORMATION



Bleed brake system. Refer to (para. 7-10).

Replace parking brake switch. Refer to (para. 4-19).

Replace harness/or repair wiring. Refer to (para. 4-85).

Replace PCB. Refer to (para. 4-5).

Replace distribution box (para. 4-5.1).

INSTRUMENTS CIRCUIT

**0-45 OHMS
STE/ICE-R TEST 89**

1. Connect RED clip to the indicated test point, BLACK clip to negative or ground.
2. Start Test 89, DC volts.
3. Displayed reading is in volts.

**BATTERY VOLTAGE
MULTIMETER**

1. Set the voltmeter to a DC volts scale of at least 40 volts.
2. Connect the RED lead to positive and the BLACK lead to the negative.
3. Be sure to read the correct scale.

**0-4500 OHMS
STE/ICE-R TEST 91**

1. Connect RED clip and BLACK clip to the terminations indicated in the question. RED to the first, BLACK to the second.
2. Start Test 91, 0-4500 ohms.
3. Displayed reading is in ohms. Less than 5 ohms is continuity. If the resistance is over 4500 ohms, STE/ICE displays '9.9.9.9.'

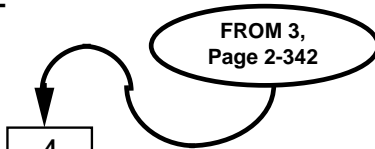
**CONTINUITY (RESISTANCE)
MULTIMETER**

1. Set the voltmeter to an ohms scale of about 1000 ohms.
2. Connect the RED and BLACK leads to the connections stated in the question.
3. Be sure to read the correct scale. Less than 5 ohms indicates continuity. For an open circuit, the meter should peg full scale (needle all the way to the left).

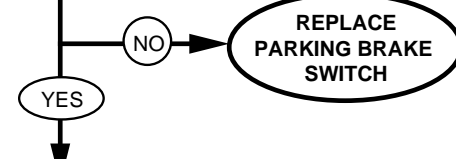
INSTRUMENTS CIRCUIT

DIAGNOSTIC FLOWCHART

KNOWN INFO
WIRING OK PCB/DISTRIBUTION BOX OK BRAKE WARNING VALVE SWITCH OK
POSSIBLE PROBLEMS
PARKING BRAKE SWITCH

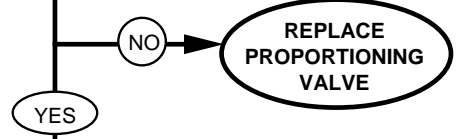


<p>4</p> <p>CONNECT PARKING BRAKE SWITCH. MAKE SURE THE PARKING BRAKE IS DISENGAGED. DOES THE LIGHT STAY OFF?</p>	<p>TEST OPTIONS</p> <p>VISUAL</p> <hr/> <p>REASON FOR QUESTION</p> <p>The light will only come on when the parking brake switch is connected. If the parking brake switch has a problem.</p>
--	--



KNOWN INFO
PCB/DISTRIBUTION BOX OK WIRING OK
POSSIBLE PROBLEMS
BRAKE WARNING PRESSURE SWITCH PARKING BRAKE SWITCH


<p>5</p> <p>REMOVE JUMPER WIRE. CONNECT BRAKE WARNING PRESSURE SWITCH. DOES LIGHT STAY OFF?</p>	<p>TEST OPTIONS</p> <p>1. STE/ICE-R TEST 91 (PAGE 2-752) 2. MULTIMETER</p> <hr/> <p>REASON FOR QUESTION</p> <p>If the light comes on when brake warning pressure switch is connected, the brake warning pressure switch is the problem.</p>
--	---




END OF TEST

REFERENCE INFORMATION

INSTRUMENTS CIRCUIT


 Replace parking brake switch, refer to (para. 4-19).


 When the brake warning pressure switch is defective, the proportioning valve must be replaced. Refer to (para. 7-18).

0-4500 OHMS STE/ICE-R TEST 91
<p>1. Connect RED clip and BLACK clip to the terminations indicated in the question. RED to the first, BLACK to the second.</p> <p>2. Start Test 91, 0-4500 ohms.</p> <p>3. Displayed reading is in ohms. Less than 5 ohms is continuity. If the resistance is over 4500 ohms, STE/ICE displays "9.9.9.9."</p>

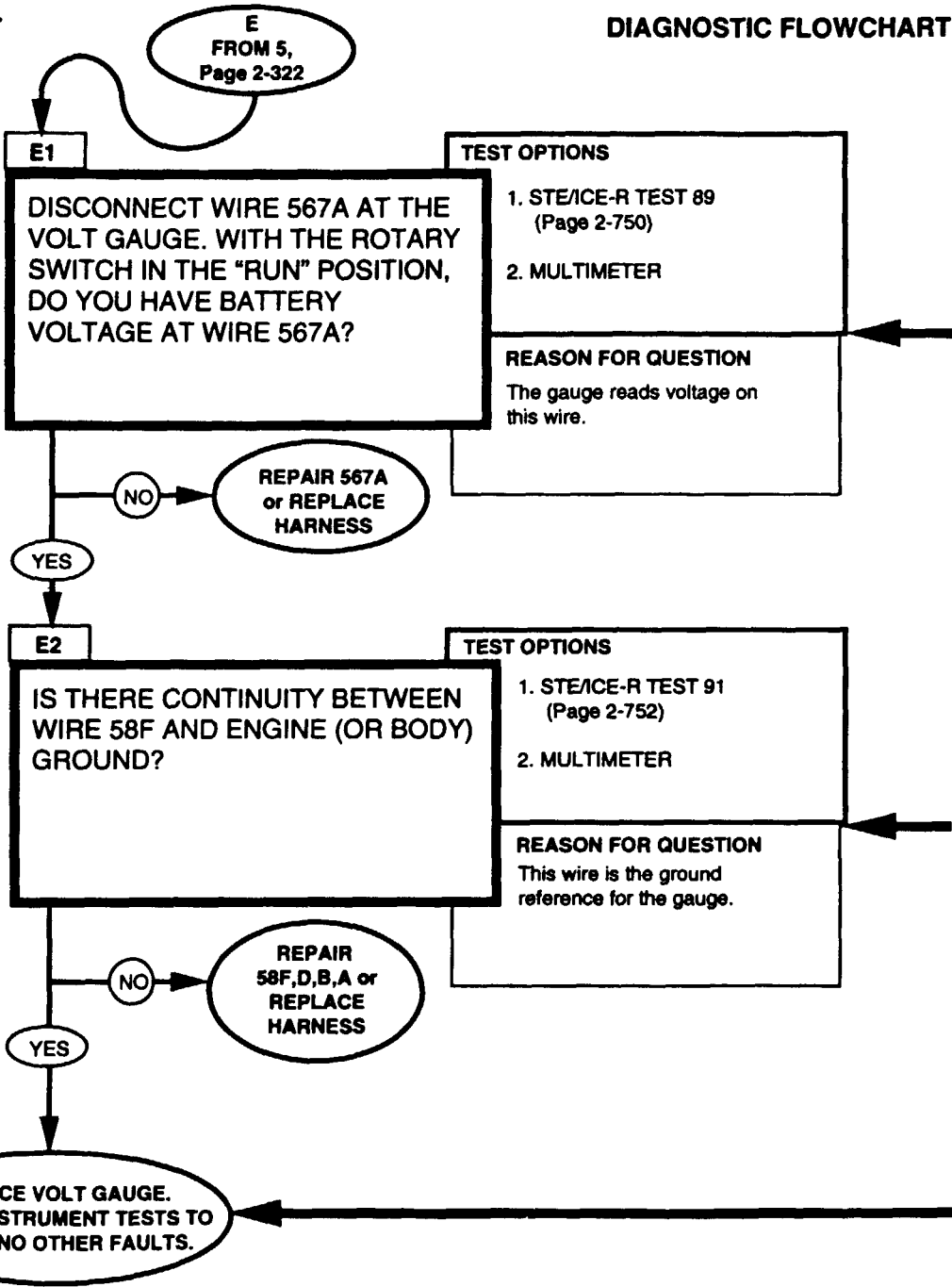
CONTINUITY (RESISTANCE) MULTIMETER
<p>1. Set the voltmeter to an ohms scale of about 1000 ohms.</p> <p>2. Connect the RED and BLACK leads to the connections stated in the question.</p> <p>3. Be sure to read the correct scale. Less than 5 ohms indicates continuity. For an open circuit, the meter should peg full scale (needle all the way to the left).</p>

INSTRUMENTS CIRCUIT

DIAGNOSTIC FLOWCHART

KNOWN INFO
POWER AVAILABLE TO GAUGES VOLT GAUGE DOESN'T WORK
POSSIBLE PROBLEMS
VOLT GAUGE WIRING

KNOWN INFO
POWER AVAILABLE AT VOLT GAUGE
POSSIBLE PROBLEMS
VOLT GAUGE WIRING



REFERENCE INFORMATION

INSTRUMENTS CIRCUIT

Replace harness/or repair wiring, refer to (para 4-85).

Replace harness/or repair wiring, refer to (para 4-85).

Be sure the charging system is functioning properly before replacing the gauge. Run the alternator tests, page 2-196, if you're not sure. Replace volt gauge, refer to (para 4-13).

**0-45 DC VOLTS
STE/ICE-R TEST 89**

1. Connect RED clip to the indicated test point, BLACK clip to negative or ground.
2. Start Test 89, DC volts.
3. Displayed reading is in volts.

**BATTERY VOLTAGE
MULTIMETER**

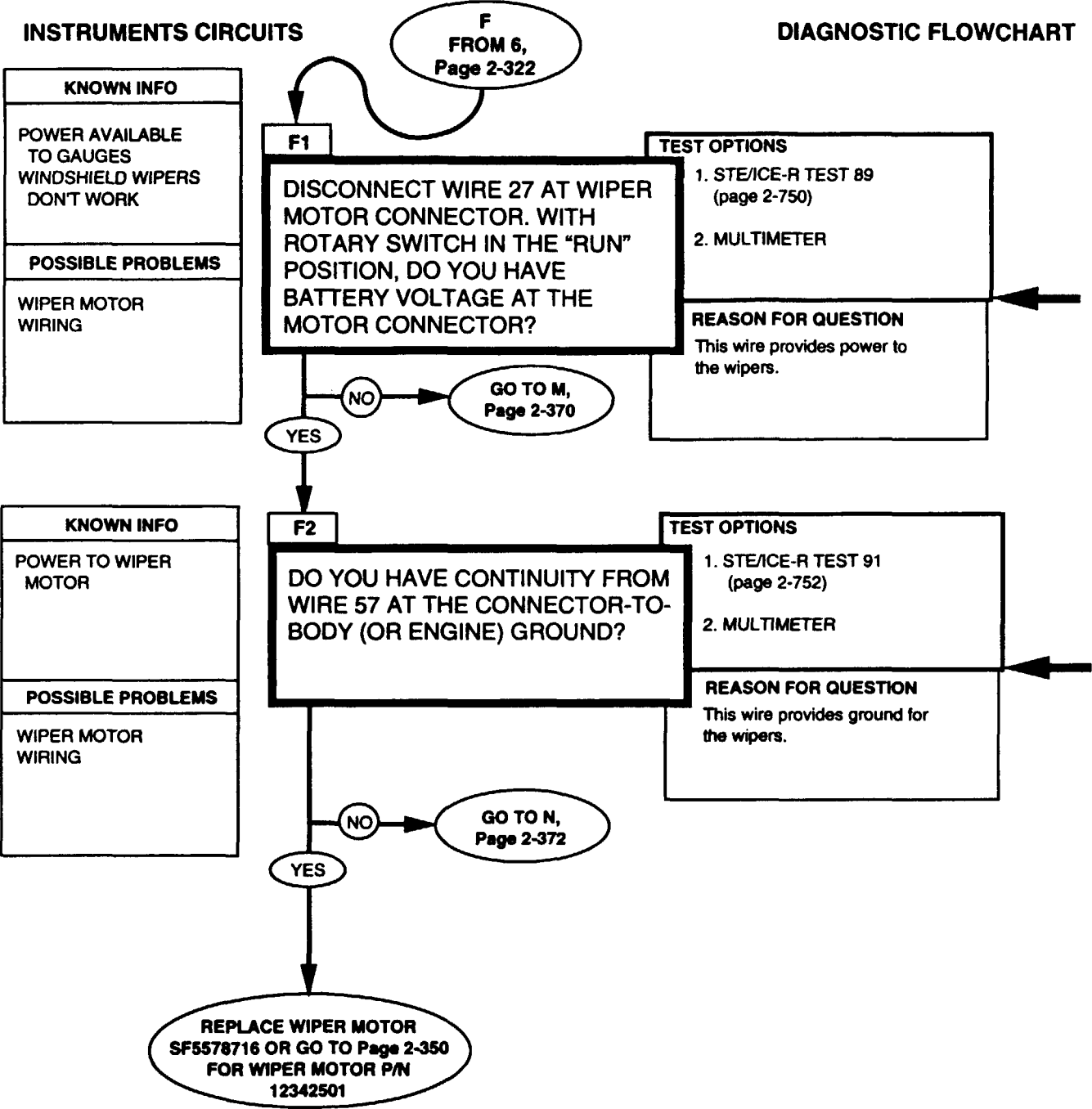
1. Set the voltmeter to a DC volts scale of at least 40 volts.
2. Connect the RED lead to positive and the BLACK lead to negative.
3. Be sure to read the correct scale.

**0-4500 OHMS
STE/ICE-R TEST 91**

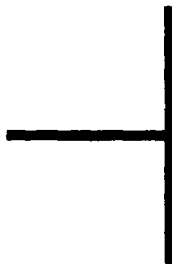
1. Connect RED clip and BLACK clip to the indicated terminals in the question. RED to the first, BLACK to the second.
2. Start Test 91, 0-4500 ohms.
3. Displayed reading is in ohms. Less than 5 ohms is continuity. If the resistance is over 4500 ohms, STE/ICE displays "9.9.9.9."

**CONTINUITY (RESISTANCE)
MULTIMETER**

1. Set the voltmeter to an ohms scale of about 1000 ohms.
2. Connect the RED and BLACK leads to the connections stated in the question.
3. Be sure to read the correct scale. Less than 5 ohms indicates continuity. For an open circuit, the meter should peg full scale (needle all the way to the left).



REFERENCE INFORMATION



Replace wiper motor SF5578716.
Refer to (para. 10-71.)

INSTRUMENTS CIRCUIT

0-45 DC VOLTS STE/ICE-R TEST 89
<ol style="list-style-type: none"> 1. Connect RED clip to the indicated test point, BLACK clip to negative or ground. 2. Start Test 89, DC volts. 3. Displayed reading is in volts.

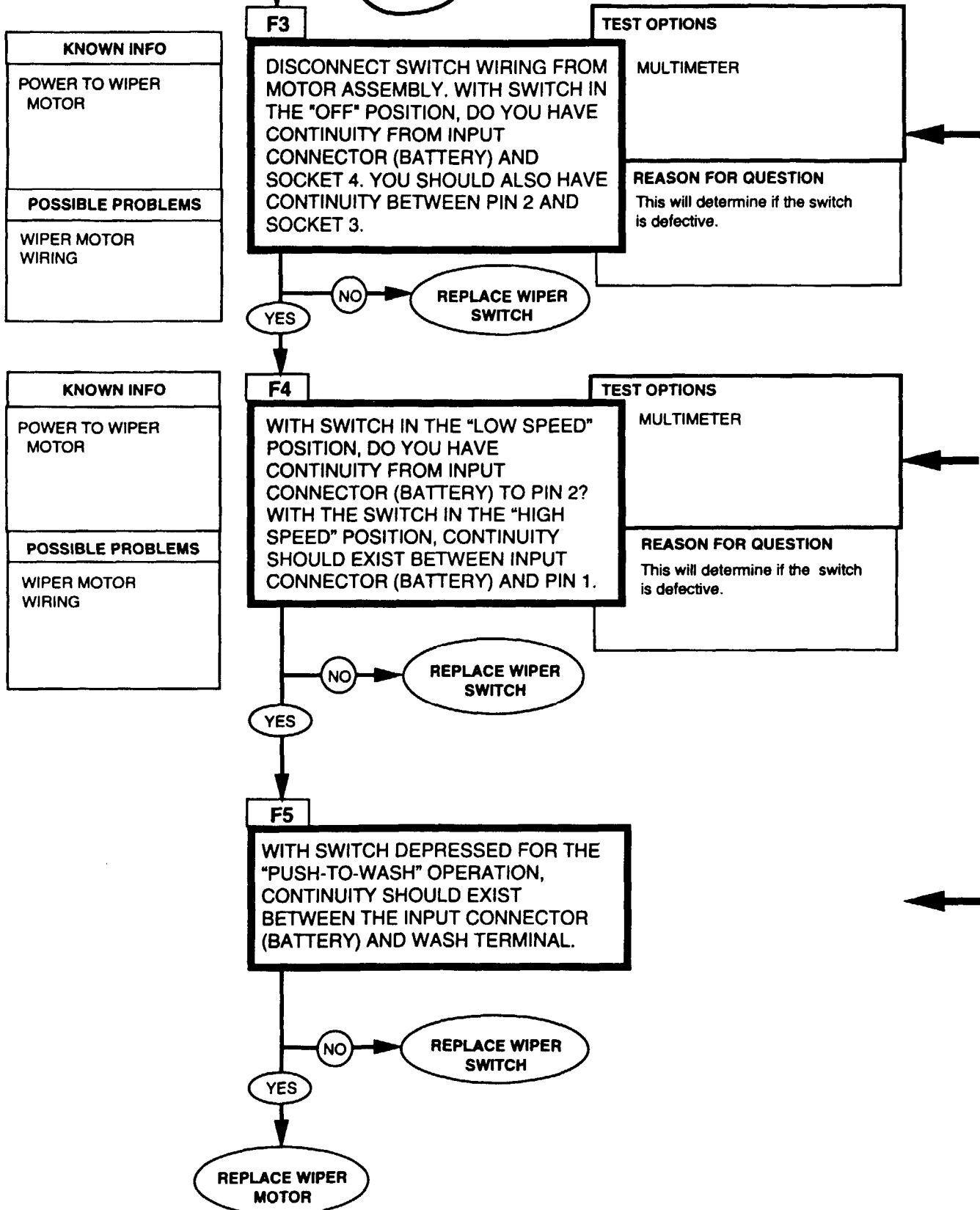
BATTERY VOLTAGE MULTIMETER
<ol style="list-style-type: none"> 1. Set the voltmeter to a DC volts scale of at least 40 volts. 2. Connect the RED lead to positive and the BLACK lead to negative. 3. Be sure to read the correct scale.

0-4500 OHMS STE/ICE-R TEST 91
<ol style="list-style-type: none"> 1. Connect RED clip and BLACK clip to the indicated terminals in the question. RED to the first, BLACK to the second. 2. Start Test 91, 0-4500 ohms. 3. Displayed reading is in ohms. Less than 5 ohms is continuity. If the resistance is over 4500 ohms, STE/ICE-R displays "9.9.9.9."

CONTINUITY (RESISTANCE) MULTIMETER
<ol style="list-style-type: none"> 1. Set the voltmeter to an ohms scale of about 1000 ohms. 2. Connect the RED and BLACK leads to the connections stated in the question. 3. Be sure to read the correct scale. Less than 5 ohms indicates continuity. For an open circuit, the meter should peg full scale (needle all the way to the left).

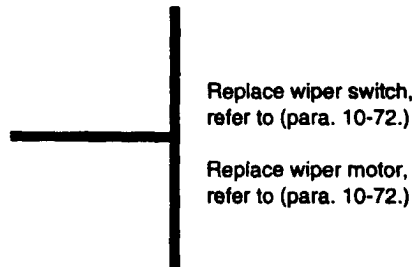
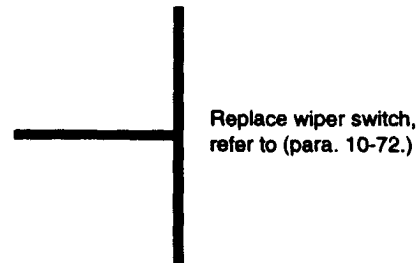
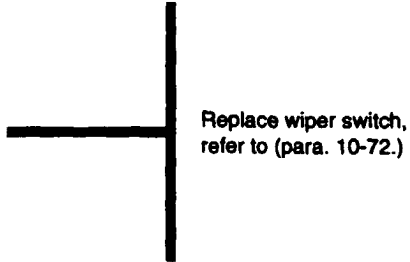
INSTRUMENTS CIRCUIT

DIAGNOSTIC FLOWCHART

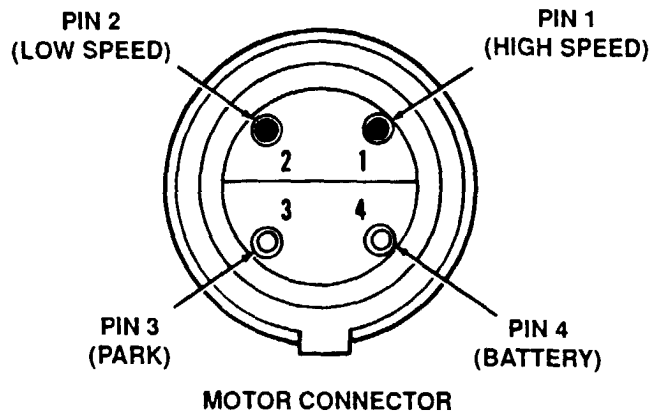
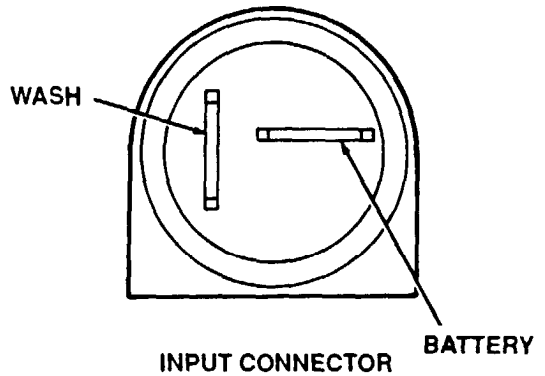


REFERENCE INFORMATION

INSTRUMENTS CIRCUITS



CONTINUITY (RESISTANCE) MULTIMETER
1. Set the voltmeter to an ohms scale of about 1000 ohms.
2. Connect the RED and BLACK leads to the connections stated in the question.
3. Be sure to read the correct scale. Less than 5 ohms indicates continuity. For an open circuit, the meter should peg full scale (needle all the way to the left).



INSTRUMENTS CIRCUIT

DIAGNOSTIC FLOWCHART

KNOWN INFO
FUEL GAUGE DOESN'T WORK
POSSIBLE PROBLEMS
GAUGE WIRING SENDING UNIT

G1

DISCONNECT WIRE 27J FROM FUEL GAUGE. WITH THE ROTARY SWITCH IN THE "RUN" POSITION, DO YOU HAVE BATTERY VOLTAGE AT WIRE 27J?

TEST OPTIONS

1. STE/ICE-R TESTS 89 (PAGE 2-750)
2. MULTIMETER

REASON FOR QUESTION
This wire provides power for the gauge.

NO → REPAIR 27J or REPLACE HARNESS

YES

KNOWN INFO
POWER AVAILABLE TO THE GAUGE
POSSIBLE PROBLEMS
GAUGE WIRING SENDING UNIT

G2

IS THERE CONTINUITY BETWEEN WIRE 58H AT THE FUEL GAUGE AND GROUND?

TEST OPTIONS

1. STE/ICE-R TESTS 91 (PAGE 2-752)
2. MULTIMETER

REASON FOR QUESTION
If there is continuity then the ground is OK.

NO → REPAIR 58H or REPLACE HARNESS

YES

KNOWN INFO
GAUGE GROUND OK
POSSIBLE PROBLEMS
GAUGE WIRING SENDING UNIT

G3

RECONNECT WIRE 27J & DISCONNECT WIRE 28A AT THE GAUGE. IS THE RESISTANCE BETWEEN WIRE 28A AT FUEL GAUGE AND CHASSIS GROUND WITHIN 0 TO 35 OHMS?

TEST OPTIONS

1. STE/ICE-R TESTS 91 (PAGE 2-752)
2. MULTIMETER

REASON FOR QUESTION
If the resistance is OK then the sense line is OK.

NO → GO TO L, Page 2-366

YES

GO TO G4, Page 2-354

REFERENCE INFORMATION

Replace harness/or repair wiring, refer to (para 4-85).

Replace harness/or repair wiring, refer to (para 4-85).

INSTRUMENTS CIRCUIT

**0-45 DC VOLTS
STE/ICE-R TEST 89**

1. Connect RED clip to the indicated test point, BLACK clip to negative or ground.
2. Start Test 89, DC volts.
3. Displayed reading is in volts.

**BATTERY VOLTAGE
MULTIMETER**

1. Set the voltmeter to a DC volts scale of at least 40 volts.
2. Connect the RED lead to positive and the BLACK lead to negative.
3. Be sure to read the correct scale.

**0-4500 OHMS
STE/ICE-R TEST 91**

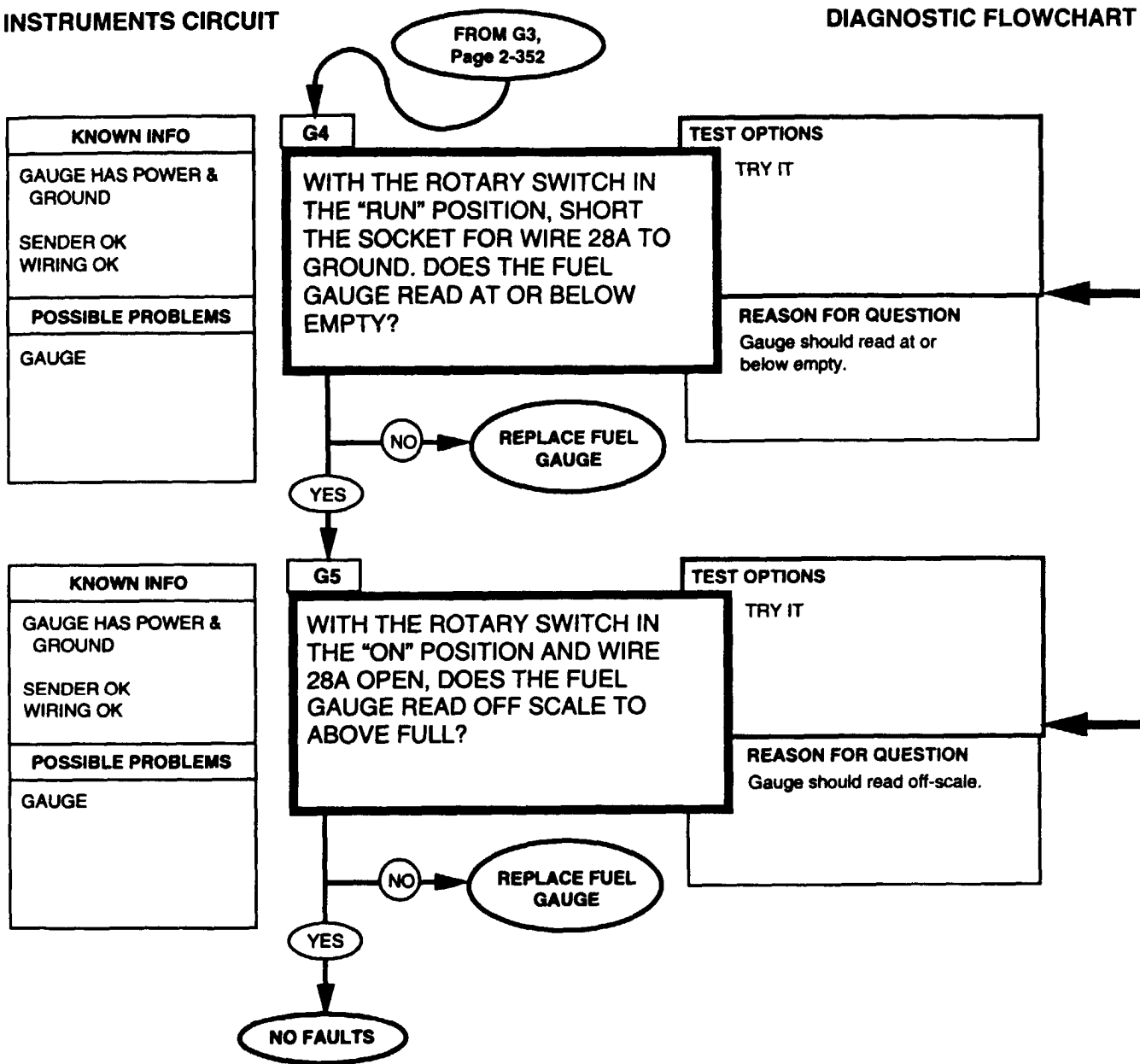
1. Connect RED clip and BLACK clip to the indicated terminals in the question. RED to the first, BLACK to the second.
2. Start Test 91, 0-4500 ohms.
3. Displayed reading is in ohms. Less than 5 ohms is continuity. If the resistance is over 4500 ohms, STE/ICE displays "9.9.9.9."

**CONTINUITY (RESISTANCE)
MULTIMETER**

1. Set the voltmeter to an ohms scale of about 1000 ohms.
2. Connect the RED and BLACK leads to the connections stated in the question.
3. Be sure to read the correct scale. Less than 5 ohms indicates continuity. For an open circuit, the meter should peg full scale (needle all the way to the left).

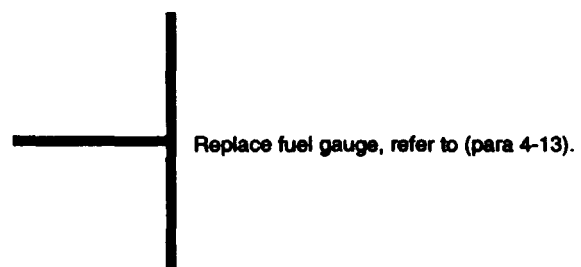
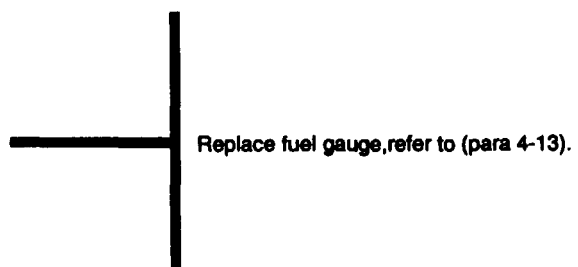
INSTRUMENTS CIRCUIT

DIAGNOSTIC FLOWCHART



REFERENCE INFORMATION

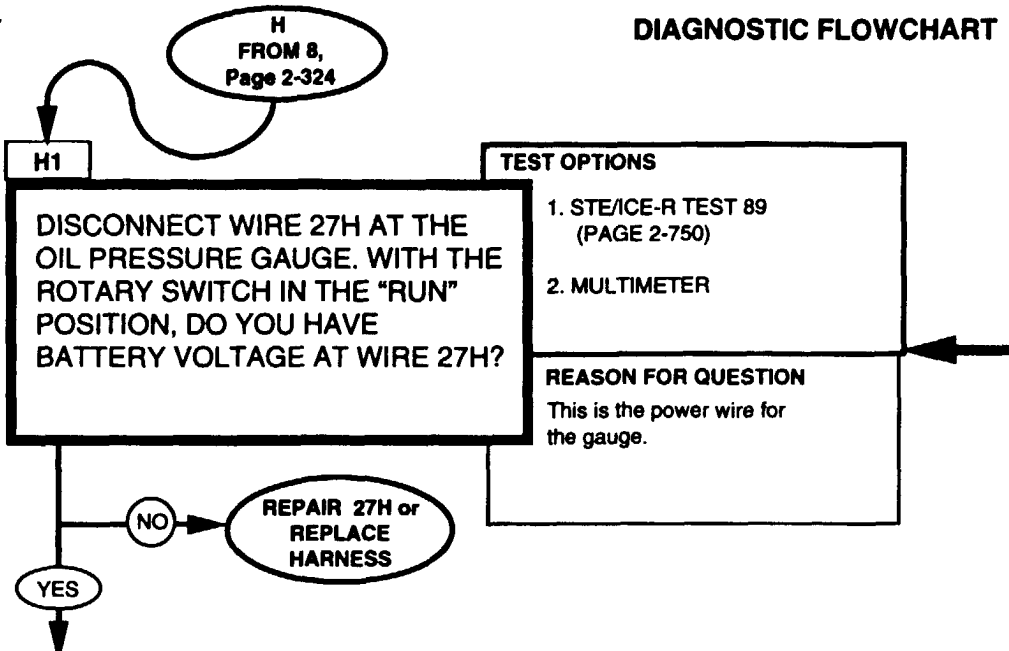
INSTRUMENTS CIRCUIT



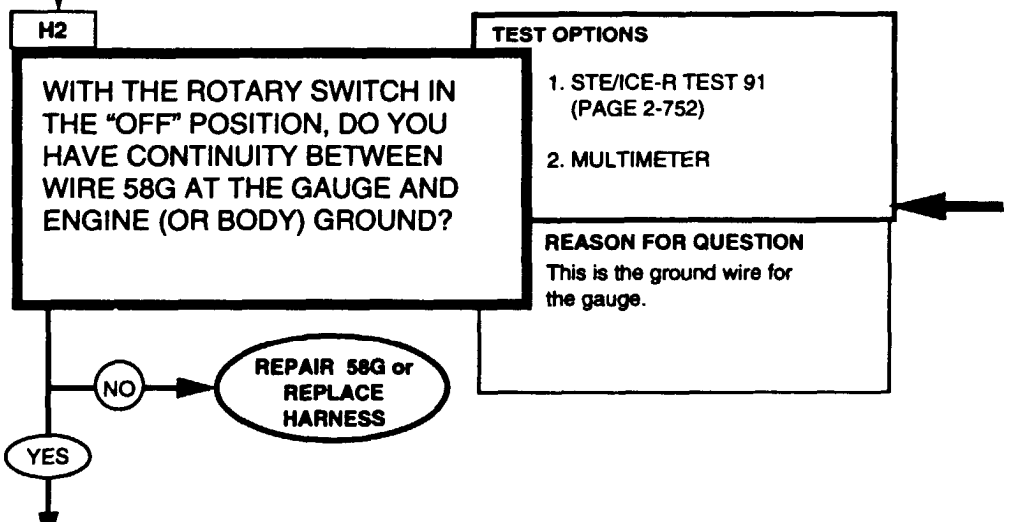
INSTRUMENTS CIRCUIT

DIAGNOSTIC FLOWCHART

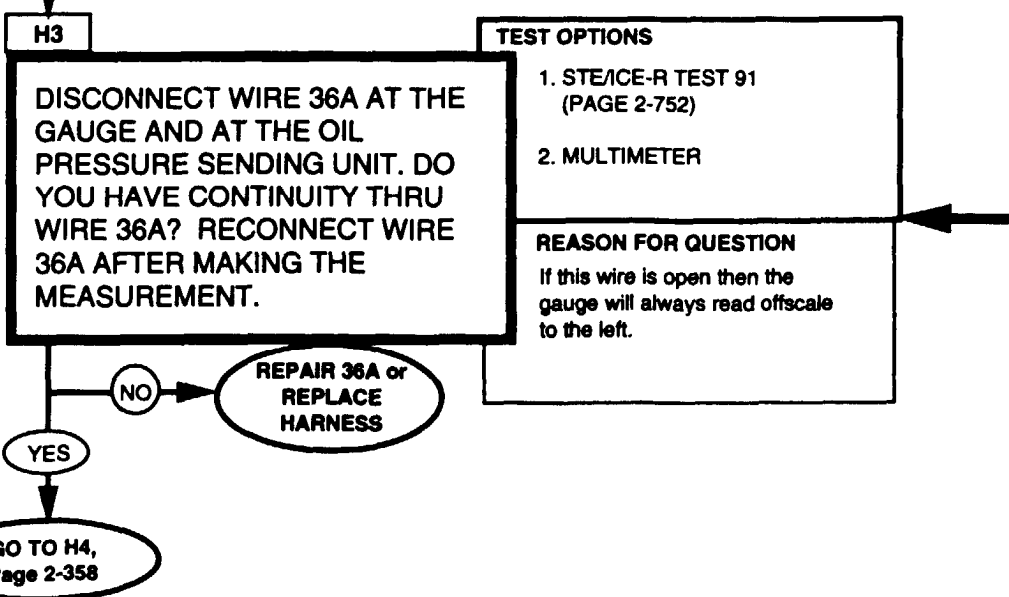
KNOWN INFO
POWER AVAILABLE TO THE GAUGES OIL PRESSURE GAUGE DOESN'T WORK.
POSSIBLE PROBLEMS
GAUGE SENDING UNIT WIRING



KNOWN INFO
OIL PRESSURE GAUGE HAS POWER.
POSSIBLE PROBLEMS
GAUGE SENDING UNIT WIRING



KNOWN INFO
GAUGE GROUND OK
POSSIBLE PROBLEMS
OIL PRESSURE GAUGE SENDING UNIT WIRING



REFERENCE INFORMATION

Replace harness/or repair wiring, refer to (para 4-85).

**0-4500 OHMS
STE/ICE-R TEST 91**

1. Connect RED clip and BLACK clip to the indicated terminals in the question. RED to the first, BLACK to the second.
2. Start Test 91, 0-4500 ohms.
3. Displayed reading is in ohms. Less than 5 ohms is continuity. If the resistance is over 4500 ohms, STE/ICE displays "9.9.9.9."

Replace harness/or repair wiring, refer to (para 4-85).

Replace harness/or repair wiring, refer to (para 4-85).

INSTRUMENTS CIRCUIT

**0-45 DC VOLTS
STE/ICE-R TEST 89**

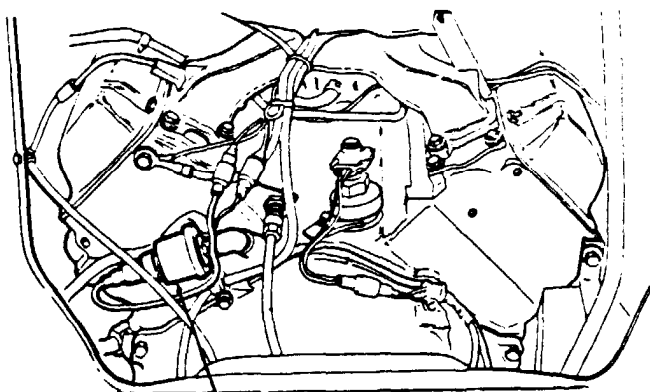
1. Connect RED clip to the indicated test point, BLACK clip to negative or ground.
2. Start Test 89, DC volts.
3. Displayed reading is in volts.

**BATTERY VOLTAGE
MULTIMETER**

1. Set the voltmeter to a DC volts scale of at least 40 volts.
2. Connect the RED lead to positive and the BLACK lead to negative.
3. Be sure to read the correct scale.

**CONTINUITY (RESISTANCE)
MULTIMETER**

1. Set the voltmeter to an ohms scale of about 1000 ohms.
2. Connect the RED and BLACK leads to the connections stated in the question.
3. Be sure to read the correct scale. Less than 5 ohms indicates continuity. For an open circuit, the meter should peg full scale (needle all the way to the left).

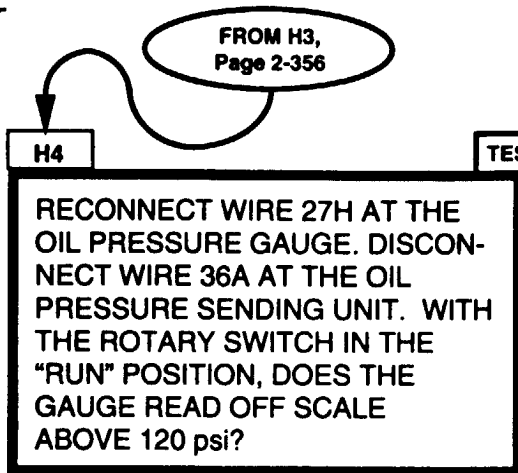


**OIL PRESSURE
SENDING UNIT**

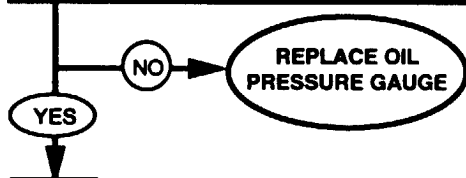
INSTRUMENTS CIRCUIT

DIAGNOSTIC FLOWCHART

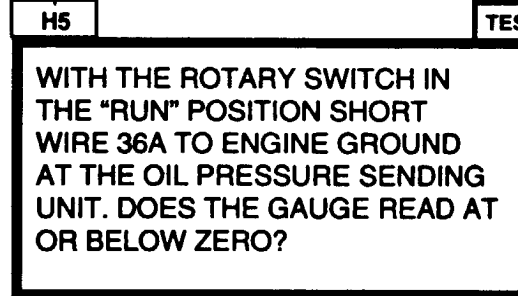
KNOWN INFO
WIRING OK
POSSIBLE PROBLEMS
GAUGE SENDING UNIT



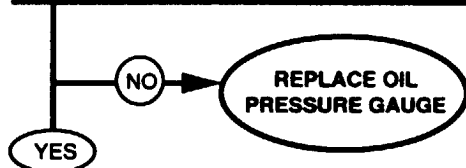
TEST OPTIONS
TRY IT
REASON FOR QUESTION
This will determine if the gauge can respond to an input signal.



KNOWN INFO
WIRING OK
POSSIBLE PROBLEMS
GAUGE SENDING UNIT




TEST OPTIONS
TRY IT
REASON FOR QUESTION
This will determine if the gauge can respond to an input signal.




REFERENCE INFORMATION

INSTRUMENTS CIRCUIT




Make sure wire 36A is not connected to the sending unit and is not touching anything metal that could cause the wire to be grounded.

Replace oil pressure gauge, refer to (para 4-13).



Wire 36A must be connected at the gauge. Short the wire at the sending unit to ground.

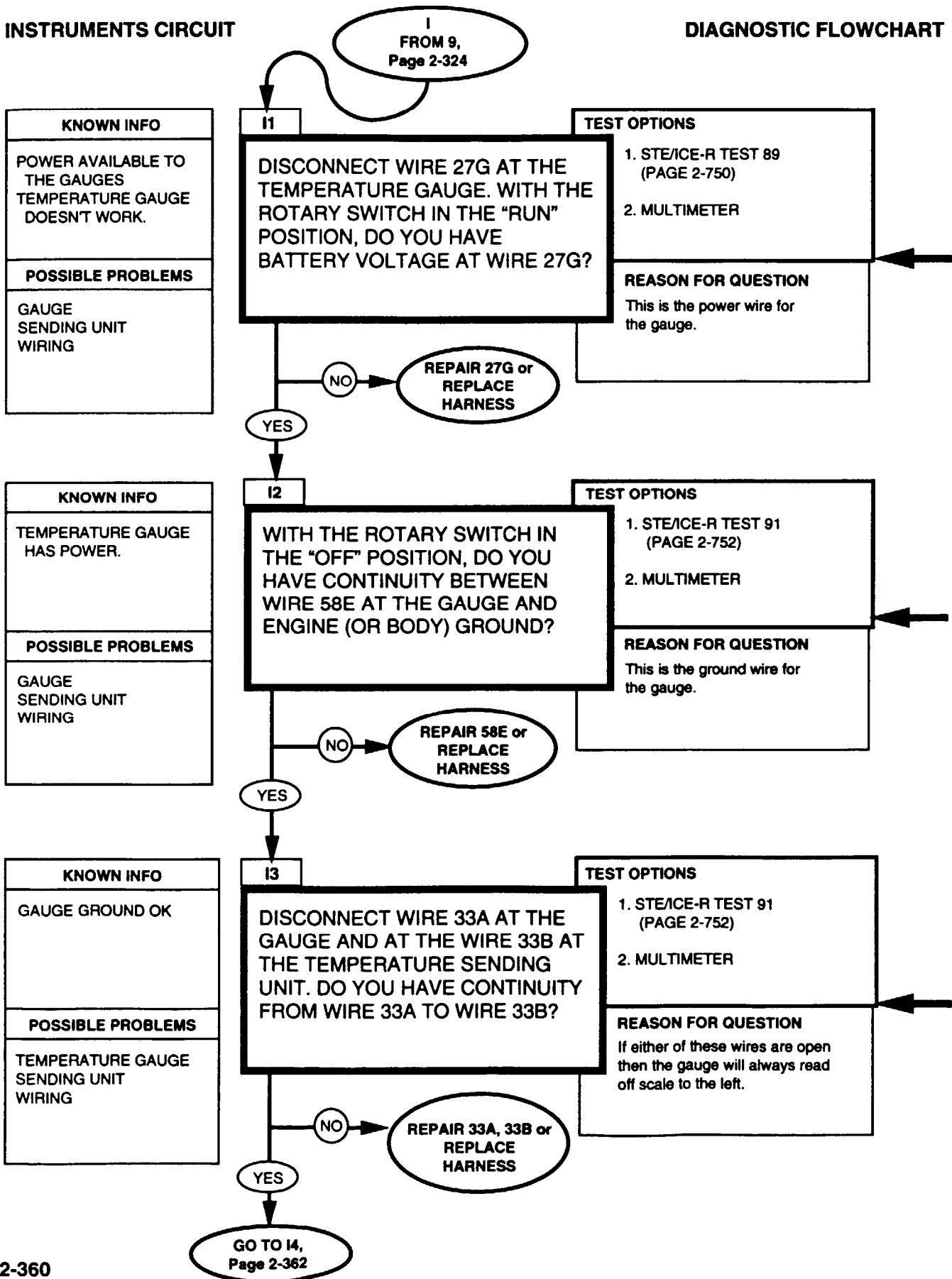
Replace oil pressure gauge, refer to (para 4-13).



Replace oil pressure sending unit, refer to (para 4-25).

INSTRUMENTS CIRCUIT

DIAGNOSTIC FLOWCHART



REFERENCE INFORMATION

INSTRUMENTS CIRCUIT

Replace harness/or repair wiring, refer to (para 4-85).

**0-45 DC VOLTS
STE/ICE-R TEST 89**

1. Connect RED clip to the indicated test point, BLACK clip to negative or ground.
2. Start Test 89, DC volts.
3. Displayed reading is in volts.

Replace harness/or repair wiring, refer to (para 4-85).

**CONTINUITY (RESISTANCE)
MULTIMETER**

1. Set the voltmeter to an ohms scale of about 1000 ohms.
2. Connect the RED and BLACK leads to the connections stated in the question.
3. Be sure to read the correct scale. Less than 5 ohms indicates continuity. For an open circuit, the meter should peg full scale (needle all the way to the left).

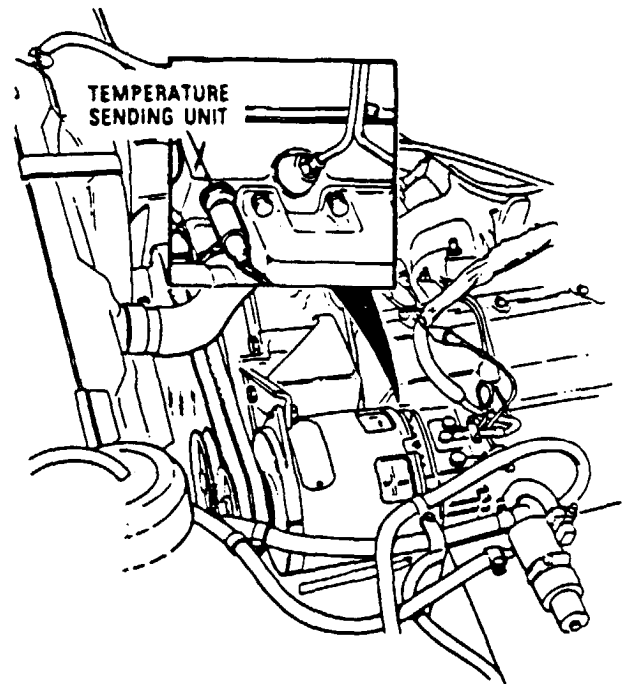
**0-4500 OHMS
STE/ICE-R TEST 91**

1. Connect RED clip and BLACK clip to the indicated terminals in the question. RED to the first, BLACK to the second.
2. Start Test 91, 0-4500 ohms.
3. Displayed reading is in ohms. Less than 5 ohms is continuity. If the resistance is over 4500 ohms, STE/ICE displays "9.9.9.9."

Replace harness/or repair wiring, refer to (para 4-85).

**BATTERY VOLTAGE
MULTIMETER**

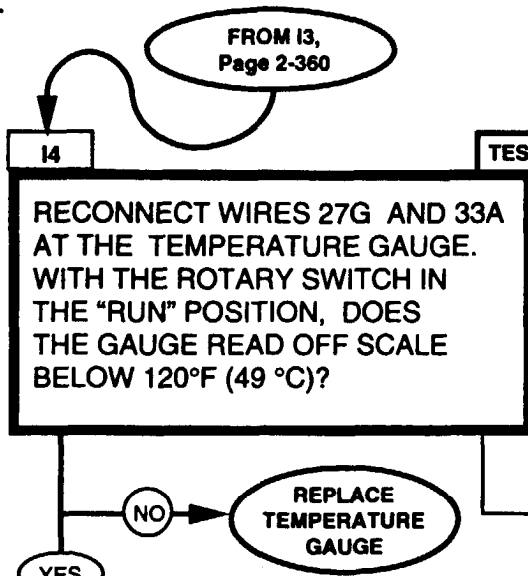
1. Set the voltmeter to a DC volts scale of at least 40 volts.
2. Connect the RED lead to positive and the BLACK lead to negative.
3. Be sure to read the correct scale.



INSTRUMENTS CIRCUIT

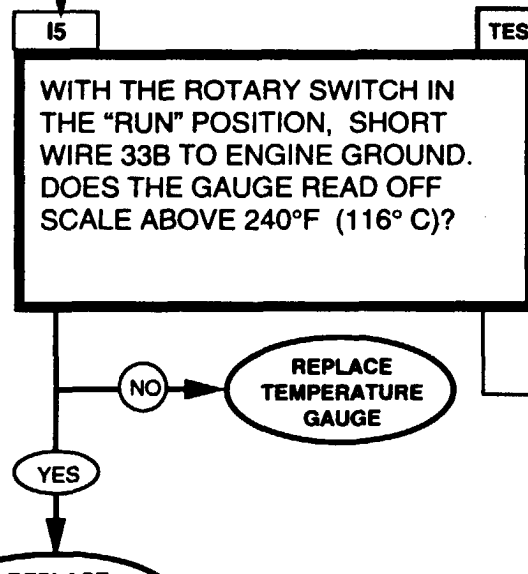
DIAGNOSTIC FLOWCHART

KNOWN INFO
WIRING OK
POSSIBLE PROBLEMS
GAUGE SENDING UNIT



TEST OPTIONS
TRY IT
REASON FOR QUESTION
This will determine if the gauge can respond to an input signal.

KNOWN INFO
WIRING OK
POSSIBLE PROBLEMS
GAUGE SENDING UNIT




TEST OPTIONS
TRY IT
REASON FOR QUESTION
This will determine if the gauge can respond to an input signal.



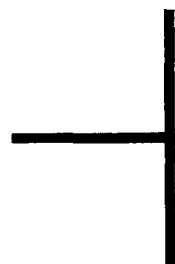
REFERENCE INFORMATION

INSTRUMENTS CIRCUIT



Make sure wire 33B is not connected to the sending unit and is not touching anything metal that could cause the wire to be grounded.

Replace temperature gauge, refer to (para 4-13).



Replace temperature gauge, refer to (para 4-13).

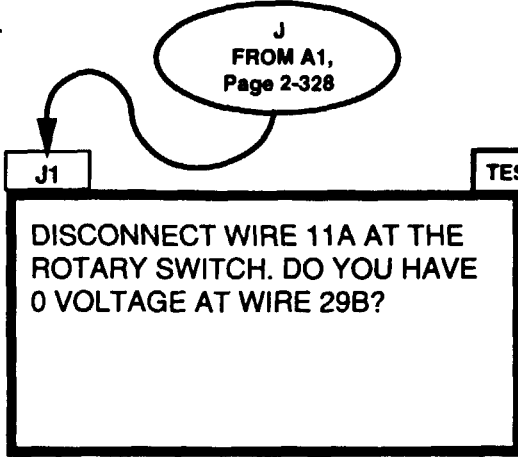


Replace temperature sending unit, refer to (para 4-24).

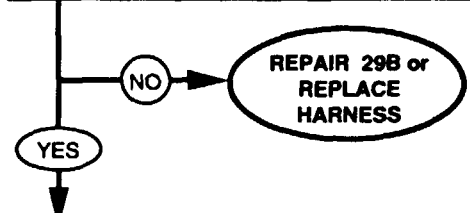
INSTRUMENTS CIRCUIT

DIAGNOSTIC FLOWCHART

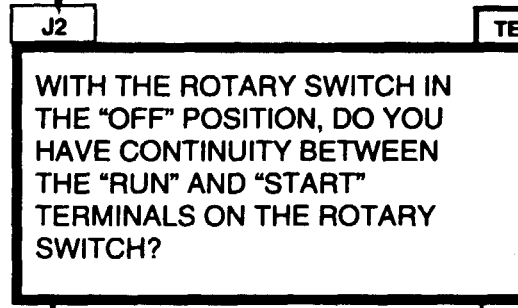
KNOWN INFO
POWER TO GAUGES WITH ROTARY SWITCH OFF
POSSIBLE PROBLEMS
ROTARY SWITCH WIRING



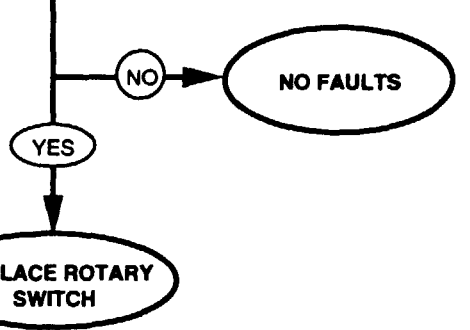
TEST OPTIONS
1. STE/ICE-R TEST 89 (Page 2-750)
2. MULTIMETER
REASON FOR QUESTION
If you disconnect the switch and still have power then the wiring is shorted.



KNOWN INFO
WIRING OK
POSSIBLE PROBLEMS
ROTARY SWITCH

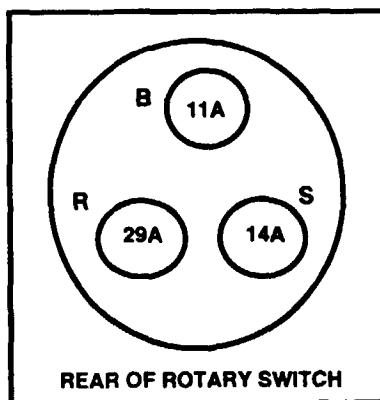
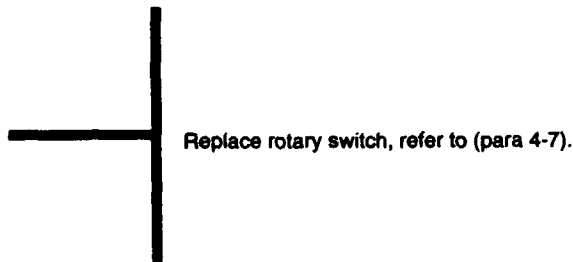
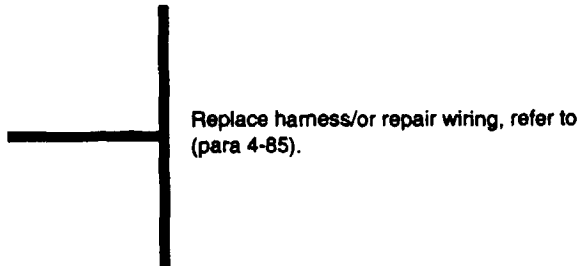


TEST OPTIONS
1. STE/ICE-R TEST 91 (Page 2-752)
2. MULTIMETER
REASON FOR QUESTION
Continuity with the switch off indicates a shorted switch.



REFERENCE INFORMATION

INSTRUMENTS CIRCUIT



**0-45 DC VOLTS
STE/ICE-R TEST 89**

1. Connect RED clip to the indicated test point, BLACK clip to negative or ground.
2. Start Test 89, DC volts.
3. Displayed reading is in volts.

**BATTERY VOLTAGE
MULTIMETER**

1. Set the voltmeter to a DC volts scale of at least 40 volts.
2. Connect the RED lead to positive and the BLACK lead to negative.
3. Be sure to read the correct scale.

**0-4500 OHMS
STE/ICE-R TEST 91**

1. Connect RED clip and BLACK clip to the indicated terminals in the question. RED to the first, BLACK to the second.
2. Start Test 91, 0-4500 ohms.
3. Displayed reading is in ohms. Less than 5 ohms is continuity. If the resistance is over 4500 ohms, STE/ICE displays "9.9.9.9."

**CONTINUITY (RESISTANCE)
MULTIMETER**

1. Set the voltmeter to an ohms scale of about 1000 ohms.
2. Connect the RED and BLACK leads to the connections stated in the question.
3. Be sure to read the correct scale. Less than 5 ohms indicates continuity. For an open circuit, the meter should peg full scale (needle all the way to the left).

INSTRUMENTS CIRCUIT

DIAGNOSTIC FLOWCHART

KNOWN INFO
WINDSHIELD WIPERS OK
POSSIBLE PROBLEMS
FUEL GAUGE OIL PRESSURE GAUGE TEMPERATURE GAUGE

L
FROM G3,
Page 2-352

L1

DISCONNECT WIRE 28A AT THE FUEL SENDING UNIT HARNESS. IS THERE CONTINUITY BETWEEN THE ENDS OF WIRE 28A AT THE FUEL GAUGE AND AT THE FUEL SENDING UNIT HARNESS?

TEST OPTIONS

1. STE/ICE-R TEST 91 (Page 2-752)
2. MULTIMETER

REASON FOR QUESTION
If the wire is OK then the sense line from the sending unit to the gauge is OK.

NO → REPAIR 28A

YES ↓

KNOWN INFO
WINDSHIELD WIPERS OK
POSSIBLE PROBLEMS
FUEL GAUGE OIL PRESSURE GAUGE TEMPERATURE GAUGE

L2

IS THERE CONTINUITY BETWEEN WIRE 58C AT THE FUEL SENDING UNIT HARNESS AND BODY (OR ENGINE) GROUND?

TEST OPTIONS

1. STE/ICE-R TEST 91 (Page 2-752)
2. MULTIMETER

REASON FOR QUESTION
If the wire is OK then the sending unit ground is OK.

NO → REPAIR WIRE 58C

YES ↓

KNOWN INFO
WINDSHIELD WIPERS OK
POSSIBLE PROBLEMS
FUEL GAUGE OIL PRESSURE GAUGE TEMPERATURE GAUGE

L3

CHECK RESISTANCE ACROSS WIRE 28B & WIRE 58J AT THE FUEL SENDING UNIT HARNESS. IS THE RESISTANCE LESS THAN 50 OHMS?

TEST OPTIONS

1. STE/ICE-R TEST 91 (Page 2-752)
2. MULTIMETER

REASON FOR QUESTION
If the fuel sending unit is OK then it could have been bad connections.

NO → GO TO L4, Page 2-368

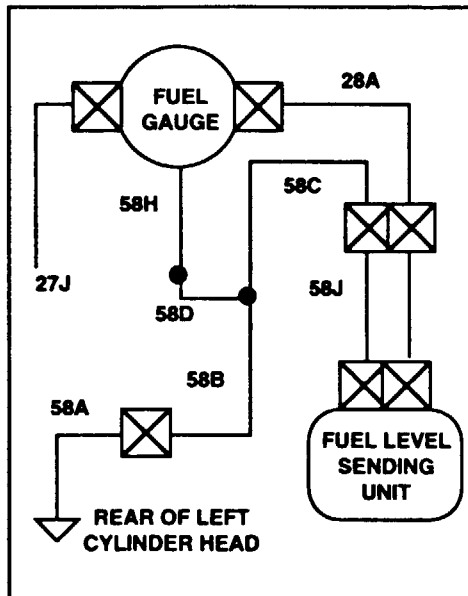
YES ↓

NO FAULTS

REFERENCE INFORMATION

INSTRUMENTS CIRCUIT

The connector is located above the driveshaft toward the rear of the vehicle.



GAUGE READING	OHMS
FULL	35
HALF	16
EMPTY	0

**0-4500 OHMS
STE/ICE-R TEST 91**

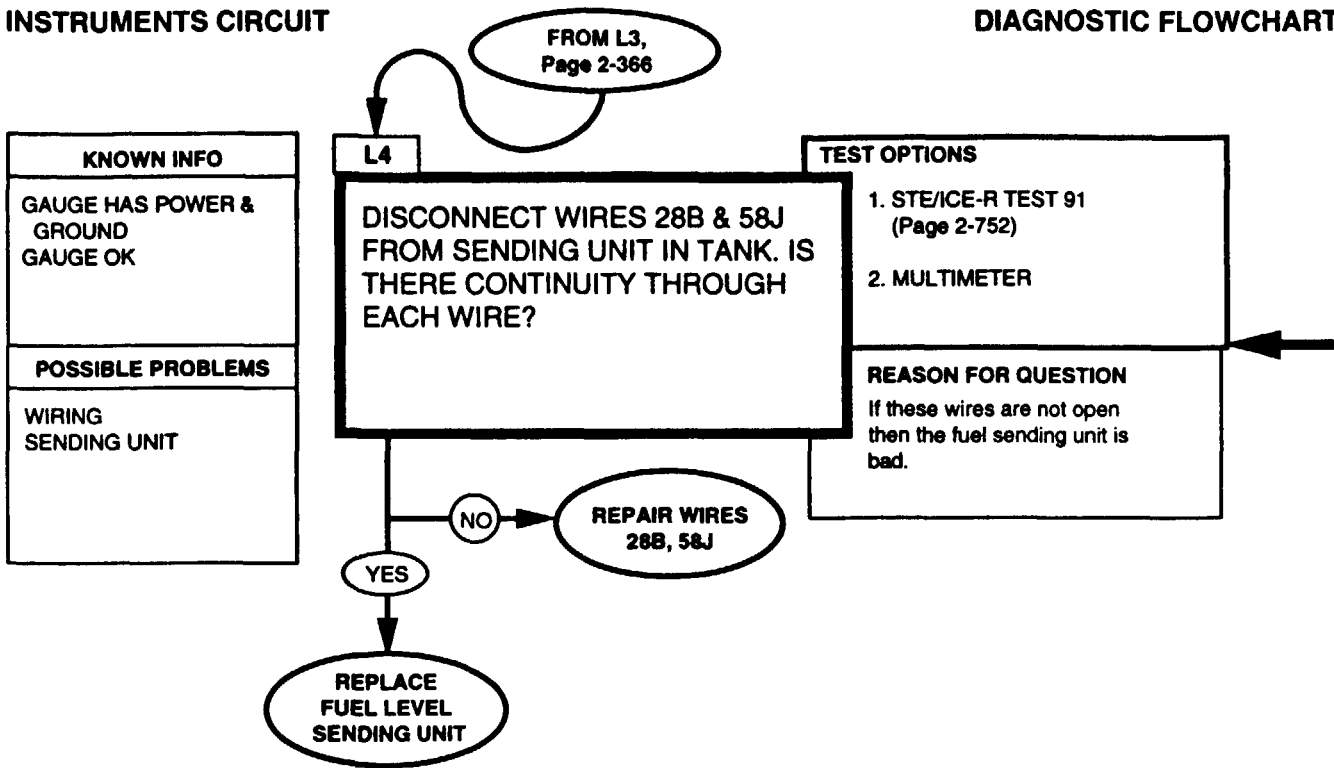
1. Connect RED clip and BLACK clip to the indicated terminals in the question. RED to the first, BLACK to the second.
2. Start Test 91, 0-4500 ohms.
3. Displayed reading is in ohms. Less than 5 ohms is continuity. If the resistance is over 4500 ohms, STE/ICE displays "9.9.9.9."

**CONTINUITY (RESISTANCE)
MULTIMETER**

1. Set the voltmeter to an ohms scale of about 1000 ohms.
2. Connect the RED and BLACK leads to the connections stated in the question.
3. Be sure to read the correct scale. Less than 5 ohms indicates continuity. For an open circuit, the meter should peg full scale (needle all the way to the left).

INSTRUMENTS CIRCUIT

DIAGNOSTIC FLOWCHART

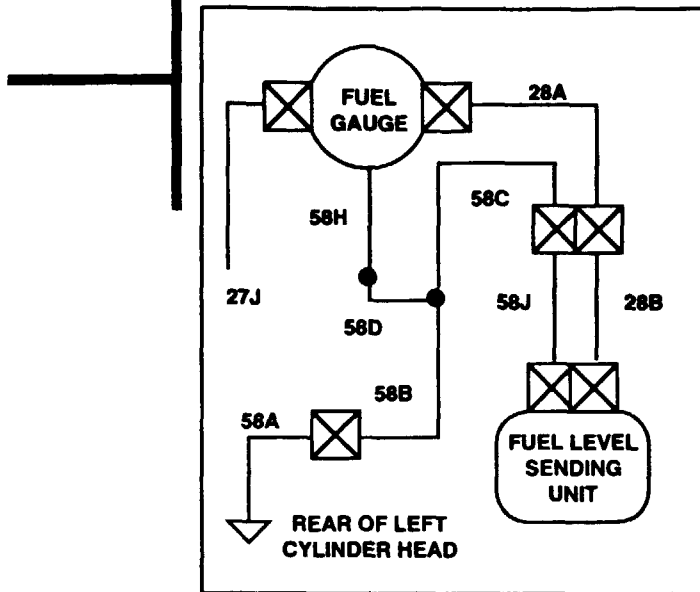


REFERENCE INFORMATION

INSTRUMENTS CIRCUIT

In order to reach these wires and the sending unit you have to remove the fuel tank. You may want to recheck the previous steps to be sure you didn't miss anything before you proceed with this step.

Replace fuel level sending unit and repair wiring, refer to (para 4-28 and 4-85).

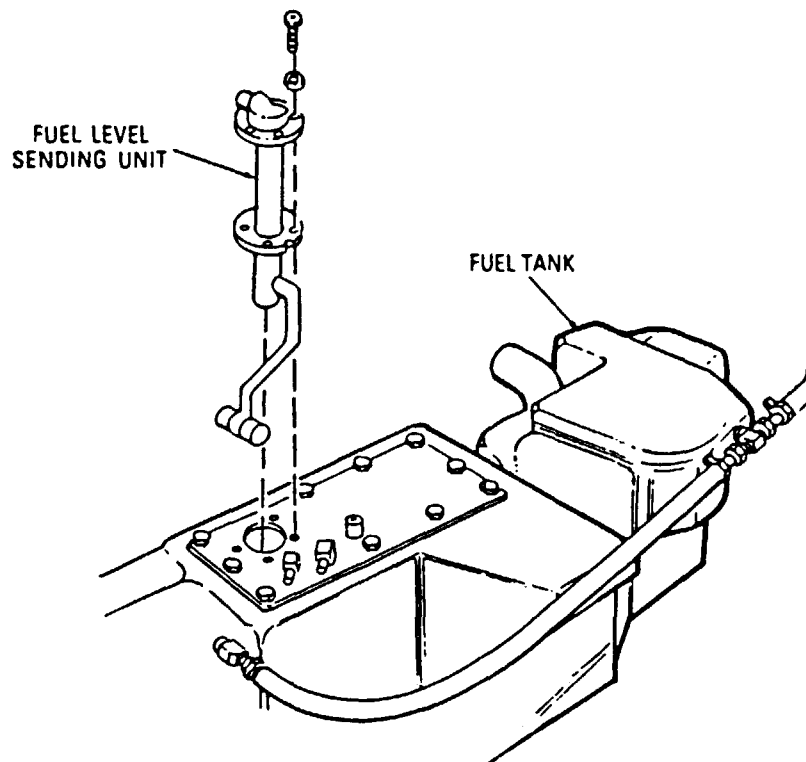


**0-4500 OHMS
STE/ICE-R TEST 91**

1. Connect RED clip and BLACK clip to the indicated terminals in the question. RED to the first, BLACK to the second.
2. Start Test 91, 0-4500 ohms.
3. Displayed reading is in ohms. Less than 5 ohms is continuity. If the resistance is over 4500 ohms, STE/ICE displays "9.9.9.9."

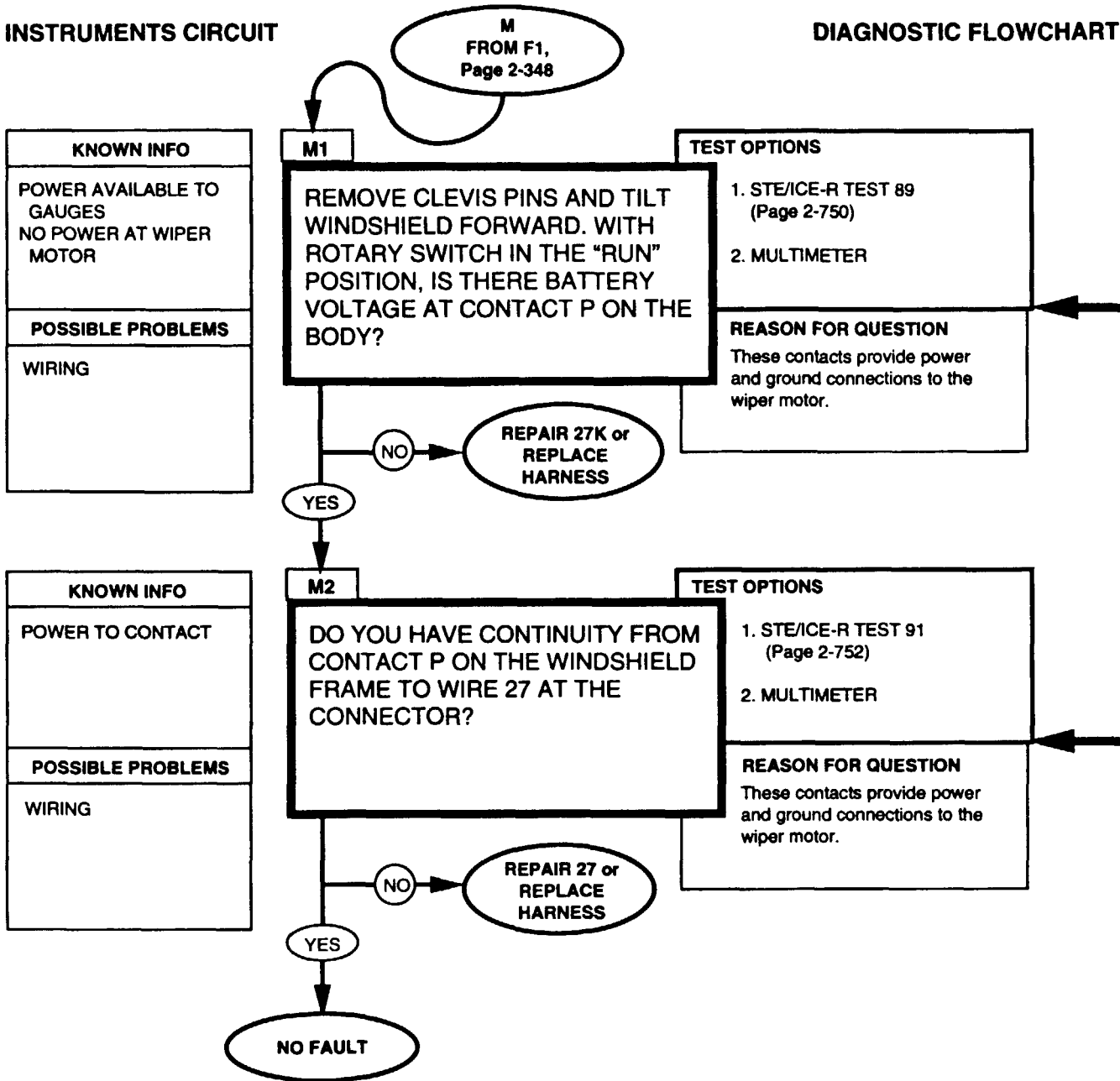
**CONTINUITY (RESISTANCE)
MULTIMETER**

1. Set the voltmeter to an ohms scale of about 1000 ohms.
2. Connect the RED and BLACK leads to the connections stated in the question.
3. Be sure to read the correct scale. Less than 5 ohms indicates continuity. For an open circuit, the meter should peg full scale (needle all the way to the left).



INSTRUMENTS CIRCUIT

DIAGNOSTIC FLOWCHART



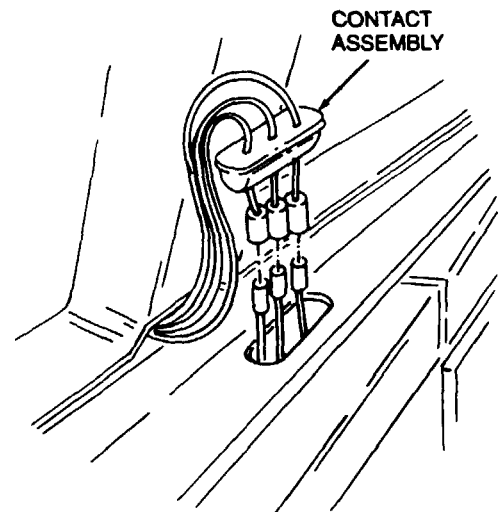
REFERENCE INFORMATION

Make sure these contacts are clean otherwise the wiper motor may not have power or ground.

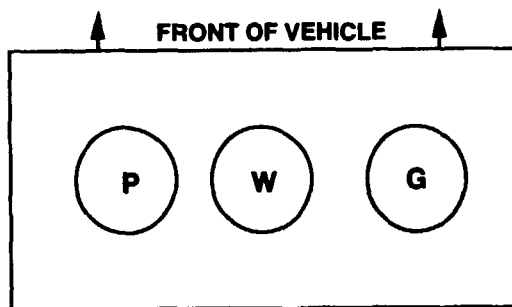
If you experience intermittent problems with the wiper motor on your vehicle, inspect the terminals and the rubber grommet of the contact assembly. If the terminals are dirty or corroded, clean or replace as required. If the grommet shows signs of damage or deformity, replace the contact assembly (TM 9-2320-280-24P).

Replace harness or repair wiring, refer to (para 4-85).

INSTRUMENTS CIRCUIT



Replace harness/or repair wiring, refer to (para 4-85).



**WINDSHIELD CONNECTOR
AS VIEWED FROM ABOVE**

**0-45 DC VOLTS
STE/ICE-R TEST 89**

1. Connect RED clip to the indicated test point, BLACK clip to negative or ground.
2. Start Test 89, DC volts.
3. Displayed reading is in volts.

**BATTERY VOLTAGE
MULTIMETER**

1. Set the voltmeter to a DC volts scale of at least 40 volts.
2. Connect the RED lead to positive and the BLACK lead to negative.
3. Be sure to read the correct scale.

**CONTINUITY (RESISTANCE)
MULTIMETER**

1. Set the voltmeter to an ohms scale of about 1000 ohms.
2. Connect the RED and BLACK leads to the connections stated in the question.
3. Be sure to read the correct scale. Less than 5 ohms indicates continuity. For an open circuit, the meter should peg full scale (needle all the way to the left).

**0-4500 OHMS
STE/ICE-R TEST 91**

1. Connect RED clip and BLACK clip to the indicated terminals in the question. RED to the first, BLACK to the second.
2. Start Test 91, 0-4500 ohms.
3. Displayed reading is in ohms. Less than 5 ohms is continuity. If the resistance is over 4500 ohms, STE/ICE displays "9.9.9.9."

INSTRUMENTS CIRCUIT

DIAGNOSTIC FLOWCHART

KNOWN INFO
NO WIPER MOTOR GROUND
POSSIBLE PROBLEMS
WIRING

N1

REMOVE CLEVIS PINS AND TILT WINDSHIELD FORWARD. DO YOU HAVE CONTINUITY FROM CONTACT G ON THE BODY (OR ENGINE) GROUND?

TEST OPTIONS

1. STE/ICE-R TEST 91 (Page 2-752)
2. MULTIMETER

REASON FOR QUESTION
These contacts provide power and ground connections to the wiper motor.

NO → REPAIR 57F or REPLACE HARNESS

YES →

KNOWN INFO
GROUND AT CONTACT
POSSIBLE PROBLEMS
WIRING

N2

DO YOU HAVE CONTINUITY FROM CONTACT G ON THE WINDSHIELD FRAME TO WIRE 57 AT THE CONNECTOR?

TEST OPTIONS

1. STE/ICE-R TEST 91 (Page 2-752)
2. MULTIMETER

REASON FOR QUESTION
These contacts provide power and ground connections to the wiper motor.

NO → REPAIR 57 or REPLACE HARNESS

YES →

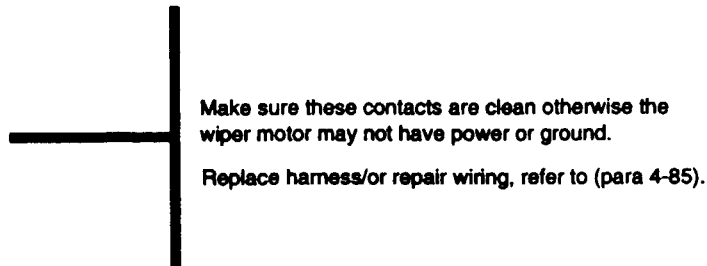
NO FAULT

N FROM F2, Page 2-348

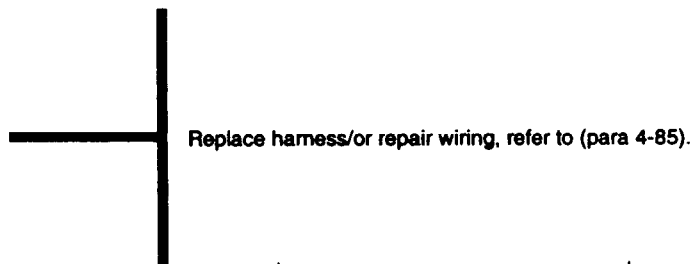


REFERENCE INFORMATION

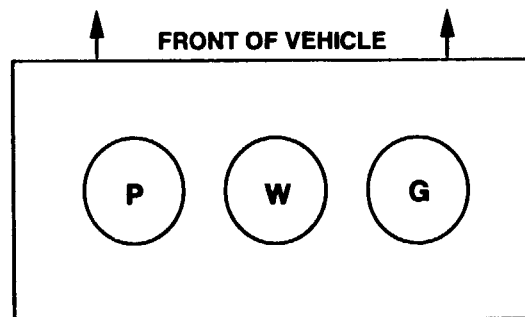
INSTRUMENTS CIRCUIT



0-4500 OHMS STE/ICE-R TEST 91
<ol style="list-style-type: none"> 1. Connect RED clip and BLACK clip to the indicated terminals in the question. RED to the first, BLACK to the second. 2. Start Test 91, 0-4500 ohms. 3. Displayed reading is in ohms. Less than 5 ohms is continuity. If the resistance is over 4500 ohms, STE/ICE displays "9.9.9.9."



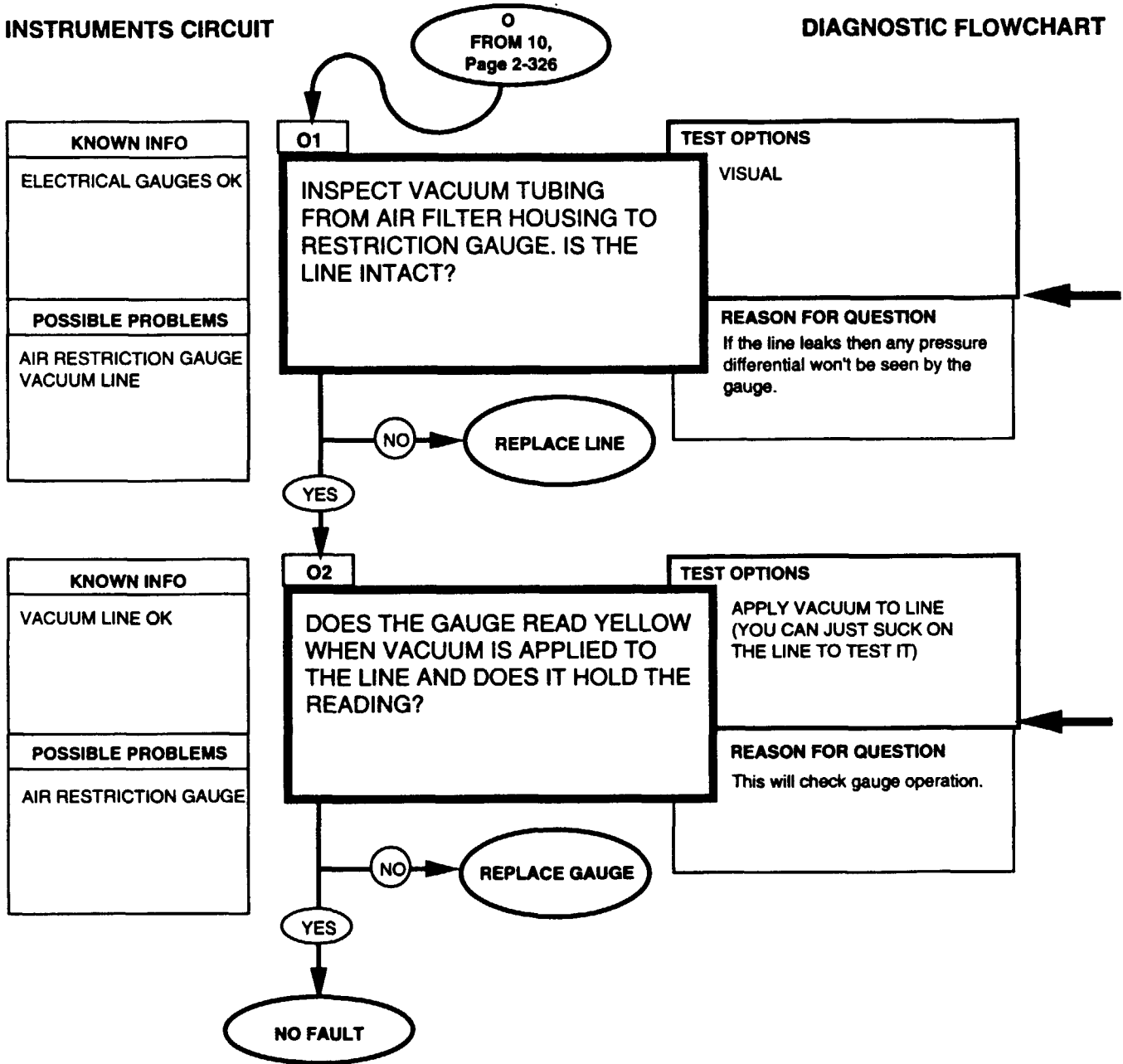
CONTINUITY (RESISTANCE) MULTIMETER
<ol style="list-style-type: none"> 1. Set the voltmeter to an ohms scale of about 1000 ohms. 2. Connect the RED and BLACK leads to the connections stated in the question. 3. Be sure to read the correct scale. Less than 5 ohms indicates continuity. For an open circuit, the meter should peg full scale (needle all the way to the left).



**WINDSHIELD CONNECTOR
 AS VIEWED FROM ABOVE**

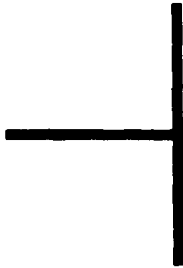
INSTRUMENTS CIRCUIT

DIAGNOSTIC FLOWCHART



REFERENCE INFORMATION

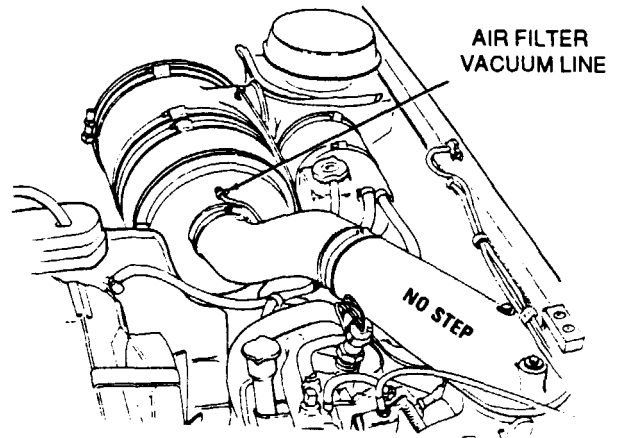
INSTRUMENTS CIRCUIT



You can provide enough vacuum to operate the gauge by sucking on the line.
Replace vacuum line, refer to (para 3-19).

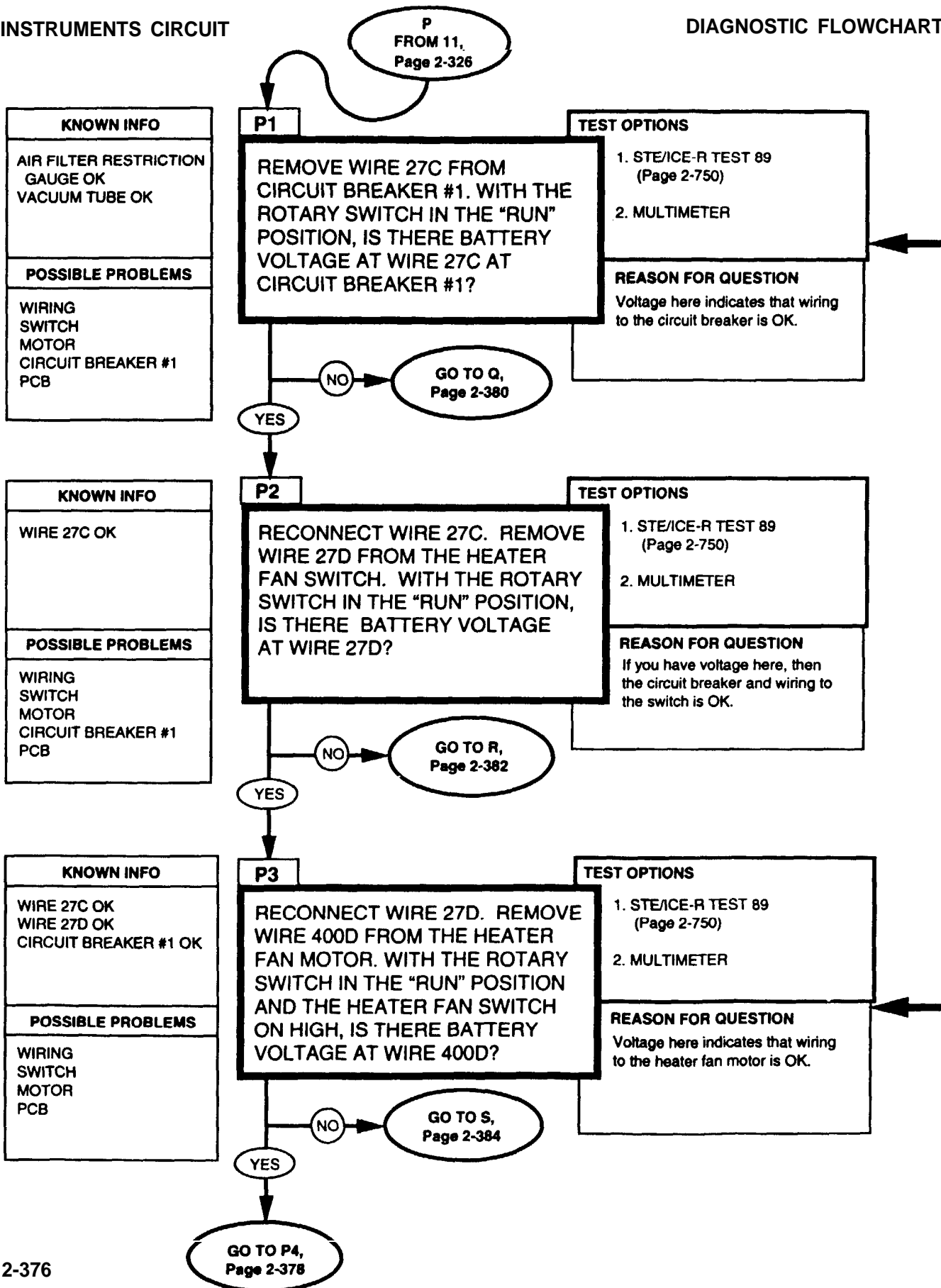


Replace gauge, refer to (para 3-17).



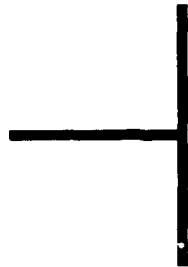
INSTRUMENTS CIRCUIT

DIAGNOSTIC FLOWCHART

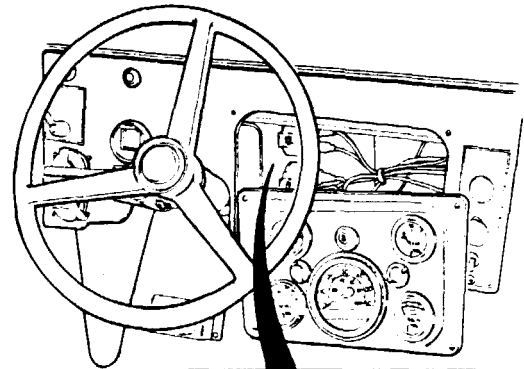


REFERENCE INFORMATION

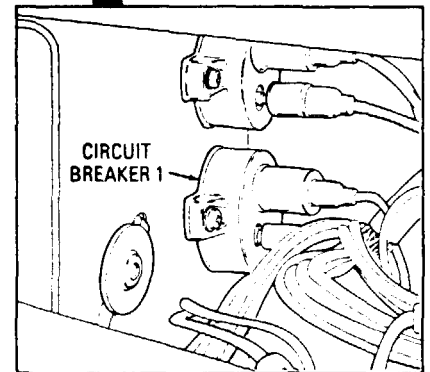
INSTRUMENTS CIRCUIT



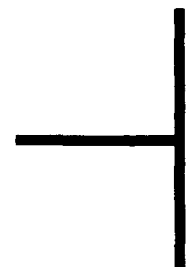
The easiest way to reach the circuit breaker is to remove the gauge panel screws and pull the panel out far enough to work with the wiring.



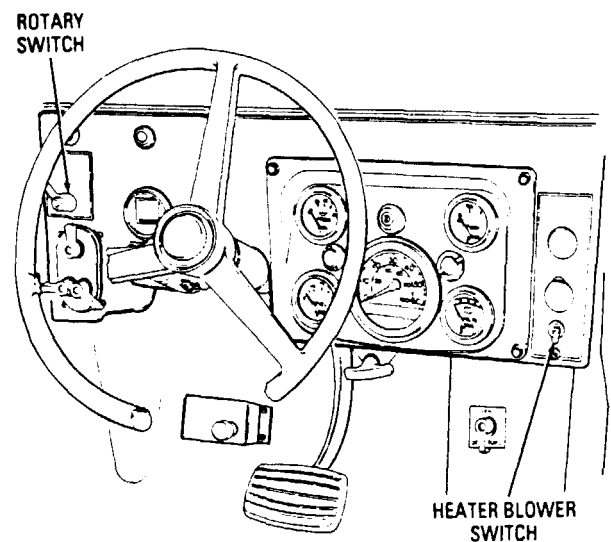
0-45 DC VOLTS STEICE-R TEST 89
1. Connect RED clip to the indicated test point, BLACK clip to negative or ground.
2. Start Test 89, DC volts.
3. Displayed reading is in volts.



BATTERY VOLTAGE MULTIMETER
1. Set the voltmeter to a DC volts scale of at least 40 volts.
2. Connect the RED lead to positive and the BLACK lead to negative.
3. Be sure to read the correct scale.



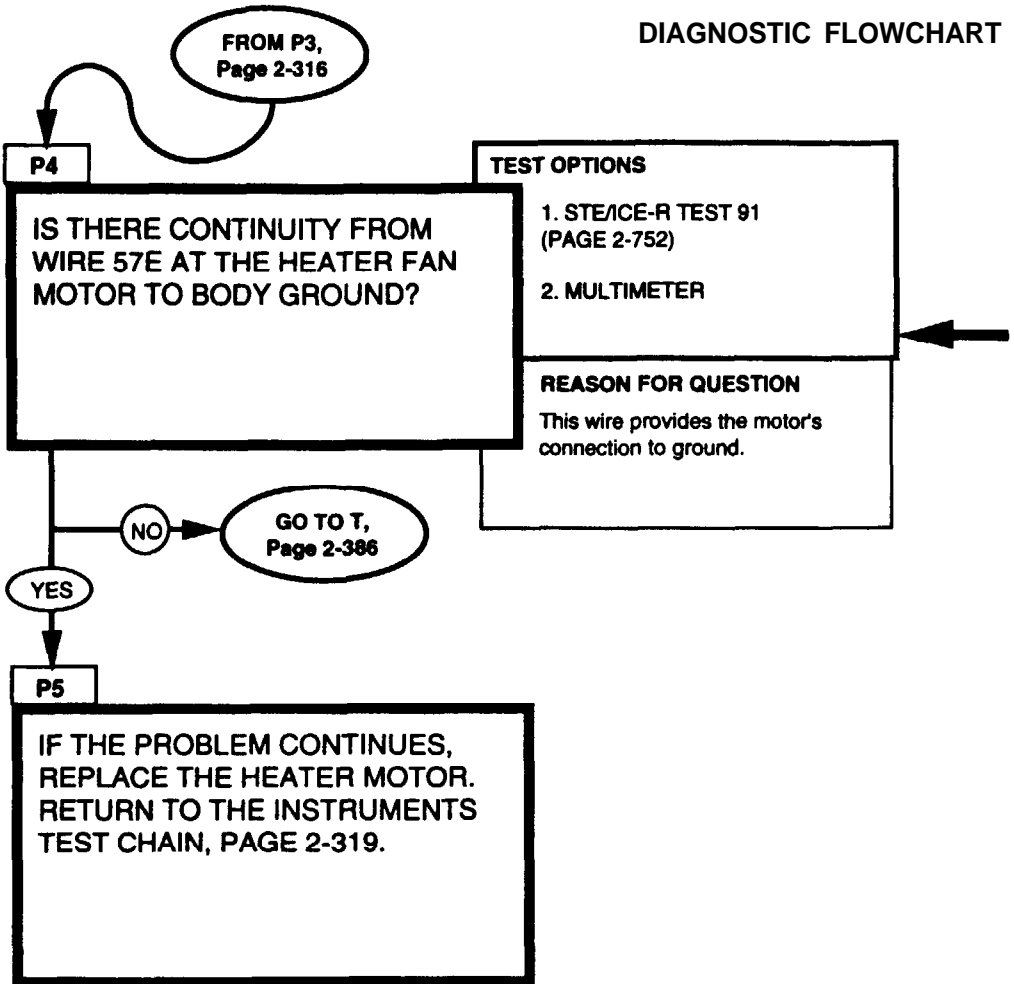
The heater motor is located directly in front of the passenger seat under the dashboard, connected to the heating ducts.



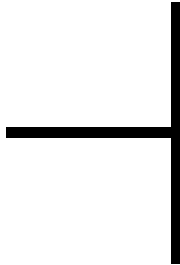
INSTRUMENTS CIRCUIT

KNOWN INFO
WIRE 27C OK WIRE 27D OK CIRCUIT BREAKER #1 OK WIRE 400D OK SWITCH OK
POSSIBLE PROBLEMS
WIRING MOTOR PCB

DIAGNOSTIC FLOWCHART



REFERENCE INFORMATION

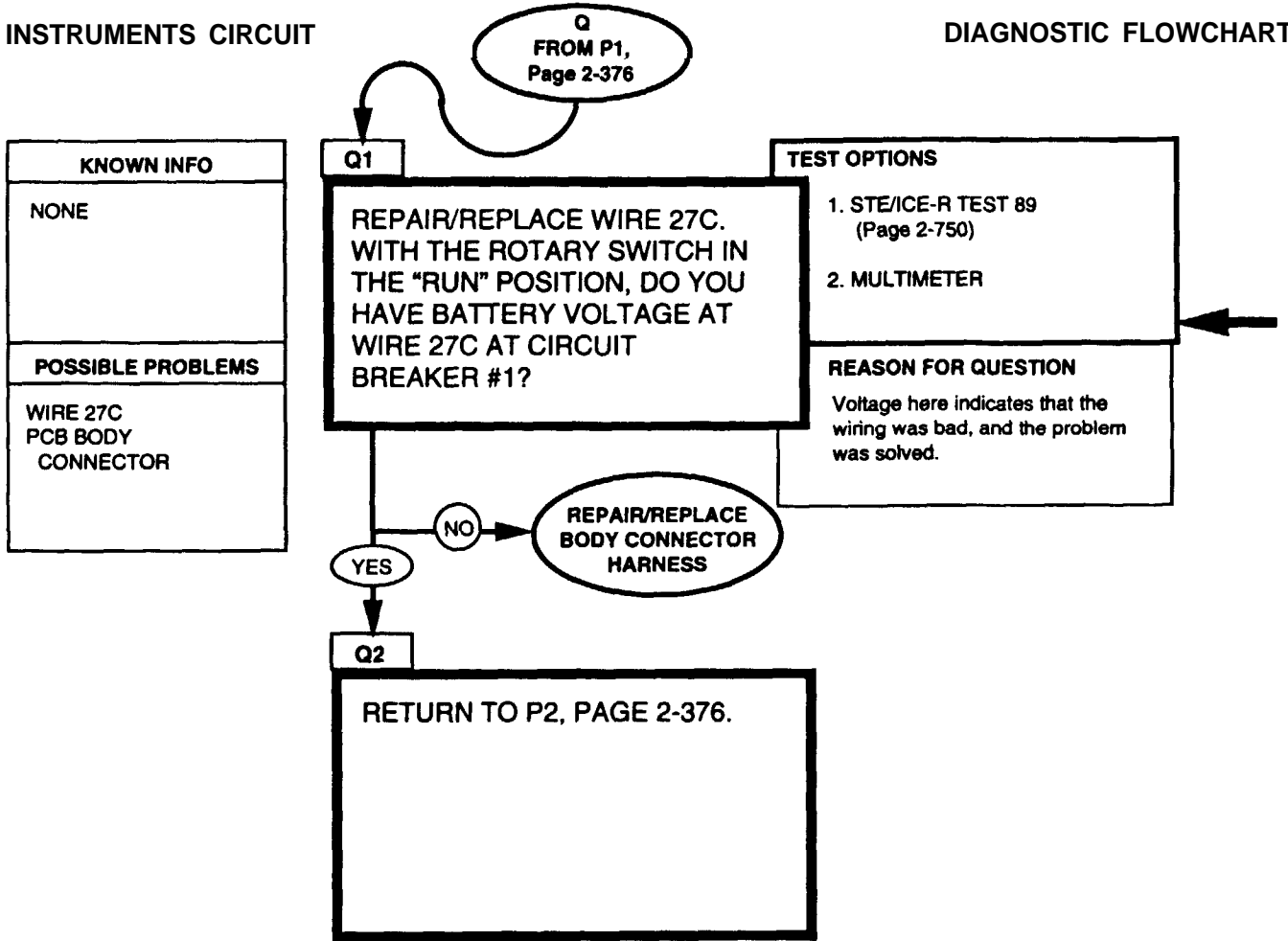


INSTRUMENTS CIRCUIT


<p>0-4500 OHMS STE/ICE-R TEST 91</p>
<p>1. Connect RED clip and BLACK clip to the indicated terminals in the question. RED to the first, BLACK to the second.</p> <p>2. Start Test 91, 0-4500 ohms.</p> <p>3. Displayed reading is in ohms. Less than 5 ohms is continuity. If the resistance is over 4500 ohms, STE/ICE displays "9.9.9.9."</p>
<p>CONTINUITY (RESISTANCE) MULTIMETER</p>
<p>1. Set the voltmeter to an ohms scale of about 1000 ohms.</p> <p>2. Connect the RED and BLACK leads to the connections stated in the question.</p> <p>3. Be sure to read the correct scale. Less than 5 ohms indicates continuity. For an open circuit, the meter should peg full scale (needle all the way to the left).</p>

INSTRUMENTS CIRCUIT

DIAGNOSTIC FLOWCHART



REFERENCE INFORMATION



Replace harness/or repair wiring, refer to (para 4-85).

INSTRUMENTS CIRCUIT

**0-45 DC VOLTS
STE/ICE-R TEST 89**

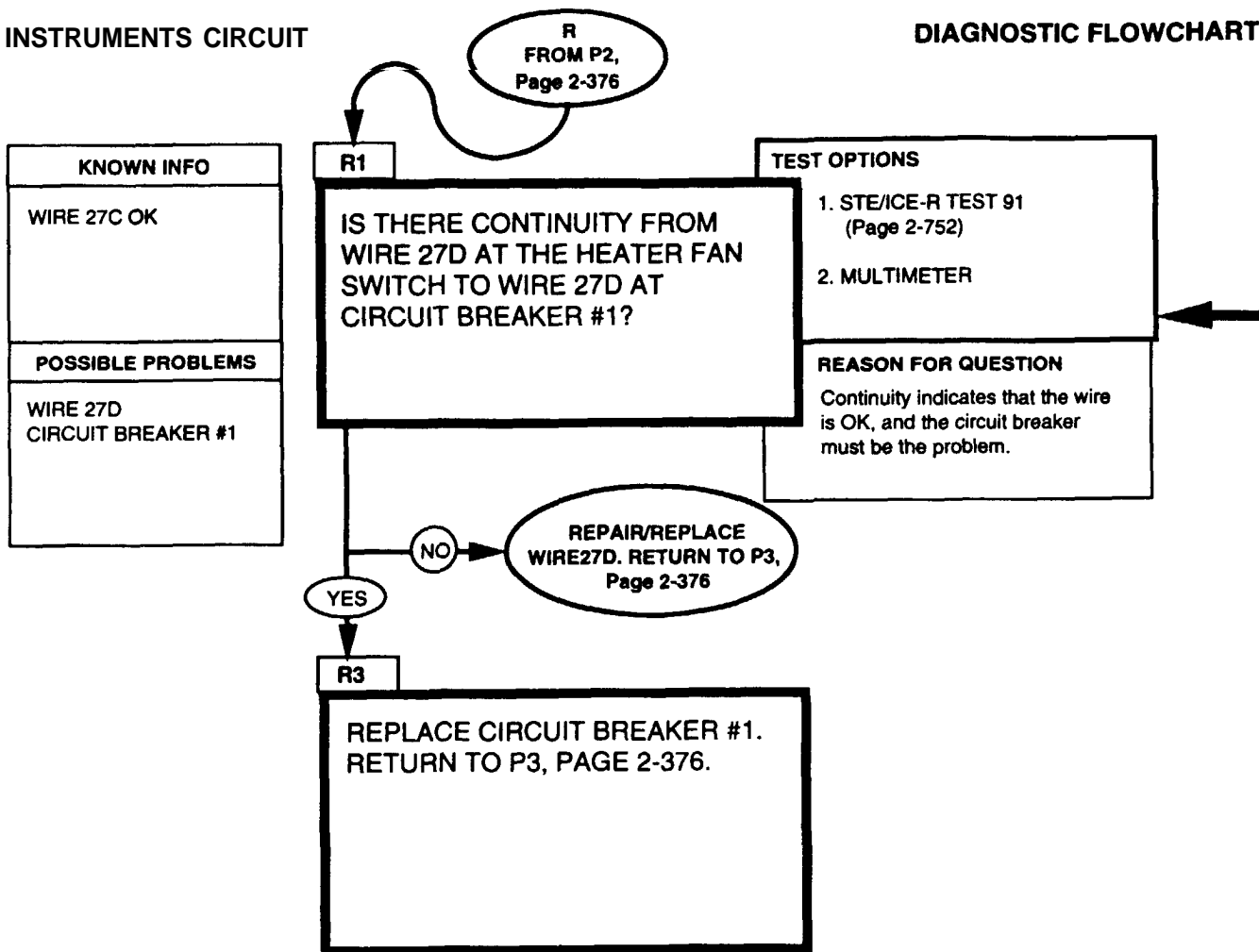
1. Connect RED clip to the indicated test point, BLACK clip to negative or ground.
2. Start Test 89, DC volts.
3. Displayed reading is in volts.

**BATTERY VOLTAGE
MULTIMETER**

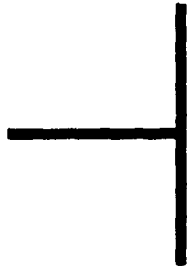
1. Set the voltmeter to a DC volts scale of at least 40 volts.
2. Connect the RED lead to positive and the BLACK lead to negative.
3. Be sure to read the correct scale.

INSTRUMENTS CIRCUIT

DIAGNOSTIC FLOWCHART



REFERENCE INFORMATION



Replace harness or repair wiring, refer to (para 4-85).

INSTRUMENTS CIRCUIT

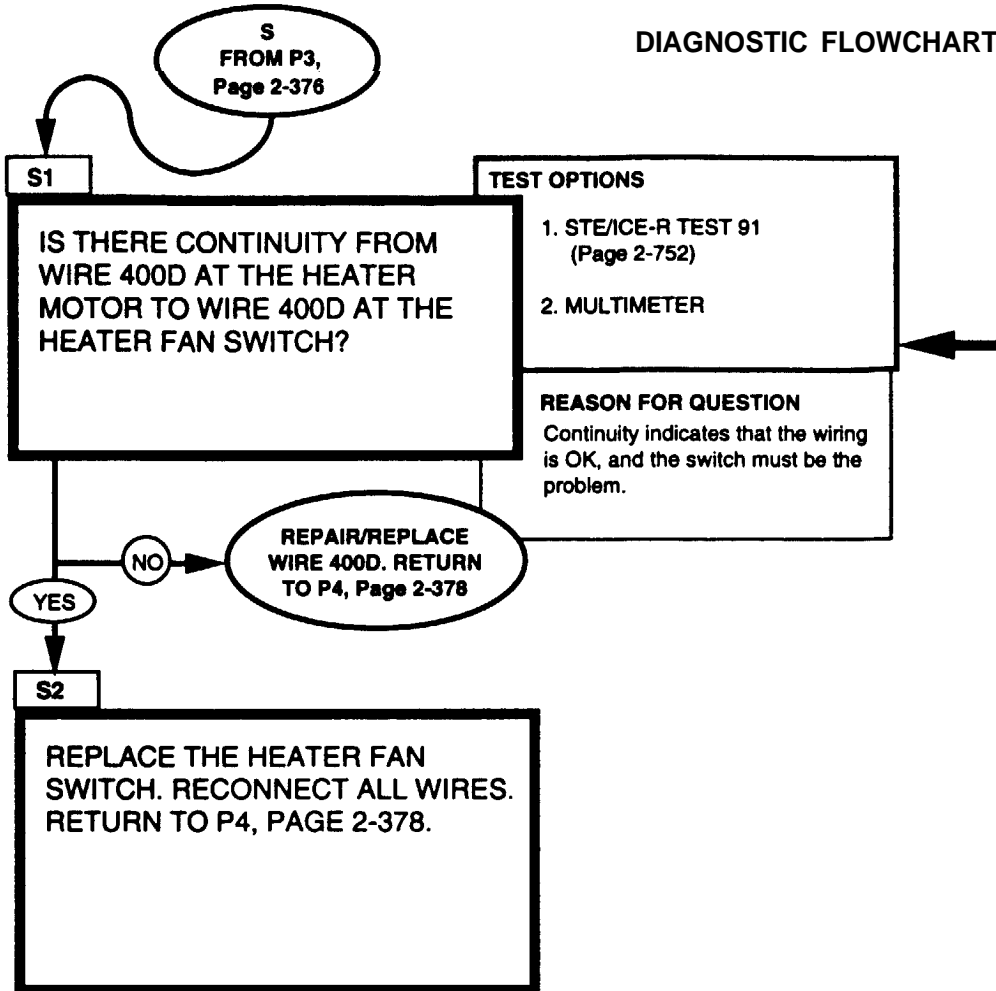
<p>0-4500 OHMS STE/CE-R TEST 91</p>
<p>1. Connect RED clip and BLACK clip to the indicated test points in the question. RED to the first, BLACK to the second.</p> <p>2. Start Test 91, 0-4500 ohms.</p> <p>3. Displayed reading is in ohms. Less than 5 ohms is continuity. If the resistance is over 4500 ohms, STE/ICE displays "9.9.9.9."</p>

<p>CONTINUITY (RESISTANCE) MULTIMETER</p>
<p>1. Set the voltmeter to an ohms scale of about 1000 ohms.</p> <p>2. Connect the RED and BLACK leads to the connections stated in the question.</p> <p>3. Be sure to read the correct scale. Less than 5 ohms indicates continuity. For an open circuit, the meter should peg full scale (needle all the way to the left).</p>

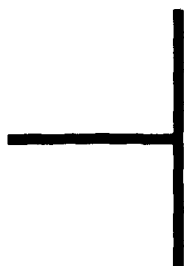
INSTRUMENTS CIRCUIT

DIAGNOSTIC FLOWCHART

KNOWN INFO
WIRE 27C OK WIRE 27D OK CIRCUIT BREAKER #1 OK
POSSIBLE PROBLEMS
WIRE 400D SWITCH



REFERENCE INFORMATION



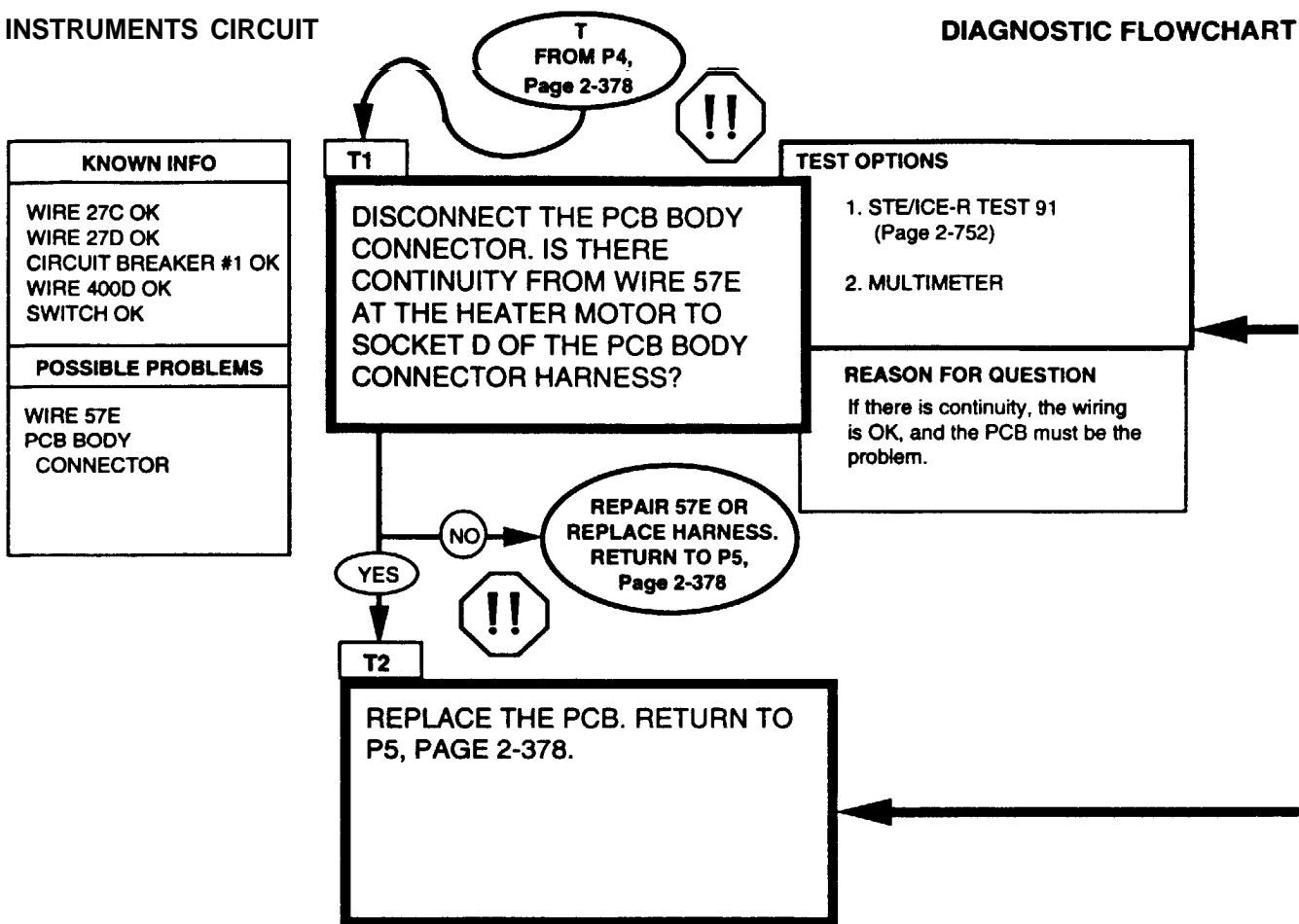
Repair wire or replace harness, refer to (para 4-85).

INSTRUMENTS CIRCUIT

<p>0-4500 OHMS STE/ICE-R TEST 91</p>
<p>1. Connect RED clip and BLACK clip to the indicated test points in the question. RED to the first, BLACK to the second.</p> <p>2. Start Test 91, 0-4500 ohms.</p> <p>3. Displayed reading is in ohms. Less than 5 ohms is continuity. If the resistance is over 4500 ohms, STE/ICE displays "9.9.9.9."</p>
<p>CONTINUITY (RESISTANCE) MULTIMETER</p>
<p>1. Set the voltmeter to an ohms scale of about 1000 ohms.</p> <p>2. Connect the RED and BLACK leads to the connections stated in the question.</p> <p>3. Be sure to read the correct scale. Less than 5 ohms indicates continuity. For an open circuit, the meter should peg full scale (needle all the way to the left).</p>

INSTRUMENTS CIRCUIT

DIAGNOSTIC FLOWCHART



REFERENCE INFORMATION

INSTRUMENTS CIRCUIT



WARNING

Disconnect negative battery cable before disconnecting and reconnecting protective control box harness.

There is battery voltage at the PCB at all times. Failure to disconnect battery cable will result in damage to equipment or injury to personnel.

Replace harness or repair wiring, refer to (para 4-85).

<p>0-4500 OHMS STE/ICE-R TEST 91</p>
<p>1. Connect RED clip and BLACK clip to the indicated terminals in the question. RED to the first, BLACK to the second.</p> <p>2. Start Test 91, 0-4500 ohms.</p> <p>3. Displayed reading is in ohms. Less than 5 ohms is continuity. If the resistance is over 4500 ohms, STE/ICE displays "9.9.9.9."</p>



WARNING

Disconnect negative battery cable before disconnecting and reconnecting protective control box harness.

There is battery voltage at the PCB at all times. Failure to disconnect battery cable will result in damage to equipment or injury to personnel.

Replace the PCB, refer to (para 4-5).

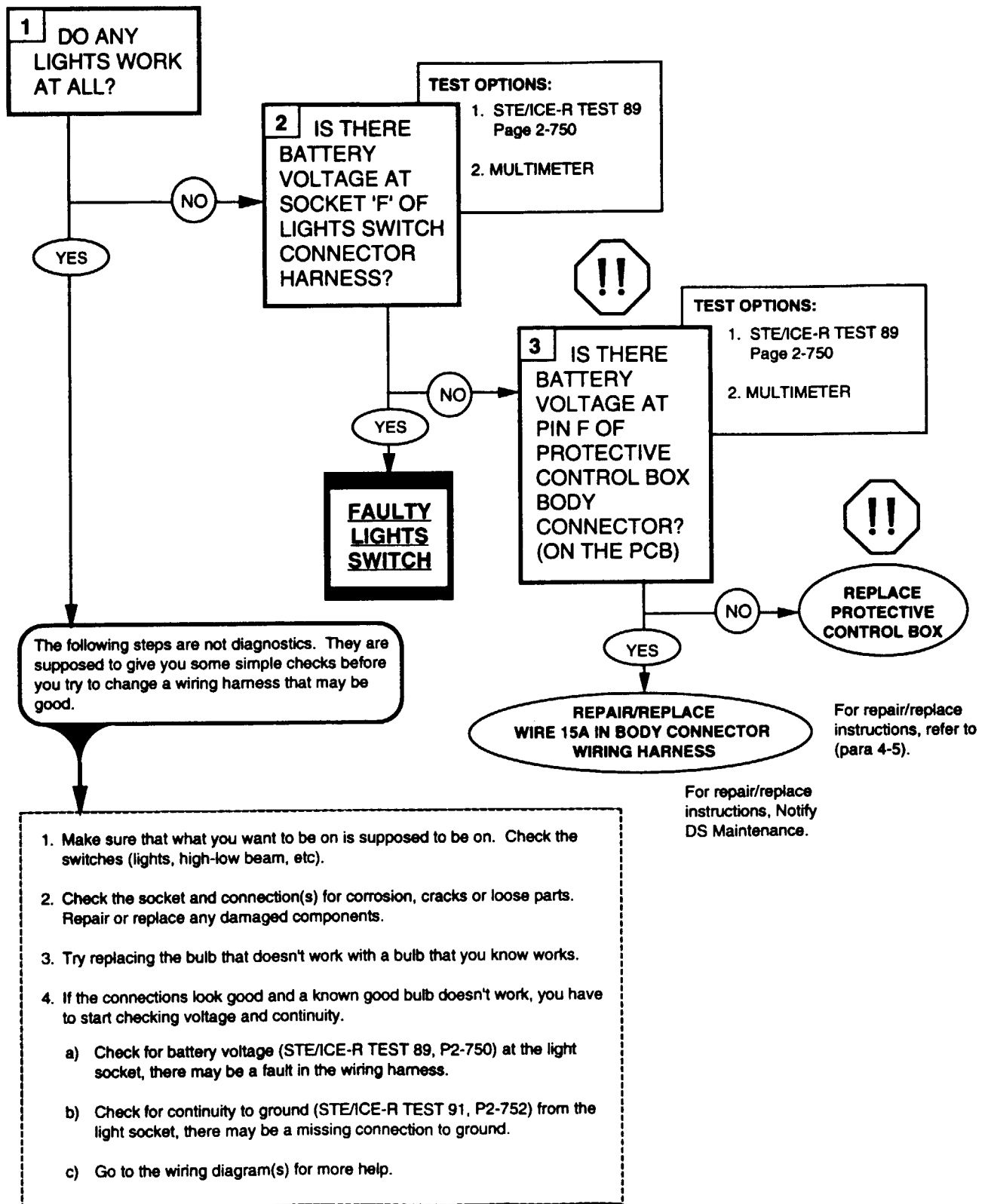
<p>CONTINUITY (RESISTANCE) MULTIMETER</p>
<p>1. Set the voltmeter to an ohms scale of about 1000 ohms.</p> <p>2. Connect the RED and BLACK leads to the connections stated in the question.</p> <p>3. Be sure to read the correct scale. Less than 5 ohms indicates continuity. For an open circuit, the meter should peg full scale (needle all the way to the left).</p>

2-33. LIGHT TESTS

The Lights paragraph has almost no flow chart to guide you through a problem. This is because there aren't very many problems that can occur. The most common problems are burned-out bulbs and loose or corroded connections. Aside from bulbs and wiring, the only components are the PCB and the lights switch. If either of these is found to be faulty, you just replace the bad unit. On the following pages you will find diagrams of the major portions of the Lights Circuit. These are designed to help you isolate a problem without wasting too much time.

LIGHTS

DIAGNOSTIC FLOWCHART



REFERENCE INFORMATION

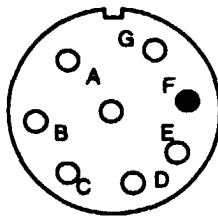
LIGHTS



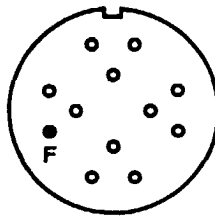
WARNING

DISCONNECT NEGATIVE BATTERY CABLE BEFORE DISCONNECTING AND RECONNECTING PROTECTIVE CONTROL BOX HARNESS.

There is battery voltage at the PCB at all times. Failure to disconnect battery cable will result in damage to equipment or injury to personnel.



PCB BODY CONNECTOR



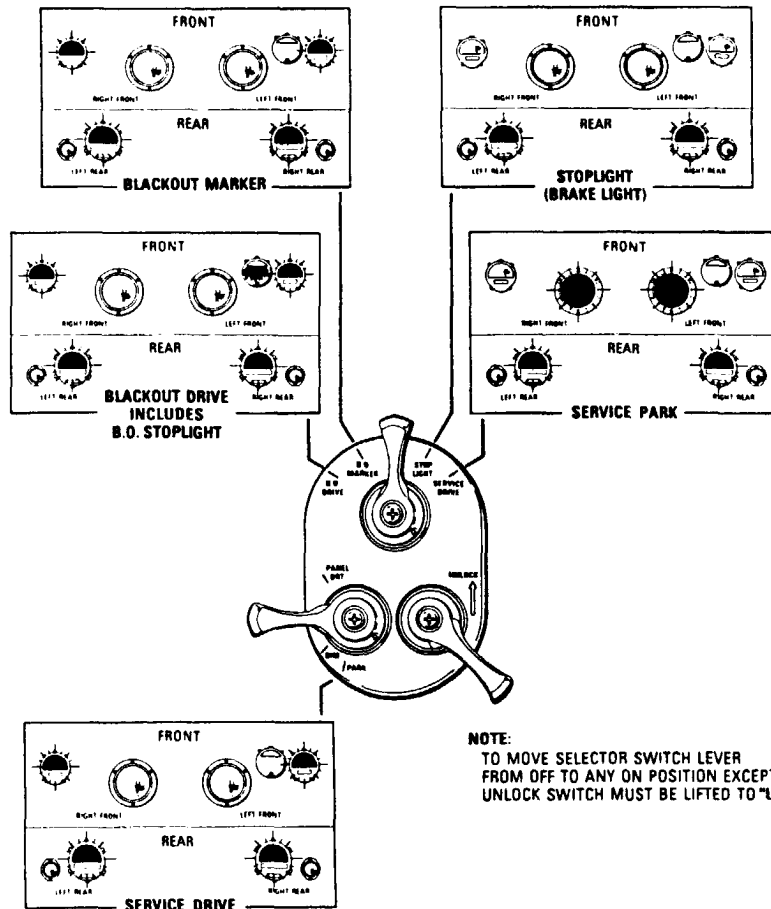
LIGHT SWITCH CONNECTOR HARNESS

**0-4500 OHMS
STE/ICE-R TEST 91**

1. Connect RED clip and BLACK clip to the indicated terminals in the question.
2. Start Test 91, 0-4500 ohms.
3. Displayed reading is in ohms. Less than 5 ohms is continuity. If the resistance is over 4500 ohms, STE/ICE displays "9.9.9.9."

**0-45 DC VOLTS
STE/ICE-R TEST 89**

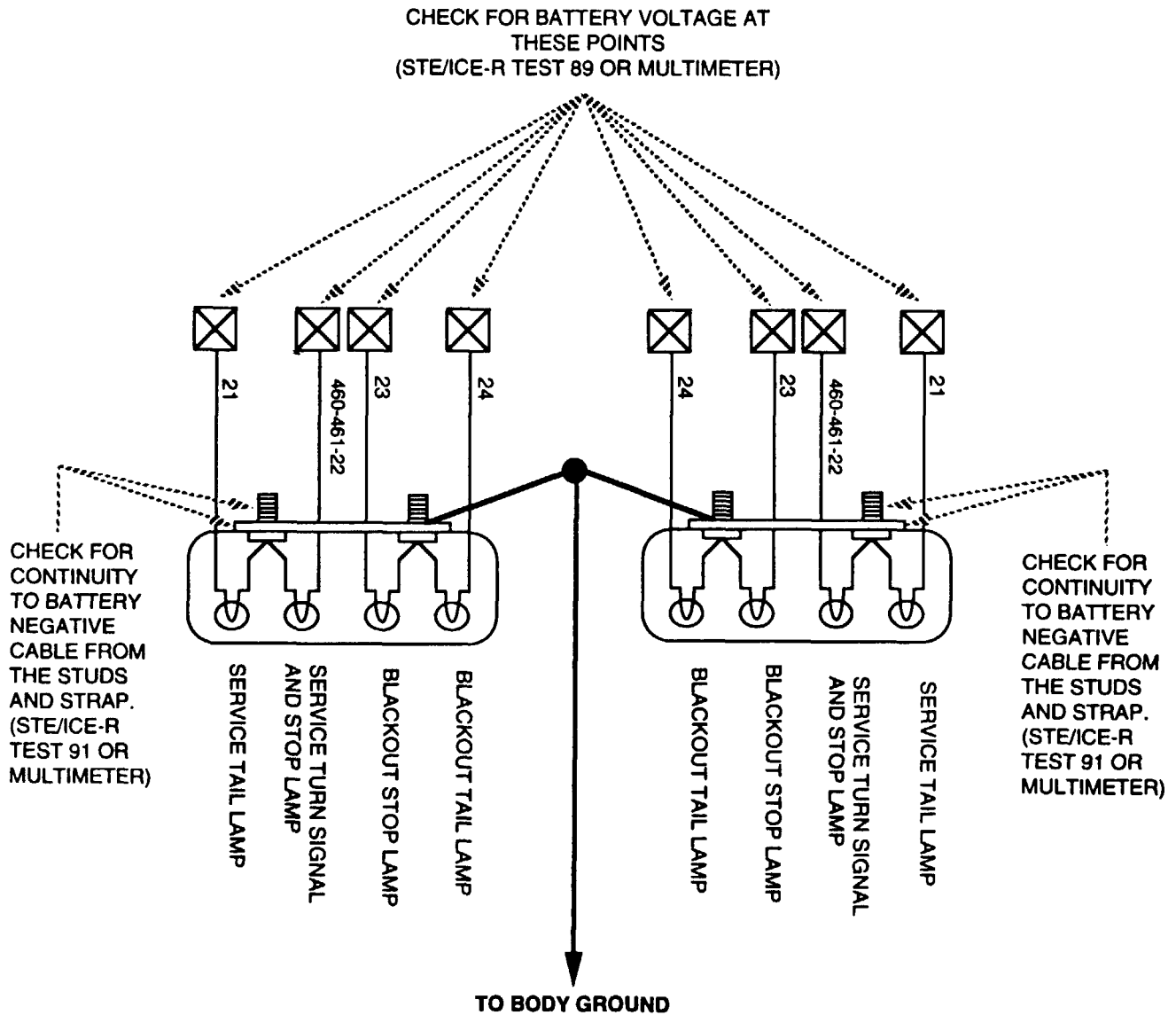
1. Connect RED clip to positive, BLACK clip to negative or ground.
2. Start Test 89, DC volts.
3. Displayed reading is in volts.



NOTE:
TO MOVE SELECTOR SWITCH LEVER FROM OFF TO ANY ON POSITION EXCEPT B.O. MARKER, UNLOCK SWITCH MUST BE LIFTED TO "UNLOCK"

LIGHTS

REAR LIGHTS
(NOT INCLUDING
BACKUP LAMPS AND
SIDE MARKERS)



CHECK FOR CONTINUITY TO BATTERY NEGATIVE CABLE FROM THE STUDS AND STRAP. (STE/ICE-R TEST 91 OR MULTIMETER)

CHECK FOR CONTINUITY TO BATTERY NEGATIVE CABLE FROM THE STUDS AND STRAP. (STE/ICE-R TEST 91 OR MULTIMETER)

1. WHEN CHECKING FOR VOLTAGE, MAKE SURE THAT THE LAMP YOU ARE CHECKING IS SUPPOSED TO BE ON (CHECK THE LIGHTS SWITCH, TURN SIGNAL SWITCH, TRANSMISSION, ETC.).

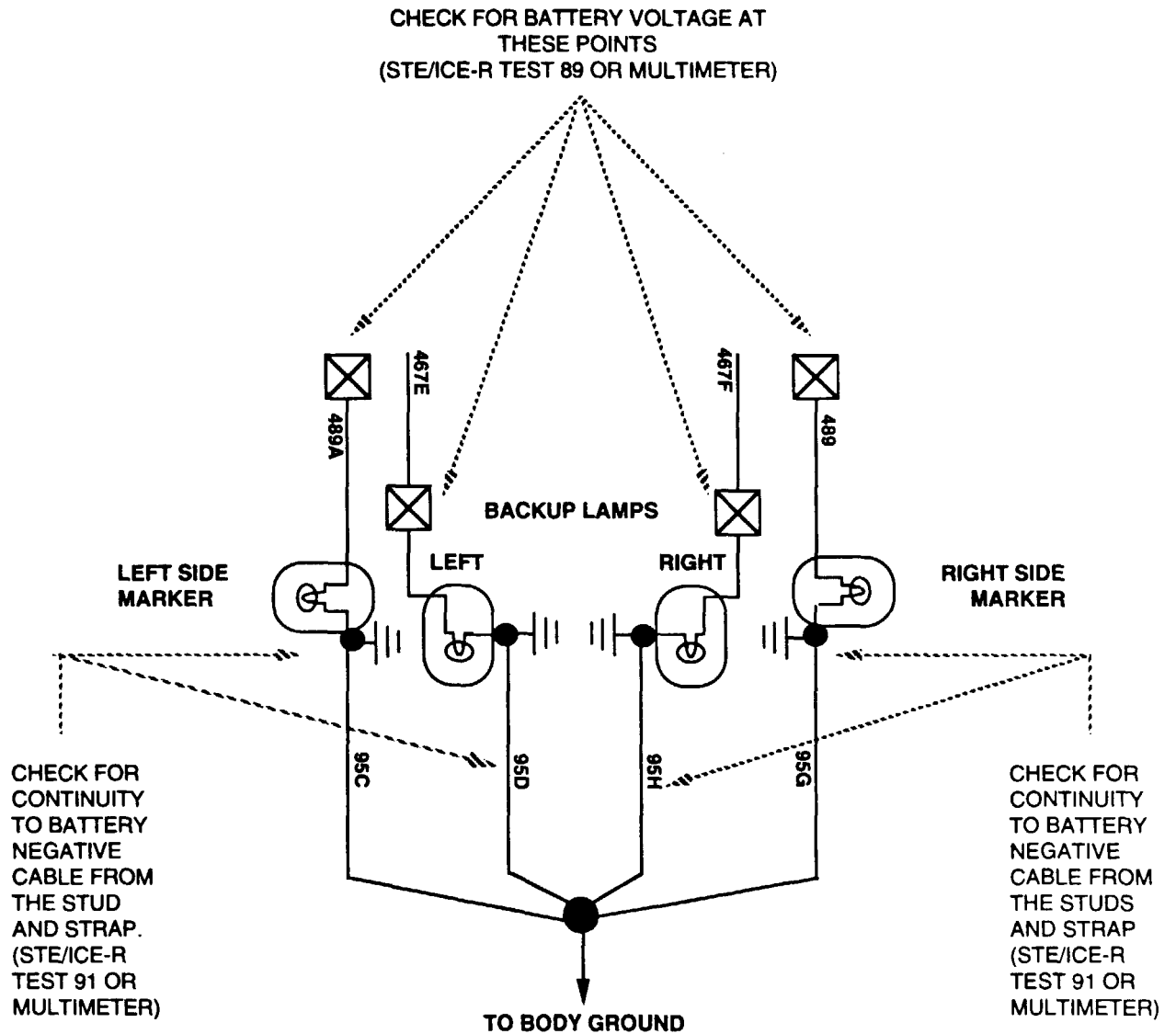
CAUTION

DISCONNECT NEGATIVE BATTERY CABLE PRIOR TO MAKING CONTINUITY MEASUREMENTS

2. CHECK CONTINUITY TO BODY GROUND.

**BACKUP LAMPS AND
REAR SIDE MARKERS**

LIGHTS



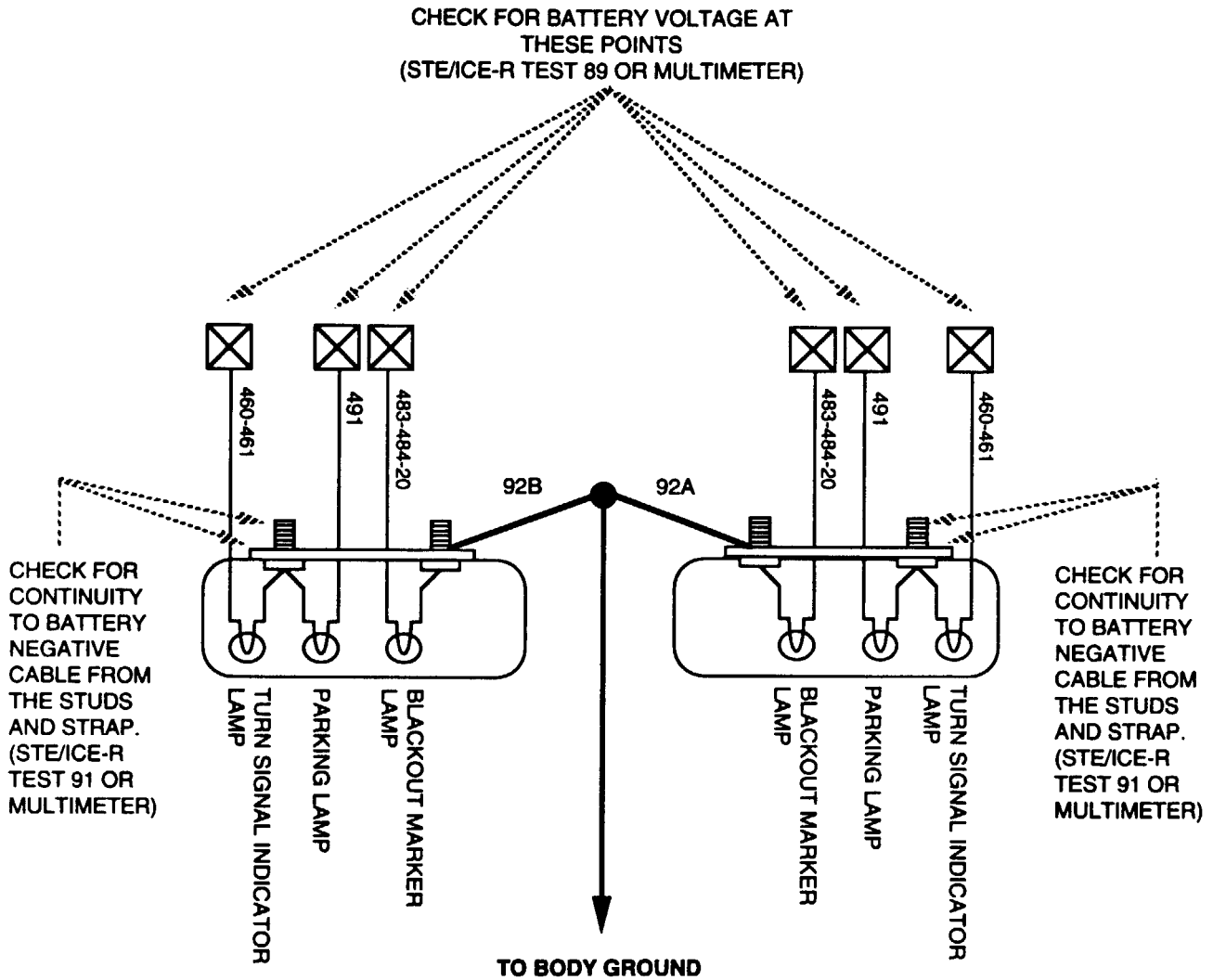
1. WHEN CHECKING FOR VOLTAGE, MAKE SURE THAT THE LAMP YOU ARE CHECKING IS SUPPOSED TO BE ON (CHECK THE LIGHTS SWITCH, TURN SIGNAL SWITCH, TRANSMISSION, ETC.).

CAUTION
DISCONNECT NEGATIVE BATTERY CABLE PRIOR
TO MAKING CONTINUITY MEASUREMENTS

2. CHECK CONTINUITY TO BODY GROUND.

LIGHTS

**FRONT LIGHTS
(PARK LIGHTS,
TURN SIGNAL LAMPS,
BLACKOUT MARKERS)**



1. WHEN CHECKING FOR VOLTAGE, MAKE SURE THAT THE LAMP YOU ARE CHECKING IS SUPPOSED TO BE ON (CHECK THE LIGHTS SWITCH, TURN SIGNAL SWITCH, TRANSMISSION, ETC.).

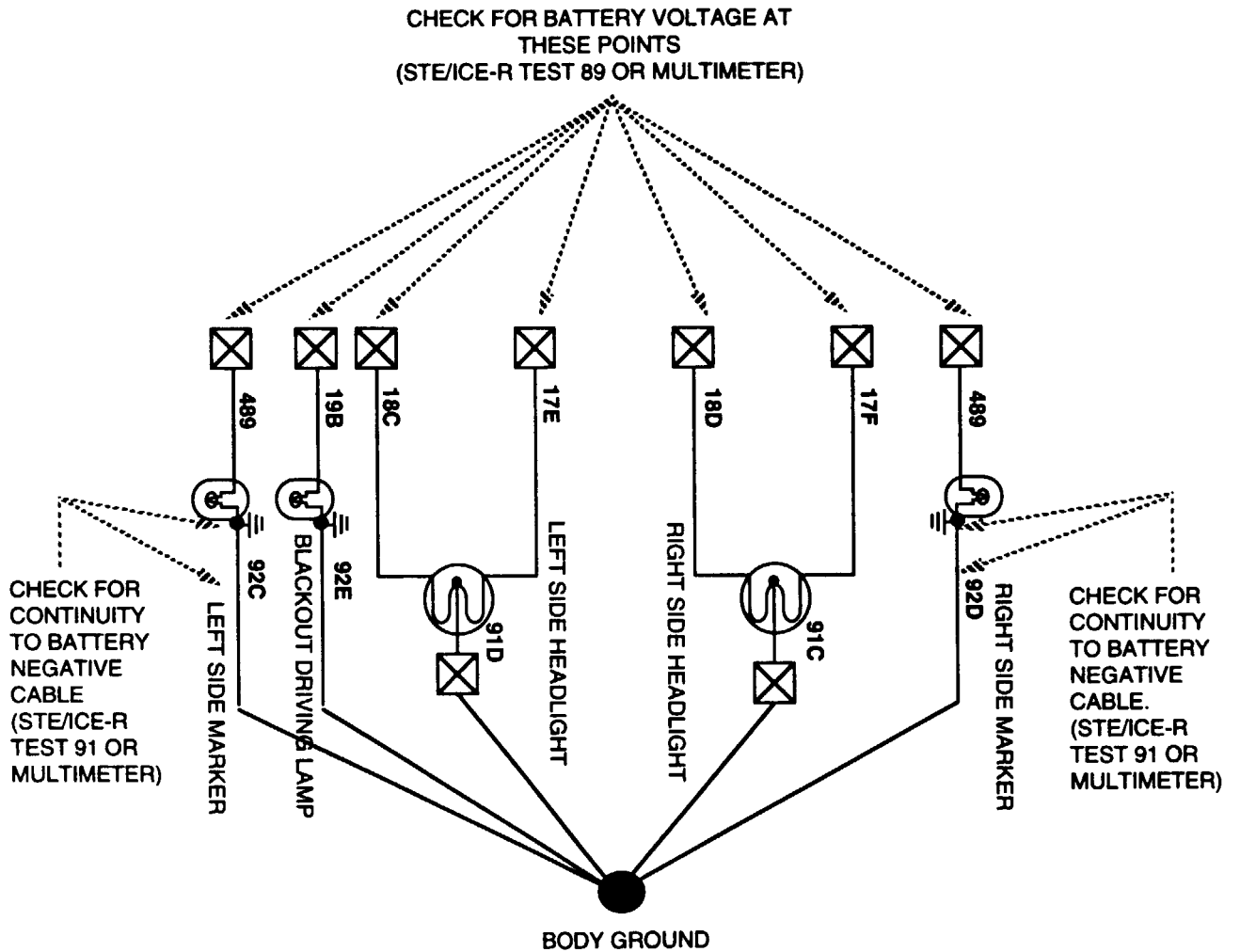
CAUTION

DISCONNECT NEGATIVE BATTERY CABLE PRIOR TO MAKING CONTINUITY MEASUREMENTS.

2. CHECK CONTINUITY TO BODY GROUND.

**FRONT LIGHTS
HEADLAMPS,
BLACKOUT DRIVING
LAMP, SIDE
MARKERS**

LIGHTS



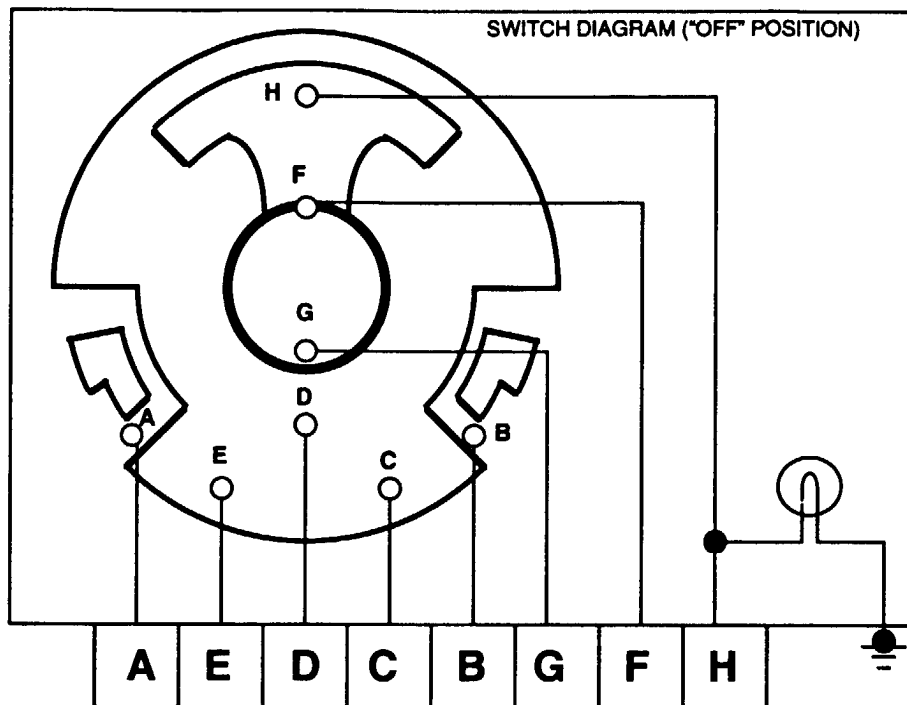
1. WHEN CHECKING FOR VOLTAGE, MAKE SURE THAT THE LAMP YOU ARE CHECKING IS SUPPOSED TO BE ON (CHECK THE LIGHTS SWITCH, TURN SIGNAL SWITCH, TRANSMISSION, ETC.).

CAUTION
DISCONNECT NEGATIVE BATTERY CABLE PRIOR TO MAKING CONTINUITY MEASUREMENTS.

2. CHECK CONTINUITY TO BODY GROUND.

LIGHTS

TURN SIGNAL SWITCH



SUMMARY OF CONNECTIONS:

TERMINAL	CONNECTION	WIRE NUMBER
A	RIGHT FRONT TURN SIGNAL	460A
B	LEFT FRONT TURN SIGNAL	461A
C	LEFT REAR TURN SIGNAL/STOP LAMP	22-461A
D	LIGHT SWITCH TERMINAL "C"	22A
E	RIGHT REAR TURN SIGNAL	22-460A
F	HAZARD/TURN SIGNAL FLASHER TERM. "B"	325B
G	LIGHT SWITCH TERMINAL "J" (24 VOLTS)	467B
H	HAZARD/TURN SIGNAL FLASHER TERM. "A"	325A

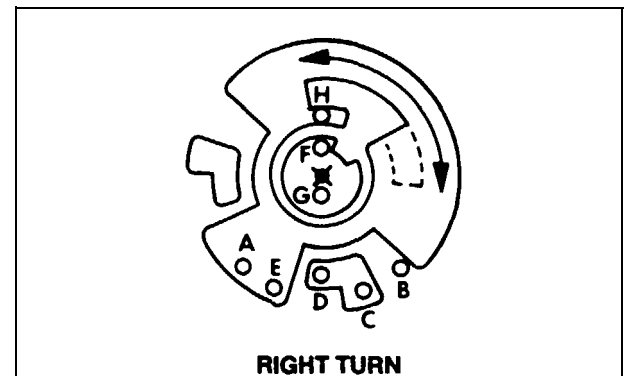
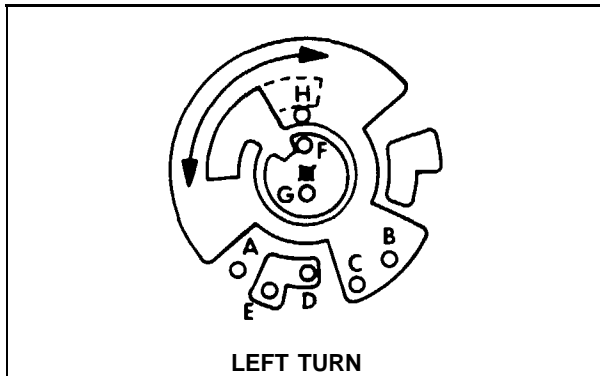
CAUTION

DISCONNECT NEGATIVE BATTERY CABLE PRIOR TO MAKING CONTINUITY MEASUREMENTS.

TURN SIGNAL SWITCH

LIGHTS

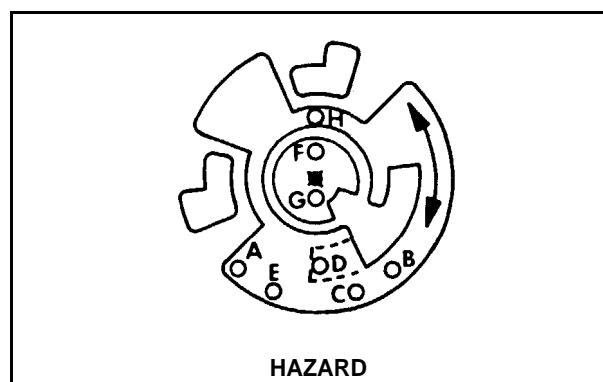
1. WITH THE SWITCH IN THE 'LEFT' POSITION, YOU SHOULD HAVE CONTINUITY FROM PIN "H" TO PINS "B" AND "C", PIN "D" TO "E", AND PIN "F" TO "G".
2. WITH THE SWITCH IN THE "RIGHT" POSITION, YOU SHOULD HAVE CONTINUITY FROM PIN "H" TO PINS "A" AND "E", PIN "C" TO "D", AND PIN "F" TO "G".



NOTE

- IF VEHICLE IS EQUIPPED WITH BRAKE LIGHT OVERRIDE DIRECTIONAL SIGNAL CONTROL ASSEMBLY (P/N12339312-1), REFER TO STEP 3.
- IF VEHICLE IS EQUIPPED WITH DIRECTIONAL SIGNAL CONTROL ASSEMBLY (P/N 12339312), REFER TO STEP 4.

3. WITH SWITCH IN HAZARD POSITION, YOU SHOULD HAVE CONTINUITY FROM PIN H TO PINS "A", "B", "C", "D", AND "E" AND PIN "F" TO "G".
4. WITH SWITCH IN HAZARD POSITION, YOU SHOULD HAVE CONTINUITY FROM PIN H TO PINS "A", "B", "C". AND "E" AND PIN "F" TO "G".



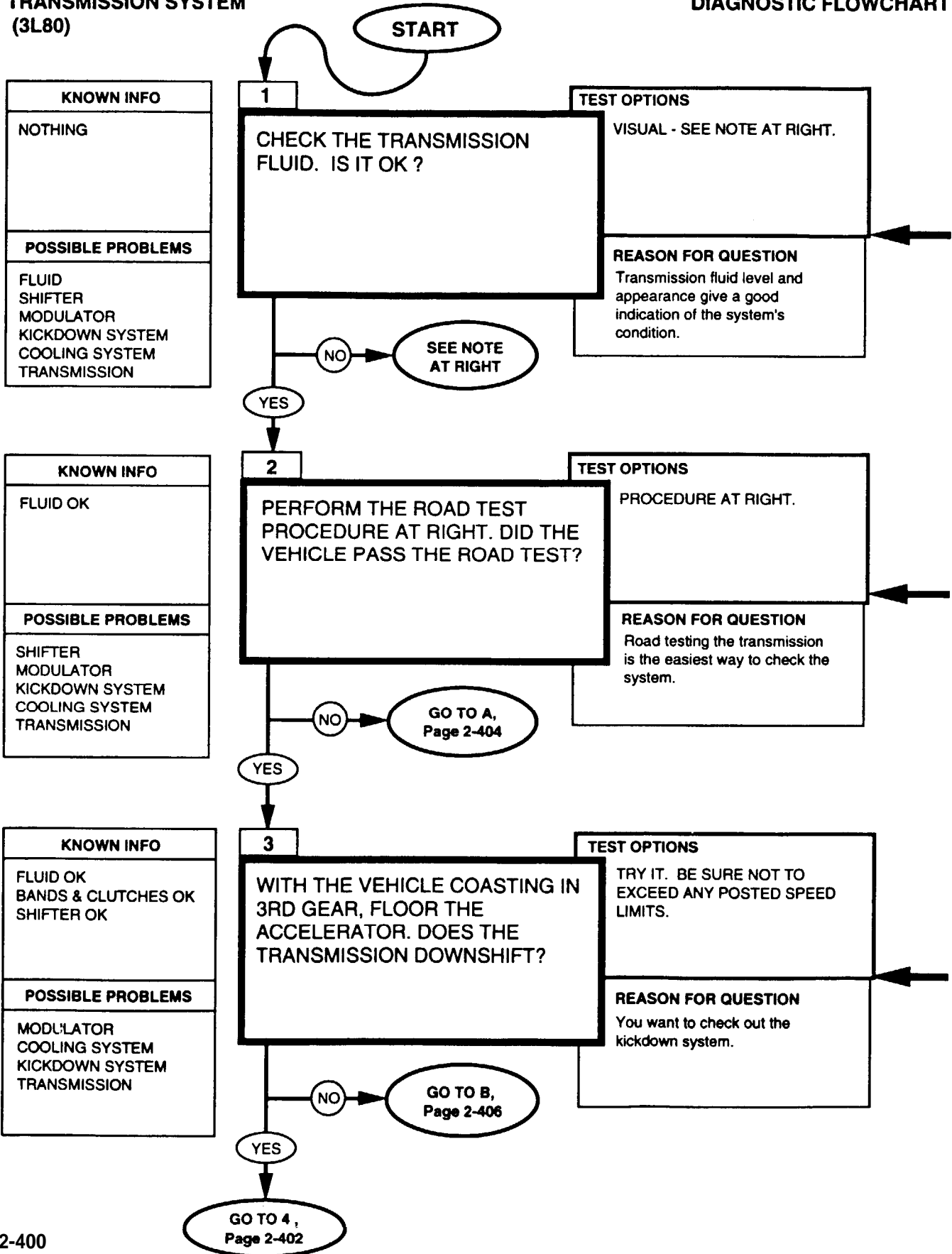
2-34. TRANSMISSION SYSTEM TESTS (3L80)

These Transmission System tests may be run any time you think you have a transmission problem or if you were sent hereby another test chain. Just follow the path, answering the questions. Additional information and notes are given on the facing page when necessary. (4L80-E) Transmission system tests, refer to (para. 2-35).

Fold-out page FO-12 may be left open for reference while testing.

**TRANSMISSION SYSTEM
(3L80)**

DIAGNOSTIC FLOWCHART



REFERENCE INFORMATION

TRANSMISSION SYSTEM
(3L80)Procedure for checking transmission fluid

1. Start engine.
2. Hold down brake pedal and move transmission shift lever through all ranges including reverse. Leave the lever in each range for 2 seconds.
3. Engage parking brake and place shift lever in neutral. Check fluid level on dipstick.
4. Proper level is between FULL and ADD marks on dipstick.

NOTE

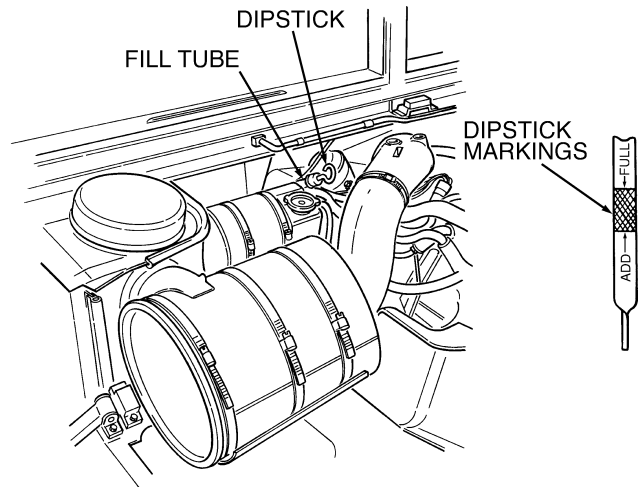
Check fluid for a burnt smell, grit, discoloration, air bubbles, or a milky appearance.

- Burnt smell, discoloration, or grit indicates worn or damaged internal components. Notify DS maintenance.
- Bubbles indicate an overfilled system or air leaks in the system. Drain the fluid and refill to proper level. Refer to (para 5-2).
- Milky appearance is due to water in the system. Change the fluid and filter.
- Check fill tube for indications of fluid being blown out. If fluid is being blown out, check vent line for obstructions, and refill transmission to proper level. Refer to (para 5-2).
- Transmission fluid coming out of dipstick filler tube indicates a restriction in the ventilation system. Check for clogged, melted, or crushed lines and/or fittings between transmission and atmosphere vent on air cleaner canister. Replace where needed. Refer to (para 5-16).

Road Test Procedure

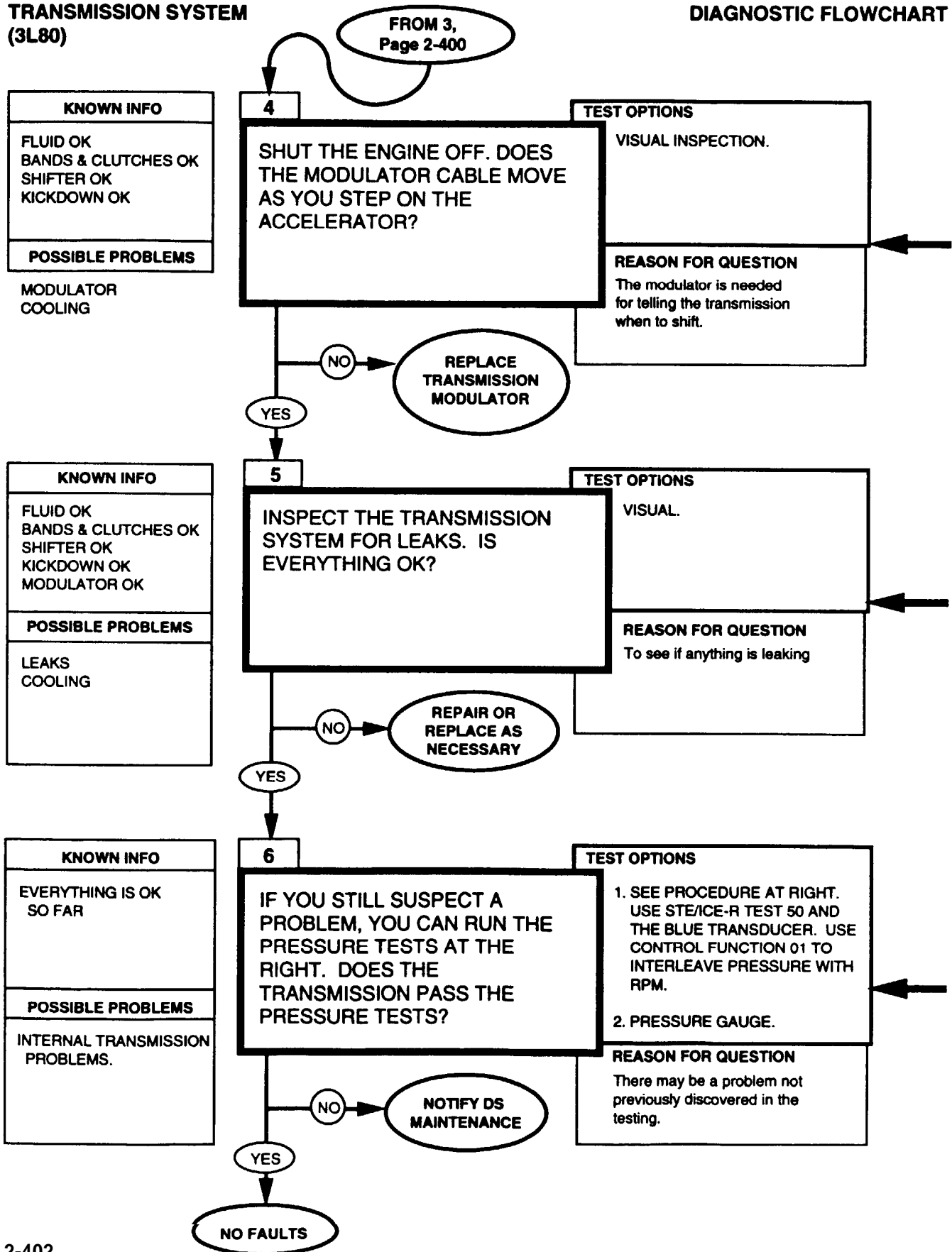
1. Position transmission shift lever in "D" (drive) and accelerate vehicle from 0 mph. A 1-2 and 2-3 shift should occur at all throttle openings. Allow vehicle to coast down to about 0 mph and 3-2 and 2-1 shifts should occur.
2. Position transmission shift lever in "2" (low two) and accelerate vehicle from 0 mph. A 1-2 shift should occur at all throttle openings. No 2-3 shift can be obtained in this range. A 1-2 shift in 2 is somewhat firmer than in "D". This is normal.
3. Position shift lever in "1" and accelerate the vehicle from 0 mph. No upshifts should occur in this range.
4. Position shift lever in "D" and with the vehicle speed at approximately 35 mph, close throttle and move lever to "2". Transmission should downshift to 2nd gear. An increase in engine rpm and engine braking effect should be noticed.
5. Position shift lever "2" and with the vehicle speed at approximately 25 mph, close the throttle and move lever to "1". Transmission should downshift to 1st gear. An increase in engine RPM and engine braking effect should be noticed.
6. Position shift lever in "R" and check for reverse operation.
7. Hard shifting may be indicative of an underfilled or clogged system.

The kickdown system is used to shift the transmission to a lower gear under heavy acceleration. The system also disengages the engine cooling fan so as to allow maximum engine power to be used for moving the vehicle.



**TRANSMISSION SYSTEM
(3L80)**

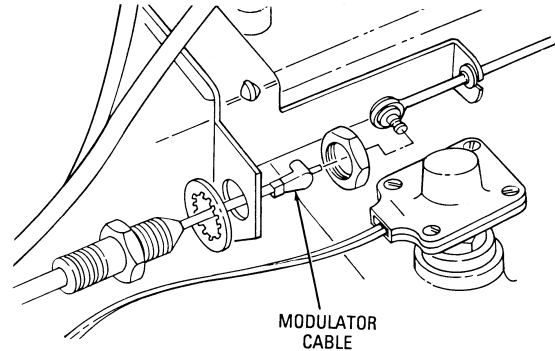
DIAGNOSTIC FLOWCHART



REFERENCE INFORMATION

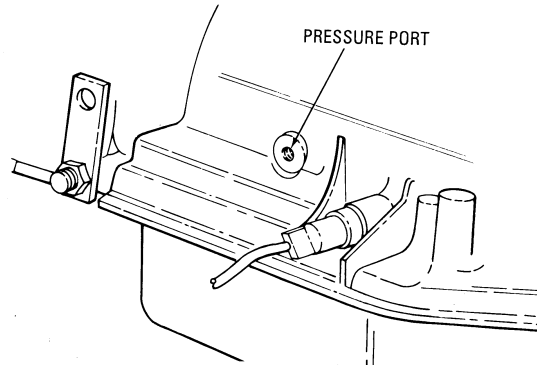
TRANSMISSION SYSTEM
(3L80)

Replace transmission modulator, refer to (para. 5-14).



**STE/ICE-R TEST #50
0 TO 1000 PSIG PRESSURE
INTERLEAVED WITH RPM**

1. Connect blue pressure transducer (1000 PSI) to system under test, and other end to a W4 cable. Make sure the system under test is not pressurized.
2. Dial 01 into VTM, and then 50 when prompted.
3. Perform offset test.
4. Start engine and VTM will display pressure interleaved with RPM.



Transmission oil pressure test

1. Remove plug from pressure port on left side of transmission.
2. Connect transducer to port using appropriate fittings.
3. Perform offset test.
4. Start engine and check for leaks at connections.
5. Bring engine to operating temperature.
6. Place shift lever in N and bring engine to 1000 RPM (STE/ICE-R test 10). Pressure should be 55-70 psi (379-483 kPa). If not, notify DS Maintenance.
7. Apply service brakes and place shifter in D. Operate engine at 1000 RPM. Pressure should be 60-90 psi (414-621 kPa). If not, notify DS Maintenance.
8. Apply brakes and place lever in 2. With engine at 1000 RPM, pressure should be 135-160 psi (931- 1103 kPa). If not, notify DS Maintenance.
9. Apply brakes and place lever in 1. With engine at 1000 RPM, pressure should be 135-160 psi (931-1103 kPa). If not, notify DS Maintenance.
10. Apply brakes and place lever in R. With engine at 1000 RPM, pressure should be 95-150 psi (655-1034 kPa). If not, notify DS Maintenance.
11. Apply brakes and place lever in D. With engine idling, pressure should be 60-85 psi (414-586 kPa). If not, notify DS Maintenance.

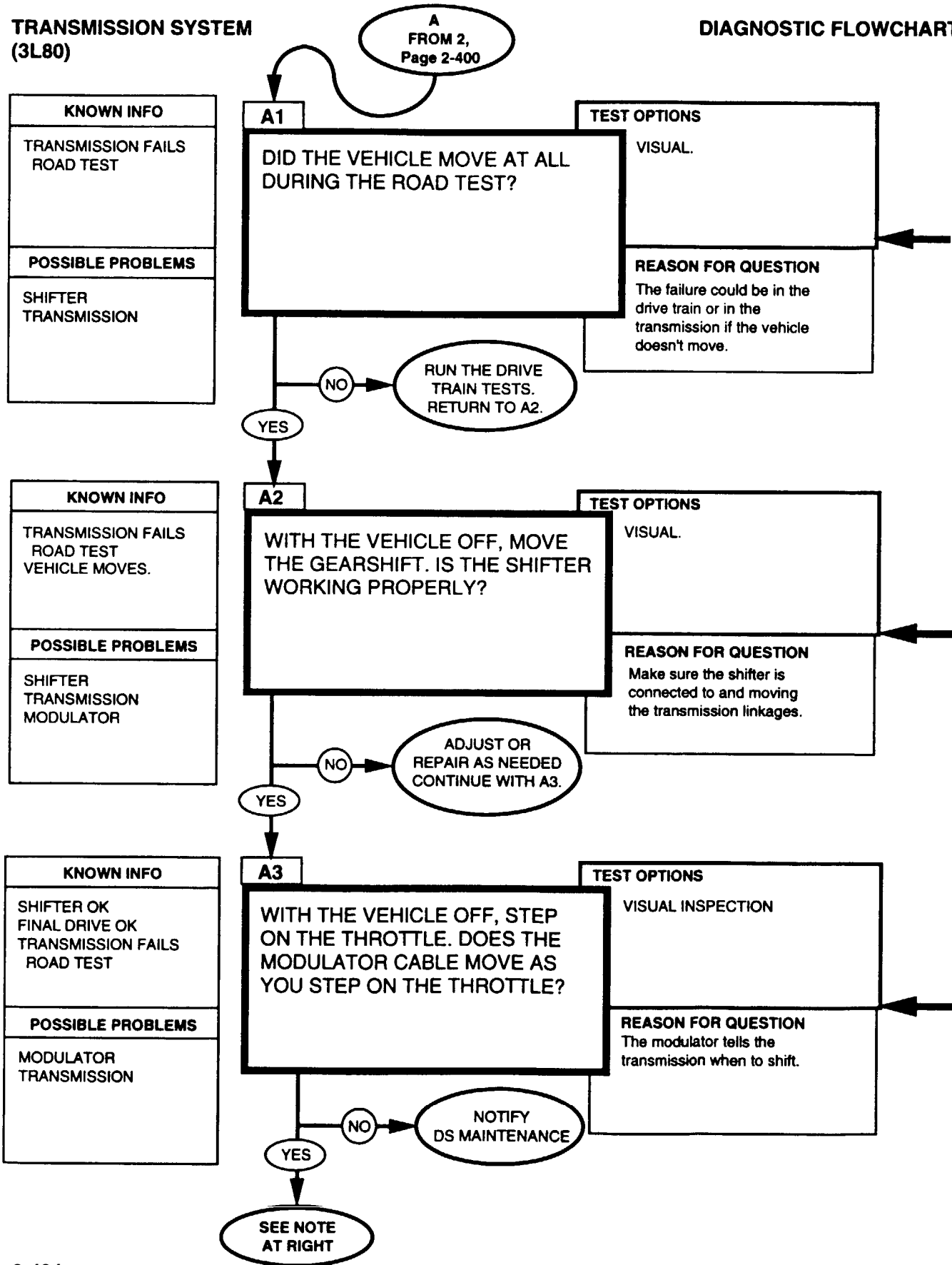
NOTE

NEXT TEST MUST BE PERFORMED DURING A ROAD TEST OR WITH VEHICLE RAISED AND TIRES OFF THE GROUND. RECORD PRESSURE WITH THROTTLE CLOSED.

12. Place lever in D and take foot off brake. With engine at 2000 RPM, close throttle and read pressure between 1200 and 2000 RPM. Pressure should be 65-70 psi (448-485 kPa). If not, notify DS Maintenance.
13. Shut off engine, remove transducer and reinstall plug.

**TRANSMISSION SYSTEM
(3L80)**

DIAGNOSTIC FLOWCHART



REFERENCE INFORMATION

TRANSMISSION SYSTEM
(3L80)



If the drivetrain system checks out OK, the problem is either the transmission itself, the shifter or the modulator. The DRIVETRAIN tests are located in (para. 2-38) of this manual.



Make sure that the detents in the shifter correspond to the shift positions shown on the plate. Have an assistant move the shifter and look to see that the linkage is moving at the transmission.

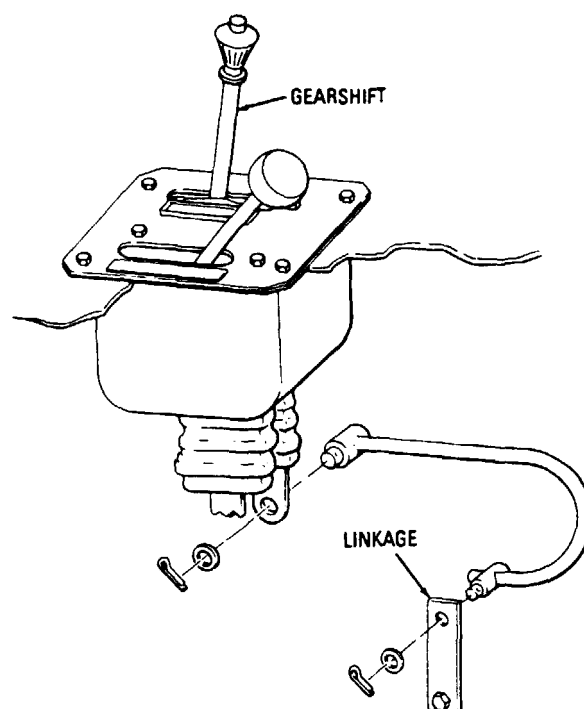
Linkage repair and adjustment procedures are shown in (para. 5-12).



Look for a modulator problem if the vehicle was not shifting, or was not shifting as well as it should be.

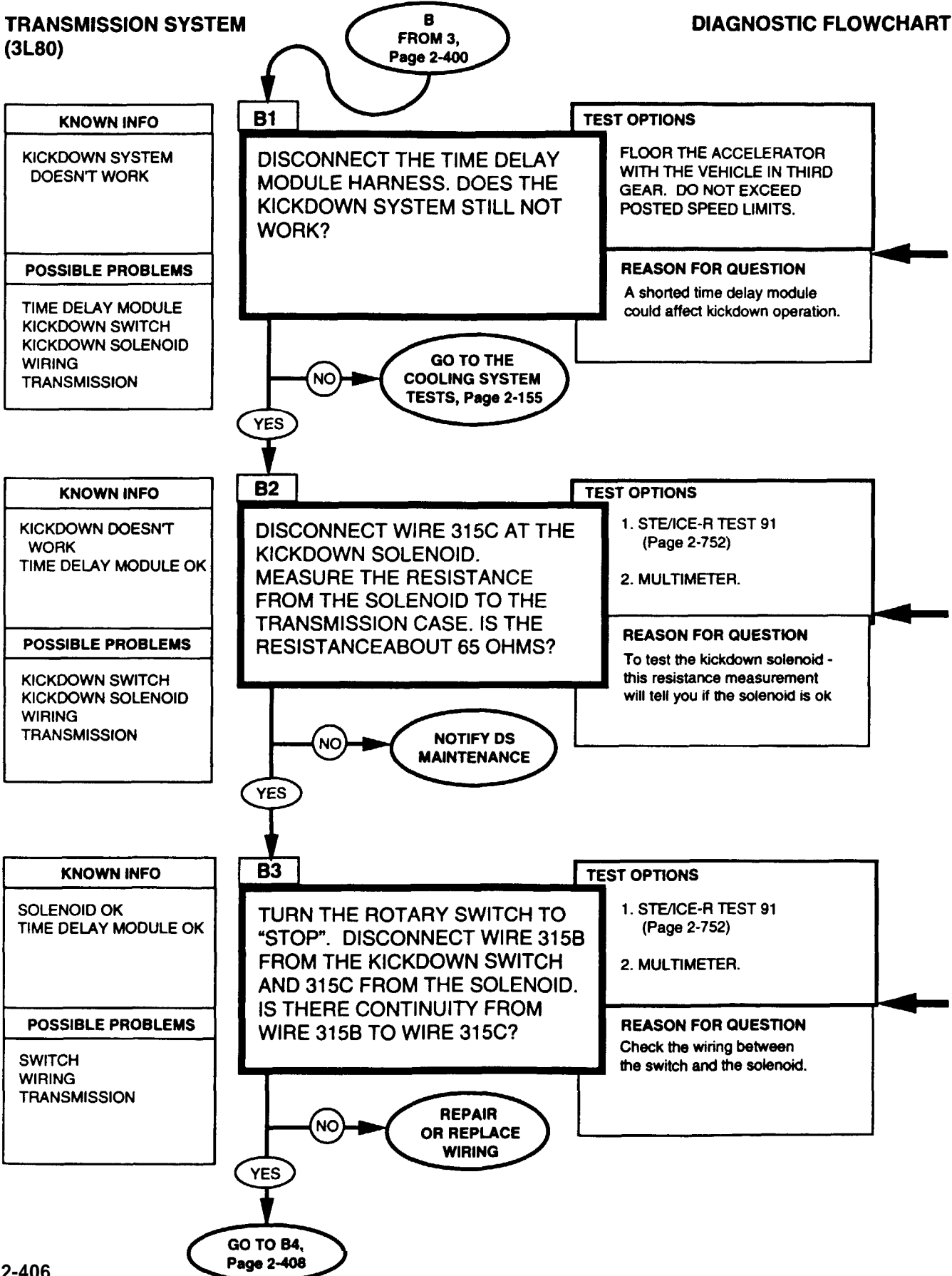
NOTE

Run the BRAKES and DRIVETRAIN tests in this manual. If you don't find any faults, notify DS maintenance.



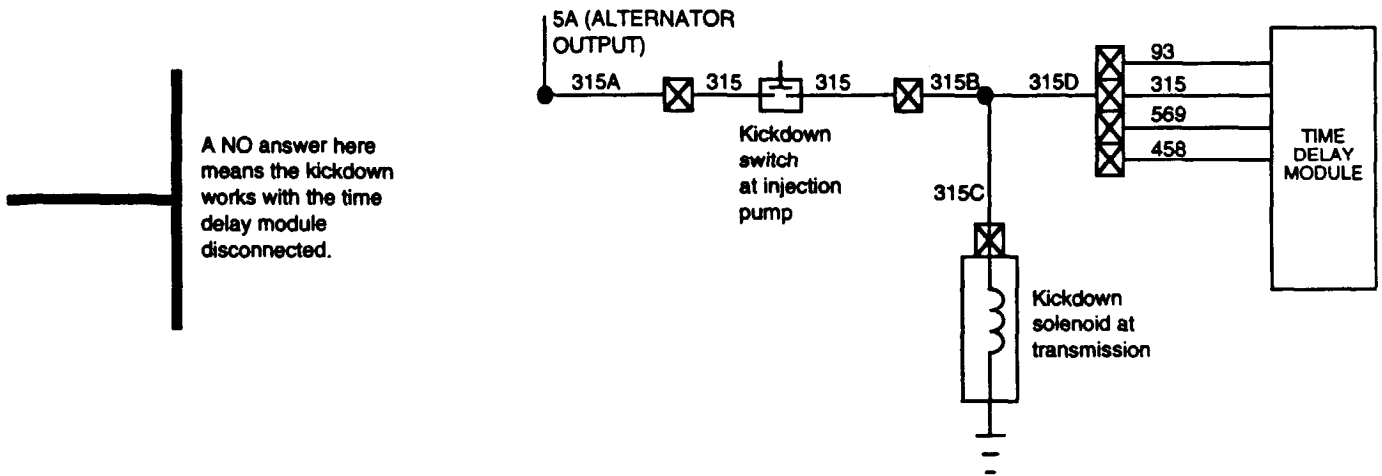
**TRANSMISSION SYSTEM
(3L80)**

DIAGNOSTIC FLOWCHART



REFERENCE INFORMATION

**TRANSMISSION SYSTEM
(3L80)**



A NO answer here means the kickdown works with the time delay module disconnected.

0-4500 OHMS STE/ICE-R TEST 91
1. Connect RED clip and BLACK clip to the test points indicated in the question. RED to the first, BLACK to the second.
2. Start Test 91, 0-4500 ohms.
3. Displayed reading is in ohms. Less than 5 ohms is continuity. If the resistance is over 4500 ohms, STE/ICE displays "9.9.9.9."

A measurement of zero or infinity means the solenoid is no good.

CONTINUITY (RESISTANCE) MULTIMETER
1. Set the voltmeter to an ohms scale of about 1000 ohms.
2. Connect the RED and BLACK leads to the connections stated in the question.
3. Be sure to read the correct scale. Less than 5 ohms indicates continuity. For an open circuit, the meter should peg full scale (needle all the way to the left).

**TRANSMISSION SYSTEM
(3L80)**

DIAGNOSTIC FLOWCHART

KNOWN INFO
SOLENOID OK WIRING AFTER SWITCH OK TIME DELAY MODULE OK
POSSIBLE PROBLEMS
SWITCH WIRING BEFORE SWITCH TRANSMISSION ALTERNATOR

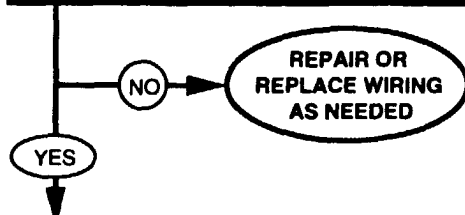
B4

DISCONNECT WIRE 315A FROM THE KICKDOWN SWITCH. IS THERE CONTINUITY FROM WIRE 5A AT THE ALTERNATOR TO WIRE 315A AT THE KICKDOWN SWITCH?

TEST OPTIONS

1. STE/ICE-R TEST 91 (Page 2-752)
2. MULTIMETER.

REASON FOR QUESTION
Test the wiring from the alternator to the switch.



KNOWN INFO
SOLENOID OK WIRING OK TIME DELAY MODULE OK
POSSIBLE PROBLEMS
SWITCH TRANSMISSION ALTERNATOR

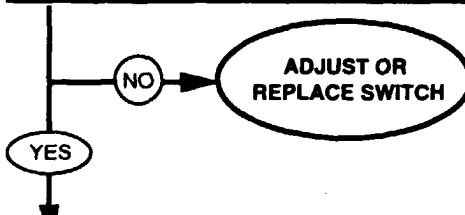
B5

IS THE KICKDOWN SWITCH FUNCTIONING PROPERLY?

TEST OPTIONS

1. STE/ICE-R TEST 91 (Page 2-752)
2. MULTIMETER.

REASON FOR QUESTION
Test out the kickdown switch.



KNOWN INFO
SOLENOID OK WIRING OK SWITCH OK TIME DELAY MODULE OK
POSSIBLE PROBLEMS
NO VOLTAGE AT ALTERNATOR OUTPUT TRANSMISSION

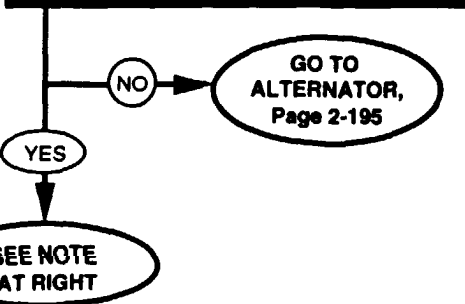
B6

RECONNECT EVERYTHING. DISCONNECT WIRE 315A FROM THE KICKDOWN SWITCH. WITH THE ROTARY SWITCH IN RUN, IS THERE BATTERY VOLTAGE AT WIRE 315A?

TEST OPTIONS

1. STE/ICE-R TEST 89 (Page 2-750)
2. MULTIMETER.

REASON FOR QUESTION
Check for voltage input to the circuit.



REFERENCE INFORMATION

TRANSMISSION SYSTEM
(3L80)

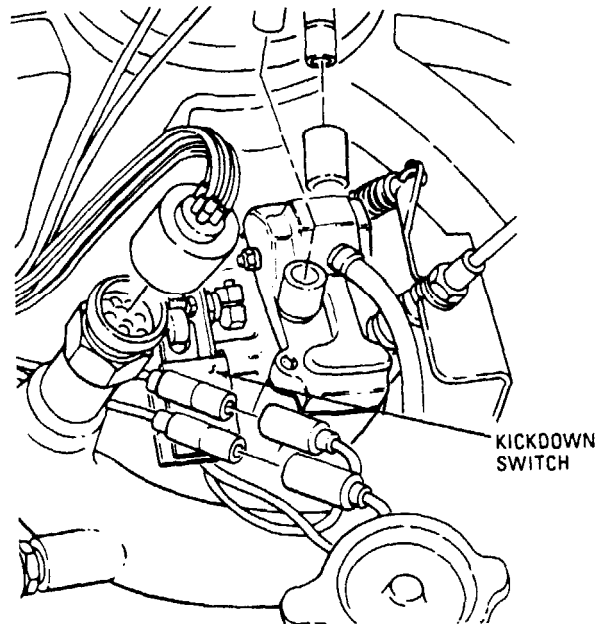
<p>0-4500 OHMS STE/ICE-R TEST 91</p>
<ol style="list-style-type: none"> 1. Connect RED clip and BLACK clip to the indicated terminals in the question. RED to the first, BLACK to the second. 2. Start Test 91, 0-4500 ohms. 3. Displayed reading is in ohms. Less than 5 ohms is continuity. If the resistance is over 4500 ohms, STE/ICE displays "9.9.9.9."

<p>CONTINUITY (RESISTANCE) MULTIMETER</p>
<ol style="list-style-type: none"> 1. Set the voltmeter to an ohms scale of about 1000 ohms. 2. Connect the RED and BLACK leads to the connections stated in the question. 3. Be sure to read the correct scale. Less than 5 ohms indicates continuity. For an open circuit, the meter should peg full scale (needle all the way to the left).

Repair or raplace of wiring, refer to (para 4-85).

There should be continuity when the injector pump is wide open, and an open circuit when it isn't. Check out both positions.

Adjust or replace kickdown switch, refer to (para 4-43).



NOTE

Recheck everything in the circuit. If you don't find anything wrong, notify DS maintenance. The problem is probably in the transmission itself.

<p>0-45 DC VOLTS STE/ICE-R TEST 89</p>
<ol style="list-style-type: none"> 1. Connect RED clip to the indicated test point, BLACK clip to negative or ground. 2. Start Test 89, DC volts. 3. Displayed reading is in volts.

<p>VOLTAGE MULTIMETER</p>
<ol style="list-style-type: none"> 1. Set the voltmeter to a DC volts scale of at least 40 volts. 2. Connect the RED lead to positive and the BLACK lead to negative. 3. Be sure to read the correct scale.

2-35. TRANSMISSION SYSTEM TESTS (4L80-E)

The 4L80-E Transmission system is equipped with a computer called the Transmission Control Module (TCM) (located left rear seat compartment; for M996A2 and M997A2 vehicles, located in the left exterior stowage compartment) which interprets, analyzes and records electronic signals from sensors and switches located on the engine, brake pedal, and transmission. The recorded codes stored in the TCM are known as TROUBLE CODES which are retrieved using the Diagnostic Switch Cable on the J2 connector of the TCM. The TCM can protect the transmission from damage by locking it in Second Gear, with maximum fluid pressure, until the problem has been corrected. The following procedures will detail diagnostic testing, troubleshooting and corrective action for any existing faults. These Transmission System tests may be run any time you think there is a transmission problem or if you were sent here by another test chain. This paragraph has a different kind of flow chart to guide you through testing because of the many problems that can occur. The most common problems are loose or corroded wiring connections. To troubleshoot the transmission, you will need a diagnostic switch cable, digital multimeter and a throttle position (TP) sensor test cable.

CAUTION

Do not disconnect battery without recording Trouble Codes. Failure to do so will result in loss of diagnostic test codes.

The diagnostic test codes (DTC) are transmitted from the TCM to transmission lamp located next to the shift lever. When Diagnostic Switch Cable is connected to the J2 connector, the system is placed in the diagnostic mode, which causes the transmission lamp to flash. The transmission lamp will flash once, pause, flash twice (meaning code 12) pause, flash once, pause, flash twice (code 12 again), and do this one more time for a total of three times, which means the system is operational.

NOTE

Diagnostic test code 63 will be set at all times.

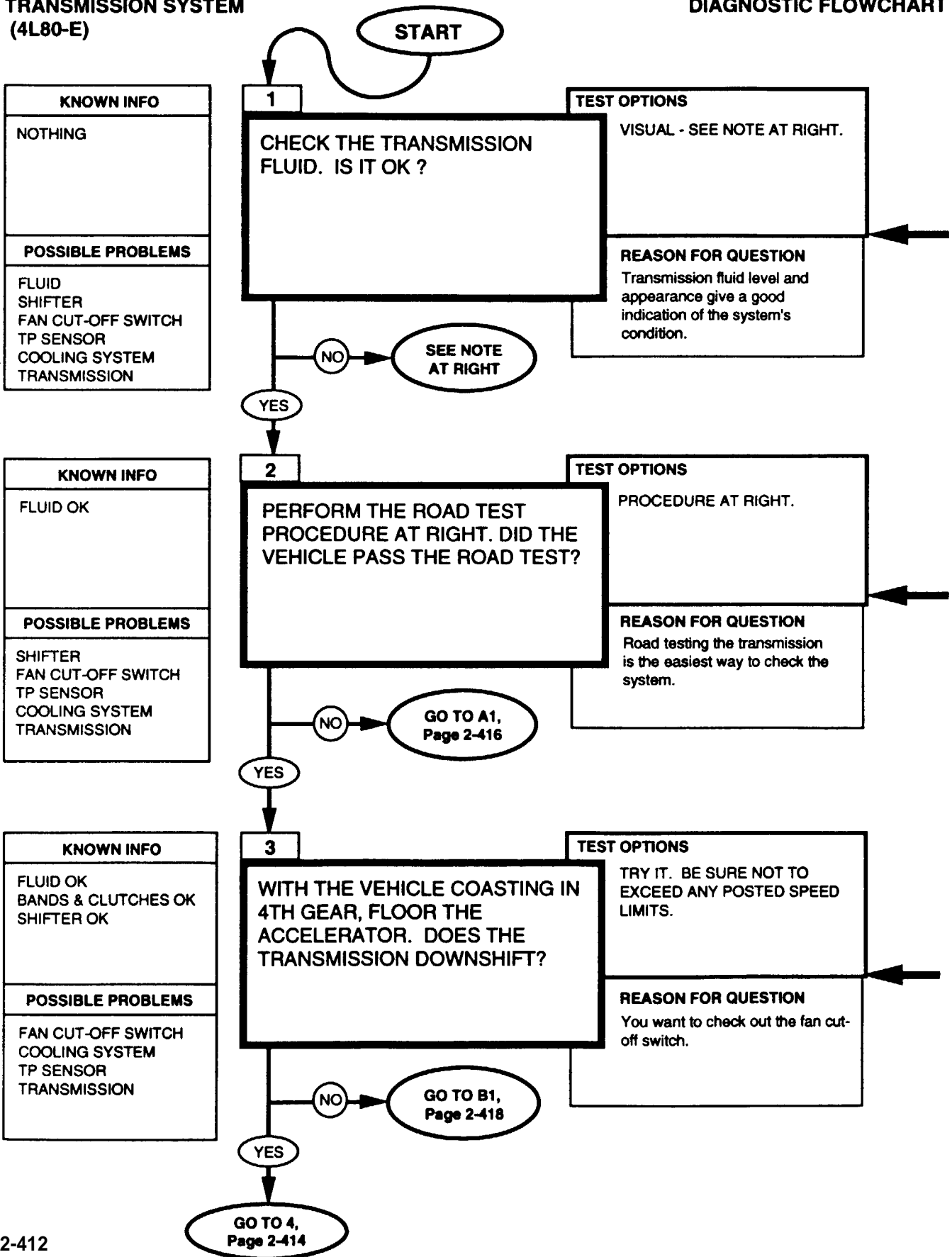
For example if the TCM is sending the trouble code 74, the lamp will flash 12 three times, flash 63 three times, which is set all the time and is to be disregarded, flash code 7 and 4, 7 and 4, 7 and 4 for code 74, and then 12, 12, 12, which ends the diagnostic check. These codes will repeat again, if not taken out of diagnostic mode.

The TCM J1 connector will be used to diagnose and troubleshoot wiring, sensor connectors, pins, solenoids, and brake switch, to insure all external problems are checked and corrected prior to TCM and transmission faults.

On the following pages you will find diagrams and charts of the major portions of the transmission circuits. These are designed to help you isolate a problem and correct it.

**TRANSMISSION SYSTEM
(4L80-E)**

DIAGNOSTIC FLOWCHART

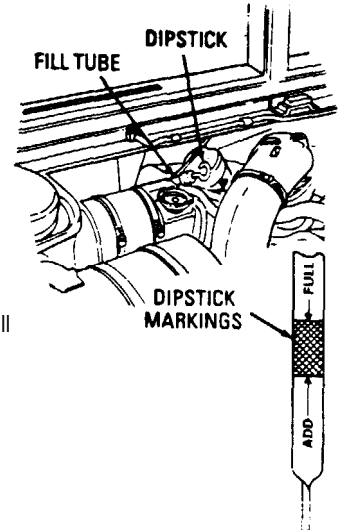


REFERENCE INFORMATION

**TRANSMISSION SYSTEM
(4L80-E)**

Procedure for checking transmission fluid

1. Start engine
2. Hold down brake pedal and move transmission shift lever through all ranges including reverse. Leave the lever in each range for 2 seconds.
3. Engage parking brake and place shift lever in neutral. Check fluid level on dipstick.
4. Proper level is between FULL and ADD marks on dipstick.



NOTE

Check fluid for a burnt smell, grit, discoloration, air bubbles, or a milky appearance.

- Burnt smell, discoloration, or grit indicates worn or damaged internal components. Notify DS maintenance
- Bubbles indicate an overfilled system or air leaks in the system. Drain the fluid and refill to proper level. Refer to (para 5-2).
- Milky appearance is due to water in the system. Change the fluid and filter.
- Check fill tube for indications of fluid being blown out. If fluid is being blown out, check vent line for obstructions, and refill transmission to proper level. Refer to (para. 5-2).

Road Test Procedure

1. Position shift lever in "D" (overdrive) and accelerate vehicle from 0 mph. A 1-2, 2-3 and 3-4 shift should occur at all throttle openings. Allow vehicle to coast down to about 0 mph and 4-3, 3-2 and 2-1 shifts should occur.
2. Position transmission shift lever in "D" (drive) and accelerate vehicle from 0 mph. A 1-2 and 2-3 shift should occur at all throttle openings. Allow vehicle to coast down to about 0 mph and 3-2 and 2-1 shifts should occur.
3. Position transmission shift lever in "2" (low two) and accelerate vehicle from 0 mph. A 1-2 shift should occur at all throttle openings. No 2-3 shift can be obtained in this range. A 1-2 shift in 2 is somewhat firmer than in "D". This is normal.
4. Position shift lever in "1" and accelerate the vehicle from 0 mph. No upshifts should occur in this range.
5. Position shift lever in "D" and with the vehicle speed at approximately 45 mph, close throttle and move lever to "3". Transmission should downshift to 3rd gear. An increase in engine rpm and engine braking effect should be noticed.
6. Position shift lever in "D" and with the vehicle speed at approximately 35 mph, close throttle and move lever to "2". Transmission should downshift to 2nd gear. An increase in engine rpm and engine braking effect should be noticed.
7. Position shift lever "2" and with the vehicle speed at approximately 25 mph, close the throttle and move lever to "1". Transmission should downshift to 1st gear. An increase in engine RPM and engine braking effect should be noticed.
8. Position shift lever in "R" and check for reverse operation.
9. Hard shifting may be indicative of an underfilled or dogged system.

The fan cut off switch and TP sensor are used to shift the transmission to a lower gear under heavy acceleration. The system also disengages the engine cooling fan so as to allow maximum engine power to be used for moving the vehicle.

**TRANSMISSION SYSTEM
(4L80-E)**

DIAGNOSTIC FLOWCHART

KNOWN INFO
FLUID OK BANDS & CLUTCHES OK SHIFTER OK TP SENSOR OK
POSSIBLE PROBLEMS
FAN CUT-OFF SWITCH COOLING

FROM 3,
Page 2-412

4

SHUT THE ENGINE OFF. DOES THE FAN CUT-OFF SWITCH ROD MOVE AS YOU STEP ON THE ACCELERATOR?

TEST OPTIONS
VISUAL INSPECTION.
REASON FOR QUESTION
The fan cut-off switch is needed for telling the transmission when to shift.

NO → REPAIR OR REPLACE AS NECESSARY

YES

KNOWN INFO
FLUID OK BANDS & CLUTCHES OK SHIFTER OK TP SENSOR OK FAN CUT-OFF SWITCH OK
POSSIBLE PROBLEMS
LEAKS COOLING

5

INSPECT THE TRANSMISSION SYSTEM FOR LEAKS. IS EVERYTHING OK?

TEST OPTIONS
VISUAL.
REASON FOR QUESTION
To see if anything is leaking

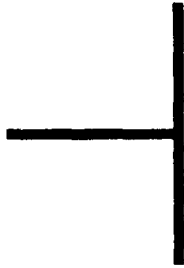
NO → REPAIR OR REPLACE AS NECESSARY

YES

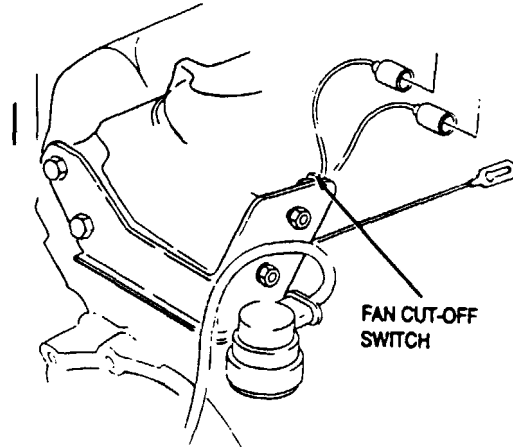
GO TO B,
Page 2-418

REFERENCE INFORMATION

TRANSMISSION SYSTEM
(4L80-E)



Repair or replace fan cut-off switch,
refer to (para 4-44).



**TRANSMISSION SYSTEM
(4L80-E)**

DIAGNOSTIC FLOWCHART

A
FROM 2,
Page 2-412

KNOWN INFO
TRANSMISSION FAILS ROAD TEST
POSSIBLE PROBLEMS
SHIFTER TRANSMISSION

A1	<p>DID THE VEHICLE MOVE AT ALL DURING THE ROAD TEST?</p>	<p>TEST OPTIONS</p> <p>VISUAL</p>
<p>REASON FOR QUESTION The failure could be in the drive train or in the transmission if the vehicle doesn't move.</p>		←

NO → RUN THE DRIVE TRAIN TESTS. RETURN TO A2.

YES →

KNOWN INFO
TRANSMISSION FAILS ROAD TEST VEHICLE MOVES
POSSIBLE PROBLEMS
SHIFTER TRANSMISSION FAN CUT-OFF SWITCH

A2	<p>WITH THE VEHICLE OFF, MOVE THE GEARSHIFT. IS THE SHIFTER WORKING PROPERLY?</p>	<p>TEST OPTIONS</p> <p>VISUAL</p>
<p>REASON FOR QUESTION Make sure the shifter is connected to and moving the transmission linkages.</p>		←

NO → ADJUST OR REPAIR AS NEEDED CONTINUE WITH A3.

YES →

KNOWN INFO
SHIFTER OK FINAL DRIVE OK TRANSMISSION FAILS ROAD TEST
POSSIBLE PROBLEMS
FAN CUT-OFF SWITCH TRANSMISSION

A3	<p>WITH THE VEHICLE OFF, STEP ON THE THROTTLE. DOES THE FAN CUT OFF SWITCH ROD MOVE AS YOU STEP ON THE THROTTLE?</p>	<p>TEST OPTIONS</p> <p>VISUAL INSPECTION</p>
<p>REASON FOR QUESTION The fan cut-off switch tells the transmission when to shift.</p>		←

NO → REPAIR OR REPLACE AS NECESSARY

YES →

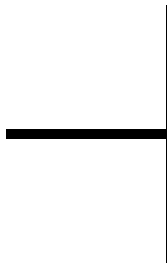
SEE NOTE AT RIGHT

REFERENCE INFORMATION

**TRANSMISSION SYSTEM
(4L80-E)**

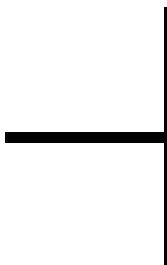
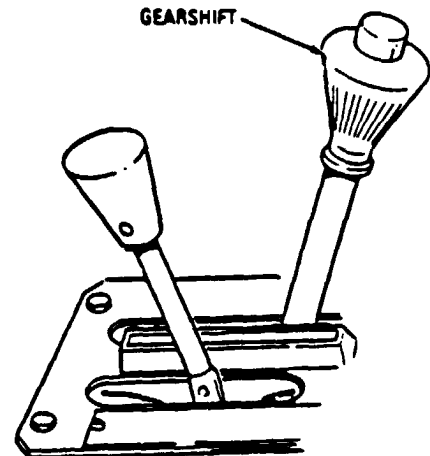


If the drivetrain system checks out OK, the problem is either the transmission itself, the shifter or the modulator. The DRIVETRAIN tests are located in Paragraph 2-33 of this manual.



Make sure that the detents in the shifter correspond to the shift positions shown on the plate. Have an assistant move the shifter and look to see that the linkage is moving at the transmission.

Linkage repair and adjustment procedures are shown in Paragraph 5-13.



Look for a fan cut-off switch problem if the vehicle was not shifting, or was not shifting as well as it should be.

NOTE

Run the BRAKES and DRIVETRAIN tests in this manual. If you don't find any faults, notify DS maintenance.

**TRANSMISSION SYSTEM
(4L80-E)**

DIAGNOSTIC FLOWCHART

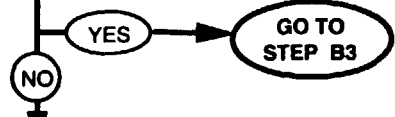
B
FROM 3,
Page 2-412

KNOWN INFO
NO LEAKS FLUID OK SHIFTER OK
POSSIBLE PROBLEMS
TRANSMISSION

B1

CONNECT DIAGNOSTIC SWITCH CABLE TO THE TRANSMISSION CONTROL MODULE (TCM) J2 CONNECTOR. DISCONNECT GLOWPLUG CONTROLLER. TURN VEHICLE IGNITION TO THE RUN POSITION. DOES TRANSMISSION CHECK LAMP STEADILY ILLUMINATE?

TEST OPTIONS
Visual inspection
REASON FOR QUESTION
Transmission check lamp may be faulty.

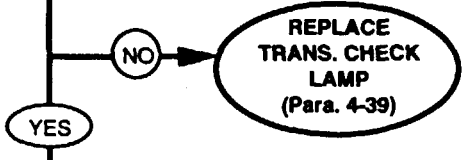


KNOWN INFO
NO LEAKS FLUID OK SHIFTER OK
POSSIBLE PROBLEMS
TRANSMISSION

B2

CHECK VOLTAGE ON TRANSMISSION CHECK LAMP LEADS. DID YOU GET:
>12 V ON PIN 1 (CKT 6578)?
0 V ON PIN 2 (CKT 657A)?

TEST OPTIONS
MULTIMETER
REASON FOR QUESTION
Transmission check lamp or harness leads may be faulty.

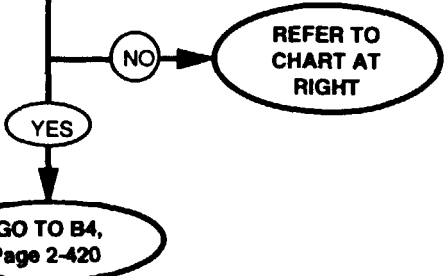


KNOWN INFO
NO LEAKS FLUID OK SHIFTER OK
POSSIBLE PROBLEMS
TRANSMISSION

B3

POSITION SWITCH TO ON. DOES THE TRANSMISSION CHECK LAMP FLASH THREE CODE 12s INDICATING THE TCM IS CAPABLE OF DIAGNOSTICS?

TEST OPTIONS
Procedure at right
REASON FOR QUESTION
Transmission check lamp must flash three code 12s indicating the TCM is capable at diagnostics.



REFERENCE INFORMATION

TRANSMISSION SYSTEM
(4L80-E)

Will Not Display DTC Code 12, or Check Transmission "ON" Steady

(NOTE: TRANSMISSION CHECK LAMP IS THE LAMP NEXT TO THE SHIFT LEVER MARKED TRANS-ONLY.)

IGNITION ON, ENGINE OFF AND GLOWPLUG CONTROLLER DISCONNECTED (PARA 4-29).

REMOVE DIAGNOSTIC SWITCH CABLE. INSTALL JUMPER CABLE BETWEEN PINS A AND E OF J2 ON TCM. ASSY.

NO DTC 12

DTC 12 FLASHES

CHECK DIAGNOSTIC CABLE FOR OPEN AND REPAIR.

READ CODES AND REMOVE JUMPER.

- IGNITION OFF.
- DISCONNECT TCM CONNECTOR.
- IGNITION ON.

TRANS CHECK LAMP OFF.

TRANS CHECK LAMP ON.

- IGNITION OFF.
- DIAGNOSTIC TERMINAL NOT GROUNDED.
- RECONNECT TCM CONNECTOR.
- IGNITION ON AND ENGINE OFF.
- PROBE PIN E ON J2 TO GROUND.

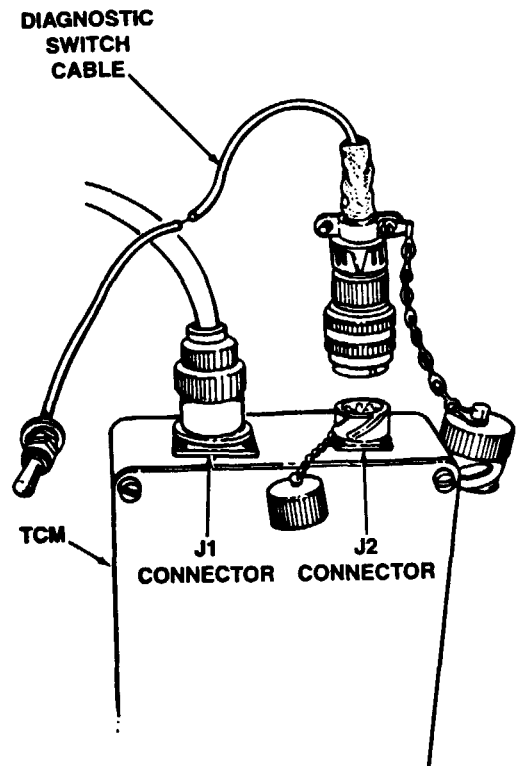
REPAIR SHORT TO GROUND IN CKT 657A. (REFER TO PARA. 4-85).

NO DTC 12

DTC 12 FLASHES

REPLACE DEFECTIVE TCM. (REFER TO PARA 4-42).

OPEN CKT PIN A J2. REPLACE TCM. (REFER TO PARA 4-42).



NOTE: AFTER TROUBLESHOOTING, RECONNECT GLOWPLUG CONTROLLER. VEHICLE WILL HAVE TO BE OPERATED IN ORDER FOR TCM TO RECEIVE TROUBLE CODES. AFTER REPAIRS, CHECK TRANS LAMP OPERATION.

**TRANSMISSION SYSTEM
(4L80-E)**

DIAGNOSTIC FLOWCHART

KNOWN INFO
NO LEAKS FLUID OK SHIFTER OK
POSSIBLE PROBLEMS
TRANSMISSION

B4

FROM B3,
Page 2-418

FOLLOWING THE CODE 12 DISPLAYS, EACH STORED CODE WILL BE FLASHED THREE TIMES IN NUMERIC ORDER FROM LOWEST TO HIGHEST. WHEN ALL CODES HAVE BEEN DISPLAYED, THREE CODE 12s WILL FLASH AGAIN. TURN THE SWITCH OFF IF YOU DO NOT WISH TO REPEAT THE SEQUENCE.

B5

RECORD THE CODES AND REFER TO THE J1 CABLE DIAGNOSTICS CHART ON PAGES 2-428 THROUGH 2-443 AND COMPLETE THE DIAGNOSTICS. REFER TO PAGE 2-421 FOR DESCRIPTION OF TROUBLE CODES.

B6

IF CODE 51 SHOWS, REPLACE TCM. REFER TO PARA. 4-42.

END OF TESTING

REFERENCE INFORMATION

TRANSMISSION SYSTEM
(4L80-E)

The following chart will help you find the code you need. The J1 cable diagnostics checks (page 2-428) must be performed. Always correct the lower code number first. If code 51 shows up, replace TCM (para. 4-42), operate vehicle, and recheck for trouble codes.

TROUBLE CODE	CIRCUIT	PAGE NO.
21	Throttle Position High	2-422
22	Throttle Position Low	2-422
24	Transmission Output Speed Sensor (TOSS)	2-422
28	Transmission Range Pressure Switch	2-422
37	Torque Converter Clutch (TCC) Brake Switch Stuck "ON"	2-422
38	TCC Brake Switch Stuck "OFF"	2-422
39	TCC Stuck "OFF"	2-423
51	Transmission Control Module (TCM) Bad	2-423
52	System Voltage High Long	2-423
53	System Voltage High	2-423
58	Transmission Temperature High	2-423
59	Transmission Temperature Low	2-423
68	Transmission Component Slipping	2-424
69	Torque Converter Clutch (TCC) Stuck "ON"	2-424
71	Engine Speed Sensor Circuit Low	2-424
73	Pressure Control Solenoid (PCS) Current	2-424
74	Transmission Input Speed Sensor (TISS) Circuit	2-425
75	System Voltage Low	2-425
79	Transmission Fluid Overtemp	2-425
81	2-3 Shift Solenoid Circuit Fault	2-425
82	1-2 Shift Solenoid Circuit Fault	2-426
83	TCC Solenoid (PWM) Circuit Fault	2-426
85	Undefined Ratio	2-426
86	Low Ratio	2-427
87	High Ratio	2-427

TRANSMISSION SYSTEM
(4L80-E)

REFERENCE INFORMATION

DTC 21/22
**Throttle Position (TP) Sensor Circuit High/
Throttle Position Sensor Circuit Low**

Circuit Description:

The TP sensor contains a resistor strip with one end connected to a 5-volt supply and the other to ground. The signal is connected to a movable contact within the TP sensor. As the accelerator pedal is applied, and the throttle shaft rotates, the voltage signal will increase from approximately 0.5 to 4.5 volts.

DTC 21 Will Set When:

- Engine is operating.
- TP sensor signal voltage is greater than 4.9 volts.
- Conditions are met for one second.

DTC 22 Will Set When:

- Engine is operating.
- TP sensor signal voltage is less than 0.2 volt.
- Conditions are met for one second.

DTC 24
Output Speed Sensor Signal

Circuit Description:

The Output Speed sensor is a magnetic induction type sensor. Gear teeth pressed onto the output shaft induce an alternating voltage into the sensor.

DTC 24 Will Set When:

- Not in P/N.
- CKT voltage is constant.
- Engine speed is greater than 3000 rpm.
- Output speed is less than 200 rpm.
- TP is between 10% and 100%.
- All conditions are met for 3 seconds.

DTC 28
**Transmission Range (TR) Pressure
Switch Assembly (PSA) Fault**

Circuit Description:

The Transmission Range (TR) switch assembly consists of five normally open pressure switches mounted on the valve body. The TCM supplies battery voltage to each range signal. By grounding one or more of these circuits through various combinations of the pressure switches, the TCM assembly detects what transmission range has been selected by the vehicle operator. When the transmission electrical connector is disconnected, the ground potential for the three range signals to the TCM will be removed and D2 gear will be indicated

DTC 28 Will Set When:

- Range signals "A" and "C" are both zero volts.
- Condition is met for 2 seconds.

DTC 37/38
**Torque Converter Clutch (TCC) Brake
Switch Stuck "ON"/
TCC Brake Switch Stuck "OFF"**

Circuit Description:

The normally closed brake switch supplies a B+ signal volt when the TCC brake switch is closed (brake pedal not applied).

DTC 37 Will Set When:

- CKT 810B is open.
- Then vehicle speed is between 5 mph (8 kph) and 20 mph (32 kph) for greater than 6 seconds.
- Then vehicle speed is greater than 20 mph (32 kph) for greater than 6 seconds.
- For a complete total of seven times.

DTC 38 Will Set When:

- TCC brake switch feed CKT 810B has constant voltage.
- Vehicle speed is greater than 20 mph (32 kph) for greater than 6 seconds.
- Then vehicle speed is between 5 mph (8 kph) and 20 mph (32 kph) for greater than 6 seconds.
- For a complete total of seven times.

REFERENCE INFORMATION

TRANSMISSION SYSTEM
(4L80-E)**DTC 39**
TCC Stuck "OFF"**Circuit Description:**

The TCM commands the TCC PWM solenoid "ON" by modulating TCC signal fluid acting on the converter clutch shift valve. Then TCC fluid applies the torque converter clutch.

DTC 39 Will Set When:

- TCC is commanded "ON."
- TCC slip speed greater than 65 RPM.
- Trans range in D3 or D4.
- 2nd or 3rd gear.
- All conditions are met for two seconds.

DTC 51
Faulty or Incorrect**Circuit description:**

The transmission Control Module (TCM), an on board computer, receives and processes input signals from sensors on the vehicle and delivers output signals to the solenoids located on the control valve assembly. These solenoids control the transmission operating pressures, upshift and downshift patterns and torque converter clutch (TCC) operation.

DTC 51 Will Set When:

- There is an uncorrectable computational error, or an input is in error intermittently.

DTC 52/53
**System Voltage High Long/
System Voltage High****Circuit Description:**

Ignition voltage is supplied to the control module to indicate the status of the ignition switch. Battery voltage is supplied to the control module to, in part, maintain memory of learned functions and parameters.

DTC 52 Will Set When:

- The ignition is "ON" and the system voltage is greater than 16 volts.
- Condition is met for 109 minutes.

DTC 53 Will Set When:

- The ignition is "ON" and the system voltage is greater than 19.5 volts.
- Condition is met for 2 minutes.

DTC 58
**Transmission Fluid Temperature (TFT)
Sensor Circuit Low
(High Temperature Indicated)****Circuit Description:**

The TFT sensor is a thermistor that controls the signal voltage to the TCM. The TCM supplies a 5-volt reference signal to the sensor on TWC pin "L." When the transmission fluid is cold, the sensor resistance is high and the TCM will sense high signal voltage.

As the transmission fluid temperature warms to normal transmission operating temperature 212°F (100°C), the sensor resistance becomes less and the voltage decreases to approximately 1.5 to 2.0 volts. With DTC 79 also set, check the transmission cooling system.

DTC 58 Will Set When:

- Signal voltage indicates TFT greater than 304°F (151°C).
- Condition is met for 1 second.

TRANSMISSION SYSTEM
(4L80-E)

REFERENCE INFORMATION

DTC 59
Transmission Fluid Temperature (TFT)
Sensor Circuit High
(Low Temperature Indicated)

Circuit Description:

The TFT sensor is a thermistor that controls the signal voltage to the TCM. The TCM supplies a 5-volt reference signal to the sensor on TWC Pin "L." When the transmission fluid is cold, the sensor resistance is high and the TCM will sense high signal voltage.

As the transmission fluid temperature warms to normal transmission operating temperature 212°F (100°C), the sensor resistance becomes less and the voltage decreases to approximately 1.5 to 2.0 volts.

DTC 59 Will Set When:

- Signal voltage indicates TFT less than -34°F (-37°C).
- Condition is met for 1 second.

DTC 68
Transmission Component Slipping

Circuit Description:

The TCM monitors the difference in engine Speed and input Speed.

DTC 68 Will Set When:

- TCC slip speed greater than 200 RPM.
 - Fourth gear is indicated.
 - TCC is locked.
 - Not in park/neutral.
 - All conditions are met for 2 seconds.
-
- Trans range switch indicates D3 or D4.
 - Commanded gear indicates 2nd or 3rd gear.
 - All conditions are met for 2 seconds.

DTC 69
Torque Converter Clutch (TCC) Stuck "ON"

Circuit Description:

The TCM commands the TCC PWM solenoid "ON" by modulating TCC signal fluid acting on the converter clutch shift valve. Then TCC fluid applies the torque converter clutch.

DTC 69 Will Set When:

- TCC slip speed RPM indicates between -5 and +10 RPM.
- TCC solenoid is commanded "OFF."
- TP sensor signal is greater than 25%.

DTC 71
Engine Speed, Sensor Circuit Low

Circuit Description:

The camshaft position sensor (CPS) detects the rotational speed of the camshaft. As the camshaft rotates, an AC signal is generated in the circuit. This signal provides the input to determine engine speed for use in various calculations including TCC slip speed and overdrive ratio.

DTC 71 Will Set When:

- Engine speed less than 50 rpm
- Transmission range indicates, R, D4, D3, or D1.
- Conditions are met for 2 seconds.

REFERENCE INFORMATION

TRANSMISSION SYSTEM
(4L80-E)**DTC 73**
Pressure Control Solenoid (PCS) Circuit
Current Error (Force Motor Circuit)***Circuit Description:***

The pressure control solenoid is a TCM-controlled device used to regulate transmission line pressure. The TCM compares TP voltage, engine rpm and other inputs to determine the appropriate line pressure of a given load. The TCM will regulate the pressure by applying a varying amperage to the pressure control solenoid. The applied amperage can vary from 0.1 to 1.1 amp. The TCM then monitors the amperage at the return line.

DTC 73 Will Set When:

- The return amperage varies greater than 0.16 amps from the commanded amperage.
- All conditions are met for 1 second.

DTC 74
Transmission Input Speed
Sensor (TISS) Circuit***Circuit Description:***

The TISS sensor consists of a permanent magnet surrounded by a coil of wire. As the forward clutch housing rotates, an AC voltage is induced in the circuit. The signal voltage and frequency vary directly with the forward clutch rotational speed.

DTC 74 Will Set When"

- Trans range not in park or neutral.
- Engine speed greater than 300 rpm.
- Trans output speed greater than 200 rpm.
- Trans input speed less than 50 rpm.
- All conditions are met for 2 seconds.

DTC 75
System Voltage Low***Circuit Description:***

Ignition voltage is supplied to the control module to indicate the status of the ignition switch. Battery voltage is supplied to the control module to, in part, maintain memory of learned functions and parameters.

DTC 75 Will Set When:

- The ignition is "ON."
- Ignition feed voltage to the control module is less than the graduated scale of:
 - -40°F (-40°C) = 7.3 volts.
 - 194°F (-90°C) = 10.3 volts.
 - 302°F (-150°C) = 11.7 volts.
- Engine speed greater than 1000 rpm.
- All conditions are met for 4 seconds.

DTC 79
Transmission Fluid Overtemp***Circuit Description:***

The Transmission Fluid Temperature (TFT) sensor is a thermistor that controls the signal voltage to the TCM. The TCM supplies a 5-volt reference signal to the sensor on CKT 923A. When the transmission fluid is cold, the sensor resistance is high and the TCM will sense high signal voltage.

As the transmission fluid temperature warms to normal transmission operating temperature 212°F (100°C), the sensor resistance becomes less and the voltage decreases to approximately 1.5 to 2.0 volts.

DTC 79 Will Set When:

- Trans fluid temp greater than 295°F (146°C).
- All conditions are met for 30 minutes.

**TRANSMISSION SYSTEM
(4L80-E)****REFERENCE INFORMATION****DTC 81
2-3 Shift Solenoid Circuit Fault*****Circuit Description:***

Ignition voltage is supplied directly to the 2-3 shift solenoid. The TCM controls the solenoid by providing the ground path through CKT 315A to TCM.

DTC 81 Will Set When:

- The TCM commands the solenoid “ON” and voltage remains high.
- The TCM commands the solenoid “OFF” and voltage remains low.
- All conditions are met for 2 seconds.

**DTC 82
1-2 Shift Solenoid Fault*****Circuit Description:***

Ignition voltage is supplied directly to the 1-2 shift solenoid. The TCM controls the solenoid by providing the ground path through CKT 237A to TCM.

DTC 82 Will Set When:

- The TCM commands the solenoid “ON” and voltage remains high.
- The TCM commands the solenoid “OFF” and voltage remains low.
- All conditions are met for 2 seconds.

**DTC 83
TCC Solenoid (PWM) Circuit Fault*****Circuit Description:***

The control module supplies a ground through an internal Quad-Driver Module (QDM) allowing current to flow through the solenoid coil according to the duty cycle (percentage of “ON” and “OFF” time). This current flow through the solenoid coil creates a magnetic field that magnetizes the solenoid core. The magnetized core attracts the check-ball to seat against spring pressure. This blocks the exhaust for the TCC signal fluid and allows 2-3 drive fluid to feed the TCC signal circuit. The TCC signal fluid pressure acts on the TCC regulator valve to regulate line pressure and to apply fluid pressure to the TCC shift valve. When the TCC shift valve is in the “apply” position, regulated apply fluid pressure is directed through the TCC valve to apply the torque converter clutch.

DTC 83 Will Set When:

- The TCM commands the solenoid “ON” and voltage remains high.
- The TCM commands the solenoid “OFF” and voltage remains low.
- AU conditions are met for 2 seconds.

REFERENCE INFORMATION

TRANSMISSION SYSTEM
(4L80-E)

DTC 85
Undefined Ratio Error

Circuit Description:

The control module calculates ratio based on the transmission input speed and output speed sensor reading. The control module compares the known transmission ratio to the calculated ratio for the particular gear range selected.

DTC 85 Will Set When:

- TP is greater than 25%.
- Not in park neutral, or 4th gear.
- Engine speed is greater than 300 rpm.
- Vehicle speed is greater than 7 mph (11 kph).

COMMANDED GEAR	IF CALCULATED RATIO IS:	
	LESS THAN	MORE THAN
1st	2.38	2.63
2nd	1.43	1.58
3rd	0.95	1.05
REV	1.97	2.17

- All conditions are met for 2 seconds.

DTC 86
Low Ratio Error

Circuit Description:

The control module calculates ratio based on the transmission input speed and output speed sensor readings. The control module compares the known transmission ratio to the calculated ratio for the particular gear range selected.

DTC 86 Will Set When:

- Not in park, reverse, or neutral.
- Engine speed greater than 300 rpm.
- TP greater than 25%.
- Vehicle speed is greater than 7 mph (11 kph).
- Trans gear ratio is less than 1.06 in first or second gear.
- All conditions are met for 2 seconds.

DTC 87
High Ratio Error

Circuit Description:

The control module calculates ratio based on the transmission input speed and output speed sensor readings. The control module compares the known transmission ratio to the calculated ratio for the particular gear range selected.

DTC 87 Will Set When:

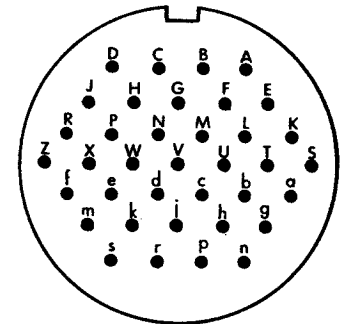
- TP greater than 25%.
- Not in park, reverse, or neutral.
- Engine speed greater than 300 rpm.
- Vehicle speed greater than 7 mph (11 kph).
- Transmission temperature is greater than 68°F (20°C).
- All conditions are met for 2 seconds.

**TRANSMISSION SYSTEM
(4L80-E)**

DIAGNOSTIC FLOWCHART

NOTE

- The following diagnostics will help isolate and repair problem circuits, wires, pins, connectors, sensors, circuit breakers, and solenoids.
- For repair of all wiring, refer to para. 4-85.
- Check connector pins before inserting probes.



J1

J1 CABLE DIAGNOSTICS CHART

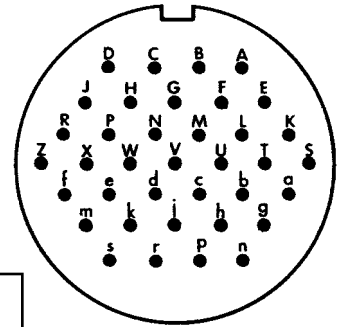
J1 Voltage Measurements With Ignition ON, Engine OFF, and Glow Plug Controller Disconnected. Refer to para 4-29.						
CKT NOM.	CKT #	PIN	TO	PIN	EXP READ	
IGN PWR	291D	j	a or b		12VDC	No Go to pg 2-430
Battery Pos	537D	Z	a or b		12VDC	No Go to pg 2-431
Trans Lp	657A	U*	a or b		LED Lights	No Go to pg 2-432
Brake Sw	810B	W	a or b		12V (Brake OFF)	No Go to pg 2-433
Brake Sw	810B	W	a or b		O (Brake ON)	No Go to pg 2-433
* Jumper wire from U to a or b.						
Reconnect Glow Plug Controller; refer to para 4-29. J1 Voltage Measurement With Ignition ON, Engine ON, and Transmission in PARK.						
CKT NOM.	CKT #	PIN	TO	PIN	EXP READ	
Engine RPM	349A	h		c or p	0.3 Volts min @ idle	Go to pg 2-434
Press SW A	765A	A		a or b	Open wire	No Go to pg 2-442
Press SW B	763A	B		a or b	0 to 1 ohms	No Go to pg 2-442
Press SW C	764A	C		a or b	Open wire	No Go to pg 2-442

DIAGNOSTIC FLOWCHART

**TRANSMISSION SYSTEM
(4L80-E)**

NOTE

Check connector pins before inserting probes.



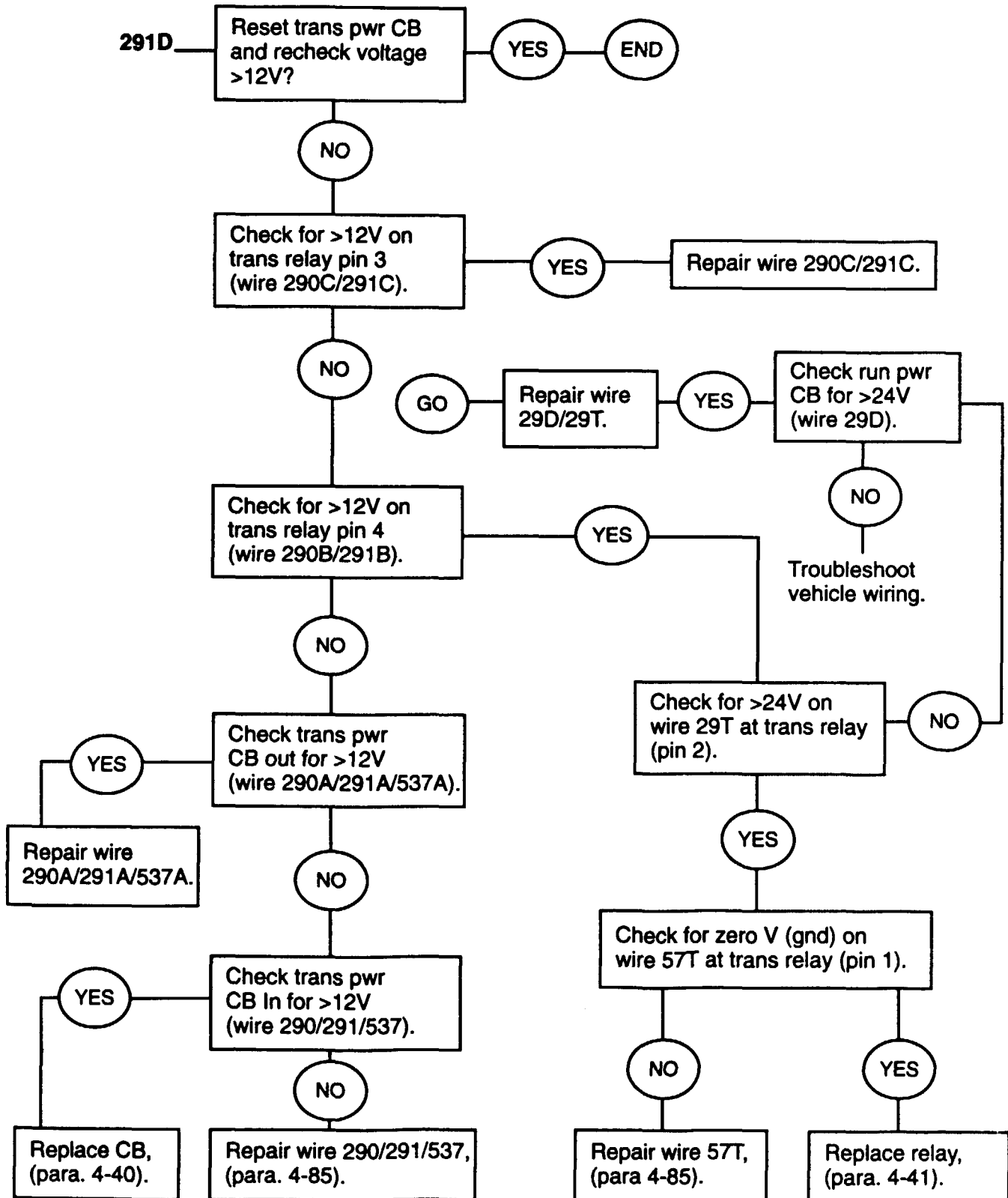
J1 CABLE DIAGNOSTICS CHART (Cont'd)

J1 Resistance Measurements With Ignition OFF						
CKT NOM.	CKT #	PIN	TO	PIN	EXP READ	
Battery Neg	599A	a		Shunt	0 ohms	No Go to pg 2-431
Battery Neg	599B	b		Shunt	0 ohms	No Go to pg 2-431
TPS	355A	s		c or p	~ 1 to 2 Kohms	No Go to pg 2-435
TPS	350A	d		c or p	4 to 6 Kohms	No Go to pg 2-435
TISS	495A 496A	m		n	1 to 2 Kohms	No Go to pg 2-436
TOSS	497A 498A	S		R	1 to 2 Kohms	No Go to pg 2-437
TCC SOL	924A	X		j	~ 8 to 12 ohms	No Go to pg 2-438
SHIFT SOL A	237A	E		j	~18 to 24 ohms	No Go to pg 2-439
SHIFT SOL B	375A	D		j	~18 to 24 ohms	No Go to pg 2-440
FORCE MTR	264A 265A	g		k	3.5 to 5.2 ohms	No Go to pg 2-441
Trans Temp Sensor	923A	e		c or p	40 ohm to 5 Kohm (High Temp → Low Resist.)	No Go to pg 2-443

Upon completion of J1 cable diagnostics, operate the vehicle and recheck for codes to insure codes have cleared. If codes have not cleared, refer to DS Maintenance.

**TRANSMISSION SYSTEM
(4L80-E)
IGN POWER CIRCUIT**

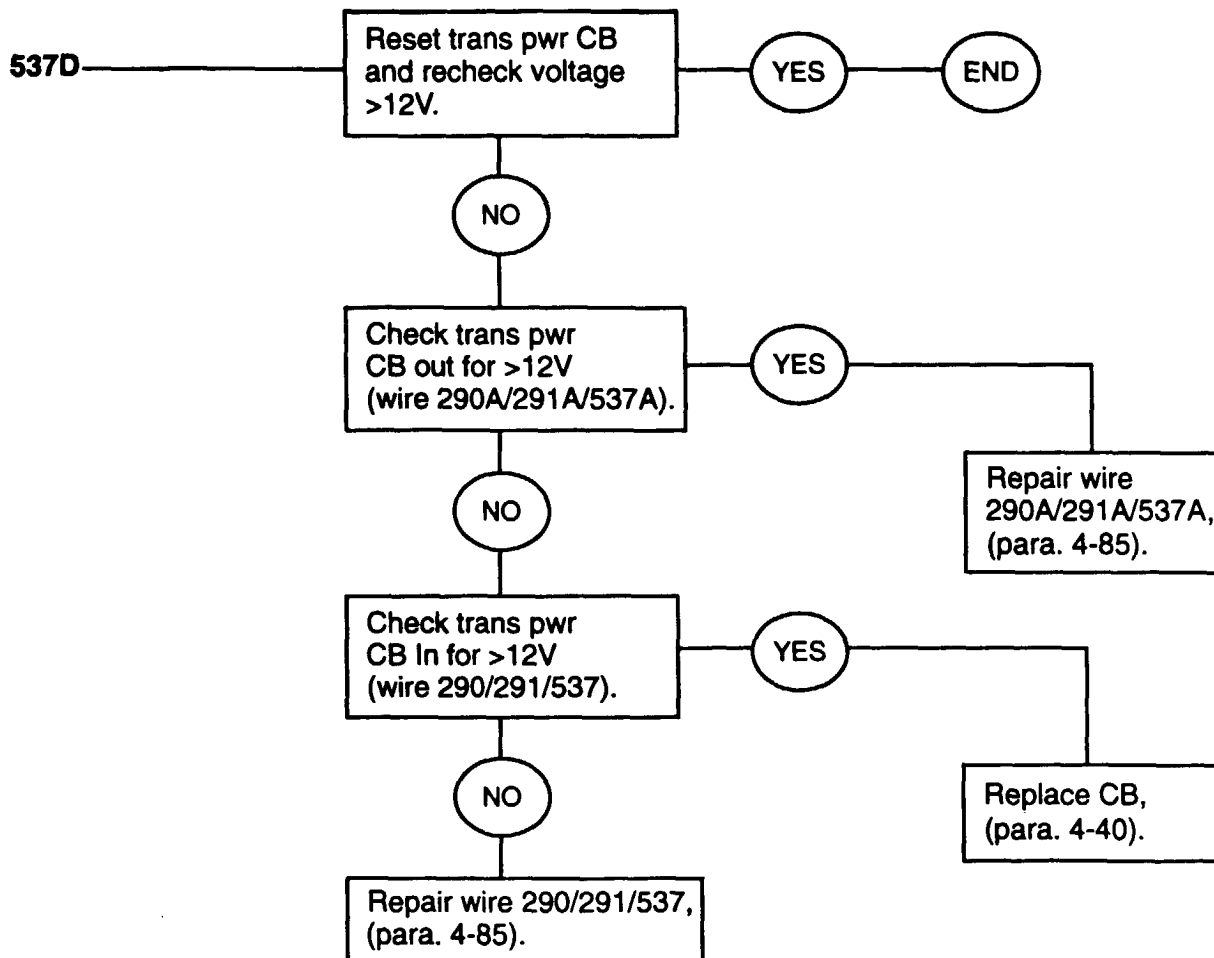
DIAGNOSTIC FLOWCHART



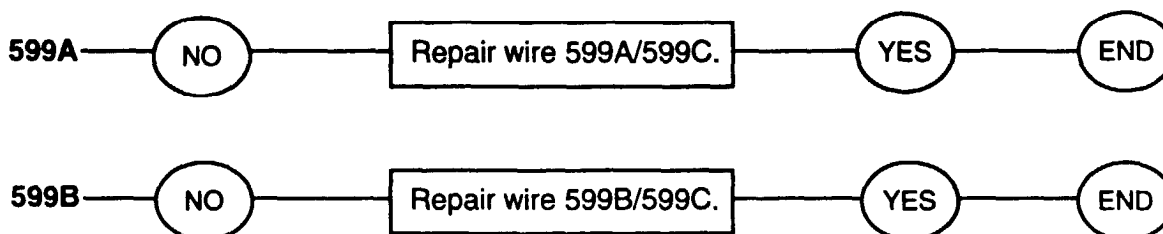
DIAGNOSTIC FLOWCHART

**TRANSMISSION SYSTEM
(4L80-E)**

BATTERY CIRCUIT



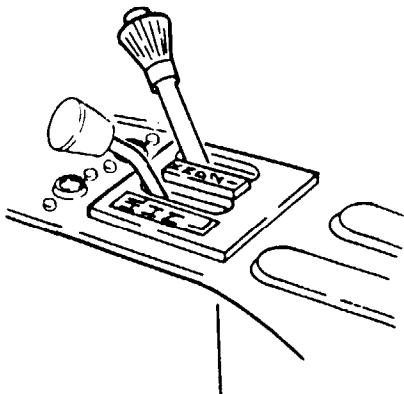
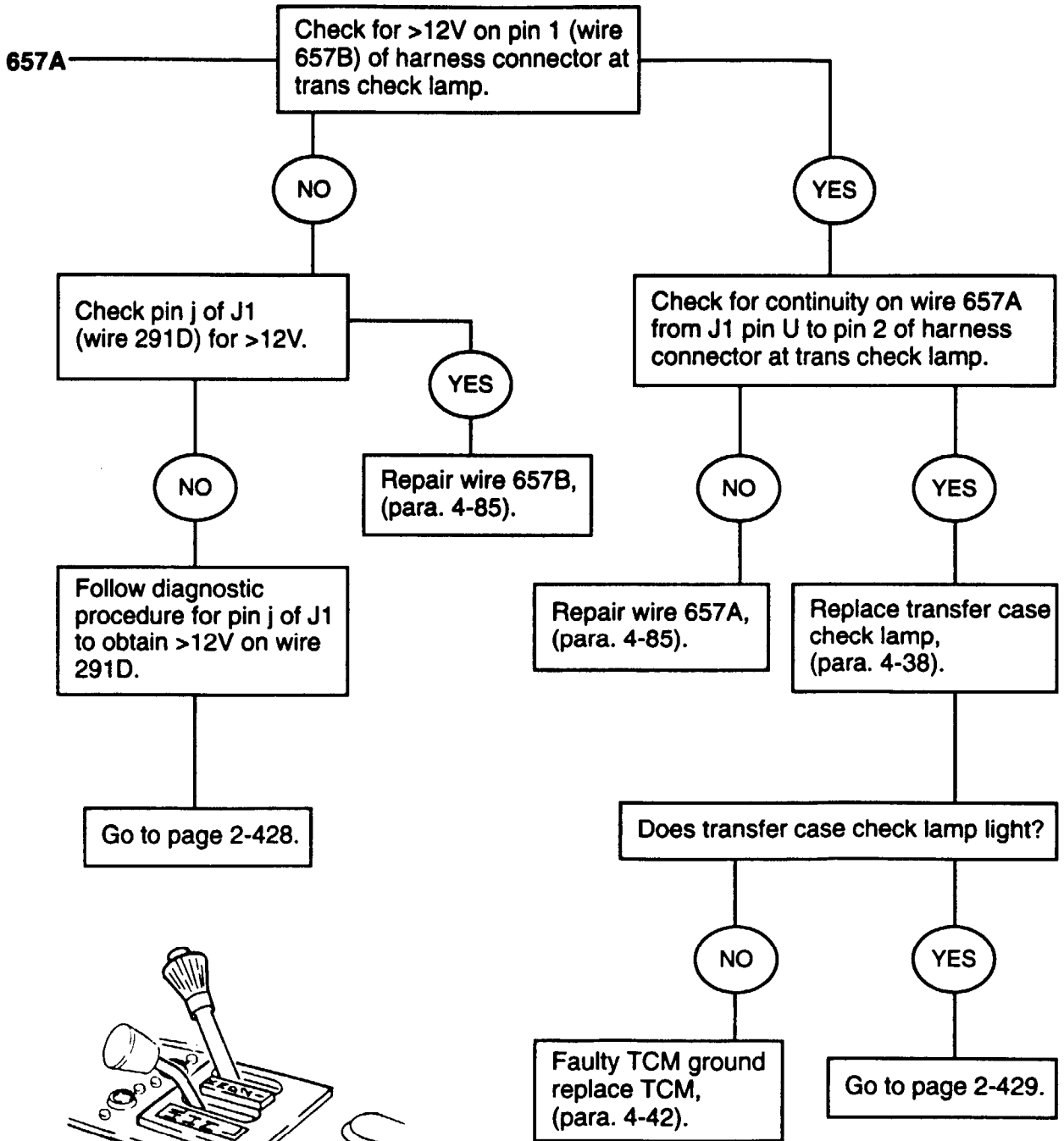
VEHICLE GROUND CIRCUIT



**TRANSMISSION SYSTEM
(4L80-E)**

DIAGNOSTIC FLOWCHART

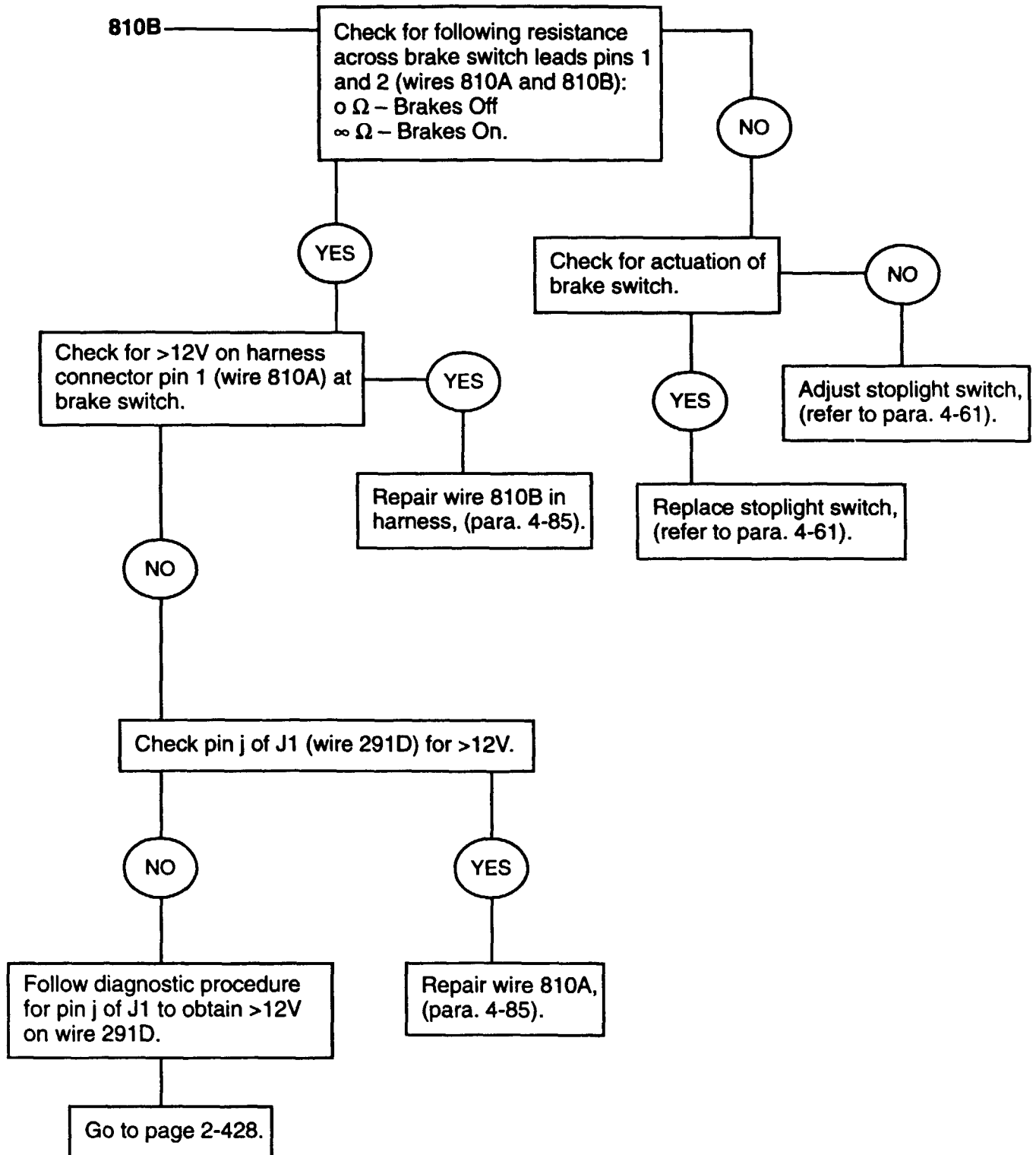
TRANSMISSION LIGHT CIRCUIT



DIAGNOSTIC FLOWCHART

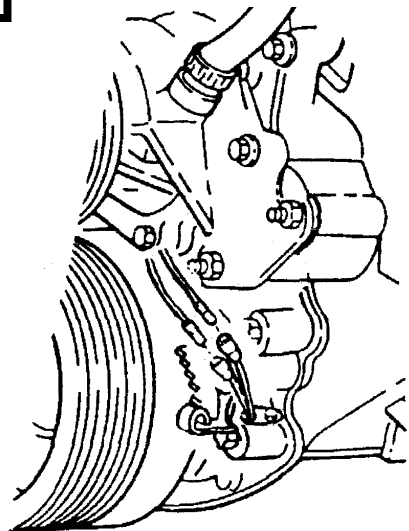
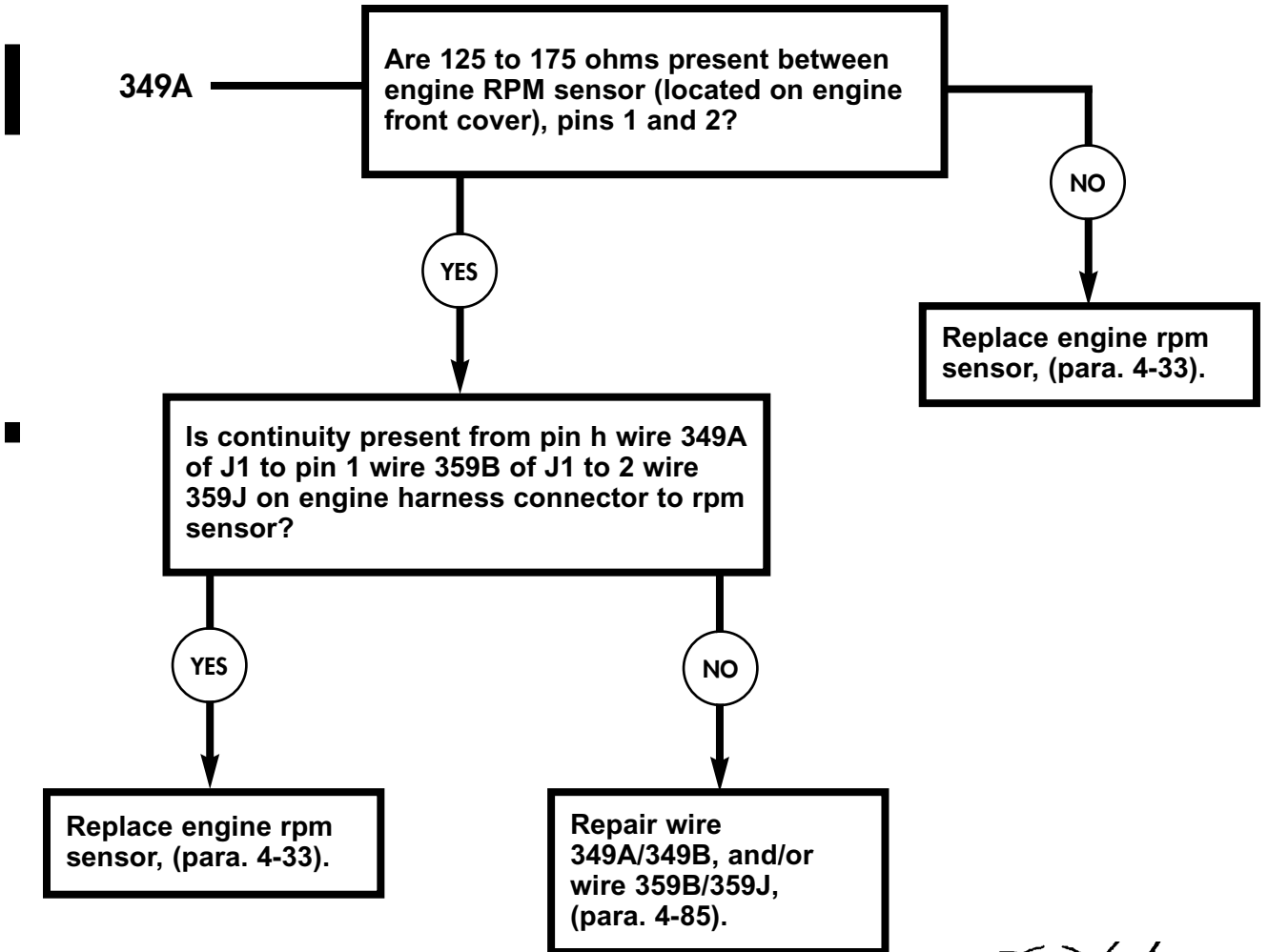
TRANSMISSION SYSTEM
(4L80-E)

BRAKE SWITCH CIRCUIT



**TRANSMISSION SYSTEM
(4L80-E)
ENGINE RPM SENSOR**

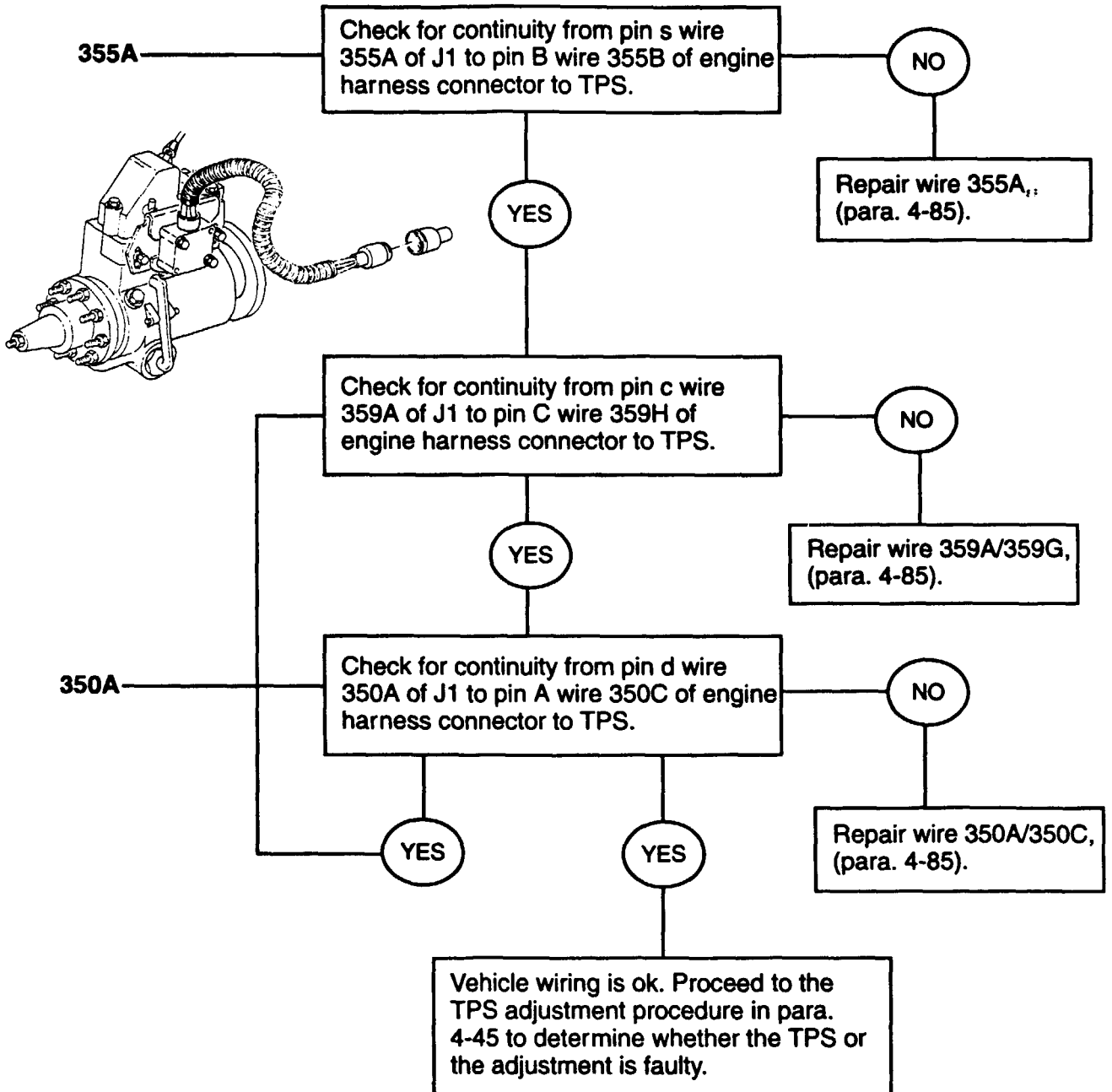
DIAGNOSTIC FLOWCHART



DIAGNOSTIC FLOWCHART

**TRANSMISSION SYSTEM
(4L80-E)**

**THROTTLE POSITION SENSOR
CIRCUIT**



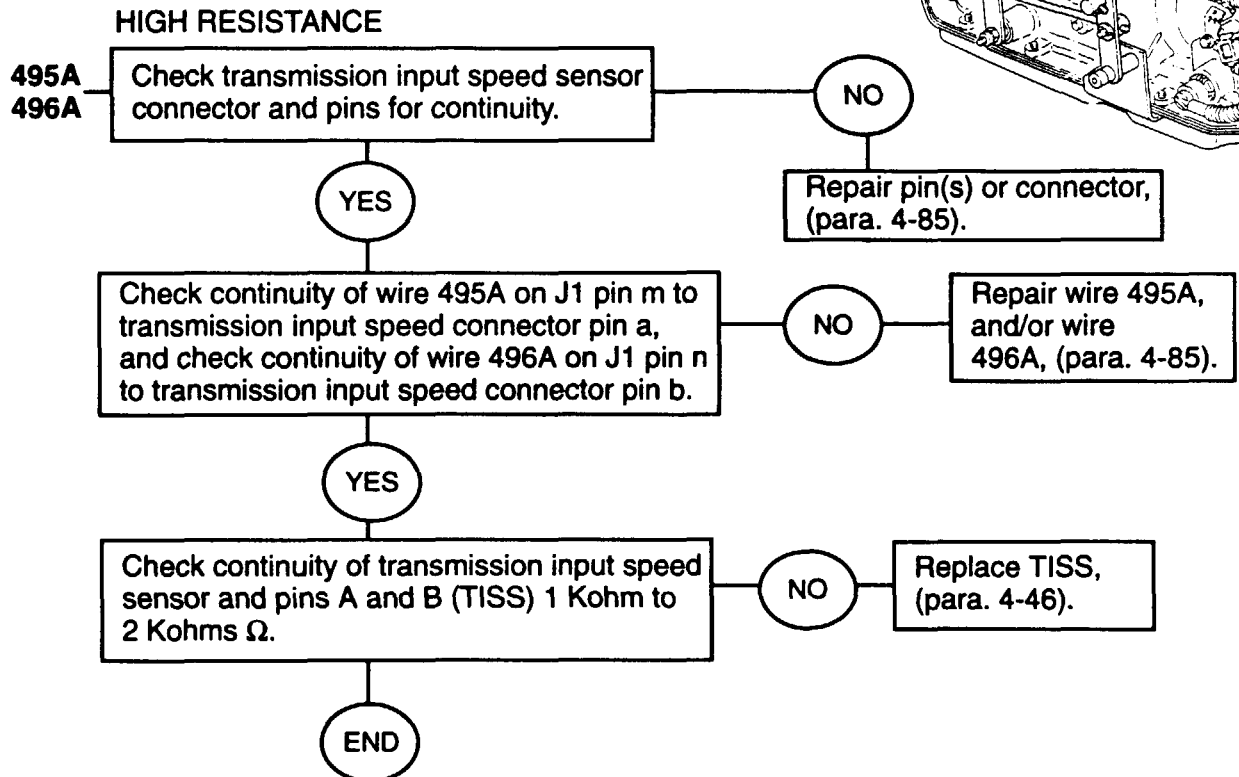
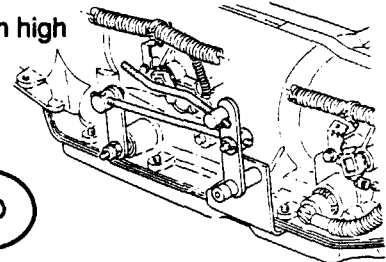
**TRANSMISSION SYSTEM
(4L80-E)**

DIAGNOSTIC FLOWCHART

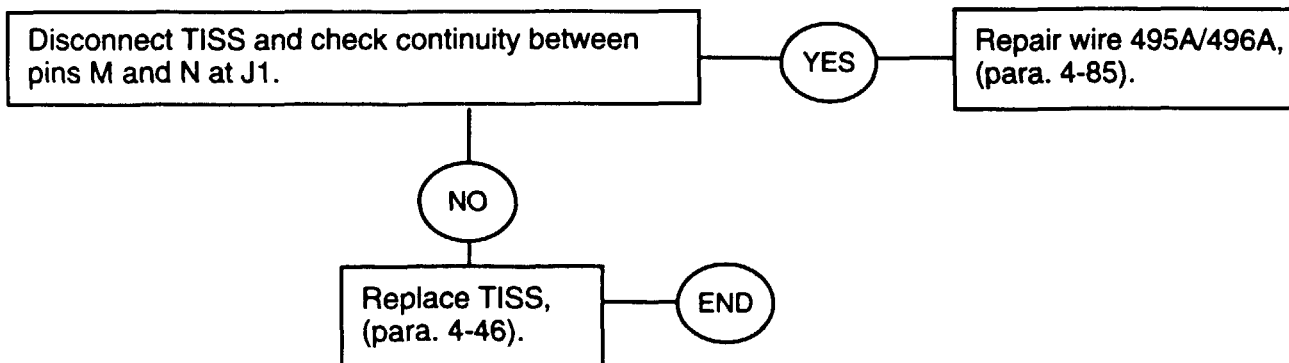
**TRANSMISSION INPUT SPEED
SENSOR (TISS) CIRCUIT**

NOTE

If reading from J1 diagnostics chart is greater than 2, perform high resistance - less than 1 perform low resistance.



LOW RESISTANCE



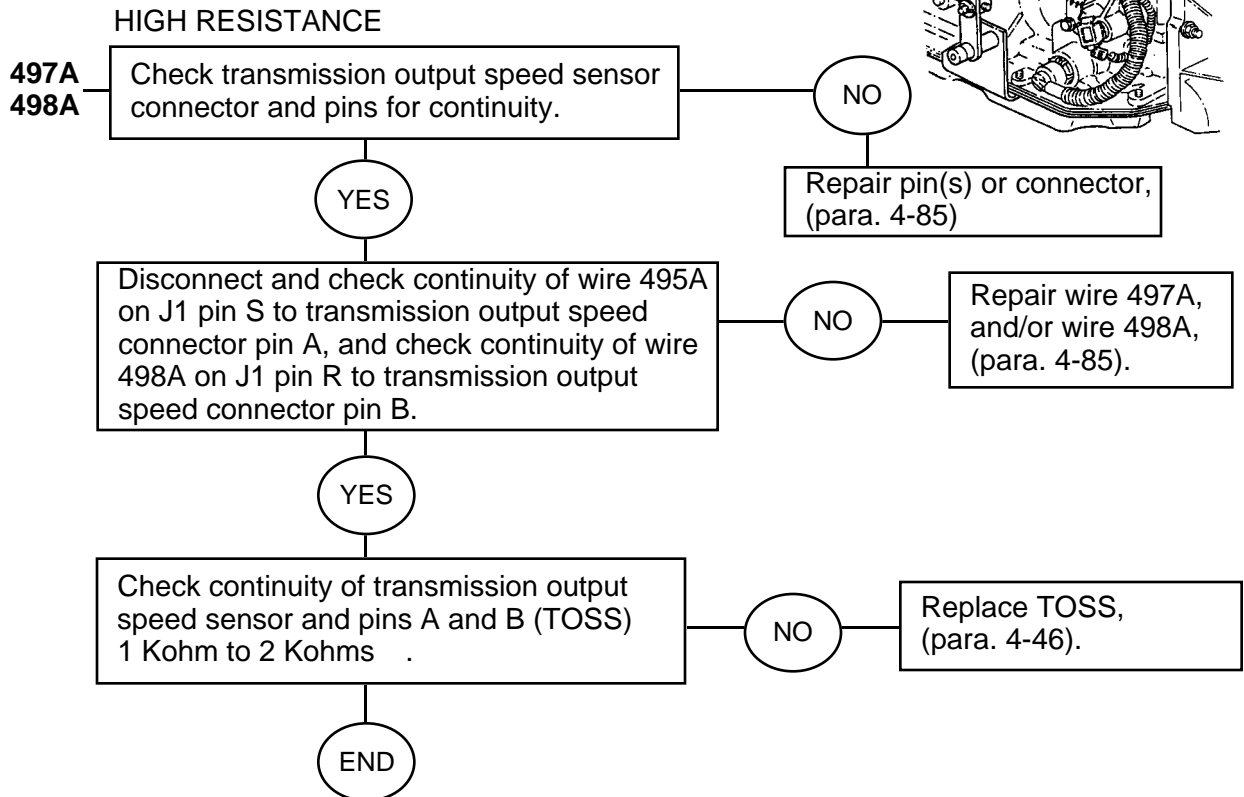
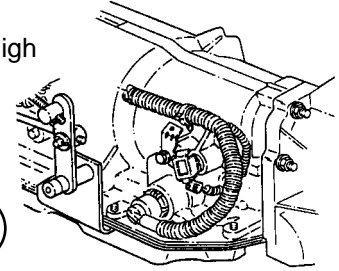
DIAGNOSTIC FLOWCHART

TRANSMISSION SYSTEM
(4L80-E)

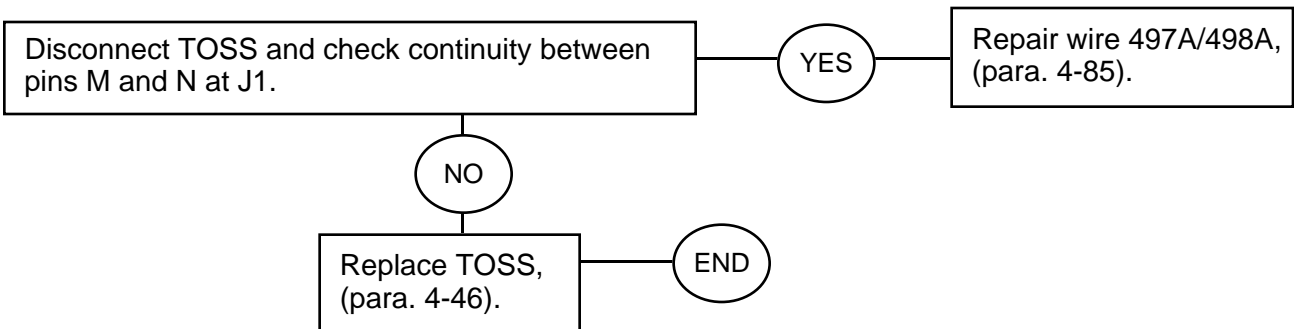
TRANSMISSION OUTPUT SPEED
SENSOR (TOSS) CIRCUIT

NOTE

If reading from J1 diagnostics chart is greater than 2, perform high resistance - less than 1 perform low resistance.



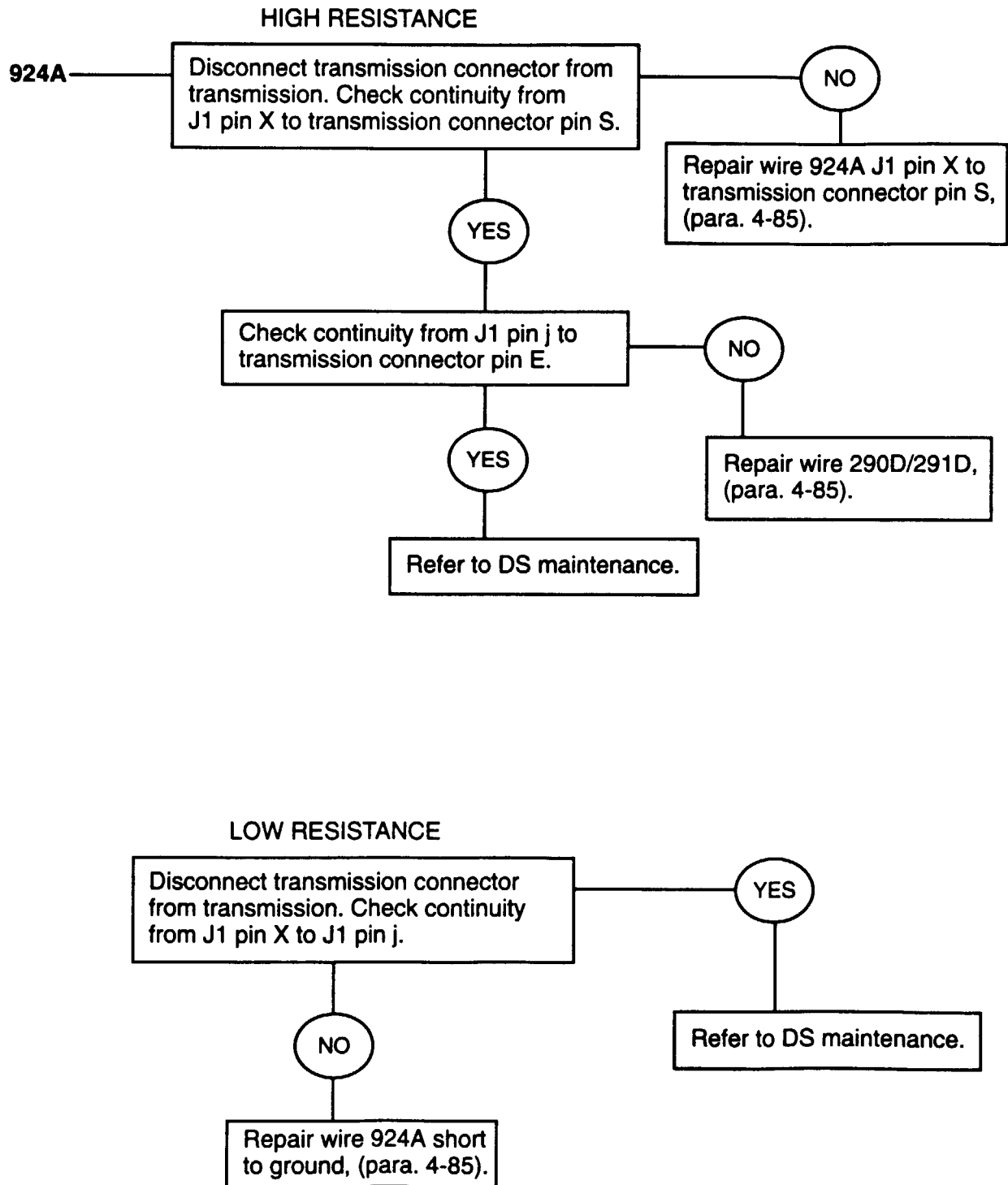
LOW RESISTANCE



**TRANSMISSION SYSTEM
(4L80-E)**

**TORQUE CONVERTER CLUTCH
SOLENOID CIRCUIT**

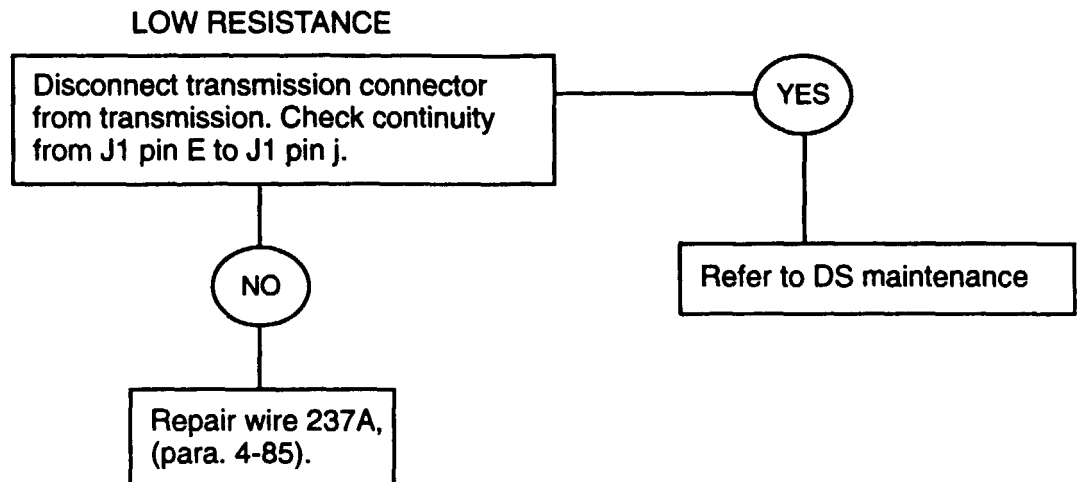
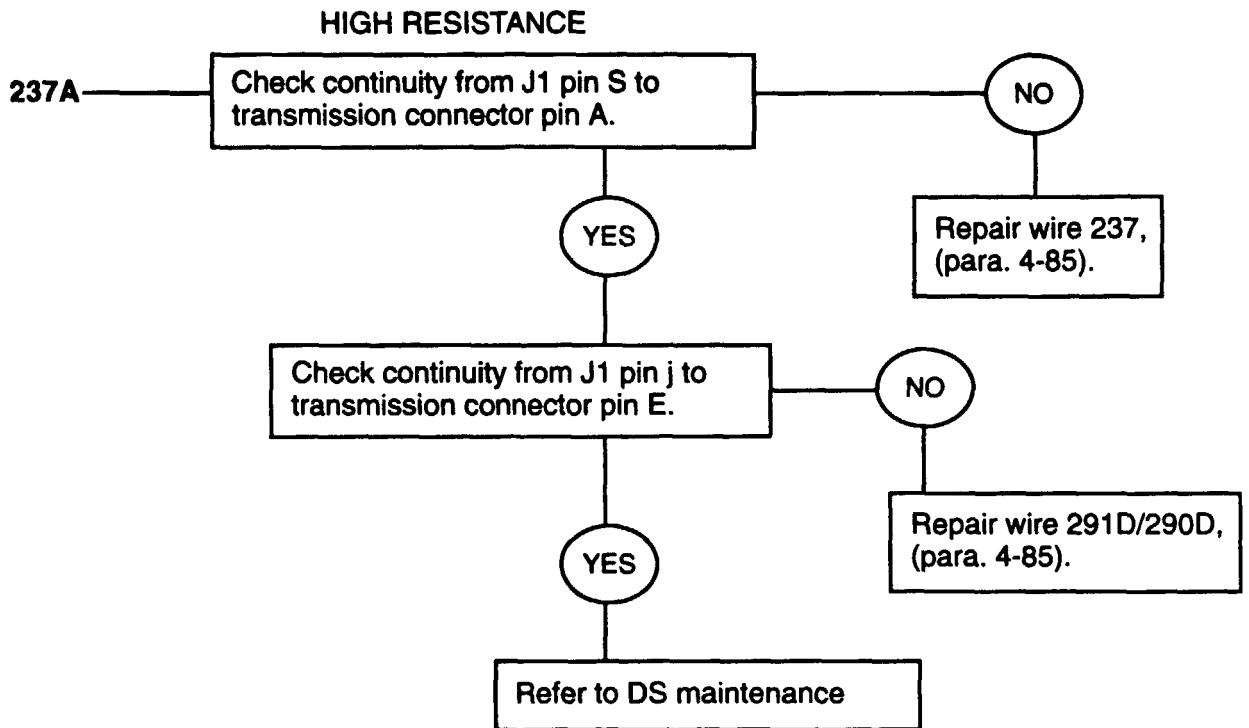
DIAGNOSTIC FLOWCHART



DIAGNOSTIC FLOWCHART

**TRANSMISSION SYSTEM
(4L80-E)**

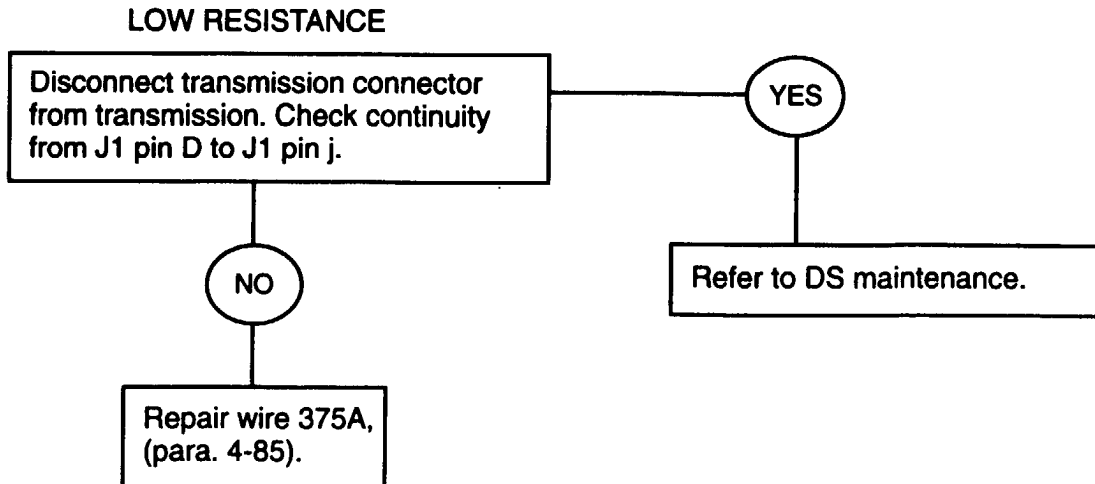
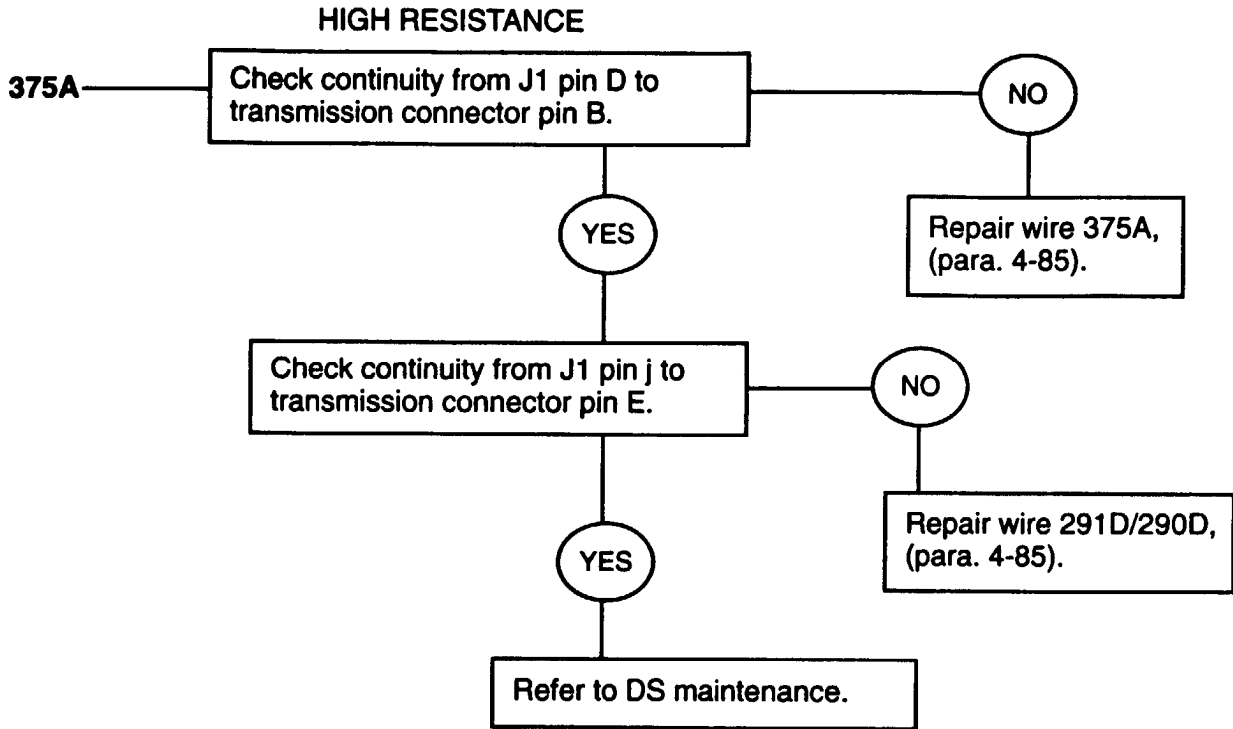
**1-2 SHIFT SOLENOID CIRCUIT SHIFT
SOLENOID A**



**TRANSMISSION SYSTEM
(4L80-E)**

DIAGNOSTIC FLOWCHART

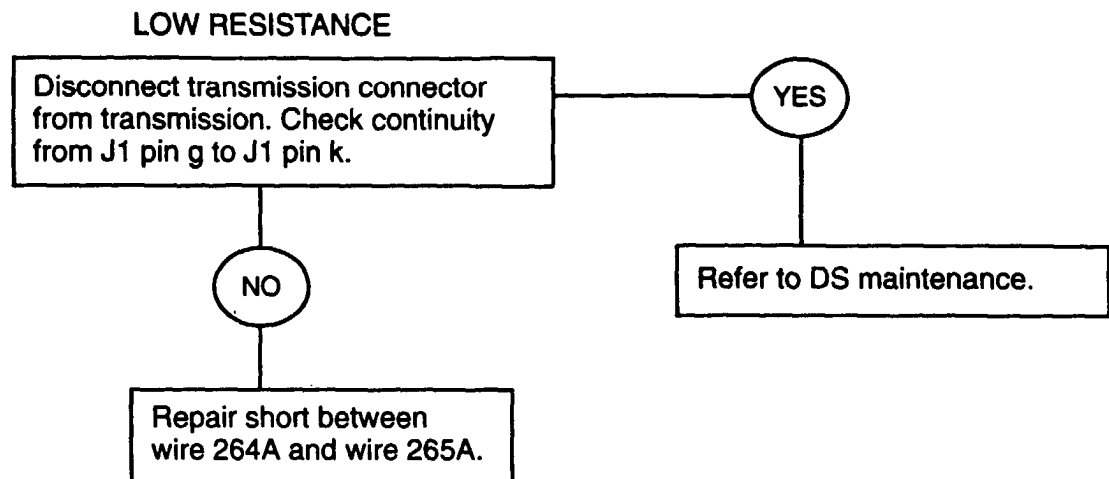
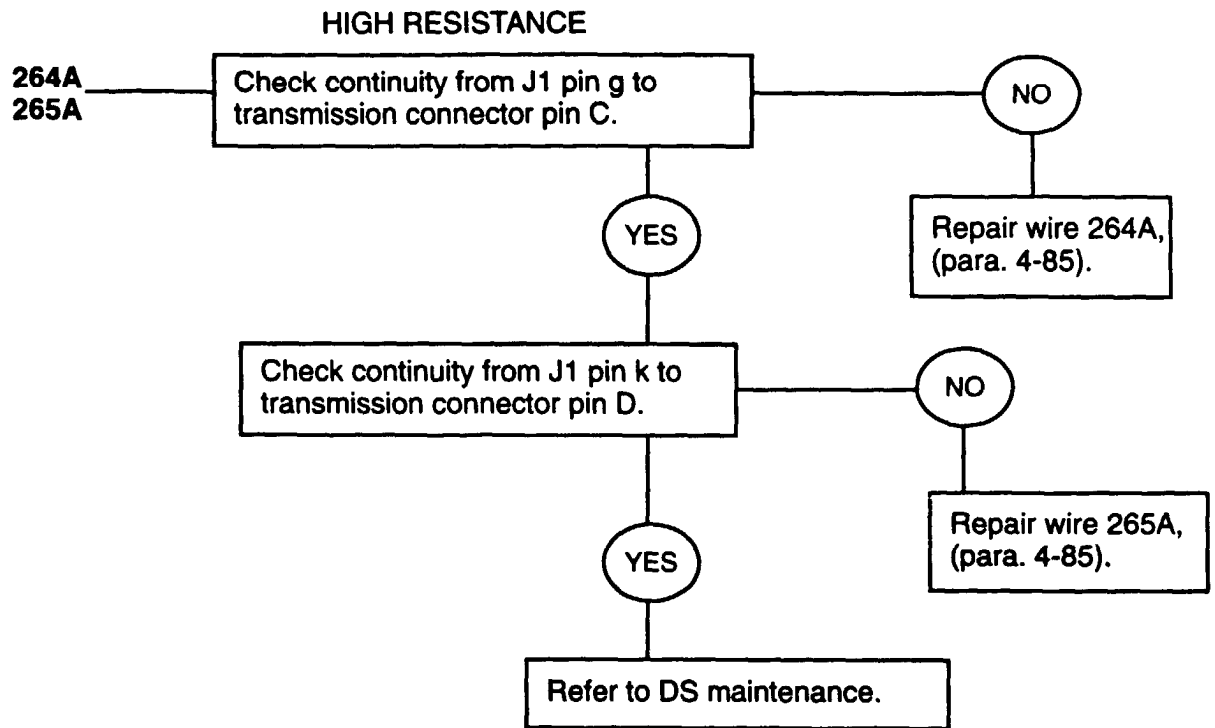
**2-3 SHIFT SOLENOID CIRCUIT SHIFT
SOLENOID B**



DIAGNOSTIC FLOWCHART

**TRANSMISSION SYSTEM
(4L80-E)**

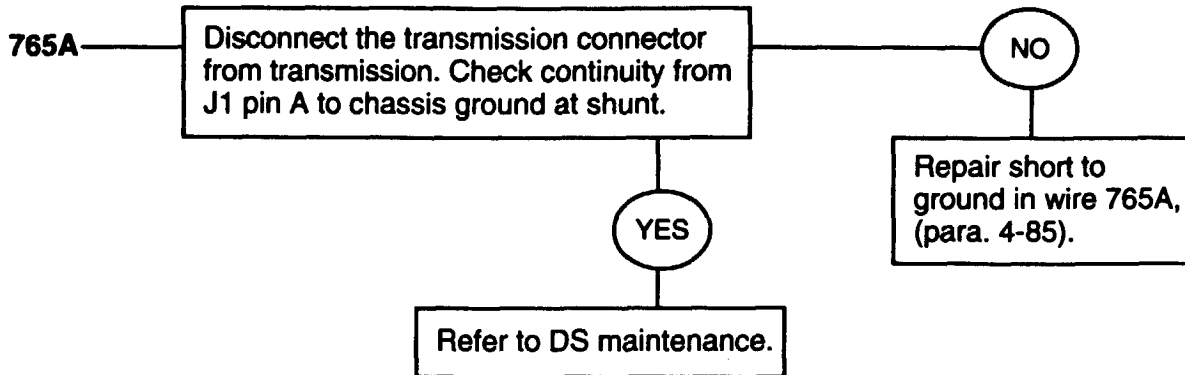
**PRESSURE CONTROL SOLENOID CIRCUIT
FORCE MOTOR HIGH**



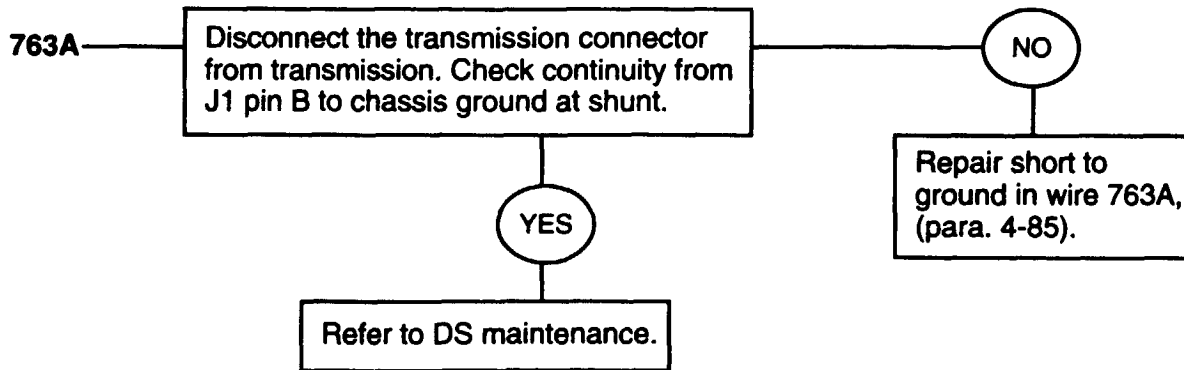
**TRANSMISSION SYSTEM
(4L80-E)**

DIAGNOSTIC FLOWCHART

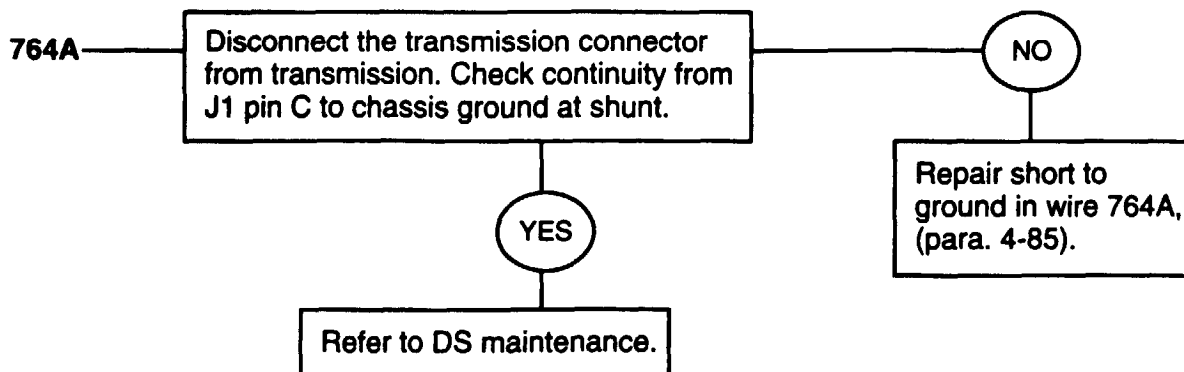
**TRANSMISSION RANGE PRESSURE
SWITCH, CIRCUIT PRESSURE SWITCH A**



**TRANSMISSION RANGE PRESSURE
SWITCH, CIRCUIT PRESSURE SWITCH B**



**TRANSMISSION RANGE PRESSURE
SWITCH, CIRCUIT PRESSURE SWITCH C**

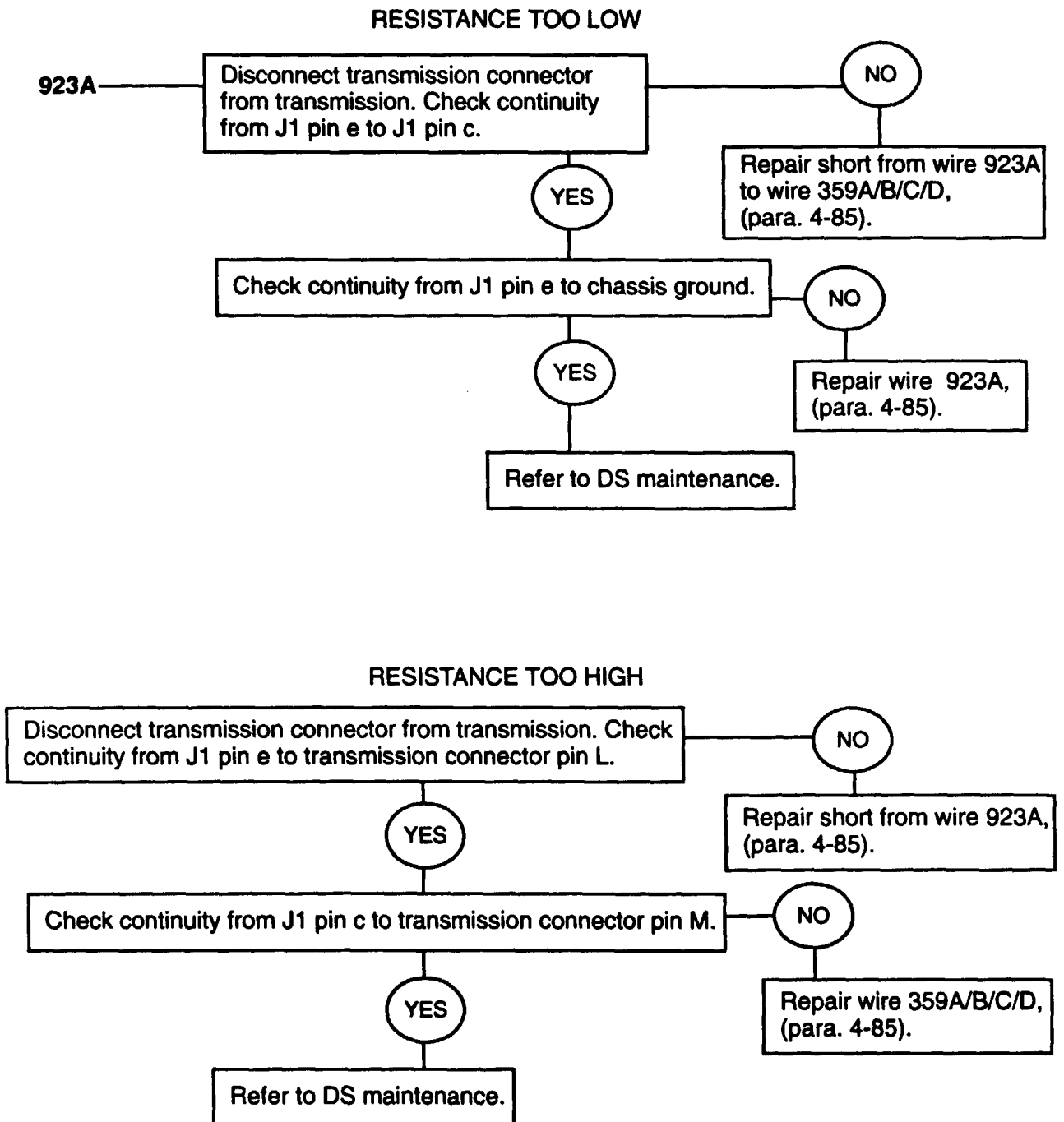


DIAGNOSTIC FLOWCHART

**TRANSMISSION SYSTEM
(4L80-E)**

TRANSMISSION TEMPERATURE SENSOR

The transmission temperature sensor is a thermistor. The resistance decreases as the temperature increases at 68°F (20°C) the resistance should be from 2980 to 4020 ohms, at 248°F (120°C) the resistance should be 90 to 111 ohms.



2-36. BRAKE SYSTEM TESTS

These Brake System tests may be run any time you think you have a braking problem or if you were sent here by another test chain. Just follow the path, answering the questions. Additional information and notes are given on the facing page when necessary.

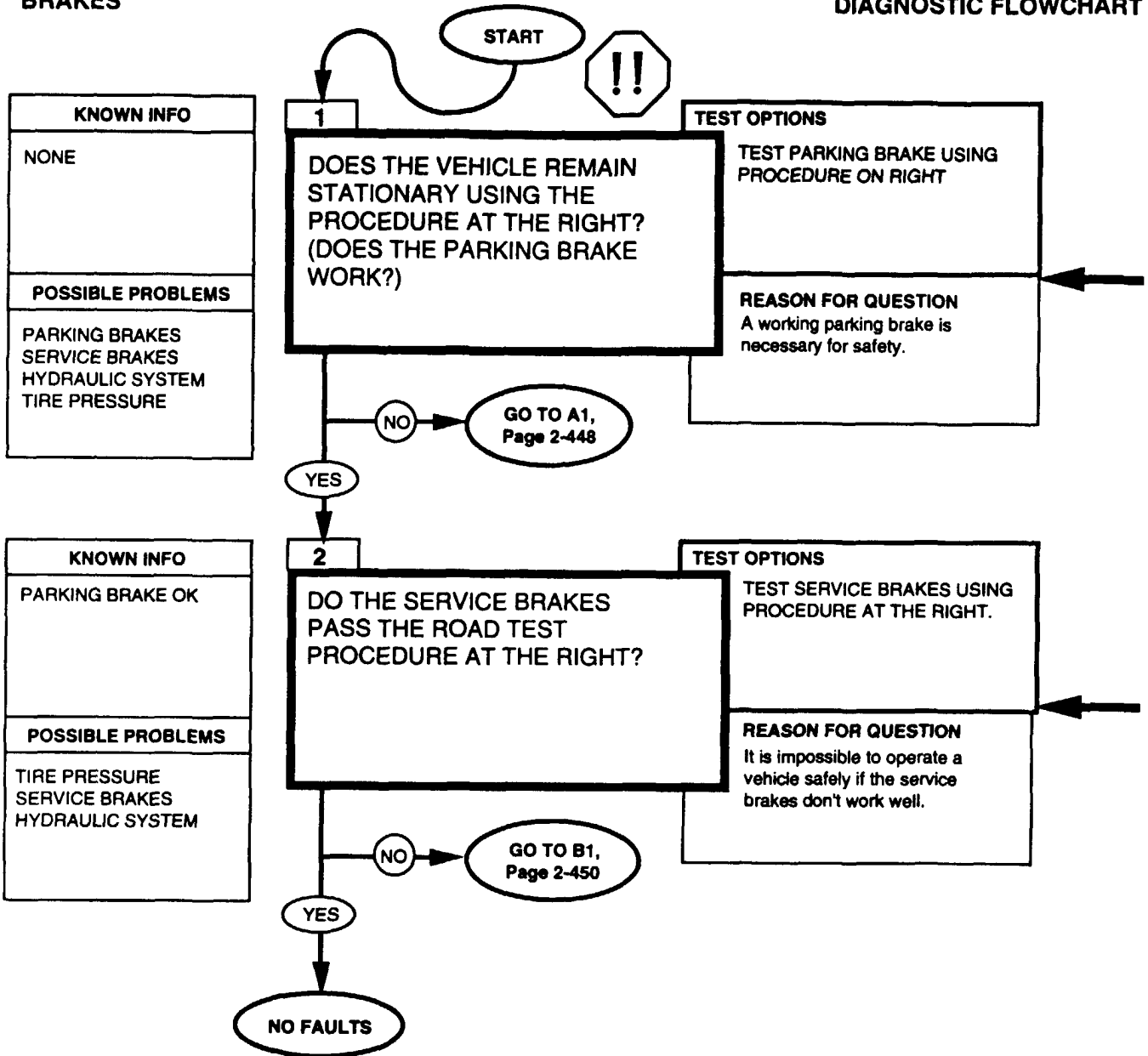
Fold-out page FO-13 may be left open for reference while testing.

NOTE

- The brake lights and the parking brake warning lamp are not diagnosed here. If you are having trouble with these parts, and you are sure the brakes are OK, go to Instruments, Page 2-319, for the warning lamp, or Lights, Page 2-389, for the brake lights.
- When parking brake handle is pulled, the parking brake is applied to the left and right rear service brake rotors.

BRAKES

DIAGNOSTIC FLOWCHART



REFERENCE INFORMATION

BRAKES

**WARNING**

Make sure the area is clear of personnel and obstacles prior to performing this test. Failure to do so may result in serious injury.

PARKING BRAKE TEST PROCEDURE:

1. Depress service brake pedal and start engine.
2. Place transmission shift lever in D (drive) and transfer case shift lever in H (high).
3. Apply parking brake. Slowly let up on service brake pedal. Vehicle should remain stationary.

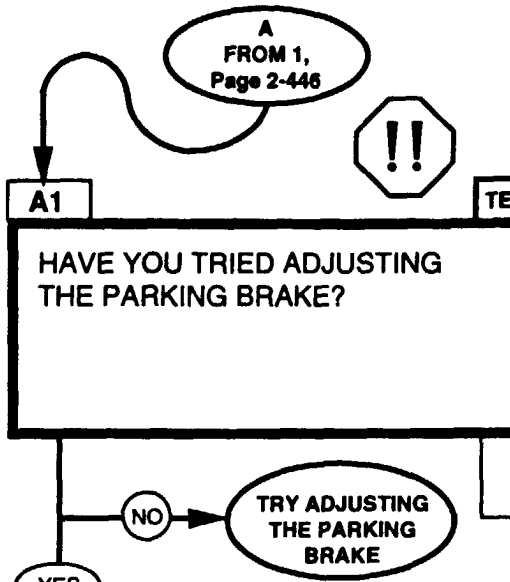
SERVICE BRAKE ROAD TEST PROCEDURE:

1. On an open, smooth, flat surface, accelerate to a steady, reasonable, safe speed (below posted limits).
2. Apply pressure on the brake pedal and bring the vehicle to a stop.
3. Repeat this procedure several times, applying a different brake pressure each time. Look for the following symptoms, which may indicate a problem with the service brakes:
 - 1) Spongy or pulsating brake pedal,
 - 2) Incomplete brake pedal return,
 - 3) Excessive pull to one side,
 - 4) Unusually long braking distance,
 - 5) Rear wheels lock-up before front wheels,
 - 6) Brake warning light comes on while braking, and
 - 7) A squealing, grinding, or chattering noise while braking.

BRAKES

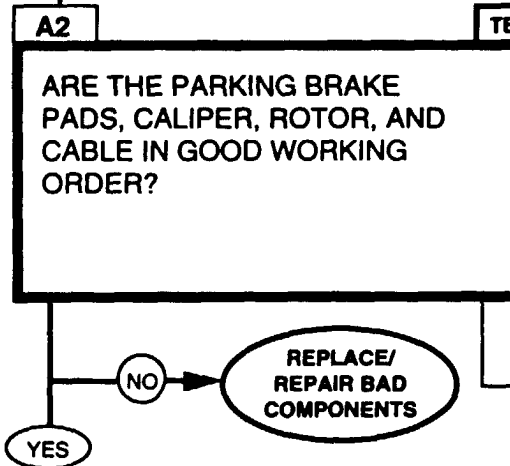
DIAGNOSTIC FLOWCHART

KNOWN INFO
PARKING BRAKE INOPERATIVE
POSSIBLE PROBLEMS
PADS CALIPER ROTOR CABLE BRAKE LEVER



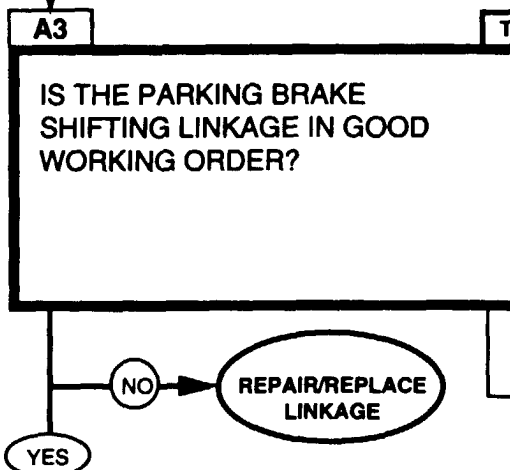
TEST OPTIONS
SEE TEST PROCEDURE AT RIGHT.
REASON FOR QUESTION
Parking brake may not be broken, it may just need adjustment.

KNOWN INFO
PARKING BRAKE INOPERATIVE
POSSIBLE PROBLEMS
PADS CALIPER ROTOR CABLE BRAKE LEVER



TEST OPTIONS
VISUAL INSPECTION.
REASON FOR QUESTION
If there is a problem with any one of these components, the parking brake will not work properly.

KNOWN INFO
PARKING BRAKE INOPERATIVE PADS OK CALIPER OK ROTOR OK CABLE OK
POSSIBLE PROBLEMS
PARKING BRAKE LEVER AND LINKAGE



TEST OPTIONS
OPERATE PARKING BRAKE FOR VISUAL INSPECTION.
REASON FOR QUESTION
If the linkage is broken or binding, the parking brake will not function properly.

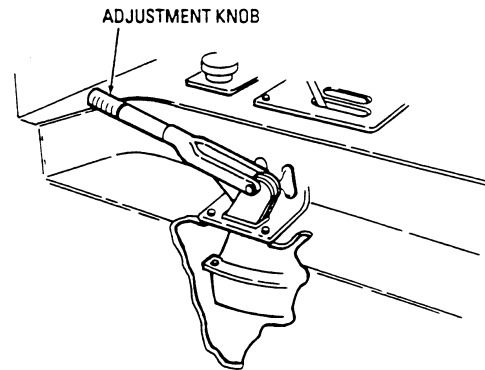
NO FAULTS

REFERENCE INFORMATION

BRAKES

PARKING BRAKE ADJUSTMENT:

- A. Chock wheels and release parking brake handle.
- B. Turn adjusting knob at the tip of the brake handle clockwise as tight as possible by hand.
- C. Apply parking brake handle.
- D. If parking brake cannot be applied, turn adjusting knob counterclockwise until parking brake can be applied.
- E. Test parking brake.



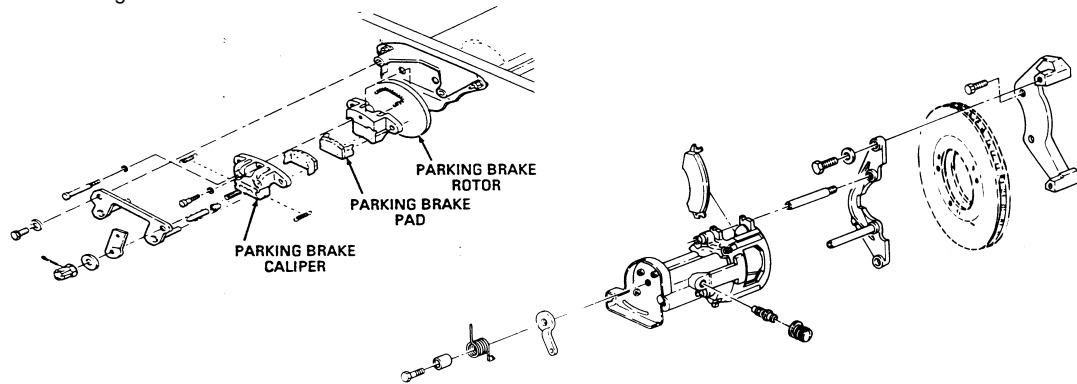
WARNING

Make sure the area is clear of personnel and obstacles prior to performing this test. Failure to do so may result in serious injury.

- (1) Remove chocks.
- (2) Depress service brake pedal and start engine.
- (3) Place transmission shift lever in drive and transfer case shift lever in high.
- (4) Apply parking brake and slowly let up on service brake pedal. Vehicle should remain stationary.

Replace or repair parts, refer to (para. 7-3) for old configuration.

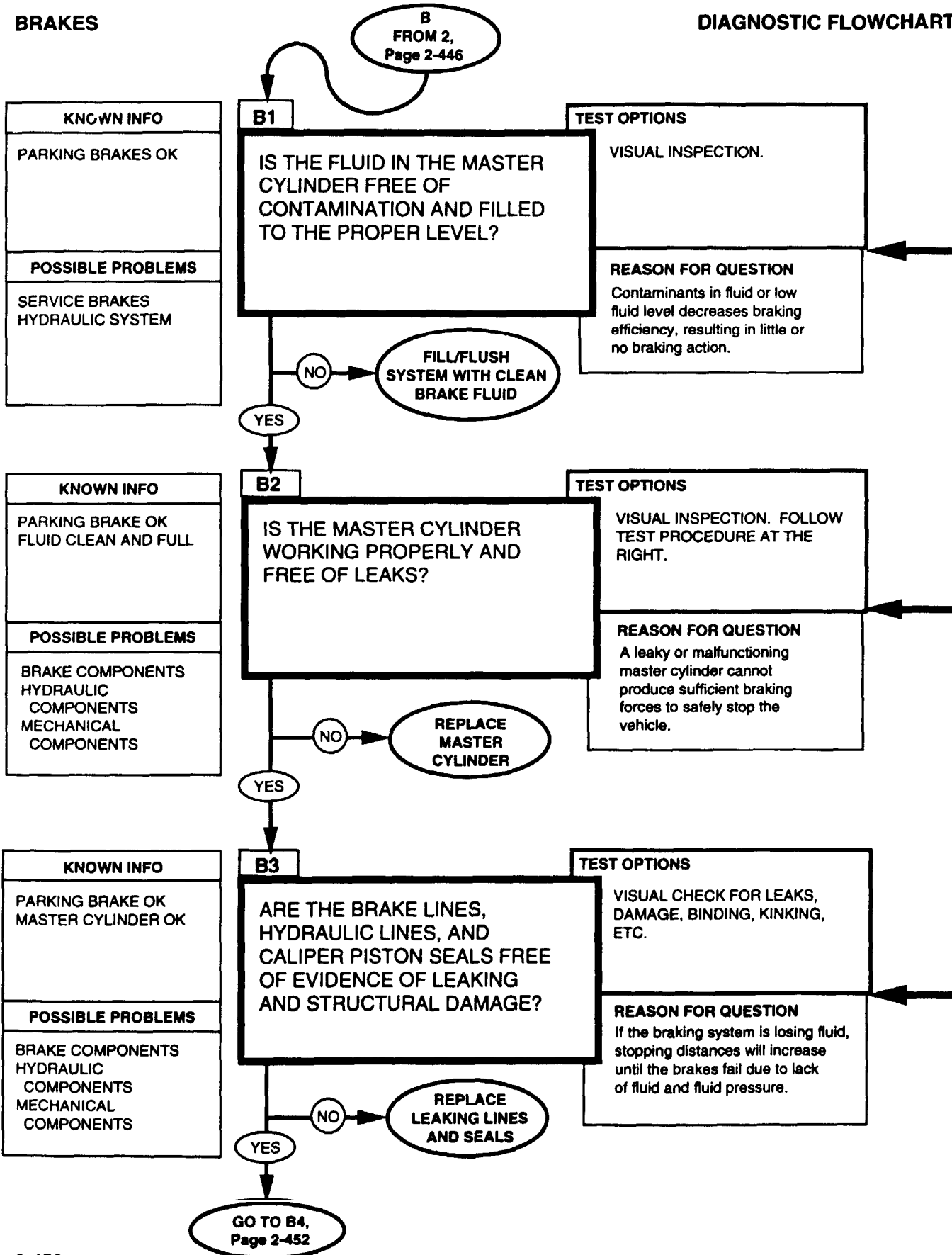
Replace or repair parts, refer to (para 7-20) for new configuration.



Repair or replace linkage, refer to (paras. 7-5, 7-23, and 7-24).

BRAKES

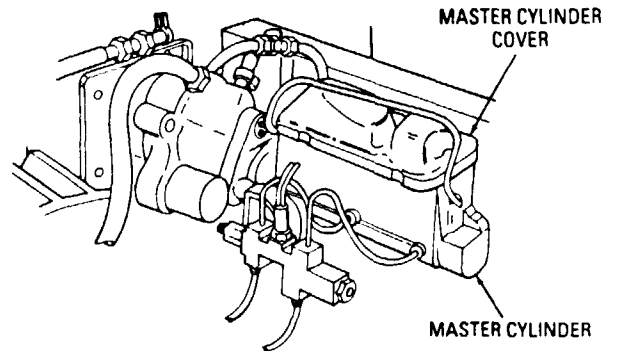
DIAGNOSTIC FLOWCHART



REFERENCE INFORMATION

BRAKES

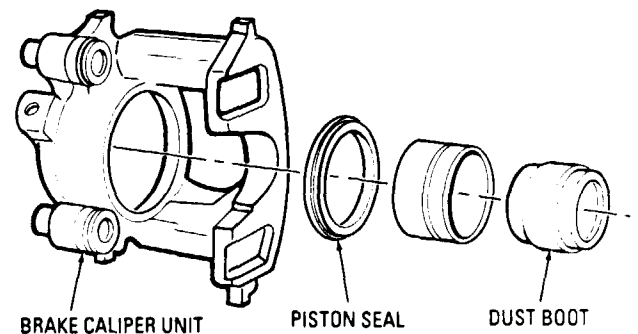
Flush and bleed the brake system, refer to (para 7-10).



Master cylinder test procedure:

1. With the engine off, pump the brake pedal six or seven times, or until the pedal becomes noticeably stiffer and harder to depress.
2. Press hard on the brake pedal. If the pedal keeps going down to the floor, either the master cylinder is bad, or there is a leak in the hydraulic system.

Replace master cylinder, refer to (para 7-13).



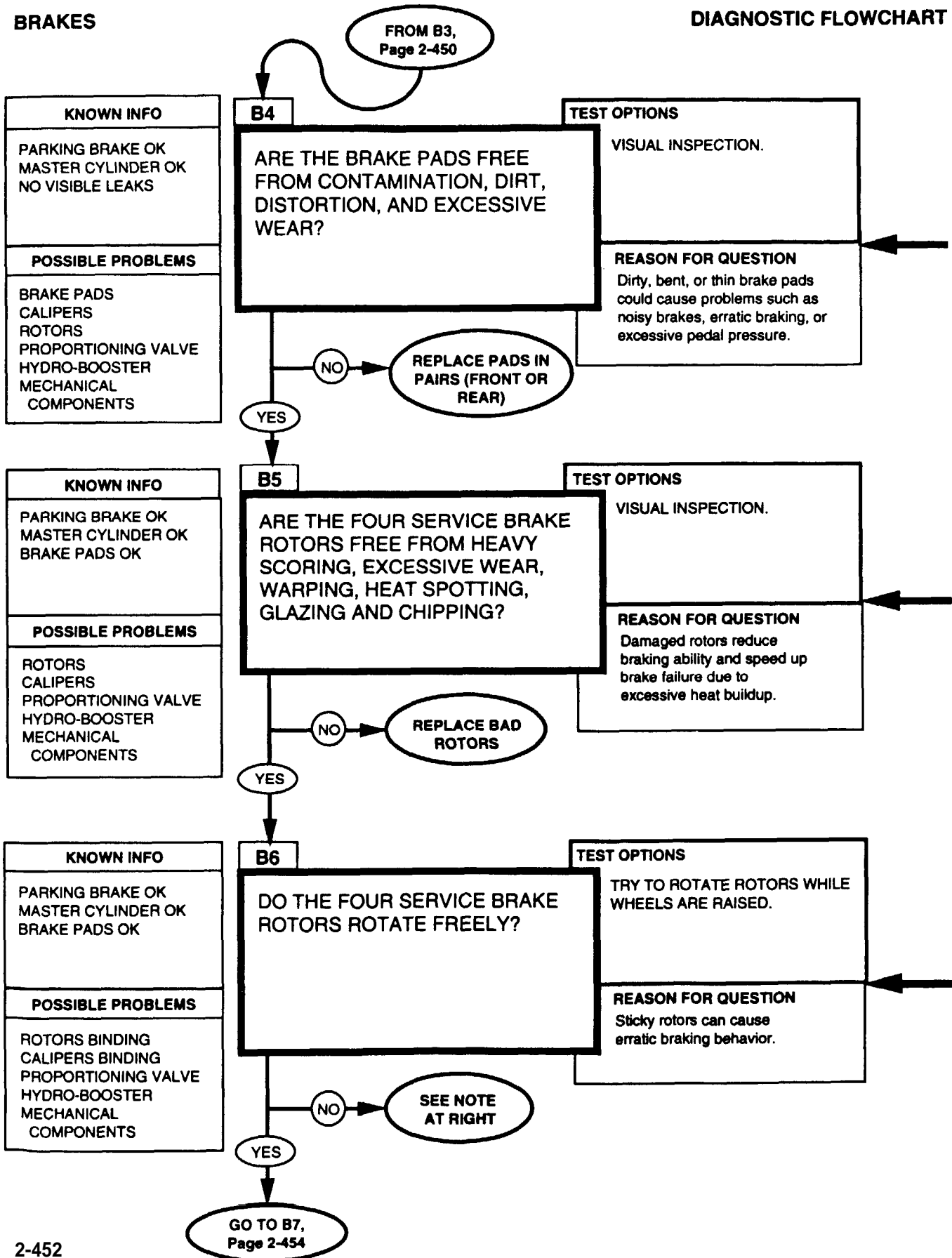
Check the individual lines going to each brake. Check the supply and return lines to the hydro-boost unit. Replace brake line, refer to (para 7-15).

NOTE

Brake hydraulic system must be bled of air whenever hydraulic lines are broken. Bleed service brake, refer to (para 7-10).

DIAGNOSTIC FLOWCHART

BRAKES



REFERENCE INFORMATION

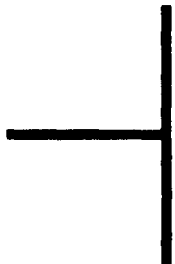
BRAKES



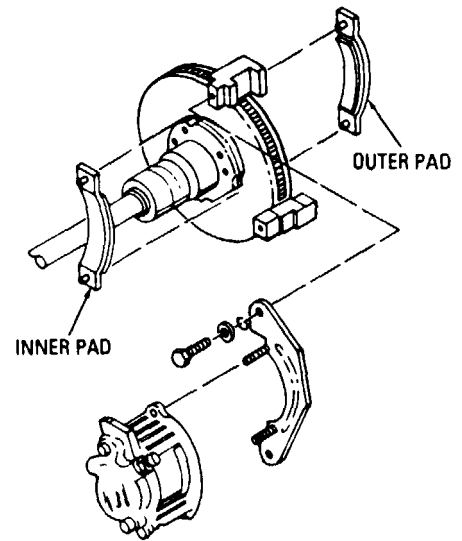
Replace brake pad, refer to (para 7-11).

NOTE

The minimum brake pad thickness is 1/8 of an inch (3.2mm).



Replace service brake rotor, refer to (para 7-1 9).



NOTE

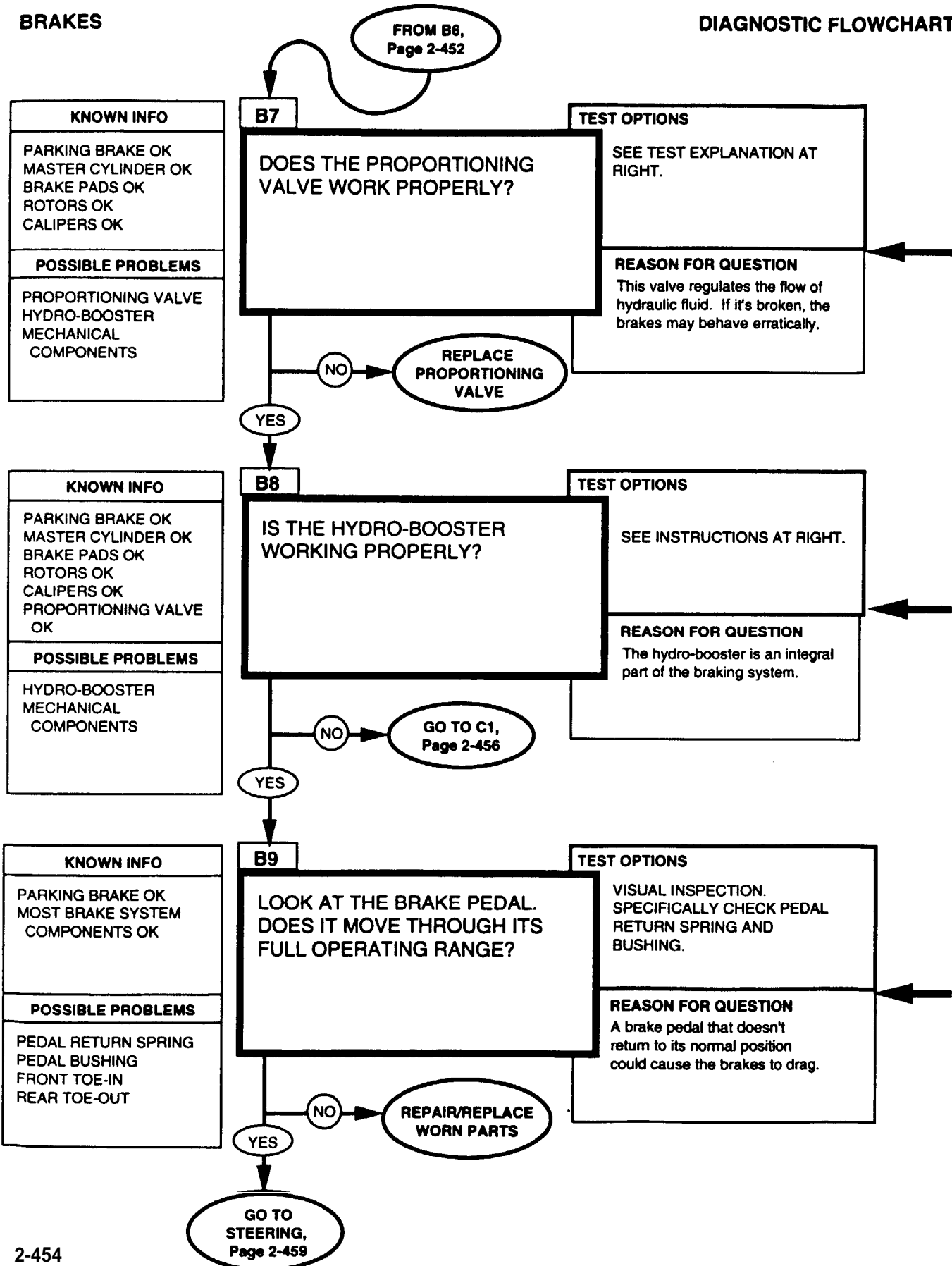
The only way the rotors can be sticking is if the calipers are not releasing fully.

Remove calipers. clean and lubricate guide pins with grease.

Replace and clean brake caliper, refer to (para 7-12).

BRAKES

DIAGNOSTIC FLOWCHART



6"REFERENCE INFORMATION

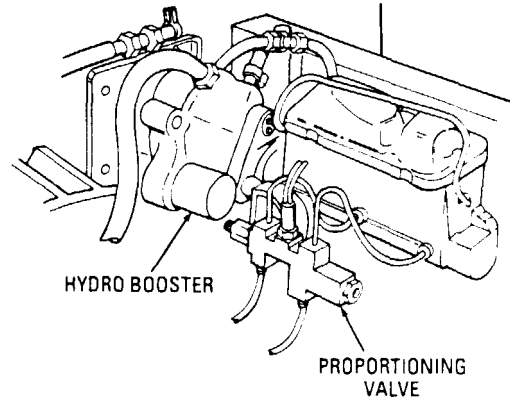
BRAKES

Test for faulty proportioning valve:

Drive the vehicle and have an assistant observe during the performance of this test.

With vehicle at curb weight, decelerate vehicle from 46 to 40mph (72 to 69 kph) on dry concrete mad and apply sufficient pressure to lockup front brakes. If rear brakes lock up before front brakes, then the proportioning valve should be replaced.

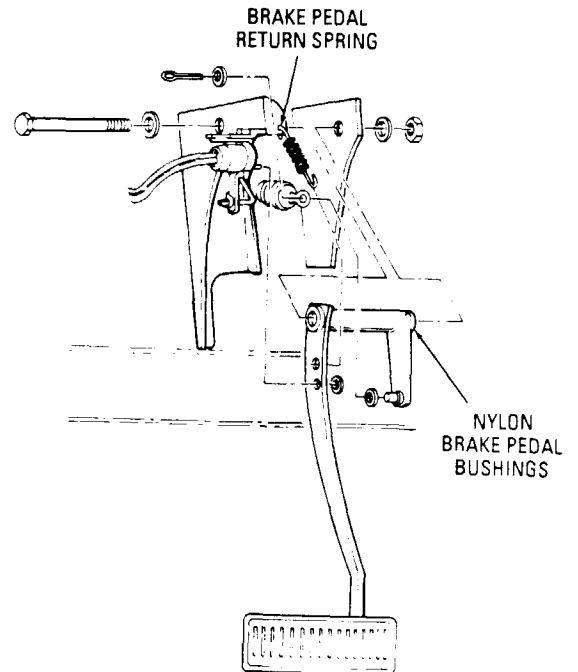
Replace proportioning valve, refer to (para 7-18).



Method for checking hydrobooster:

Depress brake pedal several times to exhaust accumulator pedal. Depress brake pedal and start engine. Brake pedal should fall, then push back against operators foot.

Replace hydro-booster, refer to (para 7-14).

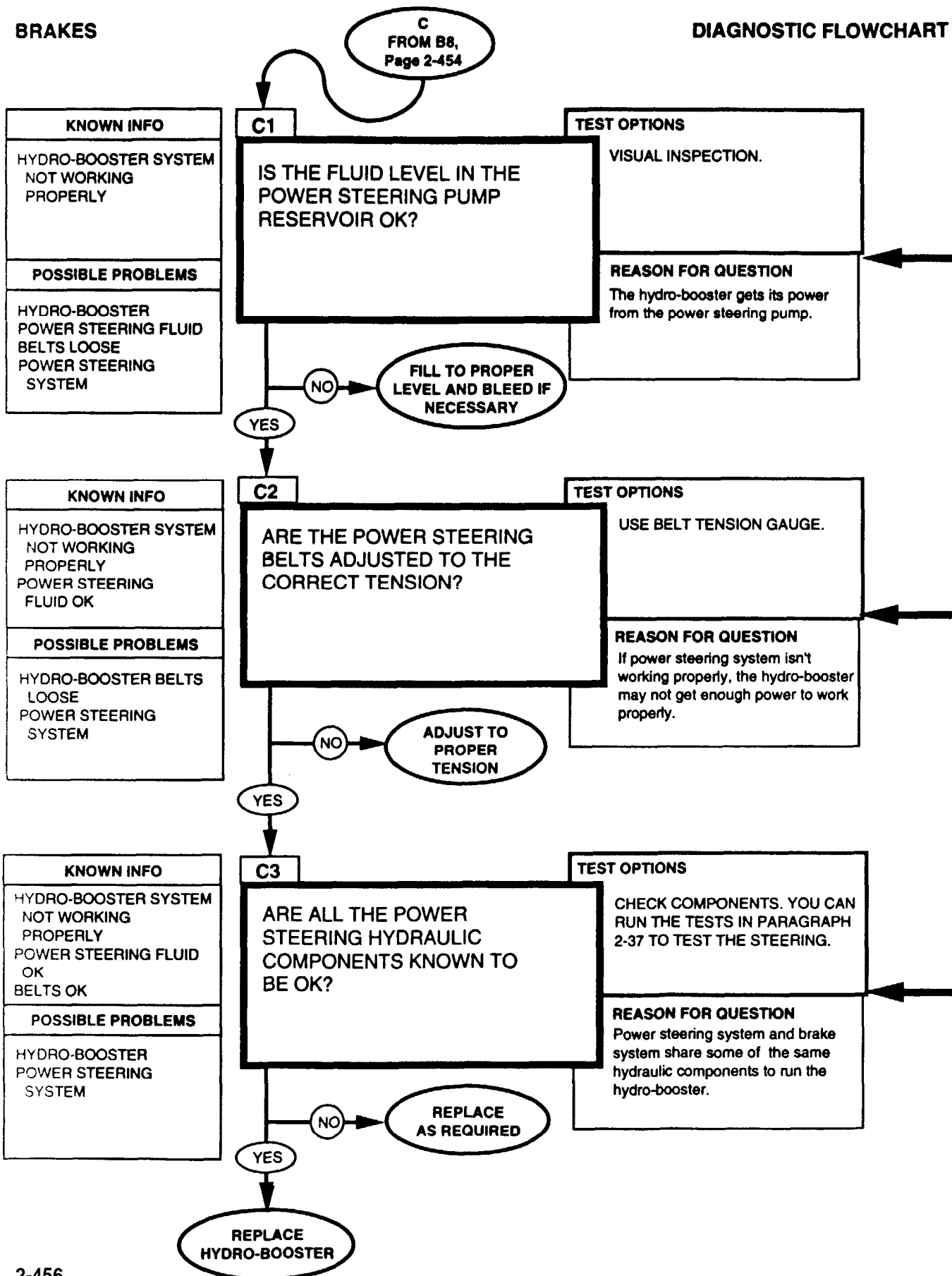


Replace service brake pedal, refer to (para 7-16).

The steering tests will check for suspension problems that will affect braking.

BRAKES

DIAGNOSTIC FLOWCHART



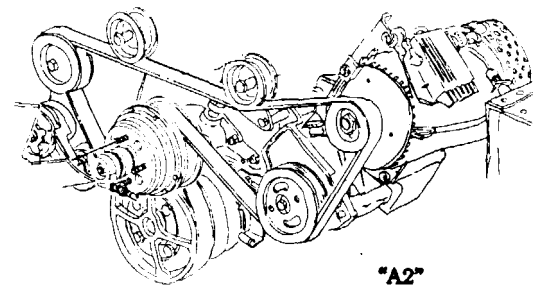
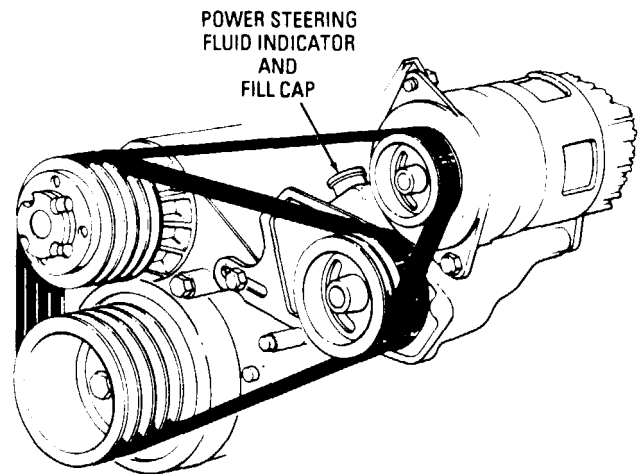
REFERENCE INFORMATION

BRAKES

Bleed power steering system, refer to (para 8-29).

Check belts using the belt tension gauge, refer to (pars 3-82) (All except "A2" vehicles).

A defective power steering pump, gear, hoses, or control valve could affect hydro-booster operation.



2-37. STEERING SYSTEM TESTS

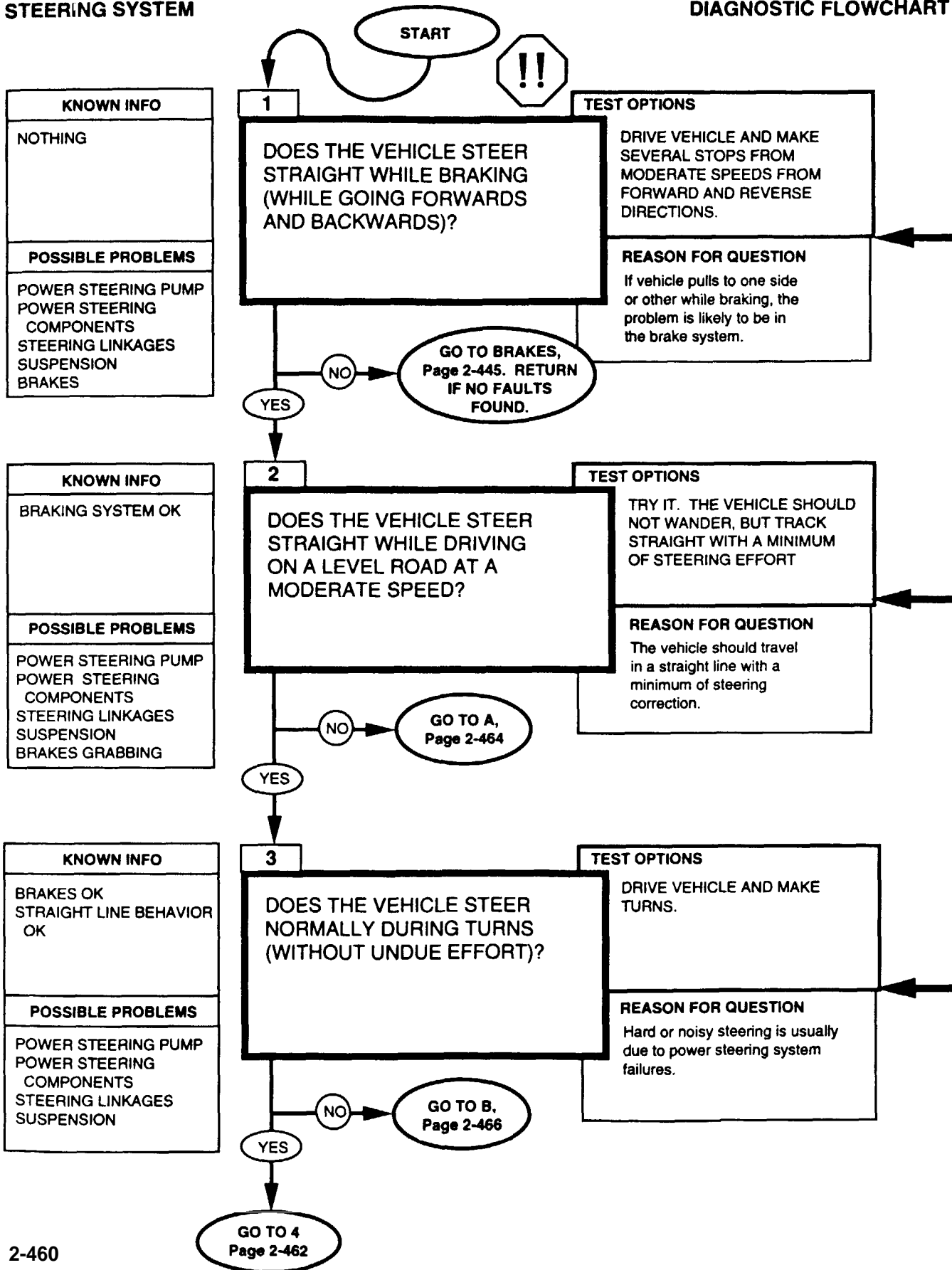
These Steering System tests may be run any time you have a steering problem or if you were sent here by another test chain. Just follow the path, answering the questions. Additional information and notes are given on the facing page when necessary.

The fold-out page shows the location of the major components of the steering in case you are not familiar with them. These parts are shown in a schematic manner. Illustrations of the actual components are given wherever applicable on the reference pages of the diagnostics.

Fold-out page FO-14 may be left open for reference while testing. The functional flow diagram shows the mechanical and hydraulic parts of the system and how they interact. Even if the hydraulic system fails, you will still be able to steer the vehicle, although it will require more effort.

STEERING SYSTEM

DIAGNOSTIC FLOWCHART



REFERENCE INFORMATION

STEERING SYSTEM

**WARNING**

Make sure that the area where you conduct these tests is free of natural and man-made obstructions. Failure to do so may result in serious injury.

PRIOR TO PERFORMING THESE TESTS:

Visually inspect steering components:

1. Check all four tires and rims for wear, inflation, damage, or warping.
 - a. Adjust tire pressure (TM 9-2320-280-10).
 - b. Replace any unserviceable rims (para 8-4).
2. Check steering linkage for damage.
 - a. Replace any damaged steering linkage components (para 3-12).
 - b. Lubricate steering linkage (TM 9-2320-280-10).
3. Check power **steering** fluid for contamination and level (TM 9-2320-280-10).
 - a. Drain and replace any fluid that appears black and smells burned.
 - b. Bleed air from system where fluid appears milky white (para 8-29).
4. Check pump drivebelts for fraying, cracks, damage, or misadjustment.
 - a. Replace unserviceable power steering drivebelts (para 3-80).
 - b. Adjust loose power steering drivebelts (para 3-82).

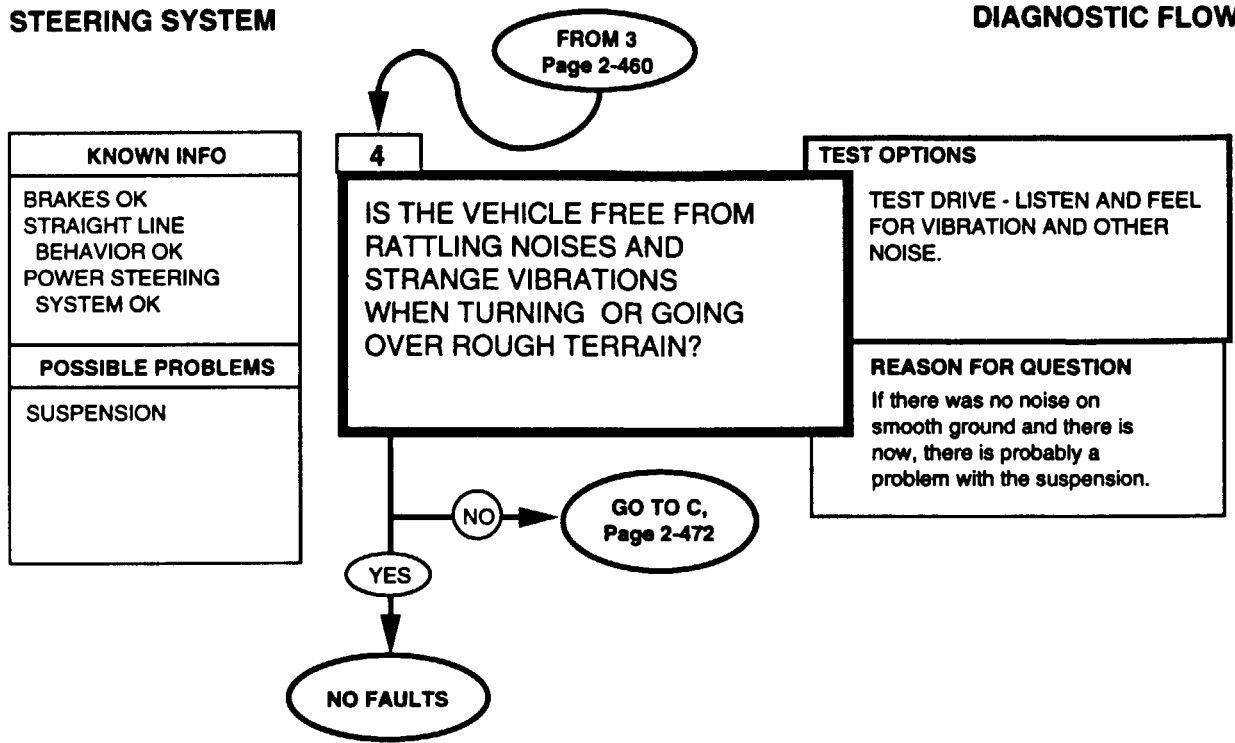
While travelling at a moderate speed (20mph) (32 kmph), apply the brakes while applying minimal pressure to the steering wheel. If pull to one side or the other occurs, make a note of the speed at which it occurs and on what side of the vehicle it occurs. Repeat this procedure for different speeds and braking forces. If the vehicle seems to steer straight while braking, then there probably isn't a problem with the brakes (at least not one that affects the steering). If the braking action feels strange in anyway, then the brake diagnostics should be run to assure vehicle safety. TM test will usually reveal problems with frozen brake calipers.

If the wheels are out of alignment or if the tires are worn unevenly, vehicle may wander.

Symptoms of bad steering characteristics include hard steering, excessive play in steering, a momentary increase in steering effort when turning wheel quickly, end jerking of the steering wheel when turning.

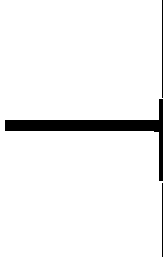
STEERING SYSTEM

DIAGNOSTIC FLOWCHART



REFERENCE INFORMATION

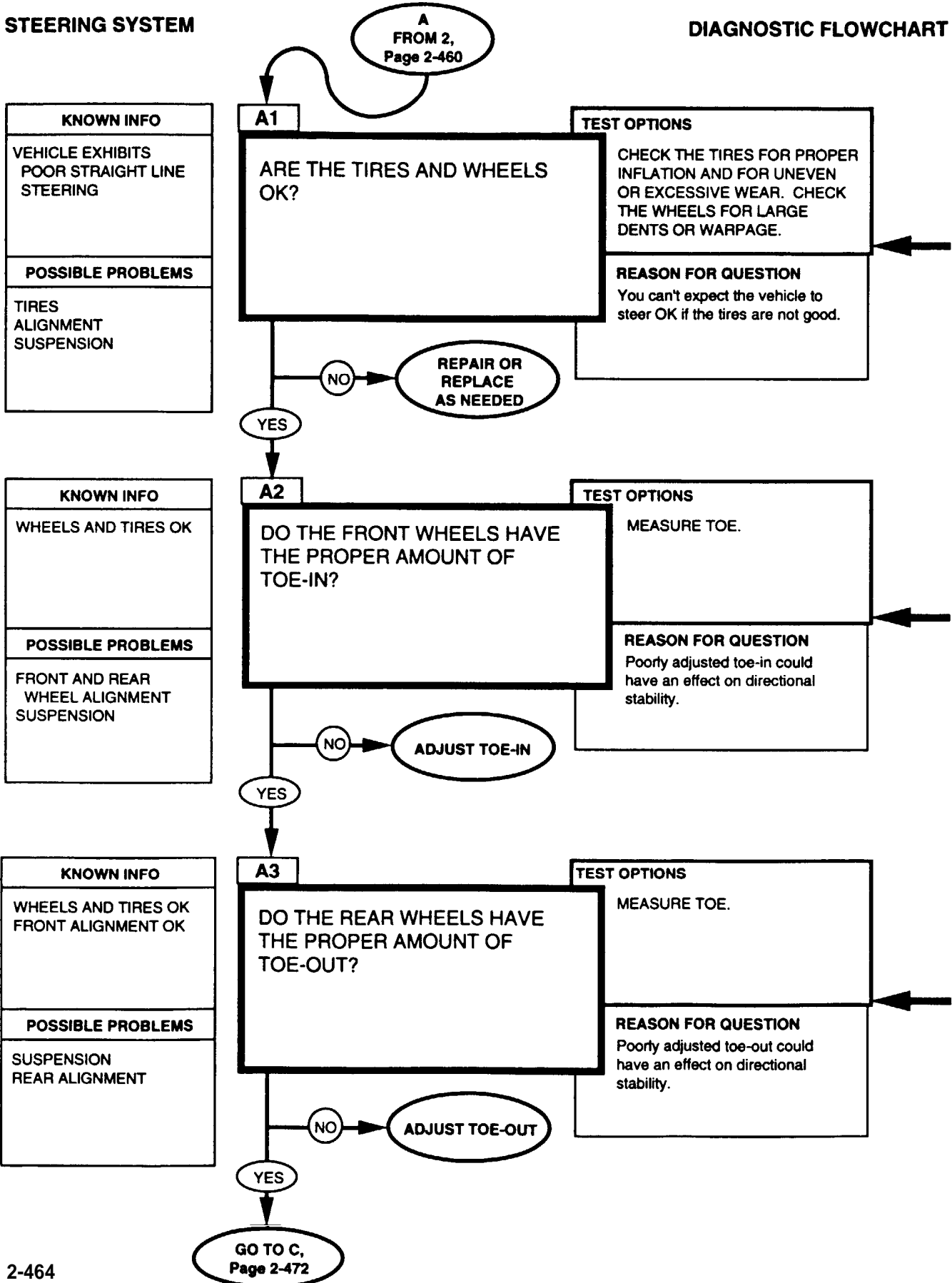
STEERING SYSTEM



Drive the vehicle until the fires warm up. If the condition goes away it was probably caused by a burst lube pack or a flat spot on a tire. Both of these conditions are OK since the vehicle will operate normally after the fires warm up.

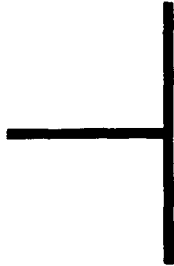
STEERING SYSTEM

DIAGNOSTIC FLOWCHART



REFERENCE INFORMATION

STEERING SYSTEM



Uneven tire wear can be caused by improper inflation, suspension misalignment or damage, hard service, or wheel imbalance. For wheel and tire replacement and maintenance procedures, refer to (para 8-3).



For instructions on adjusting front wheel toe-in, refer to (para 8-10).



For instructions on adjusting rear wheel toe-out, refer to (para 8-11). Part C will test out the suspension parts to see if they are OK.

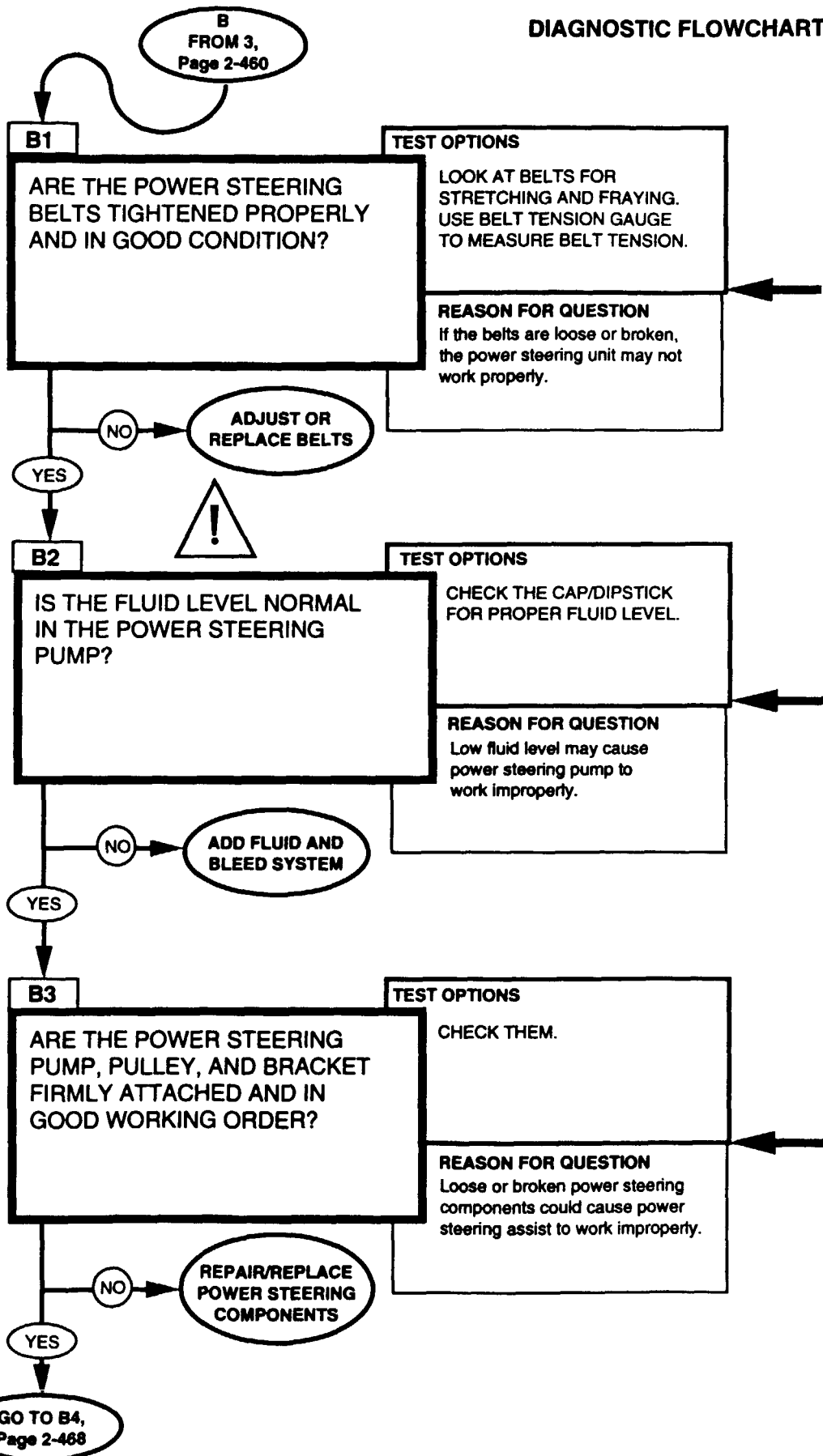
STEERING SYSTEM

DIAGNOSTIC FLOWCHART

KNOWN INFO
STRAIGHT LINE BEHAVIOR OK BRAKES OK HARD STEERING EFFORT
POSSIBLE PROBLEMS
POWER STEERING PUMP POWER STEERING COMPONENTS SUSPENSION

KNOWN INFO
WHEELS AND TIRES OK BRAKES OK HARD STEERING BELTS OK
POSSIBLE PROBLEMS
POWER STEERING PUMP POWER STEERING COMPONENTS SUSPENSION

KNOWN INFO
WHEELS AND TIRES OK BRAKES OK HARD STEERING BELTS OK FLUID LEVEL OK
POSSIBLE PROBLEMS
POWER STEERING PUMP POWER STEERING COMPONENTS SUSPENSION



REFERENCE INFORMATION

STEERING SYSTEM

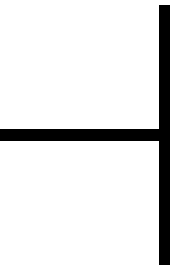


Check belts using the belt tension gauge, refer to (para 3-82) (All except "A2" Vehicles).



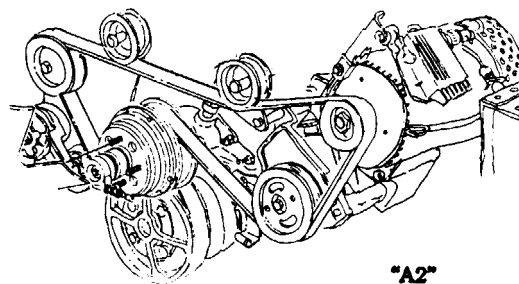
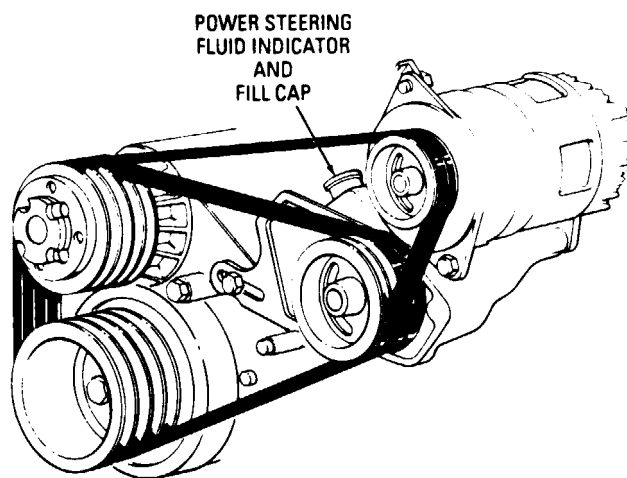
CAUTION

Do not overfill hydraulic fluid.



See TM 9-2320-280-10 for fluid replacement procedure. For bleeding procedure, refer to (para 8-29).

Low fluid level could indicate a problem elsewhere in the system, either leaking hydraulic lines or a leaking or damaged power steering pump. If adding fluid seems to cure the problem, you should probably run the rest of the tests to make sure there aren't any other problem.



**"A2"
CONFIGURATION**

A loose pump, pulley, or bracket could cause excess noise, slipping belts, or other malfunctions. For appropriate repair or replacement procedures, refer to (para 8-24).

REFERENCE INFORMATION

STEERING SYSTEM

Check hydraulic hoses, power steering pump, power steering cooler, hydraulic control valve, hydro-boost unit, steering gear, fan shroud, and fan clutch. See hose replacement procedures (refer to para 8-25). Check power steering cooler for bent fins or any other airflow restrictions. Straighten fins or replace power steering cooler (para. 8-28) if damaged beyond repair.

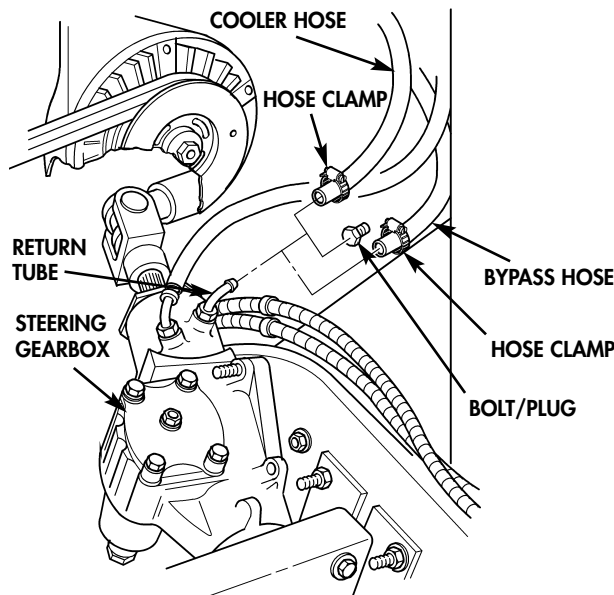
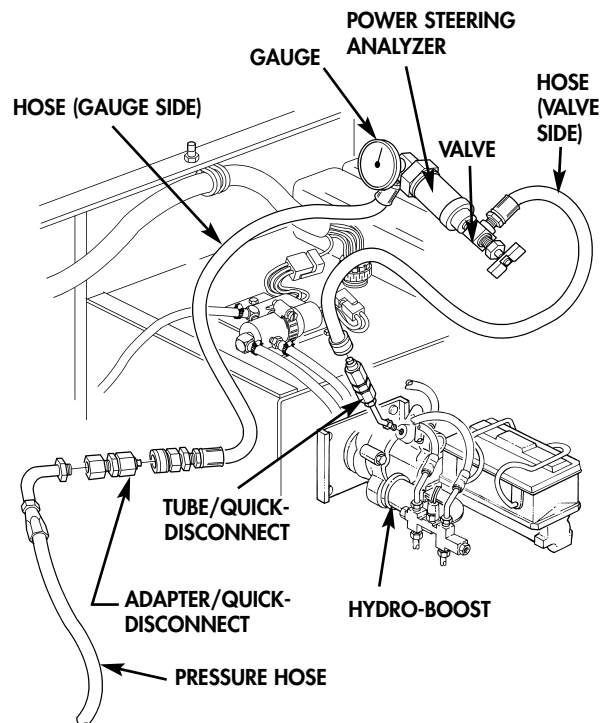
1. With engine off, disconnect pressure hose from hydro-boost and connect tube and quick-disconnect to hydro-boost.

NOTE

Have drainage container ready to catch fluid.

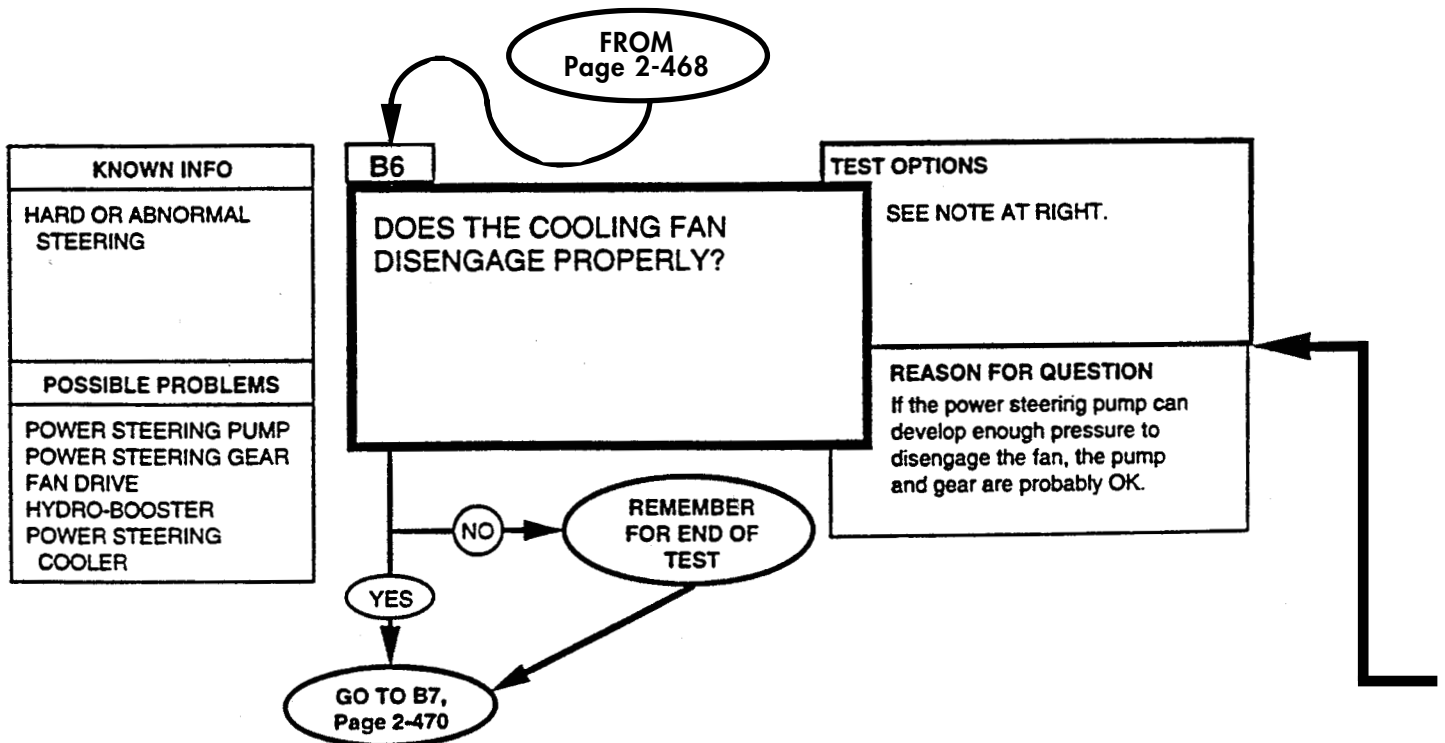
2. Connect adapter and quick-disconnect to pressure hose.
3. Connect hose from valve on power steering analyzer to tube and quick-disconnect on hydro-boost.
4. Connect hose from gauge side of power steering analyzer to adapter and quick-disconnect on pressure hose.
5. Loosen hose clamp and remove cooler hose from return tube on steering gearbox.
6. Plug hose with plug or bolt (3/8 in. or 10 mm dia.) and secure with hose clamp.
7. Connect bypass hose to tube on steering gearbox and secure with hose clamp.

(continued on page 2-469)



STEERING SYSTEM

DIAGNOSTIC FLOWCHART

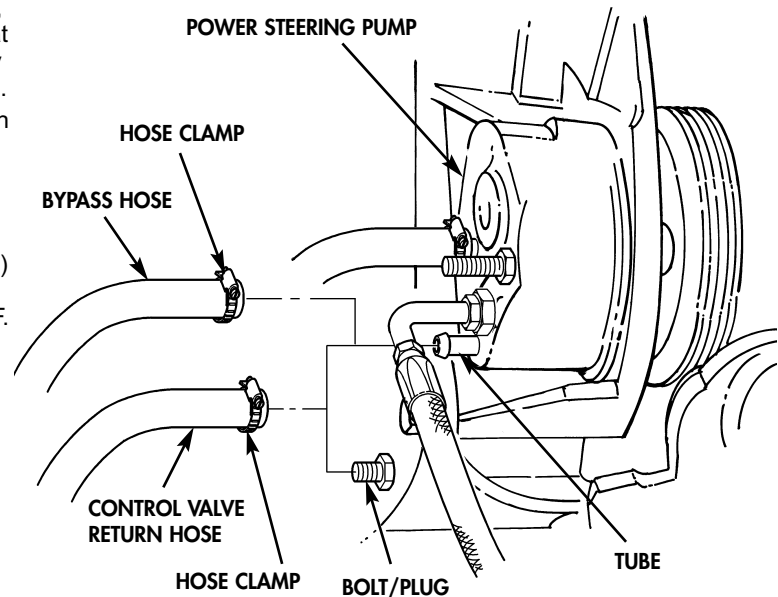


REFERENCE INFORMATION

STEERING SYSTEM

8. Loosen hose clamp and remove control valve return hose from tube on power steering pump.
9. Plug return hose with plug or bolt (3/8 in. or 10 mm dia.) and secure with hose clamp.
10. Connect other end of bypass hose to tube on power steering pump and secure with hose clamp.
11. Connect STE/ICE-R to vehicle diagnostic connector and set for measuring RPM (para. 2-43).
12. Open analyzer valve to full open position.
13. Start engine (Refer to TM 9-2320-280-10).
14. Remove power steering reservoir cap and turn steering wheel all the way left, hold in place for 5 seconds, then repeat process with steering wheel all the way right. This releases air from the system.
15. Return steering wheel to center position and shut engine off (para. 3-44).
16. Check and add power steering fluid to reach FULL COLD level in reservoir (Refer to TM 9-2320-280-10).
17. Start engine (Refer to TM 9-2320-280-10) and allow engine to idle and reach operating temperature of 190° F to 230° F.
18. Check for proper engine idle speeds and adjust if necessary (para. 3-44).

6.2L engine	650±25 RPM
6.5L engine	700±25 RPM
6.5L detuned engine	700±25 RPM
19. Ensure analyzer valve is in full open position and engine is at proper idle speed.
20. Initial pressure should be 150-250 psi and a flow of 2.50-3.50 gpm. If these specifications aren't present, check installation of analyzer and check power steering system (Refer to TM 9-2320-280-10).
21. With power steering system working properly, partially close analyzer valve until pressure reaches 700 psi. If flow rate varies more than 1 gpm from the initial reading, replace power steering pump (para. 8-24).

**CAUTION**

Do not leave analyzer valve fully closed for more than 5 seconds. Severe damage may occur to power steering pump.

22. With engine at idle, close and open analyzer valve three times, recording pressure each time. All readings should be 1300 psi or higher, if pressure is lower, replace power steering pump (para. 8-24).
23. With analyzer valve in the open position, increase engine rpm to 1500 and record fluid flow. If fluid flow varies more than 1 gpm from initial reading, replace power steering pump (para. 8-24).
24. With engine at idle, turn steering wheel all the way left, hold in place for 5 seconds, then repeat process with steering wheel all the way right and record flow rates. If flow rate does not drop to 1 gpm or less, replace steering gearbox (para. 8-21).
25. With engine at idle, turn wheels slightly left and right and release quickly. If pressure does not increase and snap back within 2 seconds, check steering shaft and column for binding and repeat step 15. If pressure still does not increase and snap back, replace steering gearbox (para. 8-21).
26. With engine at idle, push brake pedal down and hold. Record pressure. If pressure varies more than 50 psi from step 22, replace hydro-boost (para. 7-14).
27. With engine at idle, push brake pedal down and release quickly. If pressure does not increase and snap back within 2 seconds, replace hydro-boost (para. 7-14).
28. Shut off engine. Remove power steering analyzer and restore power steering system to original configuration.
29. Bleed power steering system (para. 8-29).

NOTE

You must be certain that the engine cooling system is working ok, or this test won't tell you anything. If the engine is cold, and everything is working ok, the fan should be disengaged. You can tell by gently revving the engine in neutral with the hood open. If the fan is engaged you will feel a breeze outside the driver's door. If it's disengaged, you won't feel it. If you aren't sure if it's working ok, run the tests in Paragraph 2-25.

STEERING SYSTEM

DIAGNOSTIC FLOWCHART

KNOWN INFO
HARD OR ABNORMAL STEERING
POSSIBLE PROBLEMS
POWER STEERING PUMP POWER STEERING GEAR FAN DRIVE HYDRO-BOOSTER

B7

IS THE HYDRO-BOOSTER WORKING PROPERLY?

TEST OPTIONS
SEE INSTRUCTIONS AT RIGHT.

REASON FOR QUESTION
The hydro-booster will affect the operation of the steering system.

FROM B6, Page 2-468

KNOWN INFO
HARD OR ABNORMAL STEERING
POSSIBLE PROBLEMS
POWER STEERING PUMP POWER STEERING GEAR FAN DRIVE HYDRO-BOOSTER

B8

TURN STEERING WHEEL SLIGHTLY TO LEFT OR RIGHT AND RELEASE WHEEL QUICKLY. THE STEERING WHEEL SHOULD CENTER ITSELF. DOES THIS HAPPEN?

TEST OPTIONS
TRY IT

REASON FOR QUESTION
The steering gear is working properly if this happens.

KNOWN INFO
HARD OR ABNORMAL STEERING
POSSIBLE PROBLEMS
POWER STEERING PUMP POWER STEERING GEAR FAN DRIVE HYDRO-BOOSTER

B9

LOOK AT THE CHART TO THE RIGHT TO DETERMINE WHAT IS WRONG AND REPAIR IT AS DIRECTED.

TEST OPTIONS
N/A

REASON FOR TESTS
N/A

REFERENCE INFORMATION

STEERING SYSTEM



Method for checking hydro-booster. Depress brake pedal several times to exhaust accumulator. Depress brake pedal and start engine. Brake pedal should fall, then push back against operator's foot.

ANSWERS TO QUESTION:			COMPONENT TO REPLACE
B6	B7	B8	
NO	NO	NO	POWER STEERING PUMP
NO	NO	YES	SEE NOTE BELOW
NO	YES	NO	SEE NOTE BELOW
NO	YES	YES	RUN ENGINE COOLING TEST (PARA 2-19)
YES	NO	NO	POWER STEERING PUMP
YES	NO	YES	HYDRO-BOOSTER
YES	YES	NO	DS LEVEL STEERING GEAR
YES	YES	YES	NO FAULTS



NOTE

To diagnose the second and third cases to one item, it is necessary to have a power steering analyzer. Additionally, for all cases, check the hoses for the particular part to make sure they are OK.

STEERING SYSTEM

DIAGNOSTIC FLOWCHART

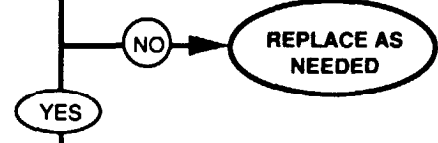
C
FROM 4, Page 2-462
OR A3, Page 2-464

KNOWN INFO
WHEELS AND TIRES OK BRAKES OK ALIGNMENT OK
POSSIBLE PROBLEMS
STEERING COMPONENTS SUSPENSION COMPONENTS

C1

CHECK THE TIE ROD ENDS, CENTER LINK PITMAN ARM AND IDLER ARM, AND ALL OF THE MOUNTING HARDWARE FOR THESE PARTS. ARE THEY ALL OK?

TEST OPTIONS
VISUAL INSPECTION - LOOK FOR BENT PARTS, LOOSE MOUNTINGS AND BAD BUSHINGS.
REASON FOR QUESTION
These are the parts that turn the front wheels in response to the steering wheel movements.

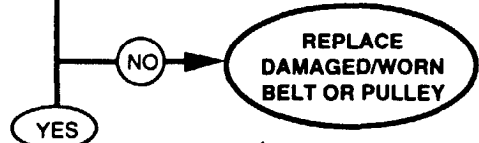


KNOWN INFO
WHEELS AND TIRES OK BRAKES OK STEERING LINKAGES OK
POSSIBLE PROBLEMS
DRIVEBELT & PULLEY CAPSCREWS SUSPENSION COMPONENTS

C2

CHECK POWER STEERING DRIVEBELT PULLEY FOR GROOVES AND SCORING, AND MAKE SURE BELT TENSION IS OK. ARE THESE OK?

TEST OPTIONS
1. VISUAL INSPECTION. 2. BELT TENSION GAUGE.
REASON FOR QUESTION
A damaged pulley will ruin the drivebelt. A loose belt will slip, causing the power steering to loose power or fail.

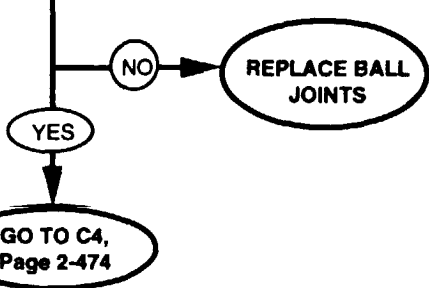


KNOWN INFO
WHEELS AND TIRES OK BRAKES OK POWER STEERING BELTS OK STEERING LINKAGES OK
POSSIBLE PROBLEMS
BALL JOINTS OTHER SUSPENSION COMPONENTS OTHER STEERING COMPONENTS

C3

ARE THE BALL JOINTS OK (NOT WORN)?

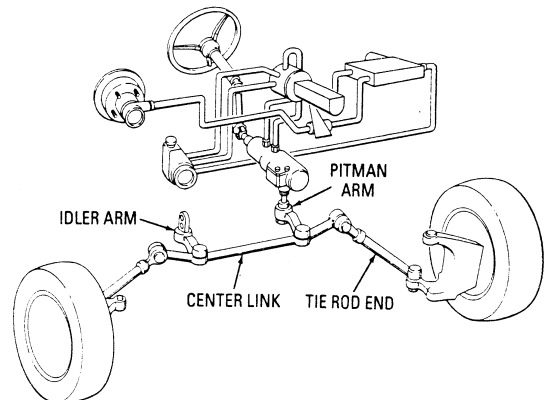
TEST OPTIONS
PROCEDURE AT RIGHT
REASON FOR QUESTION
Worn ball joints can result in difficult or noisy steering.



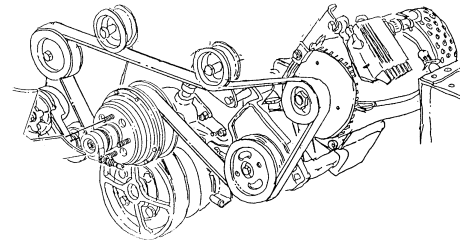
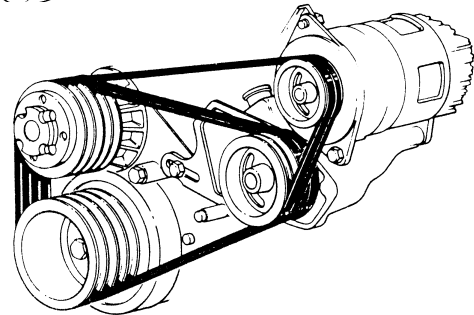
REFERENCE INFORMATION

STEERING SYSTEM

Check for looseness in idler arm and pitman arm, refer to (para. 8-18 and 8-14). For replacing center link refer to (para. 8-15). For replacing tie rods refer to (para. 8-17).



For adjusting the drivebelt tension, refer to (para. 3-82, all except M1123 and "A2" vehicles), and replacing the pulley, refer to (para 8-24).



M1123 and "A2" CONFIGURATION

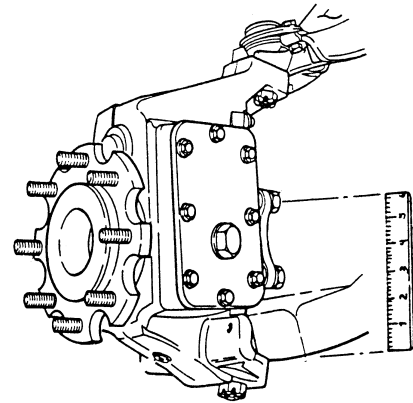


CAUTION

Do not loosen slotted nut to install cotter pin. Loosening the nut may result in damage to the equipment.

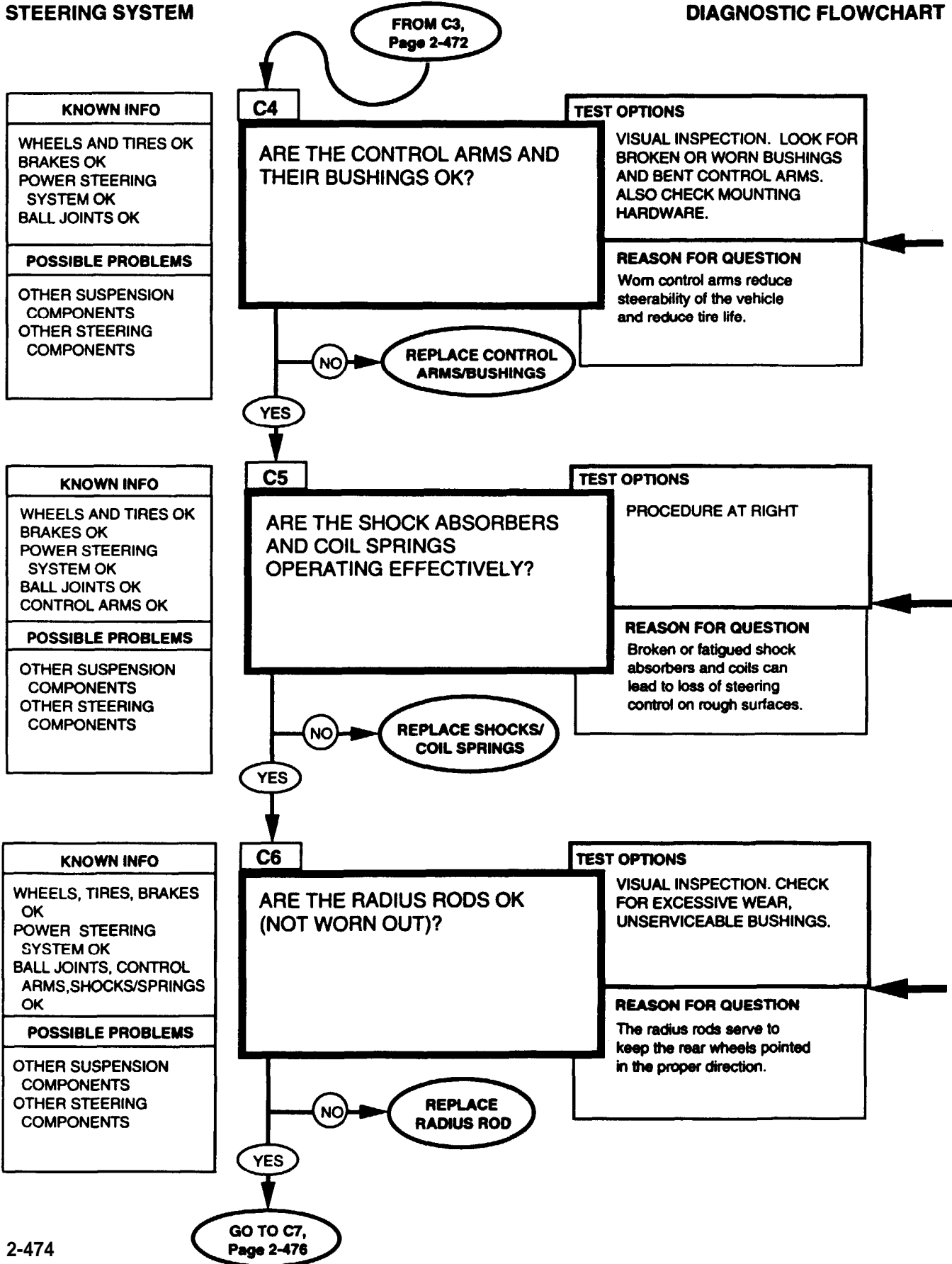
To check for proper operation of ball joints:

- (i) Chock rear wheels front and back.
- (ii) Raise front wheels about two inches off the ground and support on a jack stand.
 - (a) Lower ball joints.
- (iii) Mark a line across the head of the top bolt holding the steering arm cover. Make sure the mark is parallel to the lower control arm.
- (iv) Put a prybar between the cover control arm and geared hub.
- (v) Set a 6-inch ruler upright between the lower control arm and the marked screw.
- (vi) Push down the prybar to try to move the hub.
- (vii) Measure movement in the hub assembly. If movement is more than 1/8 inch (3 mm), replace lower ball joint (refer to para. 6-27).
 - (b) Upper ball joints.
- (viii) Grasp top of tire and attempt to move it in and out.
- (ix) Measure any movement at top outer edge of tire. Replace upper ball joints if tire movement is 3/8 inch (10 mm) or more (refer to para. 6-26).



STEERING SYSTEM

DIAGNOSTIC FLOWCHART

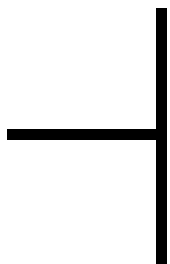
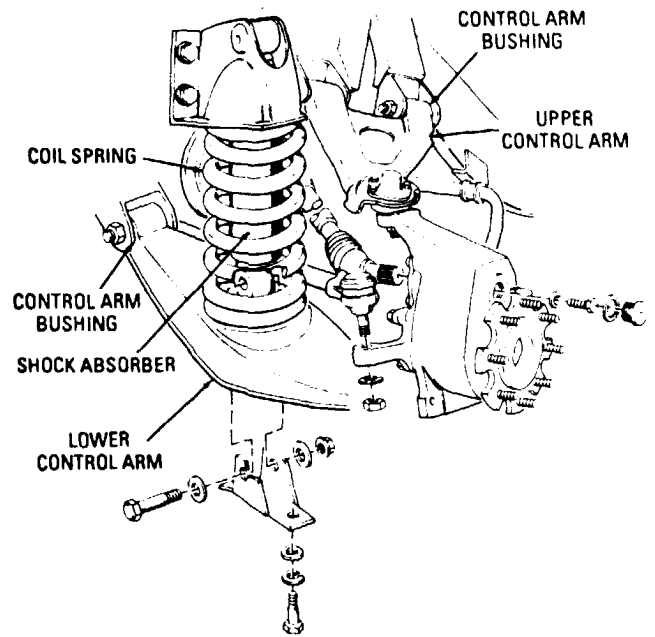


REFERENCE INFORMATION

STEERING SYSTEM



For upper and lower control arm and bushing replacement instructions, refer to (para 6-28 and 6-29).

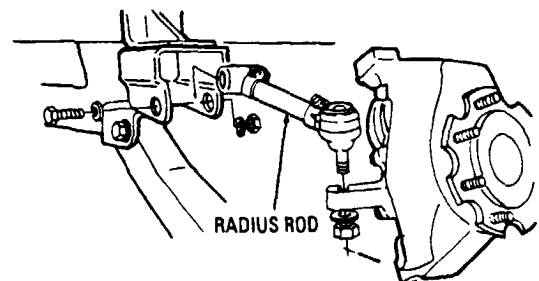


To test the shocks and springs, drive the vehicle over a variety of terrain. If the vehicle continues to bounce after hitting a bump, the shocks may be worn. If the vehicle bottoms out on the suspension, the shocks may be worn. If the vehicle sags when loaded, the springs maybe worn. If the shock absorber bodies are not warm after driving the vehicle, the shocks are no good.

For coil spring and shock absorber replacement instructions, refer to (para 6-30 and 6-31).

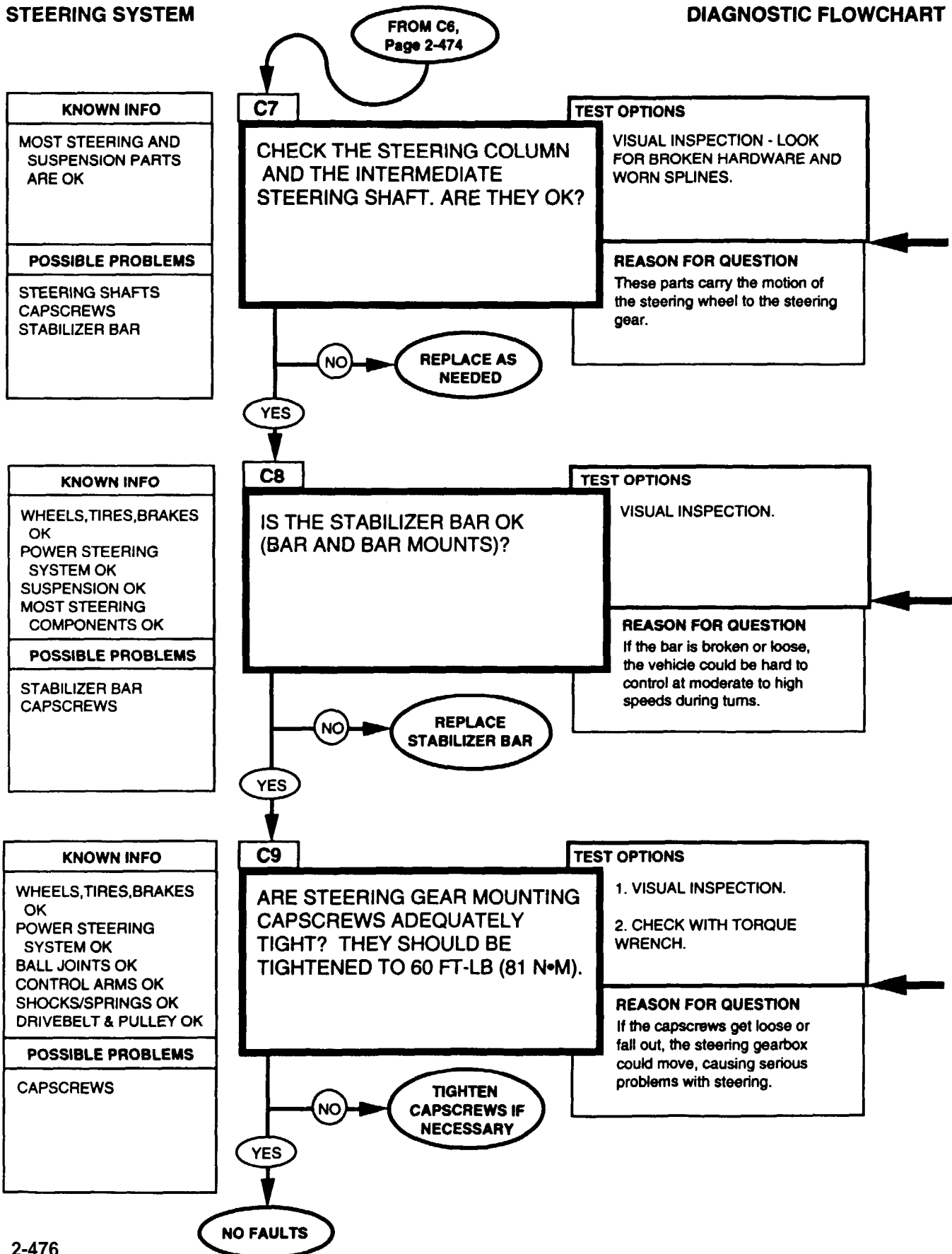


For instructions on replacing the radius rod, refer to (para 6-25).



STEERING SYSTEM

DIAGNOSTIC FLOWCHART



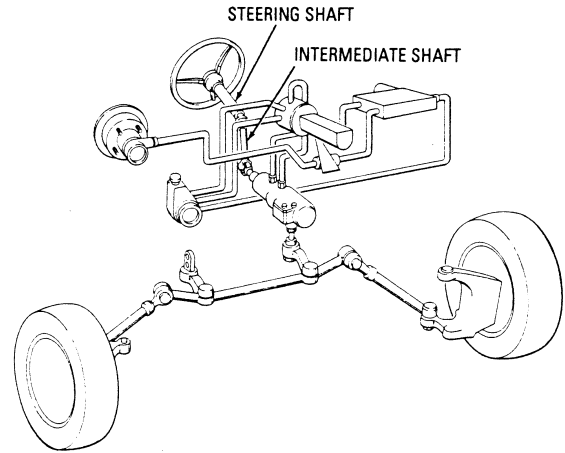
REFERENCE INFORMATION

STEERING SYSTEM

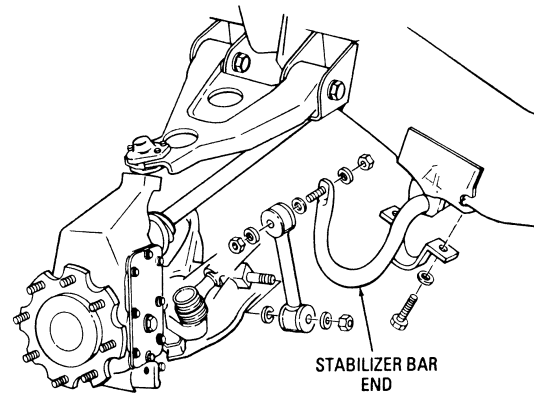
NOTE

Inspect intermediate shaft U-joints for wear, binding, or missing/damaged grease fittings. Replace or lubricate as necessary. Refer to (para. 8-22) for replacement and TM 9-2320-280-10, Appendix G, for lubrication instructions.

Replace the steering column and intermediate shaft, refer to (paras 8-19 and 8-20).



Replace the stabilizer bar, refer to (para 6-23).



If you still have a problem, rerun the test chain to make sure you didn't miss anything. If you didn't go down the "A" chain, you may want to run those tests in order to check out the hydraulic parts of the steering system.

2-38. DRIVETRAIN TESTS

These Drivetrain tests maybe run anytime you think you have a drivetrain problem or if you were sent here by another test chain. Just follow the path, answering the questions. Additional information and notes are given on the facing page when necessary.

The fold-out page shows the location of the major components of the drivetrain system in case you are not familiar with them.

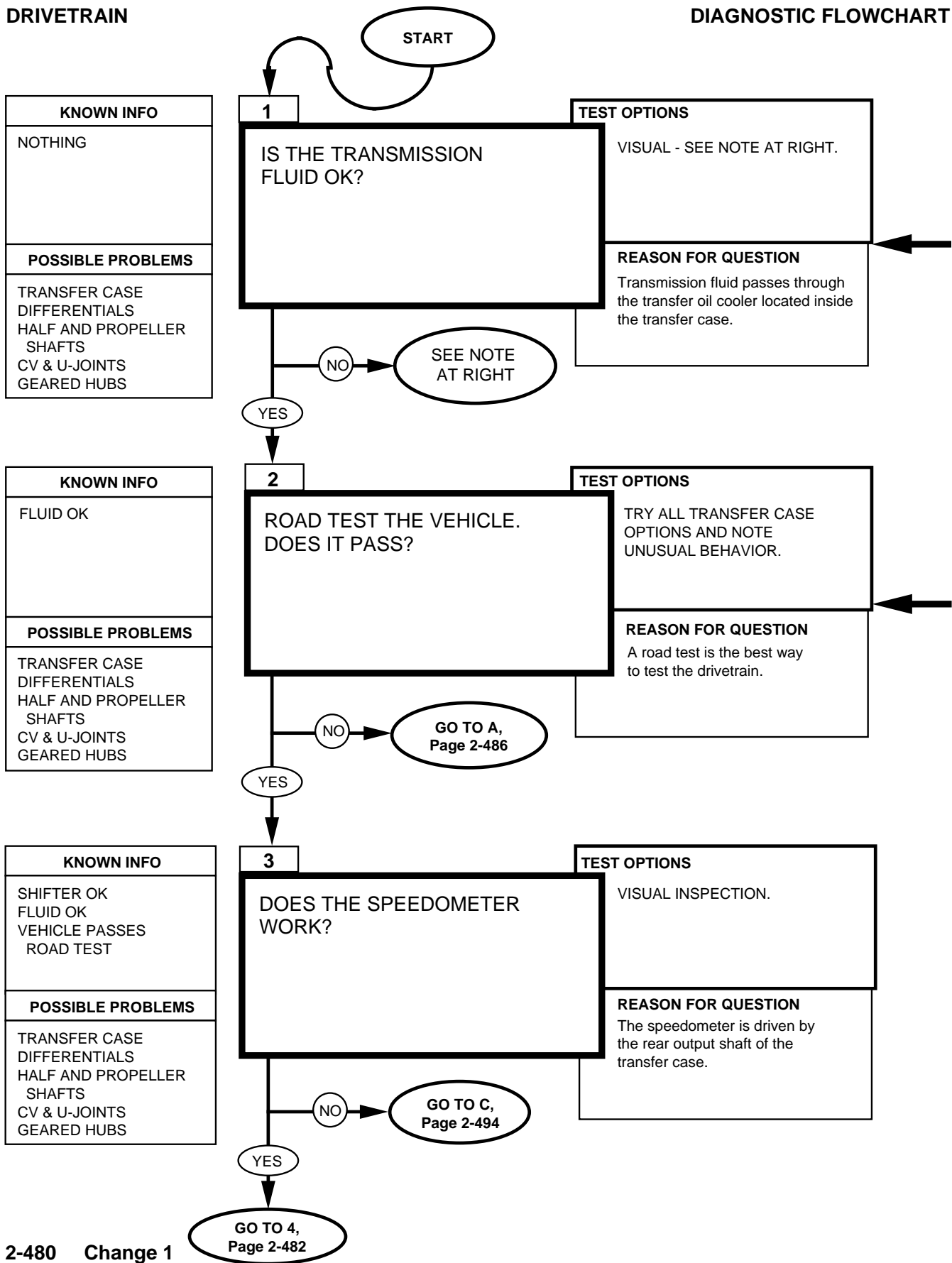
Fold-out page FO-15 may be left open for reference while testing. Also, due to the design of the functional flow diagram, it is not necessary to have a location of parts diagram, so it has been omitted.

NOTE

Problems with the transmission and drivetrain cooling system are dealt with in Paragraph 2-34 or 2-35.

DRIVETRAIN

DIAGNOSTIC FLOWCHART



REFERENCE INFORMATION

DRIVETRAIN

Procedure for checking transmission fluid

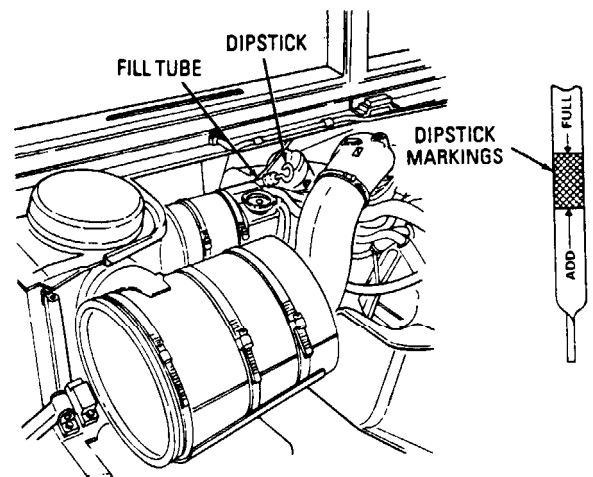
1. Start engine
2. Hold down brake pedal and move transmission shift lever through all ranges including reverse.
3. Engage parking brake and place shift lever in neutral. Check fluid level on dipstick.
4. Proper level is between FULL and ADD marks on dipstick

NOTE

Check fluid for a burnt smell, grit, discoloration, air bubbles, or a milky appearance.

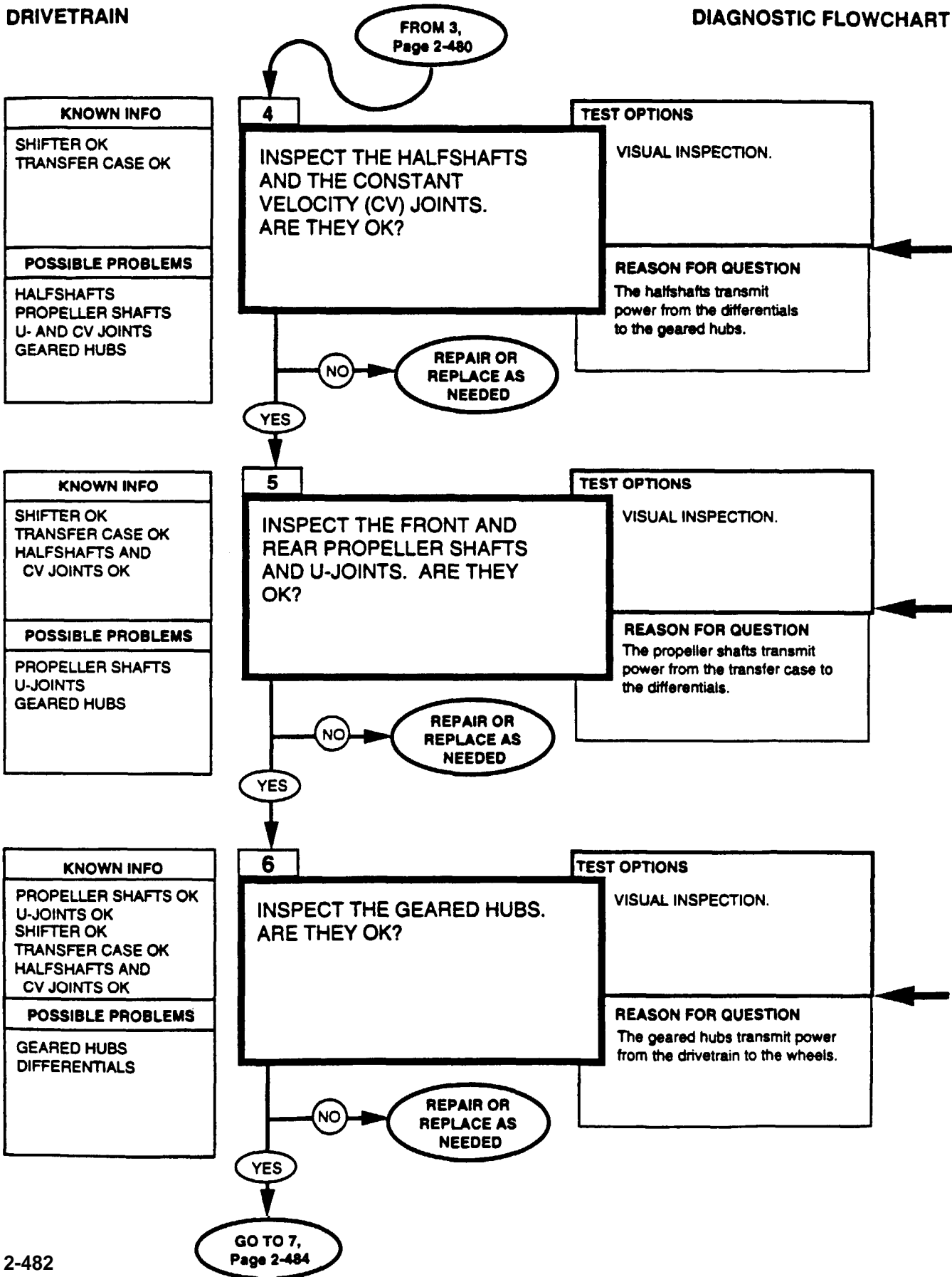
- Burnt smell, discoloration, or grit indicates worn or damaged internal components. Notify DS maintenance.
- Bubbles indicate of an overfilled system or air leaks in the system. Drain the fluid and refill to proper level, refer to (para 5-2).
- Milky appearance is due to water in the system. Replace fluid, and replace filter.

If the speedometer works, but the vehicle doesn't move, the transmission is OK and the problem is in the final drive. Most likely the fault is in the splined output shafts of the transfer case. Listen for unusual noise.



DRIVETRAIN

DIAGNOSTIC FLOWCHART



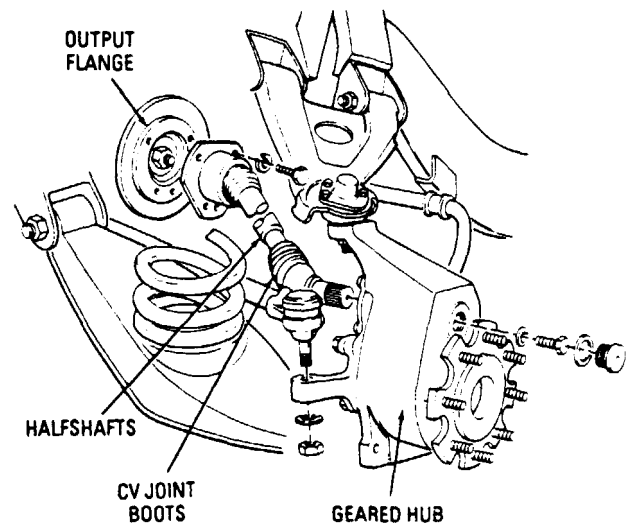
REFERENCE INFORMATION

DRIVETRAIN

Check for torn boots on the CV joints, stripped splines, smooth joint operation, and proper mounting torques.

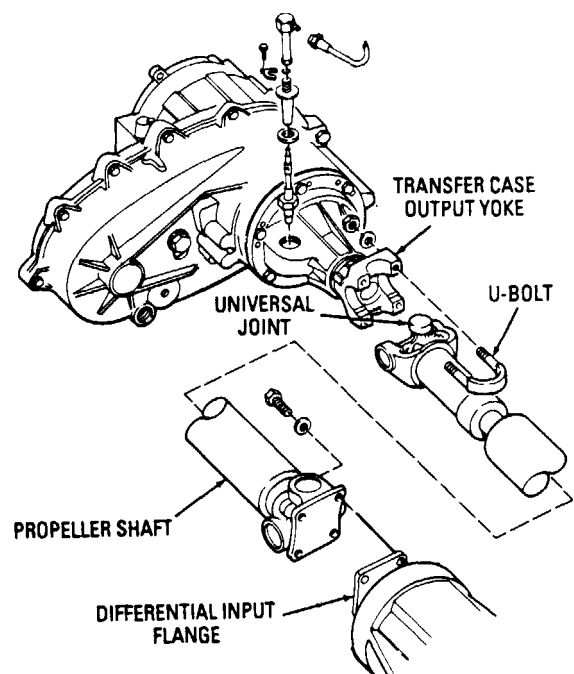
Replace halfshafts and CV joints, refer to (para 6-9).

Lube in accordance with TM 9-2320-280-10.



Check for smooth operation of U-joints, stripped splines, bent yokes, or other problems. Also check to see if the shaft itself is bent. Replace propeller shafts or U-joints, refer to (para 6-2 through 6-7).

Lube in accordance with TM 9-2320-280-10.



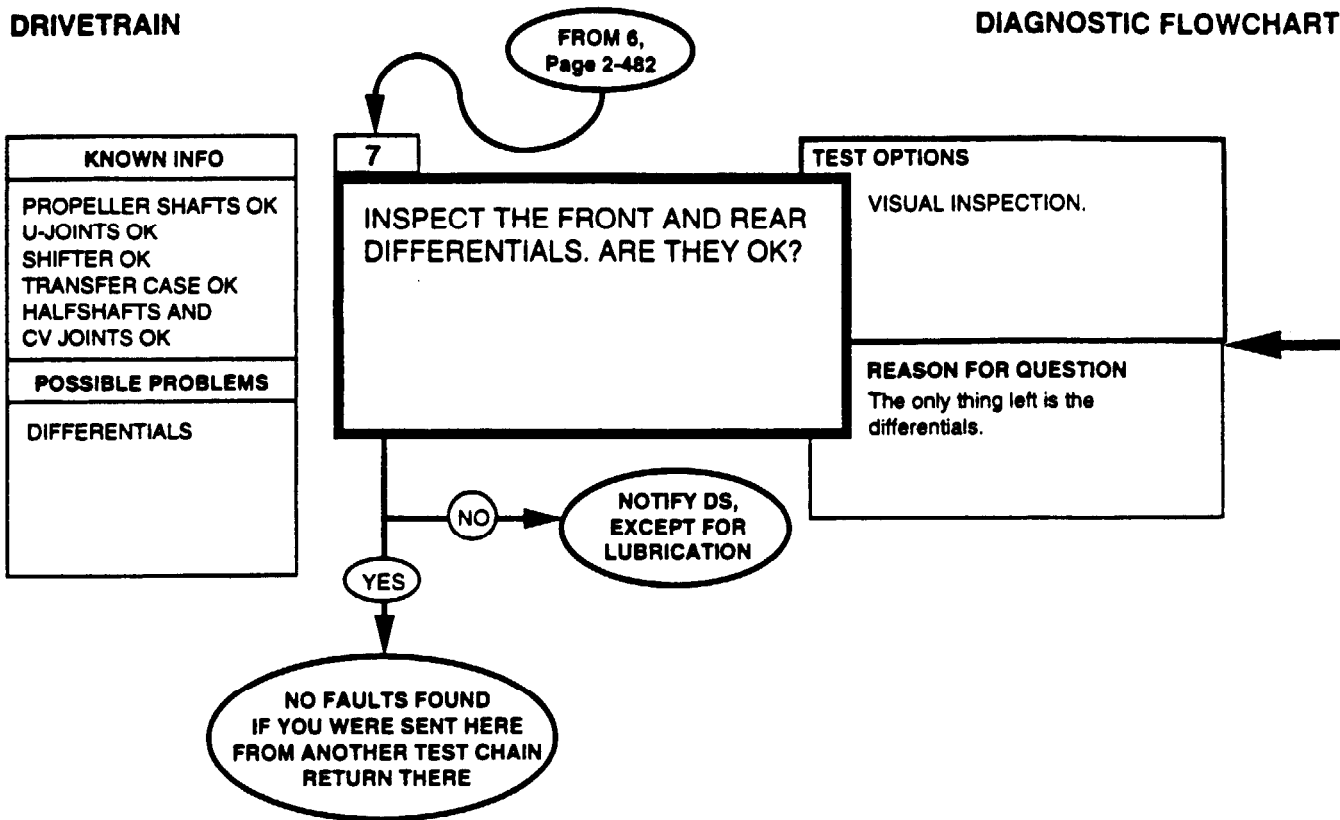
Make sure the geared hubs turn freely. Check mounting hardware for proper installation

Lube in accordance with TM 9-2320-280-10.

Replace geared hubs, refer to (para 6-11).

DRIVETRAIN

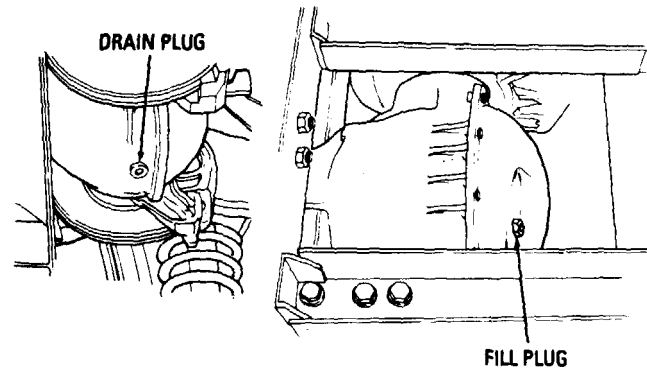
DIAGNOSTIC FLOWCHART



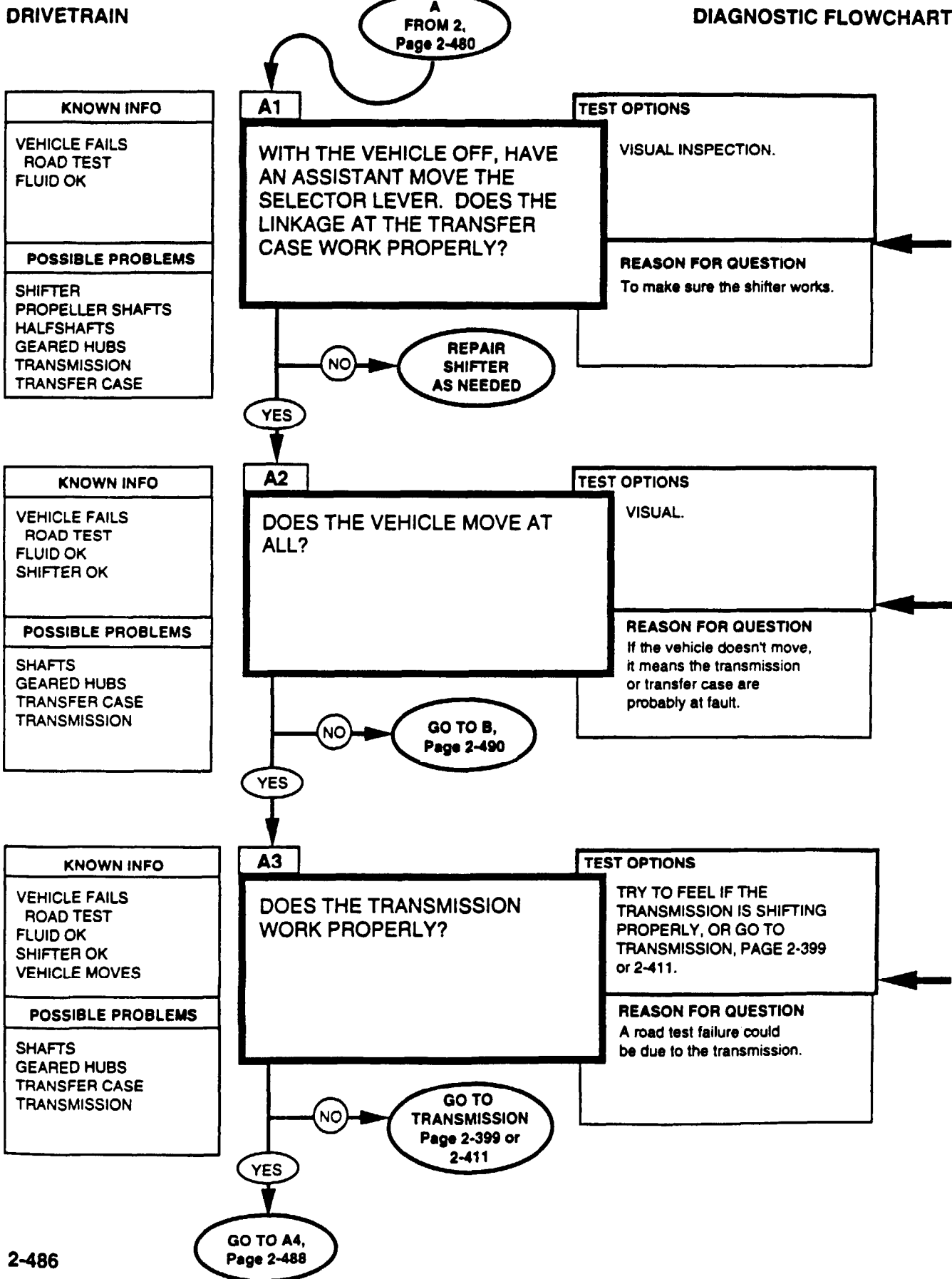
REFERENCE INFORMATION

DRIVETRAIN

- Check for loose mounting and broken parts.
- Check fluid in accordance with TM 9-2320-280-10.
- Notify DS maintenance for other faults.



DIAGNOSTIC FLOWCHART



REFERENCE INFORMATION

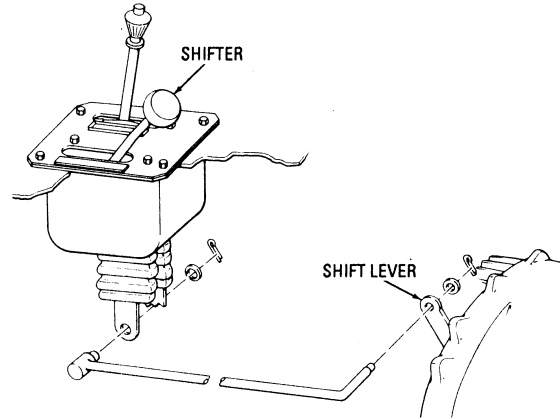
DRIVETRAIN

Lube in accordance with table 2-1.

Adjust and repair linkage, refer to (para 5-8 or 5-11). Make sure the detents in the shifter correspond with the positions on the name plate.

If difficulty occurs when shifting transfer range with engine running, perform Engine Idle Speed Adjustment prior to troubleshooting drivetrain.

If engine was turned OFF in order to shift transfer to desired range, notify DS maintenance.



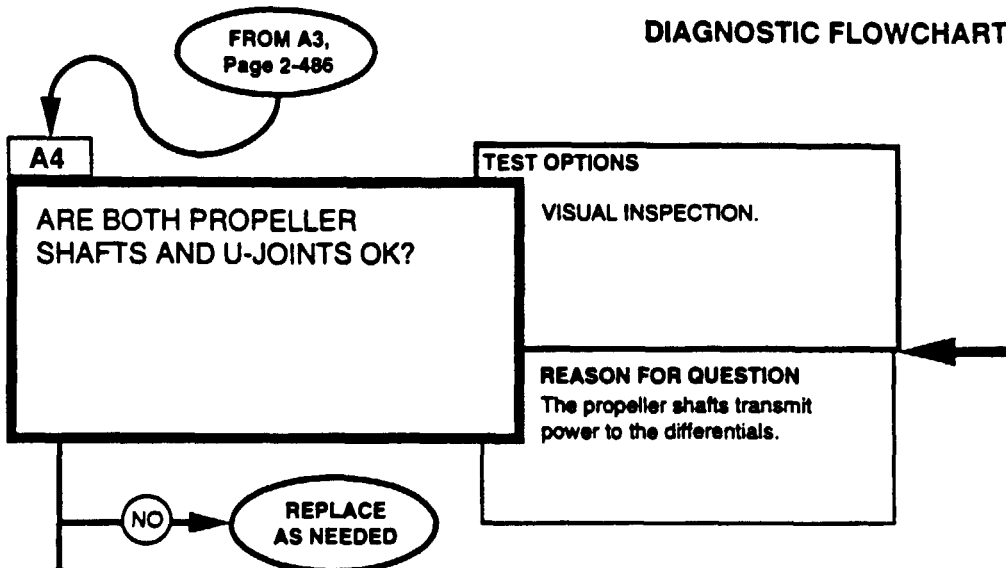
For the vehicle not to move, there must be a major problem in the drivetrain.

If you've already run the transmission tests, and you still can't find the problem, continue down this test chain.

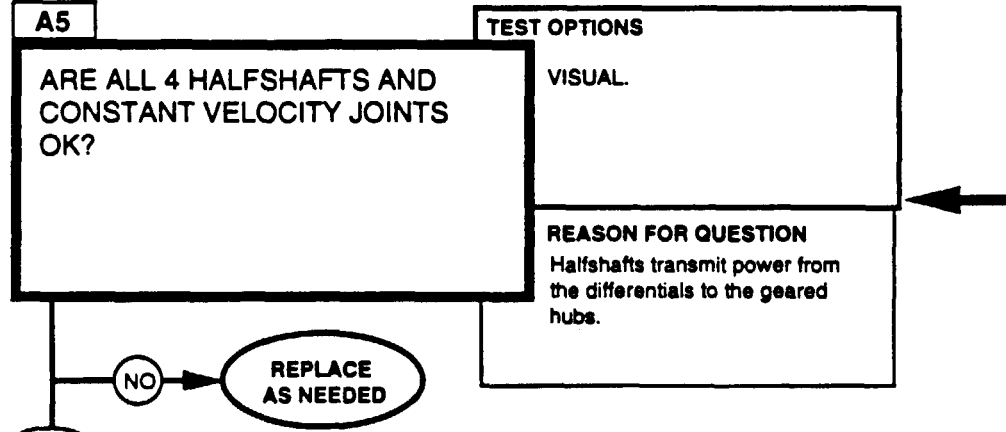
DRIVETRAIN

DIAGNOSTIC FLOWCHART

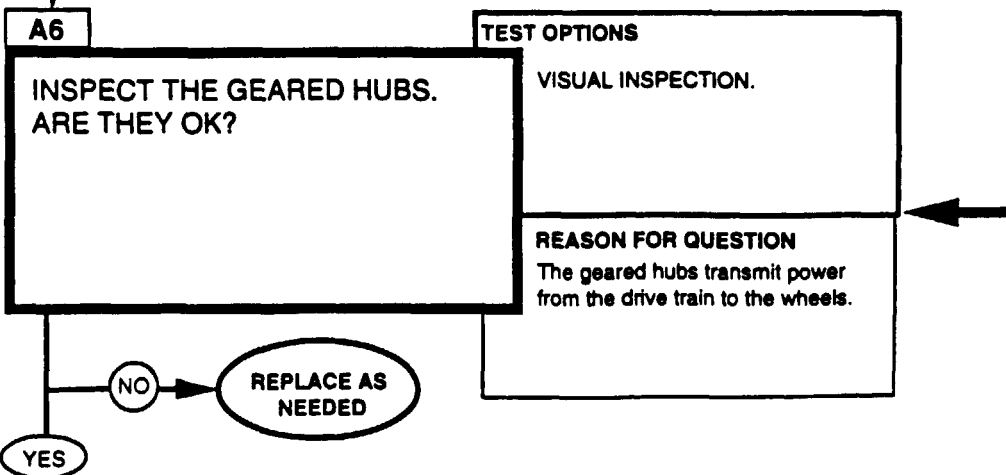
KNOWN INFO
VEHICLE FAILS ROAD TEST FLUID OK SHIFTER OK VEHICLE MOVES
POSSIBLE PROBLEMS
DIFFERENTIALS SHAFTS GEARED HUBS TRANSFER CASE



KNOWN INFO
VEHICLE FAILS ROAD TEST FLUID OK SHIFTER OK VEHICLE MOVES PROPELLER SHAFTS OK
POSSIBLE PROBLEMS
DIFFERENTIALS HALFSHAFTS GEARED HUBS TRANSFER CASE



KNOWN INFO
VEHICLE FAILS ROAD TEST FLUID OK SHIFTER OK VEHICLE MOVES PROPELLER SHAFTS OK HALFSHAFTS OK
POSSIBLE PROBLEMS
DIFFERENTIALS GEARED HUBS TRANSFER CASE



SEE NOTE AT RIGHT

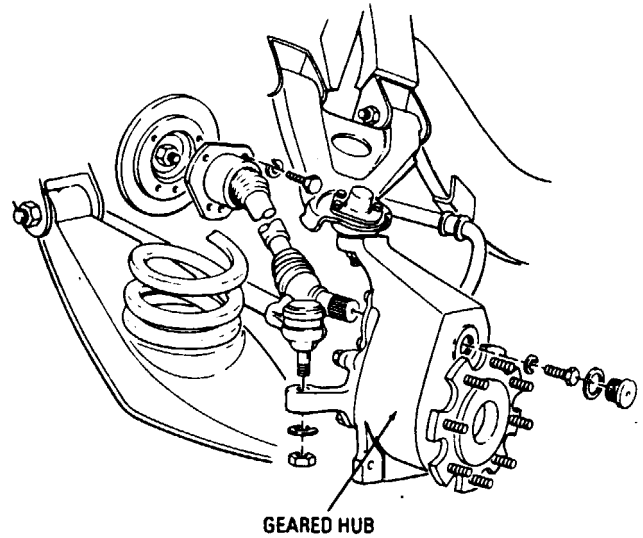
REFERENCE INFORMATION

DRIVETRAIN

Lube in accordance with TM 9-2320-280-10.

Check for smooth operation of U-Joints, stripped splines, bent yokes, or other problems. Also check to see if the shaft itself is bent.

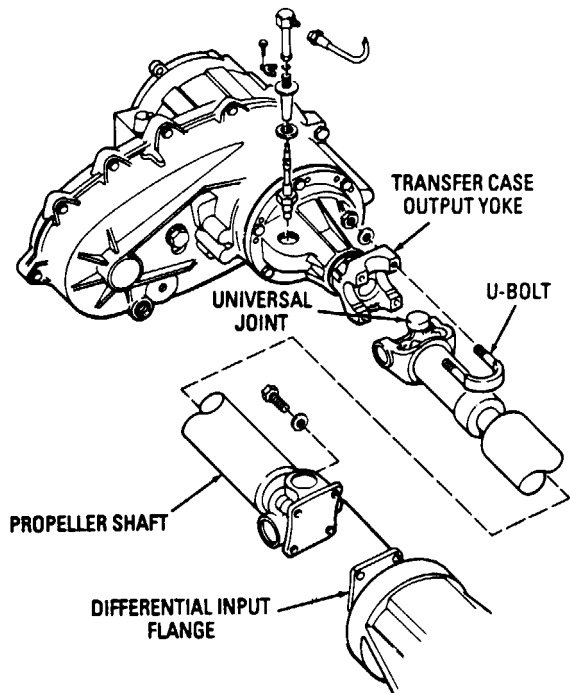
Repair and replace propeller shafts and U-joints, refer to (para 6-4 thru 6-7).



Check for torn boots on the CV joints, stripped splines, smooth joint operation, and proper mounting torques.

For halfshaft maintenance procedures, refer to (para 6-9).

Lube in accordance with TM 9-2320-280-10.



Make sure the geared hubs turn freely. Check mounting hardware for proper installation.

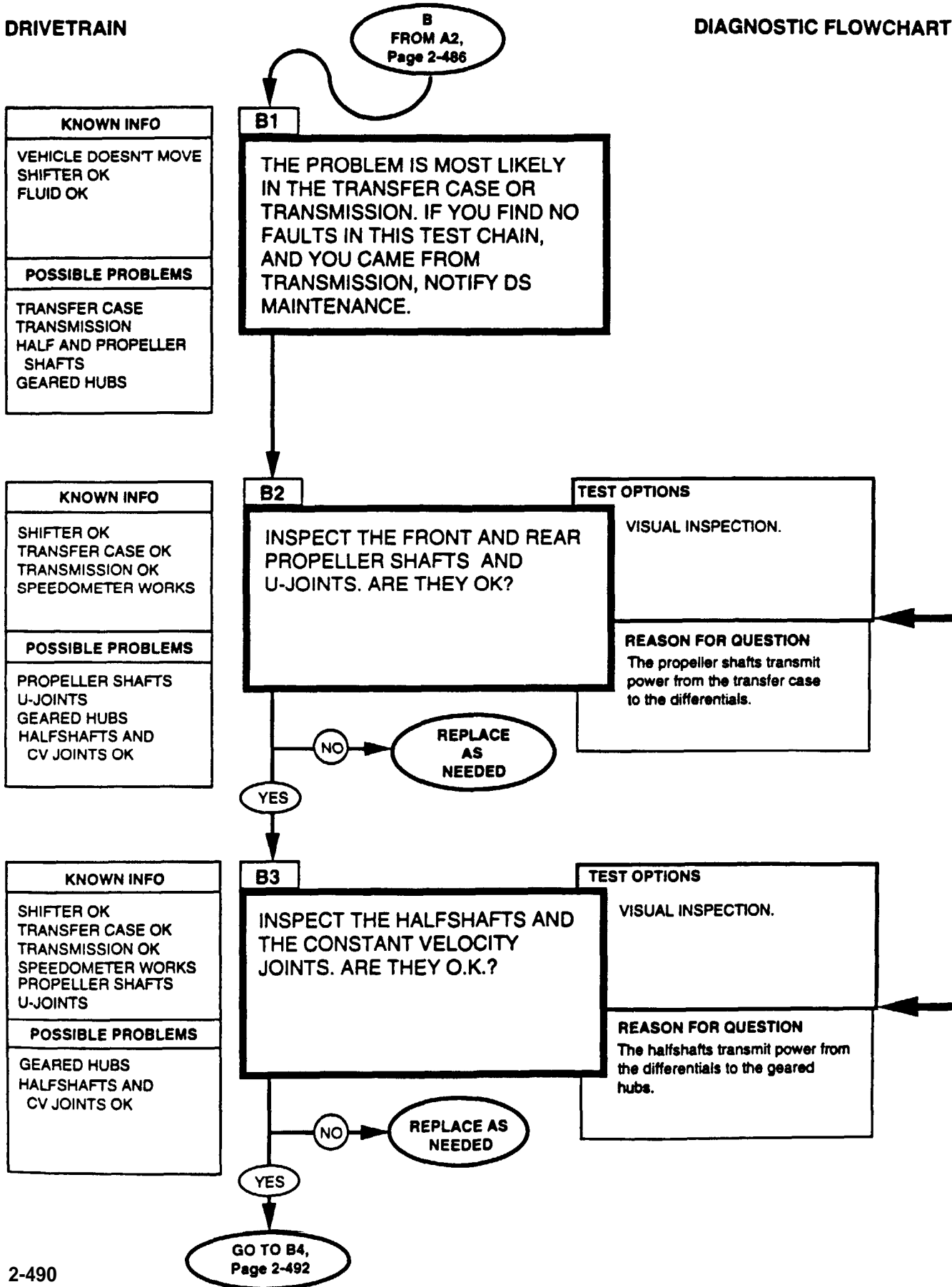
Lube in accordance with
TM 9-2320-280-10.

NOTE

If you haven't found any faults, check the differential fluid in accordance with TM 9-2320-280-10. Otherwise notify DS maintenance.

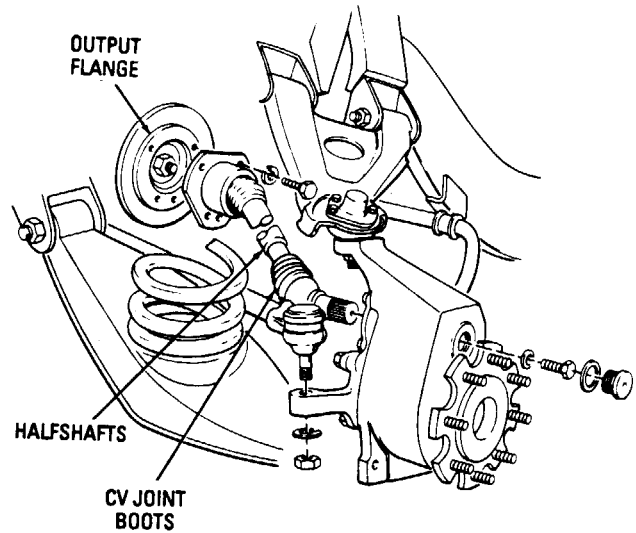
DRIVETRAIN

DIAGNOSTIC FLOWCHART



REFERENCE INFORMATION

DRIVETRAIN



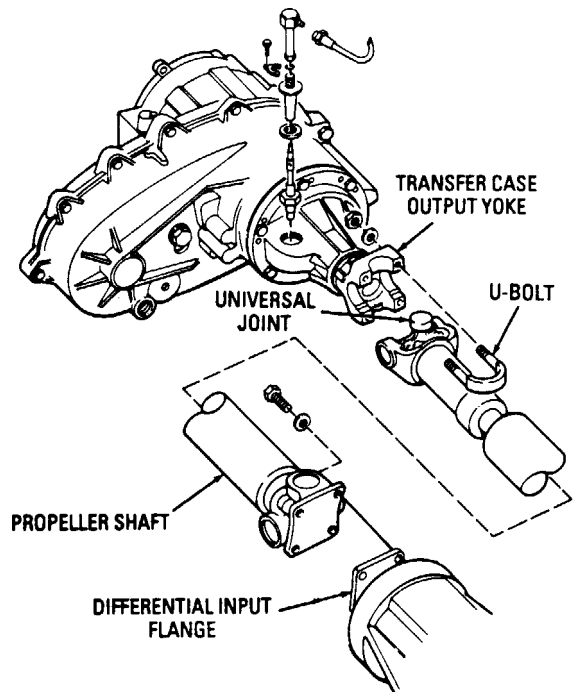
If the vehicle doesn't work, then both shafts would have to be broken.

Check for smooth operation of U-joints, stripped splines, bent yokes, or other problems.

Also check to see if the shaft itself is bent.

Replace propeller shafts, refer to (para 6-2 thru 6-6).

Lube in accordance with TM 9-2320-280-10.



If the vehicle doesn't move, all four shafts maybe broken. Check for tom boots on the CV joints, stripped splines, smooth joint operation, and proper mounting torques.

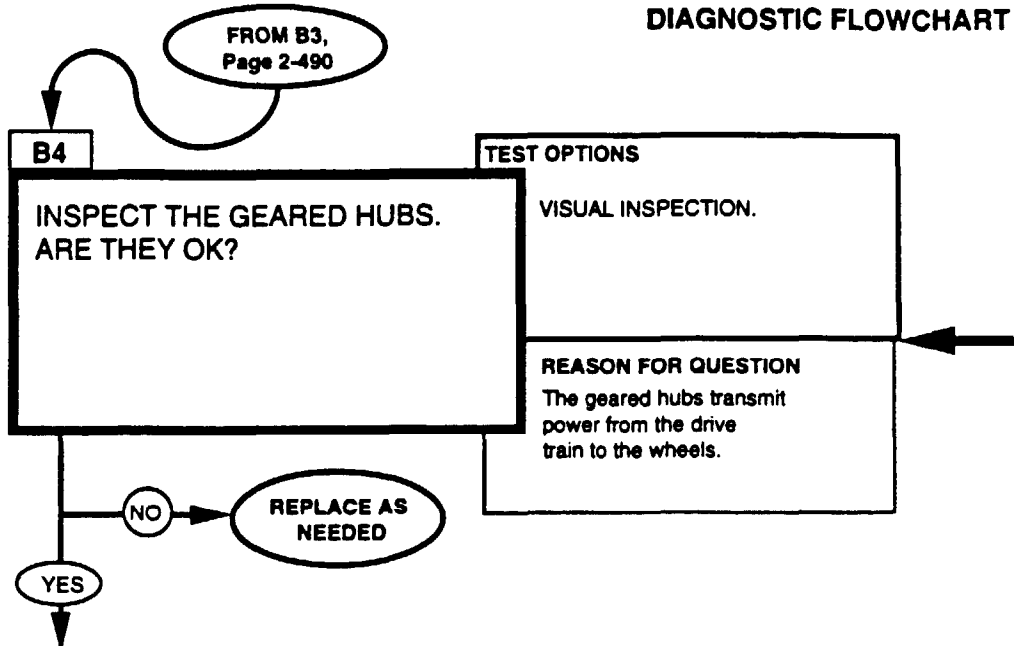
For halfshaft maintenance procedures, refer to (para 6-9).

Lube in accordance with TM 9-2320-280-10.

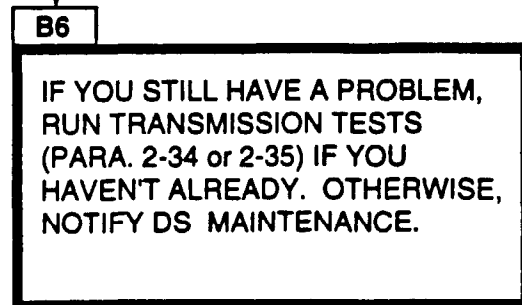
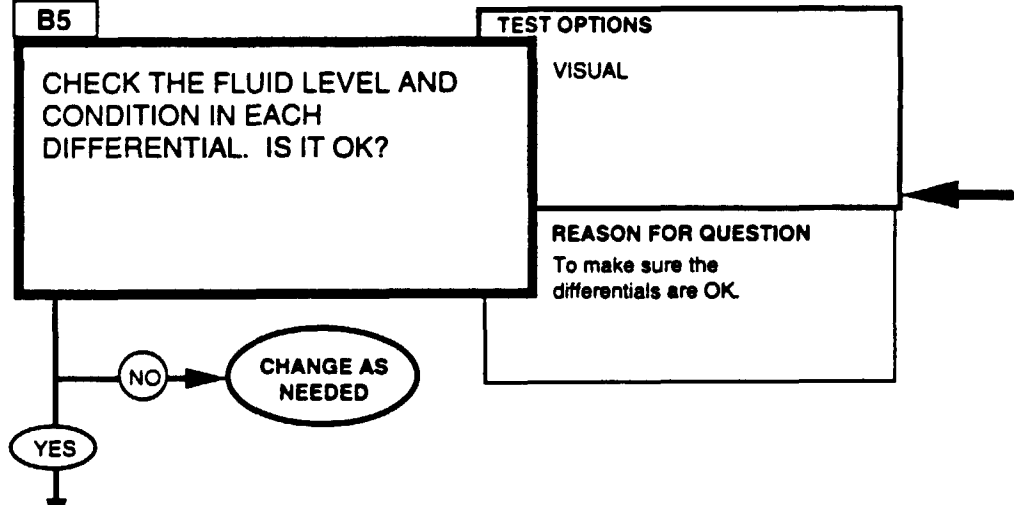
DRIVETRAIN

DIAGNOSTIC FLOWCHART

KNOWN INFO
SHIFTER OK TRANSFER CASE OK TRANSMISSION OK PROPELLER SHAFTS U-JOINTS HALFSHAFTS AND CV JOINTS OK
POSSIBLE PROBLEMS
GEARED HUBS DIFFERENTIALS



KNOWN INFO
SHIFTER OK TRANSFER CASE OK TRANSMISSION OK SHAFTS AND JOINTS OK GEARED HUBS OK
POSSIBLE PROBLEMS
DIFFERENTIALS

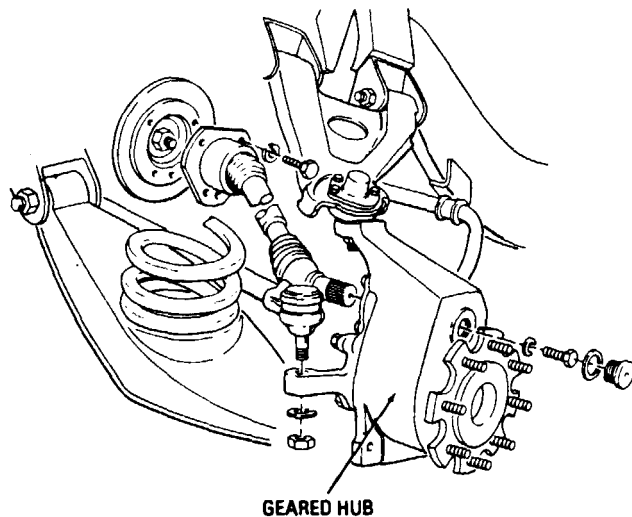


REFERENCE INFORMATION

DRIVETRAIN

Make sure the geared hubs turn freely.
 For geared hub replacement procedure,
 refer to (para 6-11). Check mounting
 hardware for proper installation.

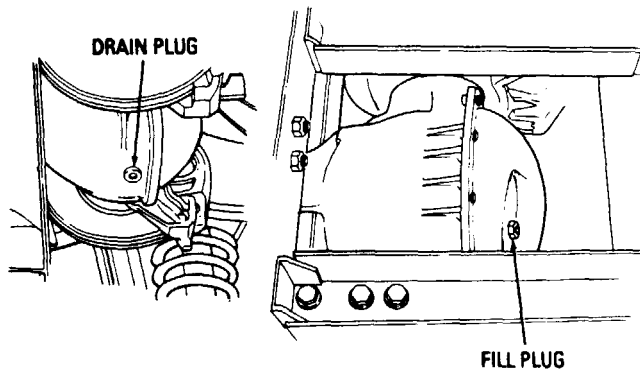
Lube in accordance with
 TM 9-2320-280-10.



Check for loose mounting and broken
 parts. Notify DS maintenance.

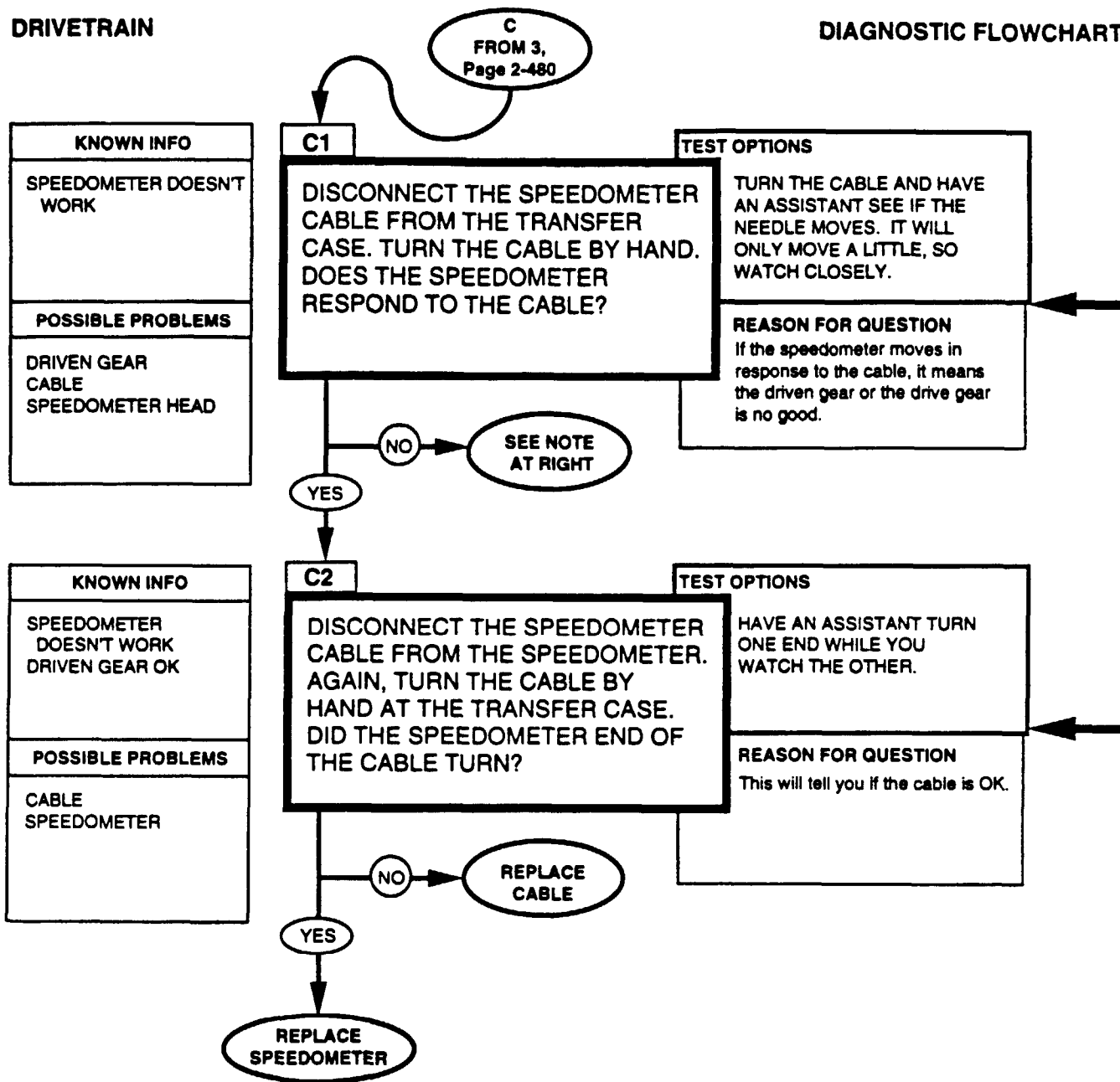
Check fluid level in accordance with
 TM 9-2320-280-10.

Notify DS maintenance for other faults.



DRIVETRAIN

DIAGNOSTIC FLOWCHART



REFERENCE INFORMATION

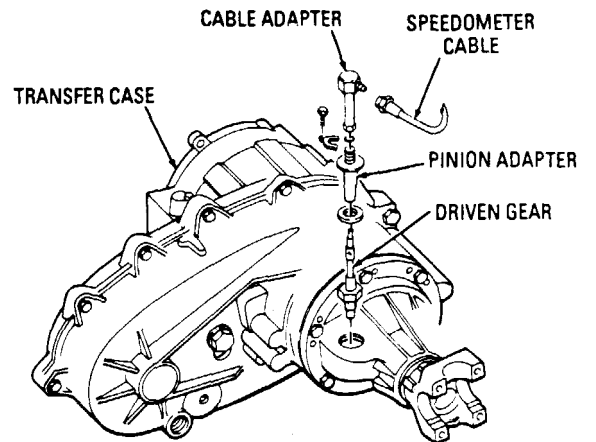
DRIVETRAIN

A no answer means the speedometer did move.

NOTE

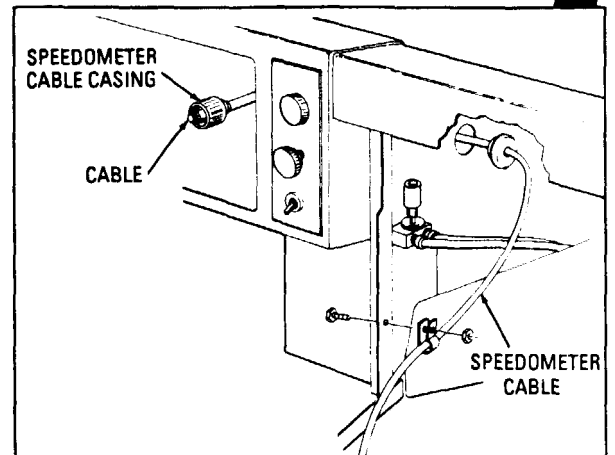
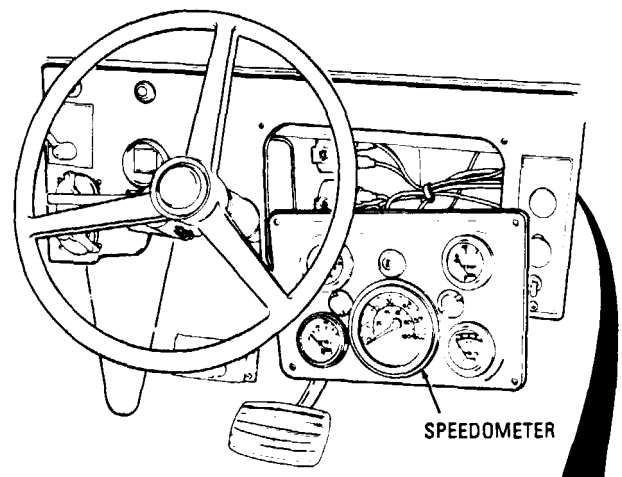
If you answer NO, check the driven gear in the transfer case. if it's OK, the problem is the drive gear. Notify DS maintenance.

Replace the driven gear, refer to (para 5-24).



Replace the cable, refer to (para 4-15).

Replace speedometer, refer to (para 4-14).



2-39. AMBULANCE ELECTRICAL SYSTEM TESTS

This section provides information to diagnose and correct malfunctions of the ambulance electrical system.

Each malfunction symptom given for an individual component or system is followed by step(s) that you should take to determine the cause and corrective action necessary to remedy the problem.

Before taking any action to correct a possible malfunction, the following rules should be followed:

- (1) Question the operator to obtain any information that might help you determine the cause of the problem.
- (2) Never overlook the chance that the problem could be of simple origin because it could be corrected with minor adjustment.
- (3) Use all senses to observe and locate trouble spots.
- (4) Use test instruments or gauges to help you determine and isolate problem.
- (5) Always isolate the system where the malfunction occurs and then locate the defective component.
- (6) Use standard automotive theories and principles when troubleshooting the vehicles covered in this manual.
- (7) Functional Schematics for ambulance electrical systems are located on pages 2-685 thru 2-691.

AMBULANCE
(All Dome Lamps)
 With Ambulance Compartment
 Front Door, Rear Door, and Rear
 Step closed (Refer to Fig. 11.)

DIAGNOSTIC FLOWCHART

KNOWN INFO
NOTHING
POSSIBLE PROBLEMS
LIGHT SWITCH POSITION BATTERY CABLE 660 LIGHT SWITCH RELAY 1

1

REPLACE OLD BULBS WITH NEW ONES. IS LIGHT SWITCH ON CONTROL BOX IN NORMAL OPERATING POSITION?

TEST OPTIONS
VISUAL

REASON FOR QUESTION
Improper switch position would cause dome lights not to illuminate.



KNOWN INFO
LIGHT SWITCH POSITION OK
POSSIBLE PROBLEMS
BATTERY CABLE 660 LIGHT SWITCH RELAY 1

2

IS BATTERY IN PROPER WORKING ORDER?

TEST OPTIONS
1. STE/ICE-R TEST 89, Page 2-750
2. MULTIMETER

REASON FOR QUESTION
Battery malfunction will cause any dependent circuit to malfunction.



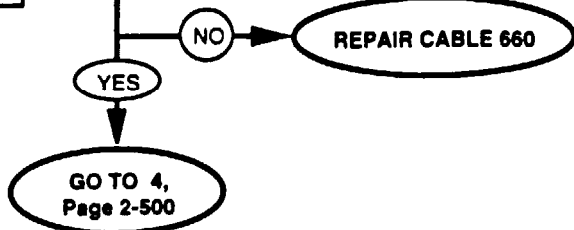
KNOWN INFO
LIGHT SWITCH POSITION OK BATTERY OK
POSSIBLE PROBLEMS
CABLE 660 LIGHT SWITCH RELAY 1

3

IS THERE BATTERY VOLTAGE IN CONTROL BOX AT POWER STUD?

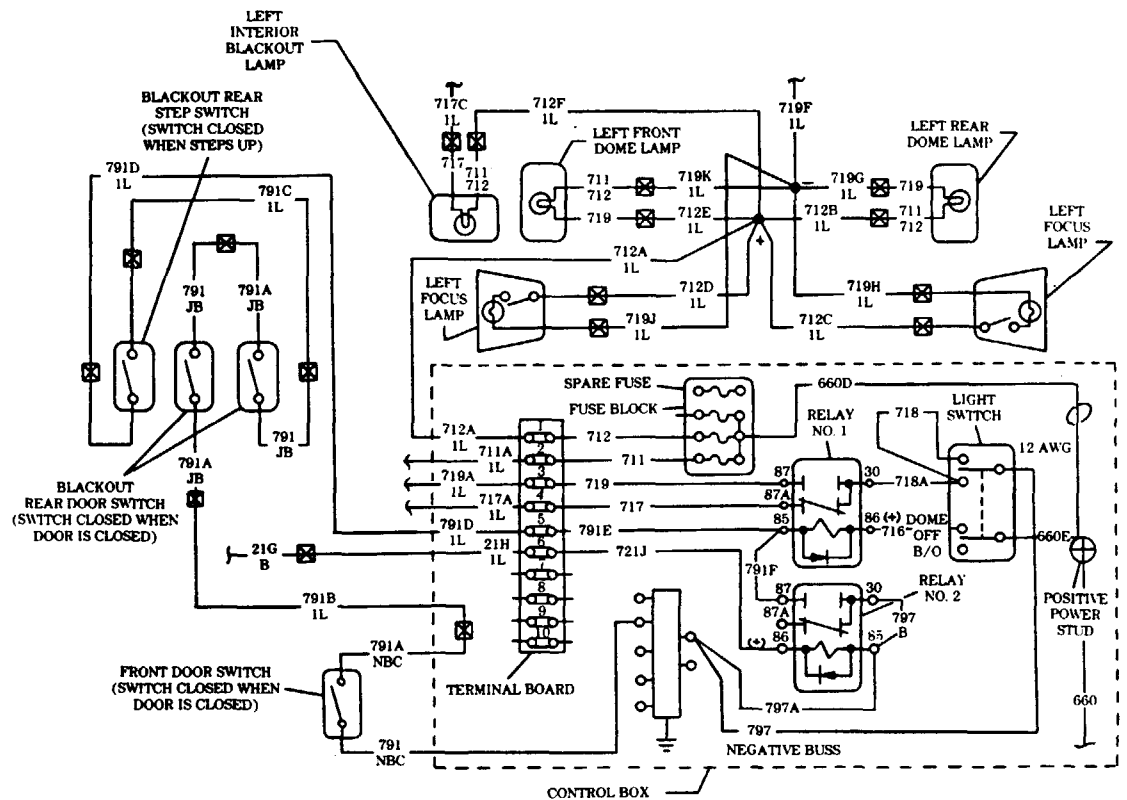
TEST OPTIONS
1. STE/ICE-R TEST 89, Page 2-750
2. MULTIMETER

REASON FOR QUESTION
No power at power stud would indicate a damaged cable from power source.



REFERENCE INFORMATION

AMBULANCE



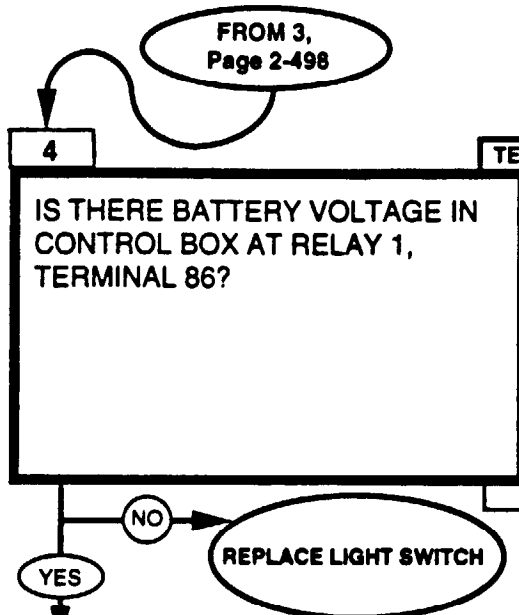
Repair cable, refer to DS Maintenance.

<p>0-45 DC VOLTS STEICE-R TEST 89</p>
<ol style="list-style-type: none"> 1. Connect RED clip to the indicated test point, BLACK clip to negative or ground. 2. Start Test 89, DC volts. 3. Displayed reading is in volts.
<p>BATTERY VOLTAGE MULTIMETER</p>
<ol style="list-style-type: none"> 1. Set the voltmeter to a DC volts scale of at least 40 volts. 2. Connect the RED lead to positive and the BLACK lead to negative. 3. Be sure to read the correct scale.

AMBULANCE
(All Dome Lamps)
 With Ambulance
 Compartment Front Door,
 Rear Door, and Rear Step
 closed (Refer to Fig. 11.)

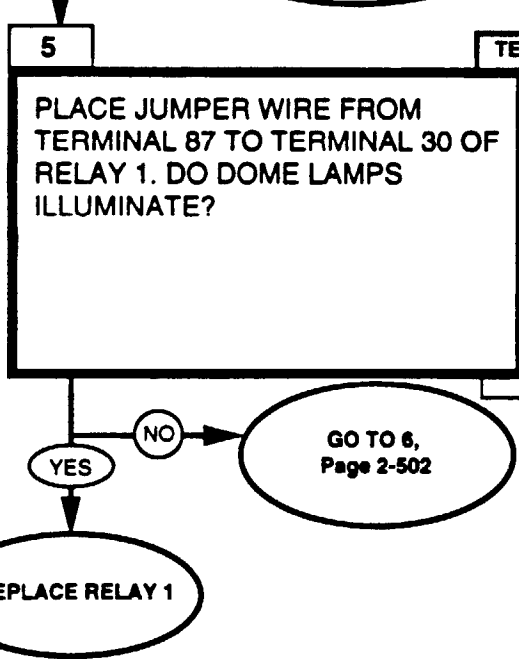
DIAGNOSTIC FLOWCHART

KNOWN INFO
LIGHT SWITCH POSITION OK BATTERY OK CABLE 660 OK
POSSIBLE PROBLEMS
LIGHT SWITCH RELAY 1



TEST OPTIONS
1. STE/ICE-R TEST 89, PAGE 2-750 2. MULTIMETER
REASON FOR QUESTION
If you have battery voltage here, then light switch is ok.

KNOWN INFO
LIGHT SWITCH POSITION OK BATTERY OK CABLE 660 OK LIGHT SWITCH OK
POSSIBLE PROBLEMS
RELAY 1



TEST OPTIONS
TRY IT
REASON FOR QUESTION
If dome lights operate, then relay 1 is malfunctioning.

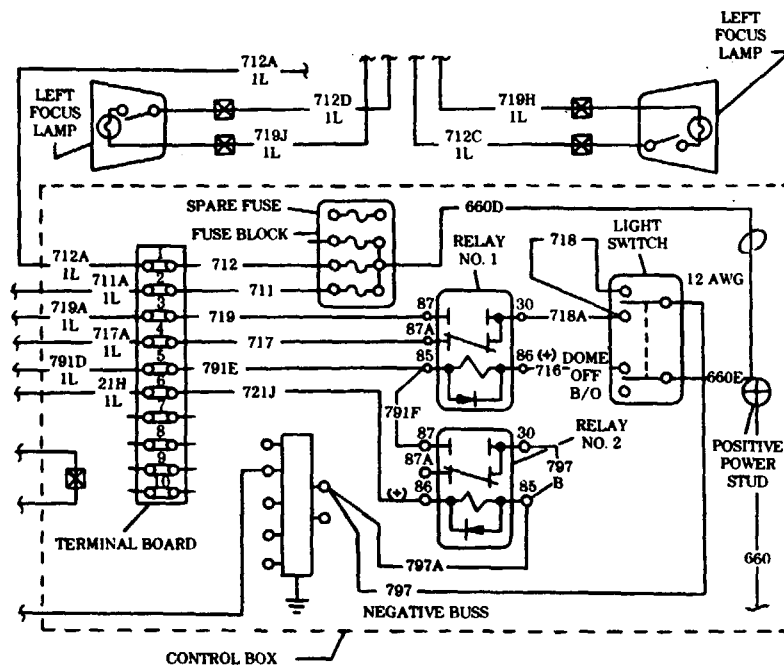
REFERENCE INFORMATION

AMBULANCE

Replace light switch, refer to (para. 4-118).

Replace relay 1, refer to (para. 4-120).

<p>0-45 DC VOLTS STE/CE-R TEST 89</p>
<ol style="list-style-type: none"> 1. Connect RED clip to the indicated test point, BLACK clip to negative or ground. 2. Start Test 89, DC volts. 3. Displayed reading is in volts.
<p>BATTERY VOLTAGE MULTIMETER</p>
<ol style="list-style-type: none"> 1. Set the voltmeter to a DC volts scale of at least 40 volts. 2. Connect the RED lead to positive and the BLACK lead to negative. 3. Be sure to read the correct scale.



AMBULANCE
(All Dome Lamps)
 With Ambulance
 Compartment Front Door,
 Rear Door, and Rear Step
 closed (Refer to Fig. 11.)

DIAGNOSTIC FLOWCHART

KNOWN INFO
PREVIOUSLY CORRECTED INFORMATION
POSSIBLE PROBLEMS
LEAD 791 E LEAD 791 D BLACKOUT REAR STEP SWITCH LEAD 791 A BLACKOUT REAR DOOR SWITCH LEAD 791 B LEAD 791 A FRONT DOOR SWITCH LEAD 791



6

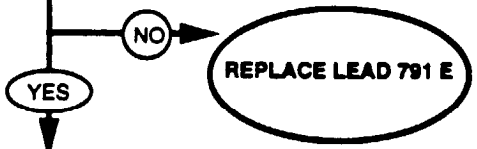
IS THERE CONTINUITY IN THE CONTROL BOX BETWEEN TERMINAL 85 OF RELAY 1 AND TERMINAL BOARD (TB) TERMINAL 5?

TEST OPTIONS

1. STE/ICE-R TEST 91, PAGE 2-752
2. MULTIMETER

REASON FOR QUESTION

No continuity would indicate a damaged lead.



KNOWN INFO
POSSIBLE PROBLEMS
LEAD 791 D BLACKOUT REAR STEP SWITCH LEAD 791 C BLACKOUT REAR DOOR SWITCH LEAD 791 A BLACKOUT REAR DOOR SWITCH LEAD 791 B LEAD 791 A FRONT DOOR SWITCH LEAD 791

7

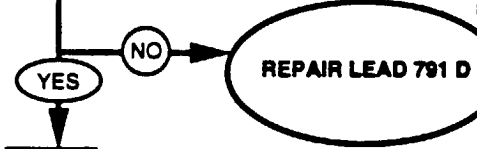
IS THERE CONTINUITY IN THE CONTROL BOX BETWEEN TB TERMINAL 5 AND BLACKOUT REAR STEP SWITCH?

TEST OPTIONS

1. STE/ICE-R TEST 91, PAGE 2-752
2. MULTIMETER

REASON FOR QUESTION

No continuity would indicate a damaged lead.



KNOWN INFO
LEAD 791 E OK LEAD 791 D OK
POSSIBLE PROBLEMS
BLACKOUT REAR STEP SWITCH LEAD 791 C BLACKOUT REAR DOOR SWITCH LEAD 791 A BLACKOUT REAR DOOR SWITCH LEAD 791 B LEAD 791 A FRONT DOOR SWITCH LEAD 791

8

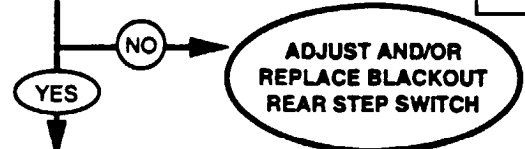
IS THERE CONTINUITY ACROSS BLACKOUT REAR STEP SWITCH?

TEST OPTIONS

1. STE/ICE-R TEST 91, PAGE 2-752
2. MULTIMETER

REASON FOR QUESTION

No continuity would indicate a malfunction of the switch.



AMBULANCE
(All Dome Lamps)
 With Ambulance
 Compartment Front Door,
 Rear Door, and Rear Step
 closed (Refer to Fig. 11.)

DIAGNOSTIC FLOWCHART

KNOWN INFO
LEAD 791 E OK LEAD 791 D OK BLACKOUT REAR STEP SWITCH OK
POSSIBLE PROBLEMS
LEAD 791 C BLACKOUT REAR DOOR SWITCH LEAD 791 A BLACKOUT REAR DOOR SWITCH 791 B LEAD 791 A FRONT DOOR SWITCH LEAD 791

FROM 8,
Page 2-502

9

TEST OPTIONS

IS THERE CONTINUITY BETWEEN BLACKOUT REAR STEP SWITCH AND BLACKOUT REAR DOOR SWITCH?

TEST OPTIONS

1. STE/ICE-R TEST 91, PAGE 2-752
2. MULTIMETER

REASON FOR QUESTION

No continuity would indicate a damaged lead.

KNOWN INFO
LEAD 791 C OK LEAD 791 E OK LEAD 791 D OK BLACKOUT REAR STEP SWITCH OK
POSSIBLE PROBLEMS
BLACKOUT REAR STEP SWITCH LEAD 791 A BLACKOUT REAR DOOR SWITCH LEAD 791 B LEAD 791 A FRONT DOOR SWITCH LEAD 791

10

TEST OPTIONS

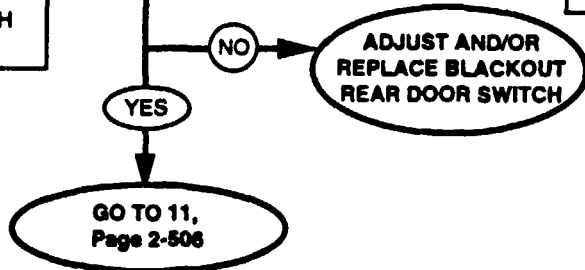
IS THERE CONTINUITY ACROSS BLACKOUT REAR DOOR SWITCH?

TEST OPTIONS

1. STE/ICE-R TEST 91, PAGE 2-752
2. MULTIMETER

REASON FOR QUESTION

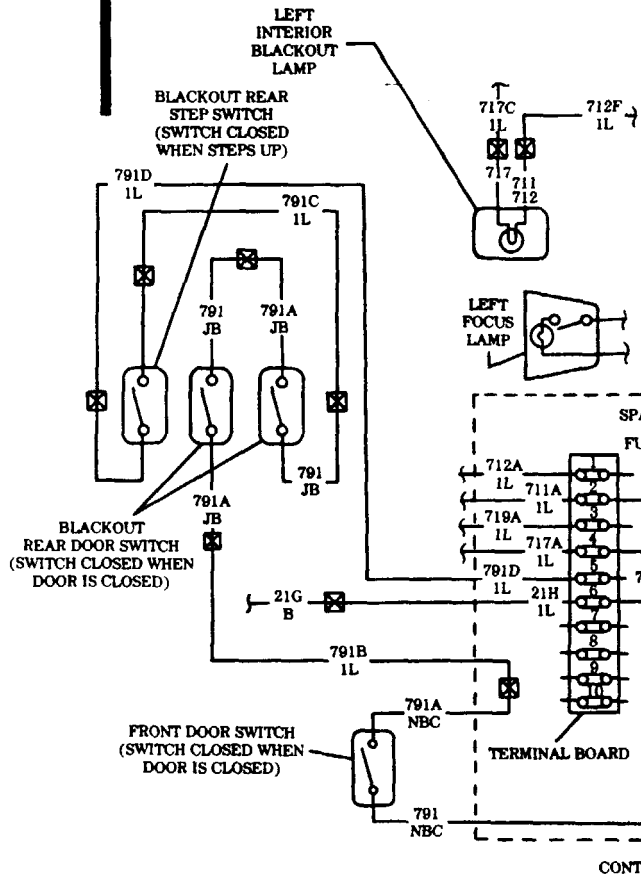
No continuity would indicate a malfunction of the switch.



REFERENCE INFORMATION

AMBULANCE

Replace blackout rear door switch, refer to (para. 4-93).

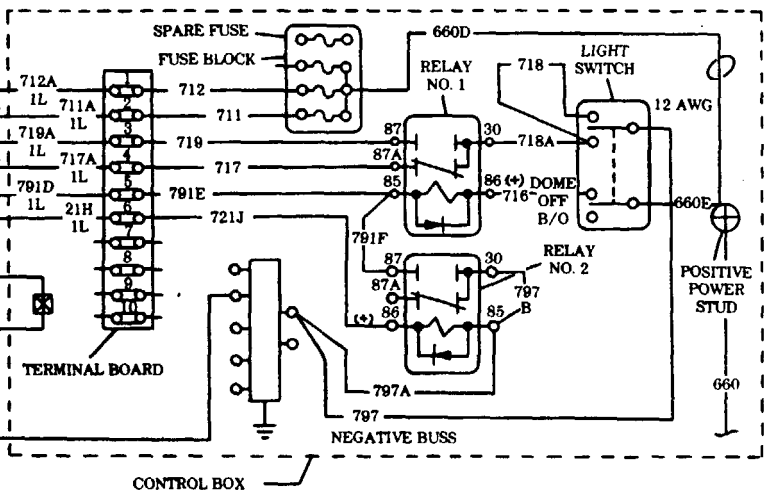


**0-4500 DC OHMS
STE/ICE-R TEST 91**

1. Connect RED clip and BLACK clip to the indicated terminals in question; RED to the first, BLACK to the second.
2. Start test 91, 0-4500 ohms.
3. Displayed reading is in ohms. Less than 5 ohms is continuity. If the resistance is over 4500 ohms, STE/ICE displays "9.9.9.9."

**CONTINUITY (RESISTANCE)
MULTIMETER**

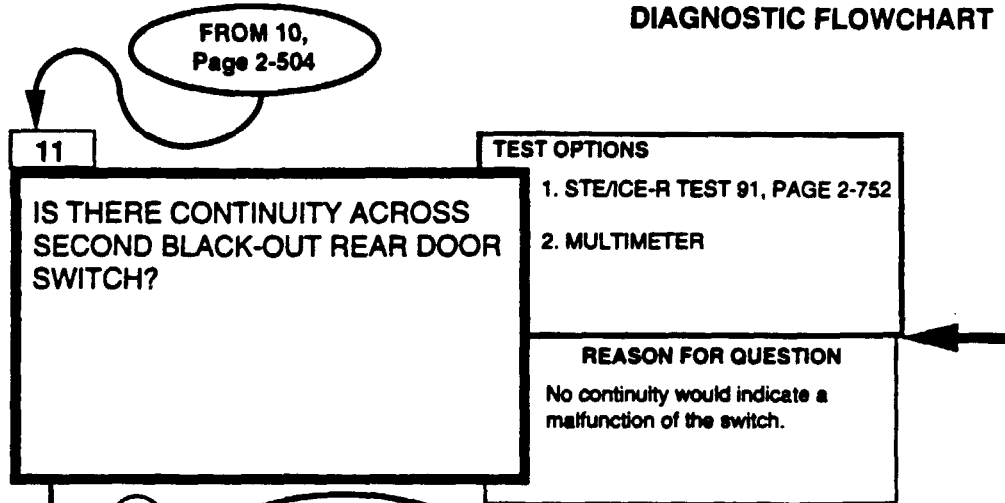
1. Set the voltmeter to an ohms scale of about 1000 ohms.
2. Connect the RED and BLACK leads to the connections stated in the question.
3. Be sure to read the correct scale. Less than 5 ohms indicates continuity. For an open circuit, the meter should peg full scale (needle all the way to the left).



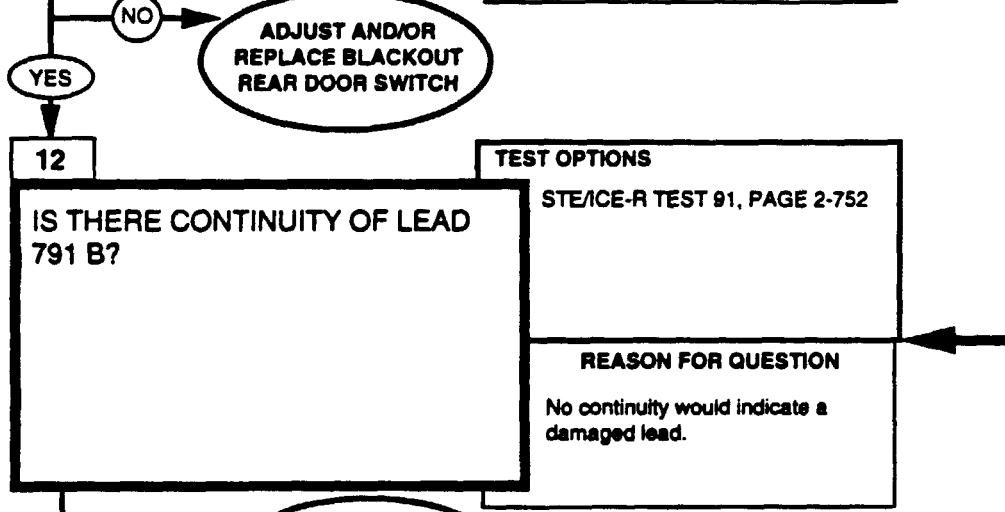
AMBULANCE
 (All Dome Lamps)
 With Ambulance
 Compartment Front Door,
 Rear Door, and Rear Step
 Closed (Refer to Fig. 11.)

DIAGNOSTIC FLOWCHART

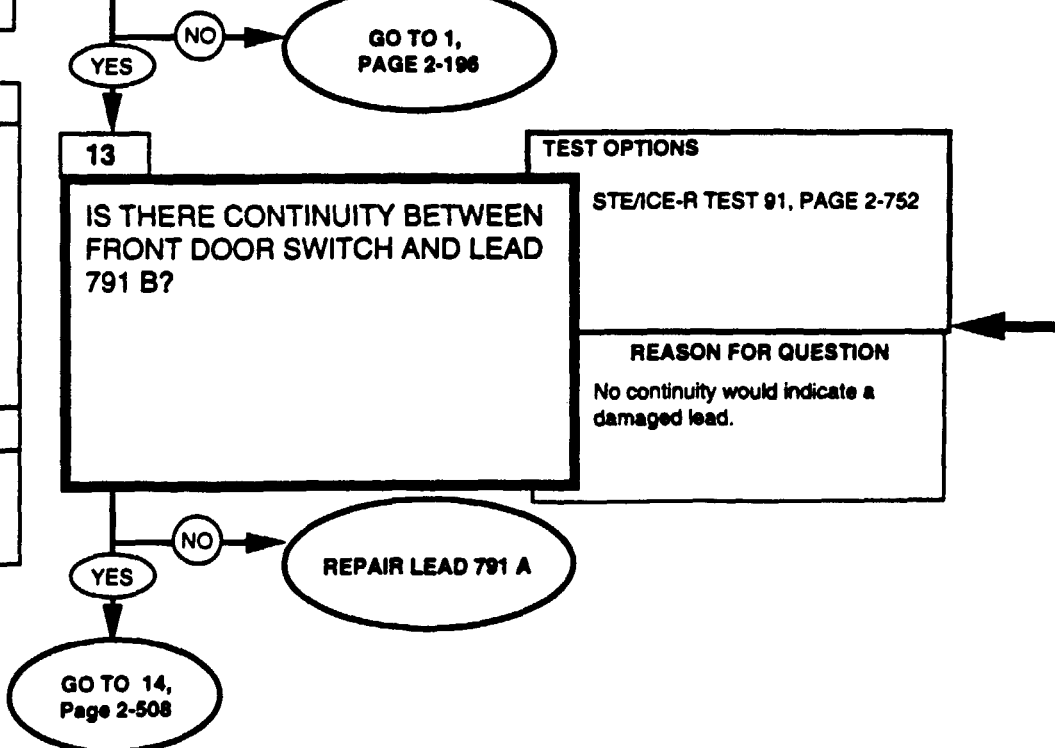
KNOWN INFO
LEAD 791 E OK LEAD 791 D OK BLACKOUT REAR STEP SWITCH OK BLACKOUT REAR DOOR SWITCH OK
POSSIBLE PROBLEMS
BLACKOUT REAR DOOR SWITCH LEAD 791 B LEAD 791 A FRONT DOOR SWITCH LEAD 791



KNOWN INFO
LEAD 791 E OK LEAD 791 D OK BLACKOUT REAR STEP SWITCH OK LEAD 791 C OK BLACKOUT REAR DOOR SWITCH OK BLACKOUT REAR DOOR SWITCH OK
POSSIBLE PROBLEMS
LEAD 791 B LEAD 791 A FRONT DOOR SWITCH LEAD 791



KNOWN INFO
LEAD 791 E OK LEAD 791 D OK BLACKOUT REAR STEP SWITCH OK LEAD 791 C OK BLACKOUT REAR DOOR SWITCH OK BLACKOUT REAR DOOR SWITCH OK LEAD 791 B OK
POSSIBLE PROBLEMS
LEAD 791 A FRONT DOOR SWITCH LEAD 791



REFERENCE INFORMATION

AMBULANCE

Replace blackout rear door switch, refer to (para. 4-83).

Repair lead, refer to (para. 4-85).
 Repair lead connector, refer to (para. 4-85).

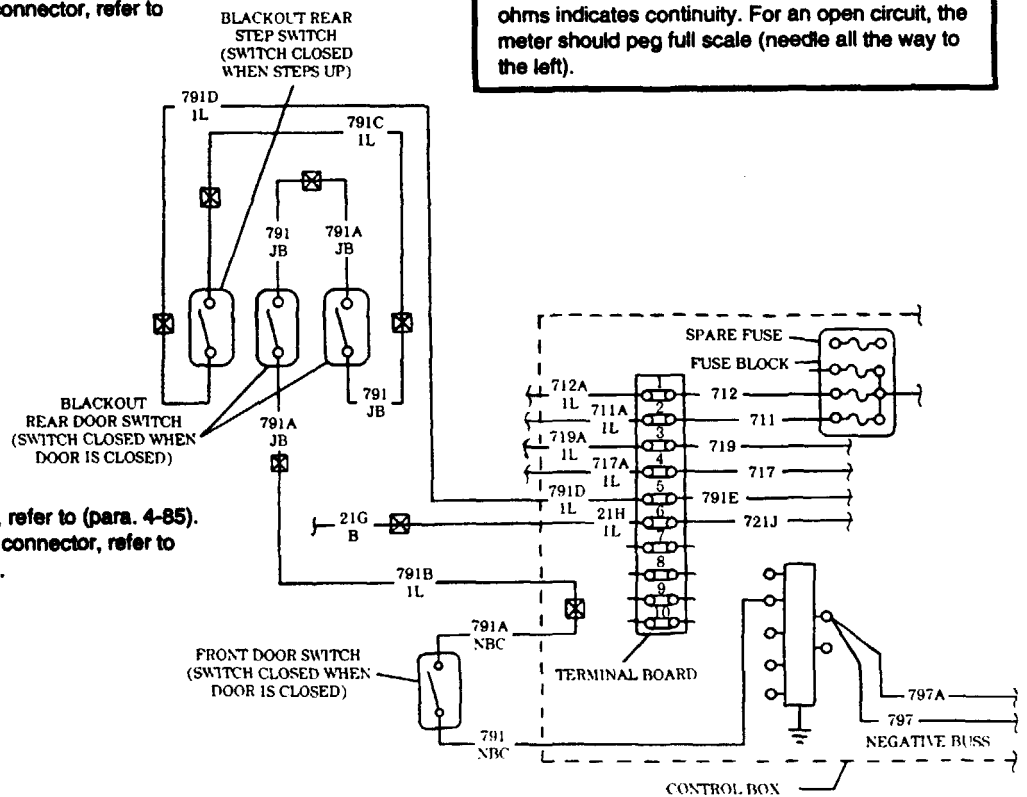
Repair lead, refer to (para. 4-85).
 Repair lead connector, refer to (para. 4-85).

**0-4500 DC OHMS
STE/ICE-R TEST 91**

1. Connect RED clip and BLACK clip to the indicated terminals in question; RED to the first, BLACK to the second.
2. Start test 91, 0-4500 ohms.
3. Displayed reading is in ohms. Less than 5 ohms is continuity. If the resistance is over 4500 ohms, STE/ICE displays "9.9.9.9."

**CONTINUITY (RESISTANCE)
MULTIMETER**

1. Set the voltmeter to an ohms scale of about 1000 ohms.
2. Connect the RED and BLACK leads to the connections stated in the question.
3. Be sure to read the correct scale. Less than 5 ohms indicates continuity. For an open circuit, the meter should peg full scale (needle all the way to the left).



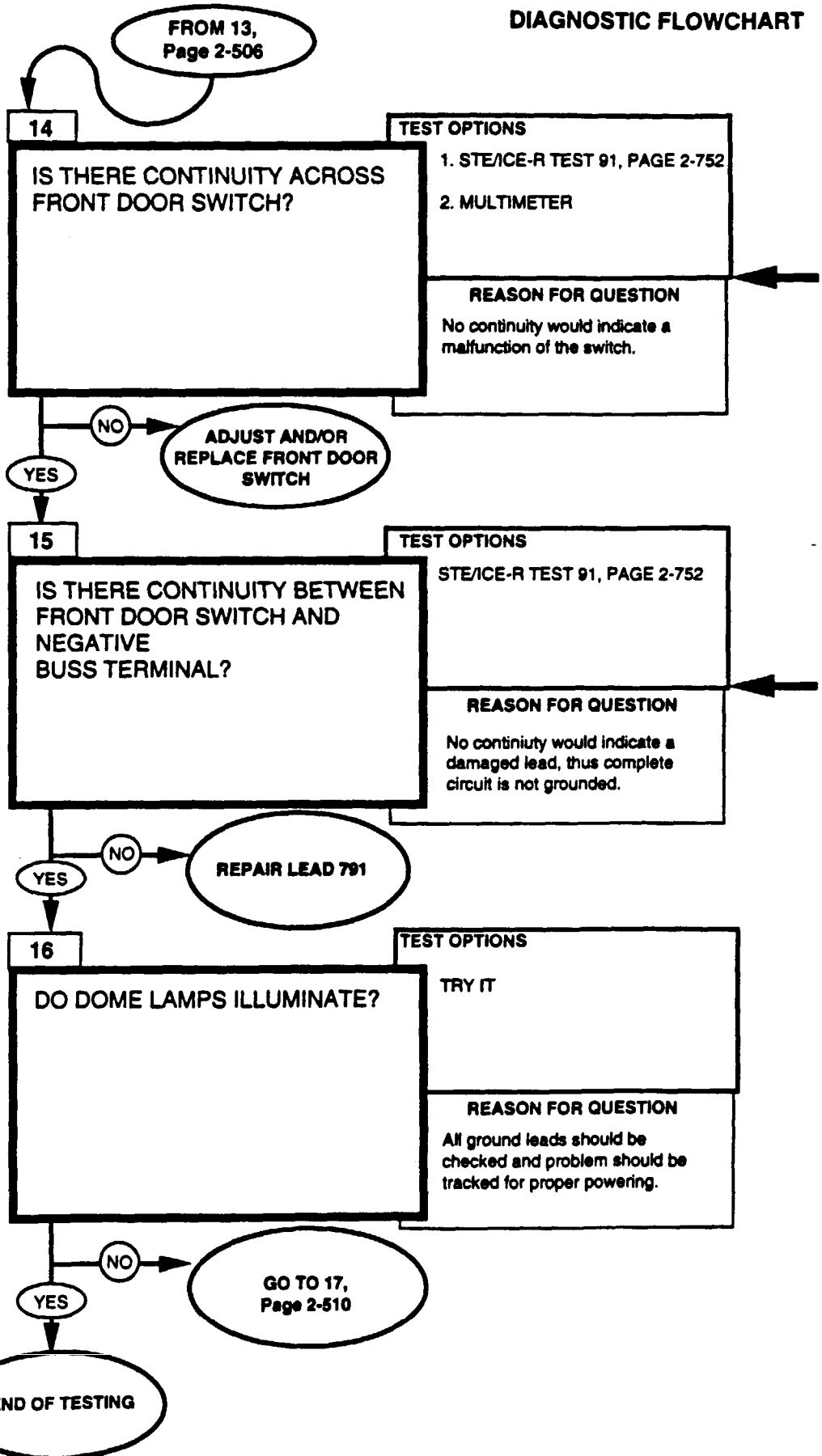
AMBULANCE
(All Dome Lamps)
With Ambulance
Compartment Front Door,
Rear Door, and Rear Step
Closed (Refer to Fig. 11.)

DIAGNOSTIC FLOWCHART

KNOWN INFO
LEAD 791 E OK LEAD 791 D OK BLACKOUT REAR STEP SWITCH OK BLACKOUT REAR DOOR SWITCH OK BLACKOUT REAR DOOR SWITCH OK LEAD 791 B OK LEAD 791 A OK
POSSIBLE PROBLEMS
FRONT DOOR SWITCH LEAD 791

KNOWN INFO
LEAD 791 E OK LEAD 791 D OK BLACKOUT REAR STEP SWITCH OK LEAD 791 C OK BLACKOUT REAR DOOR SWITCH OK BLACKOUT REAR DOOR SWITCH OK LEAD 791 B OK LEAD 791 A OK FRONT DOOR SWITCH OK
POSSIBLE PROBLEMS
LEAD 791

KNOWN INFO
LEAD 791 E OK LEAD 791 D OK BLACKOUT REAR STEP SWITCH OK LEAD 791 C OK BLACKOUT REAR DOOR SWITCH OK BLACKOUT REAR DOOR SWITCH OK LEAD 791 B OK LEAD 791 A OK FRONT DOOR SWITCH OK LEAD 791 OK
POSSIBLE PROBLEMS



REFERENCE INFORMATION

AMBULANCE

Replace front door switch, refer to (para. 4-94).

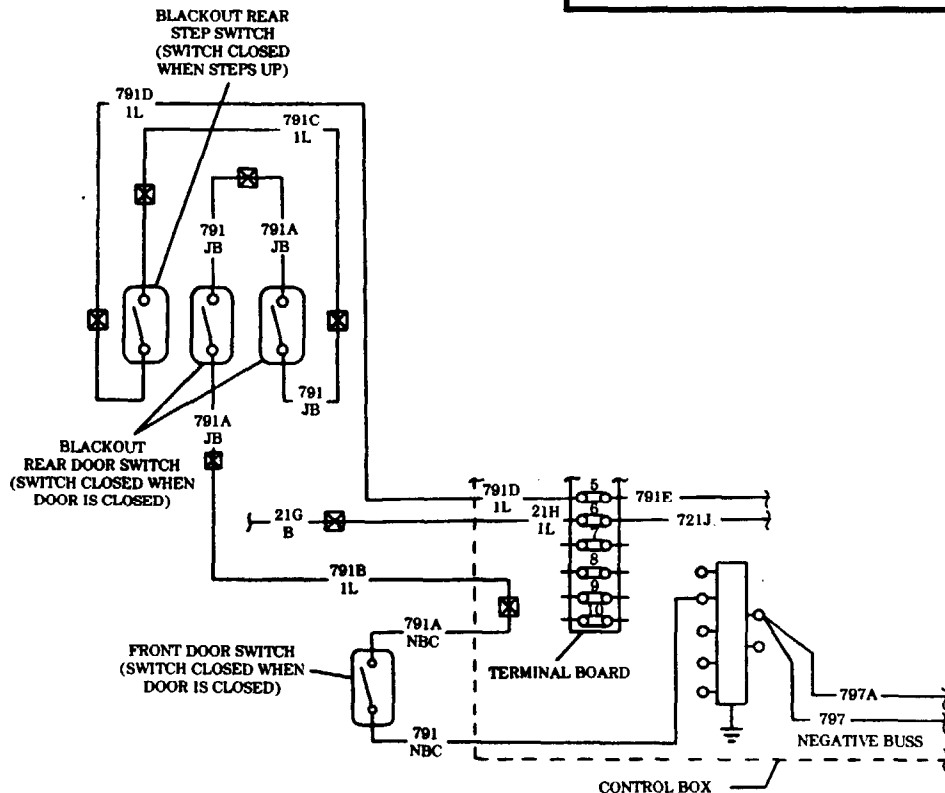
Repair lead, refer to (para. 4-85).

**0-4500 DC OHMS
STE/ICE-R TEST 91**

1. Connect RED clip and BLACK clip to the indicated terminals in question. RED to the first, BLACK to the second.
2. Start test 91, 0-4500 ohms.
3. Displayed reading is in ohms. Less than 5 ohms is continuity. If the resistance is over 4500 ohms. STE/ICE displays "9.9.9.9."

**CONTINUITY (RESISTANCE)
MULTIMETER**

1. Set the voltmeter to an ohms scale of about 1000 ohms.
2. Connect the RED and BLACK leads to the connections stated in the question.
3. Be sure to read the correct scale. Less than 5 ohms indicates continuity. For an open circuit, the meter should peg full scale (needle all the way to the left).



AMBULANCE
 (All Dome Lamps)
 With Ambulance
 Compartment Front Door,
 Rear Door, and Rear Step
 Closed (Refer to Fig. 11.)

DIAGNOSTIC FLOWCHART

KNOWN INFO
PREVIOUSLY CORRECTED INFORMATION
POSSIBLE PROBLEMS
LEAD 660 D BLOWN FUSES LEAD 712 LEAD 711 DAMAGED LEADS

17

TEST OPTIONS

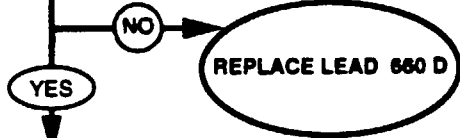
IS THERE BATTERY VOLTAGE IN CONTROL BOX AT FUSE BLOCK?

1. STE/ICE-R TEST 89, PAGE 2-750
2. MULTIMETER

REASON FOR QUESTION

No voltage would indicate a damaged power supply lead, thus no power.

FROM 16,
Page 2-508



KNOWN INFO
LEAD 660 D OK
POSSIBLE PROBLEMS
BLOWN FUSES LEAD 712 LEAD 711 DAMAGED LEADS

18

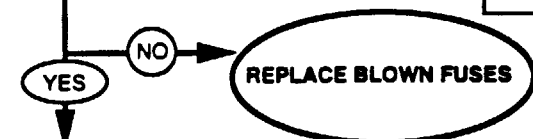
TEST OPTIONS

CHECK FUSE BLOCK IN CONTROL BOX. ARE FUSES OK?

VISUAL

REASON FOR QUESTION

Damaged fuses causes the power circuit to be incomplete.



KNOWN INFO
LEAD 660 D OK FUSES OK
POSSIBLE PROBLEMS
LEAD 712 LEAD 711 DAMAGED LEADS

19

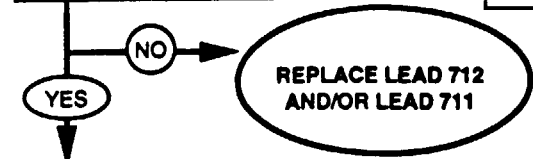
TEST OPTIONS

**IS THERE BATTERY VOLTAGE IN CONTROL BOX AT:
TB TERMINAL 1?
TB TERMINAL 2?**

1. STE/ICE-R TEST 89, PAGE 2-750
2. MULTIMETER

REASON FOR QUESTION

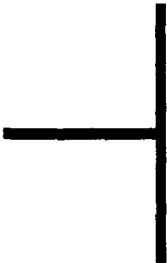
No power would indicate damaged leads.



GO TO 20,
Page 2-512

REFERENCE INFORMATION

AMBULANCE

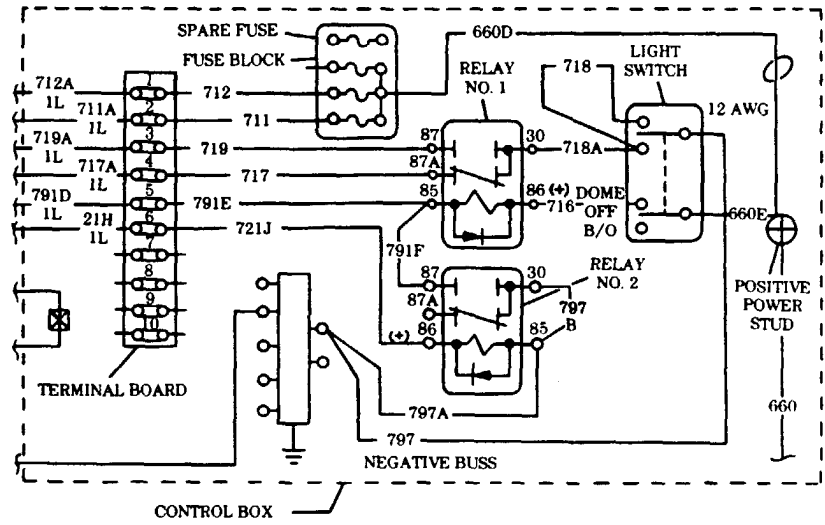
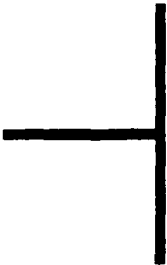


**0-45 DC VOLTS
STE/ICE-R TEST 89**

1. Connect RED clip to the indicated test point, BLACK clip to negative or ground.
2. Start test 89, DC volts.
3. Displayed reading is in volts.

**BATTERY VOLTAGE
MULTIMETER**

1. Set the voltmeter to a DC volts scale of at least 40 volts.
2. Connect the RED lead to positive and the BLACK lead to negative.
3. Be sure to read the correct scale.



AMBULANCE
 (All Dome Lamps)
 With Ambulance
 Compartment Front Door,
 Rear Door, and Rear Step
 Closed (Refer to Fig. 11.)

DIAGNOSTIC FLOWCHART

KNOWN INFO
LEAD 660 D OK FUSES OK LEAD 712 OK LEAD 711 OK
POSSIBLE PROBLEMS
DAMAGED LAMPS

20

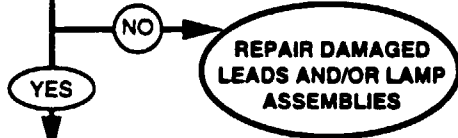
TEST OPTIONS

**IS THERE BATTERY VOLTAGE AT DOME LAMPS THROUGH:
LEADS 712 A, 712 E, AND 712 B?
LEADS 711 A, 711 F, AND 711 C?**

REASON FOR QUESTION
No power would indicate damaged leads.

FROM 19,
Page 2-510

1. STE/CE-R TEST 89, PAGE 2-750
2. MULTIMETER



KNOWN INFO
LEAD 660 D OK FUSES OK LEAD 712 OK LEAD 711 OK LEADS OK
POSSIBLE PROBLEMS

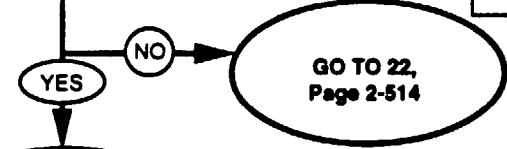
21

TEST OPTIONS

DO DOME LAMPS ILLUMINATE?

REASON FOR QUESTION
No power would indicate damaged leads.

TRY IT



END OF TESTING

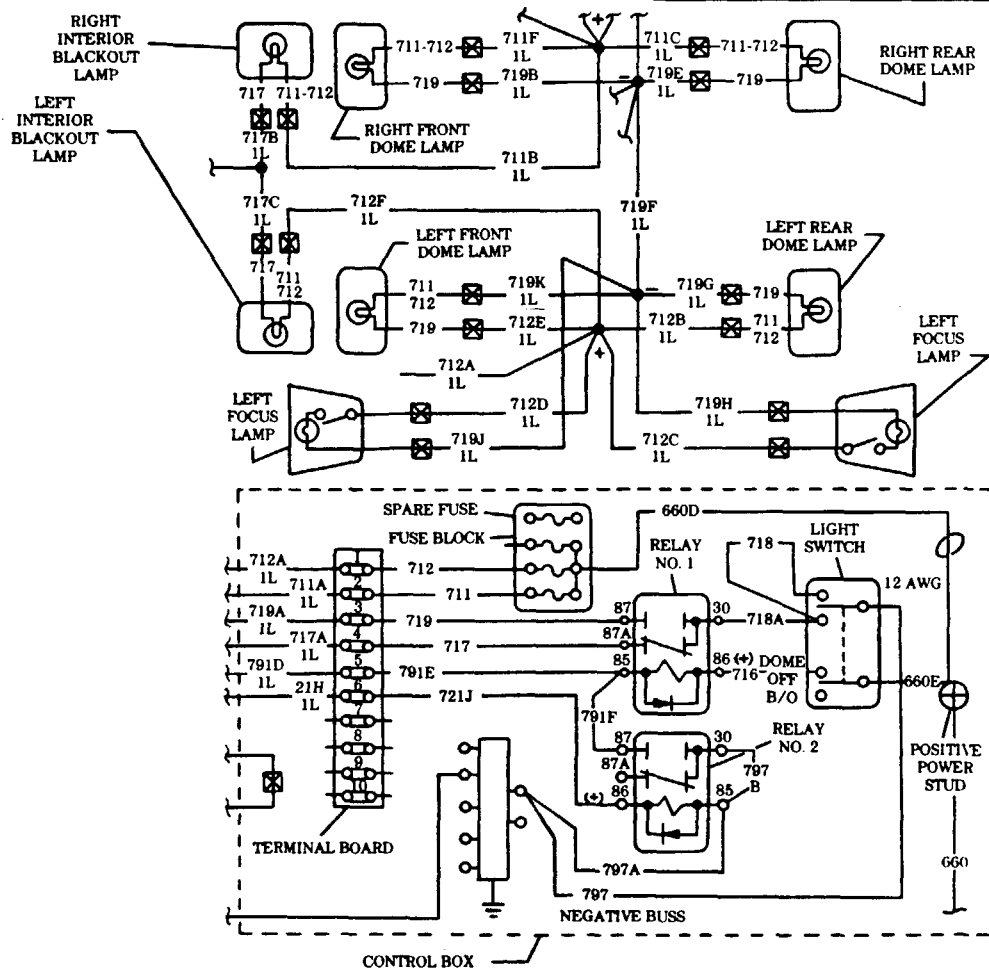
REFERENCE INFORMATION

AMBULANCE



Replace dome lamp assembly, refer to (para. 4-87).
 Repair lead connector, refer to (para. 4-85).

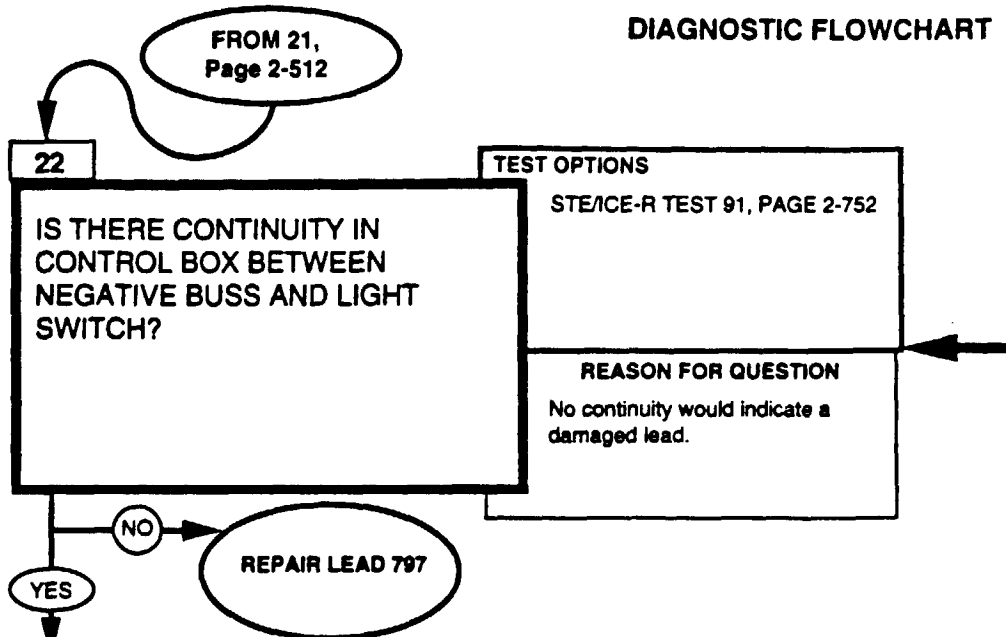
<p>0-45 DC VOLTS STE/ICE-R TEST 89</p> <ol style="list-style-type: none"> 1. Connect RED clip to the indicated test point, BLACK clip to negative or ground. 2. Start test 89, DC volts. 3. Displayed reading is in volts.
<p>BATTERY VOLTAGE MULTIMETER</p> <ol style="list-style-type: none"> 1. Set the voltmeter to a DC volts scale of at least 40 volts. 2. Connect the RED lead to positive and the BLACK lead to negative. 3. Be sure to read the correct scale.



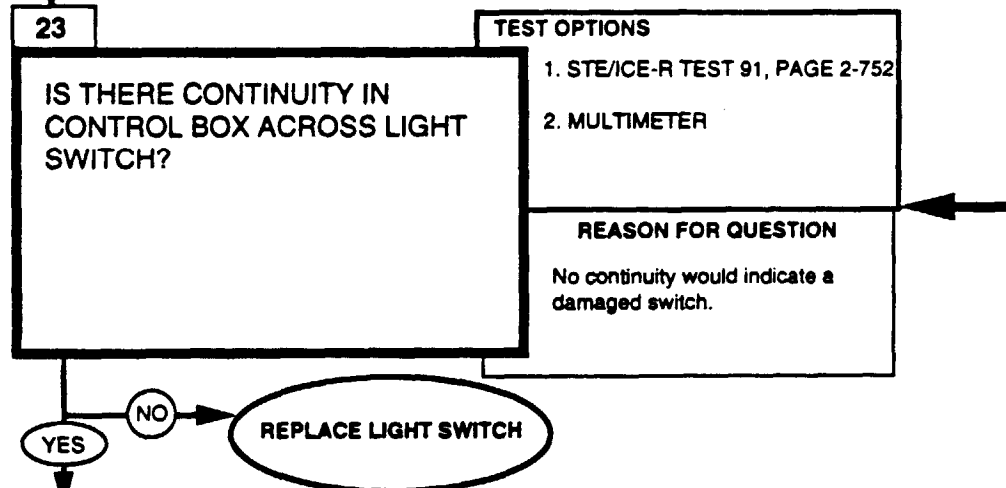
AMBULANCE
(All Dome Lamps)
 With Ambulance
 Compartment Front Door,
 Rear Door, and Rear Step
 Closed (Refer to Fig. 11.)

DIAGNOSTIC FLOWCHART

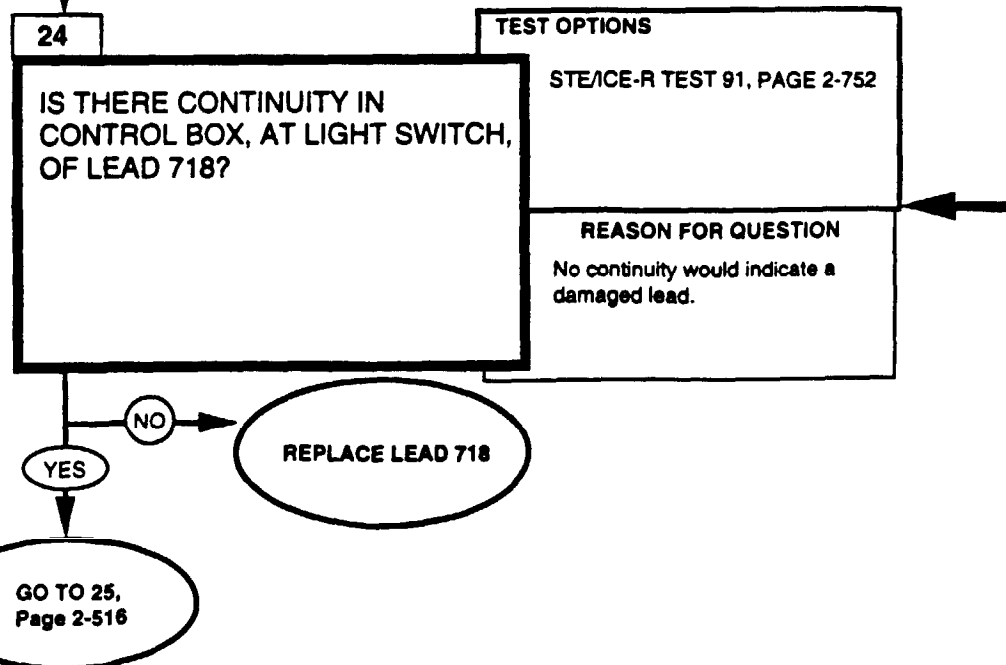
KNOWN INFO
PREVIOUSLY CORRECTED INFORMATION
POSSIBLE PROBLEMS
LEAD 797 LIGHT SWITCH LEAD 718 LEAD 718 A LEAD 719 DAMAGED LEADS DOME LAMP SOCKETS



KNOWN INFO
LEAD 797 OK
POSSIBLE PROBLEMS
LIGHT SWITCH LEAD 718 LEAD 718 A LEAD 719 DAMAGED LEADS DOME LAMP SOCKETS



KNOWN INFO
LEAD 797 OK LIGHT SWITCH OK
POSSIBLE PROBLEMS
LEAD 718 LEAD 718 A LEAD 719 DAMAGED LEADS DOME LAMP SOCKETS



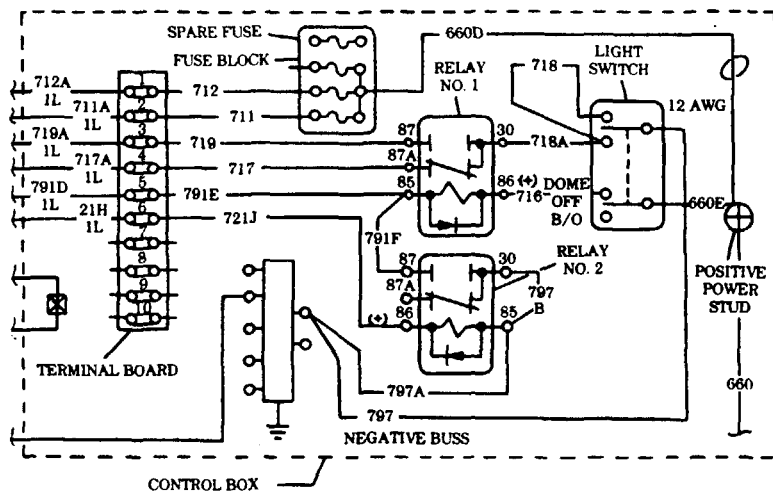
REFERENCE INFORMATION

AMBULANCE

Repair lead, refer to (para. 4-85).

Replace light switch, refer to (para. 4-118).

<p>0-4500 DC OHMS STE/ICE-R TEST 91</p>
<p>1. Connect RED clip and BLACK clip to the indicated terminals in question; RED to the first, BLACK to the second.</p> <p>2. Start Test 91, 0-4500 ohms.</p> <p>3. Displayed reading is in ohms. Less than 5 ohms is continuity. If the resistance is over 4500 ohms, STE/ICE displays "9.9.9.9."</p>
<p>CONTINUITY (RESISTANCE) MULTIMETER</p>
<p>1. Set the voltmeter to an ohms scale of about 1000 ohms.</p> <p>2. Connect the RED and BLACK leads to the connections stated in the question.</p> <p>3. Be sure to read the correct scale. Less than 5 ohms indicates continuity. For an open circuit, the meter should peg full scale (needle all the way to the left).</p>



AMBULANCE
(All Dome Lamps)
 With Ambulance
 Compartment Front Door,
 Rear Door, and Rear Step
 Closed (Refer to Fig. 11.)

DIAGNOSTIC FLOWCHART

KNOWN INFO
LEAD 797 OK LIGHT SWITCH OK LEAD 718 OK
POSSIBLE PROBLEMS
LEAD 718 A LEAD 719 DAMAGED LEADS DOME LAMP SOCKETS

25

FROM 24, Page 2-514

IS THERE CONTINUITY IN CONTROL BOX BETWEEN RELAY 1, TERMINAL 30, AND LIGHT SWITCH?

TEST OPTIONS
STE/ICE-R TEST 91, PAGE 2-752

REASON FOR QUESTION
No continuity would indicate a damaged lead.



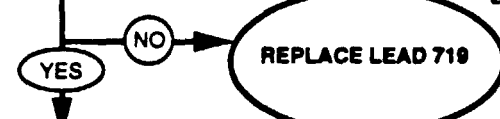
KNOWN INFO
LEAD 797 OK LIGHT SWITCH OK LEAD 718 OK LEAD 718A OK
POSSIBLE PROBLEMS
LEAD 719 DAMAGED LEADS DOME LAMP SOCKETS

26

IS THERE CONTINUITY IN CONTROL BOX BETWEEN TB TERMINAL 3, RELAY 1, AND TERMINAL 87?

TEST OPTIONS
STE/ICE-R TEST 91, PAGE 2-752

REASON FOR QUESTION
No continuity would indicate a damaged lead.



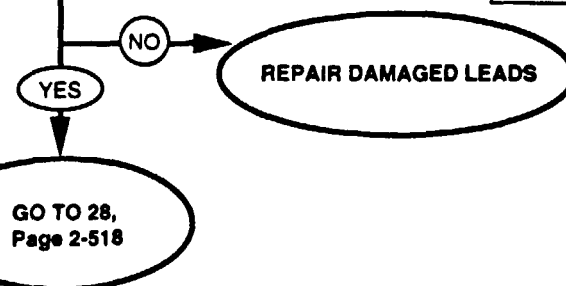
KNOWN INFO
LEAD 797 OK LIGHT SWITCH OK LEAD 718 OK LEAD 718 A OK LEAD 719 OK
POSSIBLE PROBLEMS
DAMAGED LEADS DOME LAMP SOCKETS

27

**IS THERE CONTINUITY IN CONTROL BOX BETWEEN TB TERMINAL 3 AND DOME LAMPS THROUGH:
LEADS 719 A, 719 B, AND 719 E?
LEADS 719 A, 719 F, 719 K, AND 719 G?**

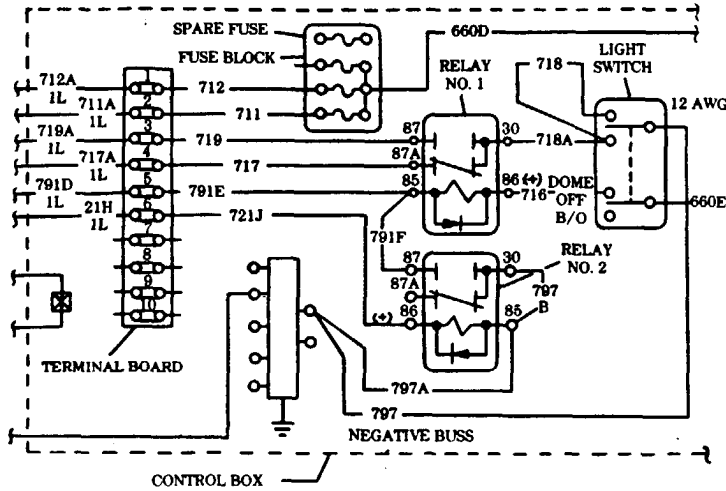
TEST OPTIONS
1. STE/ICE-R TEST 91, PAGE 2-752
2. MULTIMETER

REASON FOR QUESTION
No continuity would indicate damaged leads.



REFERENCE INFORMATION

AMBULANCE

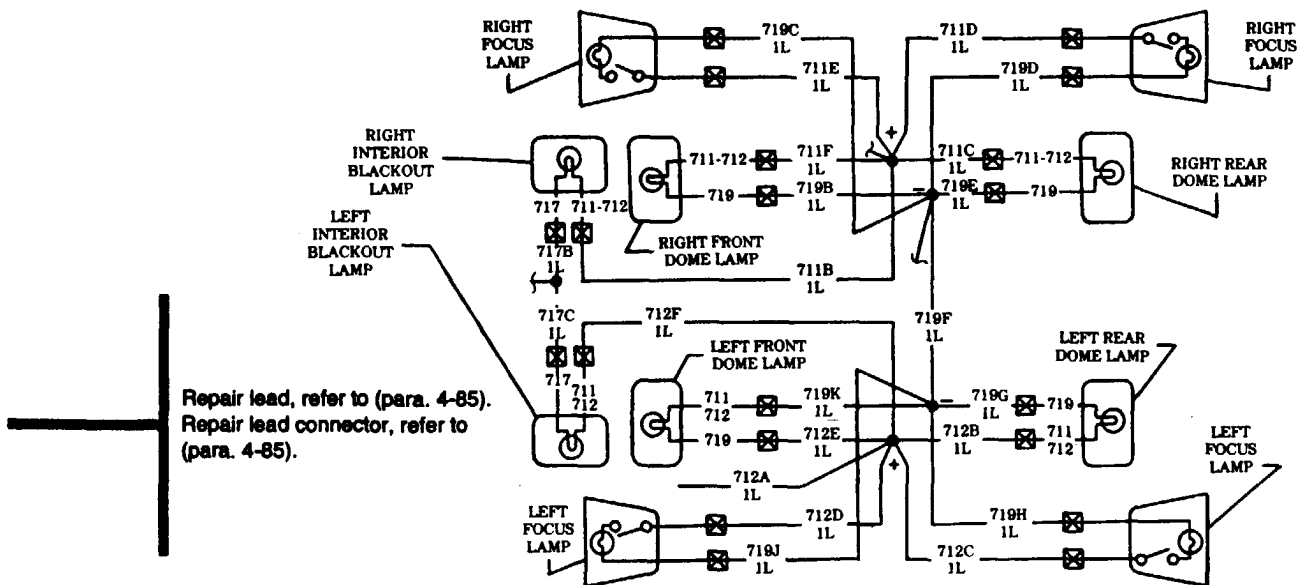


**0-4500 DC OHMS
STE/ICE-R TEST 91**

1. Connect RED clip and BLACK clip to the indicated terminals in question; RED to the first, BLACK to the second.
2. Start Test 91, 0-4500 ohms.
3. Displayed reading is in ohms. Less than 5 ohms is continuity. If the resistance is over 4500 ohms, STE/ICE displays "9.9.9.9."

**CONTINUITY (RESISTANCE)
MULTIMETER**

1. Set the voltmeter to an ohms scale of about 1000 ohms.
2. Connect the RED and BLACK leads to the connections stated in the question.
3. Be sure to read the correct scale. Less than 5 ohms indicates continuity. For an open circuit, the meter should peg full scale (needle all the way to the left).

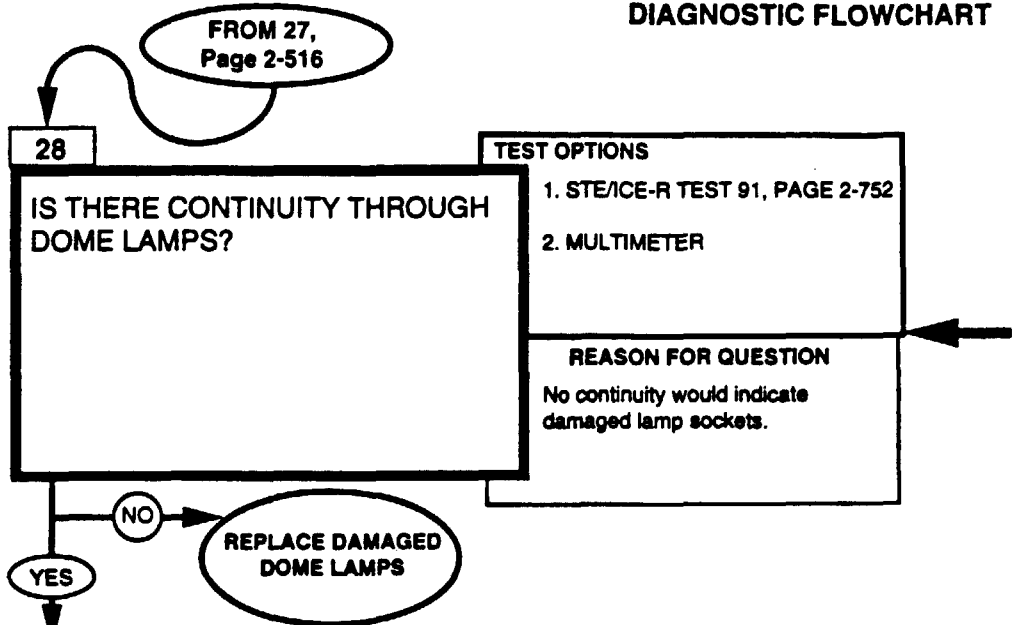


Repair lead, refer to (para. 4-85).
Repair lead connector, refer to (para. 4-85).

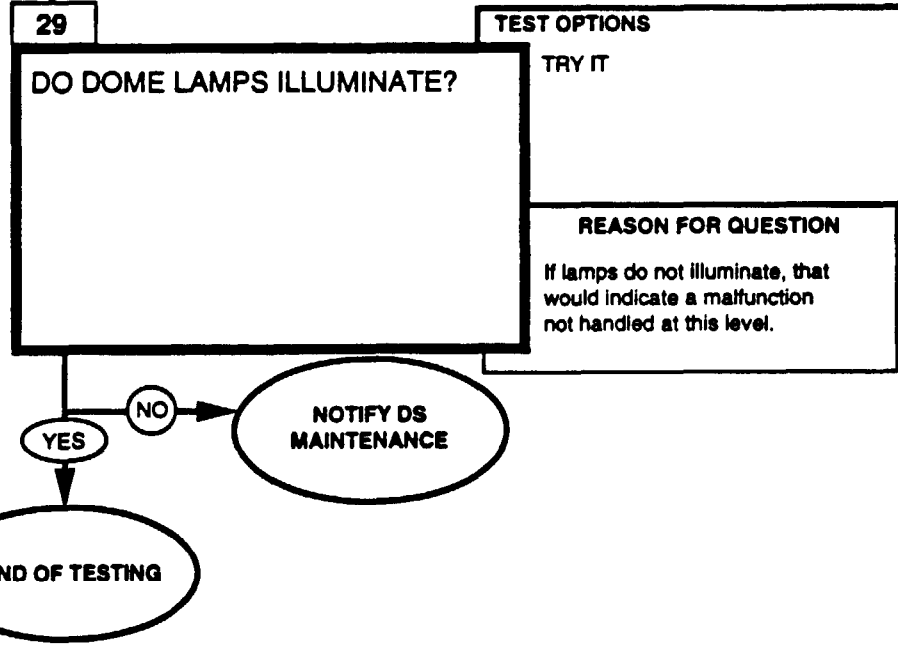
AMBULANCE
(All Dome Lamps)
 With Ambulance
 Compartment Front Door,
 Rear Door, and Rear Step
 Closed (Refer to Fig. 11.)

DIAGNOSTIC FLOWCHART

KNOWN INFO
LEAD 797 OK LIGHT SWITCH OK LEAD 718 OK LEAD 718 A OK LEAD 719 OK DAMAGED LEADS OK
POSSIBLE PROBLEMS
DAMAGED LAMPS



KNOWN INFO
LEAD 660 D OK FUSES OK LEAD 712 OK LEAD 711 OK LEADS OK
POSSIBLE PROBLEMS

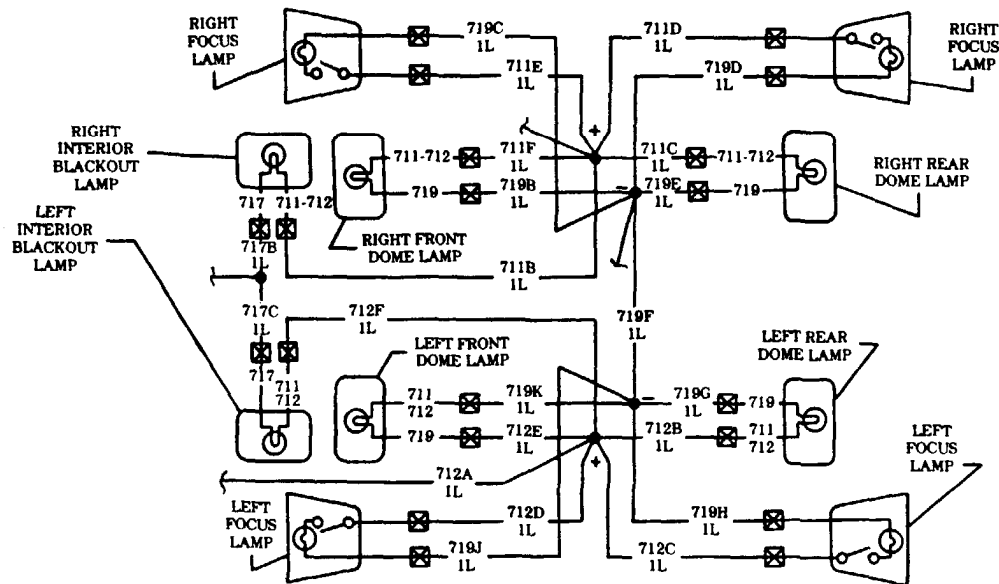


REFERENCE INFORMATION

AMBULANCE

Replace dome lamps, refer to (para. 4-87).

<p>0-4500 DC OHMS STE/ICE-R TEST 91</p>
<p>1. Connect RED clip and BLACK clip to the indicated terminals in question; RED to the first, BLACK to the second.</p> <p>2. Start Test 91, 0-4500 ohms.</p> <p>3. Displayed reading is in ohms. Less than 5 ohms is continuity. If the resistance is over 4500 ohms, STE/ICE displays "9.9.9.9."</p>
<p>CONTINUITY (RESISTANCE) MULTIMETER</p>
<p>1. Set the voltmeter to an ohms scale of about 1000 ohms.</p> <p>2. Connect the RED and BLACK leads to the connections stated in the question.</p> <p>3. Be sure to read the correct scale. Less than 5 ohms indicates continuity. For an open circuit, the meter should peg full scale (needle all the way to the left).</p>



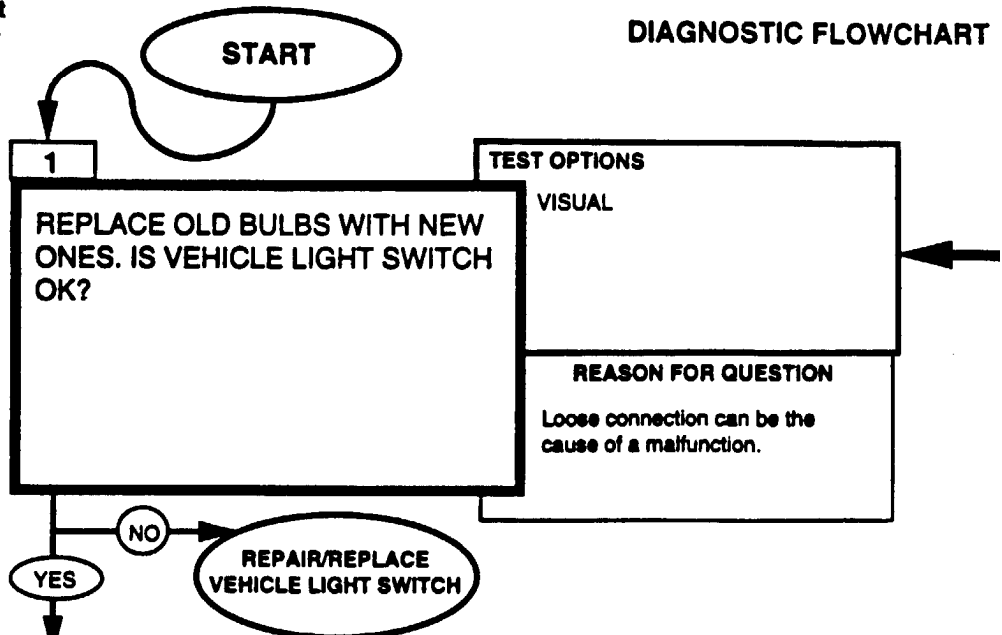
AMBULANCE

(All Dome Lamps)

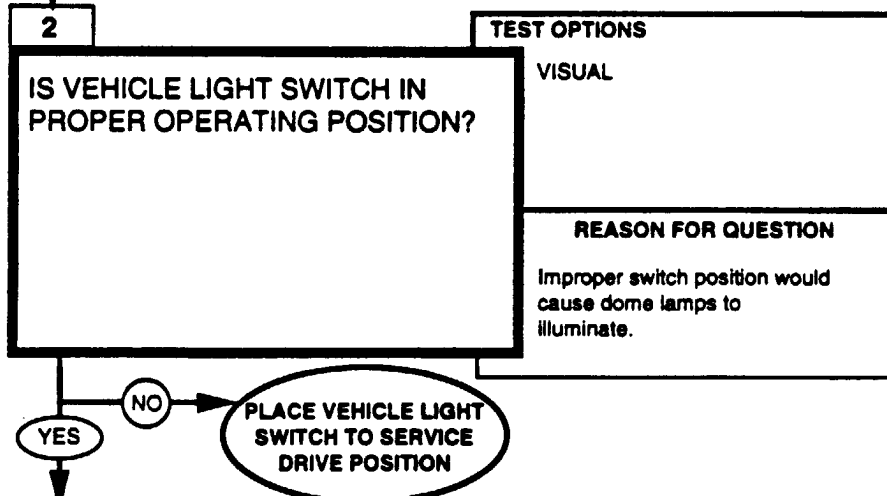
With Ambulance compartment front door, rear door, and rear step open and vehicle light switch in service position. (Refer to Fig. 11.)

DIAGNOSTIC FLOWCHART

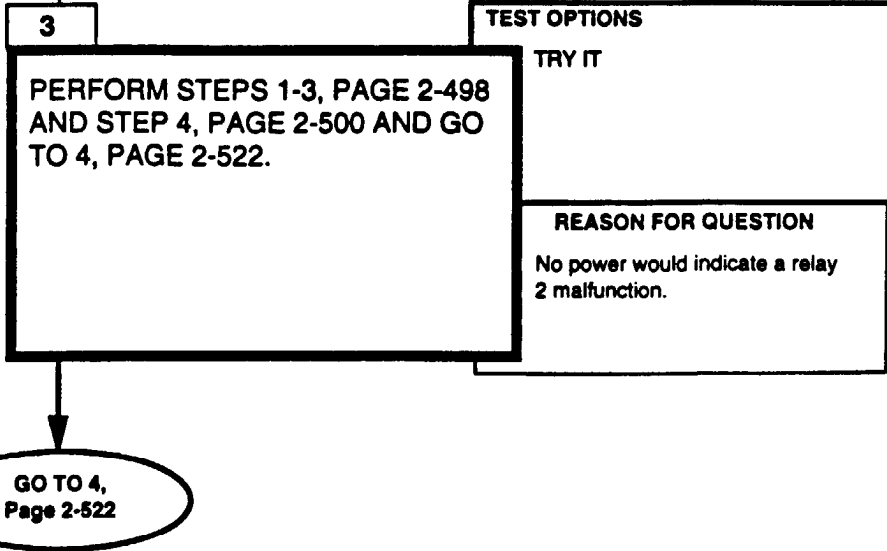
KNOWN INFO
NOTHING
POSSIBLE PROBLEMS
VEHICLE LIGHT SWITCH VEHICLE LIGHT SWITCH POSITION RELAY 2



KNOWN INFO
VEHICLE LIGHT SWITCH OK
POSSIBLE PROBLEMS
VEHICLE LIGHT SWITCH POSITION RELAY 2



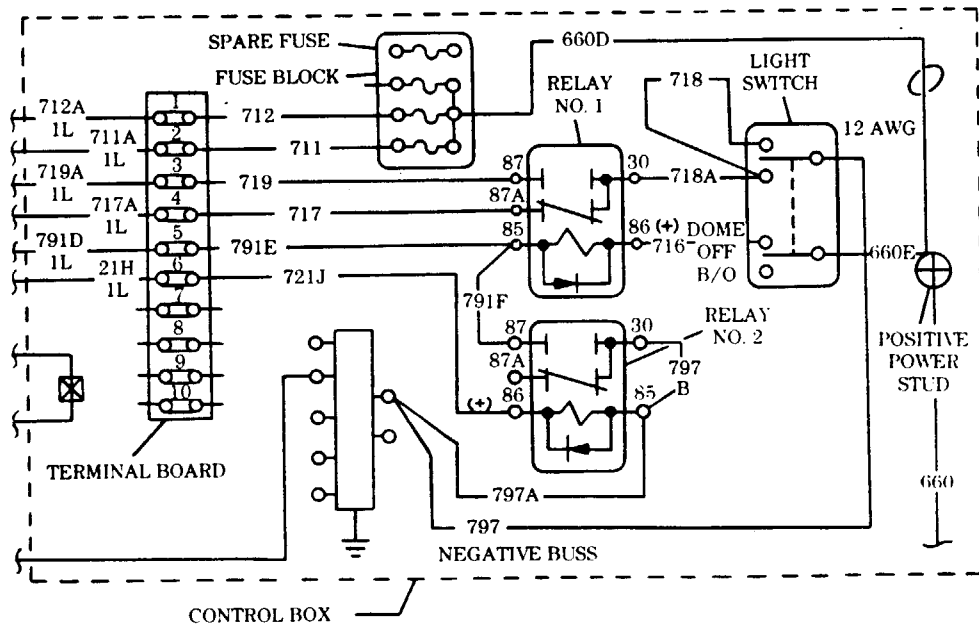
KNOWN INFO
VEHICLE LIGHT SWITCH OK VEHICLE LIGHT SWITCH POSITION OK
POSSIBLE PROBLEMS
RELAY 2



REFERENCE INFORMATION

AMBULANCE

Replace main light switch,
refer to (para. 4-59).



**AMBULANCE
(All Dome Lamps)**

With Ambulance compartment front door, rear door, or rear step open and vehicle light switch in service position (Refer to Fig. 11.)

DIAGNOSTIC FLOWCHART

KNOWN INFO
VEHICLE LIGHT SWITCH OK VEHICLE LIGHT SWITCH POSITION OK BATTERY OK CABLE 660 OK
POSSIBLE PROBLEMS
RELAY 2

4

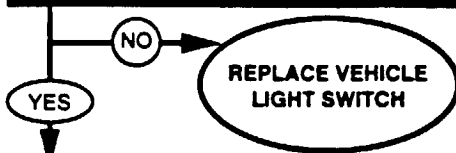
IS THERE BATTERY VOLTAGE IN CONTROL BOX AT RELAY 2, TERMINAL 86?

TEST OPTIONS

1. STE/ICE-R TEST 89, PAGE 2-750
2. MULTIMETER

REASON FOR QUESTION

No power would indicate a vehicle light switch malfunction.



KNOWN INFO
VEHICLE LIGHT SWITCH OK VEHICLE LIGHT SWITCH POSITION OK BATTERY OK CABLE 660 OK
POSSIBLE PROBLEMS
RELAY 2

5

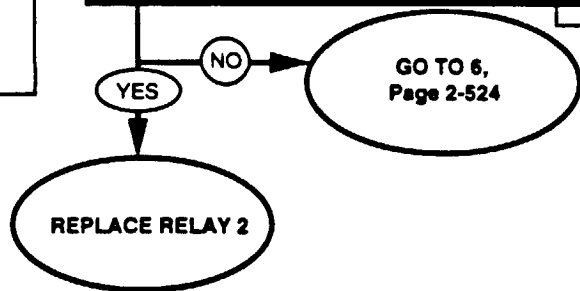
PLACE JUMPER WIRE FROM TERMINAL 87 TO TERMINAL 30 OF RELAY. DO DOME LAMPS ILLUMINATE?

TEST OPTIONS

TRY IT

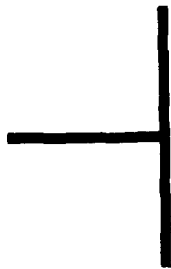
REASON FOR QUESTION

If lamps illuminate, that would indicate a malfunction in relay 2.



REFERENCE INFORMATION

AMBULANCE

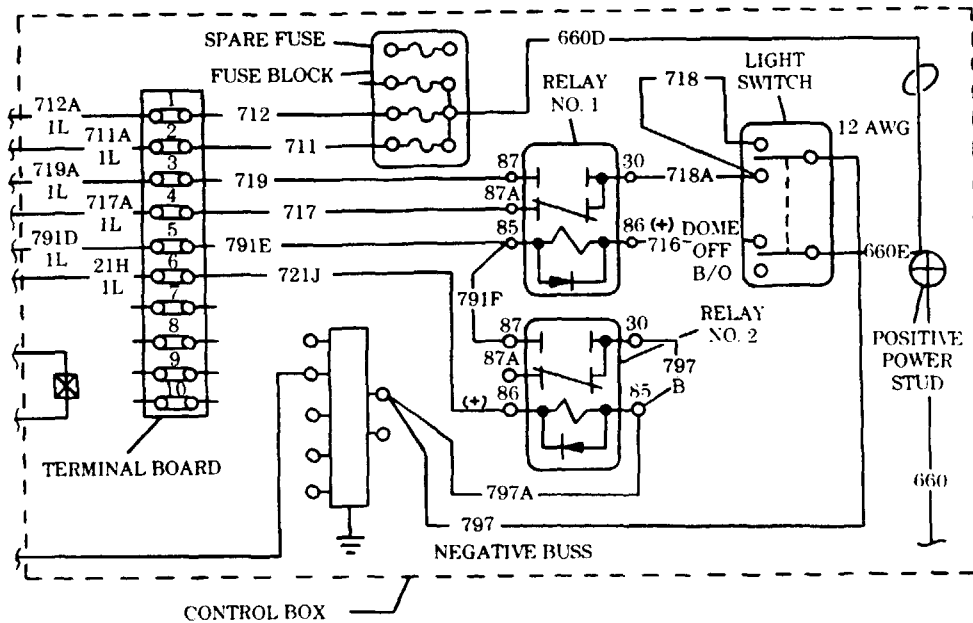


Replace main light switch,
refer to (para. 4-59).



Replace relay 2, refer to (para. 4-120).

0-45DC VOLTS STE/CE-R TEST 89
<ol style="list-style-type: none"> 1. Connect RED clip to the indicated test point, BLACK clip to negative or ground. 2. Start Test 89, DC volts. 3. Displayed reading is in volts.
BATTERY VOLTAGE MULTIMETER
<ol style="list-style-type: none"> 1. Set the voltmeter to volts scale of at least 40 volts. 2. Connect the RED lead to positive and the black lead to negative. 3. Be sure to read the correct scale.



(All Dome Lamps)
 With Ambulance compartment front door, rear door, or rear step open and vehicle light switch in service position (Refer to Fig. 11.)

DIAGNOSTIC FLOWCHART

KNOWN INFO
PREVIOUSLY CORRECTED INFORMATION
POSSIBLE PROBLEMS
LEAD 797 A LEAD 797 B LEAD 791 F

6

FROM 5, Page 2-522

PERFORM STEPS 18-22 ON PAGES 2-510 THROUGH 2-514. GO TO 7 BELOW IF THE ANSWER TO 21, PAGE 2-512, IS NO.

TEST OPTIONS
TRY IT
REASON FOR QUESTION
No power would indicate damaged leads.

KNOWN INFO
PREVIOUSLY CORRECTED INFORMATION
POSSIBLE PROBLEMS
LEAD 797 A LEAD 797 B LEAD 791 F

7

IS THERE CONTINUITY IN CONTROL BOX BETWEEN NEGATIVE BUSS AND TERMINAL 85 OF RELAY 2?

TEST OPTIONS
STE/ICE-R TEST 91, PAGE 2-752
REASON FOR QUESTION
No continuity would indicate a damaged lead.



KNOWN INFO
LEAD 797 A OK
POSSIBLE PROBLEMS
LEAD 797 B LEAD 791 F

8

IS THERE CONTINUITY BETWEEN TERMINALS 85 AND 30 OF RELAY 2?

TEST OPTIONS
STE-ICE-R TEST 91, PAGE 2-752
REASON FOR QUESTION
No continuity would indicate a damaged lead.



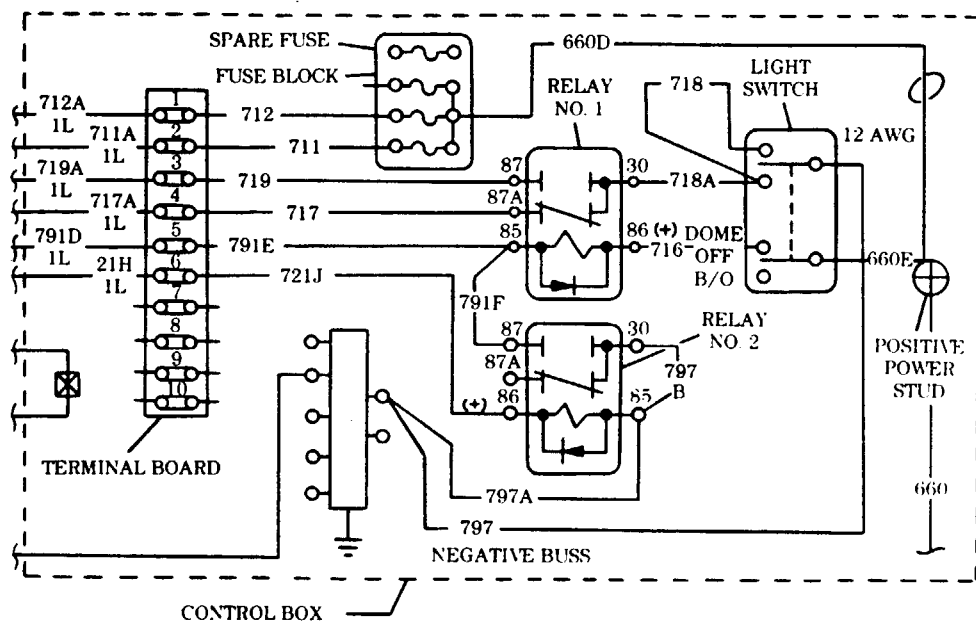
GO TO 9, Page 2-526

REFERENCE INFORMATION

AMBULANCE

**0-4500 DC OHMS
STE/ICE-R TEST 91**

1. Connect RED clip and BLACK clip to the indicated terminals in question; RED to the first, BLACK to the second.
2. Start test 91, 0-4500 ohms.
3. Displayed reading is in ohms. Less than 5 ohms is continuity. If the resistance is over 4500 ohms, STE/ICE displays "9.9.9.9."

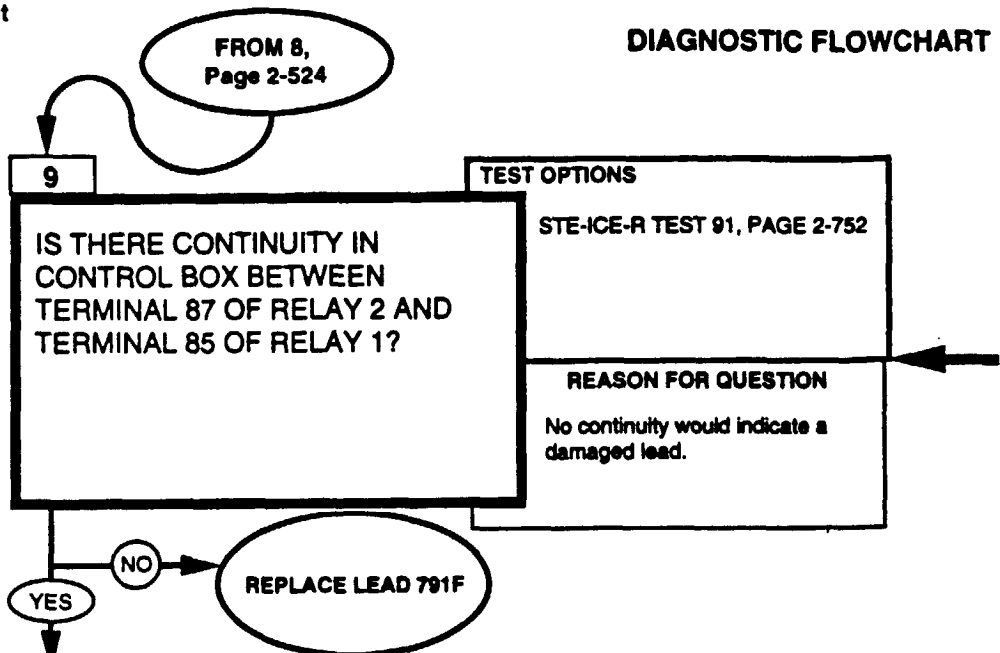


**AMBULANCE
(All Dome Lamps)**

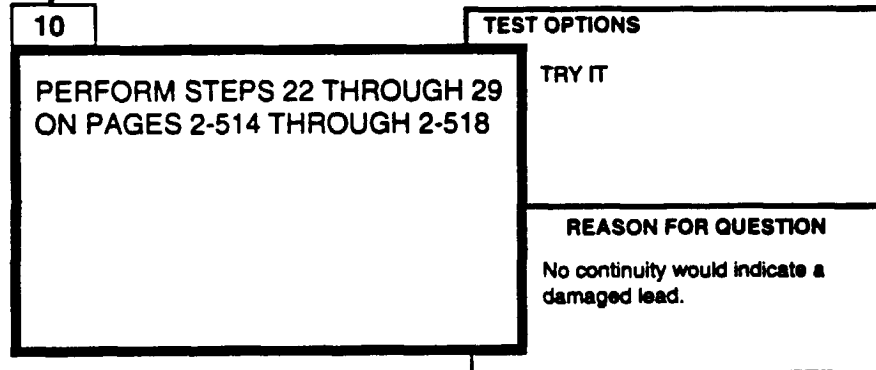
With Ambulance compartment front door, rear door, or rear step open and vehicle light switch in service position. (Refer to Fig. 11.)

DIAGNOSTIC FLOWCHART

KNOWN INFO
LEAD 797 A OK LEAD 797 B OK
POSSIBLE PROBLEMS
LEAD 791 F

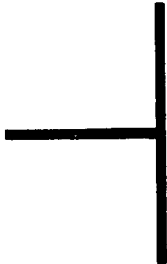


KNOWN INFO
LEAD 797 A OK LEAD 797 B OK LEAD 791 F OK
POSSIBLE PROBLEMS

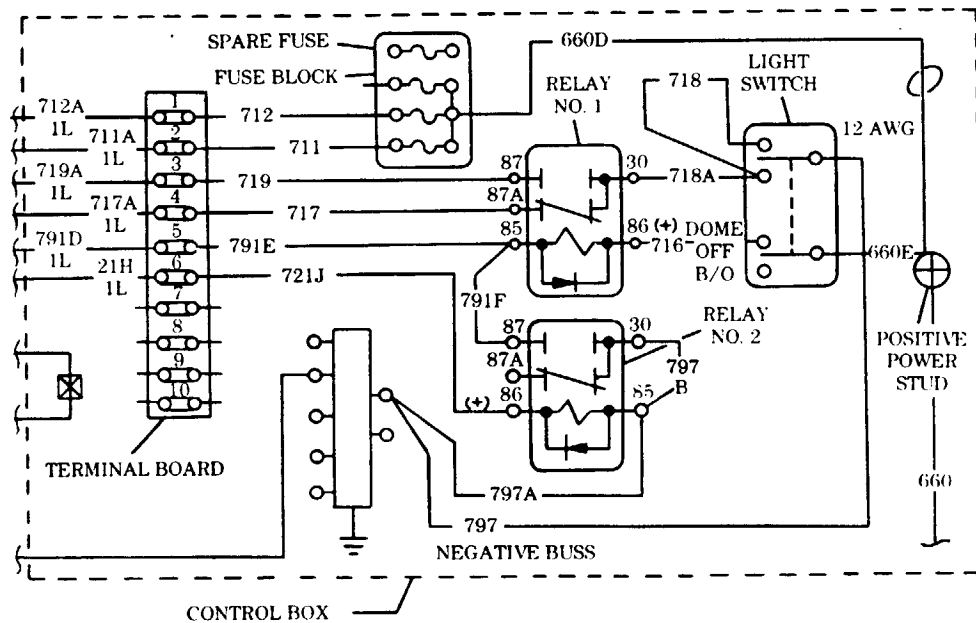


REFERENCE INFORMATION

AMBULANCE

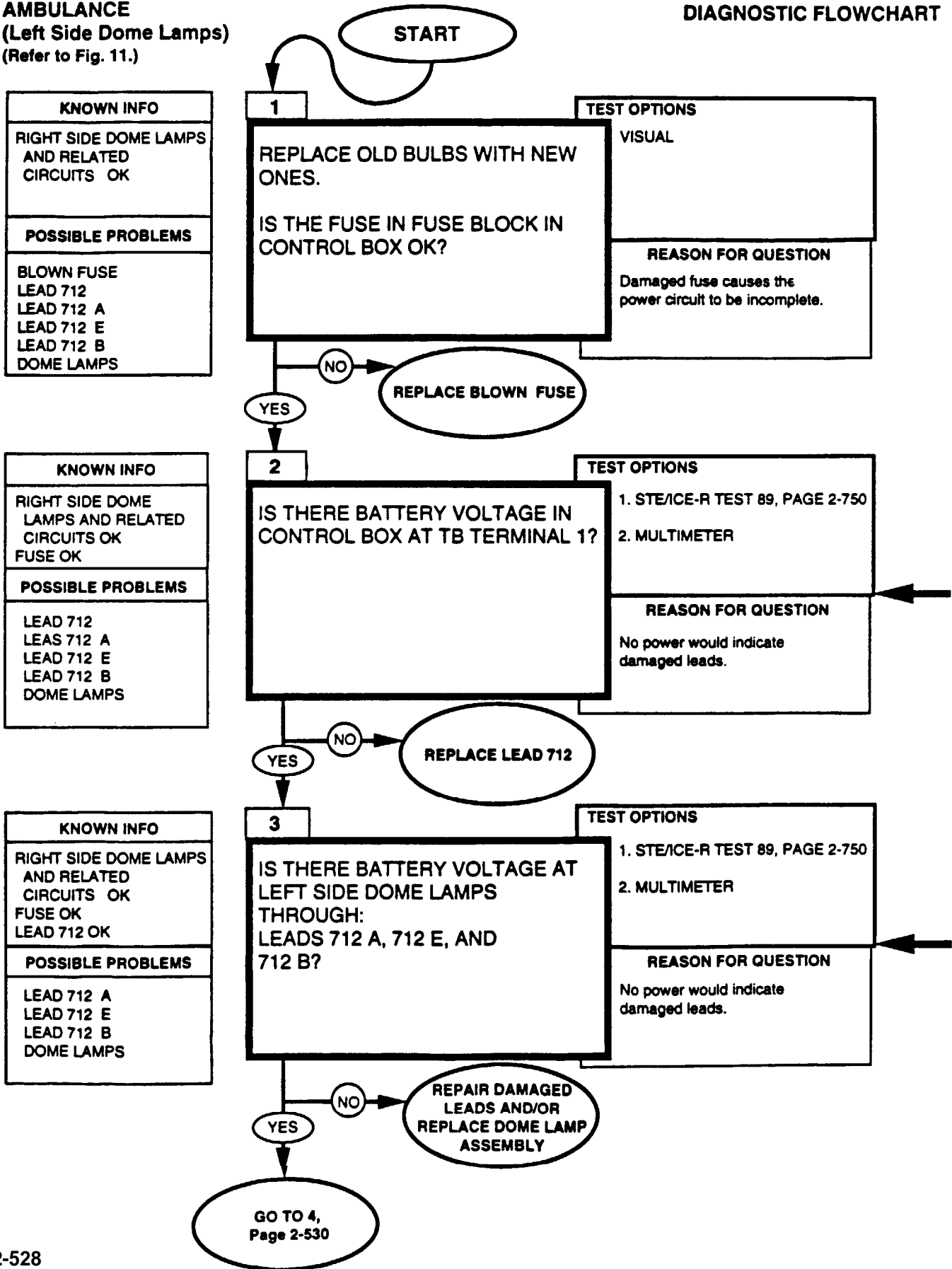


0-4500 DC OHMS STE/ICE-R TEST 91
<p>1. Connect RED clip and BLACK clip to the indicated terminals in question; RED to the first, BLACK to the second.</p>
<p>2. Start test 91, 0-4500 ohms.</p>
<p>3. Displayed reading is in ohms. Less than 5 ohms is continuity. If the resistance is over 4500 ohms, STE/ICE displays "9.9.9.9."</p>



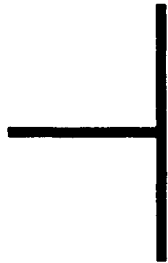
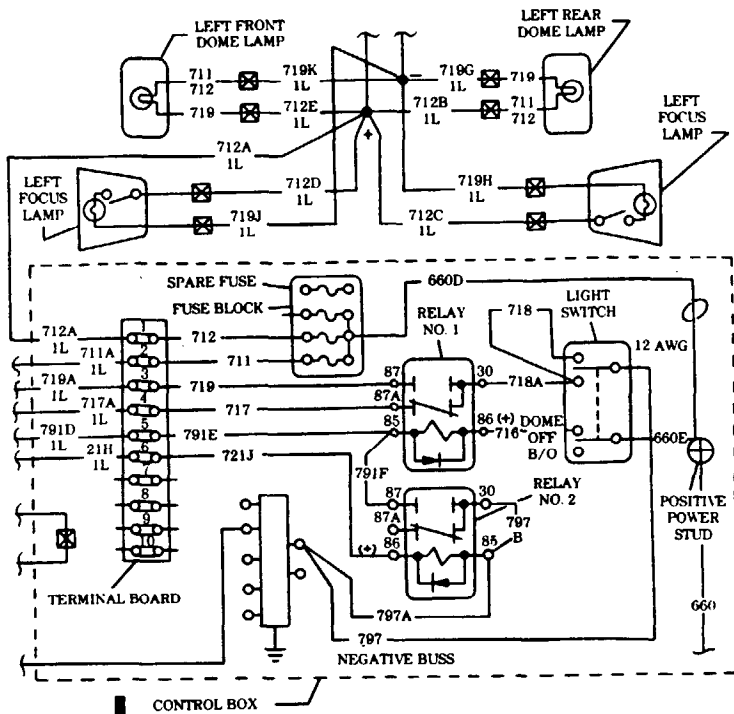
AMBULANCE
(Left Side Dome Lamps)
 (Refer to Fig. 11.)

DIAGNOSTIC FLOWCHART



REFERENCE INFORMATION

AMBULANCE



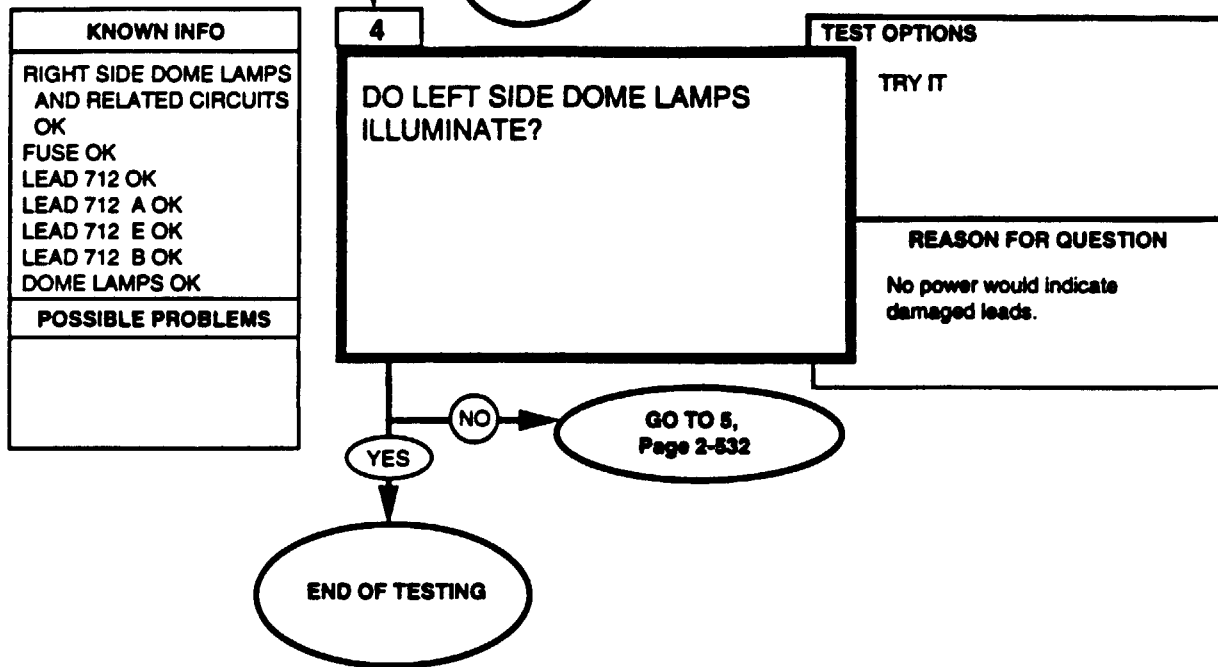
<p>0-45 DC VOLTS STEICE-R TEST 89</p>
<p>1. Connect RED clip to the indicated test point, BLACK clip to negative or ground.</p> <p>2. Start Test 89, DC volts.</p> <p>3. Displayed reading is in volts.</p>
<p>BATTERY VOLTAGE MULTIMETER</p>
<p>1. Set the voltmeter to a volts scale of at least 40 volts.</p> <p>2. Connect the RED lead to positive and the black lead to negative.</p> <p>3. Be sure to read the correct scale.</p>



Replace dome lamp assembly, refer to (para. 4-87).
 Repair lead, refer to (para. 4-85).
 Repair lead connector, refer to (para. 4-85).

AMBULANCE
(Left Side Dome Lamps)
(Refer to Fig. 11.)

DIAGNOSTIC FLOWCHART



REFERENCE INFORMATION

AMBULANCE

AMBULANCE
(Left Side Dome Lamps)
 (Refer to Fig. 11.)

DIAGNOSTIC FLOWCHART

KNOWN INFO
PREVIOUSLY CORRECTED INFORMATION
POSSIBLE PROBLEMS
LEAD 719 F LEAD 719 K LEAD 719 G DOME LAMPS

5

TEST OPTIONS

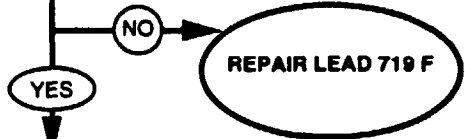
IS THERE CONTINUITY AT LEAD 719 F?

STE/ICE-R TEST 91, PAGE 2-752

REASON FOR QUESTION

No continuity would indicate a damaged lead.

FROM 4,
Page 2-530



KNOWN INFO
LEAD 719 F OK
POSSIBLE PROBLEMS
LEAD 719 K LEAD 719 G DOME LAMPS

6

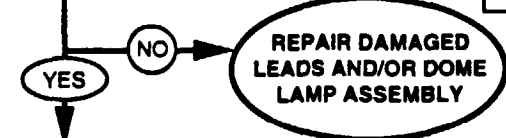
TEST OPTIONS

IS THERE CONTINUITY OF LEADS 719 K AND 719 G THROUGH TO LEFT SIDE DOME LAMPS LEADS?

STE/ICE-R TEST 91, PAGE 2-752

REASON FOR QUESTION

No continuity would indicate damaged leads.



KNOWN INFO
LEAD 719 F OK LEAD 719 K OK LEAD 719 G OK DOME LAMPS OK
POSSIBLE PROBLEMS

7

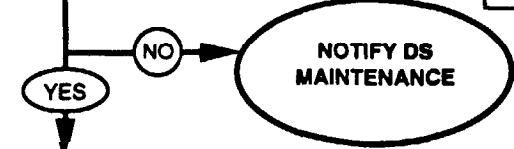
TEST OPTIONS

DO LEFT SIDE DOME LAMPS ILLUMINATE?

TRY IT

REASON FOR QUESTION

If left side dome lamps do not illuminate, that would indicate a malfunction not handled at this level.



END OF TESTING

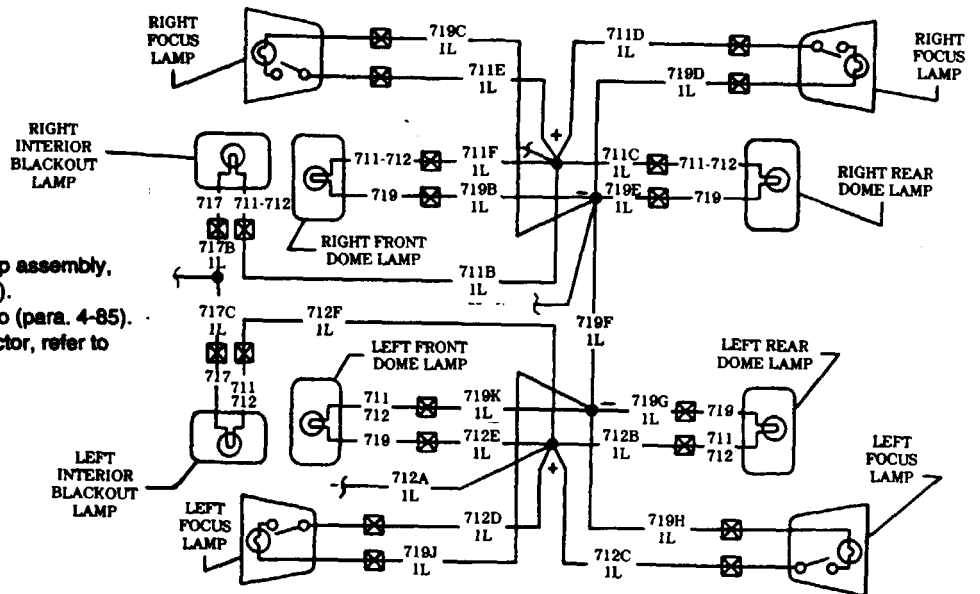
REFERENCE INFORMATION

AMBULANCE

Repair lead, refer to (para. 4-85).

0-4500 DC OHMS STE/ICE-R TEST 91
1. Connect RED clip and BLACK clip to the indicated terminals in question; RED to the first, BLACK to the second.
2. Start Test 91, 0-4500 ohms.
3. Displayed reading is in ohms. Less than 5 ohms is continuity. If the resistance is over 4500 ohms, STE/ICE displays "9.9.9.9."

Replace dome lamp assembly, refer to (para. 4-87).
Repair lead, refer to (para. 4-85).
Repair lead connector, refer to (para. 4-85).



AMBULANCE
(Right Side Dome Lamps)
 (Refer to Fig. 11.)

DIAGNOSTIC FLOWCHART

KNOWN INFO
LEFT SIDE DOME LAMPS AND RELATED CIRCUITS OK
POSSIBLE PROBLEMS
BLOWN FUSE LEAD 711 LEAD 711 A LEAD 711 F LEAD 711 C DOME LAMPS

1

REPLACE OLD BULBS WITH NEW ONES.

IS THE FUSE IN FUSE BLOCK IN CONTROL BOX OK?

TEST OPTIONS
VISUAL

REASON FOR QUESTION
Damaged fuse causes the power circuit to be incomplete.



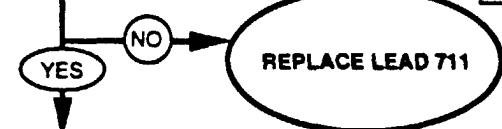
KNOWN INFO
LEFT SIDE DOME LAMPS AND RELATED CIRCUITS OK FUSE OK
POSSIBLE PROBLEMS
LEAD 711 LEAS 711 A LEAD 711 F LEAD 711 C DOME LAMPS

2

IS THERE BATTERY VOLTAGE IN CONTROL BOX AT TB TERMINAL 2?

TEST OPTIONS
1. STE/ICE-R TEST 89, PAGE 2-750
2. MULTIMETER

REASON FOR QUESTION
No power would indicate damaged leads.



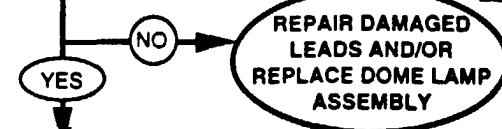
KNOWN INFO
LEFT SIDE DOME LAMPS AND RELATED CIRCUITS OK FUSE OK LEAD 711 OK
POSSIBLE PROBLEMS
LEAD 711 A LEAD 711 F LEAD 711 C DOME LAMPS

3

IS THERE BATTERY VOLTAGE AT RIGHT SIDE DOME LAMPS THROUGH: LEADS 711 A, 711 F, AND 711 C?

TEST OPTIONS
1. STE/ICE-R TEST 89, PAGE 2-750
2. MULTIMETER

REASON FOR QUESTION
No power would indicate damaged leads.

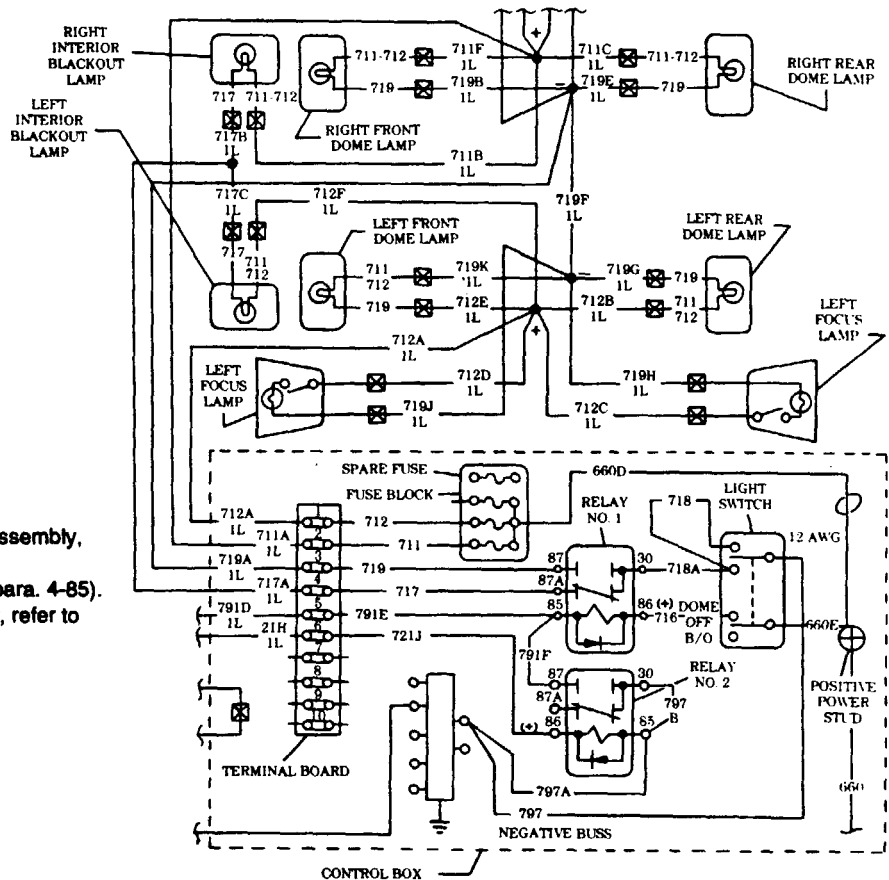


GO TO 4,
Page 2-536

REFERENCE INFORMATION

AMBULANCE

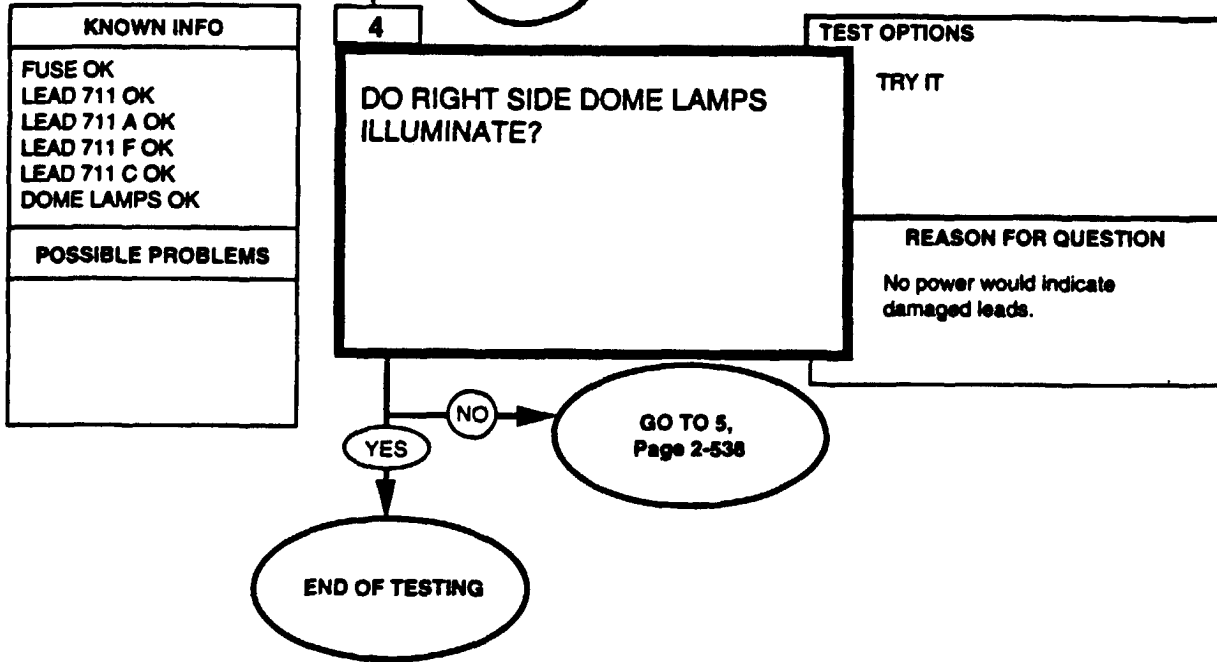
<p>0-45 DC VOLTS STE/ICE-R TEST 89</p> <ol style="list-style-type: none"> 1. Connect RED clip to the indicated test point, BLACK clip to negative or ground. 2. Start Test 89, DC volts. 3. Displayed reading is in volts.
<p>BATTERY VOLTAGE MULTIMETER</p> <ol style="list-style-type: none"> 1. Set the voltmeter to volts scale of at least 40 volts. 2. Connect the RED lead to positive and the black lead to negative. 3. Be sure to read the correct scale.



Replace dome lamp assembly, refer to (para. 4-87).
 Repair lead, refer to (para. 4-85).
 Repair lead connector, refer to (para. 4-85).

AMBULANCE
(Right Side Dome Lamps)
(Refer to Fig. 11.)

DIAGNOSTIC FLOWCHART



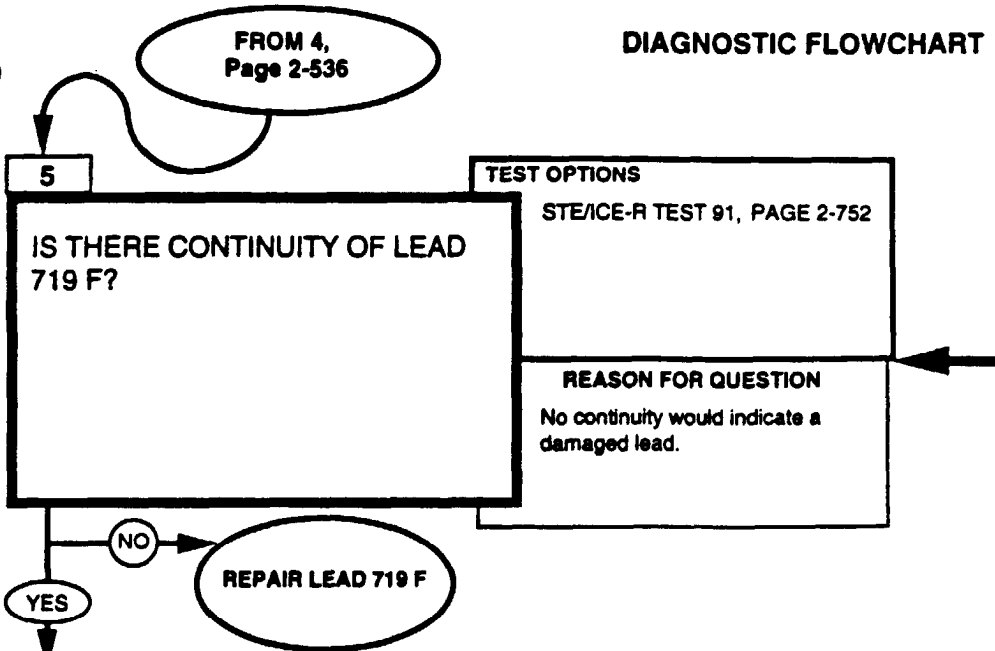
REFERENCE INFORMATION

AMBULANCE

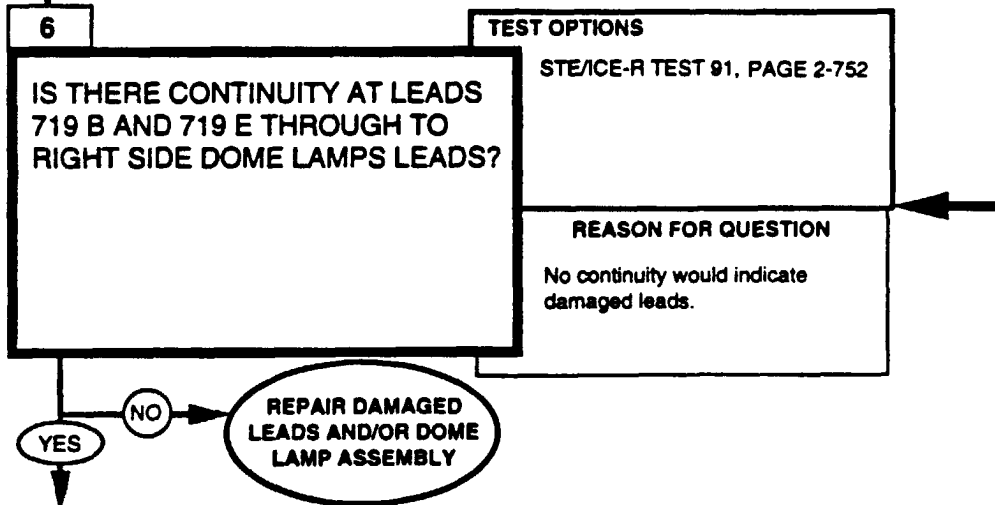
AMBULANCE
(Right Side Dome Lamps)
 (Refer to Fig. 11.)

DIAGNOSTIC FLOWCHART

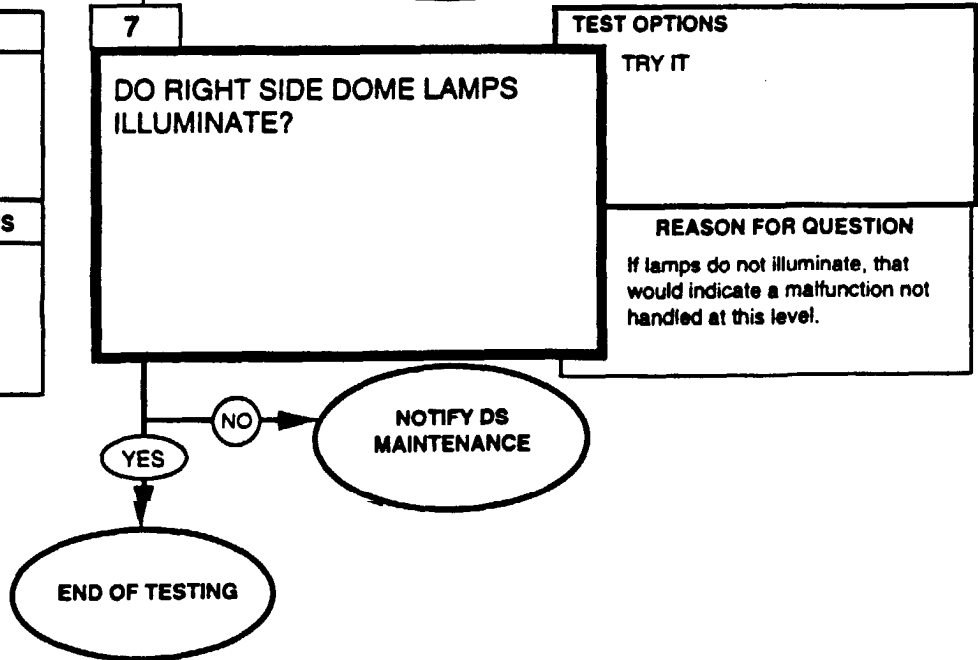
KNOWN INFO
PREVIOUSLY CORRECTED INFORMATION
POSSIBLE PROBLEMS
LEAD 719 F LEAD 719 B LEAD 719 E DOME LAMPS



KNOWN INFO
LEAD 719 F OK
POSSIBLE PROBLEMS
LEAD 719 E LEAD 719 B DOME LAMPS



KNOWN INFO
LEAD 719 F OK LEAD 719 E OK LEAD 719 B OK DOME LAMPS OK
POSSIBLE PROBLEMS



REFERENCE INFORMATION

AMBULANCE

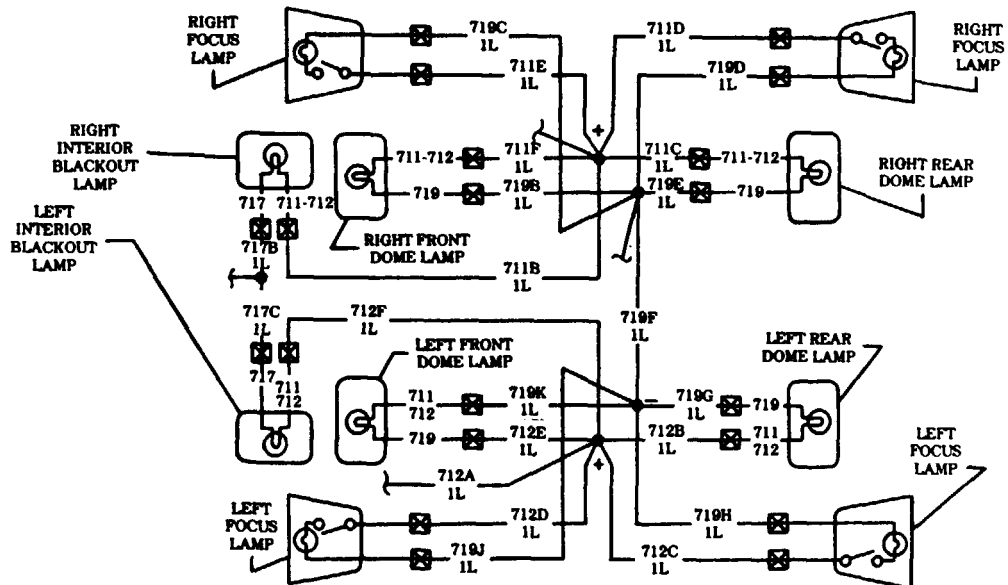
Repair lead, refer to (para. 4-85).

0-4500 DC OHMS STE/ICE-R TEST 91
1. Connect RED clip and BLACK clip to the indicated terminals in question; RED to the first, BLACK to the second.
2. Start Test 91, 0-4500 ohms.
3. Displayed reading is in ohms. Less than 5 ohms is continuity. If the resistance is over 4500 ohms, STE/ICE displays "9.9.9.9."

Replace dome lamp assembly, refer to (para. 4-87).

Repair lead, refer to (para. 4-85).

Repair lead connector, refer to (para. 4-85).

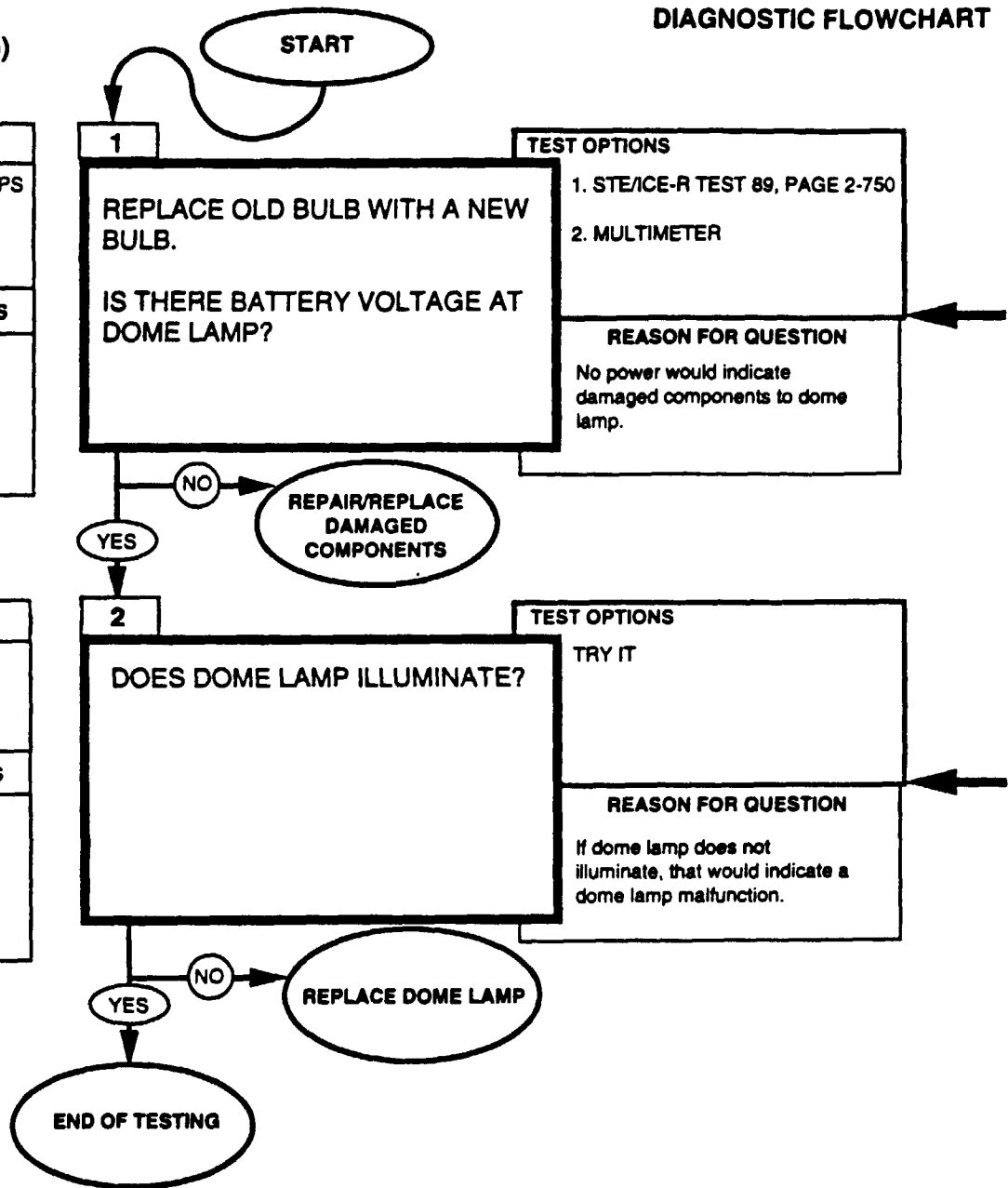


**AMBULANCE
(Single Dome Lamp)
(Refer to Fig. 11.)**

DIAGNOSTIC FLOWCHART

KNOWN INFO
ALL OTHER DOME LAMPS ILLUMINATE
POSSIBLE PROBLEMS
CORRODED CONNECTIONS LOOSE LAMP SOCKET DAMAGED WIRE TERMINALS DOME LAMP

KNOWN INFO
CONNECTIONS OK LAMP SOCKET OK WIRE TERMINALS OK
POSSIBLE PROBLEMS
DOME LAMP



REFERENCE INFORMATION

AMBULANCE

Repair leads, refer to (para. 4-85).
 Repair lead connector, refer to (para. 4-85).

Replace dome lamp assembly, refer to (para. 4-87).

<p>0-45 DC VOLTS STE/CE-R TEST 89</p>
<p>1. Connect RED clip to the indicated test point, BLACK clip to negative or ground.</p> <p>2. Start Test 89, DC volts.</p> <p>3. Displayed reading is in volts.</p>
<p>BATTERY VOLTAGE MULTIMETER</p>
<p>1. Set the voltmeter to DC volts scale of at least 40 volts.</p> <p>2. Connect the RED lead to positive and the black lead to negative.</p> <p>3. Be sure to read the correct scale.</p>

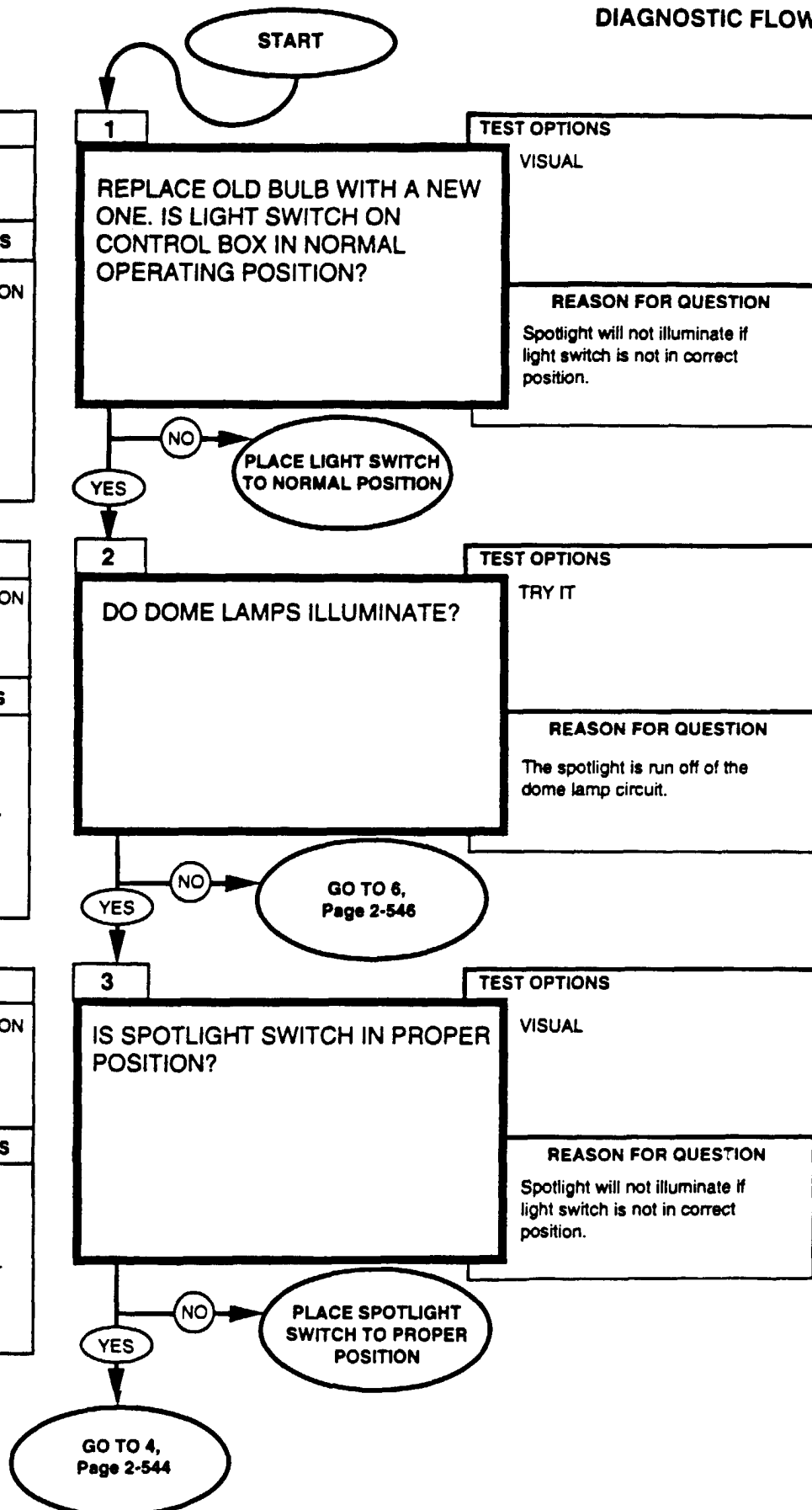
**AMBULANCE
(SPOTLIGHT)
(Refer to Fig. 11.)**

DIAGNOSTIC FLOWCHART

KNOWN INFO
NOTHING
POSSIBLE PROBLEMS
LIGHT SWITCH POSITION SPOTLIGHT SWITCH POSITION CORRODED CONNECTIONS LOOSE LAMP SOCKET DAMAGED WIRE TERMINALS DOME LAMPS SPOTLIGHT

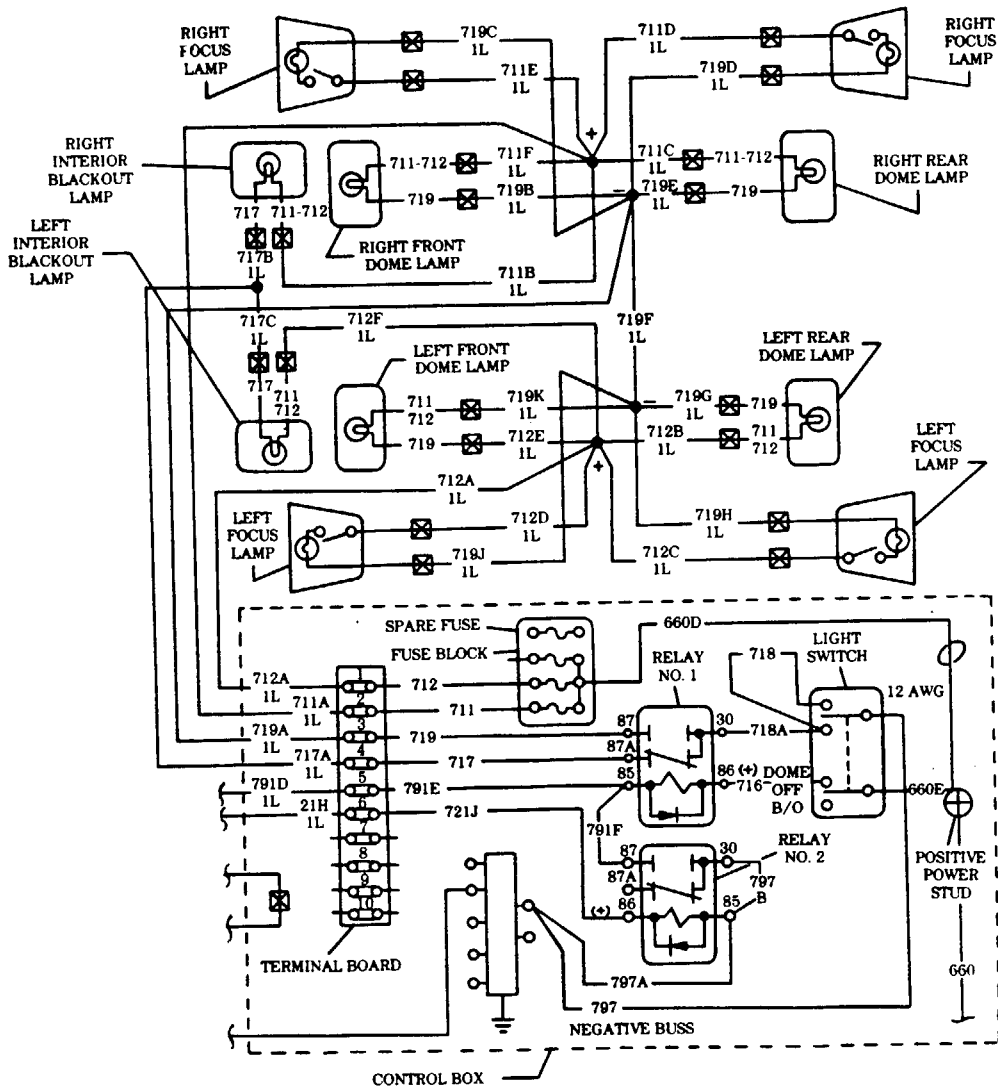
KNOWN INFO
LIGHT SWITCH POSITION OK
POSSIBLE PROBLEMS
SPOTLIGHT SWITCH POSITION CORRODED CONNECTIONS LOOSE LAMP SOCKET DAMAGED WIRE TERMINALS DOME LAMPS SPOTLIGHT

KNOWN INFO
LIGHT SWITCH POSITION OK DOME LAMPS OK
POSSIBLE PROBLEMS
SPOTLIGHT SWITCH POSITION CORRODED CONNECTIONS LOOSE LAMP SOCKET DAMAGED WIRE TERMINALS SPOTLIGHT



REFERENCE INFORMATION

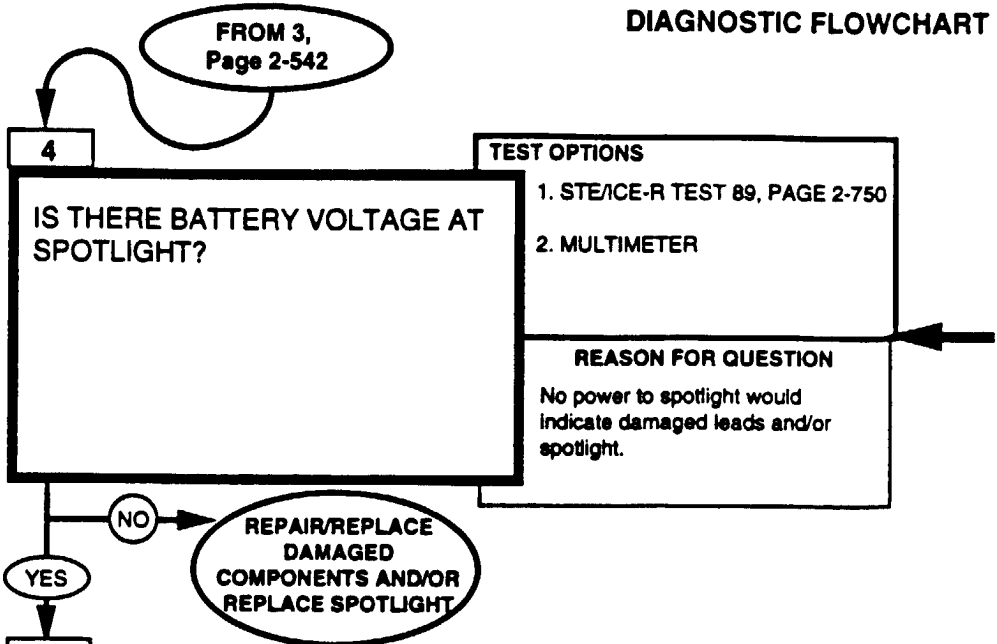
AMBULANCE



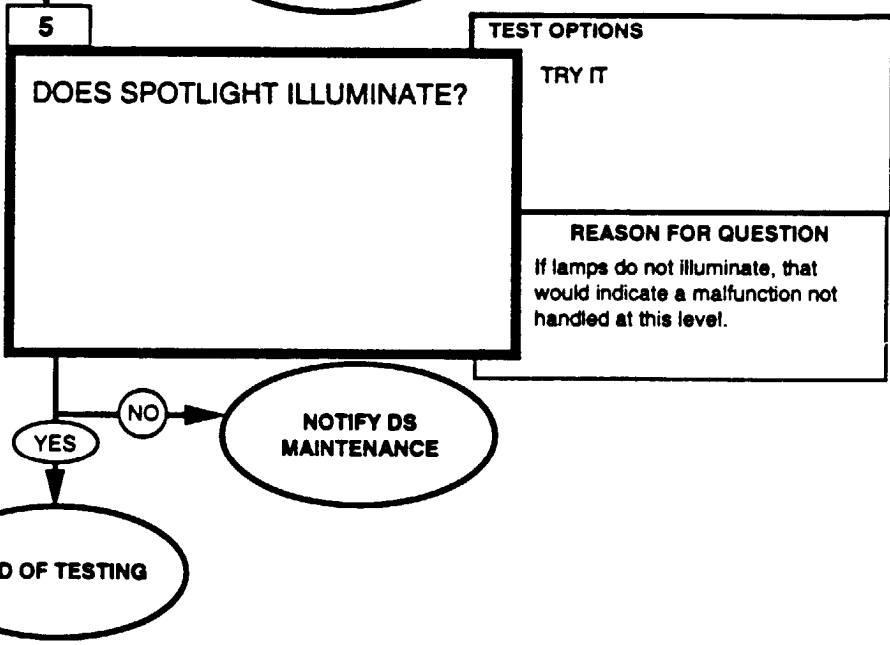
**AMBULANCE
(Spotlight)
(Refer to Fig. 11.)**

DIAGNOSTIC FLOWCHART

KNOWN INFO
LIGHT SWITCH POSITION OK DOME LAMPS OK SPOTLIGHT SWITCH POSITION OK
POSSIBLE PROBLEMS
CORRODED CONNECTIONS LOOSE LAMP SOCKET DAMAGED WIRE TERMINALS SPOTLIGHT




KNOWN INFO
LIGHT SWITCH POSITION OK DOME LAMPS OK SPOTLIGHT SWITCH POSITION OK CONNECTIONS OK LAMP SOCKET TIGHT WIRE TERMINALS OK SPOTLIGHT OK
POSSIBLE PROBLEMS



REFERENCE INFORMATION

AMBULANCE


 Replace spotlight assembly, refer to (para. 4-88).
 Repair leads, refer to (para. 4-85).
 Repair lead connector, refer to (para. 4-85).

0-45 DC VOLTS STE/CE-R TEST 89
<ol style="list-style-type: none"> 1. Connect RED clip to the indicated test point, BLACK clip to negative or ground. 2. Start Test 89, DC volts. 3. Displayed reading is in volts.
BATTERY VOLTAGE MULTIMETER
<ol style="list-style-type: none"> 1. Set the voltmeter to a DC volts scale of at least 40 volts. 2. Connect the RED lead to positive and the BLACK lead to negative. 3. Be sure to read the correct scale.

**AMBULANCE
(Spotlight)
(Refer to Fig. 11.)**

DIAGNOSTIC FLOWCHART

KNOWN INFO
LIGHT SWITCH POSITION OK
POSSIBLE PROBLEMS

**FROM 2,
Page 2-542**

6

PERFORM STEPS 1 THROUGH 29, PAGES 2-498 THROUGH 2-518 IF VEHICLE LIGHT SWITCH IS IN THE BLACKOUT DRIVE POSITION. IF VEHICLE LIGHT SWITCH IS IN THE SERVICE DRIVE POSITION, PERFORM STEPS 1 THROUGH 10, PAGES 2-520 THROUGH 2-526, AND RETURN TO 3, PAGE 2-542.

TEST OPTIONS
TRY IT
REASON FOR QUESTION
No power would indicate damage in electrical system.

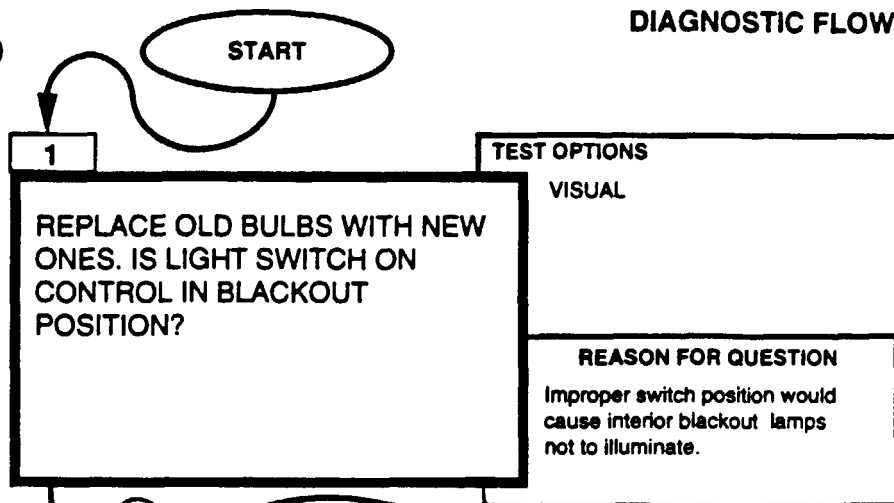
REFERENCE INFORMATION

AMBULANCE

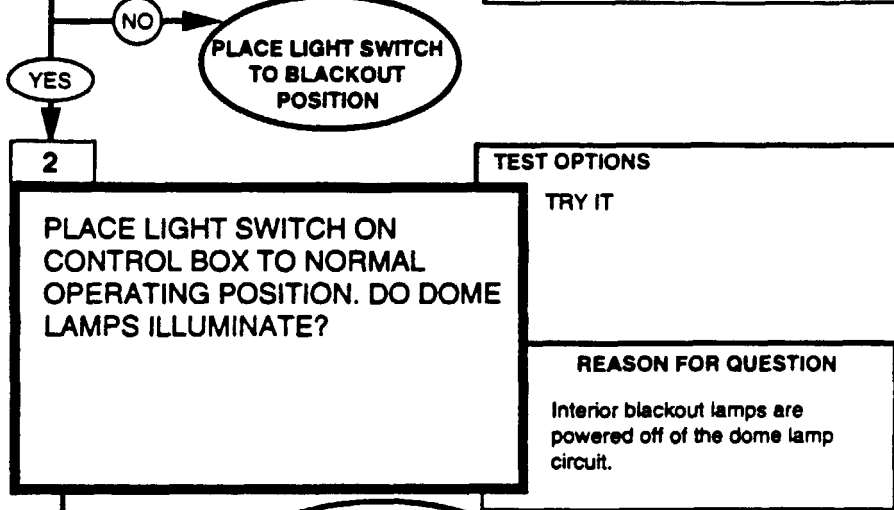
AMBULANCE
 (Interior Blackout Lamps)
 (Refer to Fig. 11.)

DIAGNOSTIC FLOWCHART

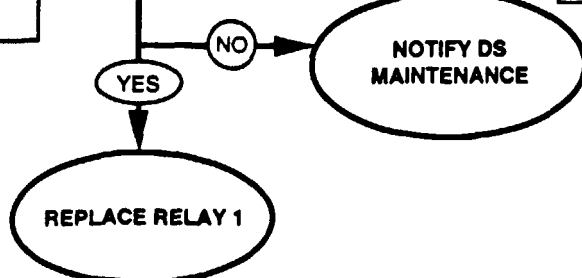
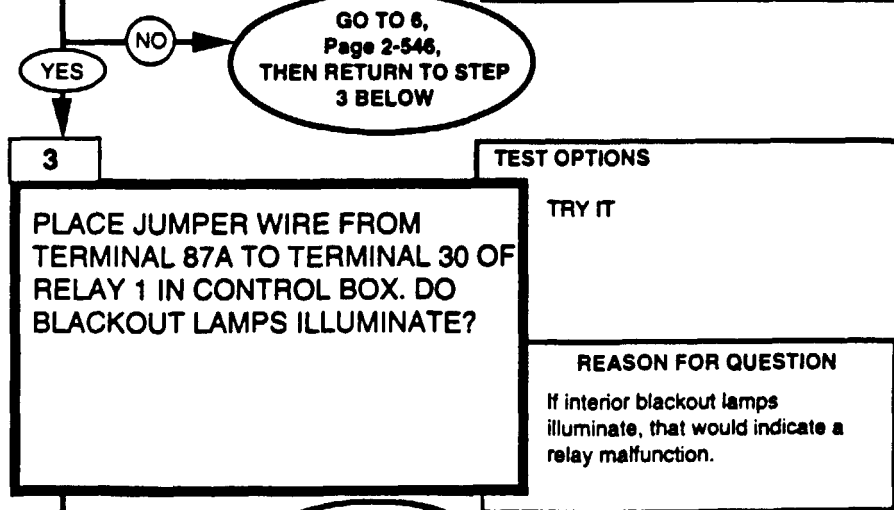
KNOWN INFO
NOTHING
POSSIBLE PROBLEMS
LIGHT SWITCH POSITION DOME LAMPS



KNOWN INFO
LIGHT SWITCH POSITION OK
POSSIBLE PROBLEMS
DOME LAMPS



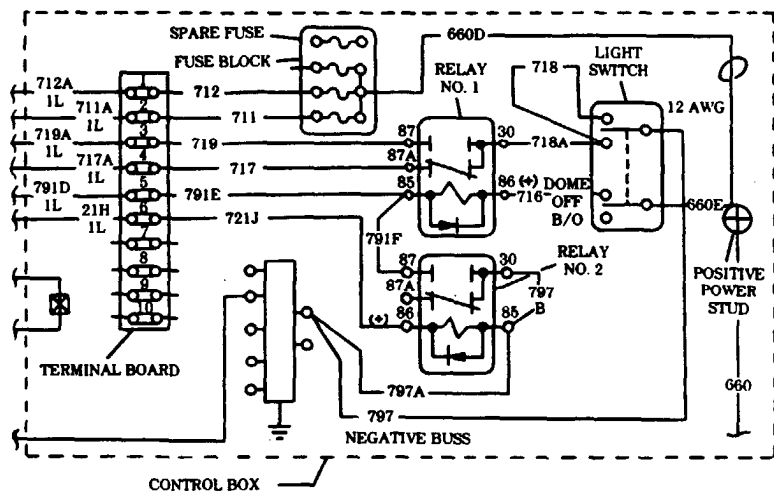
KNOWN INFO
LIGHT SWITCH POSITION OK DOME LAMPS OK
POSSIBLE PROBLEMS



REFERENCE INFORMATION

AMBULANCE

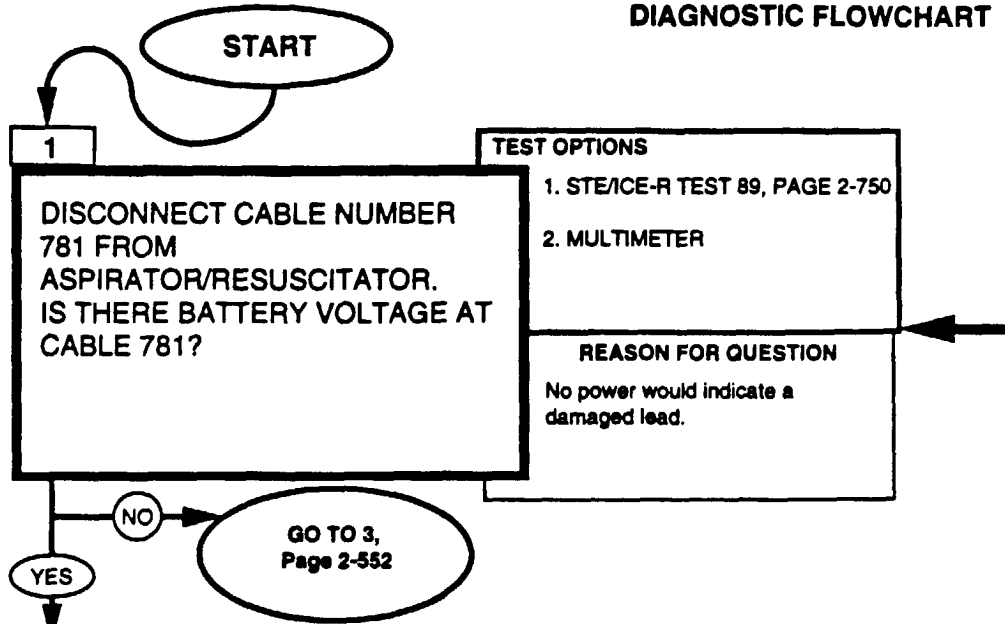
Replace relay,
refer to (para. 4-120).



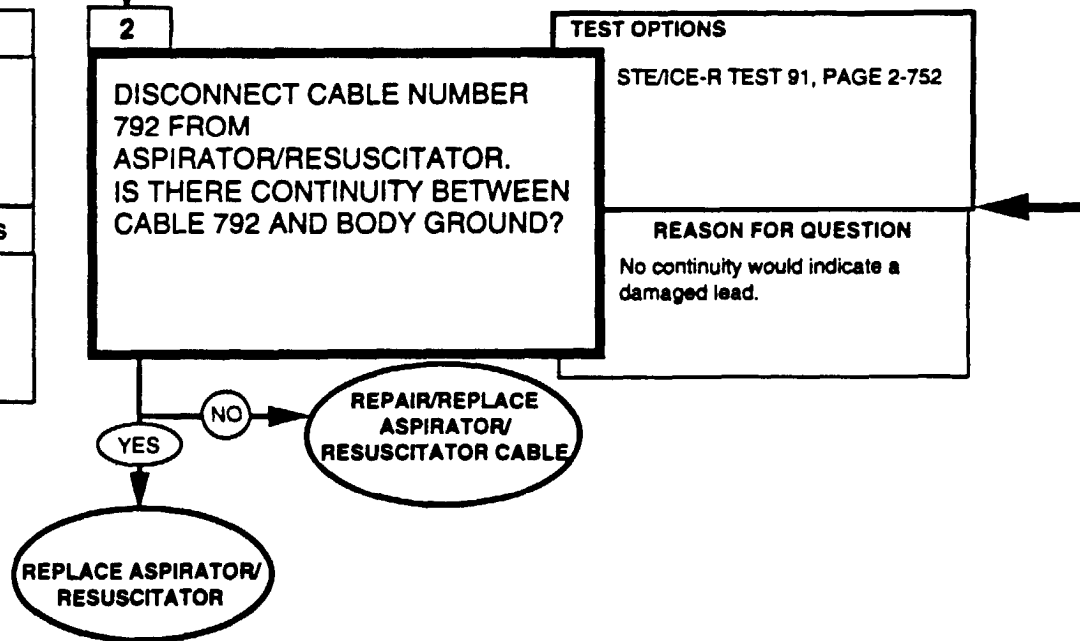
**AMBULANCE
(Aspirator)
(Refer to Fig. 12.)**

DIAGNOSTIC FLOWCHART

KNOWN INFO
NOTHING
POSSIBLE PROBLEMS
ASPIRATOR CABLES ASPIRATOR BATTERY

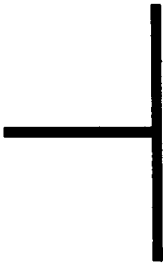


KNOWN INFO
BATTERY OK
POSSIBLE PROBLEMS
ASPIRATOR CABLES ASPIRATOR

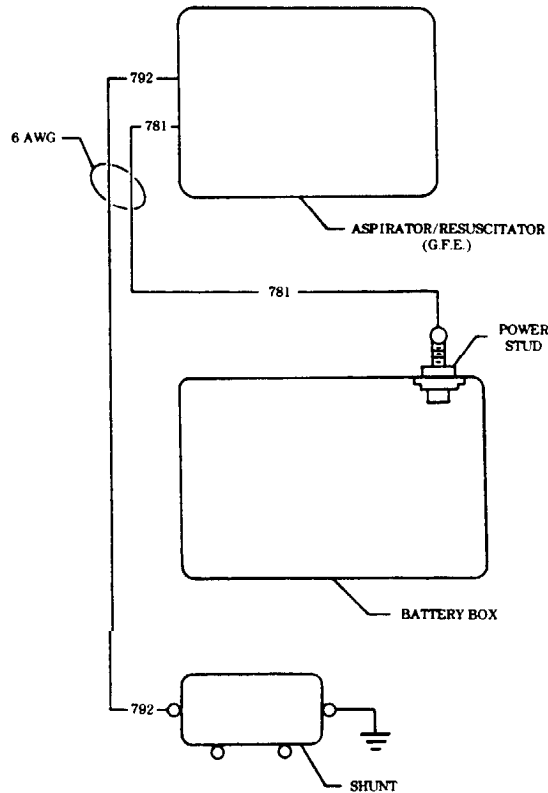


REFERENCE INFORMATION

AMBULANCE



Replace Aspirator/Resuscitator cable,
refer to (para. 4-104).
Repair cable, refer to DS Maintenance.



**0-45 DC VOLTS
STE/CE-R TEST 89**

1. Connect RED clip to the indicated test point, BLACK clip to negative or ground.
2. Start Test 89, DC volts.
3. Displayed reading is in volts.

**BATTERY VOLTAGE
MULTIMETER**

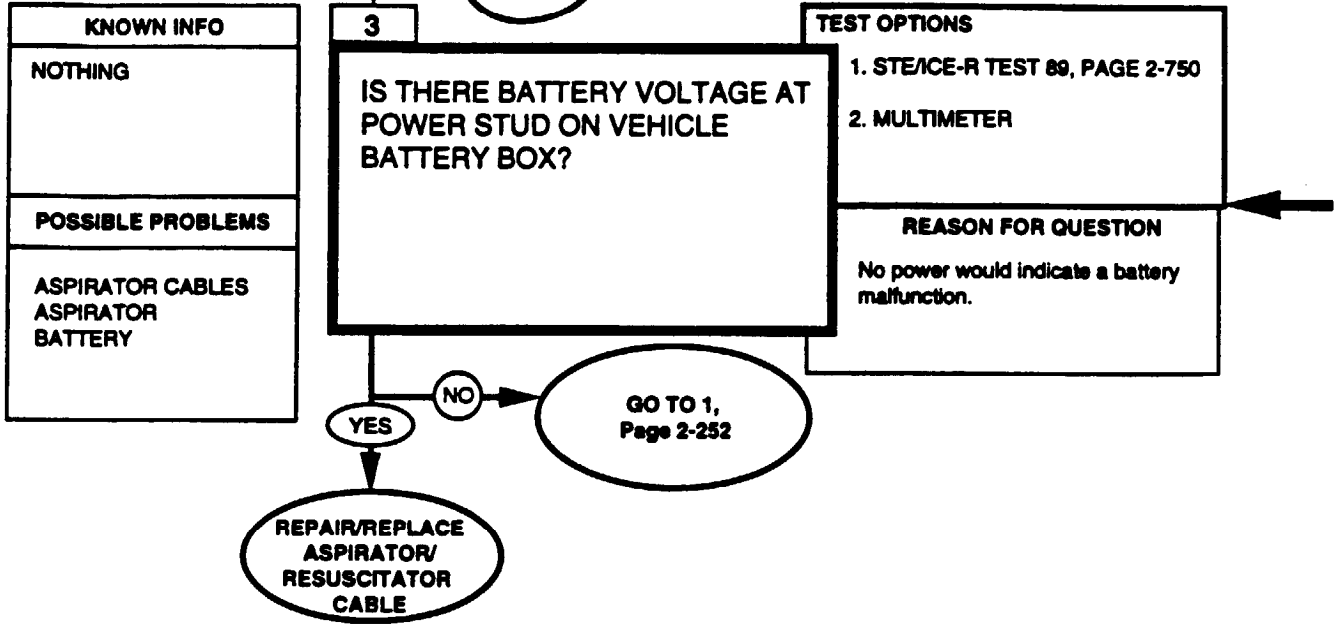
1. Set the voltmeter to a DC volts scale of at least 40 volts.
2. Connect the RED lead to positive and the BLACK lead to negative.
3. Be sure to read the correct scale.

**0-4500 DC OHMS
STE/CE-R TEST 91**

1. Connect RED clip and BLACK clip to the indicated terminals in question; RED to the first, BLACK to the second.
2. Start Test 91, 0-4500 ohms.
3. Displayed reading is in ohms. Less than 5 ohms is continuity. If the resistance is over 4500 ohms, STE/ICE displays "9.9.9.9."

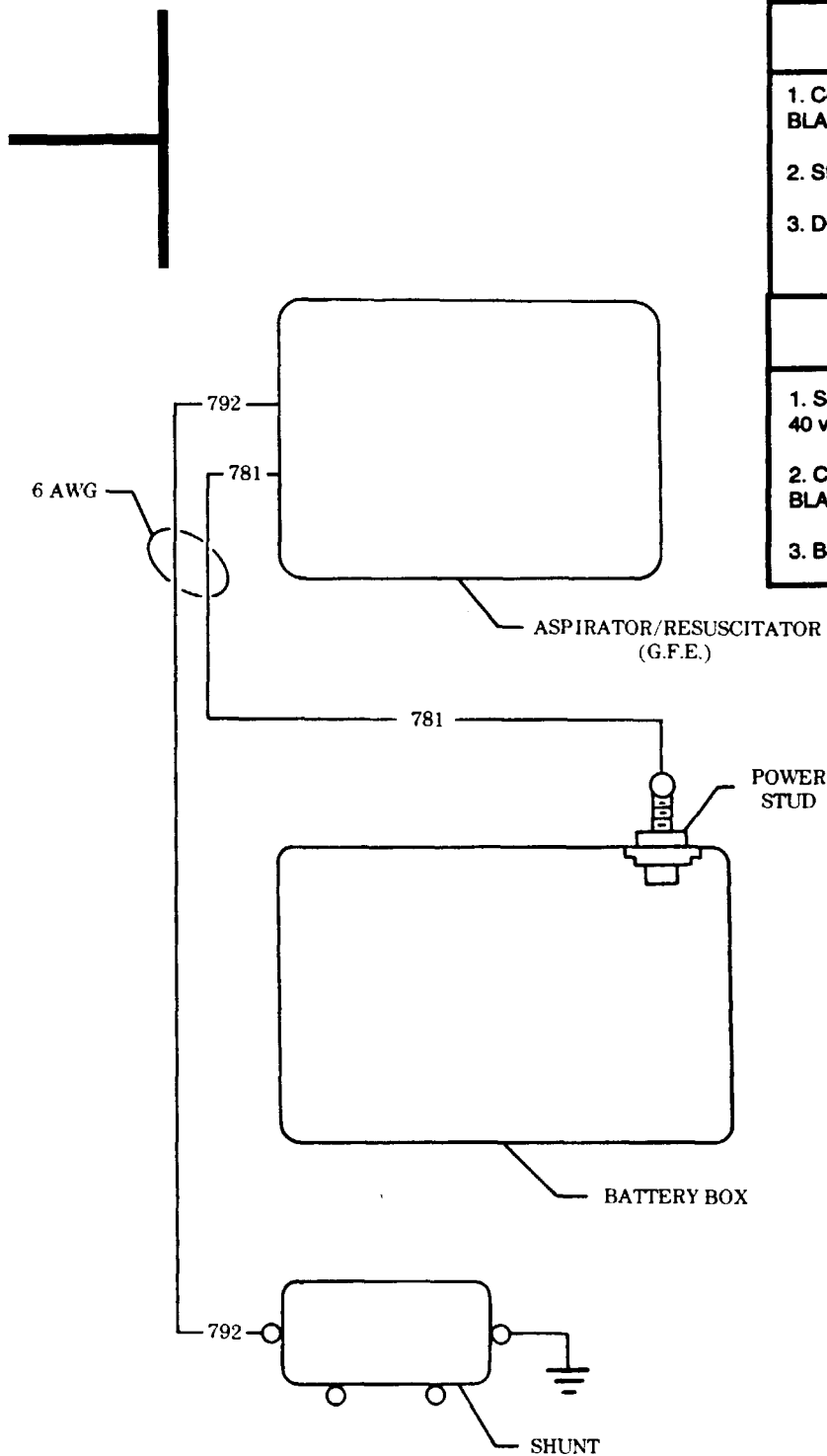
**AMBULANCE
(Aspirator)
(Refer to Fig. 12.)**

DIAGNOSTIC FLOWCHART



REFERENCE INFORMATION

AMBULANCE

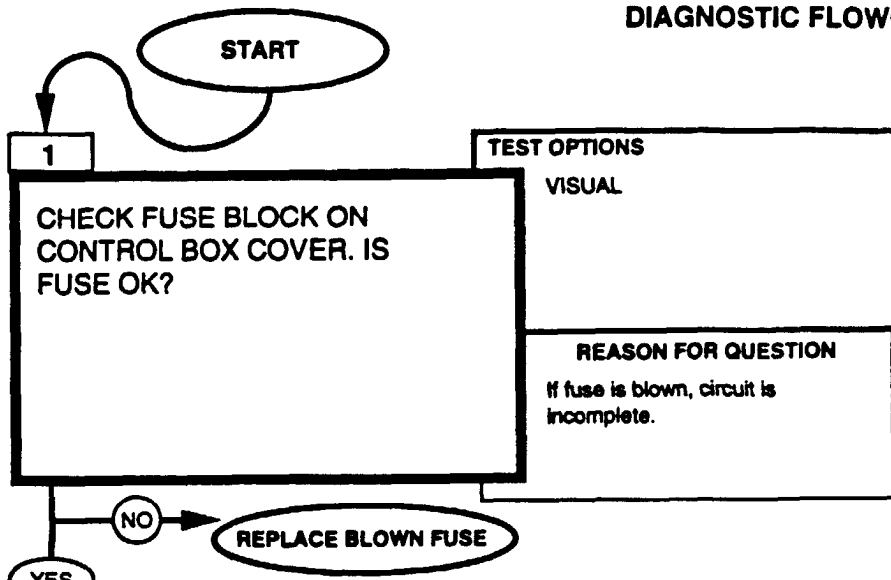


<p>0-45 DC VOLTS STE/CE-R TEST 89</p>
<p>1. Connect RED clip to the indicated test point, BLACK clip to negative or ground.</p> <p>2. Start Test 89, DC volts.</p> <p>3. Displayed reading is in volts.</p>
<p>BATTERY VOLTAGE MULTIMETER</p>
<p>1. Set the voltmeter to a DC volts scale of at least 40 volts.</p> <p>2. Connect the RED lead to positive and the BLACK lead to negative.</p> <p>3. Be sure to read the correct scale.</p>

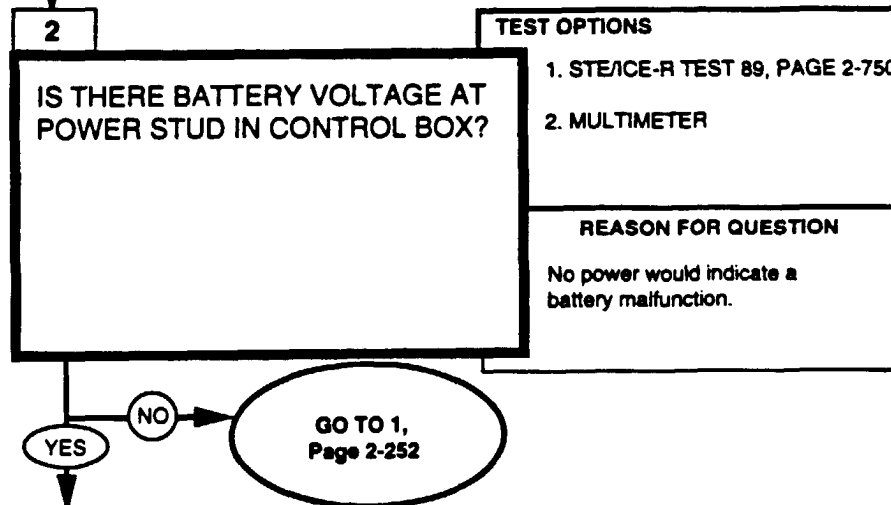
AMBULANCE
 (Front DC Outlet)
 (Refer to Fig. 13.)

DIAGNOSTIC FLOWCHART

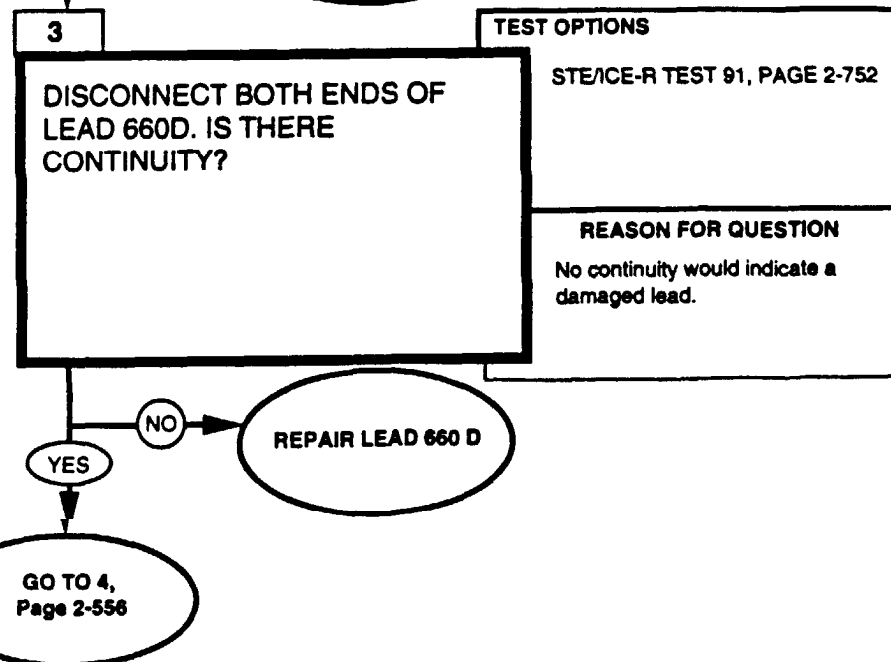
KNOWN INFO
NOTHING
POSSIBLE PROBLEMS
FUSE BATTERY LEAD 660 D LEAD 714 LEAD 790



KNOWN INFO
FUSE OK
POSSIBLE PROBLEMS
BATTERY LEAD 660 D LEAD 714 LEAD 790

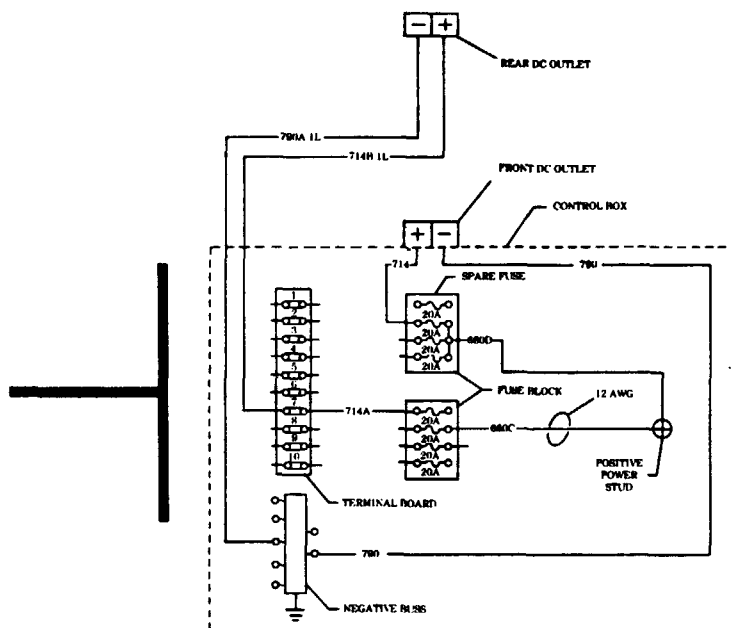


KNOWN INFO
FUSE OK BATTERY OK
POSSIBLE PROBLEMS
LEAD 660 D LEAD 714 LEAD 790



REFERENCE INFORMATION

AMBULANCE



Repair lead, refer to (para. 4-85).
 Repair lead connector, refer to (para. 4-85).

**0-45 DC VOLTS
 STE/ICE-R TEST 89**

1. Connect RED clip to the indicated test point, BLACK clip to negative or ground.
2. Start Test 89, DC volts.
3. Displayed reading is in volts.

**BATTERY VOLTAGE
 MULTIMETER**

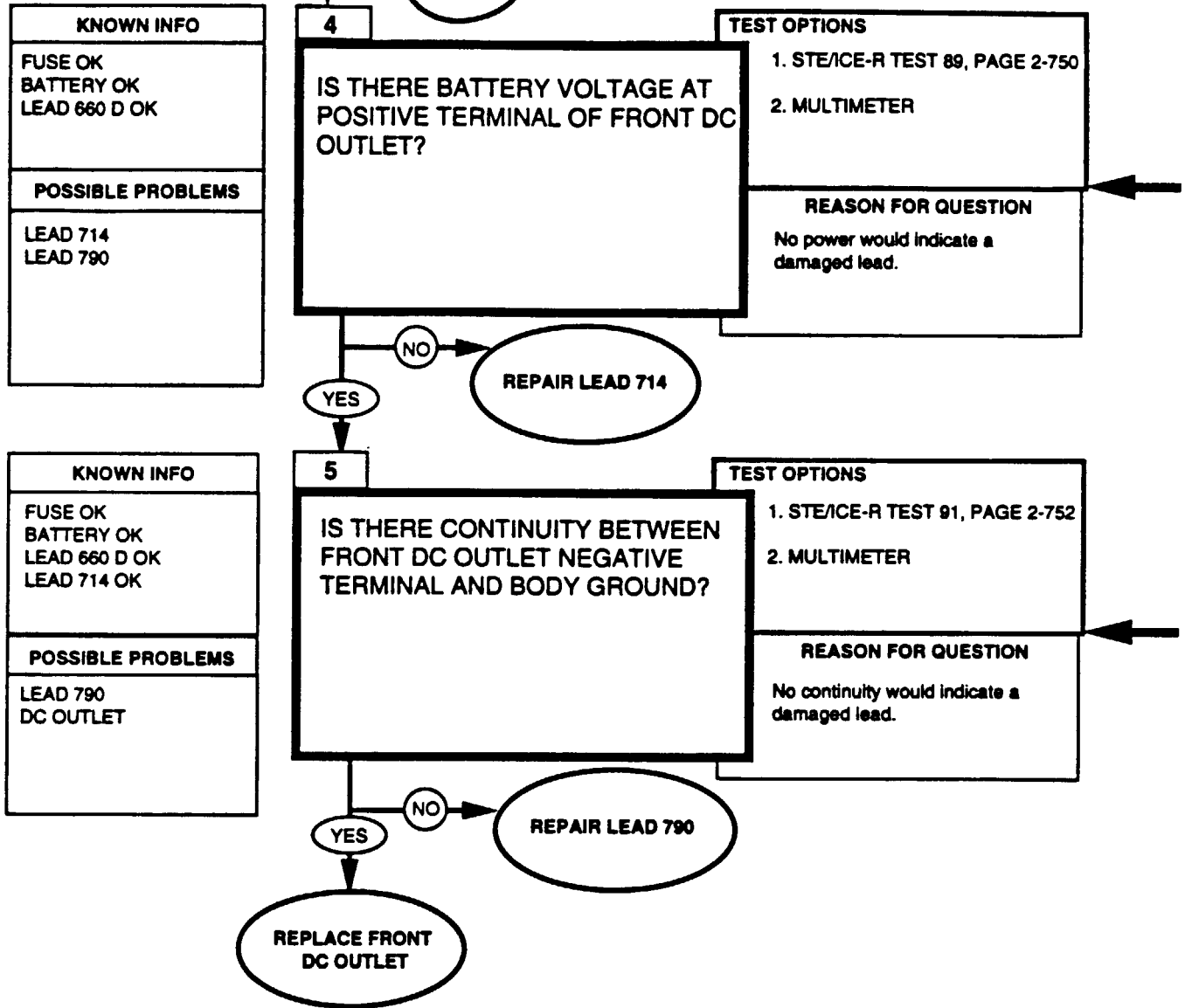
1. Set the voltmeter to a DC volts scale of at least 40 volts.
2. Connect the RED lead to positive and the BLACK lead to negative.
3. Be sure to read the correct scale.

**0-4500 DC OHMS
 STE/ICE-R TEST 91**

1. Connect RED clip and BLACK clip to the indicated terminals in question; RED to the first, BLACK to the second.
2. Start Test 91, 0-4500 ohms.
3. Displayed reading is in ohms. Less than 5 ohms is continuity. If the resistance is over 4500 ohms, STE/ICE displays "9.9.9.9."

AMBULANCE
(Front DC Outlet)
 (Refer to Fig. 13.)

DIAGNOSTIC FLOWCHART

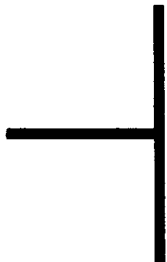


REFERENCE INFORMATION

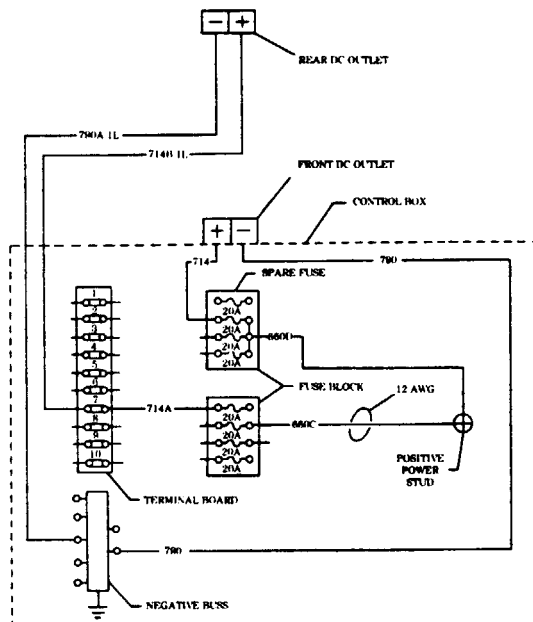
AMBULANCE



Repair lead, refer to (para. 4-85).
 Repair lead connector,
 refer to (para. 4-85).



Repair lead connectors,
 refer to (para. 4-85).
 Repair lead, refer to (para. 4-85).
 Replace front DC outlet,
 refer to (para. 4-90).

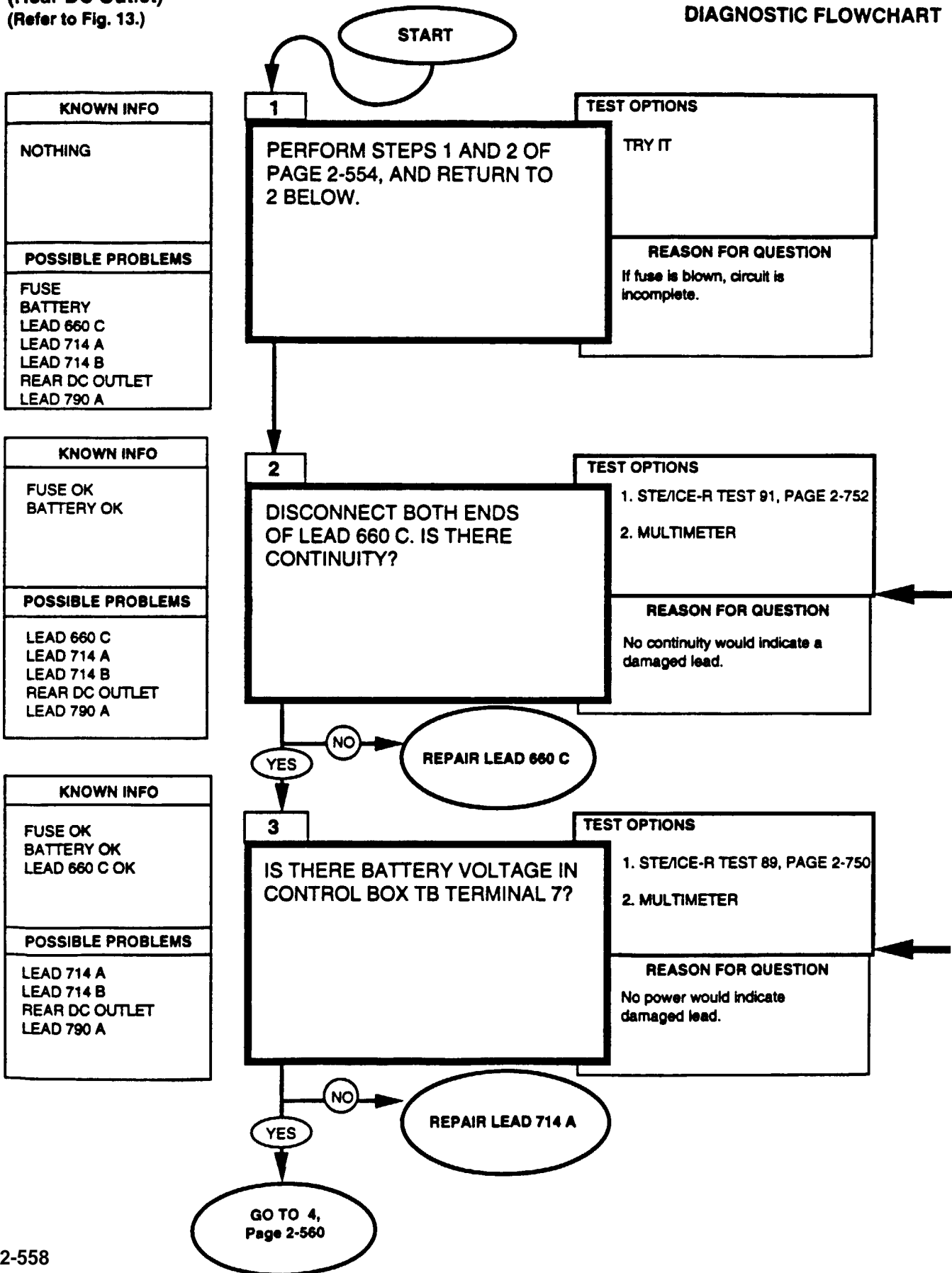


0-45 DC VOLTS STE/ICE-R TEST 89
<ol style="list-style-type: none"> 1. Connect RED clip to the indicated test point, BLACK clip to negative or ground. 2. Start Test 89, DC volts. 3. Displayed reading is in volts.
BATTERY VOLTAGE MULTIMETER
<ol style="list-style-type: none"> 1. Set the voltmeter to a DC volts scale of at least 40 volts. 2. Connect the RED lead to positive and the BLACK lead to negative. 3. Be sure to read the correct scale.

0-4500 DC OHMS STE/ICE-R TEST 91
<ol style="list-style-type: none"> 1. Connect RED clip and BLACK clip to the indicated terminals in question; RED to the first, BLACK to the second. 2. Start Test 91, 0-4500 ohms. 3. Displayed reading is in ohms. Less than 5 ohms is continuity. If the resistance is over 4500 ohms, STE/ICE displays "9.9.9.9."
CONTINUITY (RESISTANCE) MULTIMETER
<ol style="list-style-type: none"> 1. Set the voltmeter to an ohms scale of about 1000 ohms. 2. Connect the RED and BLACK leads to the connections stated in the question. 3. Be sure to read the correct scale. Less than 5 ohms indicates continuity. For an open circuit, the meter should peg full scale (needle all the way to the left).

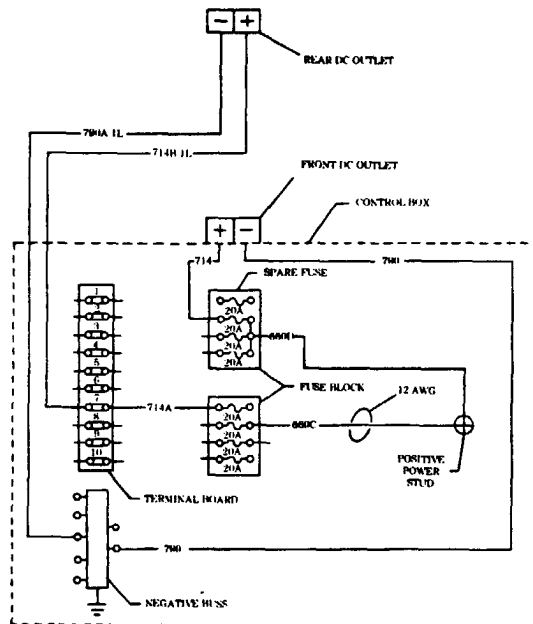
AMBULANCE
(Rear DC Outlet)
(Refer to Fig. 13.)

DIAGNOSTIC FLOWCHART



REFERENCE INFORMATION

AMBULANCE



Repair lead, refer to (para. 4-85).
 Repair lead connector, refer to (para. 4-85).

Repair lead, refer to (para. 4-85).
 Repair lead connector, refer to (para. 4-85).

**0-4500 OHMS
 STE/ICE-R TEST 91**

1. Connect RED clip and BLACK clip to the indicated terminals in question; RED to the first, BLACK to the second.
2. Start Test 91, 0-4500 ohms.
3. Displayed reading is in ohms. Less than 5 ohms is continuity. If the resistance is over 4500 ohms, STE/ICE displays "9.9.9.9."

**CONTINUITY (RESISTANCE)
 MULTIMETER**

1. Set the voltmeter to an ohms scale of about 1000 ohms.
2. Connect the RED and BLACK leads to the connections stated in the question.
3. Be sure to read the correct scale. Less than 5 ohms indicates continuity. For an open circuit, the meter should peg full scale (needle all the way to the left).

**0-45 DC VOLTS
 STE/ICE-R TEST 89**

1. Connect RED clip to the indicated test point, BLACK clip to negative or ground.
2. Start Test 89, DC volts.
3. Displayed reading is in volts.

**BATTERY VOLTAGE
 MULTIMETER**

1. Set the voltmeter to a volts scale of at least 40 volts.
2. Connect the RED lead to positive and the BLACK lead to negative.
3. Be sure to read the correct scale.

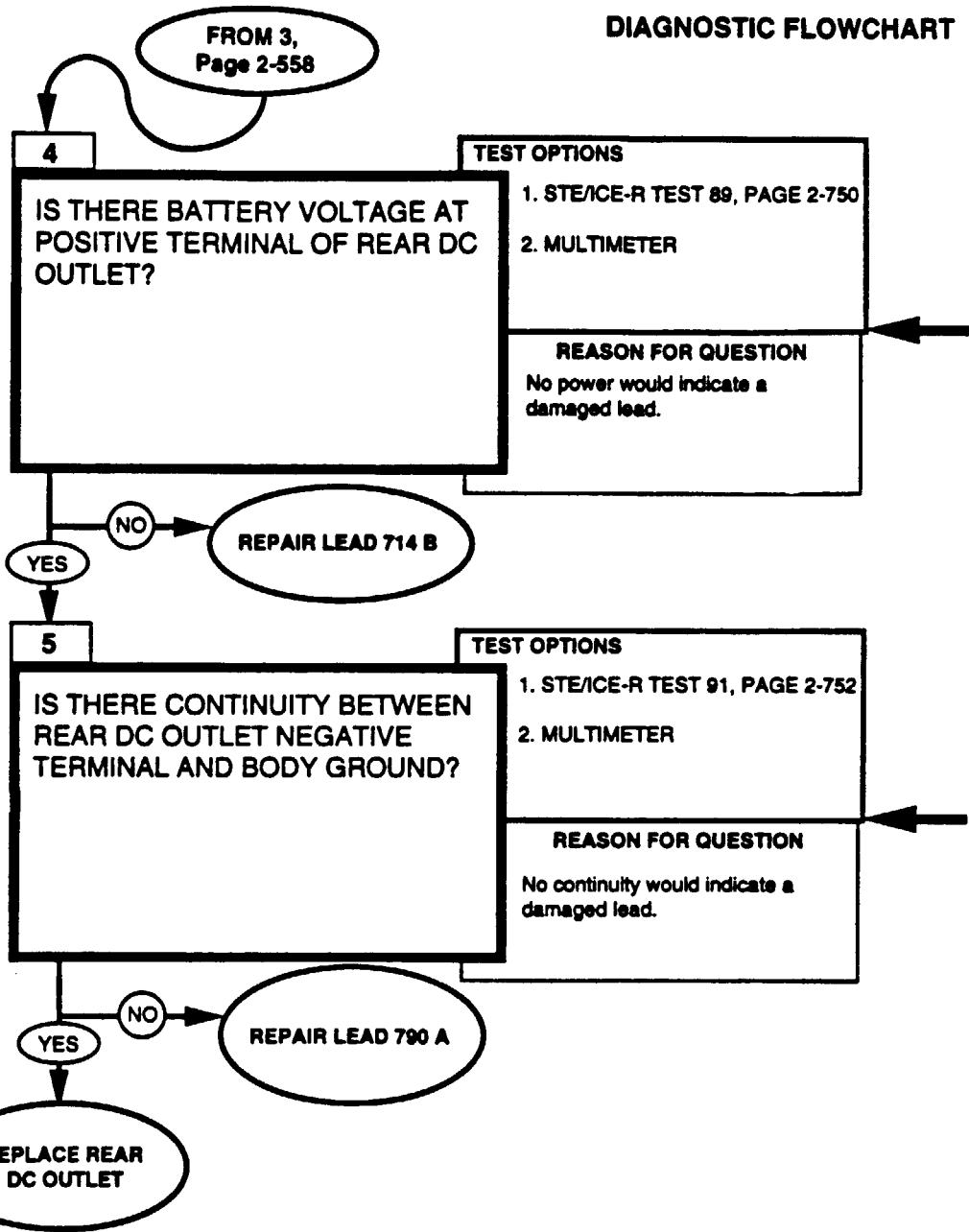
**AMBULANCE
(Rear DC Outlet)**

(Refer to Fig. 13.)

DIAGNOSTIC FLOWCHART

KNOWN INFO
FUSE OK BATTERY OK LEAD 660 C OK LEAD 714 A OK
POSSIBLE PROBLEMS
LEAD 714 B REAR DC OUTLET

KNOWN INFO
FUSE OK BATTERY OK LEAD 660 C OK LEAD 714 A OK LEAD 714 B OK
POSSIBLE PROBLEMS
LEAD 790 A REAR DC OUTLET



REFERENCE INFORMATION

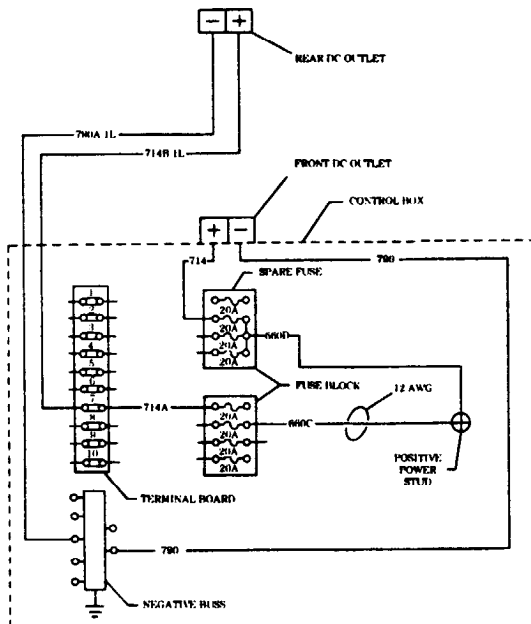
AMBULANCE



Repair lead, refer to (para. 4-85).
 Repair lead connector, refer to (para. 4-85).



Repair lead, refer to (para. 4-85).
 Replace rear DC outlet, refer to (para. 4-90).



**0-45 DC VOLTS
 STE/ICE-R TEST 89**

1. Connect RED clip to the indicated test point, BLACK clip to negative or ground.
2. Start Test 89, DC volts.
3. Displayed reading is in volts.

**BATTERY VOLTAGE
 MULTIMETER**

1. Set the voltmeter to a DC volts scale of at least 40 volts.
2. Connect the RED lead to positive and the BLACK lead to negative.
3. Be sure to read the correct scale.

**0-4500 DC OHMS
 STE/ICE-R TEST 91**

1. Connect RED clip and BLACK clip to the indicated terminals in question; RED to the first, BLACK to the second.
2. Start Test 91, 0-4500 ohms.
3. Displayed reading is in ohms. Less than 5 ohms is continuity. If the resistance is over 4500 ohms, STE/ICE displays "9.9.9.9."

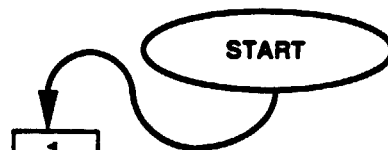
**CONTINUITY (RESISTANCE)
 MULTIMETER**

1. Set the voltmeter to an ohms scale of about 1000 ohms.
2. Connect the RED and BLACK leads to the connections stated in the question.
3. Be sure to read the correct scale. Less than 5 ohms indicates continuity. For an open circuit, the meter should peg full scale (needle all the way to the left).

**AMBULANCE
(Compressor Clutch)
(M997 Only)
(Refer to Fig. 14.)**

DIAGNOSTIC FLOWCHART

KNOWN INFO
NOTHING
POSSIBLE PROBLEMS
A/C CONTROL SETTING FUSE CABLE 660 LEAD 660 B LEAD 720 LEAD 720 A DOOR SWITCH



1

IS AIR-CONDITIONER ON AND THE CONTROLS SET TO MAXIMUM COOLING AND BLOWER SPEED SETTINGS?

TEST OPTIONS

VISUAL

REASON FOR QUESTION

Controls must be in correct position for clutch to engage.



KNOWN INFO
A/C CONTROL SETTINGS OK
POSSIBLE PROBLEMS
FUSE CABLE 660 LEAD 660 B LEAD 720 LEAD 720 A DOOR SWITCH

2

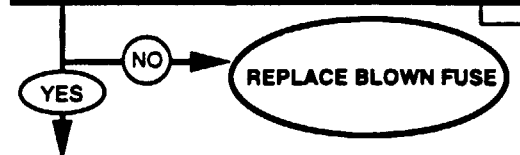
CHECK FUSE BLOCK ON CONTROL BOX COVER. IS FUSE OK?

TEST OPTIONS

VISUAL

REASON FOR QUESTION

If fuse is blown, circuit to A/C is incomplete.



KNOWN INFO
A/C CONTROL SETTINGS OK FUSE OK
POSSIBLE PROBLEMS
CABLE 660 LEAD 660 B LEAD 720 LEAD 720 A DOOR SWITCH

3

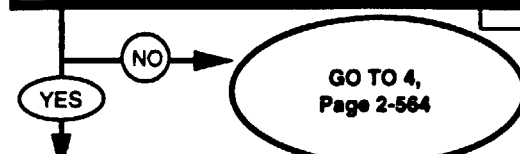
DISCONNECT LEAD 436 E AT COMPRESSOR. IS THERE BATTERY VOLTAGE AT LEAD 436 E?

TEST OPTIONS

STE/ICE-R TEST 89, PAGE 2-750

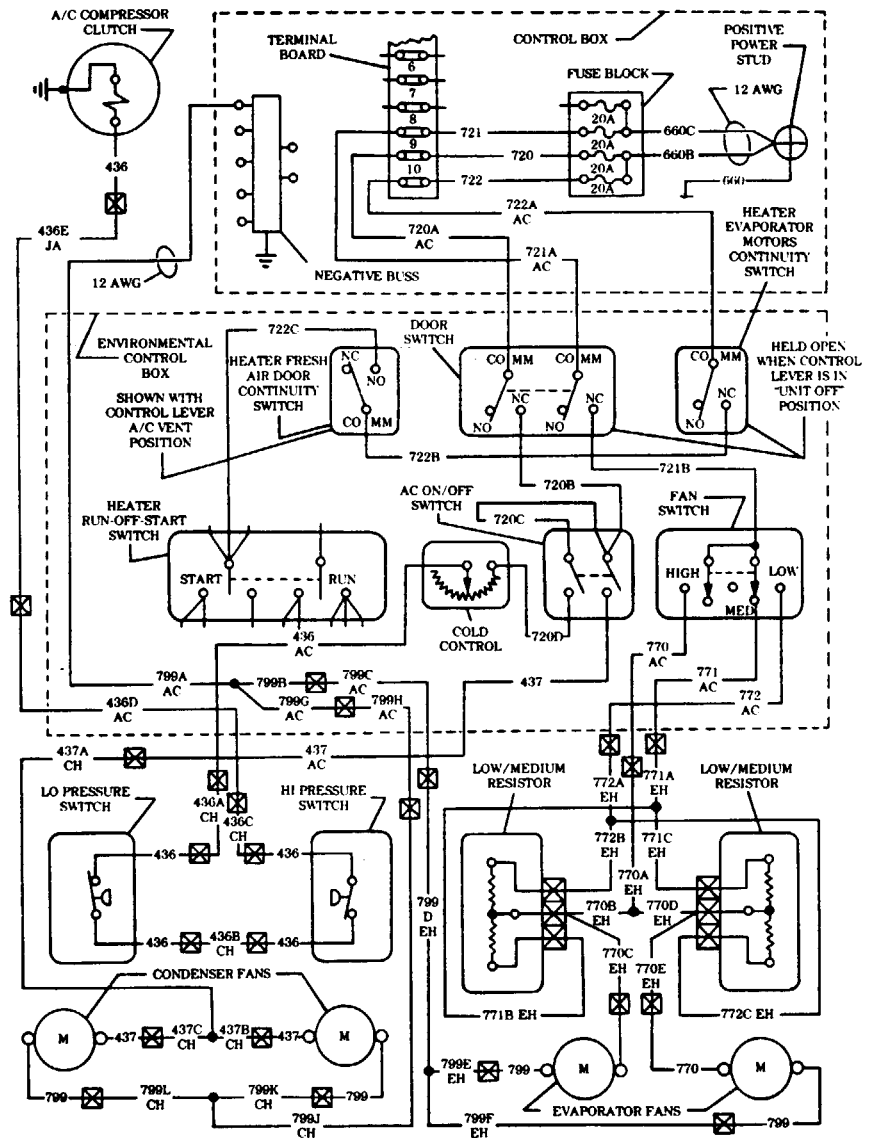
REASON FOR QUESTION

The presence of voltage would indicate a malfunction of compressor or related components.



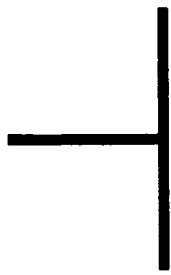
REFERENCE INFORMATION

AMBULANCE



**0-45 DC VOLTS
STE/CE-R TEST 89**

1. Connect RED clip to the indicated test point, BLACK clip to negative or ground.
2. Start Test 89, DC volts.
3. Displayed reading is in volts.



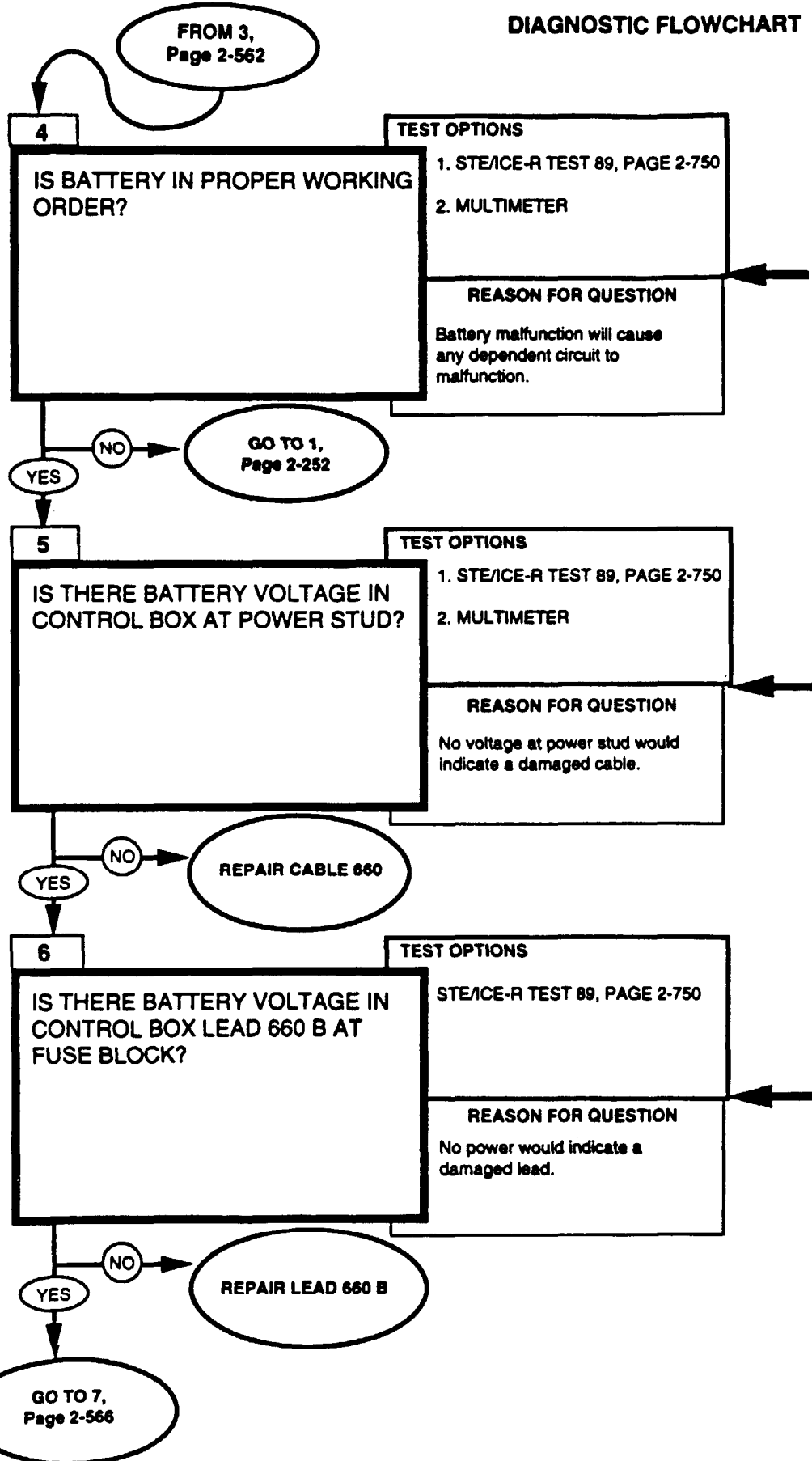
**AMBULANCE
(Compressor Clutch)
(M997 Only)
(Refer to Fig. 14.)**

DIAGNOSTIC FLOWCHART

KNOWN INFO
A/C CONTROL SETTINGS OK FUSE OK
POSSIBLE PROBLEMS
CABLE 660 LEAD 660 B LEAD 720 LEAD 720 A DOOR SWITCH

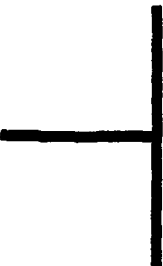
KNOWN INFO
A/C CONTROL SETTINGS OK FUSE OK BATTERY OK
POSSIBLE PROBLEMS
CABLE 660 LEAD 660 B LEAD 720 LEAD 720 A DOOR SWITCH

KNOWN INFO
A/C CONTROL SETTINGS OK FUSE OK BATTERY OK CABLE 660 OK
POSSIBLE PROBLEMS
LEAD 660 B LEAD 720 LEAD 720 A DOOR SWITCH



REFERENCE INFORMATION

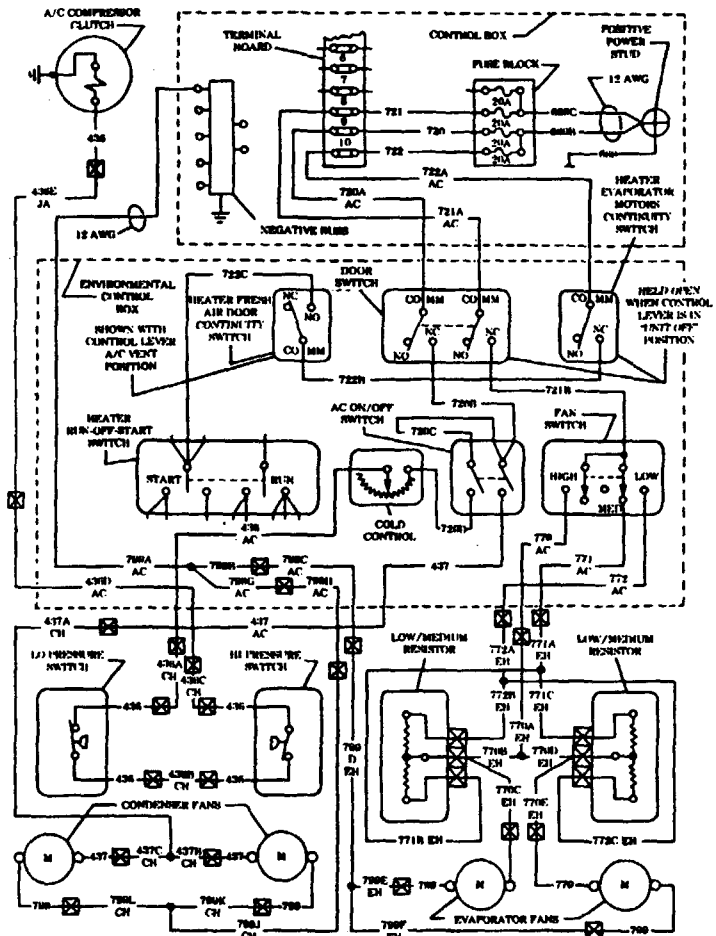
AMBULANCE



Repair cable, refer to DS Maintenance.

Repair lead, refer to (para. 4-85).
Repair lead connector, refer to (para. 4-85).

<p>0-45 DC VOLTS STEACE-R TEST 89</p>
<ol style="list-style-type: none"> 1. Connect RED clip to the indicated test point, BLACK clip to negative or ground. 2. Start Test 89, DC volts. 3. Displayed reading is in volts.
<p>BATTERY VOLTAGE MULTIMETER</p>
<ol style="list-style-type: none"> 1. Set the voltmeter to a DC volts scale of at least 40 volts. 2. Connect the RED lead to positive and the BLACK lead to negative. 3. Be sure to read the correct scale.



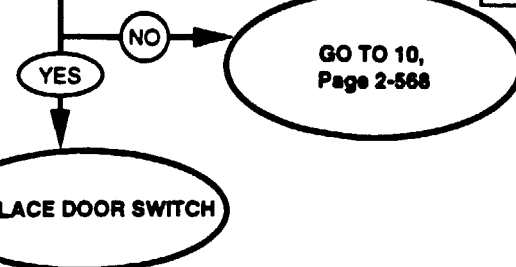
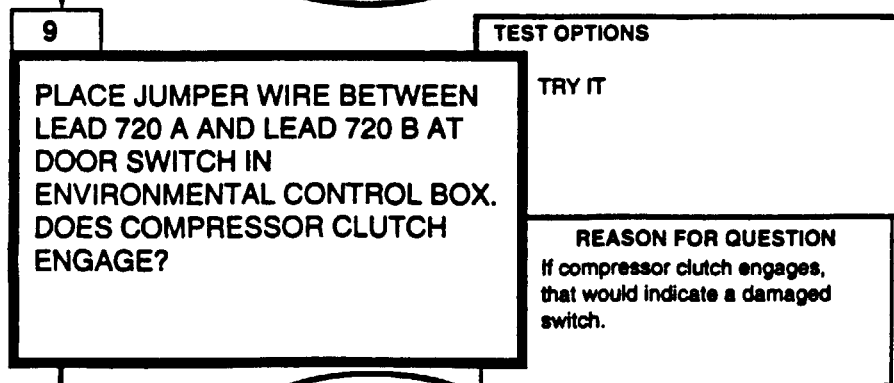
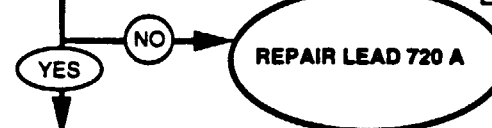
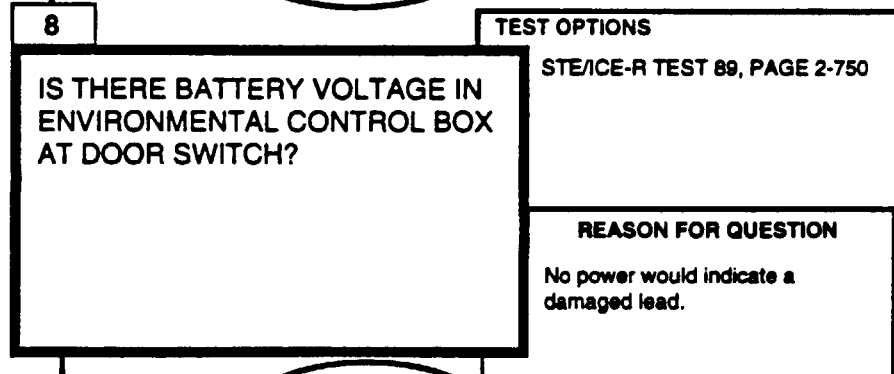
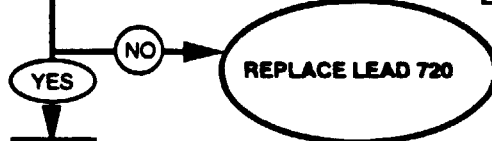
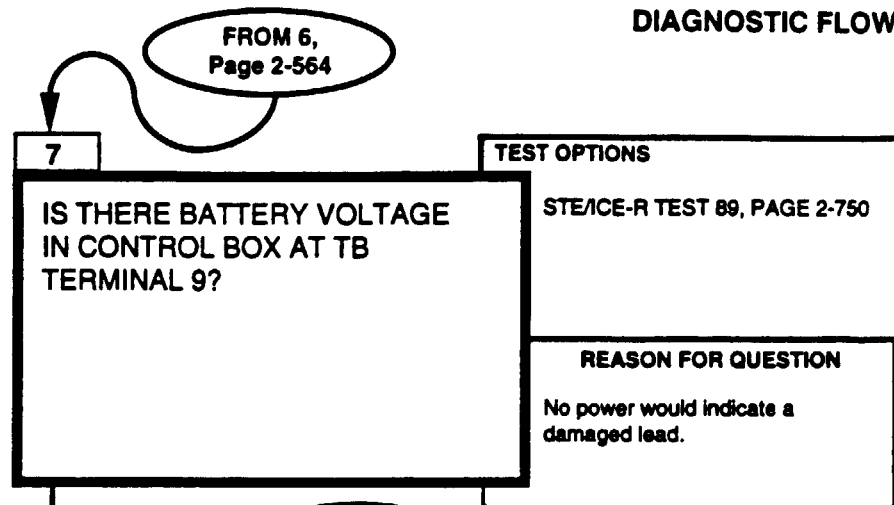
**AMBULANCE
(Compressor Clutch)
(M997 Only)
(Refer to Fig. 14.)**

DIAGNOSTIC FLOWCHART

KNOWN INFO
A/C CONTROL SETTINGS OK FUSE OK BATTERY OK CABLE 660 OK LEAD 660 B OK
POSSIBLE PROBLEMS
LEAD 720 LEAD 720 A DOOR SWITCH

KNOWN INFO
A/C CONTROL SETTINGS OK FUSE OK BATTERY OK CABLE 660 OK LEAD 660B OK LEAD 720 OK
POSSIBLE PROBLEMS
LEAD 720 A DOOR SWITCH

KNOWN INFO
A/C CONTROL SETTINGS OK FUSE OK BATTERY OK CABLE 660 OK LEAD 660 B OK LEAD 720 OK LEAD 720 A OK
POSSIBLE PROBLEMS
DOOR SWITCH



REFERENCE INFORMATION

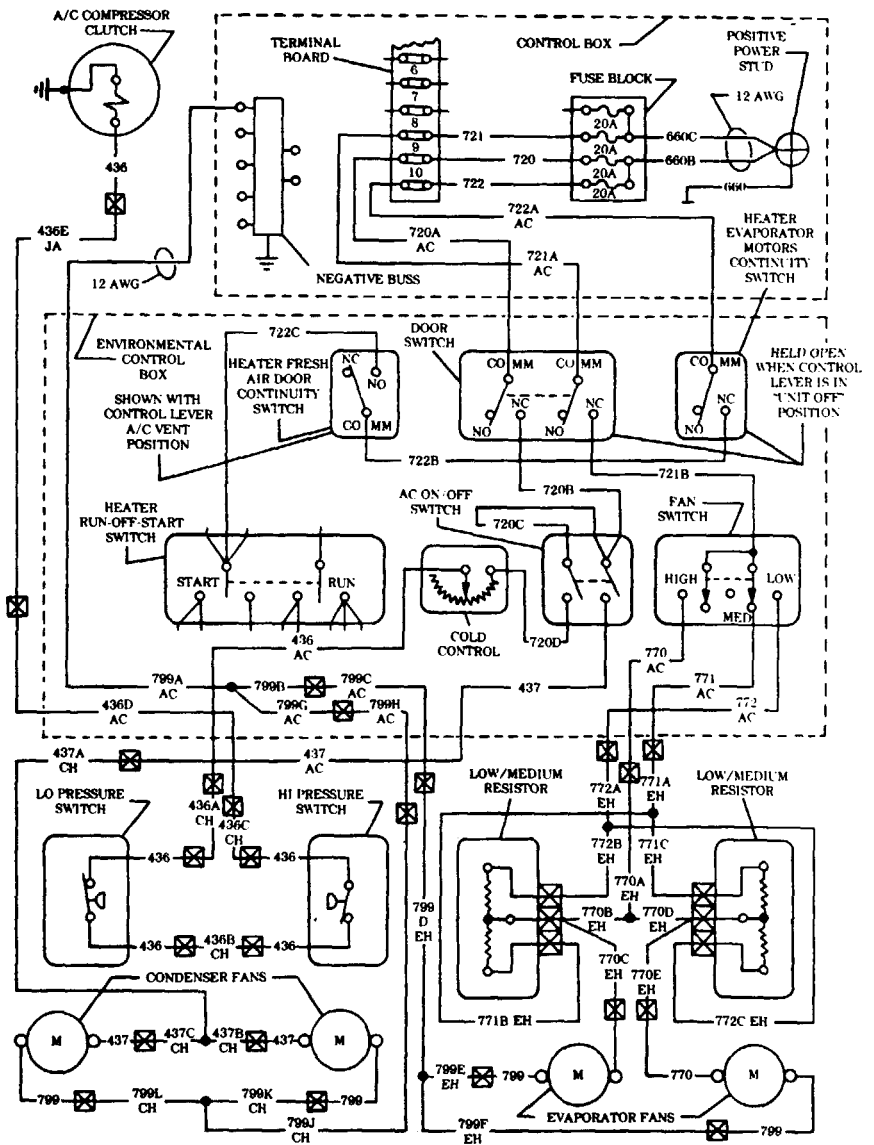
AMBULANCE

**0-45 DC VOLTS
STE/CE-R TEST 89**

1. Connect RED clip to the indicated test point, BLACK clip to negative or ground.
2. Start Test 89, DC volts.
3. Displayed reading is in volts..

Repair lead, refer to (para. 4-85).
Repair lead connector, refer to (para. 4-85).

Replace door switch, refer to DS Maintenance.

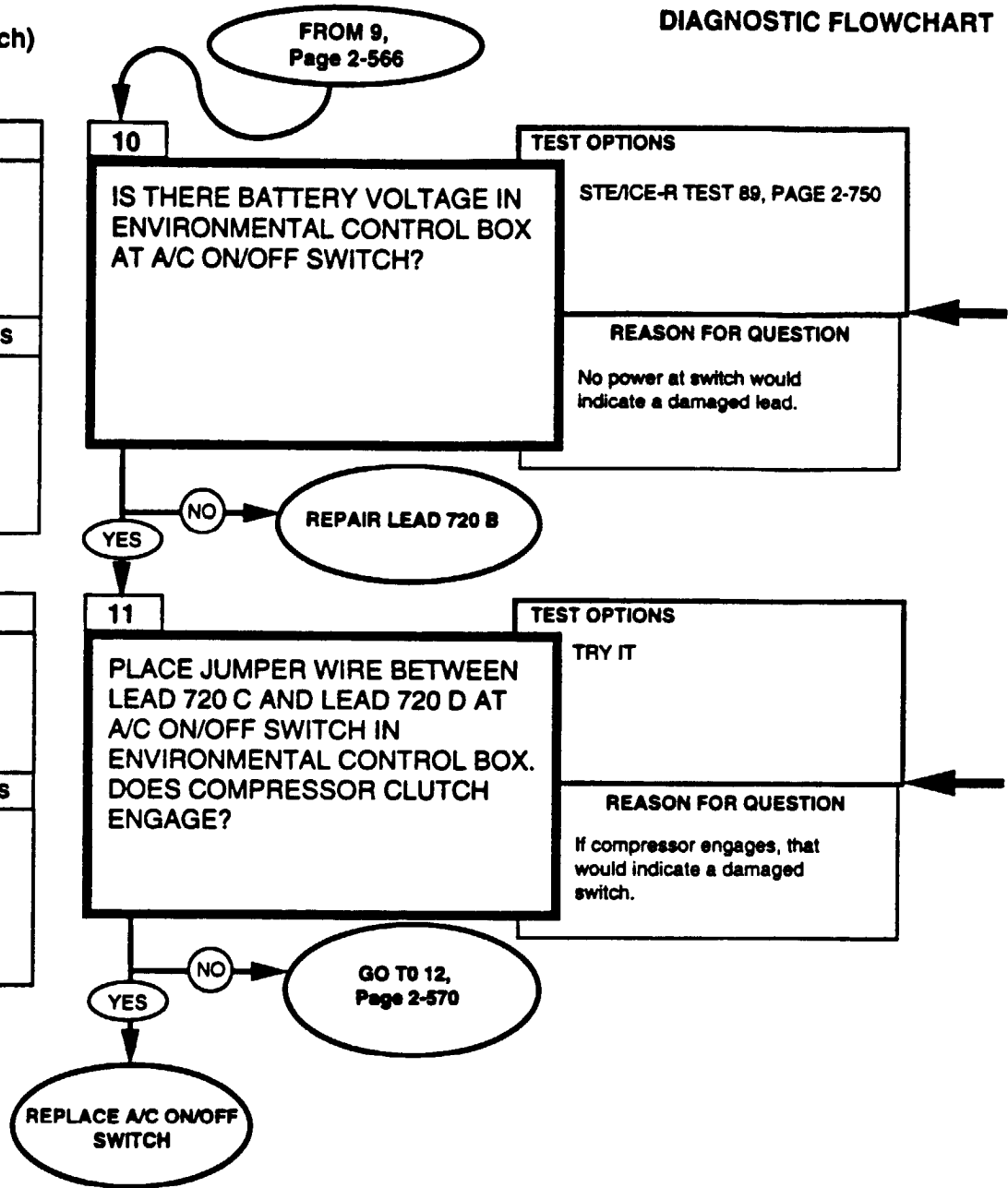


**AMBULANCE
(Compressor Clutch)
(M997 Only)
(Refer to Fig. 14.)**

KNOWN INFO
PREVIOUSLY CORRECTED INFORMATION
POSSIBLE PROBLEMS
LEAD 720 B A/C ON/OFF SWITCH

KNOWN INFO
LEAD 720 B OK
POSSIBLE PROBLEMS
A/C ON/OFF SWITCH

DIAGNOSTIC FLOWCHART



REFERENCE INFORMATION

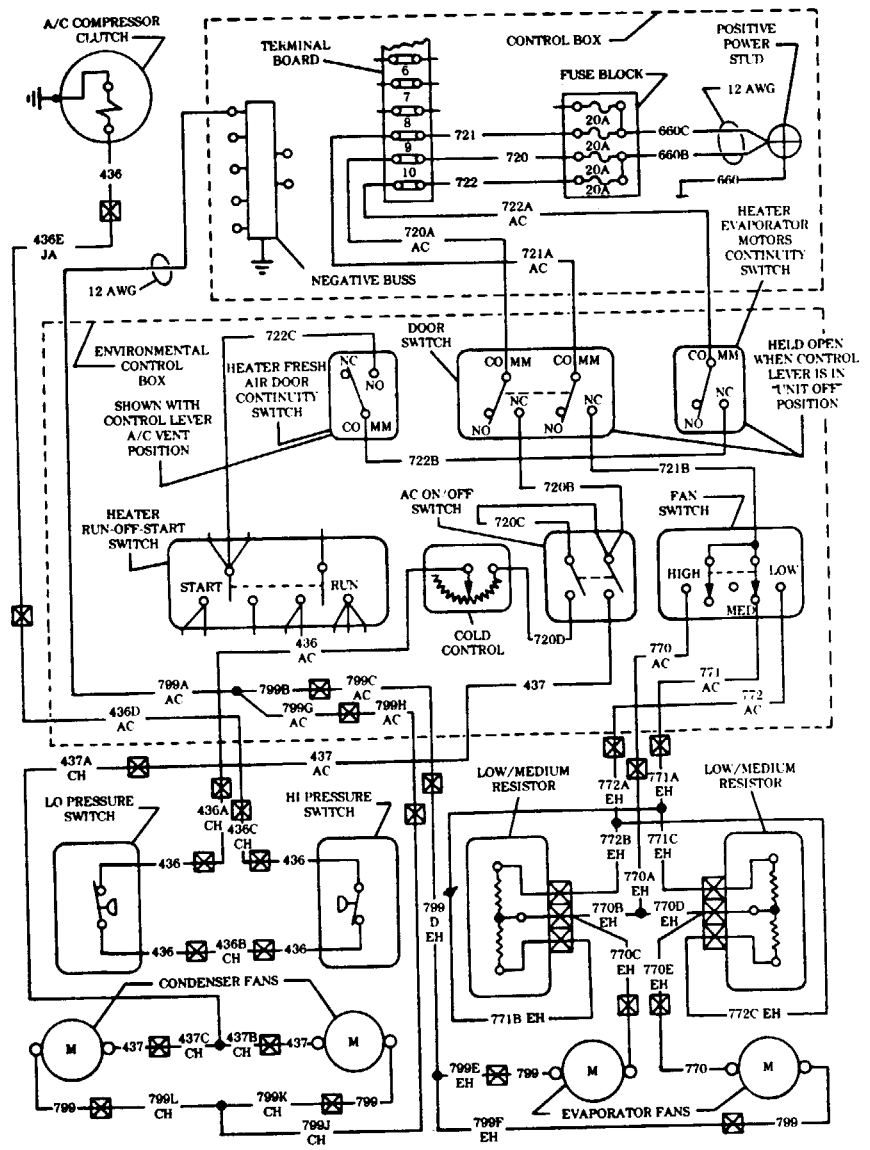
AMBULANCE

Repair lead, refer to (para. 4-85).

Replace A/C ON/OFF switch, refer to (para. 4-127).

**0-45 DC VOLTS
STE/ICE-R TEST 89**

1. Connect RED clip to the indicated test point, BLACK clip to negative or ground.
2. Start Test 89, DC volts.
3. Displayed reading is in volts.

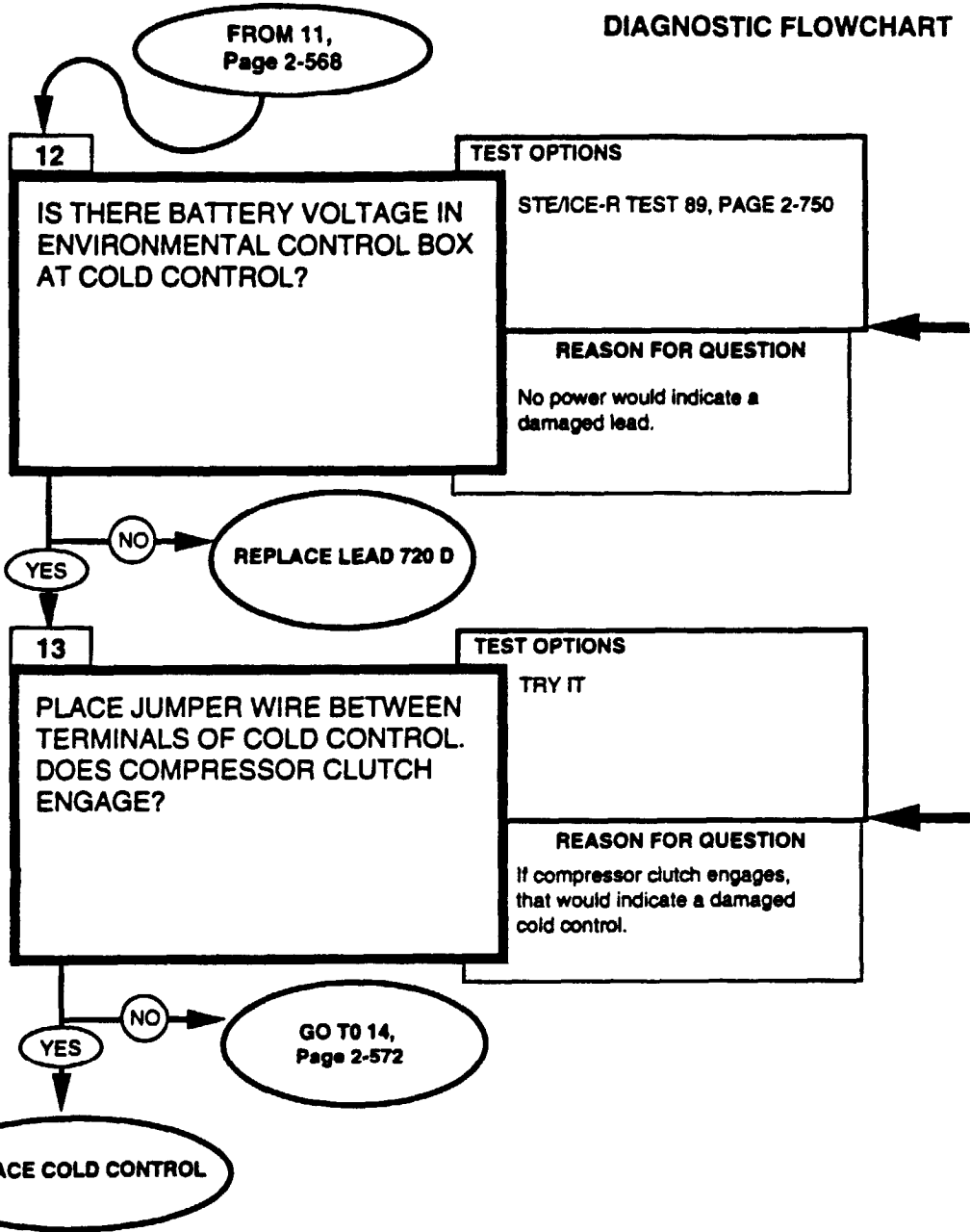


**AMBULANCE
(Compressor Clutch)
(M997 Only)
(Refer to Fig. 14.)**

DIAGNOSTIC FLOWCHART

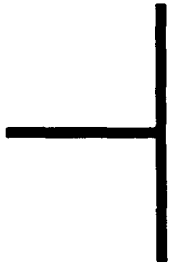
KNOWN INFO
PREVIOUSLY CORRECTED INFORMATION
POSSIBLE PROBLEMS
LEAD 720 D COLD CONTROL

KNOWN INFO
LEAD 720 D OK
POSSIBLE PROBLEMS
COLD CONTROL



REFERENCE INFORMATION

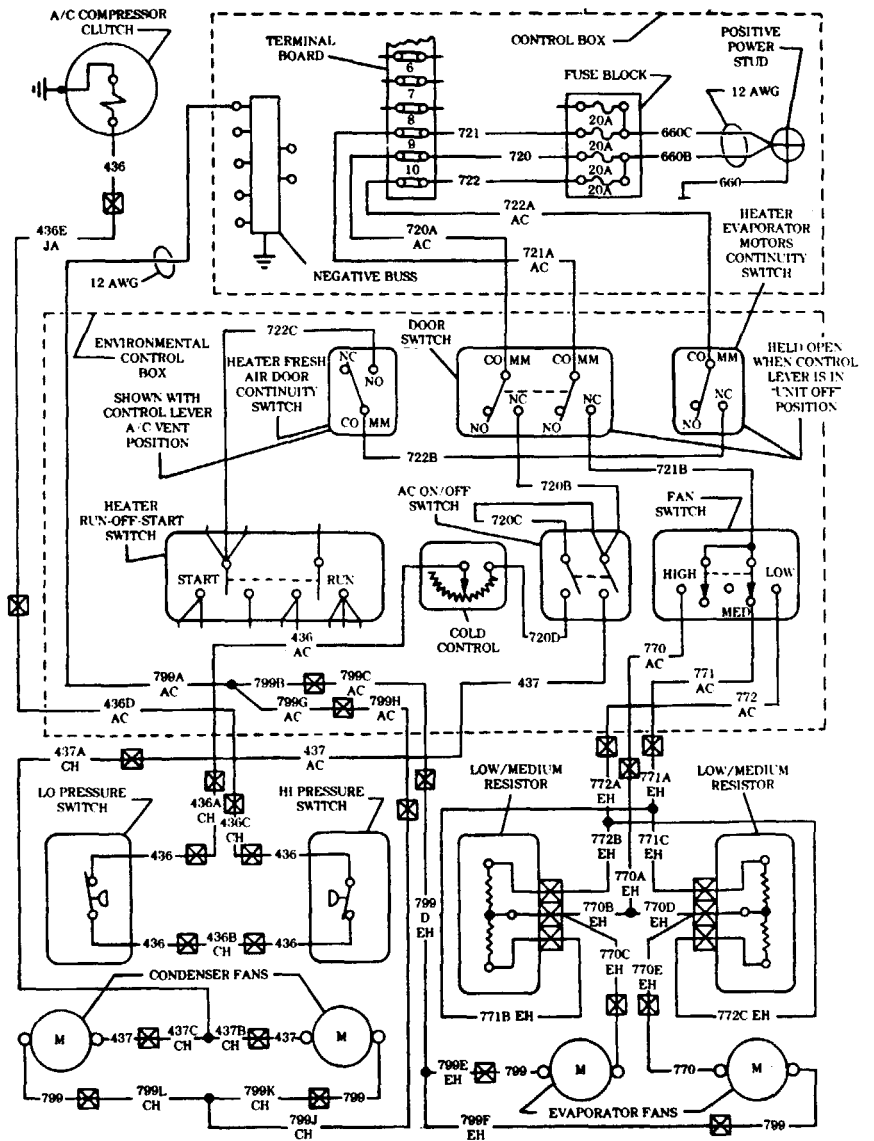
AMBULANCE



Replace cold control, refer to DS Maintenance.

**0-45 DC VOLTS
STE/CE-R TEST 89**

1. Connect RED clip to the indicated test point, BLACK clip to negative or ground.
2. Start Test 89, DC volts.
3. Displayed reading is in volts.



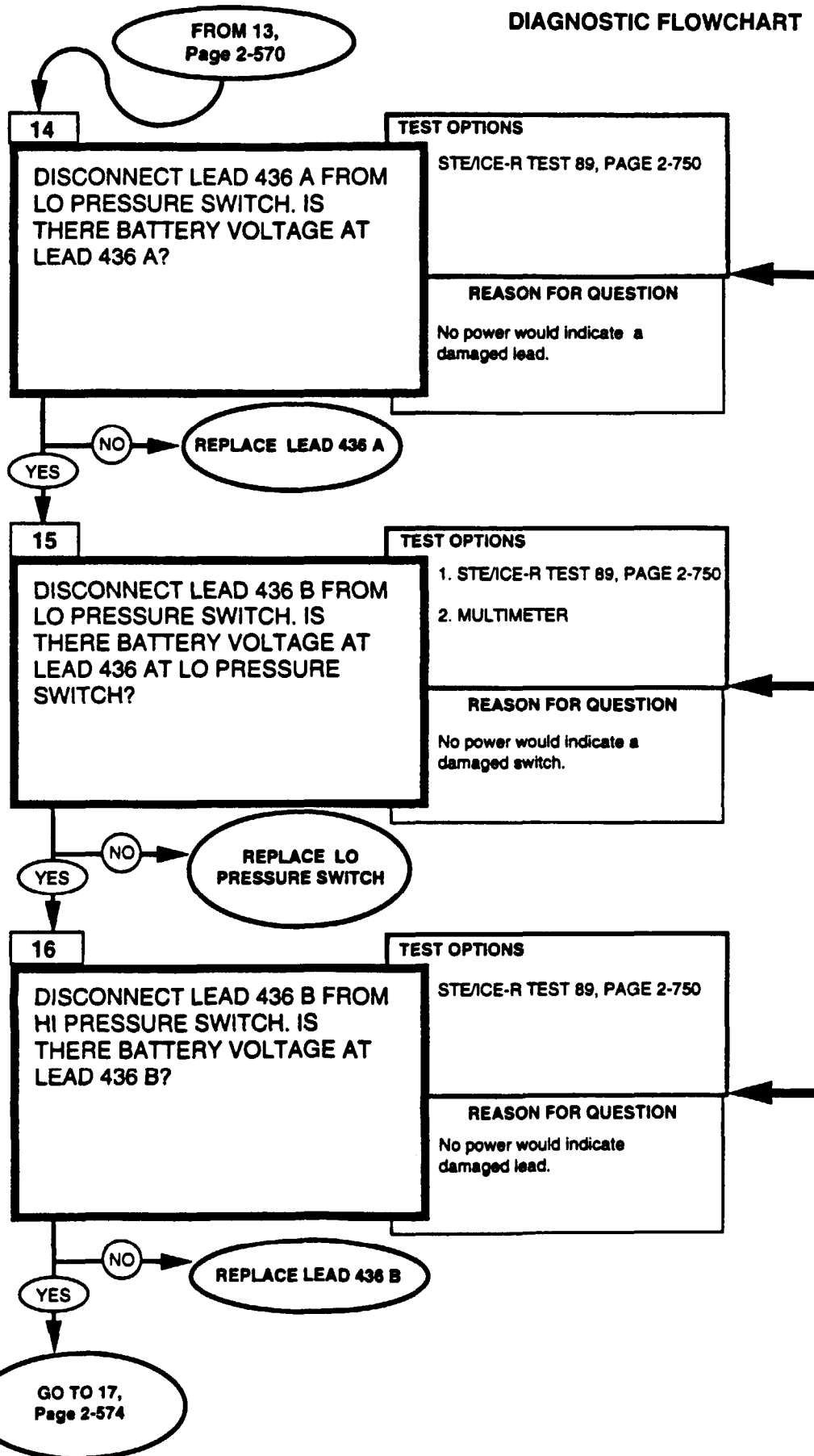
**AMBULANCE
(Compressor Clutch)
(M997 Only)
(Refer to Fig. 14.)**

DIAGNOSTIC FLOWCHART

KNOWN INFO
PREVIOUSLY CORRECTED INFORMATION
POSSIBLE PROBLEMS
LEAD 436 A LO PRESSURE SWITCH LEAD 436 B HI PRESSURE SWITCH LEAD 436 C LEAD 436 D LEAD 436 E COMPRESSOR WIRING HARNESS LEAD 798 A COMPRESSOR

KNOWN INFO
LEAD 436 A OK
POSSIBLE PROBLEMS
LO PRESSURE SWITCH LEAD 436 B HI PRESSURE SWITCH LEAD 436 C LEAD 436 D LEAD 436 E COMPRESSOR WIRING HARNESS LEAD 798 A COMPRESSOR

KNOWN INFO
LEAD 436 A OK LO PRESSURE SWITCH OK
POSSIBLE PROBLEMS
LEAD 436 B HI PRESSURE SWITCH LEAD 436 C LEAD 436 D LEAD 436 E COMPRESSOR WIRING HARNESS LEAD 798 A COMPRESSOR

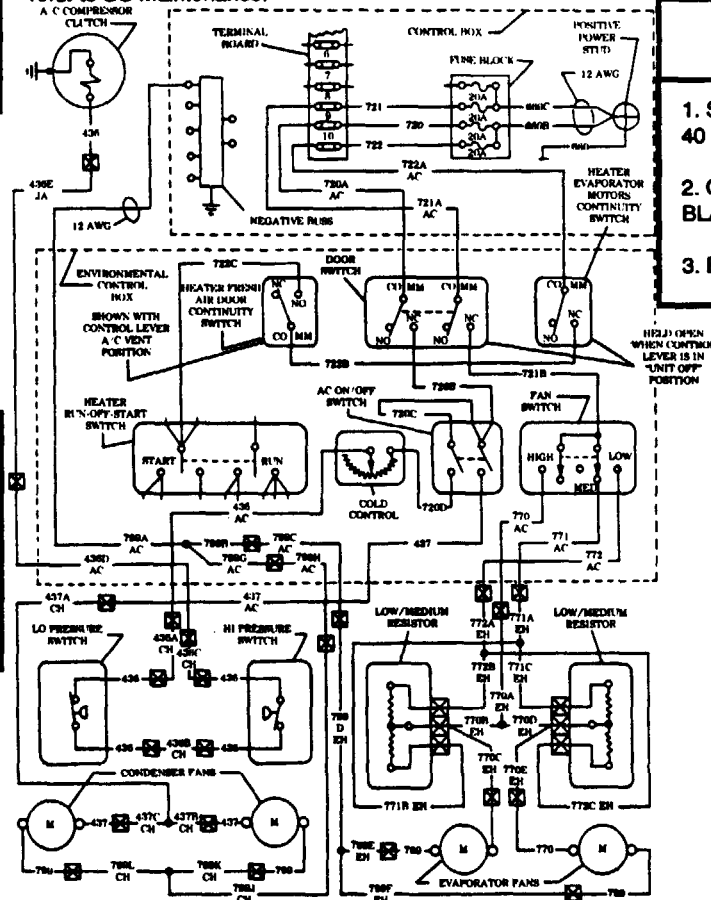


REFERENCE INFORMATION

AMBULANCE



Replace LO pressure switch, refer to DS Maintenance.

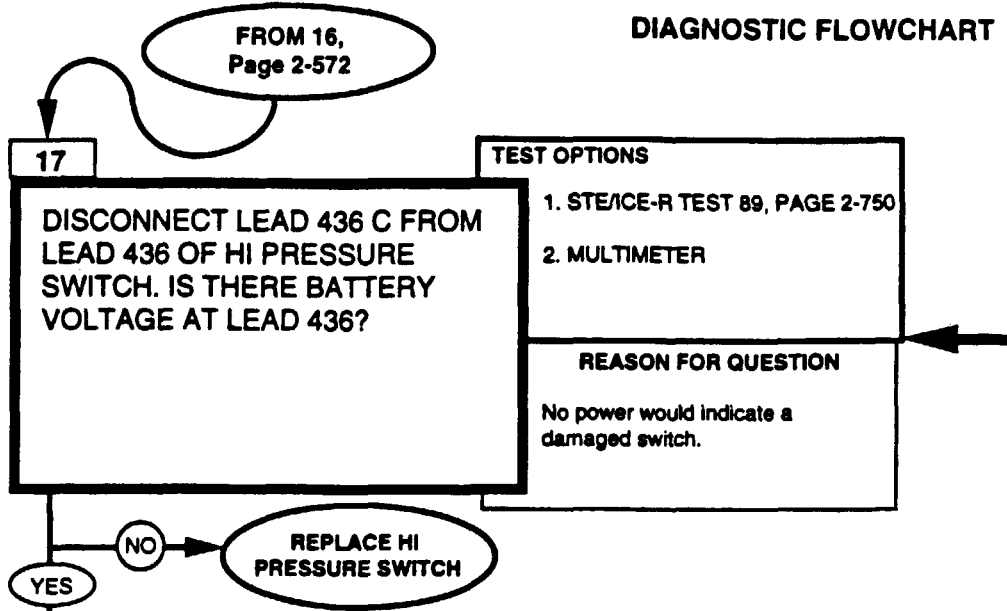


<p>0-45 DC VOLTS STE/CE-R TEST 89</p>
<ol style="list-style-type: none"> 1. Connect RED clip to the indicated test point, BLACK clip to negative or ground. 2. Start Test 89, DC volts. 3. Displayed reading is in volts.
<p>BATTERY VOLTAGE MULTIMETER</p>
<ol style="list-style-type: none"> 1. Set the voltmeter to a DC volts scale of at least 40 volts. 2. Connect the RED lead to positive and the BLACK lead to negative. 3. Be sure to read the correct scale.

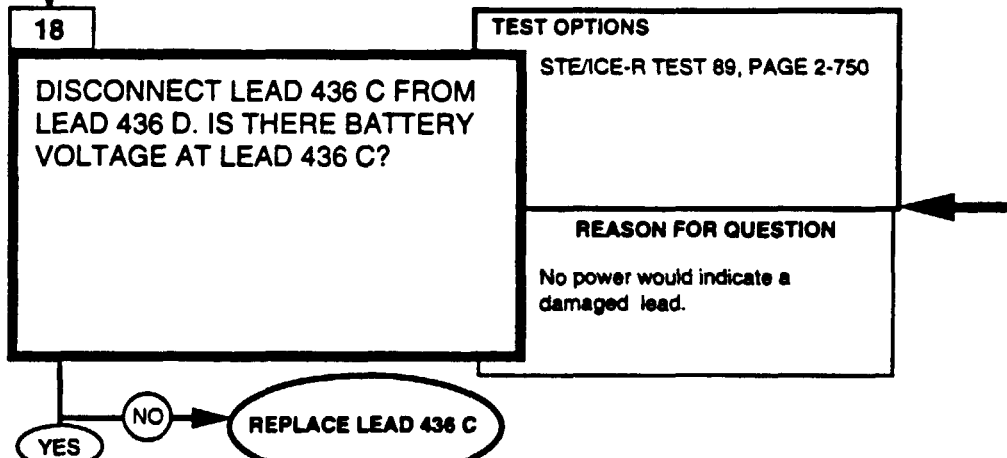
**AMBULANCE
(Compressor Clutch)
(M997 Only)
(Refer to Fig. 14.)**

DIAGNOSTIC FLOWCHART

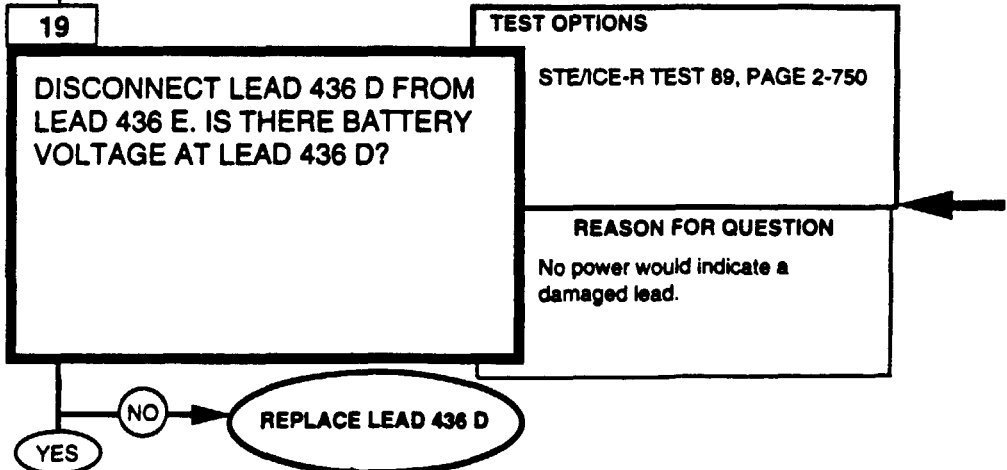
KNOWN INFO
LEAD 436 A OK LO PRESSURE SWITCH OK LEAD 436 B OK
POSSIBLE PROBLEMS
HI PRESSURE SWITCH LEAD 436 C LEAD 436 D LEAD 436 E COMPRESSOR WIRING HARNESS LEAD 798 A COMPRESSOR



KNOWN INFO
LEAD 436 A OK LO PRESSURE SWITCH OK LEAD 436 B OK HI PRESSURE SWITCH OK
POSSIBLE PROBLEMS
LEAD 436 C LEAD 436 D LEAD 436 E COMPRESSOR WIRING HARNESS LEAD 798 A COMPRESSOR



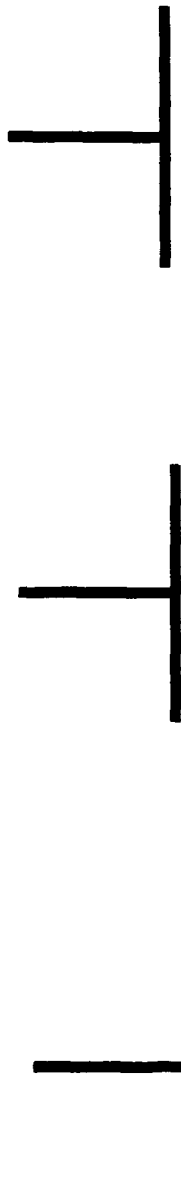
KNOWN INFO
LEAD 436 A OK LO PRESSURE SWITCH OK LEAD 436 B OK HI PRESSURE SWITCH OK LEAD 436 C OK
POSSIBLE PROBLEMS
LEAD 436 D LEAD 436 E COMPRESSOR WIRING HARNESS LEAD 798 A COMPRESSOR



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Page 2-576

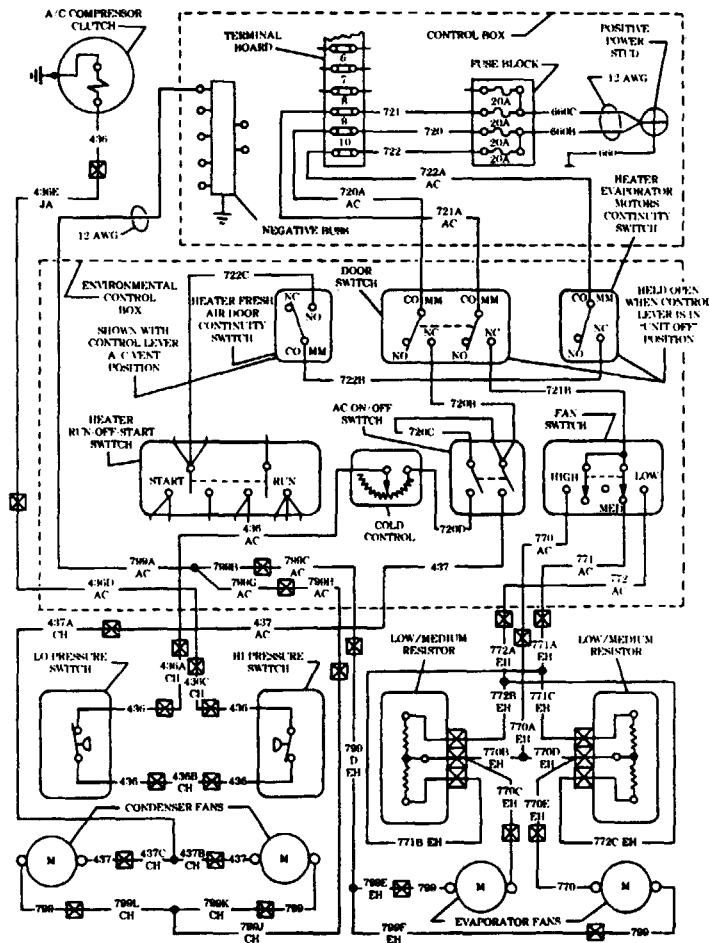
REFERENCE INFORMATION

AMBULANCE



Replace high pressure switch, refer to DS Maintenance.

<p>0-45 DC VOLTS STE/CE-R TEST 89</p>
<ol style="list-style-type: none"> 1. Connect RED clip to the indicated test point, BLACK clip to negative or ground. 2. Start Test 89, DC volts. 3. Displayed reading is in volts.
<p>BATTERY VOLTAGE MULTIMETER</p>
<ol style="list-style-type: none"> 1. Set the voltmeter to a DC volts scale of at least 40 volts. 2. Connect the RED lead to positive and the BLACK lead to negative. 3. Be sure to read the correct scale.

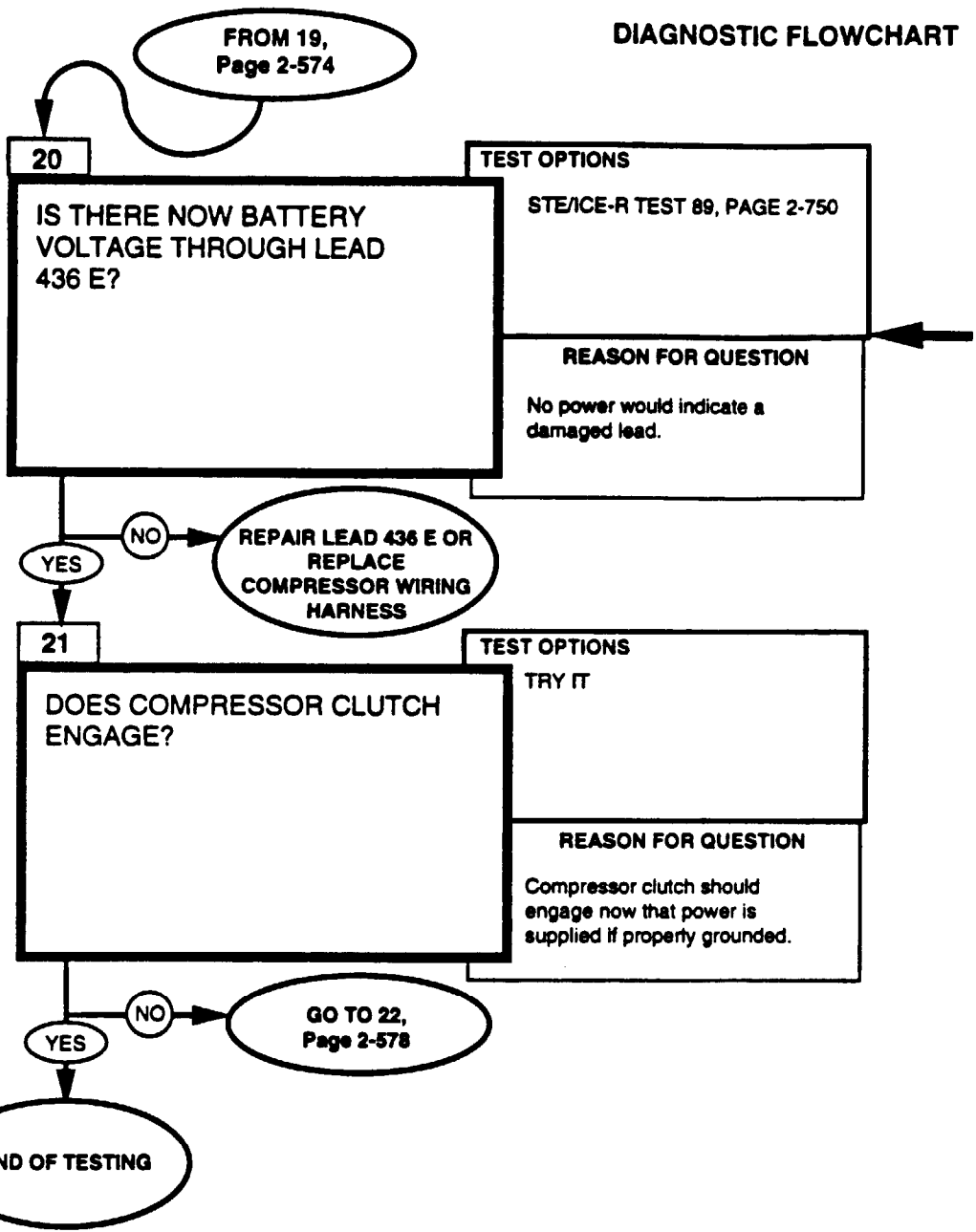


**AMBULANCE
(Compressor Clutch)
(M997 Only)
(Refer to Fig. 14.)**

DIAGNOSTIC FLOWCHART

KNOWN INFO
LEAD 436 A OK LO PRESSURE SWITCH OK LEAD 436 B OK HIGH PRESSURE SWITCH OK LEAD 436 C OK LEAD 436 D OK
POSSIBLE PROBLEMS
LEAD 436 E COMPRESSOR WIRING HARNESS LEAD 798 A COMPRESSOR

KNOWN INFO
LEAD 436 A OK LO PRESSURE SWITCH OK LEAD 436 C OK LEAD 436 D OK LEAD 436 E OK COMPRESSOR WIRING HARNESS OK
POSSIBLE PROBLEMS



REFERENCE INFORMATION

AMBULANCE

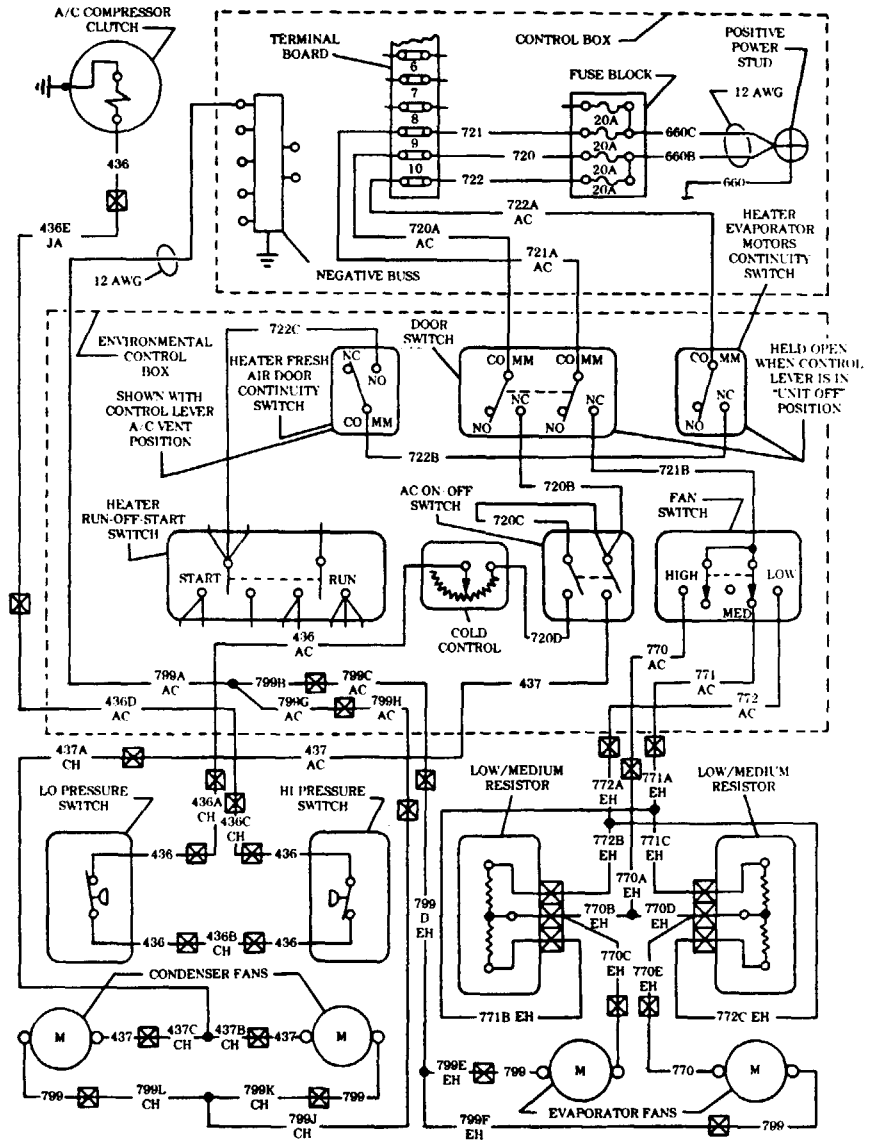


Replace compressor wiring harness, refer to (para. 4-122).

Repair lead, refer to (para. 4-85).
Repair lead connector, refer to (para. 4-85).

**0-45 DC VOLTS
STE/ICE-R TEST 89**

1. Connect RED clip to the indicated test point, BLACK clip to negative or ground.
2. Start Test 89, DC volts.
3. Displayed reading is in volts.

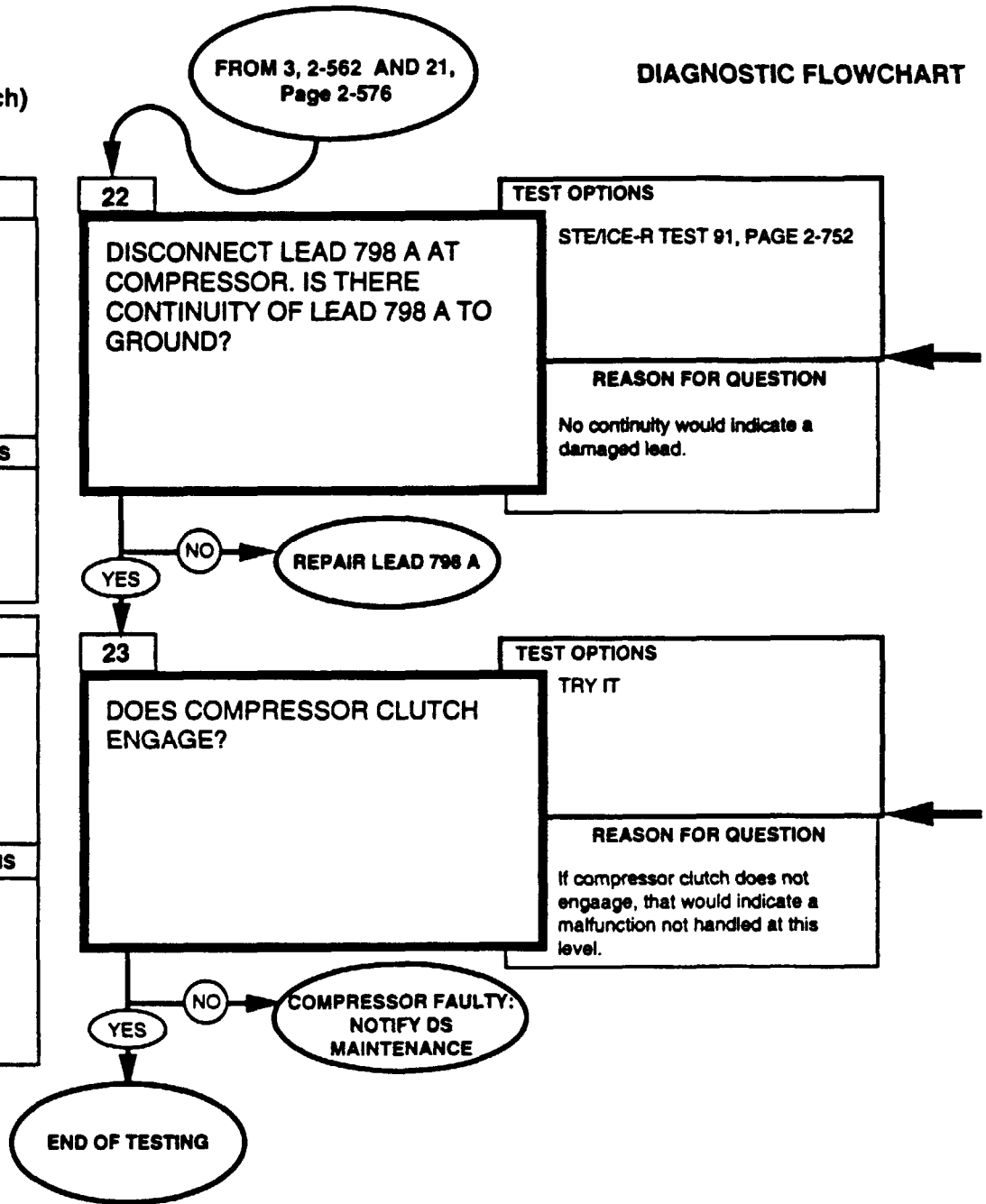


**AMBULANCE
(Compressor Clutch)
(M997 Only)
(Refer to Fig. 14.)**

DIAGNOSTIC FLOWCHART

KNOWN INFO
PREVIOUSLY CORRECTED INFORMATION
POSSIBLE PROBLEMS
LEAD 798 A COMPRESSOR

KNOWN INFO
LEAD 798 A OK
POSSIBLE PROBLEMS
COMPRESSOR



REFERENCE INFORMATION

AMBULANCE

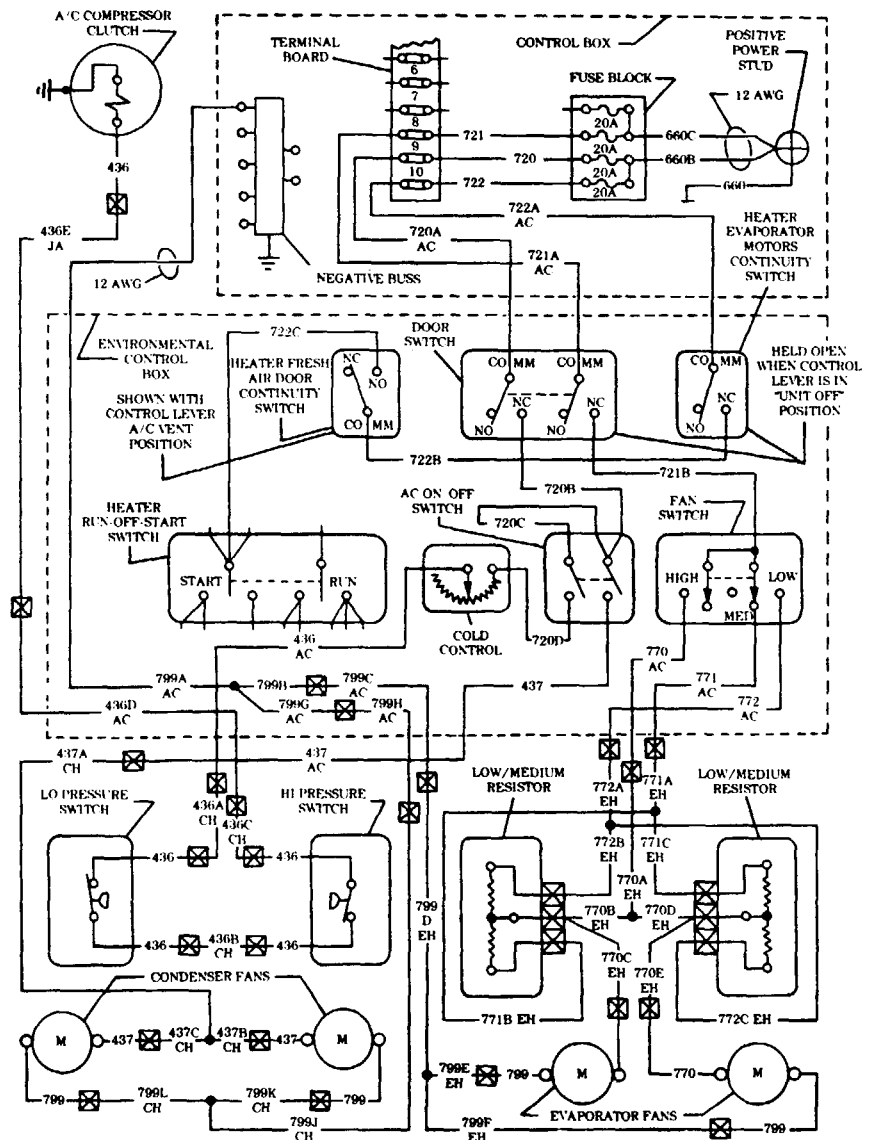


Repair lead, refer to (para. 4-85).

Repair lead connector, refer to (para. 4-85).

**0-4500 DC OHMS
STE/ICE-R TEST 91**

1. Connect RED clip and BLACK clip to the indicated terminals in question; RED to the first, BLACK to the second.
2. Start Test 91, 0-4500 ohms.
3. Displayed reading is in ohms. Less than 5 ohms is continuity. If the resistance is over 4500 ohms, STE/ICE displays "9.9.9.9."



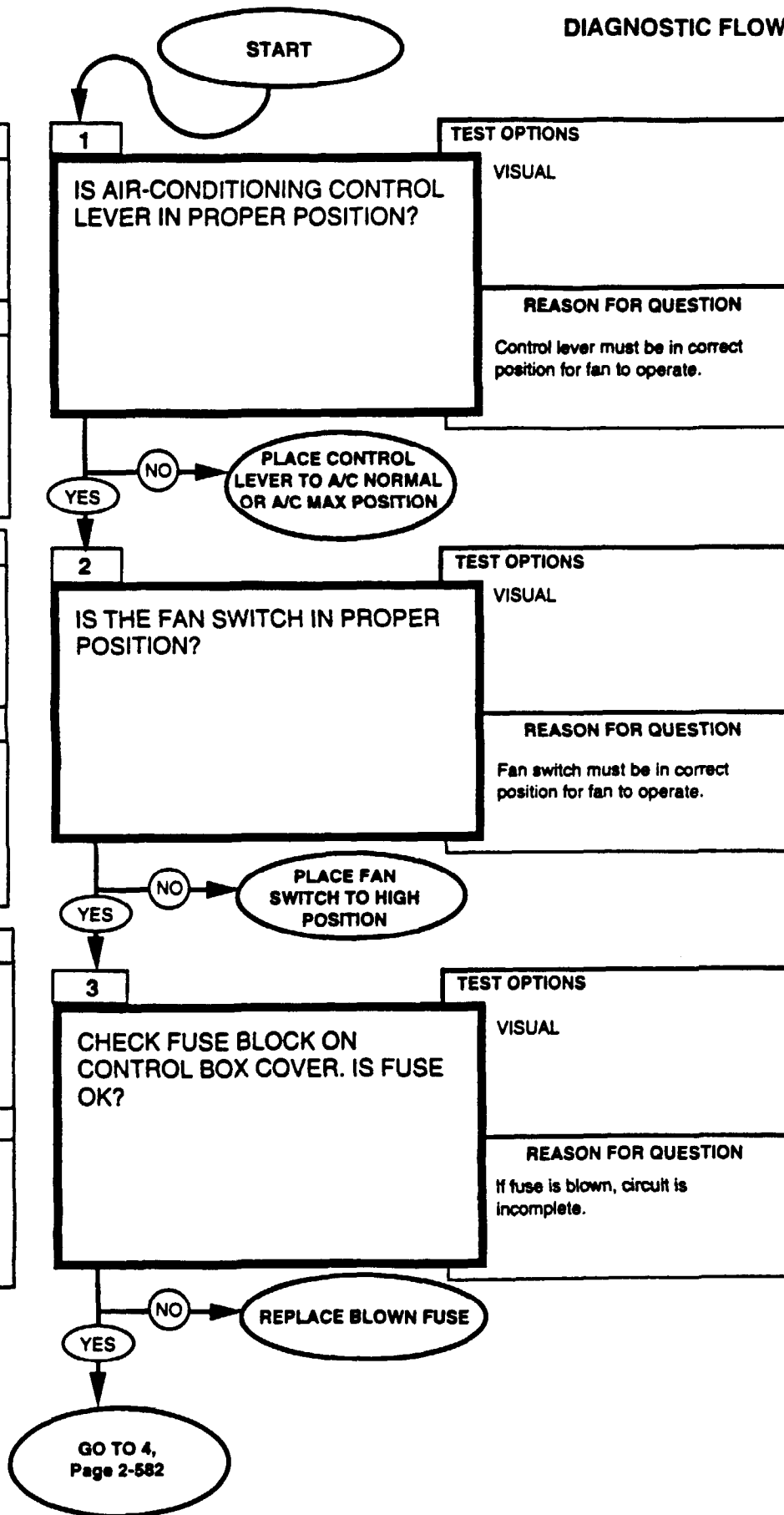
**AMBULANCE
(Evaporator Fans)
(M997 Only)
(Refer to Fig. 14.)**

DIAGNOSTIC FLOWCHART

KNOWN INFO
NOTHING
POSSIBLE PROBLEMS
A/C CONTROL LEVER POSITION FAN SWITCH POSITION FUSE EVAPORATOR FANS

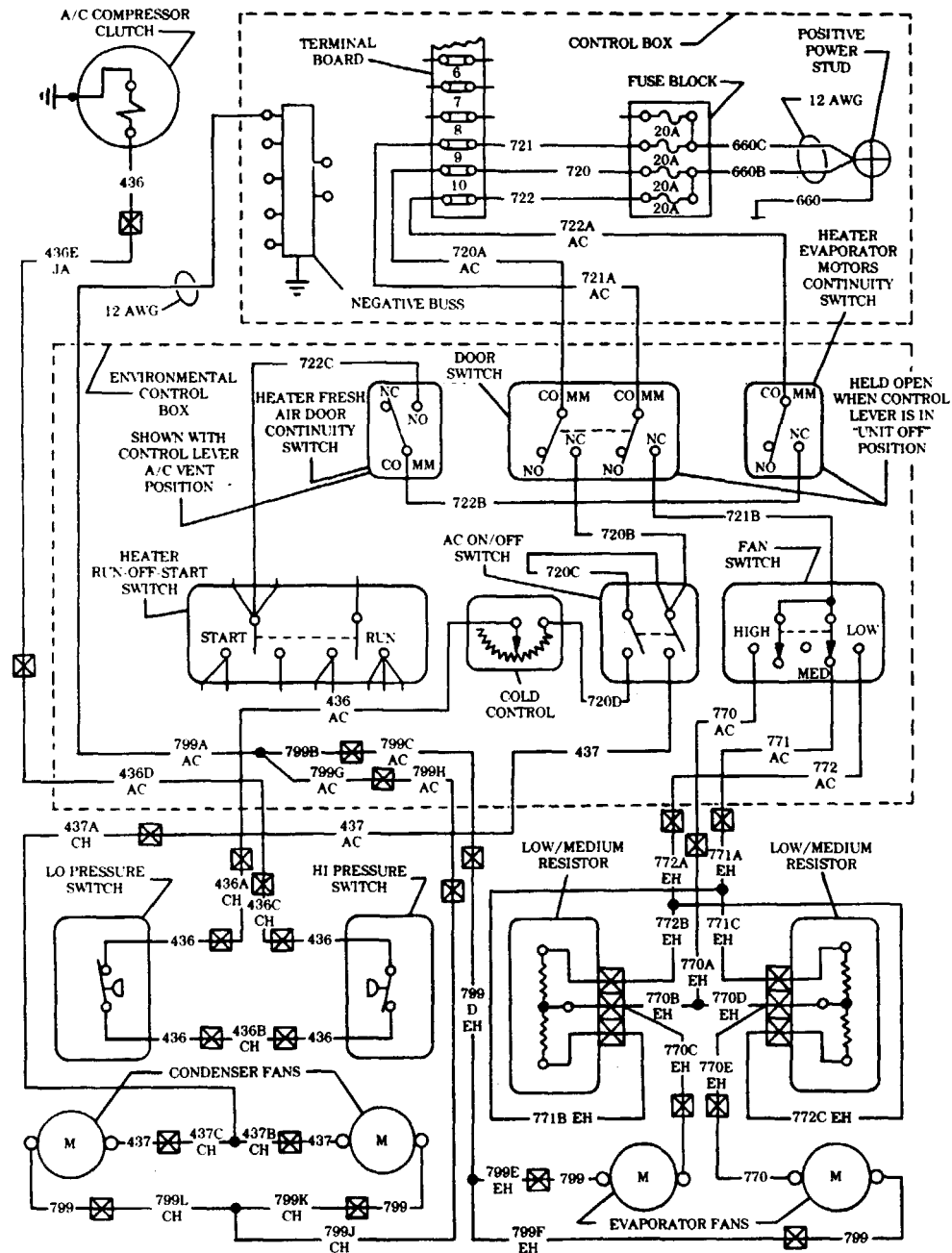
KNOWN INFO
A/C CONTROL LEVER POSITION OK
POSSIBLE PROBLEMS
FAN SWITCH POSITION FUSE EVAPORATOR FANS

KNOWN INFO
A/C CONTROL LEVER POSITION OK FAN SWITCH POSITION OK
POSSIBLE PROBLEMS
FUSE EVAPORATOR FANS



REFERENCE INFORMATION

AMBULANCE

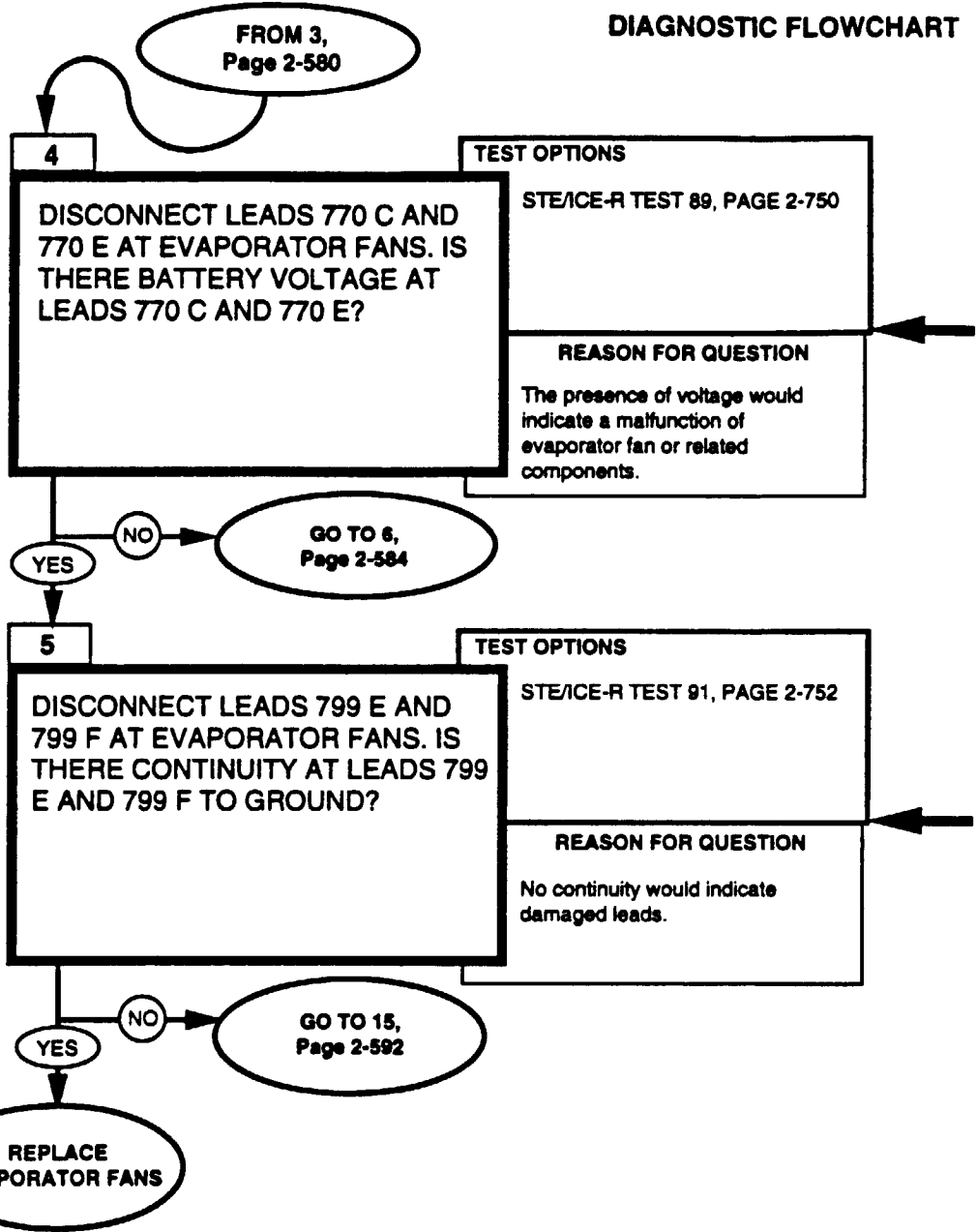


**AMBULANCE
(Evaporator Fans)
(M997 Only)
(Refer to Fig. 14.)**

DIAGNOSTIC FLOWCHART

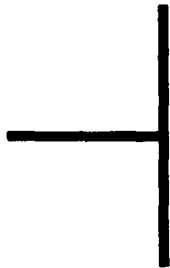
KNOWN INFO
A/C CONTROL LEVER POSITION OK FAN SWITCH POSITION OK FUSE OK
POSSIBLE PROBLEMS
EVAPORATOR FANS

KNOWN INFO
A/C CONTROL LEVER POSITION OK FAN SWITCH POSITION OK FUSE OK
POSSIBLE PROBLEMS
EVAPORATOR FANS

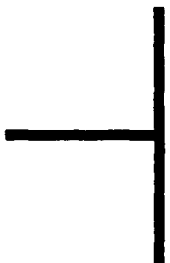


REFERENCE INFORMATION

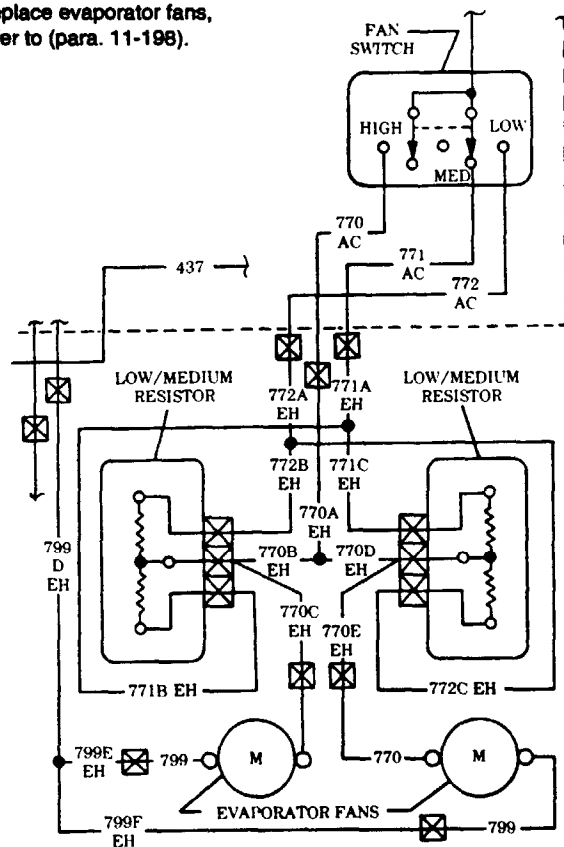
AMBULANCE



0-45 DC VOLTS STE/ICE-R TEST 89
<ol style="list-style-type: none"> 1. Connect RED clip to the indicated test point, BLACK clip to negative or ground. 2. Start Test 89, DC volts. 3. Displayed reading is in volts.



Replace evaporator fans, refer to (para. 11-198).



0-4500 OHMS STE/ICE-R TEST 91
<ol style="list-style-type: none"> 1. Connect RED clip and BLACK clip to the indicated terminals in question; RED to the first, BLACK to the second. 2. Start Test 91, 0-4500 ohms. 3. Displayed reading is in ohms. Less than 5 ohms is continuity. If the resistance is over 4500 ohms, STE/ICE displays "9.9.9.9."

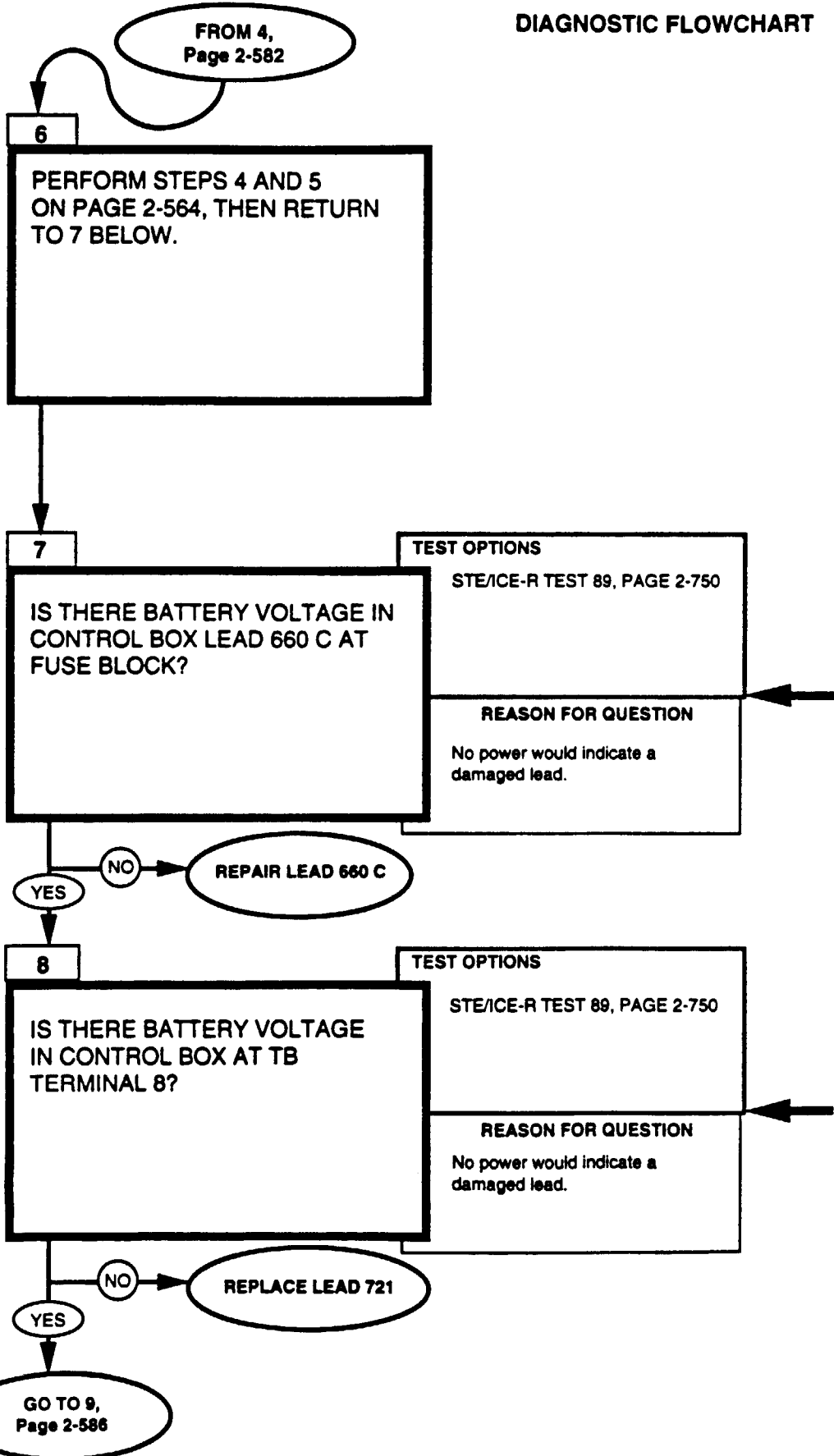
**AMBULANCE
(Evaporator Fans)
(M997 Only)
(Refer to Fig. 14.)**

DIAGNOSTIC FLOWCHART

KNOWN INFO
PREVIOUSLY CORRECTED INFORMATION
POSSIBLE PROBLEMS
BATTERY CABLE 660 LEAD 660 C LEAD 721 LEAD 721 A DOOR SWITCH

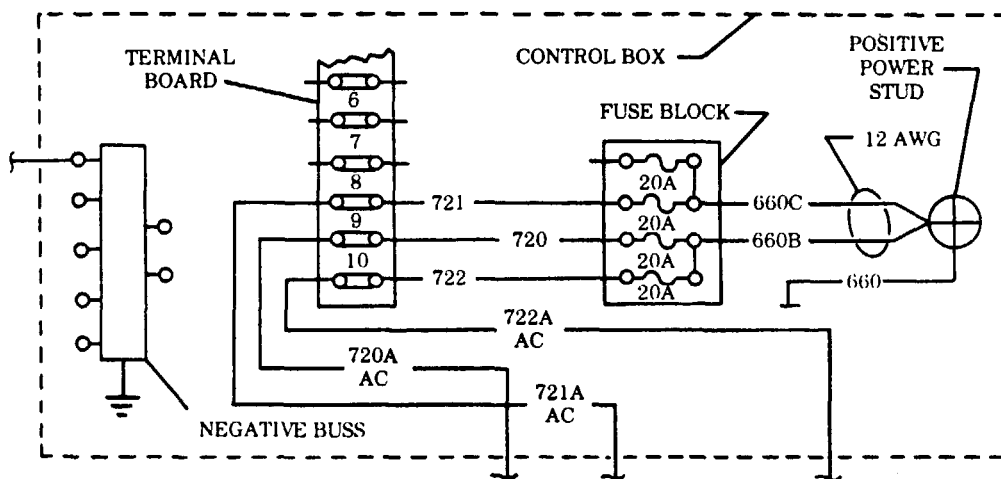
KNOWN INFO
BATTERY OK CABLE 660 OK
POSSIBLE PROBLEMS
LEAD 660 C LEAD 721 LEAD 721 A DOOR SWITCH

KNOWN INFO
BATTERY OK CABLE 660 OK LEAD 660 C OK
POSSIBLE PROBLEMS
LEAD 721 LEAD 721 A DOOR SWITCH



REFERENCE INFORMATION

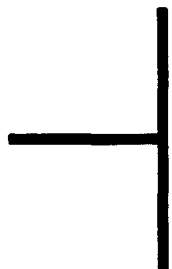
AMBULANCE



Repair lead,
refer to (para. 4-85).

Repair lead connector,
refer to (para. 4-85).

0-45 DC VOLTS STE/CE-R TEST 89
1. Connect RED clip to the indicated test point, BLACK clip to negative or ground.
2. Start Test 89, DC volts.
3. Displayed reading is in volts.

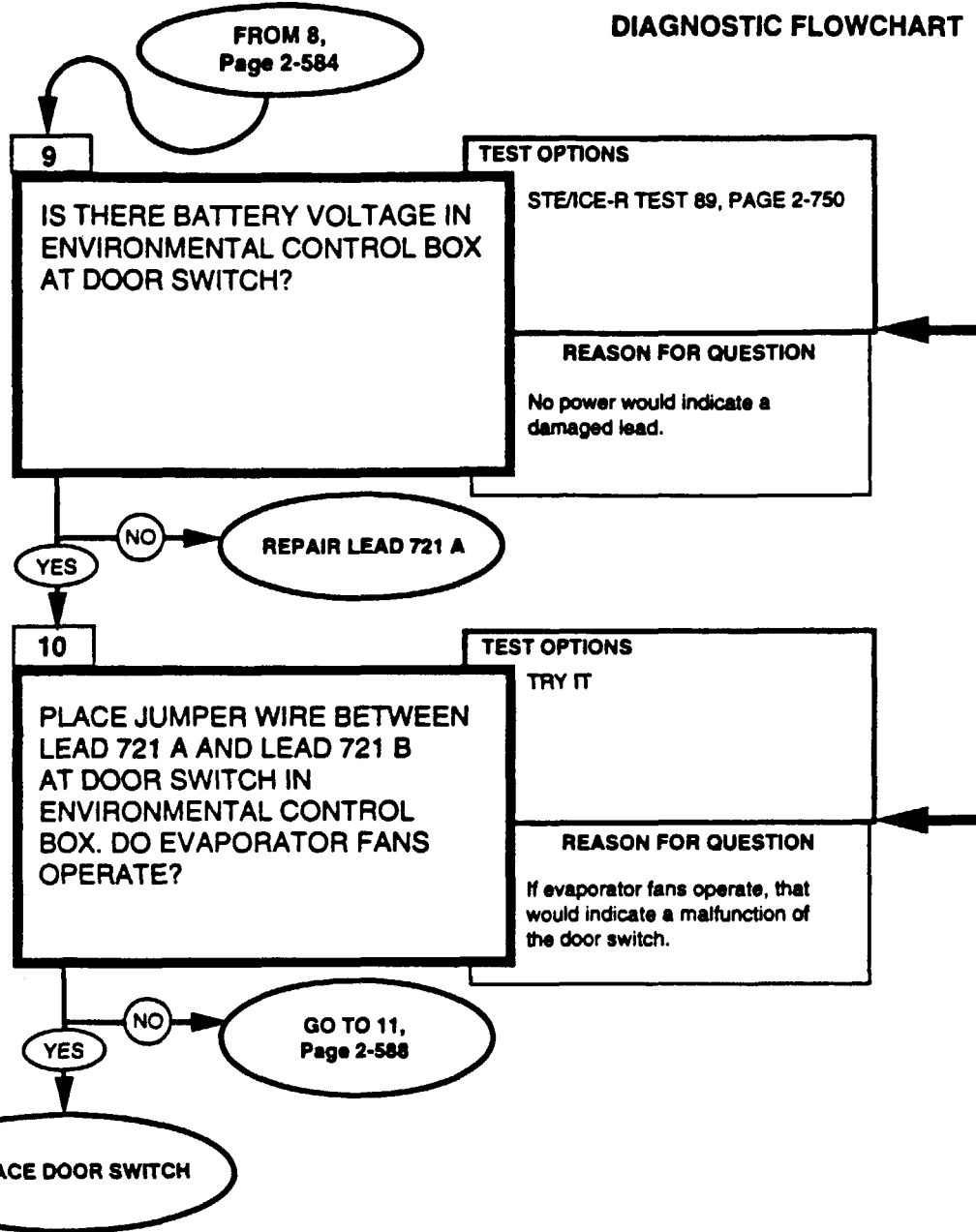


**AMBULANCE
(Evaporator Fans)
(M997 Only)
(Refer to Fig. 14.)**

DIAGNOSTIC FLOWCHART

KNOWN INFO
BATTERY OK CABLE 660 OK LEAD 660C OK LEAD 721 OK
POSSIBLE PROBLEMS
LEAD 721 A DOOR SWITCH

KNOWN INFO
BATTERY OK CABLE 660 OK LEAD 660 C OK LEAD 721 OK LEAD 721 A OK
POSSIBLE PROBLEMS
DOOR SWITCH



REFERENCE INFORMATION

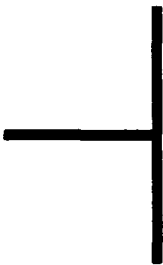
AMBULANCE



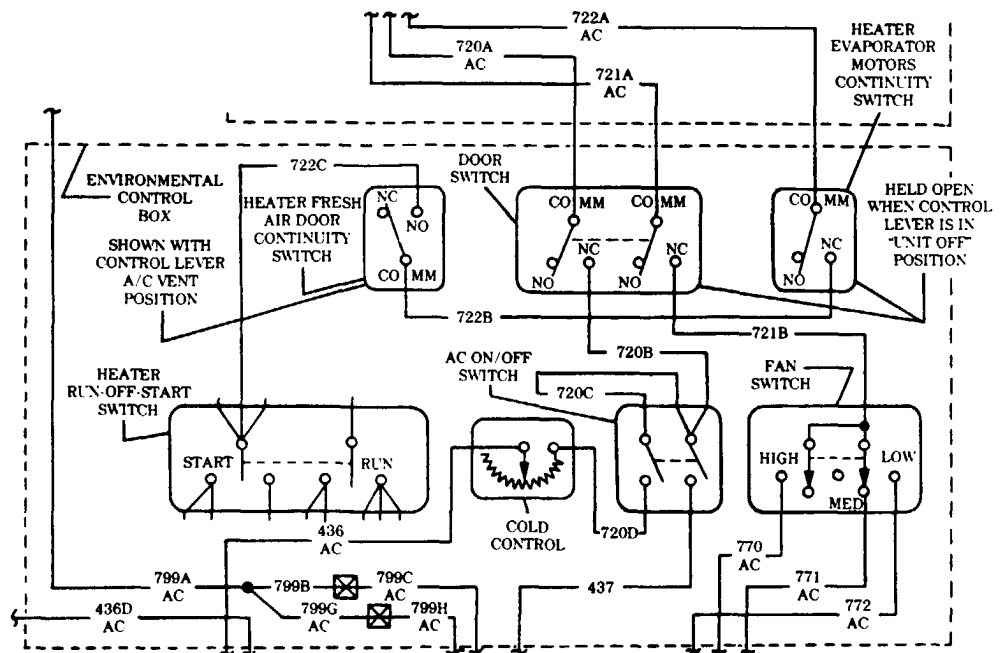
Repair lead,
refer to (para. 4-85).

Repair lead connector,
refer to (para. 4-85).

0-45 DC VOLTS STE/ICE-R TEST 89
1. Connect RED clip to the indicated test point, BLACK clip to negative or ground.
2. Start Test 89, DC volts.
3. Displayed reading is in volts.



Replace door switch,
refer to DS Maintenance.



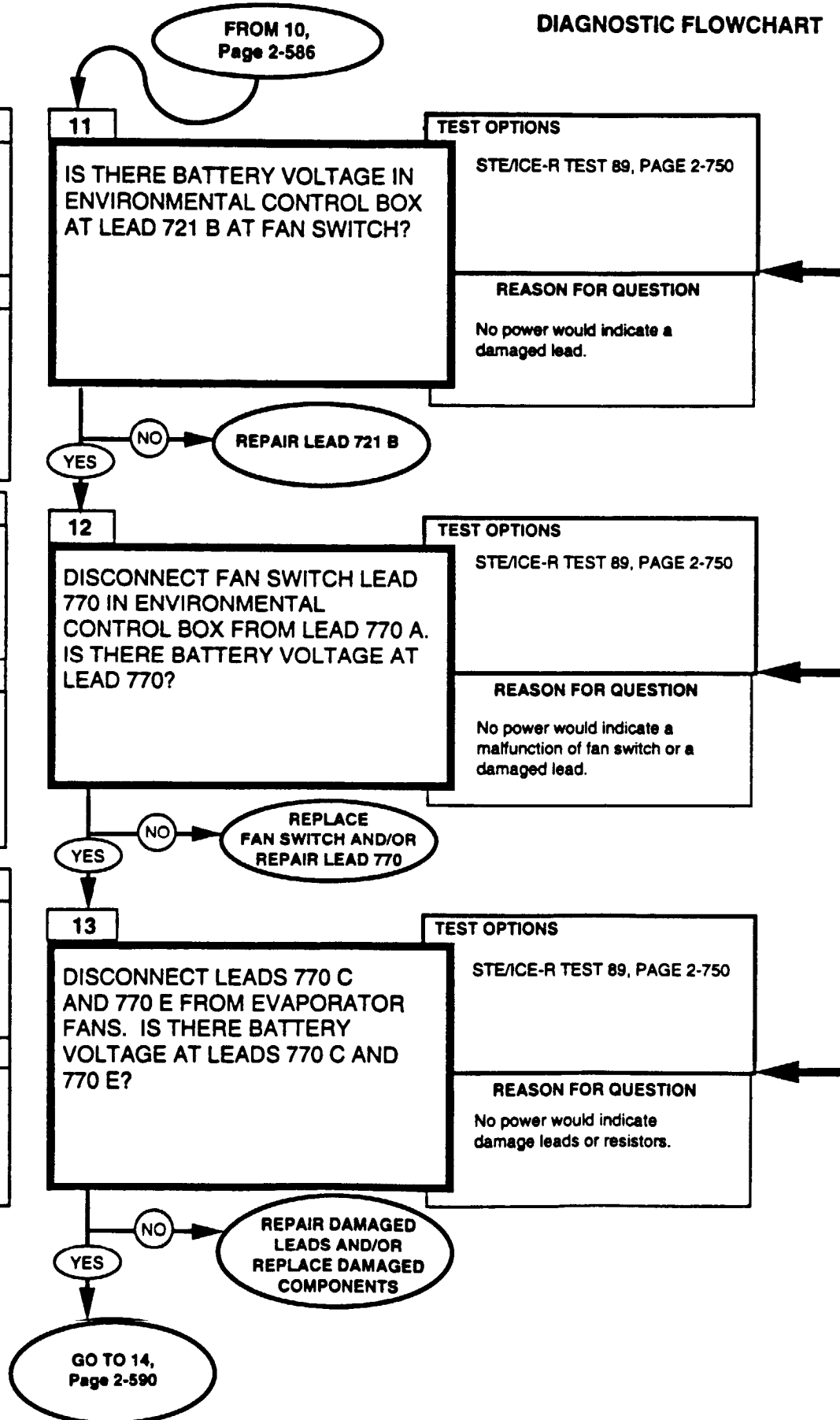
**AMBULANCE
(Evaporator Fans)
(M997 Only)
(Refer to Fig. 14.)**

KNOWN INFO
PREVIOUSLY CORRECTED INFORMATION
POSSIBLE PROBLEMS
LEAD 721 B FAN SWITCH LEAD 770 DAMAGED LEADS DAMAGED COMPONENTS

KNOWN INFO
LEAD 721 B OK
POSSIBLE PROBLEMS
FAN SWITCH LEAD 770 DAMAGED LEADS DAMAGED COMPONENTS

KNOWN INFO
LEAD 721 B OK FAN SWITCH OK LEAD 770 OK
POSSIBLE PROBLEMS
DAMAGED LEADS DAMAGED COMPONENTS

DIAGNOSTIC FLOWCHART



REFERENCE INFORMATION

AMBULANCE

Repair lead, refer to (para. 4-85).

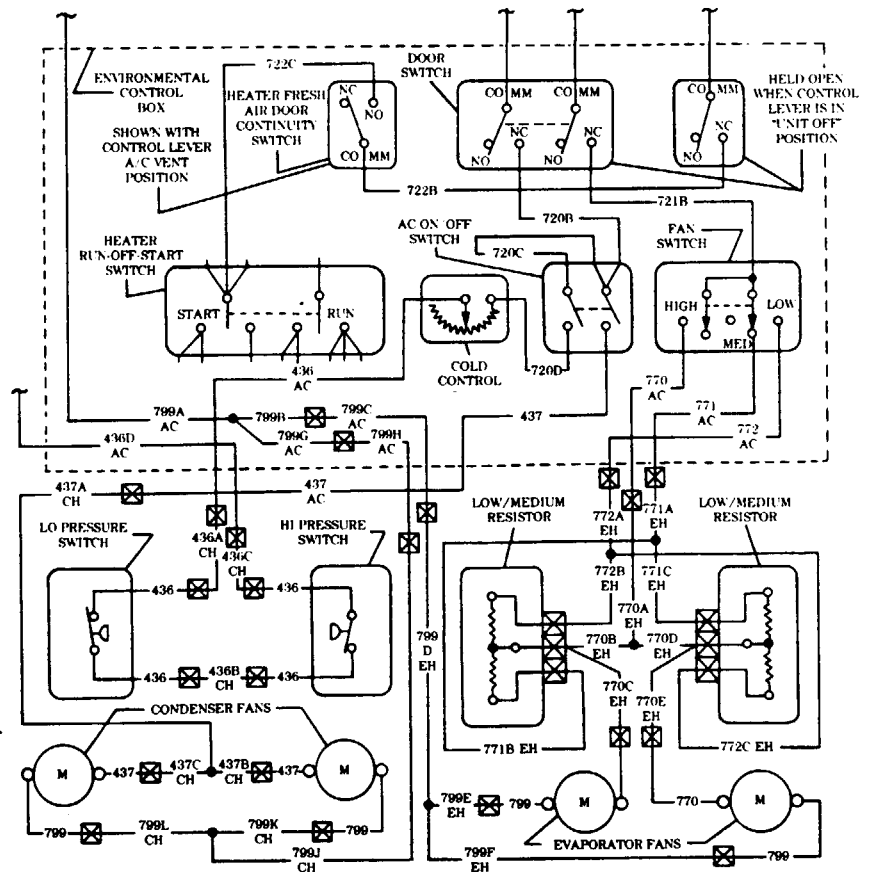
**0-45 DC VOLTS
STE/ICE-R TEST 89**

1. Connect RED clip to the indicated test point, BLACK clip to negative or ground.
2. Start Test 89, DC volts.
3. Displayed reading is in volts.

Replace fan switch, refer to (para. 4-127).

Repair lead, refer to (para. 4-85).

Repair lead connector, refer to (para. 4-85).

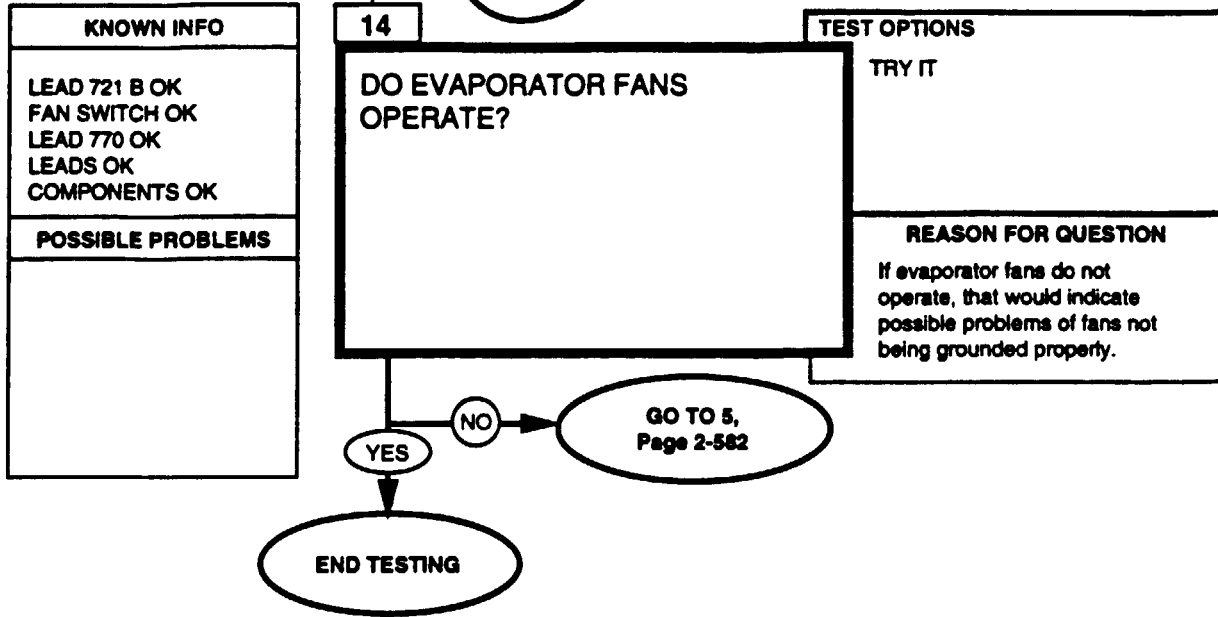


Repair lead, refer to (para. 4-85).

Repair lead connector, refer to (para. 4-85).

**AMBULANCE
(Evaporator Fans)
(M997 Only)
(Refer to Fig. 14.)**

DIAGNOSTIC FLOWCHART

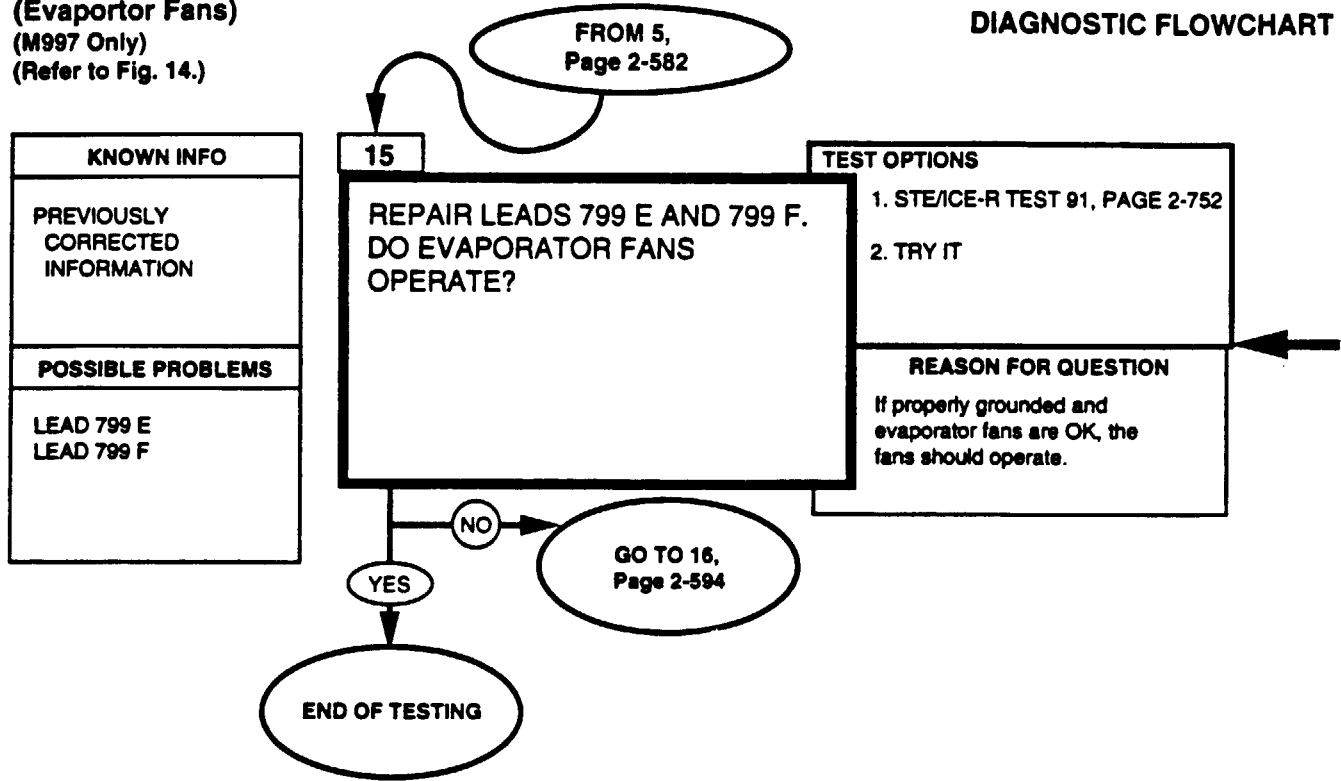


REFERENCE INFORMATION

AMBULANCE

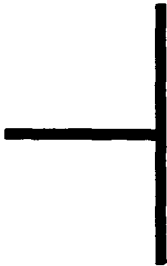
AMBULANCE
(Evaporator Fans)
(M997 Only)
(Refer to Fig. 14.)

DIAGNOSTIC FLOWCHART



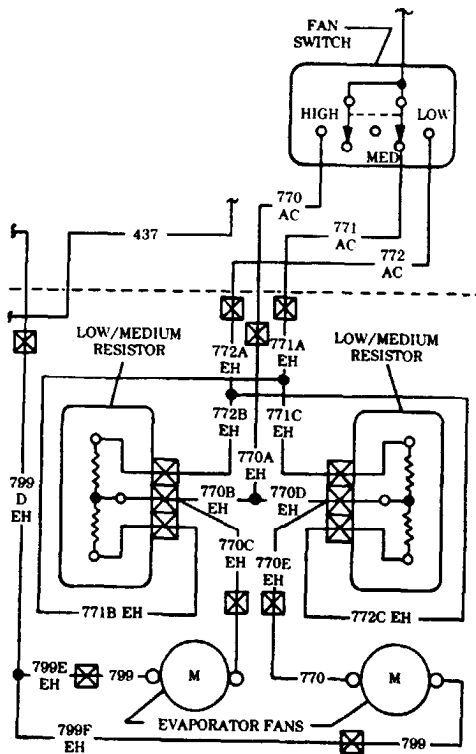
REFERENCE INFORMATION

AMBULANCE



Repair lead, refer to (para. 4-85).
 Repair lead connector, refer to (para. 4-85).

0-4500 OHMS STE/ICE-R TEST 91
1. Connect RED clip and BLACK clip to the indicated terminals in question; RED to the first, BLACK to the second.
2. Start Test 91, 0-4500 ohms.
3. Displayed reading is in ohms. Less than 5 ohms is continuity. If the resistance is over 4500 ohms, STE/ICE displays "9.9.9.9."



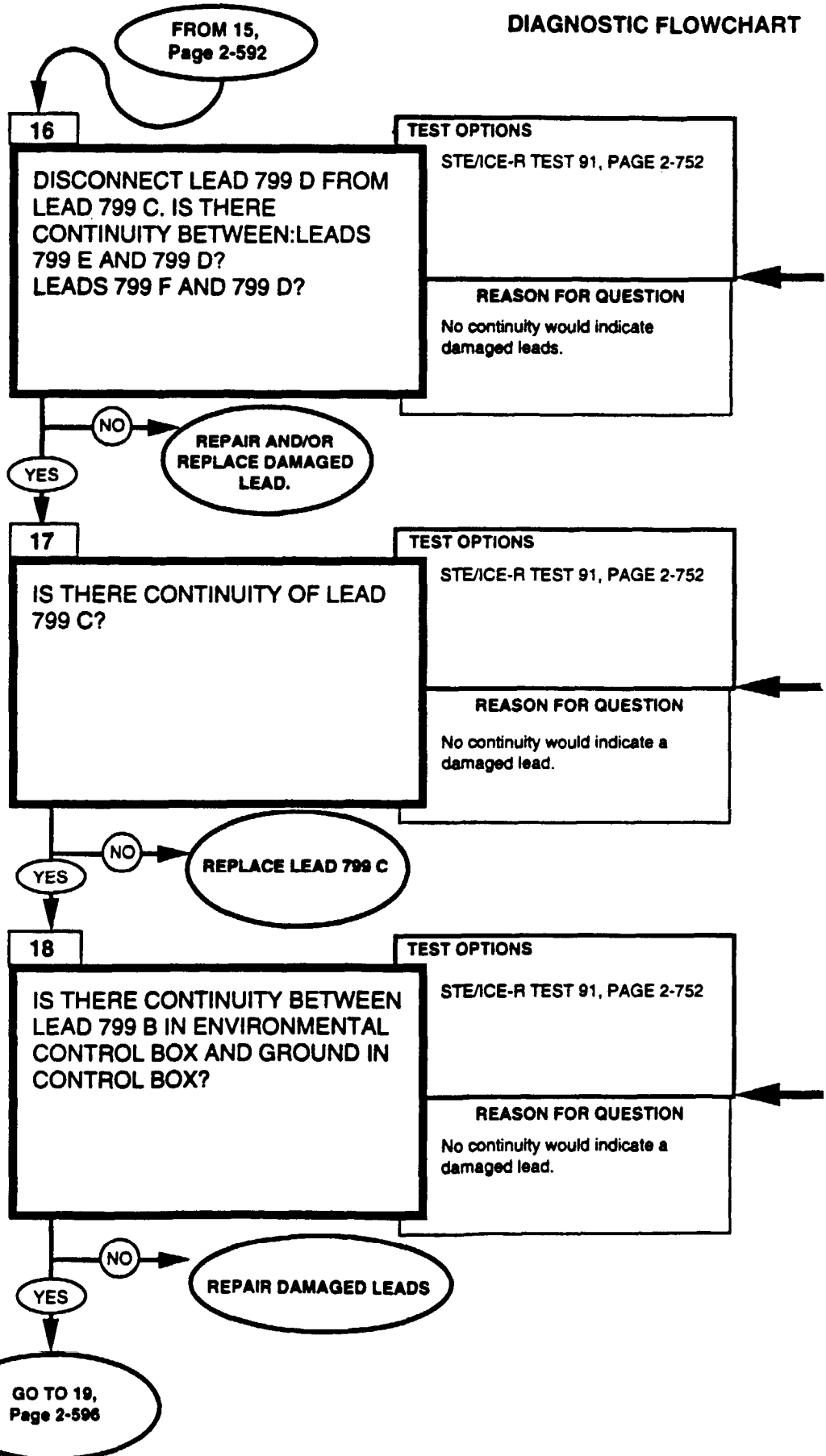
**AMBULANCE
(Evaporator Fans)
(M997 Only)
(Refer to Fig. 14.)**

DIAGNOSTIC FLOWCHART

KNOWN INFO
PREVIOUSLY CORRECTED INFORMATION
POSSIBLE PROBLEMS
LEAD 799 D LEAD 799 C LEAD 799 B LEAD 799 A EVAPORATOR FANS

KNOWN INFO
LEAD 799 D OK
POSSIBLE PROBLEMS
LEAD 799 C LEAD 799 B LEAD 799 A EVAPORATOR FANS

KNOWN INFO
LEAD 799 D OK LEAD 799 C OK
POSSIBLE PROBLEMS
LEAD 799 B LEAD 799 A EVAPORATOR FANS

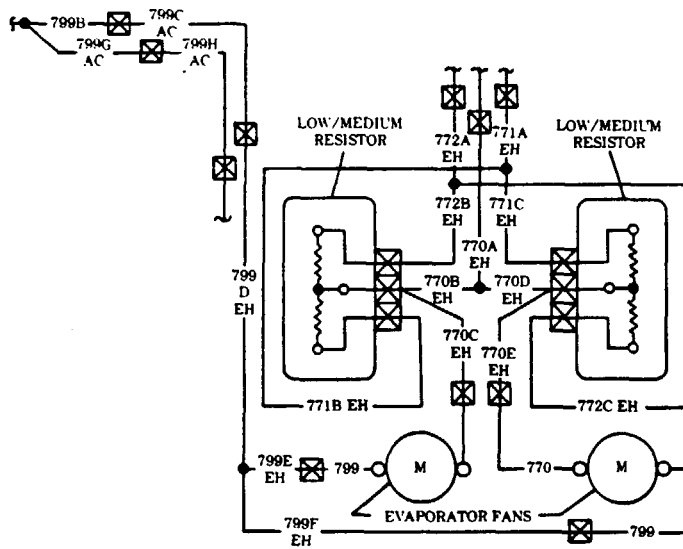


REFERENCE INFORMATION

AMBULANCE

Repair lead, refer to (para. 4-85).
 Repair lead connector, refer to (para. 4-85).

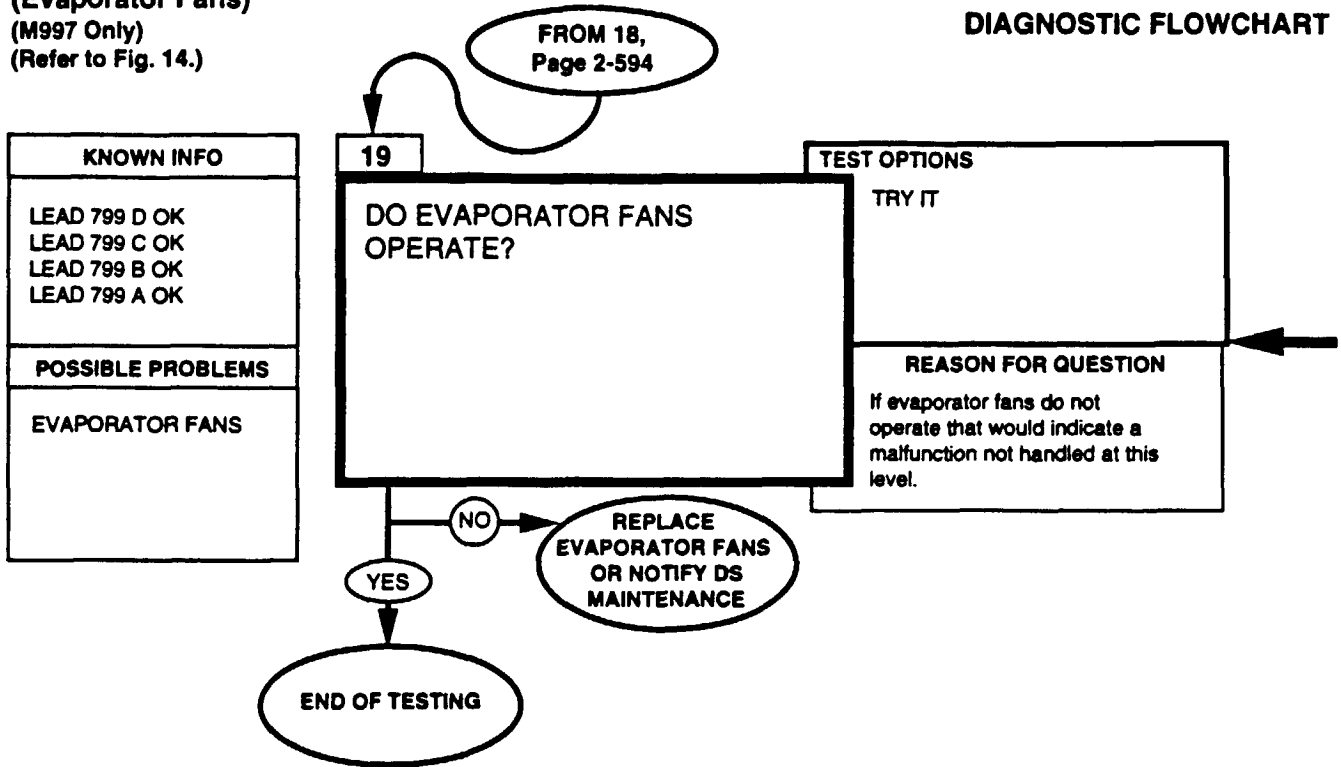
0-4500 OHMS STE/ICE-R TEST 91
<p>1. Connect RED clip and BLACK clip to the indicated terminals in question; RED to the first, BLACK to the second.</p>
<p>2. Start Test 91, 0-4500 ohms.</p>
<p>3. Displayed reading is in ohms. Less than 5 ohms is continuity. If the resistance is over 4500 ohms, STE/ICE displays "9.9.9.9."</p>



Repair lead, refer to (para. 4-85).
 Repair lead connector, refer to (para. 4-85).

**AMBULANCE
(Evaporator Fans)
(M997 Only)
(Refer to Fig. 14.)**

DIAGNOSTIC FLOWCHART



REFERENCE INFORMATION

AMBULANCE



Replace evaporator fans, refer to (para.11-198).

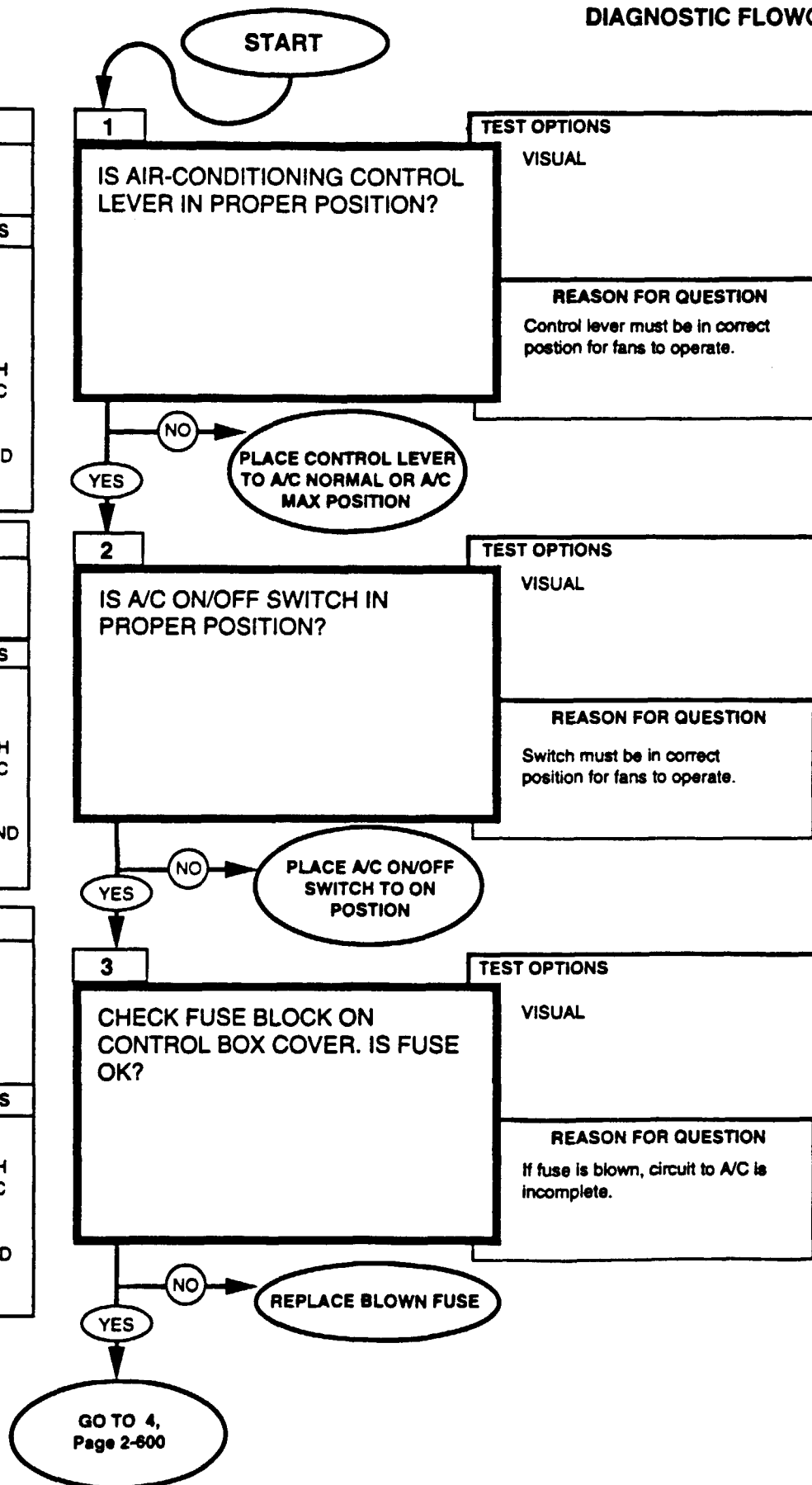
**AMBULANCE
(Condenser Fans)
(M997 Only)
(Refer to Fig. 14.)**

DIAGNOSTIC FLOWCHART

KNOWN INFO
NOTHING
POSSIBLE PROBLEMS
A/C CONTROL LEVER POSITION A/C ON/OFF SWITCH POSITION FUSE COMPRESSOR CLUTCH LEADS 437 B AND 437 C LEAD 799 C LEAD G LEAD H LEADS 799 J, 799 K, AND 799 L CONDENSER FANS

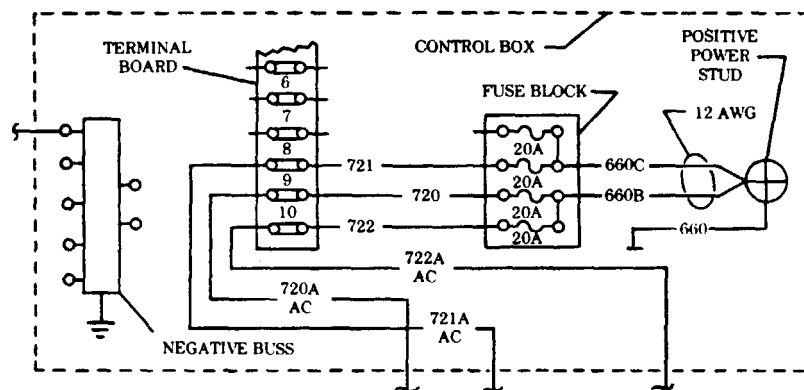
KNOWN INFO
A/C CONTROL LEVER POSITION OK
POSSIBLE PROBLEMS
A/C ON/OFF SWITCH POSITION FUSE COMPRESSOR CLUTCH LEADS 437 B AND 437 C LEAD 799 G LEAD 799 H LEADS 799 J, 799 K, AND 799 L CONDENSER FANS

KNOWN INFO
A/C CONTROL LEVER POSITION OK A/C ON/OFF SWITCH POSITION OK
POSSIBLE PROBLEMS
FUSE COMPRESSOR CLUTCH LEADS 437 B AND 437 C LEAD 799 G LEAD 799 H LEADS 799 J, 799 K, AND 799 L CONDENSER FANS



REFERENCE INFORMATION

AMBULANCE



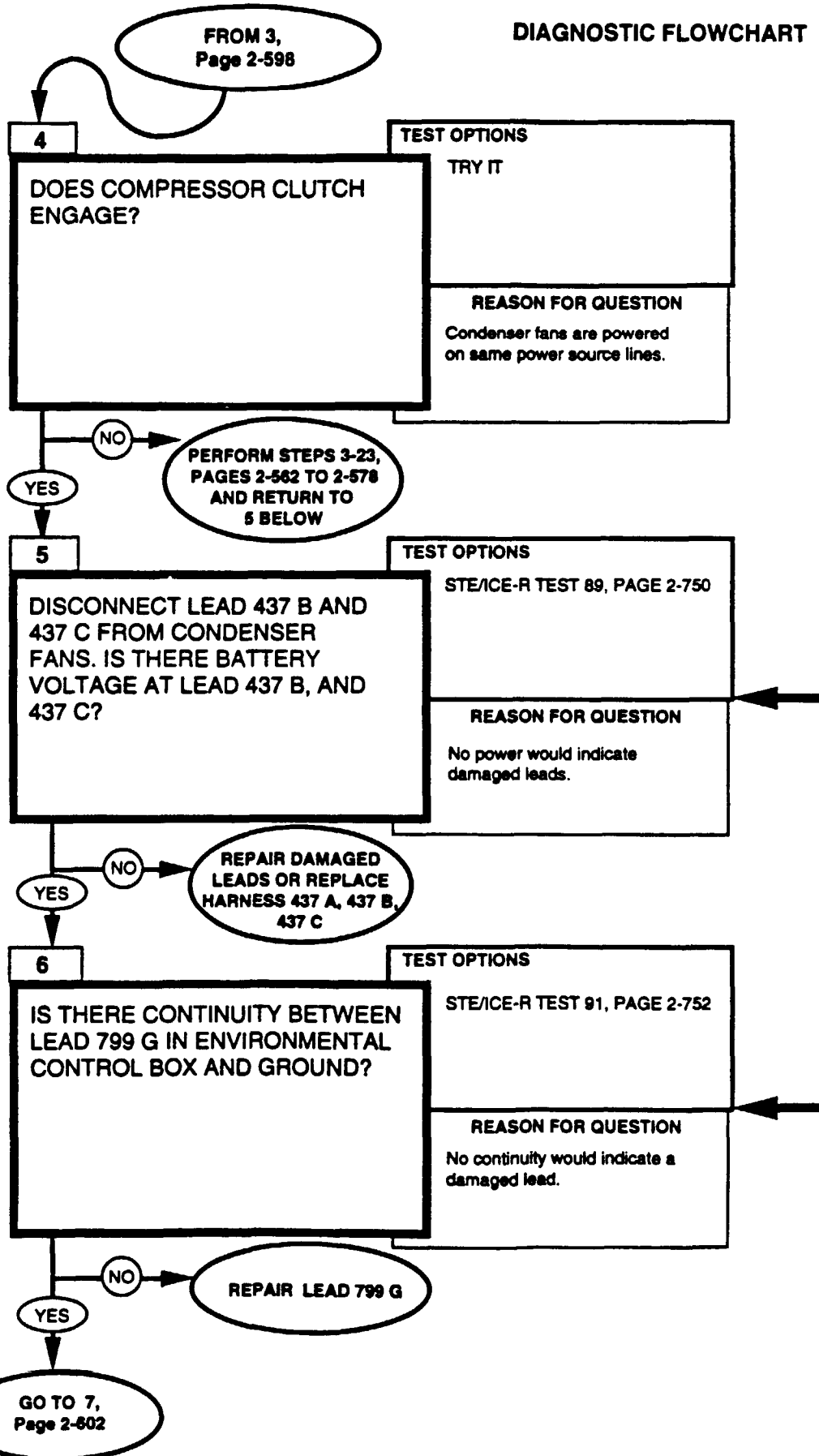
**AMBULANCE
(Condenser Fans)
(M997 Only)
(Refer to Fig. 14.)**

DIAGNOSTIC FLOWCHART

KNOWN INFO
A/C CONTROL LEVER POSITION A/C ON/OFF SWITCH POSITION FUSE
POSSIBLE PROBLEMS
COMPRESSOR CLUTCH LEADS 437 B AND 437 C LEAD 799 G LEAD 799 H LEADS 799 J, 799 K, AND 799 L CONDENSER FANS

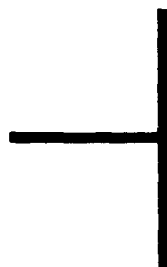
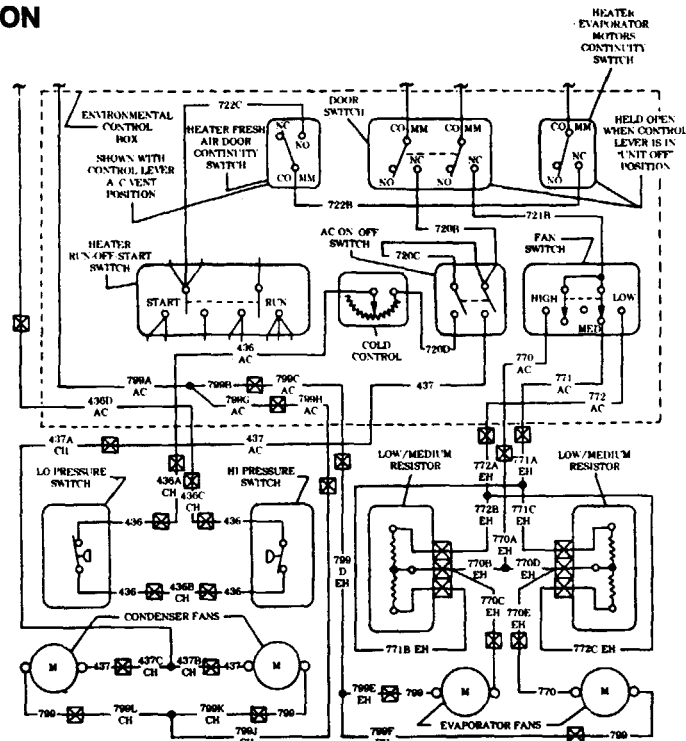
KNOWN INFO
A/C CONTROL LEVER POSITION A/C ON/OFF SWITCH POSITION FUSE COMPRESSOR CLUTCH
POSSIBLE PROBLEMS
LEADS 437 B AND 437 C LEAD 799 G LEAD 799 H LEADS 799 J, 799 K, AND 799 L CONDENSER FANS

KNOWN INFO
A/C CONTROL LEVER POSITION A/C ON/OFF SWITCH POSITION FUSE COMPRESSOR CLUTCH LEADS 437 B AND 437 C
POSSIBLE PROBLEMS
LEAD 799 G LEAD 799 H LEADS 799 J, 799 K, AND 799 L CONDENSER FANS



REFERENCE INFORMATION

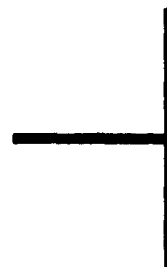
AMBULANCE



Repair leads, refer to (para. 4-85).
Repair lead connectors, refer to (para. 4-85).

**0-45 DC VOLTS
STE/ICE-R TEST 89**

1. Connect RED clip to the indicated test point, BLACK clip to negative or ground.
2. Start Test 89, DC volts.
3. Displayed reading is in volts.



Repair lead, refer to (para. 4-85).
Repair lead connector, refer to (para. 4-85).

**0-4500 OHMS
STE/ICE -R TEST 91**

1. Connect RED clip and BLACK clip to the indicated terminals in question; RED to the first, BLACK to the second.
2. Start Test 91, 0-4500 ohms.
3. Displayed reading is in ohms. Less than 5 ohms is continuity. If the resistance is over 4500 ohms STE/ICE displays "9.9.9.9."

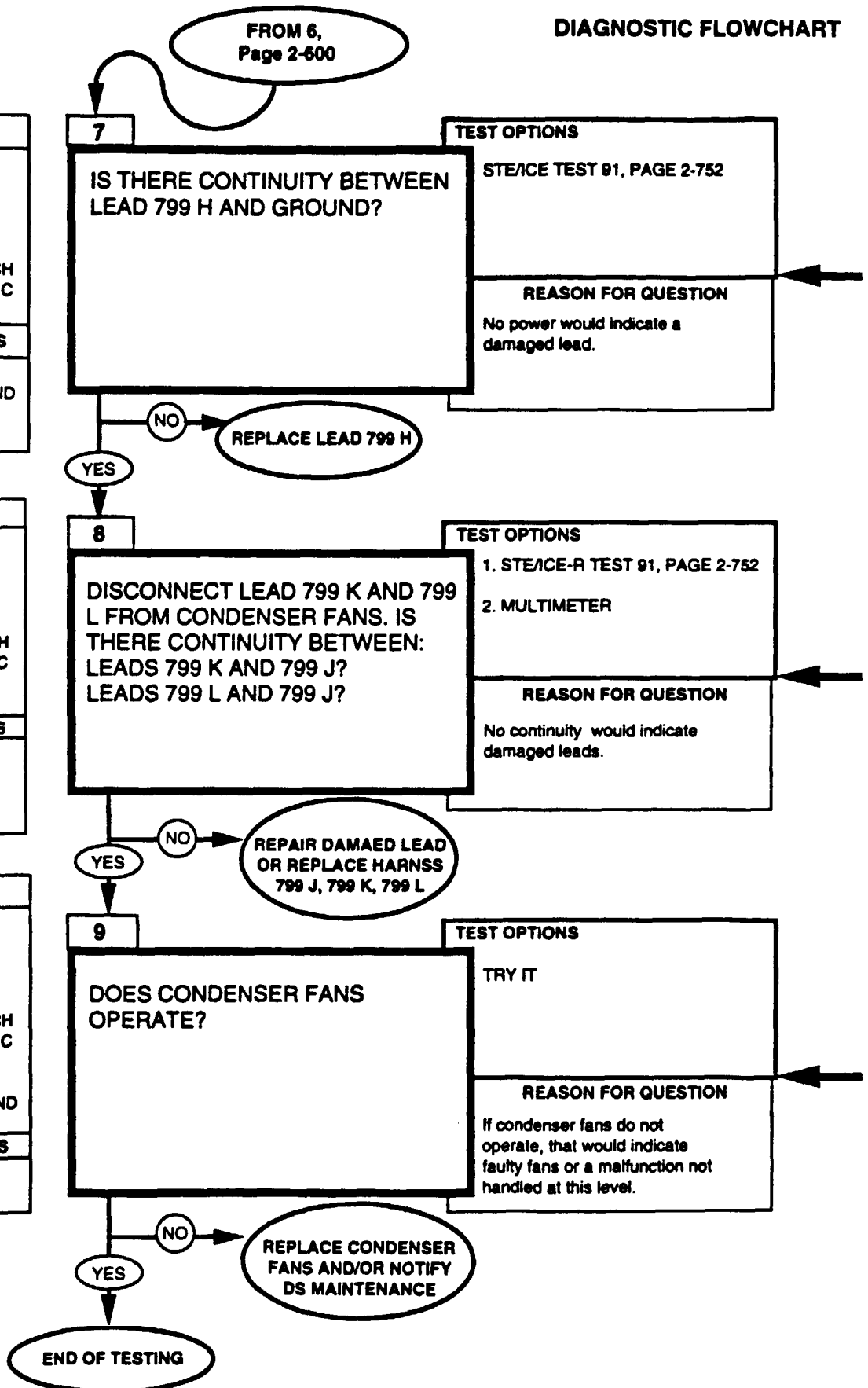
**AMBULANCE
(Condenser Fans)
(M997 Only)
(Refer to Fig.14.)**

DIAGNOSTIC FLOWCHART

KNOWN INFO
A/C CONTROL LEVER POSITION A/C ON/OFF SWITCH POSITION FUSE COMPRESSOR CLUTCH LEADS 437 B AND 437 C LEAD 799 G
POSSIBLE PROBLEMS
LEAD 799 H LEADS 799 J, 799 K, AND 799 L CONDENSER FANS

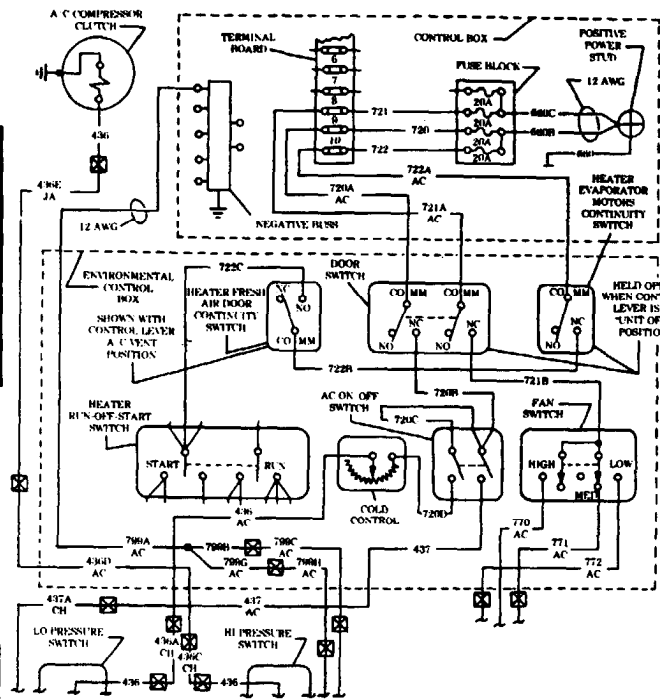
KNOWN INFO
A/C CONTROL LEVER POSITION A/C ON/OFF SWITCH POSITION FUSE COMPRESSOR CLUTCH LEADS 437 B AND 437 C LEAD 799 G LEAD 799 H
POSSIBLE PROBLEMS
LEADS 799 J, 799 K, AND 799 L CONDENSER FANS

KNOWN INFO
A/C CONTROL LEVER POSITION A/C ON/OFF SWITCH POSITION FUSE COMPRESSOR CLUTCH LEADS 437 B AND 437 C LEAD 799 G LEAD 799 H LEADS 799 J, 799 K, AND 799 L
POSSIBLE PROBLEMS
CONDENSER FANS



REFERENCE INFORMATION

AMBULANCE



Repair leads, refer to (para. 4-85).
Repair lead connectors, refer to (para. 4-85).

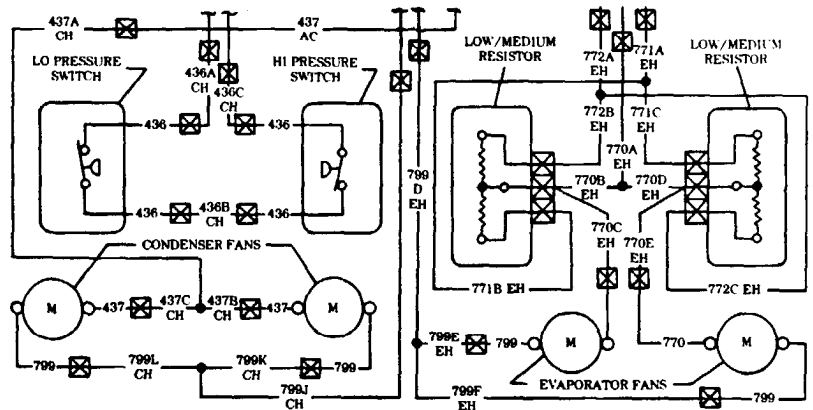
**0-4500 OHMS
STE/ICE -R TEST 91**

1. Connect RED clip and BLACK clip to the indicated terminals in question; RED to the first, BLACK to the second.
2. Start Test 91, 0-4500 ohms.
3. Displayed reading is in ohms. Less than 5 ohms is continuity. If the resistance is over 4500 ohms STE/ICE displays "9.9.9.9."

**CONTINUITY (RESISTANCE)
MULTIMETER**

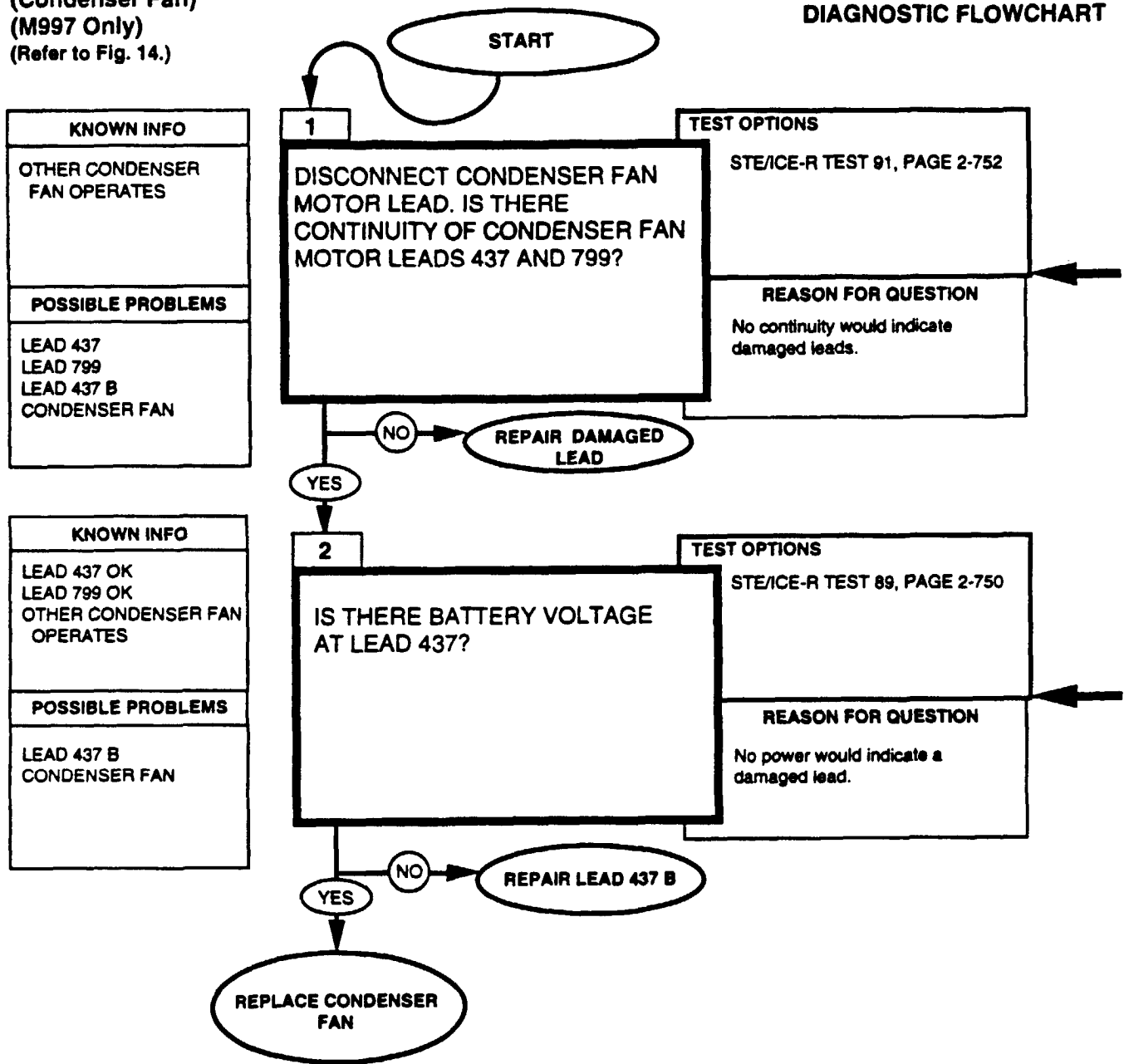
1. Set the voltmeter to an ohms scale of about 1000 ohms.
2. Connect the RED and BLACK leads to the connections stated in the question.
3. Be sure to read the correct scale. Less than 5 ohms indicates continuity. For an open circuit, the meter should peg full scale (needle all the way to the left).

Replace condenser fans, refer to (para. 11-201).



**AMBULANCE
(Condenser Fan)
(M997 Only)
(Refer to Fig. 14.)**

DIAGNOSTIC FLOWCHART



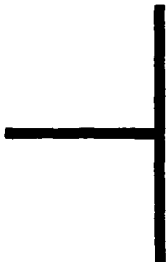
REFERENCE INFORMATION

AMBULANCE



Repair leads, refer to (para. 4-85).
 Repair lead connector, refer to (para. 4-85).

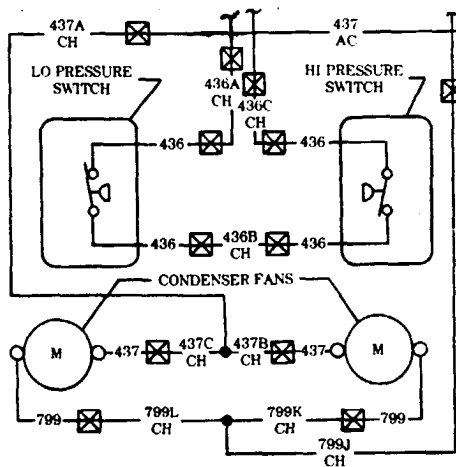
0-4500 OHMS STE/ICE -R TEST 91
<p>1. Connect RED clip and BLACK clip to the indicated terminals in question; RED to the first, BLACK to the second.</p> <p>2. Start Test 91, 0-4500 ohms.</p> <p>3. Displayed reading is in ohms. Less than 5 ohms is continuity. If the resistance is over 4500 ohms STE/ICE displays "9.9.9.9."</p>



Repair lead, (refer to 4-85).
 Repair lead connector, refer to (para. 4-85).

Replace condenser fan, refer to (para. 11-201).

0-45 DC VOLTS STE/ICE-R TEST 89
<p>1. Connect RED clip to the indicated test point, BLACK clip to negative or ground.</p> <p>2. Start Test 89, DC volts.</p> <p>3. Displayed reading is in volts.</p>



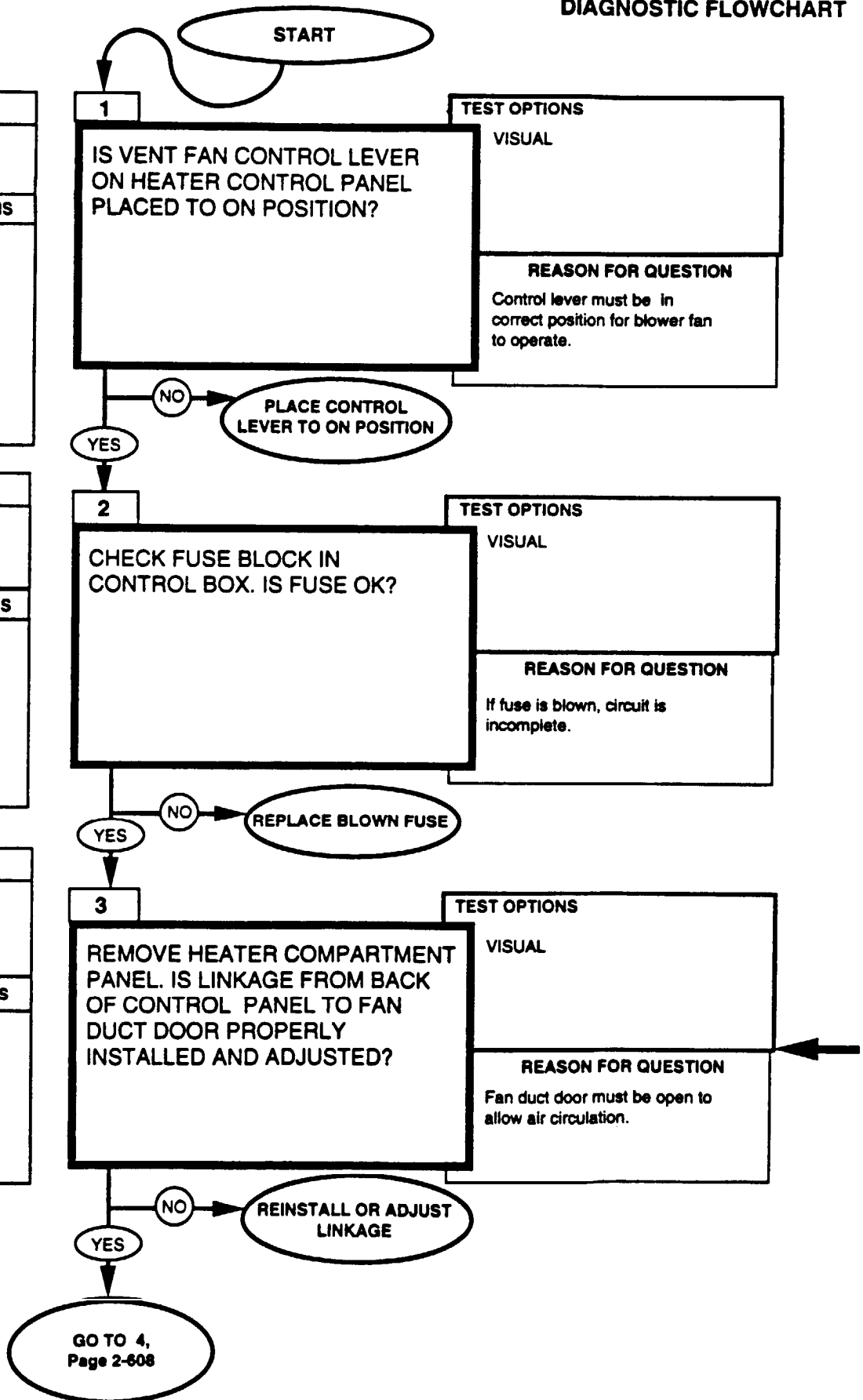
**AMBULANCE
(Blower Fan)
(M997 Only)
(Refer to Fig. 15.)**

DIAGNOSTIC FLOWCHART

KNOWN INFO
NOTHING
POSSIBLE PROBLEMS
CONTROL LEVER POSITION FUSE LINKAGE BATTERY CABLE 660 LEAD 660 B LEAD 721 LEAD 721 A RELAY

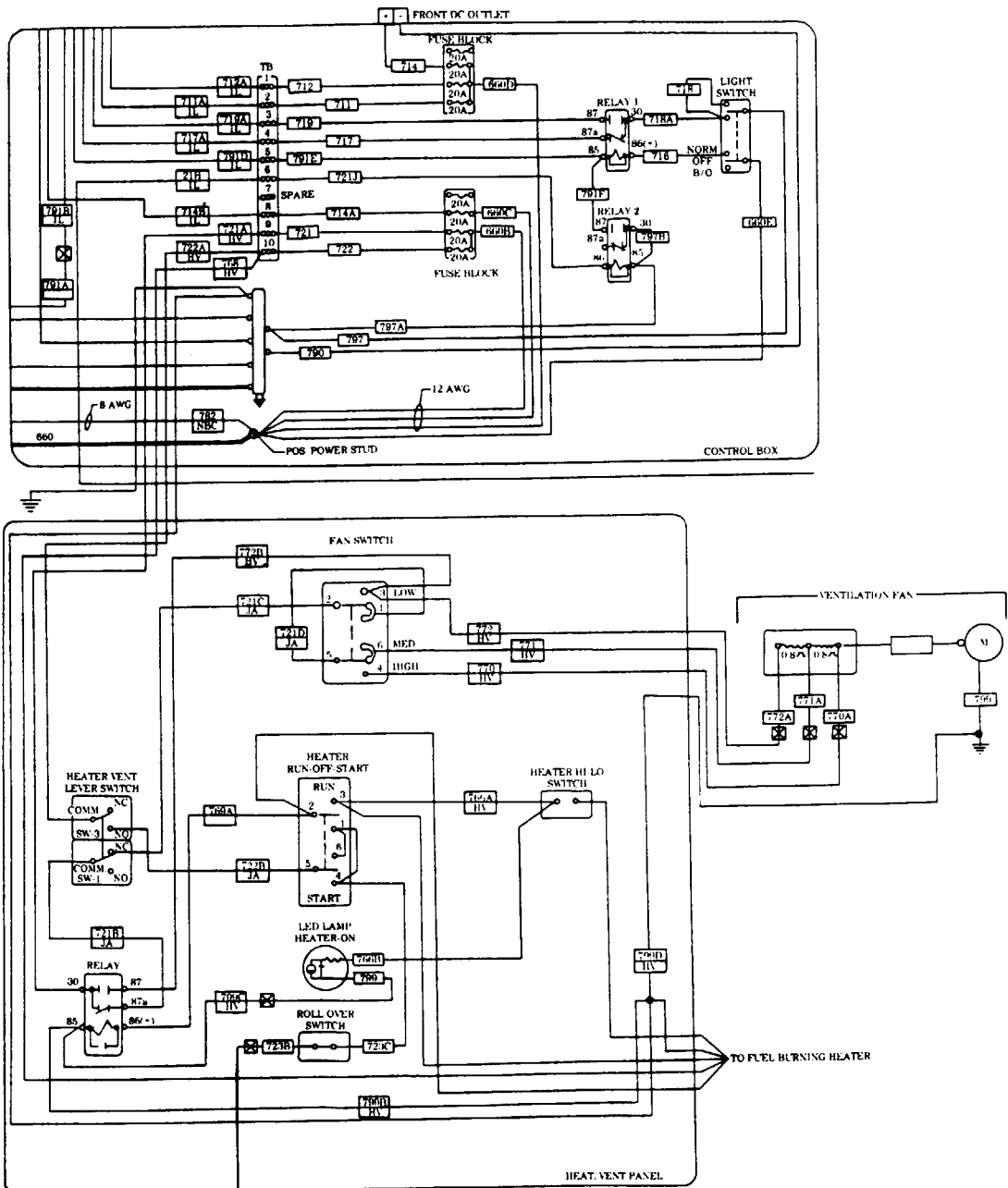
KNOWN INFO
CONTROL LEVER POSITION OK
POSSIBLE PROBLEMS
FUSE LINKAGE BATTERY CABLE 660 LEAD 660 B LEAD 721 LEAD 721 A RELAY

KNOWN INFO
CONTROL LEVER POSITION OK FUSE OK
POSSIBLE PROBLEMS
LINKAGE BATTERY CABLE 660 LEAD 660 B LEAD 721 LEAD 721 A RELAY



REFERENCE INFORMATION

AMBULANCE



Remove heater compartment panel, refer to (para. 11-214).

Installation/adjustment of fan duct door linkage, refer to (para. 11-211).

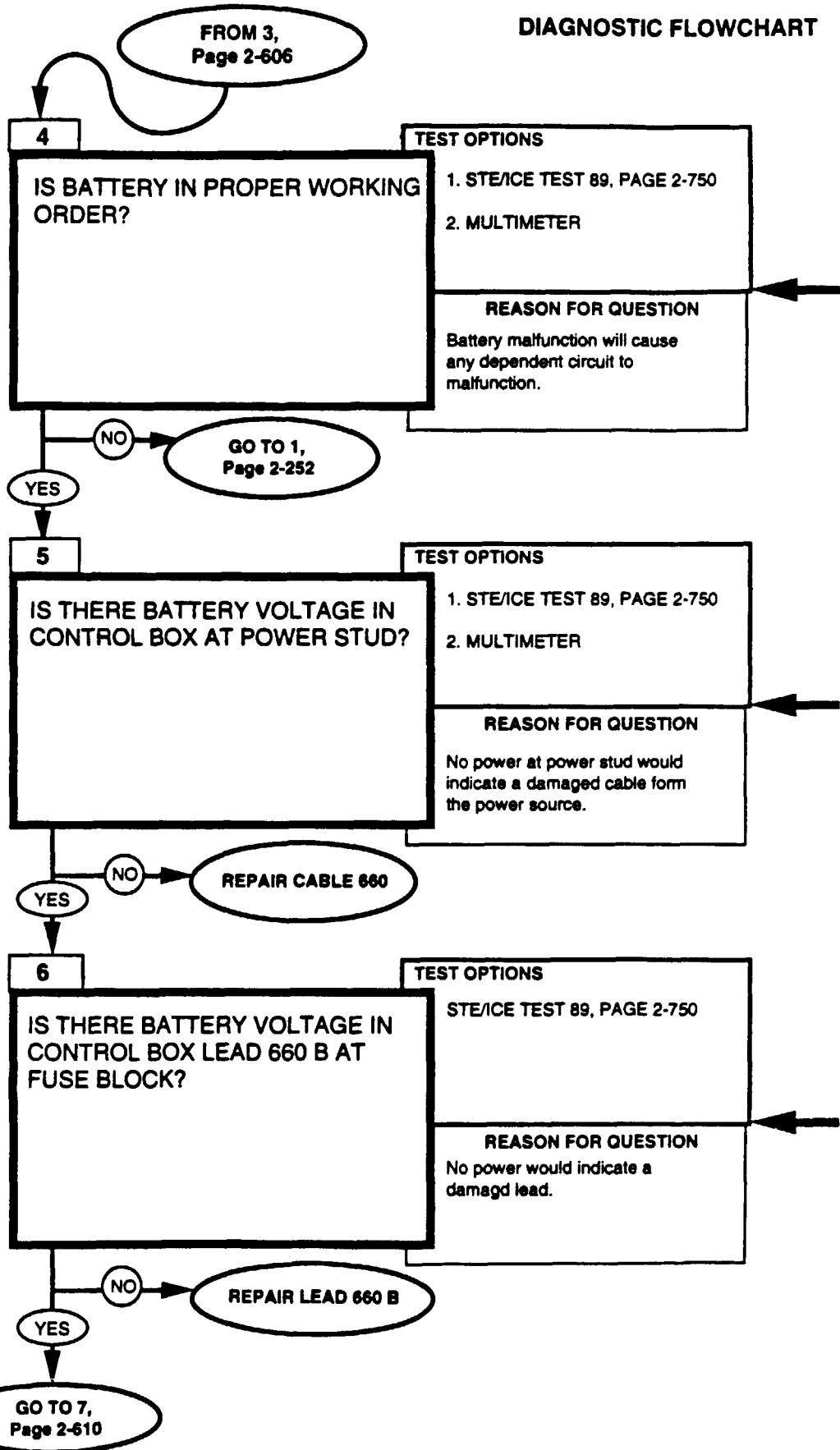
**AMBULANCE
(Blower Fan)
(M997 Only)
(Refer to Fig. 15.)**

DIAGNOSTIC FLOWCHART

KNOWN INFO
CONTROL LEVER POSITION OK FUSE OK LINKAGE OK
POSSIBLE PROBLEMS
BATTERY CABLE 660 LEAD 660 B LEAD 721 LEAD 721 A RELAY

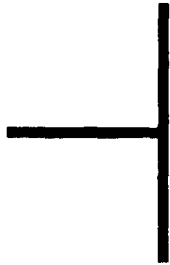
KNOWN INFO
CONTROL LEVER POSITION OK FUSE OK LINKAGE OK BATTERY OK
POSSIBLE PROBLEMS
CABLE 660 LEAD 660 B LEAD 721 LEAD 721 A RELAY

KNOWN INFO
CONTROL LEVER POSITION OK FUSE OK LINKAGE OK BATTERY OK CABLE 660 OK
POSSIBLE PROBLEMS
LEAD 660 B LEAD 721 LEAD 721 A RELAY



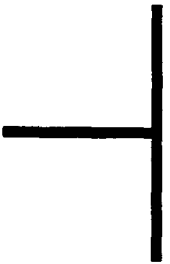
REFERENCE INFORMATION

AMBULANCE



**0-45 DC VOLTS
STE/ICE-R TEST 89**

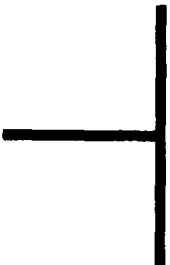
1. Connect RED clip to the indicated test point, BLACK clip to negative or ground.
2. Start Test 89, DC volts.
3. Displayed reading is in volts.



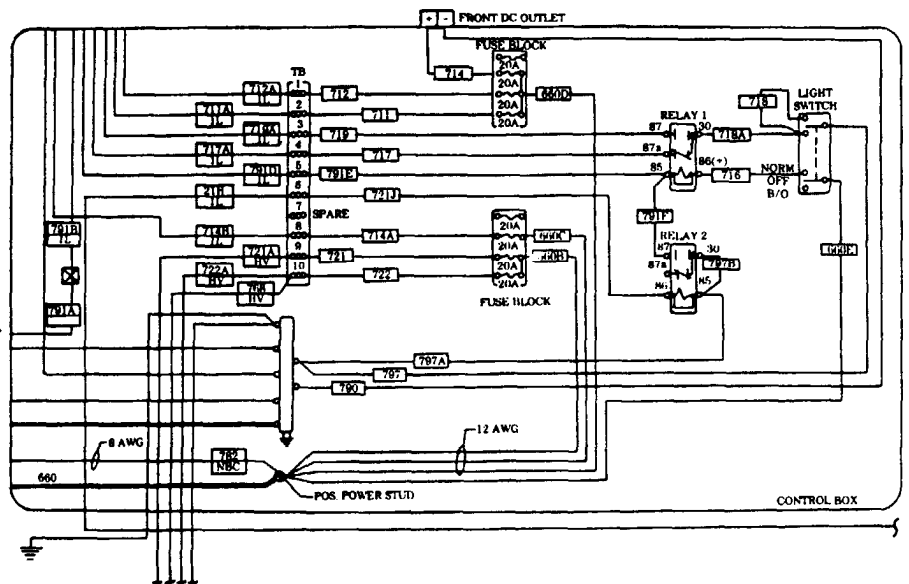
Repair lead, refer to (para. 4-85).

**BATTERY VOLTAGE
MULTIMETER**

1. Set the voltmeter to a DC volts scale of at least 40 volts.
2. Connect the RED lead to positive and the BLACK lead to negative.
3. Be sure to read the correct scale.



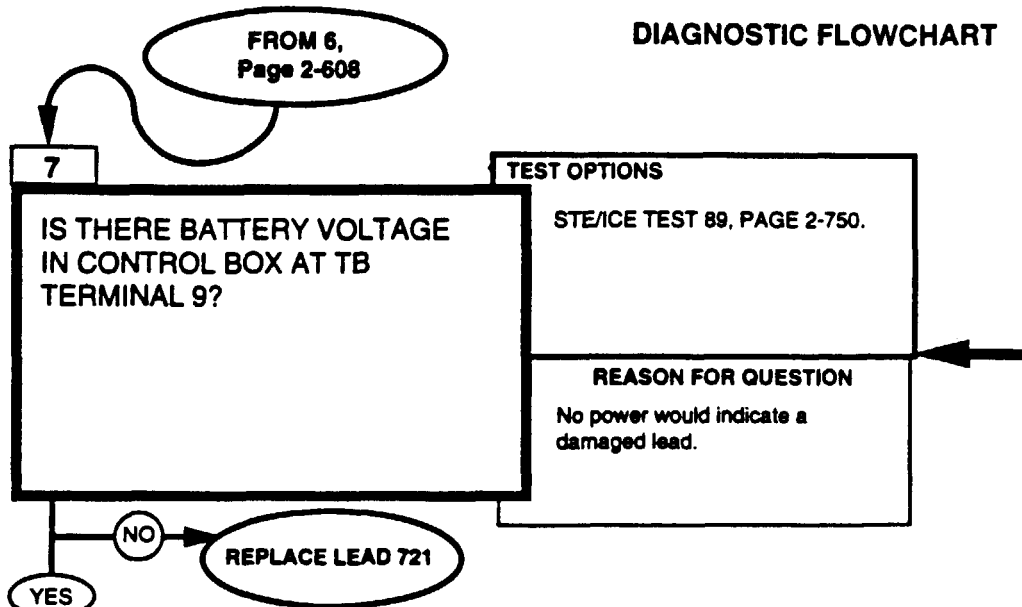
Repair lead, refer to (para. 4-85).
Repair lead connector, refer to (para. 4-85).



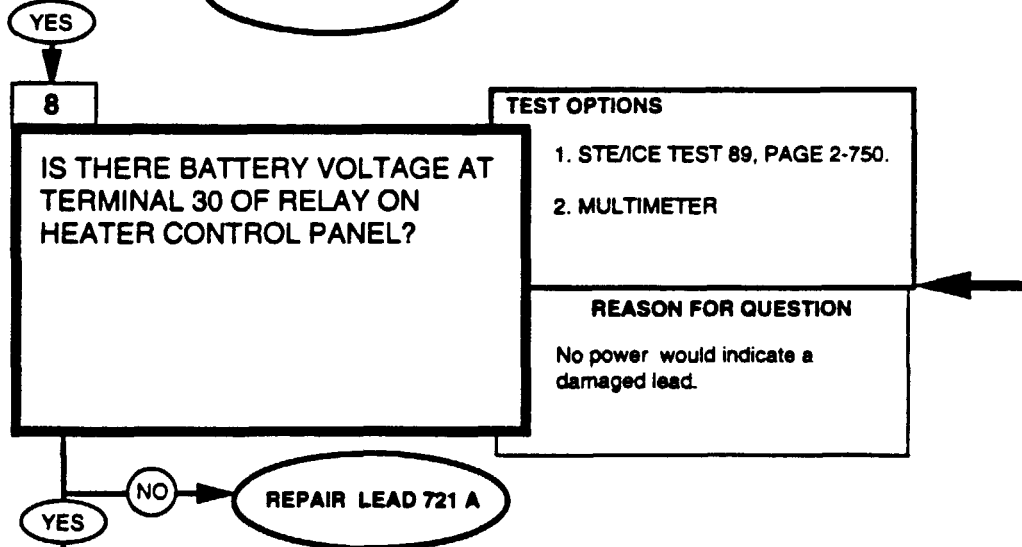
**AMBULANCE
(Blower Fan)
(M997 Only)
(Refer to Fig. 15.)**

DIAGNOSTIC FLOWCHART

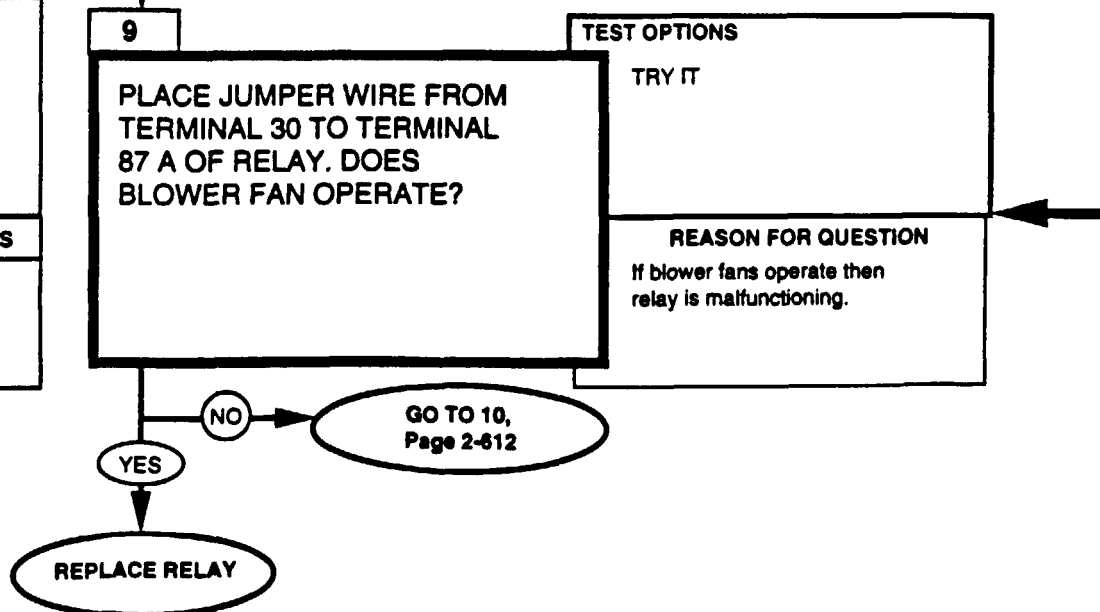
KNOWN INFO
CONTROL LEVER POSITION OK FUSE OK LINKAGE OK BATTERY OK CABLE 660 OK LEAD 660 B OK
POSSIBLE PROBLEMS
LEAD 721 LEAD 721 A RELAY



KNOWN INFO
CONTROL LEVER POSITION OK FUSE OK LINKAGE OK BATTERY OK LEAD 660 OK LEAD 660 B OK LEAD 721 OK
POSSIBLE PROBLEMS
LEAD 721 A RELAY

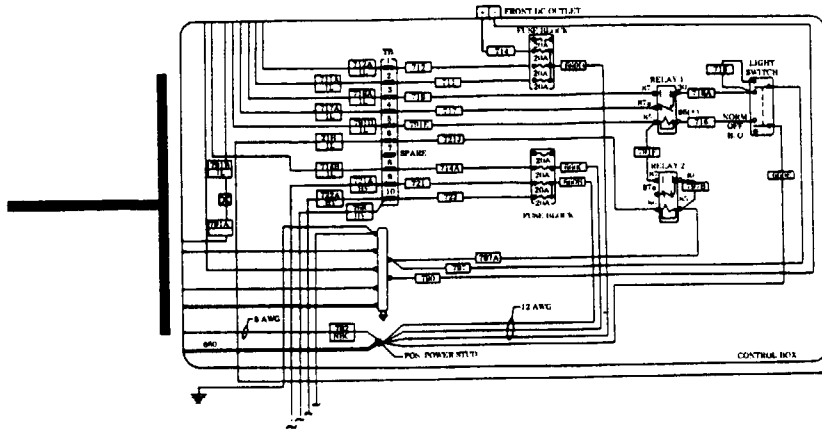


KNOWN INFO
CONTROL LEVER POSITION OK FUSE OK LINKAGE OK BATTERY OK CABLE 660 OK LEAD 721 OK LEAD 721 A OK
POSSIBLE PROBLEMS
RELAY



REFERENCE INFORMATION

AMBULANCE

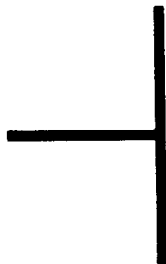


**0-45 DC VOLTS
STE/ICE-R TEST 89**

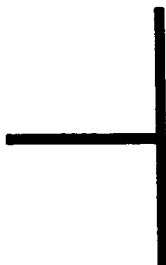
1. Connect RED clip to the indicated test point, BLACK clip to negative or ground.
2. Start Test 89, DC volts.
3. Displayed reading is in volts.

**BATTERY VOLTAGE
MULTIMETER**

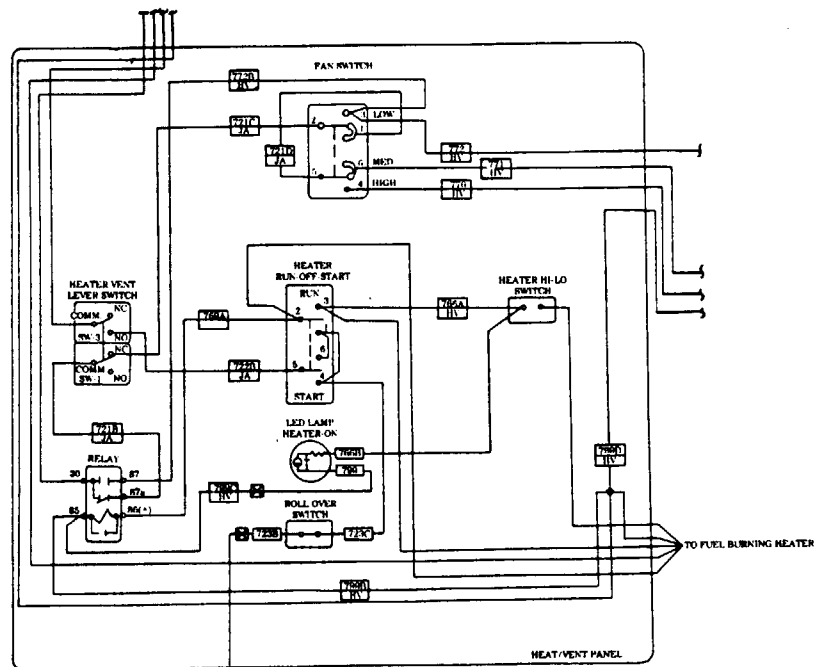
1. Set the voltmeter to a DC volts scale of at least 40 volts.
2. Connect the RED lead to positive and the BLACK lead to negative.
3. Be sure to read the correct scale.



Repair lead, refer to (para. 4-85).
Repair lead connector, refer to (para. 4-85).



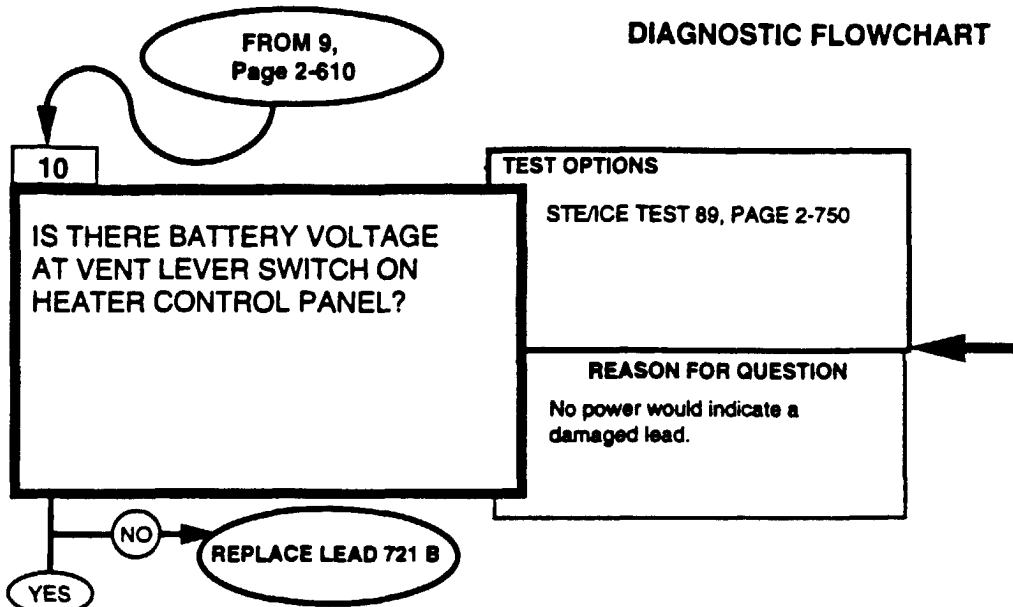
Replace relay, refer to (para. 4-120).



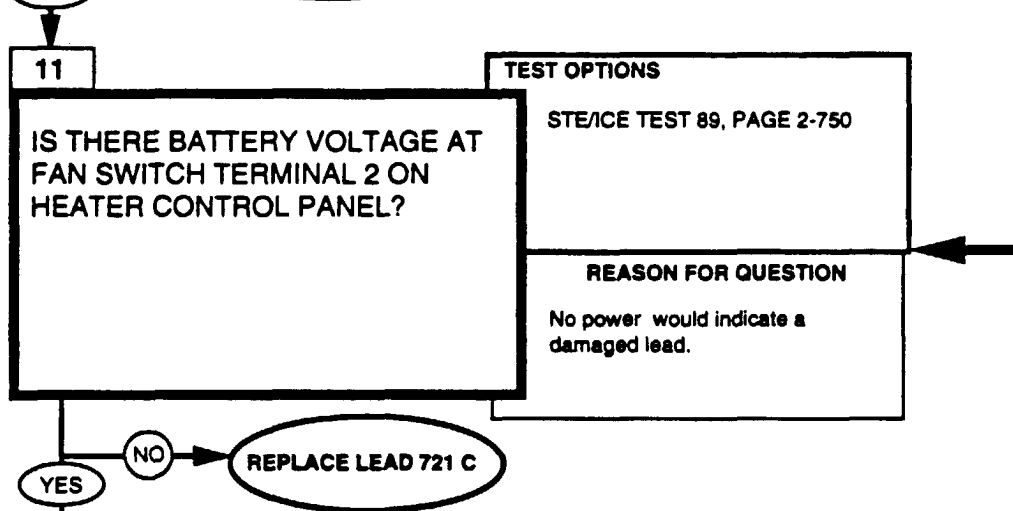
**AMBULANCE
(Blower Fan)
(M997 Only)
(Refer to Fig. 15.)**

DIAGNOSTIC FLOWCHART

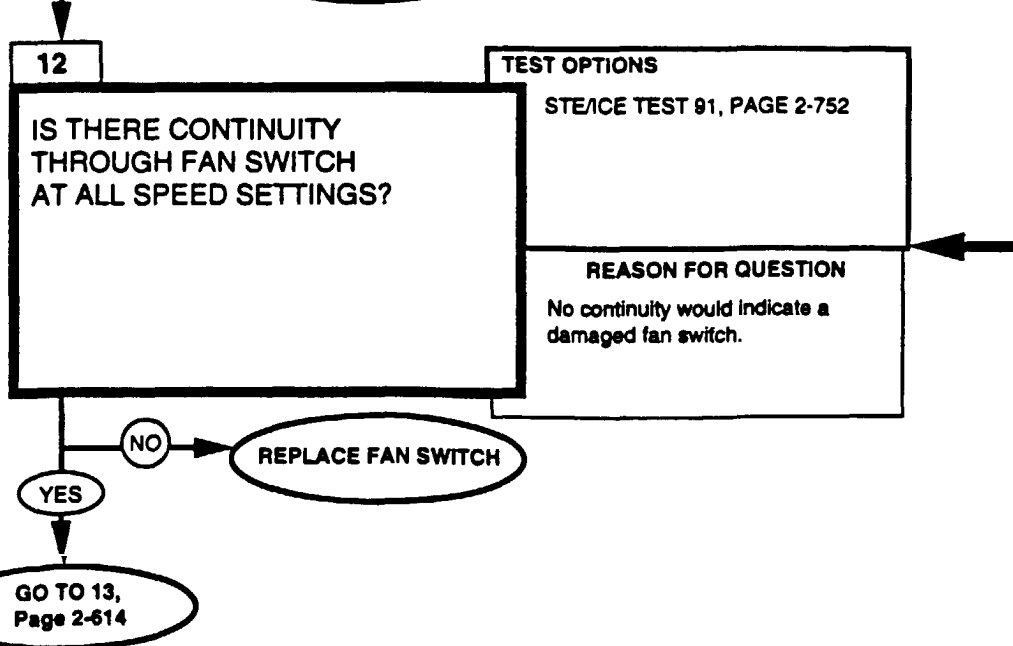
KNOWN INFO
PREVIOUSLY CORRECTED INFORMATION
POSSIBLE PROBLEMS
LEAD 721 B LEAD 721 C FAN SWITCH



KNOWN INFO
LEAD 721 B OK
POSSIBLE PROBLEMS
LEAD 721 A FAN SWITCH

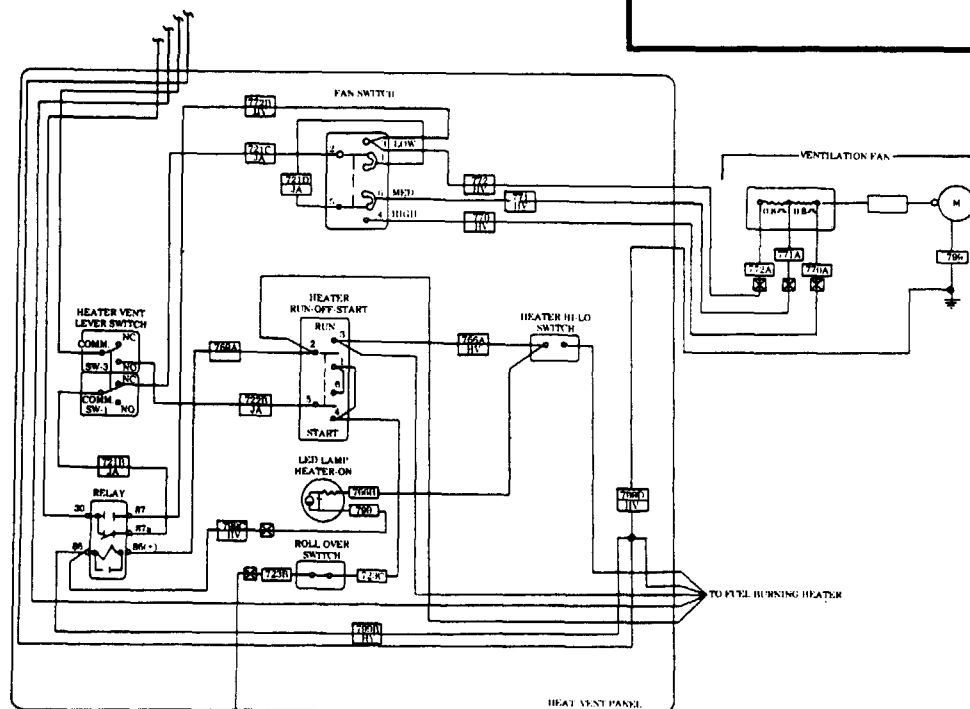
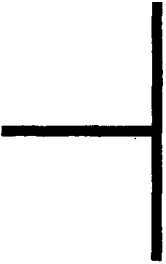
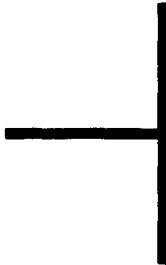


KNOWN INFO
LEAD 721 B OK LEAD 721 C OK
POSSIBLE PROBLEMS
FAN SWITCH



REFERENCE INFORMATION

AMBULANCE



**0-45 DC VOLTS
STE/ICE-R TEST 89**

1. Connect RED clip to the indicated test point, BLACK clip to negative or ground.
2. Start Test 89, DC volts.
3. Displayed reading is in volts.

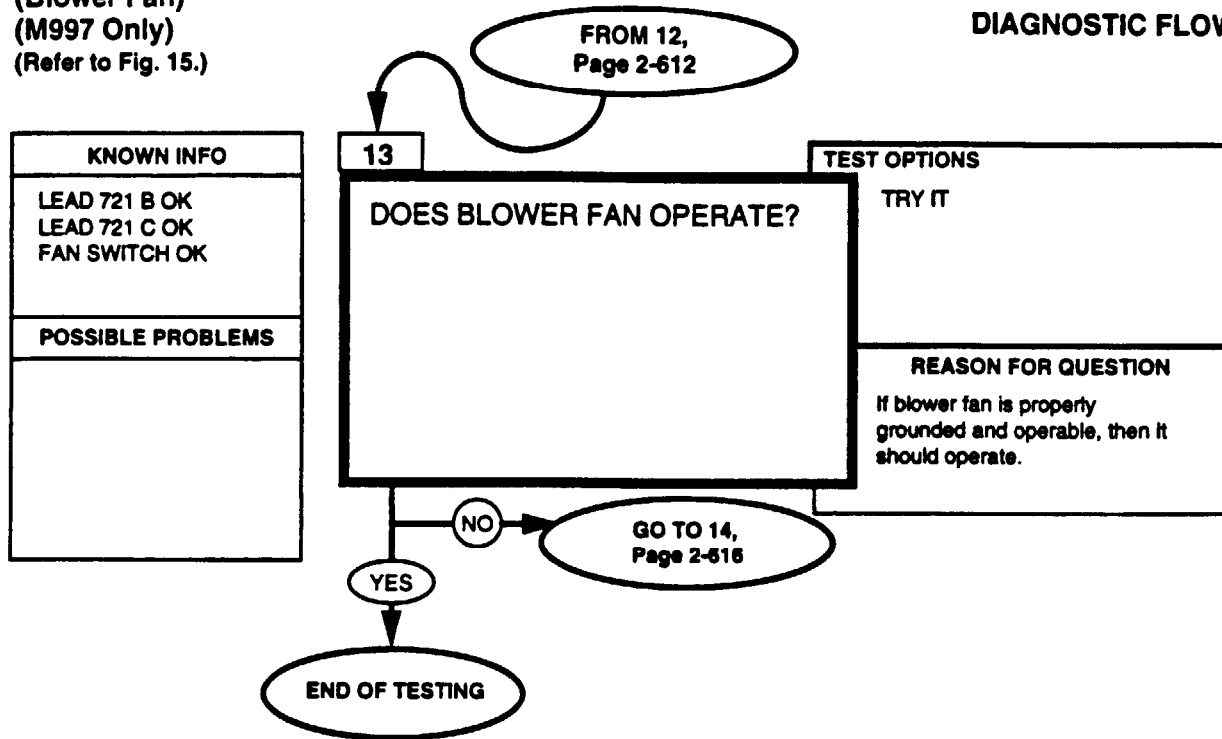
Replace fan switch, refer to (para. 4-127).

**0-4500 OHMS
STE/ICE -R TEST 91**

1. Connect RED clip and BLACK clip to the indicated terminals in question; RED to the first, BLACK to the second.
2. Start Test 91, 0-4500 ohms.
3. Displayed reading is in ohms. Less than 5 ohms is continuity. If the resistance is over 4500 ohms STE/ICE displays "9.9.9.9."

**AMBULANCE
(Blower Fan)
(M997 Only)
(Refer to Fig. 15.)**

DIAGNOSTIC FLOWCHART



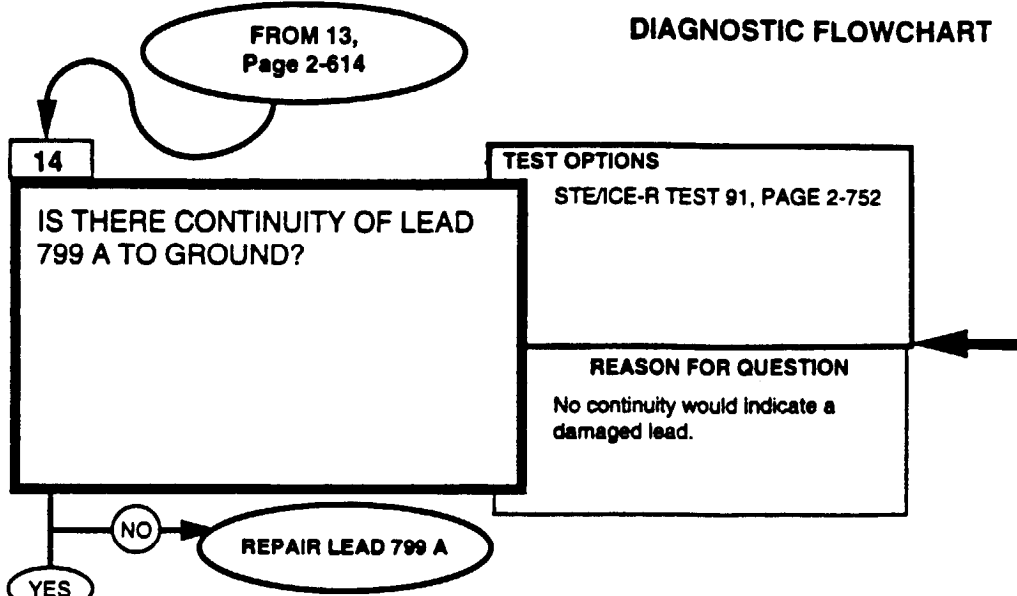
REFERENCE INFORMATION

AMBULANCE

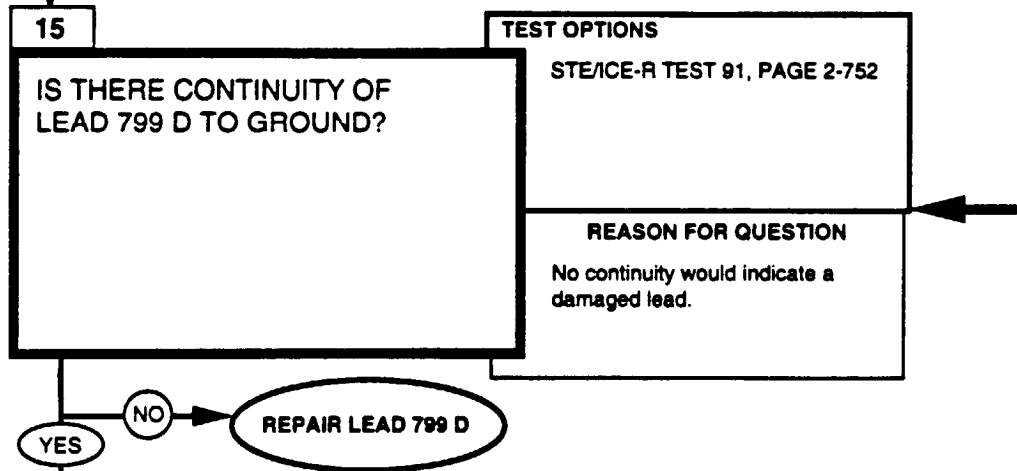
**AMBULANCE
(Blower Fan)
(M997 Only)
(Refer to Fig.15.)**

DIAGNOSTIC FLOWCHART

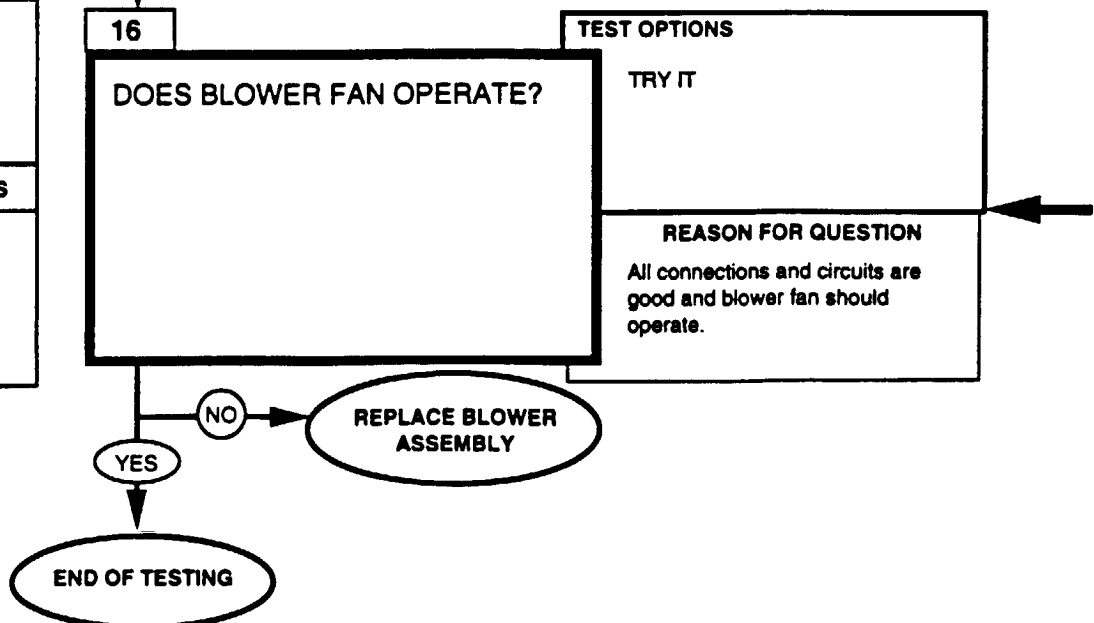
KNOWN INFO
PREVIOUSLY CORRECTED INFORMATION
POSSIBLE PROBLEMS
LEAD 799 A LEAD 799 D BLOWER ASSEMBLY



KNOWN INFO
LEAD 799 A OK
POSSIBLE PROBLEMS
LEAD 799 D BLOWER ASSEMBLY



KNOWN INFO
LEAD 799 A OK LEAD 799 D OK
POSSIBLE PROBLEMS
BLOWER ASSEMBLY



REFERENCE INFORMATION

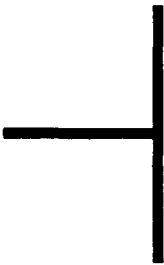
AMBULANCE



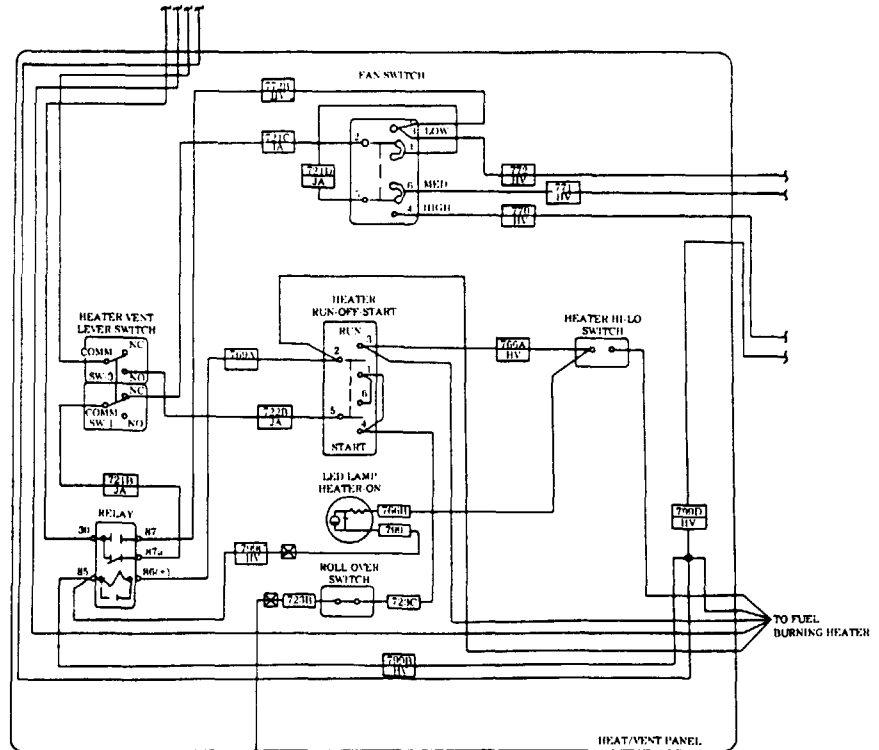
Repair lead, refer to (para. 4-85).
Repair lead connector, refer to (para. 4-85).

**0-4500 OHMS
STE/ICE -R TEST 91**

1. Connect RED clip and BLACK clip to the indicated terminals in question; RED to the first, BLACK to the second.
2. Start Test 91, 0-4500 ohms.
3. Displayed reading is in ohms. Less than 5 ohms is continuity. If the resistance is over 4500 ohms STE/ICE displays "9.9.9.9."



Repair lead, refer to (para. 4-85).



Replace blower assembly, refer to (para. 11-212).

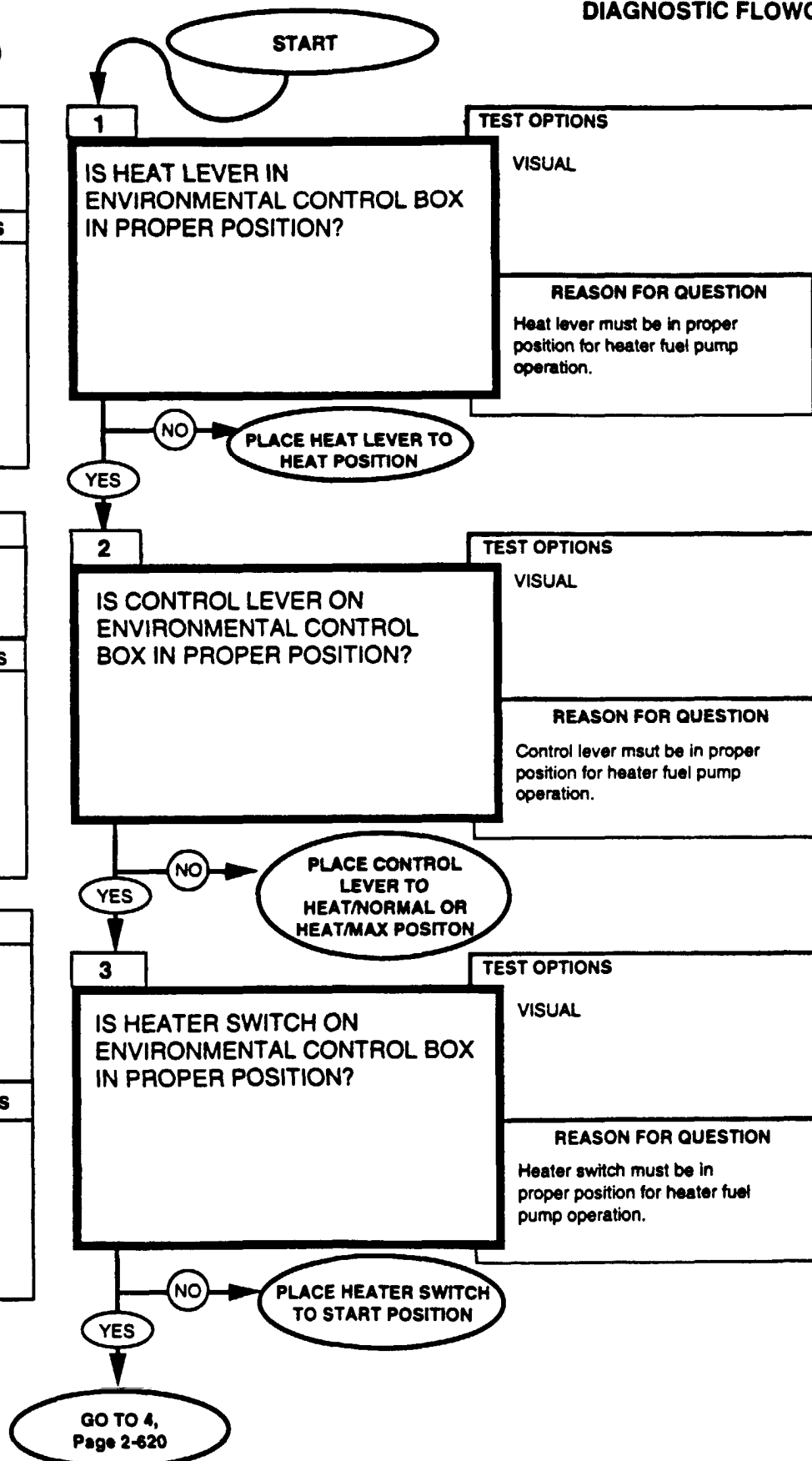
DIAGNOSTIC FLOWCHART

**AMBULANCE
(Heater Fuel Pump)
(Refer to Figs.14-16.)**

KNOWN INFO
NOTHING
POSSIBLE PROBLEMS
HEAT LEVER POSITION CONTROL LEVER POSITION HEATER SWITCH POSITION FUSE BATTERY CABLE 660 LEAD 798 FUEL PUMP

KNOWN INFO
HEAT LEVER POSITION OK
POSSIBLE PROBLEMS
CONTROL LEVER POSITION HEATER SWITCH POSITION FUSE BATTERY CABLE 660 LEAD 798 FUEL PUMP

KNOWN INFO
HEAT LEVER POSITION OK CONTROL LEVER POSITION OK
POSSIBLE PROBLEMS
HEATER SWITCH POSITION FUSE BATTERY CABLE 660 LEAD 798 FUEL PUMP



REFERENCE INFORMATION

AMBULANCE

**AMBULANCE
(Heater Fuel Pump)
(Refer to Figs. 14-16.)**

DIAGNOSTIC FLOWCHART

KNOWN INFO
HEAT LEVER POSITION OK CONTROL LEVER POSITION OK HEATER SWITCH POSITION OK
POSSIBLE PROBLEMS
FUSE BATTERY CABLE 660 LEAD 798 FUEL PUMP

KNOWN INFO
HEAT LEVER POSITION OK CONTROL LEVER POSITION OK HEATER SWITCH POSITION OK
POSSIBLE PROBLEMS
BATTERY CABLE 660 LEAD 798 FUEL PUMP

KNOWN INFO
HEAT LEVER POSITION OK CONTROL LEVER POSITION OK HEATER SWITCH POSITION OK FUSE OK BATTERY OK
POSSIBLE PROBLEMS
CABLE 660 LEAD 798 FUEL PUMP

FROM 3, Page 2-618

4

CHECK FUSE BLOCK ON CONTROL COVER. IS FUSE OK?

TEST OPTIONS
VISUAL

REASON FOR QUESTION
If fuse is blown, circuit is incomplete.

NO → REPLACE BLOWN FUSE

YES →

5

IS BATTERY IN PROPER WORKING ORDER?

TEST OPTIONS
1. STE/ICE-R TEST 89, PAGE 2-750
2. MULTIMETER

REASON FOR QUESTION
Battery malfunction will cause any dependent circuit to malfunction.

NO → GO TO 1, Page 2-252

YES →

6

IS THERE BATTERY VOLTAGE IN CONTROL BOX AT POWER STUD?

TEST OPTIONS
1. STE/ICE-R TEST 89, PAGE 2-750
2. MULTIMETER

REASON FOR QUESTION
No power at power stud would indicate a damaged cable from the power source.

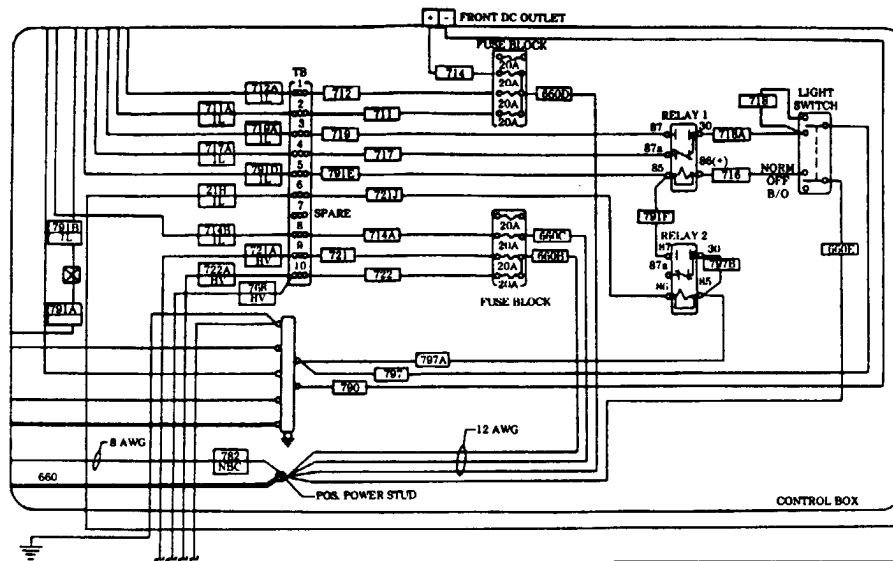
NO → REPAIR CABLE 660

YES →

GO TO 7, Page 2-622

REFERENCE INFORMATION

AMBULANCE



**0-45 DC VOLTS
STEICE-R TEST 89**

1. Connect RED clip to the indicated test point, BLACK clip to negative or ground.
2. Start Test 89, DC volts.
3. Displayed reading is in volts.

**BATTERY VOLTAGE
MULTIMETER**

1. Set the voltmeter to a DC volts scale of at least 40 volts.
2. Connect the RED lead to positive and the BLACK lead to negative.
3. Be sure to read the correct scale.

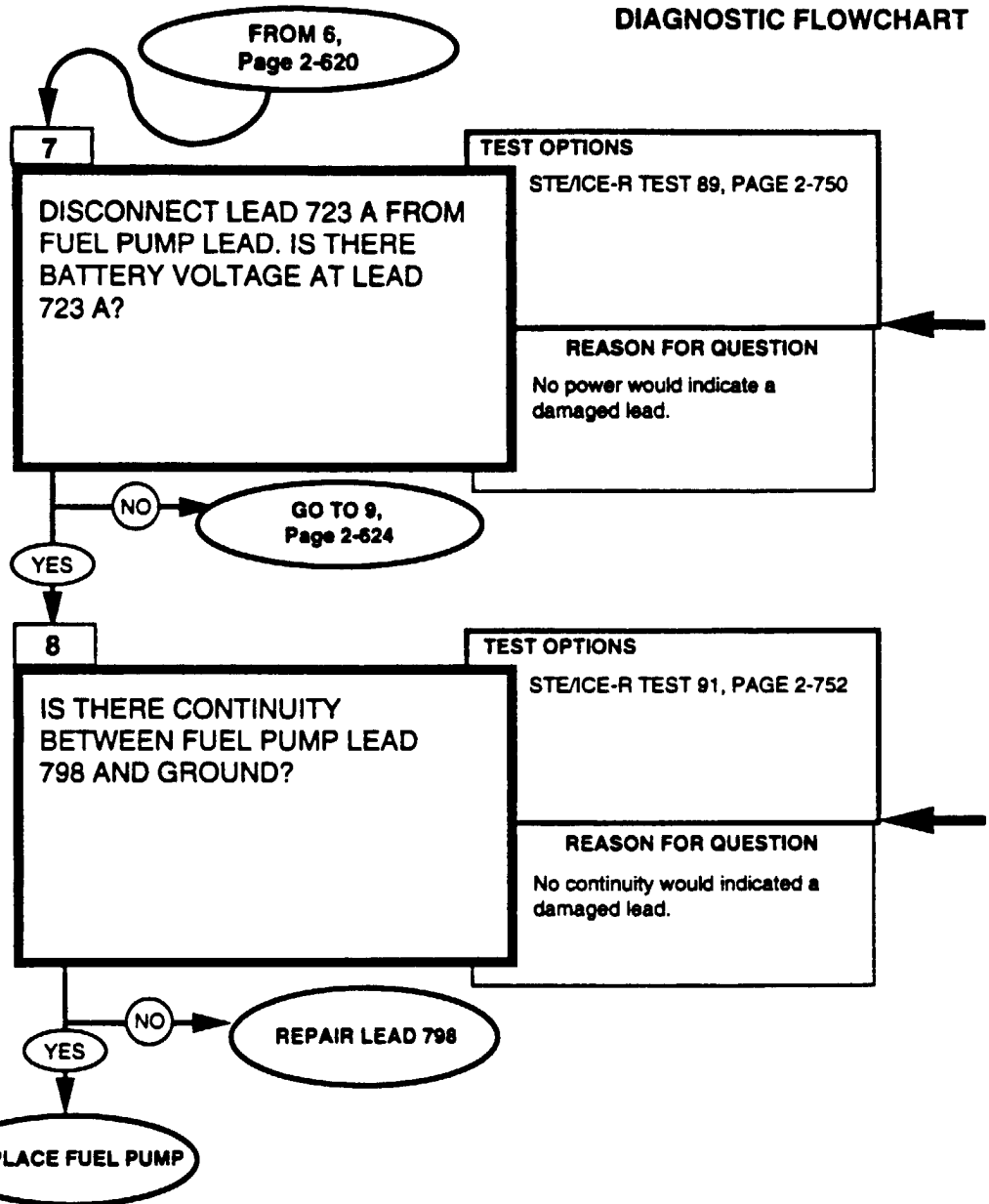
Repair lead, refer to (para. 4-85).

AMBULANCE
(Heater Fuel Pump)
 (Refer to Figs.14-16.)

DIAGNOSTIC FLOWCHART

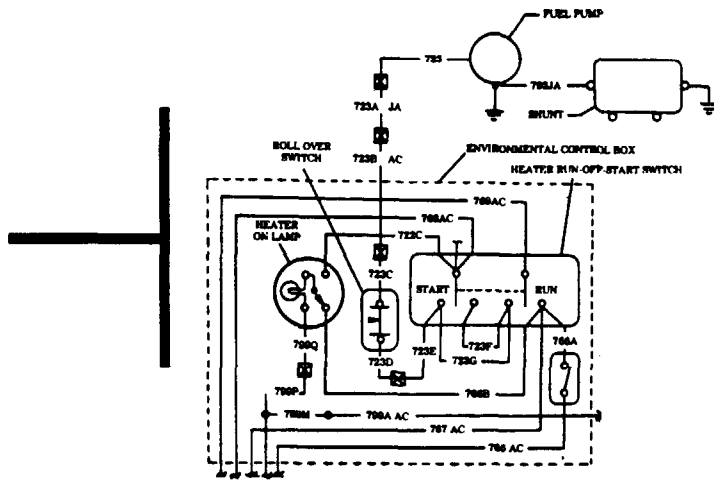
KNOWN INFO
HEAT LEVER POSITION OK
CONTROL LEVER POSITION OK
HEATER SWITCH POSITION OK
FUSE OK
BATTERY OK
CABLE 660 OK
POSSIBLE PROBLEMS
LEAD 798 FUEL PUMP

KNOWN INFO
HEAT LEVER POSITION OK
CONTROL LEVER POSITION OK
HEATER SWITCH POSITION OK
FUSE OK
BATTERY OK
CABLE 660 OK
POSSIBLE PROBLEMS
LEAD 798 FUEL PUMP



REFERENCE INFORMATION

AMBULANCE



**0-45 DC VOLTS
STE/ICE-R TEST 89**

1. Connect RED clip to the indicated test point, BLACK clip to negative or ground.
2. Start Test 89, DC volts.
3. Displayed reading is in volts.



Repair lead, refer to (para. 4-85).
Repair lead connector, refer to (para. 4-85).

Replace heater fuel pump, refer to (para. 11-194).

**0-4500 OHMS
STE/ICE -R TEST 91**

1. Connect RED clip and BLACK clip to the indicated terminals in question; RED to the first, BLACK to the second.
2. Start Test 91, 0-4500 ohms.
3. Displayed reading is in ohms. Less than 5 ohms is continuity. If the resistance is over 4500 ohms STE/ICE displays "9.9.9.9."

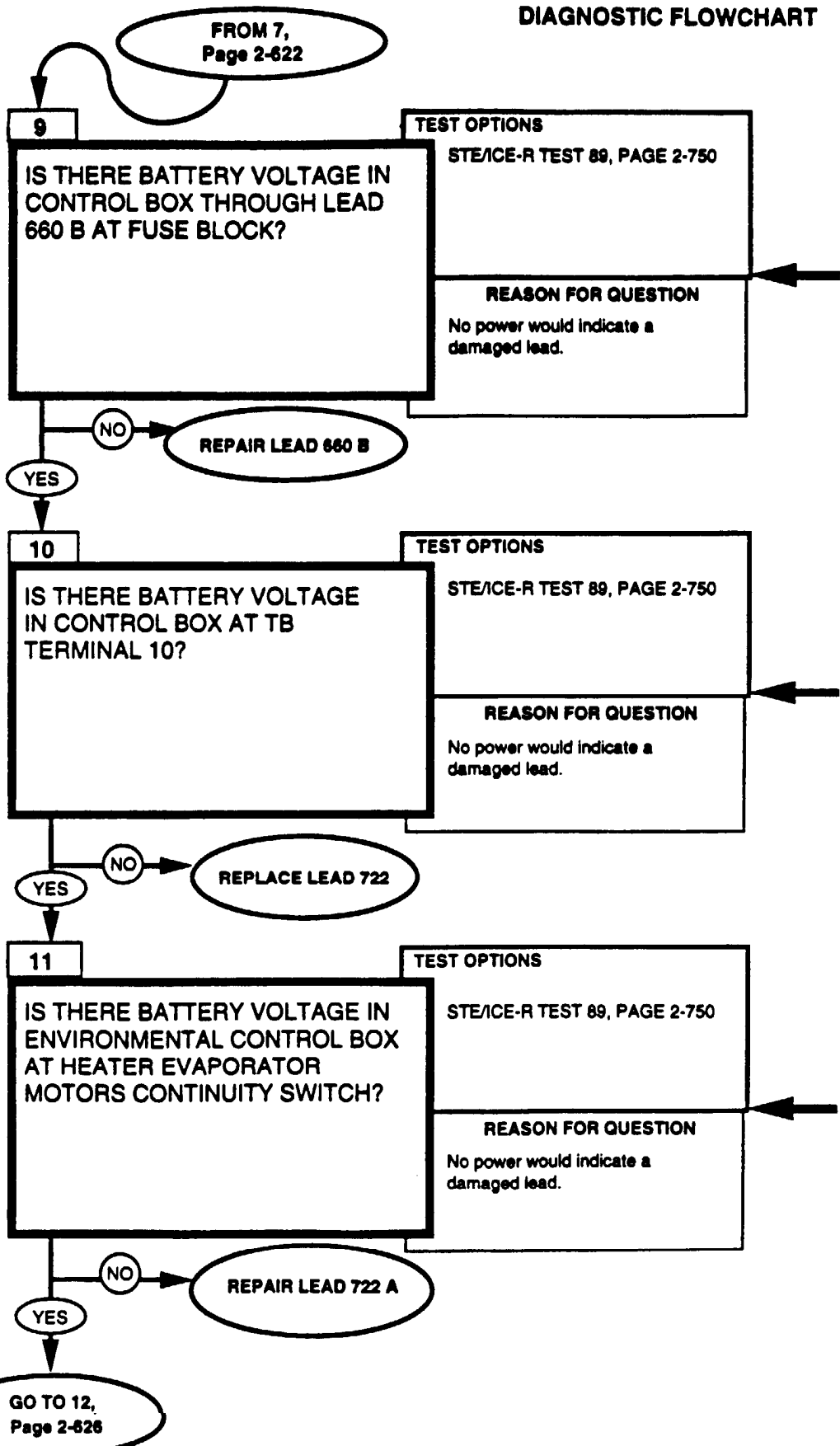
**AMBULANCE
(Heater Fuel Pump)
(Refer to Figs. 14-16.)**

DIAGNOSTIC FLOWCHART

KNOWN INFO
PREVIOUSLY CORRECTED INFORMATION
POSSIBLE PROBLEMS
LEAD 660 B LEAD 722 LEAD 722 A HEATER CONTINUITY SWITCH LEAD 722 B HEATER FRESH AIR SWITCH LEAD 722 C HEATER SWITCH LEAD 722 D ROLLOVER SWITCH LEAD 723 C LEAD 723 B LEAD 723 A FUEL PUMP

KNOWN INFO
LEAD 660 B OK
POSSIBLE PROBLEMS
LEAD 722 LEAD 722 A HEATER CONTINUITY SWITCH LEAD 722 B HEATER FRESH AIR SWITCH LEAD 722 C HEATER SWITCH LEAD 722 D ROLLOVER SWITCH LEAD 723 C LEAD 723 B LEAD 723 A FUEL PUMP

KNOWN INFO
LEAD 660 B OK LEAD 722 OK
POSSIBLE PROBLEMS
LEAD 722 A HEATER CONTINUITY SWITCH LEAD 722 B HEATER FRESH AIR SWITCH LEAD 722 C HEATER SWITCH LEAD 722 D ROLLOVER SWITCH LEAD 723 C LEAD 723 B LEAD 723 A FUEL PUMP



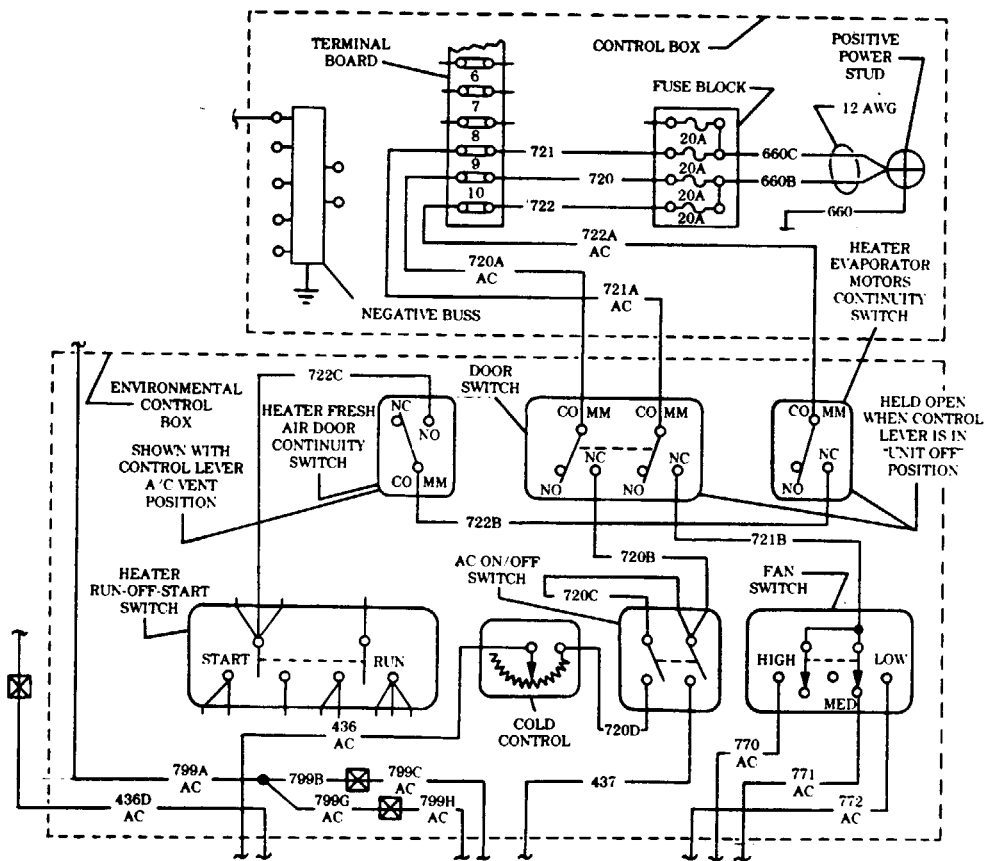
REFERENCE INFORMATION

AMBULANCE

**0-45 DC VOLTS
STE/ICE-R TEST 89**

1. Connect RED clip to the indicated test point, BLACK clip to negative or ground.
2. Start Test 89, DC volts.
3. Displayed reading is in volts.

Repair lead, refer to (para. 4-85).
Repair lead connector, refer to (para. 4-85).



Repair lead, refer to (para. 4-85).
Repair lead connector, refer to (para. 4-85).

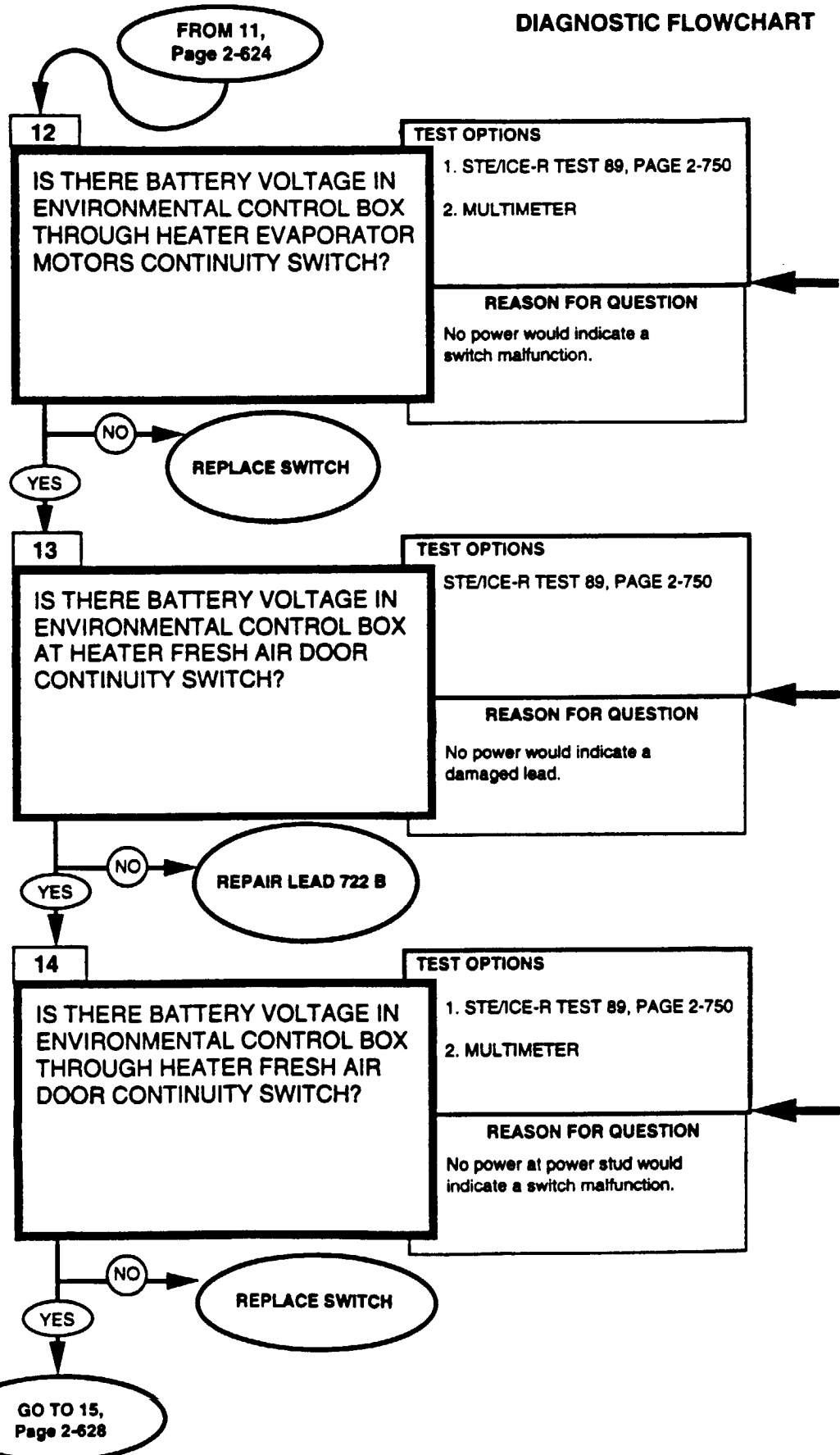
**AMBULANCE
(Heater Fuel Pump)
(Refer to Figs. 14-16.)**

DIAGNOSTIC FLOWCHART

KNOWN INFO
LEAD 660 B OK LEAD 722 OK LEAD 722 A OK
POSSIBLE PROBLEMS
HEATER CONTINUITY SWITCH LEAD 722 B HEATER FRESH AIR SWITCH LEAD 722 C HEATER SWITCH LEAD 723 D ROLLOVER SWITCH LEAD 723 C LEAD 723B LEAD 723 A FUEL PUMP

KNOWN INFO
LEAD 660 B OK LEAD 722 OK LEAD 722 A OK HEATER CONTINUITY SWITCH OK
POSSIBLE PROBLEMS
LEAD 722 B HEATER FRESH AIR SWITCH LEAD 722 C HEATER SWITCH LEAD 723 D ROLLOVER SWITCH LEAD 723 C LEAD 723 B LEAD 723 A FUEL PUMP

KNOWN INFO
LEAD 660 B OK LEAD 722 OK LEAD 722 A OK HEATER CONTINUITY SWITCH OK LEAD 722 B OK
POSSIBLE PROBLEMS
HEATER FRESH AIR SWITCH LEAD 722 C HEATER SWITCH LEAD 723 D ROLLOVER SWITCH LEAD 723 C LEAD 723 B LEAD 723 A FUEL PUMP



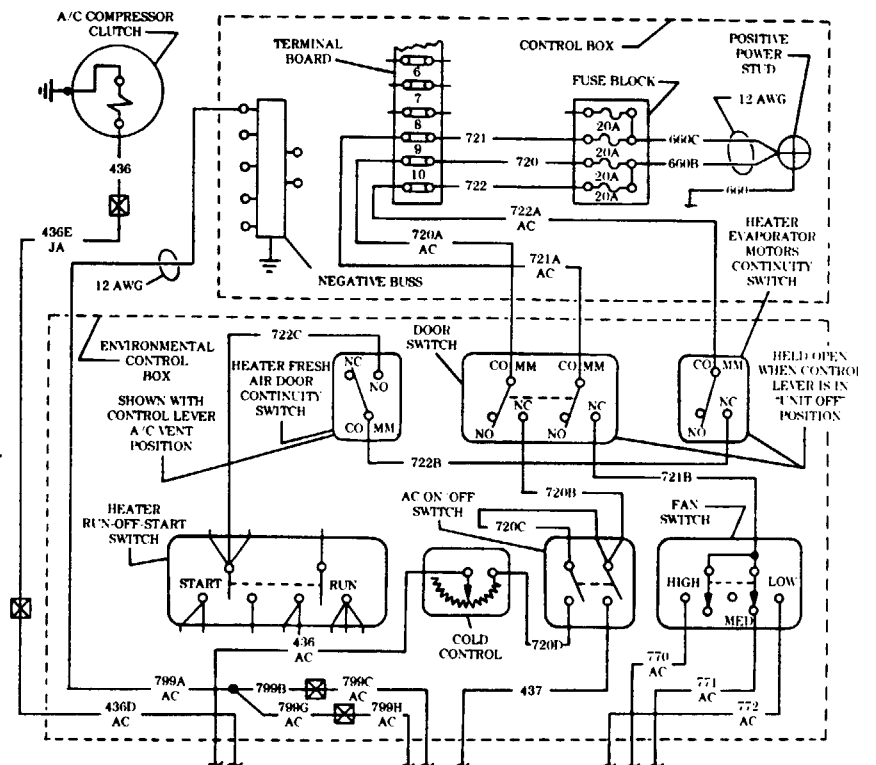
REFERENCE INFORMATION

AMBULANCE

Replace Heater Evaporator Motors continuity switch, refer to DS Maintenance.

<p>0-45 DC VOLTS STE/CE-R TEST 89</p>
<ol style="list-style-type: none"> 1. Connect RED clip to the indicated test point, BLACK clip to negative or ground. 2. Start Test 89, DC volts. 3. Displayed reading is in volts.
<p>BATTERY VOLTAGE MULTIMETER</p>
<ol style="list-style-type: none"> 1. Set the voltmeter to a DC volts scale of at least 40 volts. 2. Connect the RED lead to positive and the BLACK lead to negative. 3. Be sure to read the correct scale.

Replace Heater Fresh Air Door continuity switch, refer to DS Maintenance.



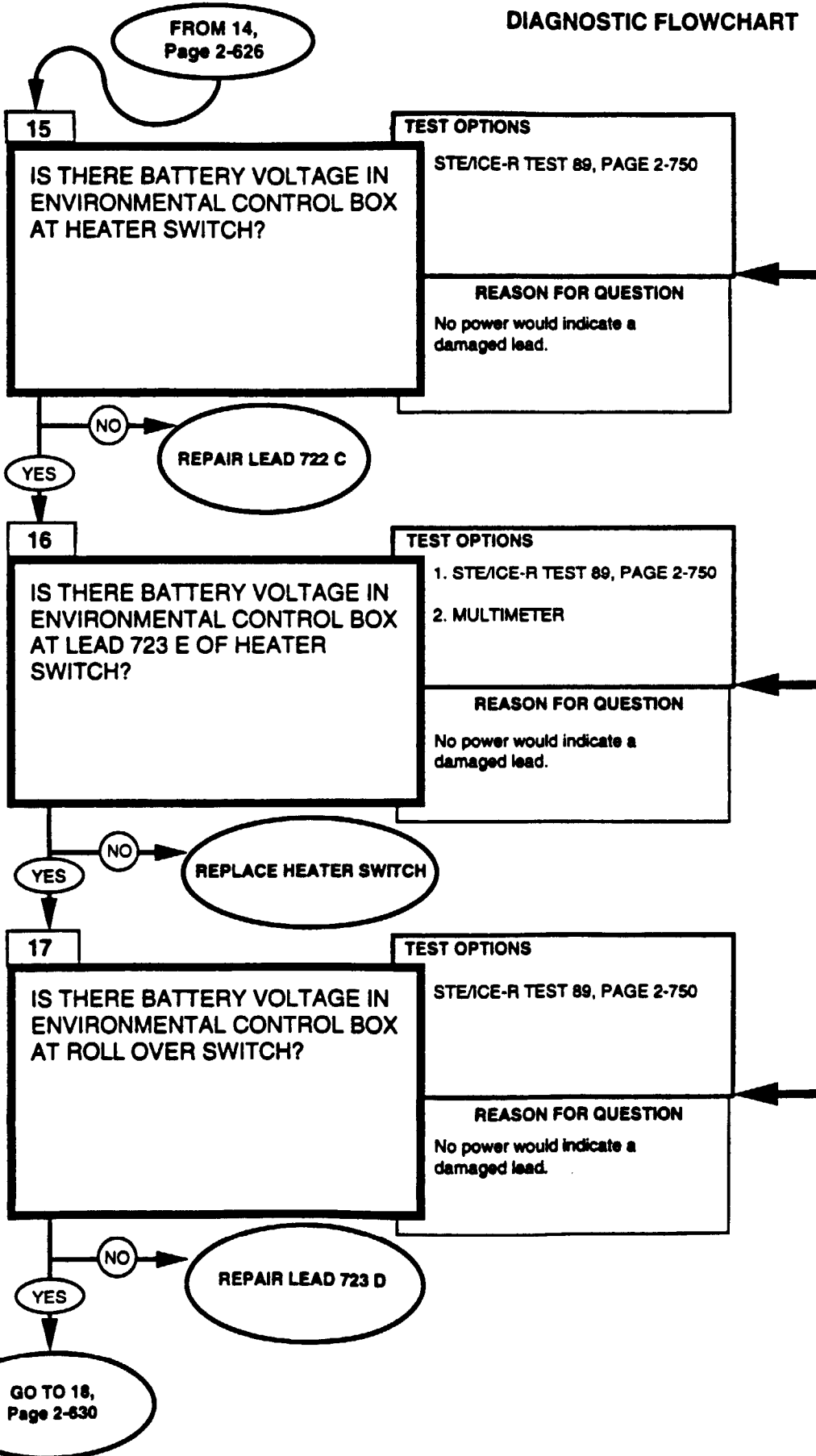
**AMBULANCE
(Heater Fuel Pump)
(Refer to Figs. 14-16.)**

DIAGNOSTIC FLOWCHART

KNOWN INFO
LEAD 660 B OK LEAD 722 OK LEAD 722 A OK HEATER CONTINUITY SWITCH OK LEAD 722 B OK HEATER FRESH AIR SWITCH OK
POSSIBLE PROBLEMS
LEAD 722 C HEATER SWITCH LEAD 723 D ROLLOVER SWITCH LEAD 723 C LEAD 723 B LEAD 723 A FUEL PUMP

KNOWN INFO
LEAD 660 B OK LEAD 722 OK LEAD 722 A OK HEATER CONTINUITY SWITCH OK HEATER FRESH AIR SWITCH OK LEAD 722 C OK
POSSIBLE PROBLEMS
HEATER SWITCH LEAD 723 D ROLL OVER SWITCH LEAD 723 C LEAD 723 B LEAD 723 A FUEL PUMP

KNOWN INFO
LEAD 660 B OK LEAD 722 OK LEAD 722 A OK HEATER CONTINUITY SWITCH OK LEAD 722 B OK HEATER FRESH AIR SWITCH OK LEAD 722 C OK HEATER SWITCH OK
POSSIBLE PROBLEMS
LEAD 723D ROLLOVER SWITCH LEAD 723 C LEAD 723 B LEAD 723 A FUEL PUMP

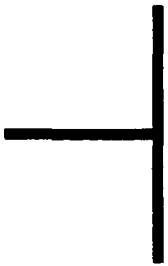


REFERENCE INFORMATION

AMBULANCE



Repair lead, refer to (para. 4-85).

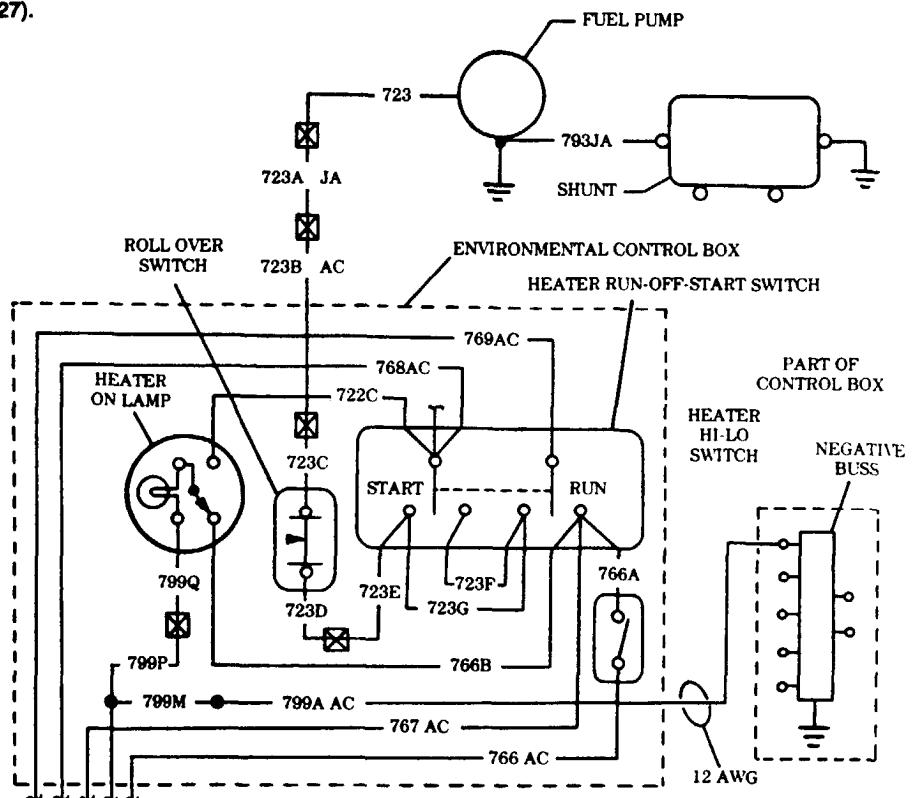


Replace Heater Switch, refer to (para. 4-126 or 4-127).



Repair lead, refer to (para. 4-85).
Repair lead connector, refer to (para. 4-85).

0-45 DC VOLTS STEACE-R TEST 89
<ol style="list-style-type: none"> 1. Connect RED clip to the indicated test point, BLACK clip to negative or ground. 2. Start Test 89, DC volts. 3. Displayed reading is in volts.
BATTERY VOLTAGE MULTIMETER
<ol style="list-style-type: none"> 1. Set the voltmeter to a DC volts scale of at least 40 volts. 2. Connect the RED lead to positive and the BLACK lead to negative. 3. Be sure to read the correct scale.



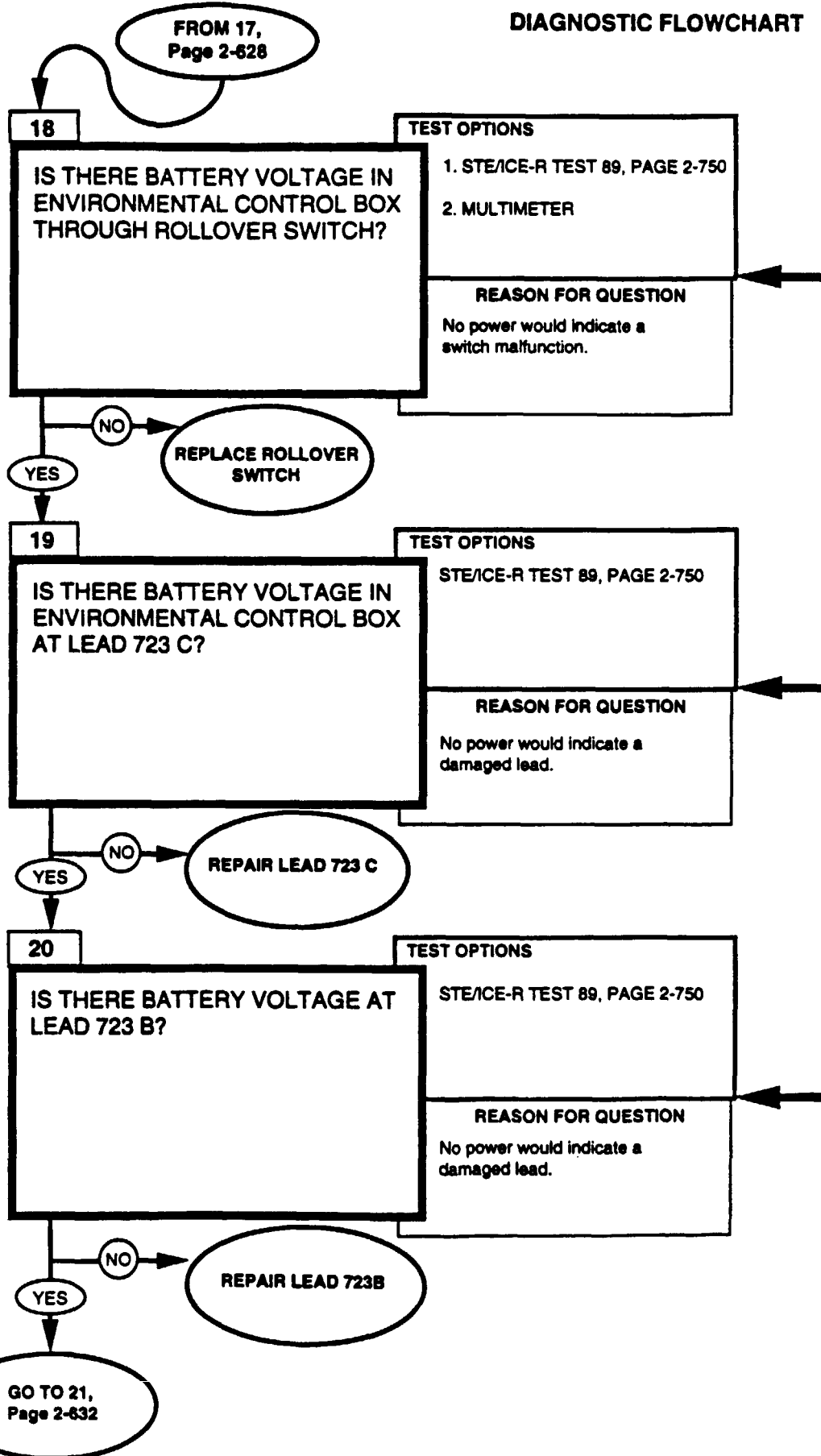
**AMBULANCE
(Heater Fuel Pump)
(Refer to Figs. 14-16.)**

DIAGNOSTIC FLOWCHART

KNOWN INFO
LEAD 660 B OK LEAD 722 OK LEAD 722 A OK HEATER CONTINUITY SWITCH OK LEAD 722 B OK HEATER FRESH AIR SWITCH OK LEAD 722 C OK HEATER SWITCH OK LEAD 723 D OK
POSSIBLE PROBLEMS
ROLLOVER SWITCH LEAD 723 C LEAD 723 B LEAD 723 A FUEL PUMP

KNOWN INFO
LEAD 660 B OK LEAD 722 OK LEAD 722 A OK HEATER CONTINUITY SWITCH OK LEAD 722 B OK HEATER FRESH AIR SWITCH OK LEAD 722 C OK HEATER SWITCH OK LEAD 723 D OK ROLLOVER SWITCH OK
POSSIBLE PROBLEMS
LEAD 723 C LEAD 723 B LEAD 723 A FUEL PUMP

KNOWN INFO
LEAD 660 B OK LEAD 722 OK LEAD 722 A OK HEATER CONTINUITY SWITCH OK LEAD 722 B OK HEATER FRESH AIR SWITCH OK LEAD 722 C OK HEATER SWITCH OK LEAD 723 D OK ROLLOVER SWITCH OK LEAD 723 C OK
POSSIBLE PROBLEMS
LEAD 723 B LEAD 723 A FUEL PUMP

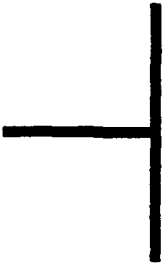


REFERENCE INFORMATION

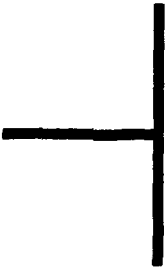
AMBULANCE



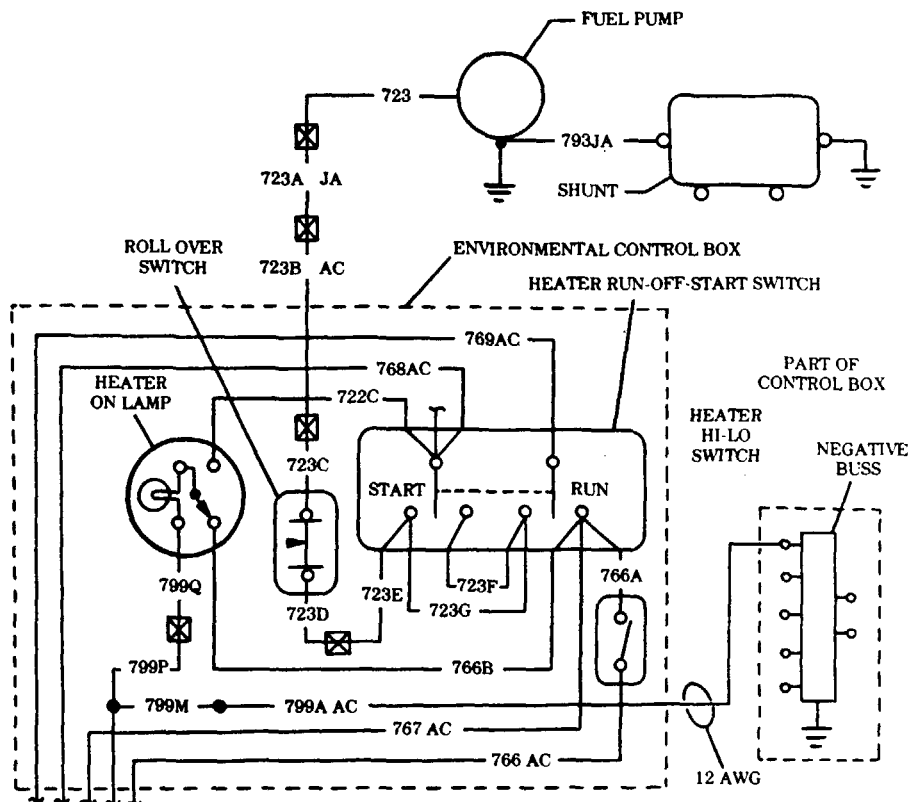
Replace Rollover Switch,
refer to (para. 4-126 or 4-127).



Repair lead,
refer to (para. 4-85).
Repair lead connector,
refer to (para. 4-85).



0-45 DC VOLTS STE/CE-R TEST 89
<ol style="list-style-type: none"> 1. Connect RED clip to the indicated test point, BLACK clip to negative or ground. 2. Start Test 89, DC volts. 3. Displayed reading is in volts.
BATTERY VOLTAGE MULTIMETER
<ol style="list-style-type: none"> 1. Set the voltmeter to a DC volts scale of at least 40 volts. 2. Connect the RED lead to positive and the BLACK lead to negative. 3. Be sure to read the correct scale.

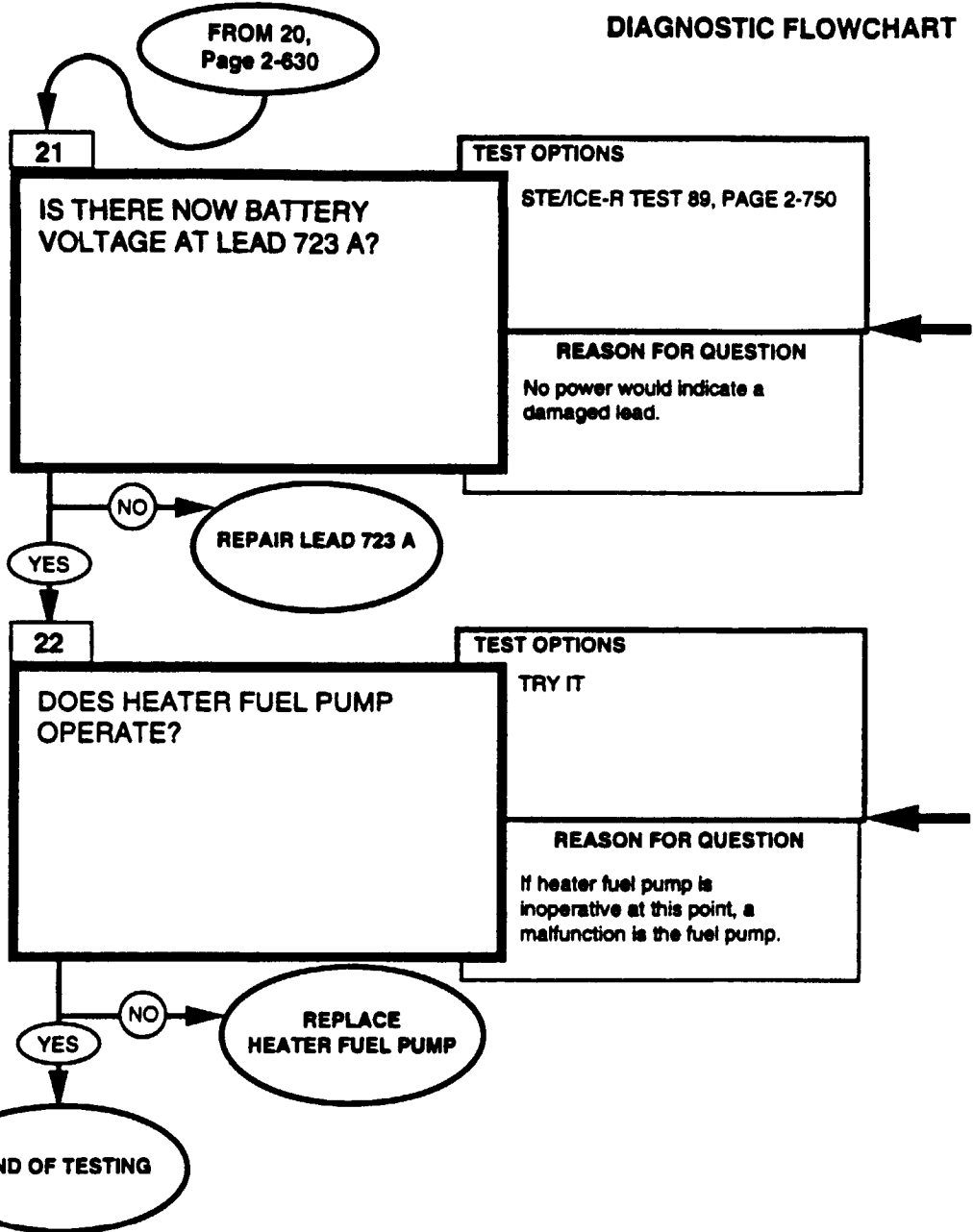


**AMBULANCE
(Heater Fuel Pump)
(Refer to Figs. 14-16.)**

DIAGNOSTIC FLOWCHART

KNOWN INFO
LEAD 660 B OK
LEAD 722 OK
LEAD 722 A OK
HEATER CONTINUITY SWITCH OK
LEAD 722 B OK
HEATER FRESH AIR SWITCH OK
LEAD 722 C OK
HEATER SWITCH OK
LEAD 723 D OK
ROLL OVER SWITCH OK
LEAD 723 C OK
LEAD 723 B OK
POSSIBLE PROBLEMS
LEAD 723 A FUEL PUMP

KNOWN INFO
LEAD 660 B OK
LEAD 722 OK
LEAD 722 A OK
HEATER CONTINUITY SWITCH OK
LEAD 722 B OK
HEATER FRESH AIR SWITCH OK
LEAD 722 C OK
HEATER SWITCH OK
LEAD 723 D OK
ROLL OVER SWITCH OK
LEAD 723 C OK
LEAD 723 B OK
LEAD 723 A OK
POSSIBLE PROBLEMS
FUEL PUMP



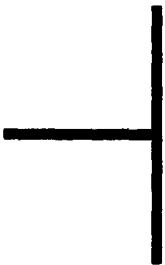
REFERENCE INFORMATION

AMBULANCE

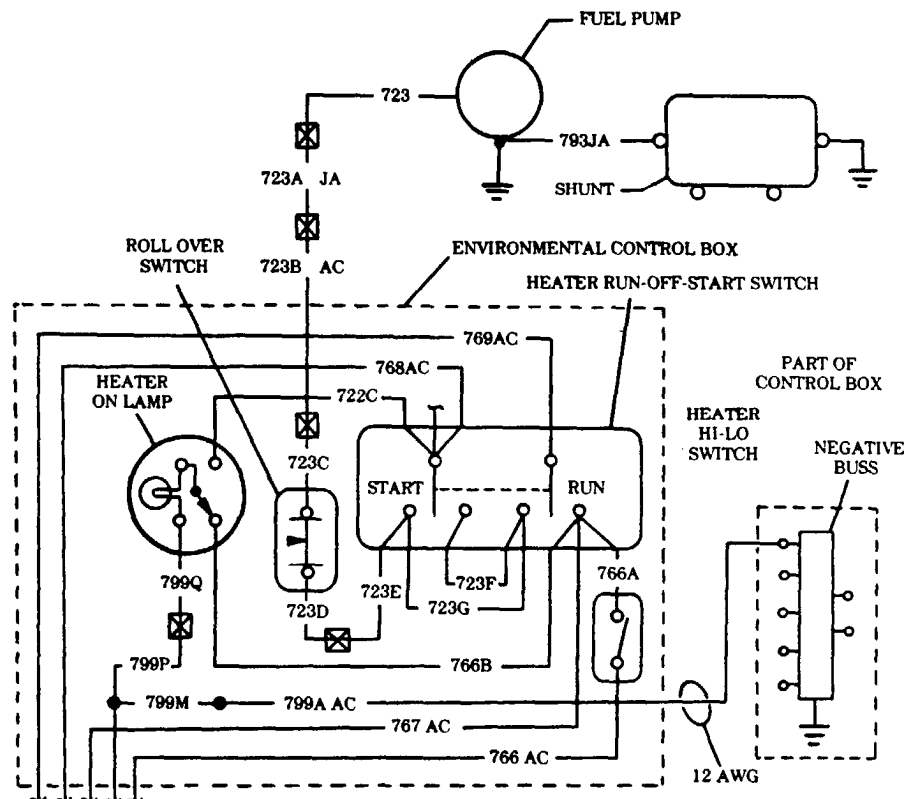


Repair lead,
refer to (para. 4-85).
Repair lead connector,
refer to (para. 4-85).

0-45 DC VOLTS STE/CE-R TEST 89
<ol style="list-style-type: none"> 1. Connect RED clip to the indicated test point, BLACK clip to negative or ground. 2. Start Test 89, DC volts. 3. Displayed reading is in volts.



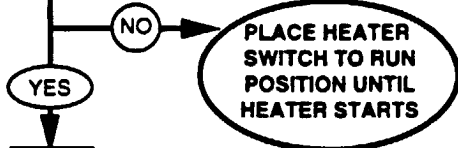
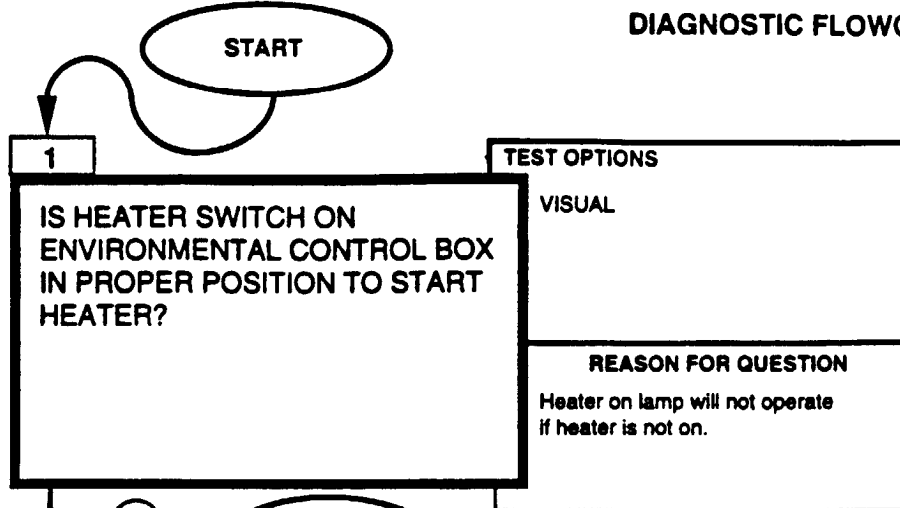
Replace Heater Fuel Pump,
refer to (para. 11-194).



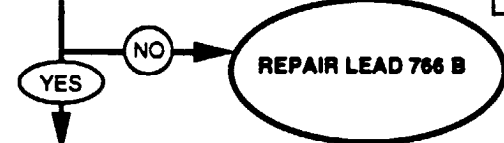
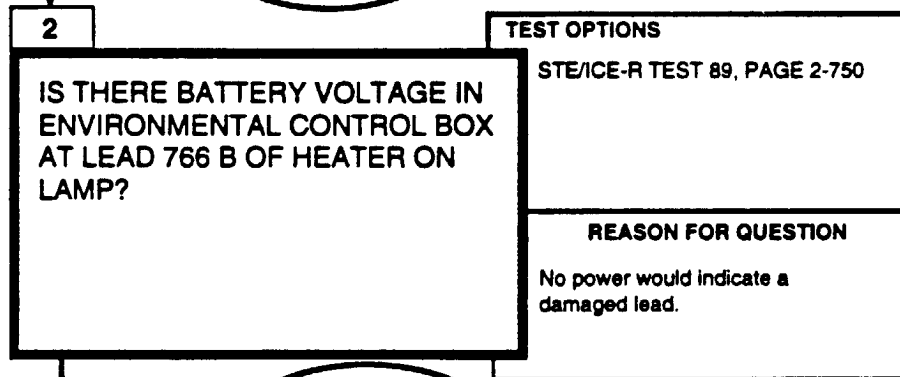
**AMBULANCE
(Heater On Lamp)
(Heater Operates)
(Refer to Figs. 15, 16.)**

DIAGNOSTIC FLOWCHART

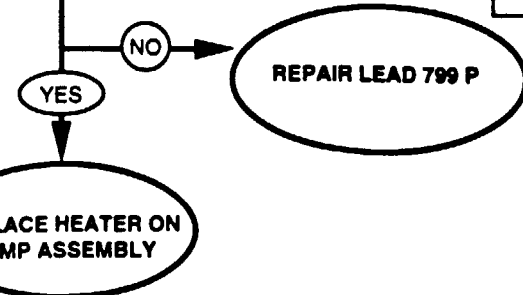
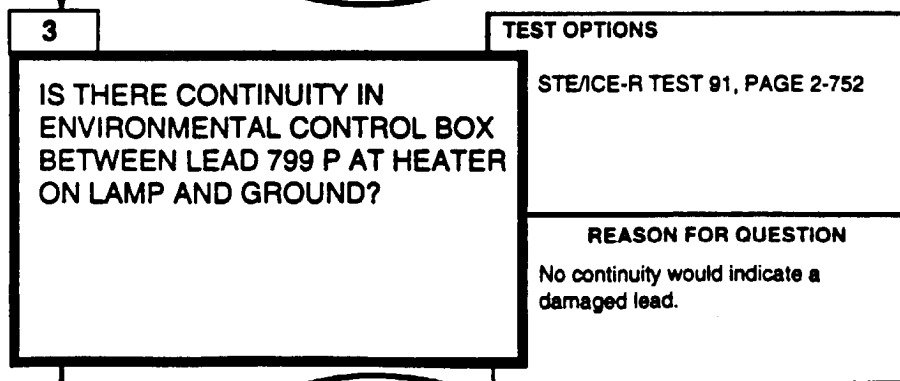
KNOWN INFO
NOTHING
POSSIBLE PROBLEMS
HEATER SWITCH POSITION LEAD 766 B LEAD 799 P HEATER ON LAMP



KNOWN INFO
HEATER SWITCH POSITION OK
POSSIBLE PROBLEMS
LEAD 766 B LEAD 799 P HEATER ON LAMP

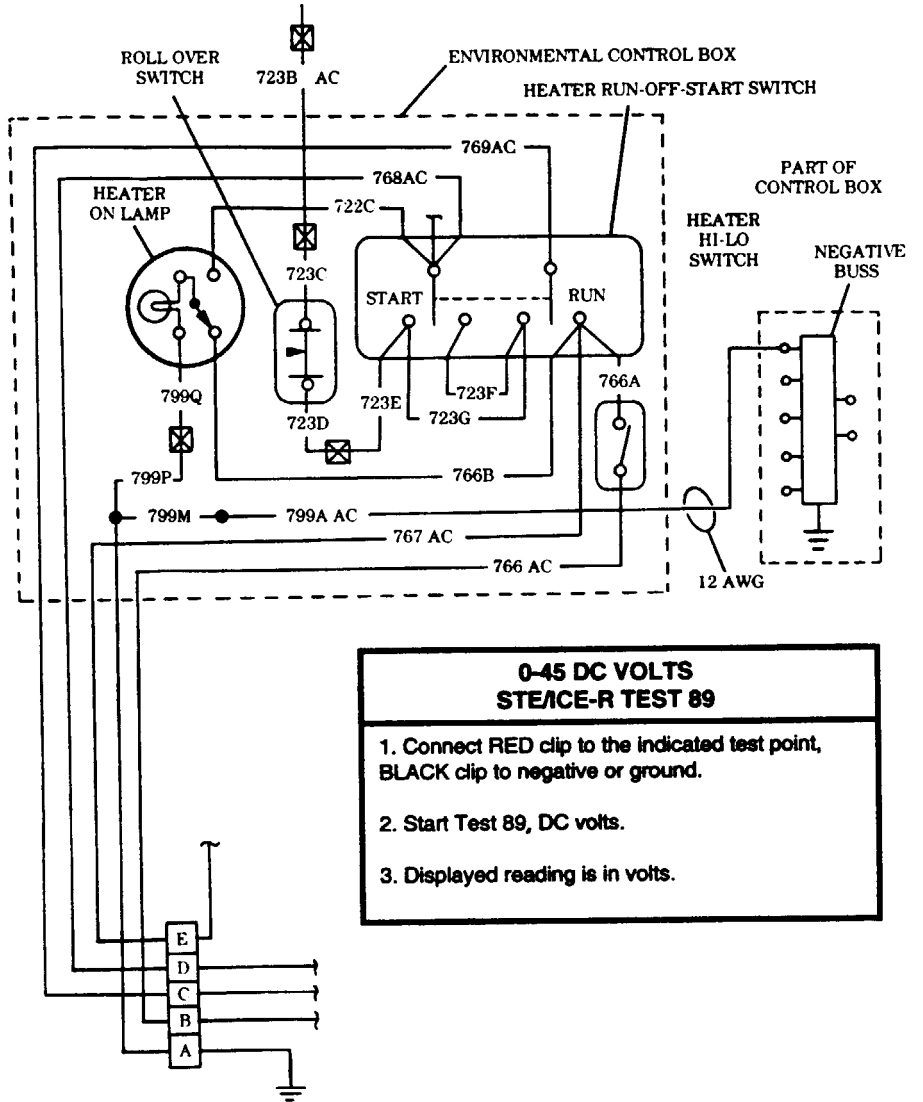


KNOWN INFO
HEATER SWITCH POSITION OK LEAD 766 B OK
POSSIBLE PROBLEMS
LEAD 799 P HEATER ON LAMP



REFERENCE INFORMATION

AMBULANCE



Repair lead, refer to (para. 4-85).

**0-45 DC VOLTS
STE/ICE-R TEST 89**

1. Connect RED clip to the indicated test point, BLACK clip to negative or ground.
2. Start Test 89, DC volts.
3. Displayed reading is in volts.

Repair lead, refer to (para. 4-85).
Repair lead connector, refer to (para. 4-85).
Replace Heater on Lamp, refer to (para. 4-126 or 4-127).

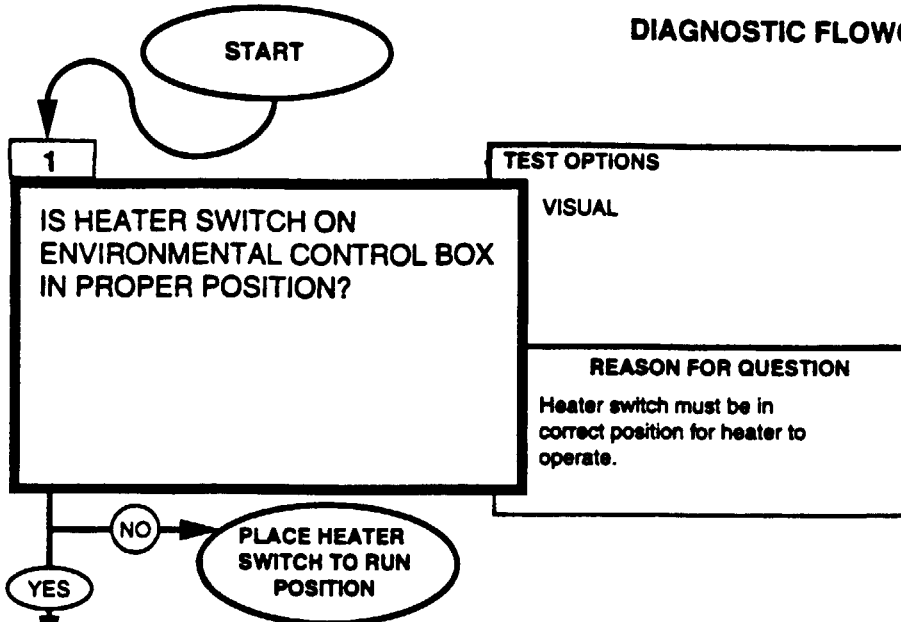
**0-4500 OHMS
STE/ICE-R TEST 91**

1. Connect RED clip and BLACK clip to the indicated terminals in question; RED to the first, BLACK to the second.
2. Start test 91, 0-4500 ohms.
3. Displayed reading is in ohms. Less than 5 ohms is continuity. If the resistance is over 4500 ohms, STE/ICE displays "9.9.9.9."

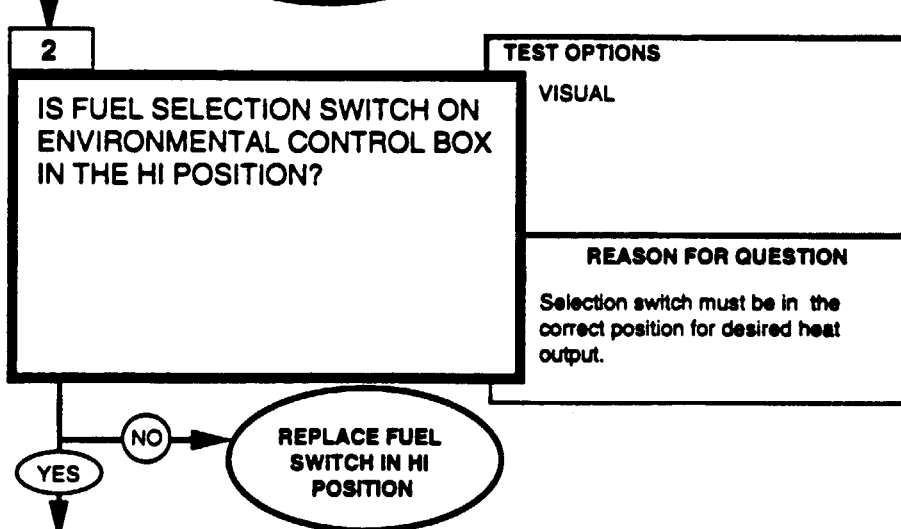
**AMBULANCE
(Heater Output)
(Refer to Figs. 14-16.)**

DIAGNOSTIC FLOWCHART

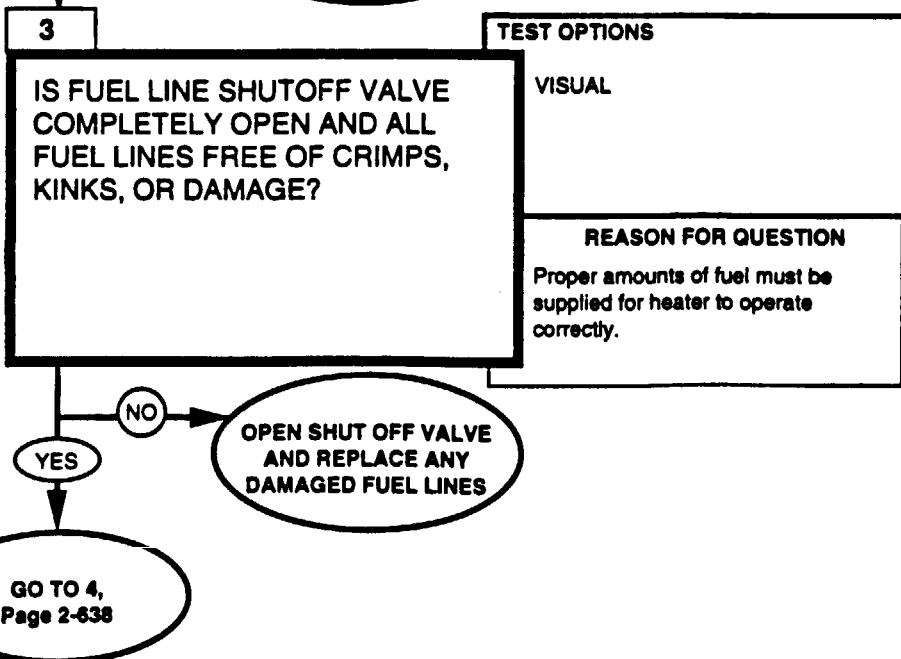
KNOWN INFO
NOTHING
POSSIBLE PROBLEMS
HEATER SWITCH POSITION FUEL SWITCH POSITION FUEL SHUTOFF VALVE POSITION FUEL LINES FUEL FILTER LEAD 766 A FUEL SWITCH



KNOWN INFO
HEATER SWITCH POSITION OK
POSSIBLE PROBLEMS
FUEL SWITCH POSITION FUEL SWITCH VALVE POSITION FUEL LINES FUEL FILTER LEAD 766 A FUEL SWITCH

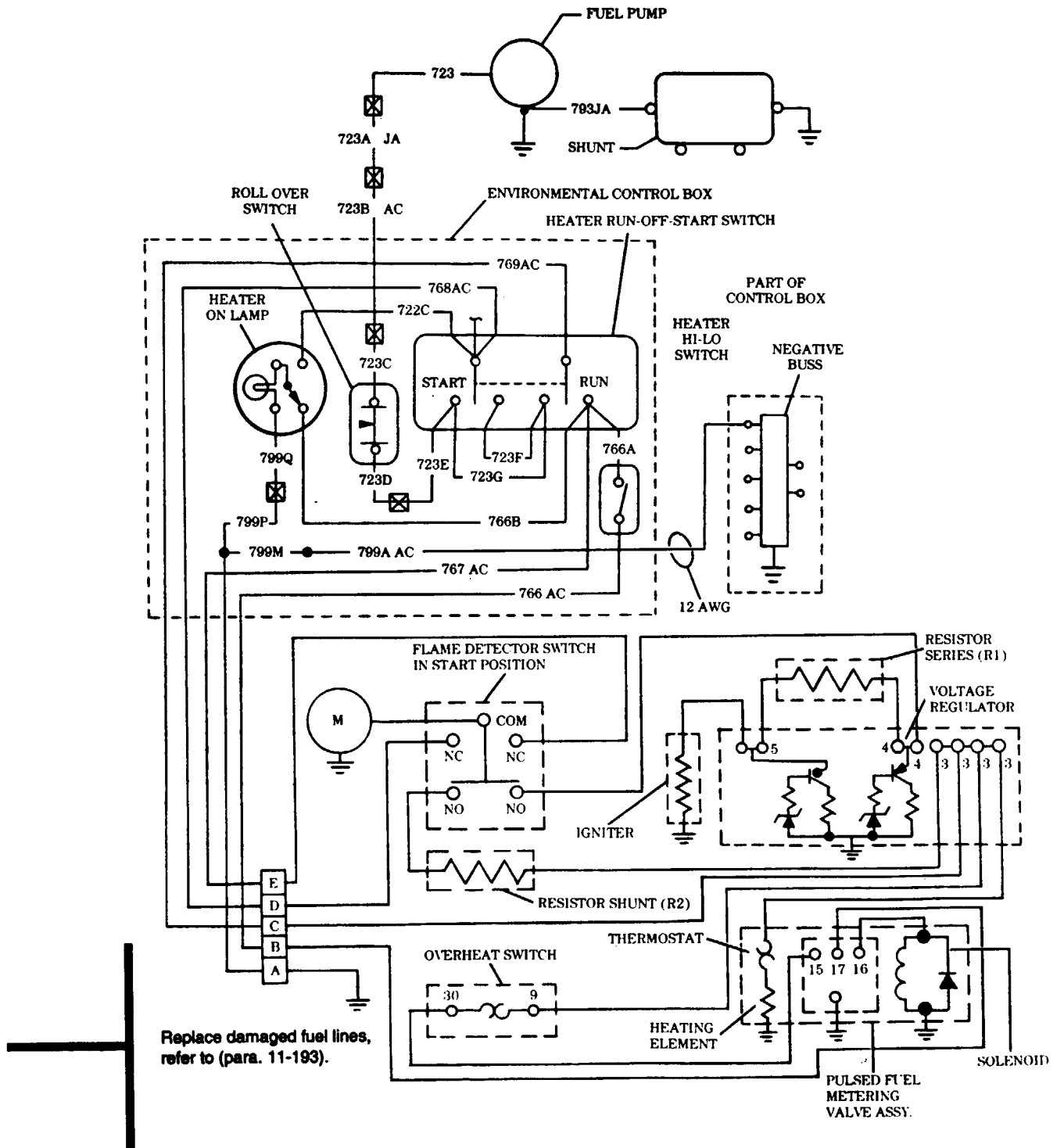


KNOWN INFO
HEATER SWITCH POSITION OK FUEL SWITCH OK
POSSIBLE PROBLEMS
FUEL SWITCH VALVE POSITION FUEL LINES FUEL FILTER LEAD 766 A FUEL SWITCH



REFERENCE INFORMATION

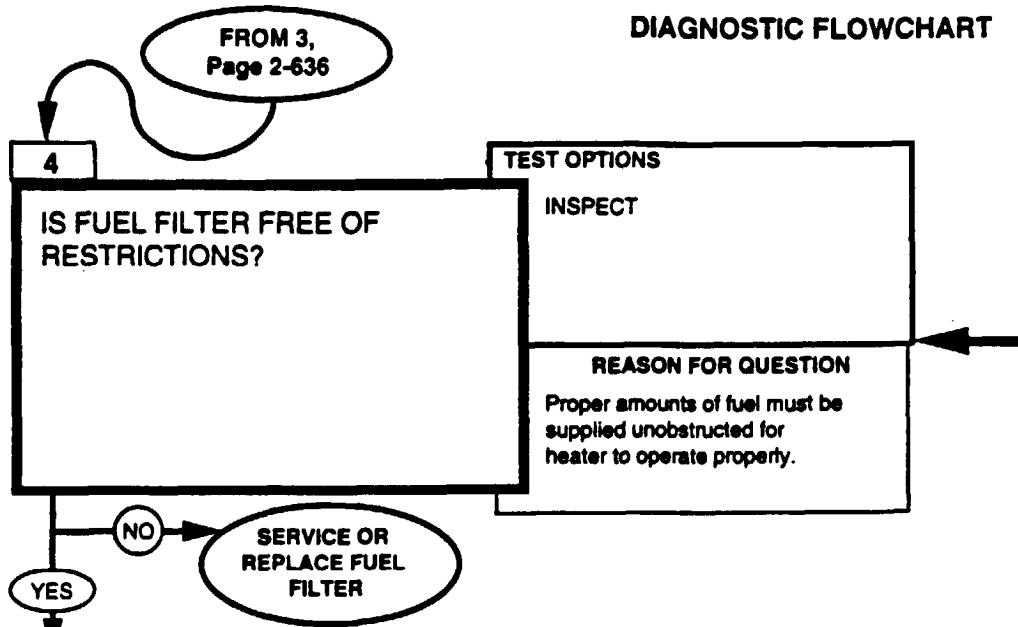
AMBULANCE



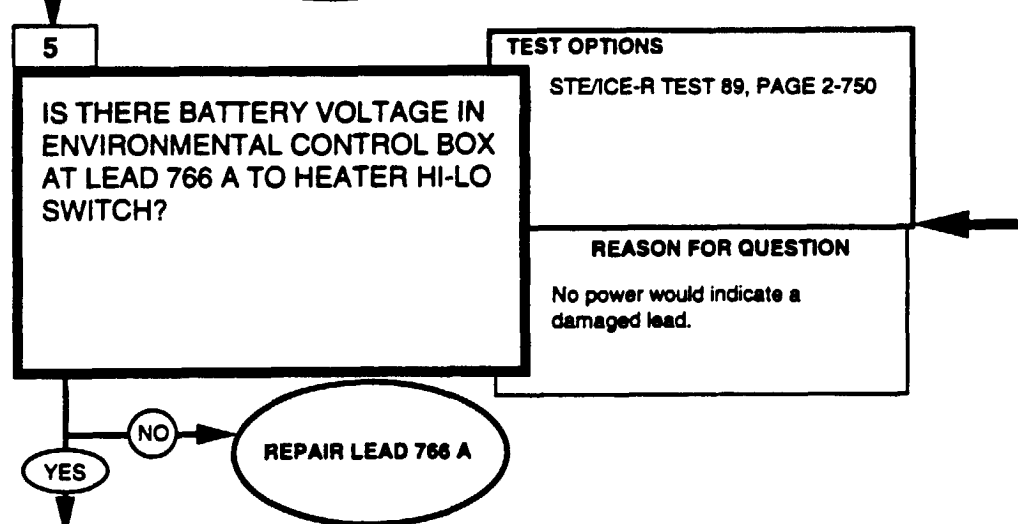
**AMBULANCE
(Heater Output)
(Refer to Figs. 14-16.)**

DIAGNOSTIC FLOWCHART

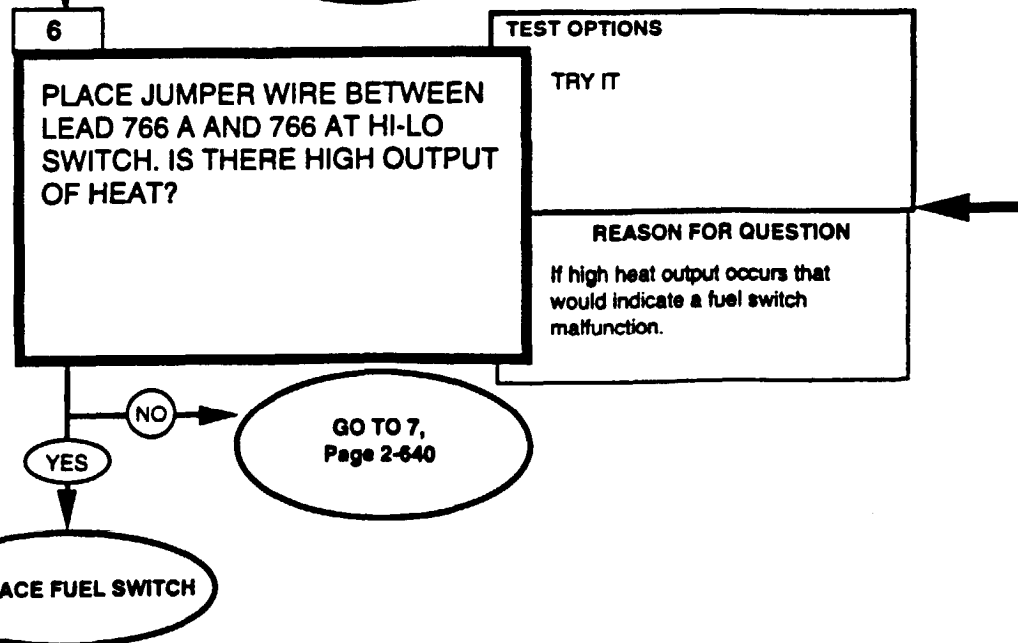
KNOWN INFO
HEATER SWITCH POSITION OK FUEL SWITCH POSITION OK FUEL SHUTOFF VALVE POSITION OK FUEL LINES OK
POSSIBLE PROBLEMS
FUEL FILTER LEAD 766 A FUEL SWITCH



KNOWN INFO
HEATER SWITCH POSITION OK FUEL SWITCH POSITION OK FUEL SHUTOFF VALVE POSITION OK FUEL LINES OK FUEL FILTER OK
POSSIBLE PROBLEMS
LEAD 766 A FUEL SWITCH

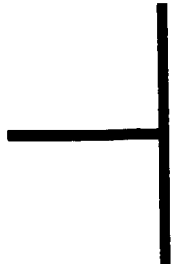


KNOWN INFO
HEATER SWITCH POSITION OK FUEL SWITCH POSITION OK FUEL SHUTOFF VALVE POSITION OK FUEL LINES OK FUEL FILTER OK LEAD 766 A OK
POSSIBLE PROBLEMS
FUEL SWITCH

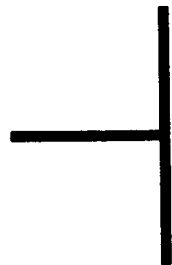


REFERENCE INFORMATION

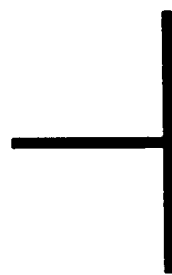
AMBULANCE



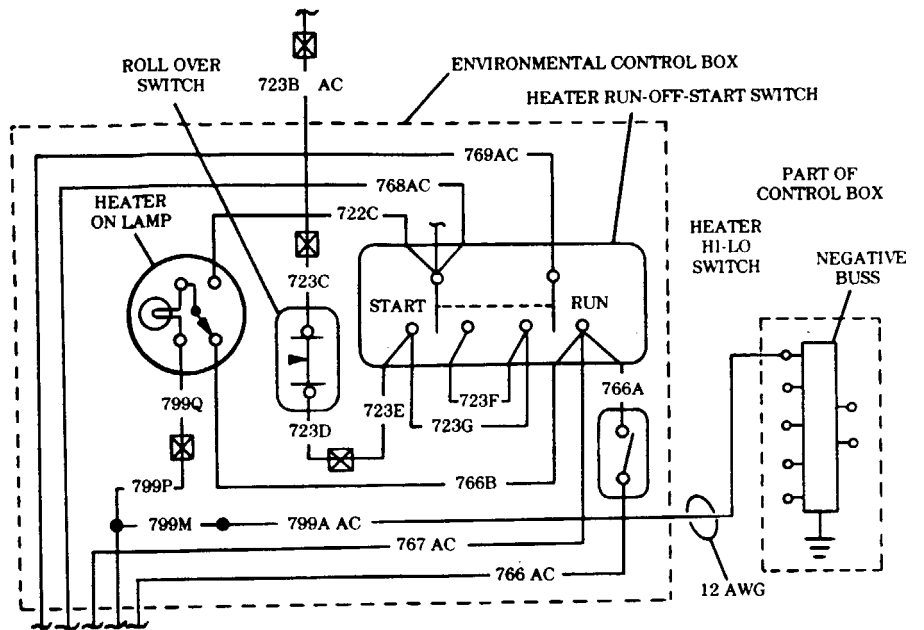
Repair/replace fuel filter, refer to (para. 11-192).



Repair lead, refer to (para. 4-85).



Replace fuel switch, refer to (para. 4-127).



<p>0-45 DC VOLTS STEACE-R TEST 89</p>
<ol style="list-style-type: none"> 1. Connect RED clip to the indicated test point, BLACK clip to negative or ground. 2. Start Test 89, DC volts. 3. Displayed reading is in volts.

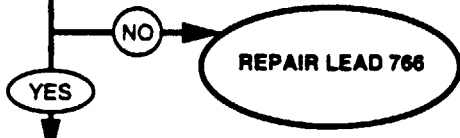
DIAGNOSTIC FLOWCHART

AMBULANCE
(Heater Output)
(Refer to Figs. 14-16.)

KNOWN INFO
PREVIOUSLY CORRECTED INFORMATION
POSSIBLE PROBLEMS
LEAD 766 HEATER ASSEMBLY

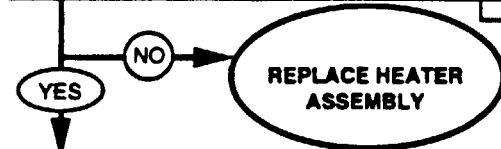


7	TEST OPTIONS
IS THERE BATTERY VOLTAGE OF LEAD 766 AT TERMINAL B OF FUEL COMBUSTION HEATER?	STE/ICE-R TEST 89, PAGE 2-750
	REASON FOR QUESTION No power would indicate a damaged lead.



KNOWN INFO
LEAD 766 OK
POSSIBLE PROBLEMS
HEATER ASSEMBLY

8	TEST OPTIONS
IS THERE HIGH OUTPUT OF HEAT?	TRY IT
	REASON FOR QUESTION Low heat output would indicate a heater assembly malfunction.



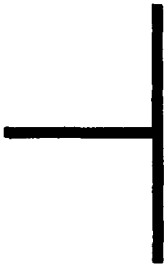
REFERENCE INFORMATION

AMBULANCE

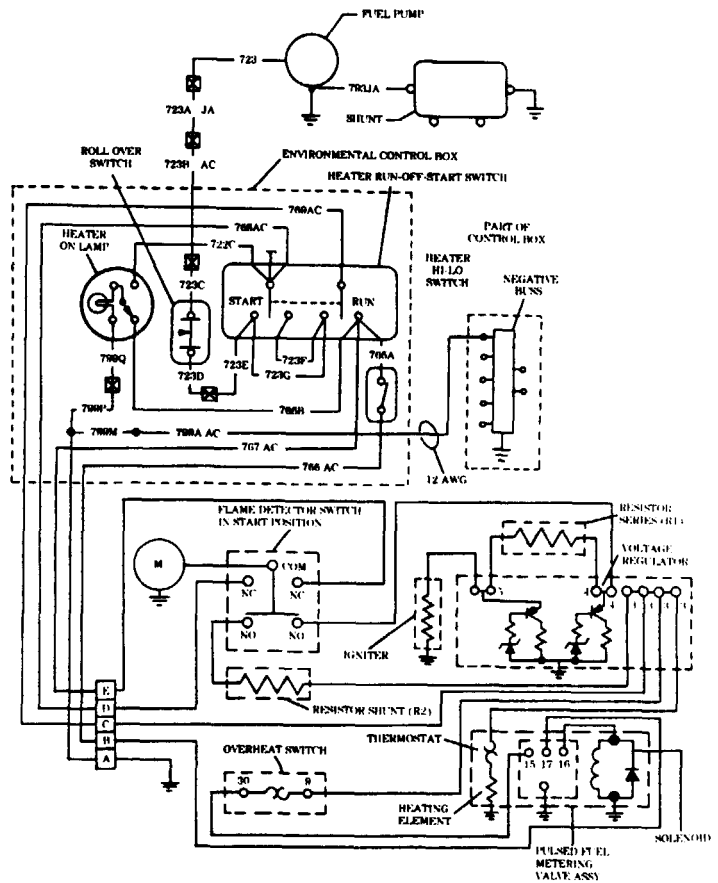


Repair lead, refer to (para. 4-85).
 Repair lead connector, refer to (para. 4-85).

0-45 DC VOLTS STE/ICE-R TEST 89
1. Connect RED clip to the indicated test point, BLACK clip to negative or ground.
2. Start Test 89, DC volts.
3. Displayed reading is in volts.



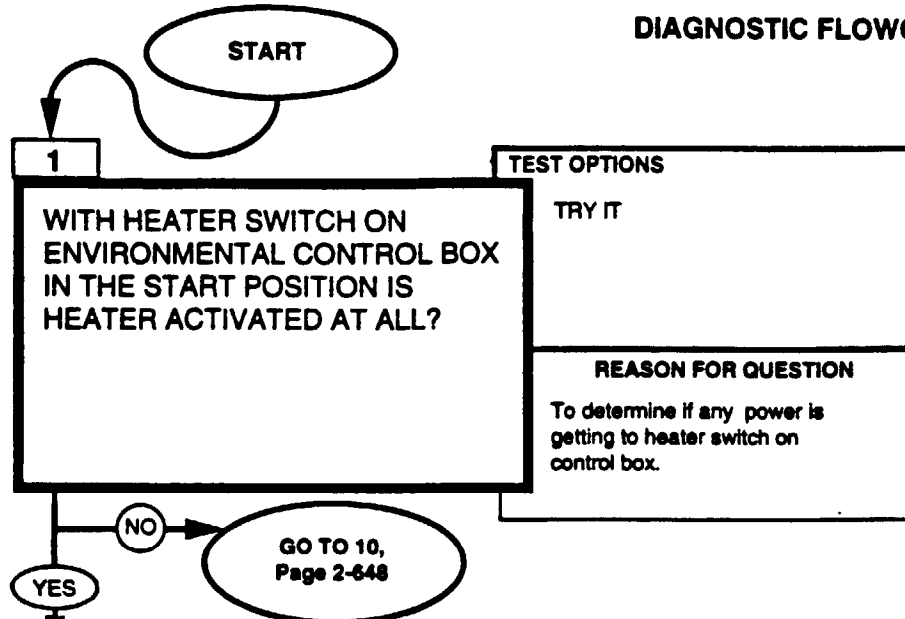
Replace heater assembly, refer to (para. 11-190 or 11-209).



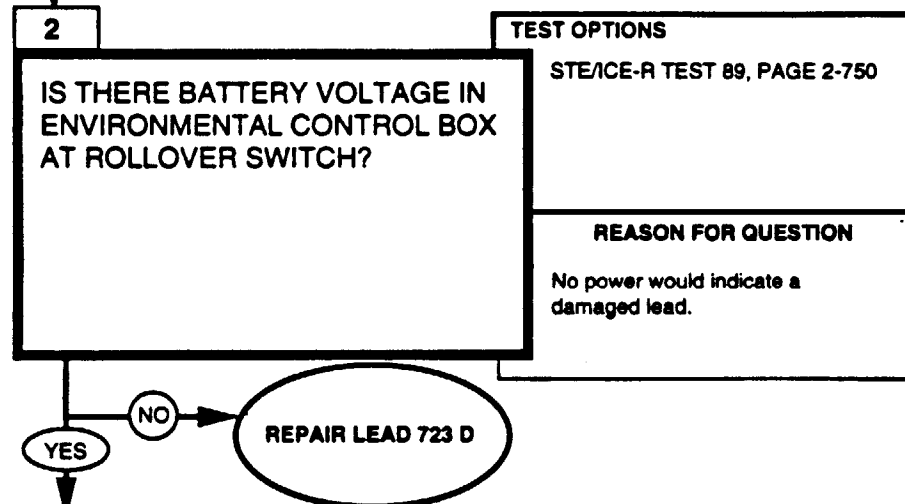
DIAGNOSTIC FLOWCHART

AMBULANCE
(Heater Starting)
 (Refer to Figs. 14-16.)

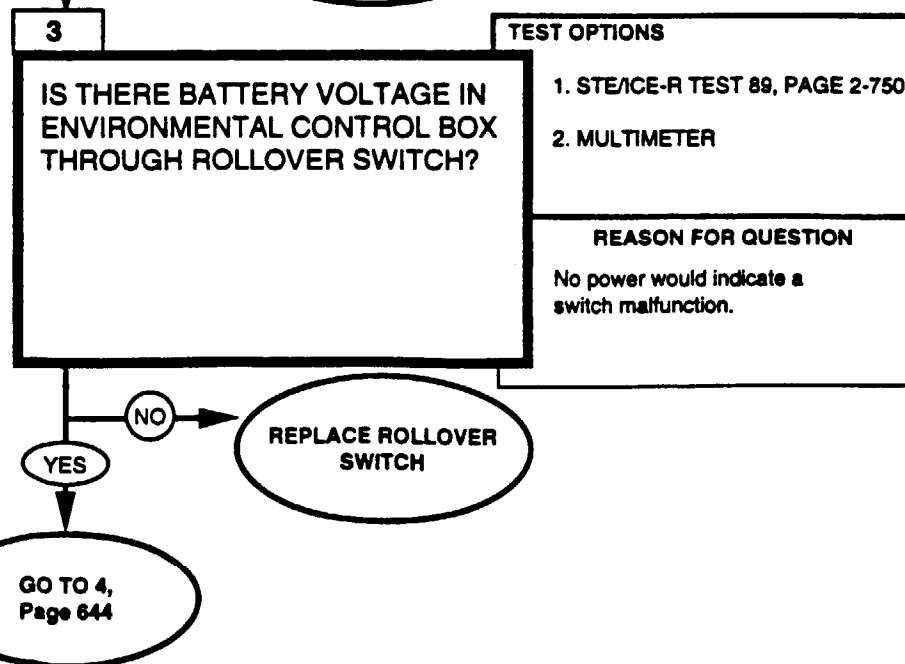
KNOWN INFO
NOTHING
POSSIBLE PROBLEMS
HEATER ASSEMBLY LEAD 723 D ROLLOVER SWITCH LEAD 723 B LEAD 723 A LEAD 798 FUEL PUMP LEAD 768



KNOWN INFO
POSSIBLE PROBLEMS
HEATER ASSEMBLY LEAD 723 D ROLLOVER SWITCH LEAD 723 B LEAD 723 A LEAD 798 FUEL PUMP LEAD 768

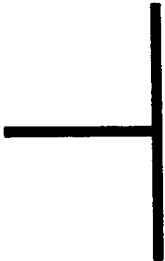
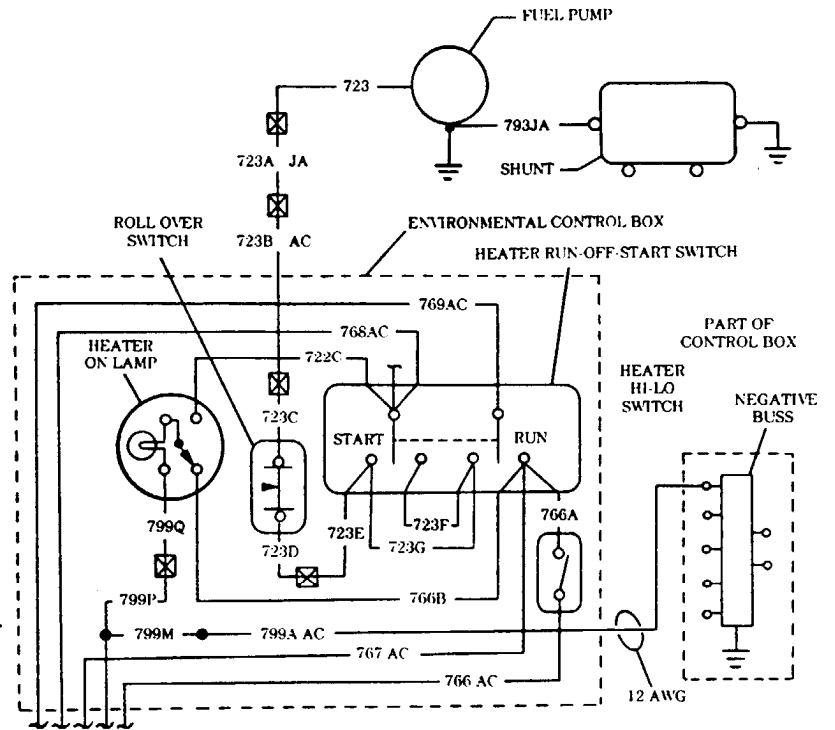


KNOWN INFO
LEAD 723 D OK
POSSIBLE PROBLEMS
HEATER ASSEMBLY ROLL OVER SWITCH LEAD 723 B LEAD 723 A LEAD 798 FUEL PUMP LEAD 768

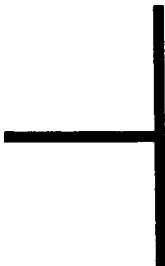


REFERENCE INFORMATION

AMBULANCE



Repair lead, refer to (para. 4-85).
 Repair lead connector,
 refer to (para. 4-85).



Replace Rollover Switch,
 refer to (para. 4-127).

<p>0-45 DC VOLTS STE/ICE-R TEST 89</p>
<p>1. Connect RED clip to the indicated test point, BLACK clip to negative or ground.</p> <p>2. Start Test 89, DC volts.</p> <p>3. Displayed reading is in volts.</p>
<p>BATTERY VOLTAGE MULTIMETER</p>
<p>1. Set the voltmeter to volts scale of at least 40 volts.</p> <p>2. Connect the RED lead to positive and the black lead to negative.</p> <p>3. Be sure to read the correct scale.</p>

**AMBULANCE
(Heater Starting)
(Refer to Figs. 14-16.)**

DIAGNOSTIC FLOWCHART

KNOWN INFO
LEAD 723 D OK ROLLOVER SWITCH OK
POSSIBLE PROBLEMS
HEATER ASSEMBLY LEAD 723 B LEAD 723 A LEAD 798 FUEL PUMP LEAD 768

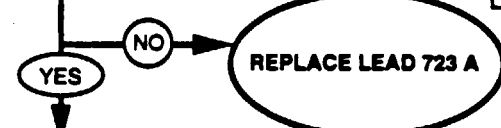


<p>4</p> <p>IS THERE BATTERY VOLTAGE AT LEAD 723 B?</p>	<p>TEST OPTIONS</p> <p>STE/ICE-R TEST 89, PAGE 2-750</p> <hr/> <p>REASON FOR QUESTION</p> <p>No power would indicate a damaged lead.</p>
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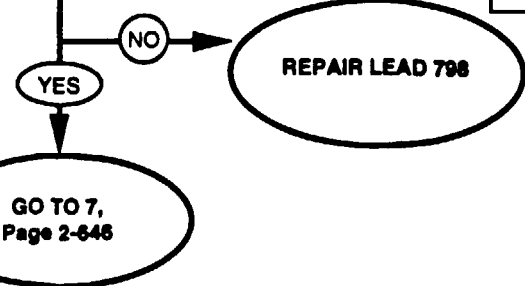
KNOWN INFO
LEAD 723 D OK ROLLOVER SWITCH OK LEAD 723 B OK
POSSIBLE PROBLEMS
HEATER ASSEMBLY LEAD 723 A LEAD 798 FUEL PUMP LEAD 768

<p>5</p> <p>DISCONNECT LEAD 723 A FROM FUEL PUMP LEAD. IS THERE BATTERY VOLTAGE AT LEAD 723 A?</p>	<p>TEST OPTIONS</p> <p>STE/ICE-R TEST 89, PAGE 2-750</p> <hr/> <p>REASON FOR QUESTION</p> <p>No power would indicate a damaged lead.</p>
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KNOWN INFO
LEAD 723 D OK ROLLOVER SWITCH OK LEAD 723 B OK LEAD 723 A OK
POSSIBLE PROBLEMS
HEATER ASSEMBLY LEAD 798 FUEL PUMP LEAD 768

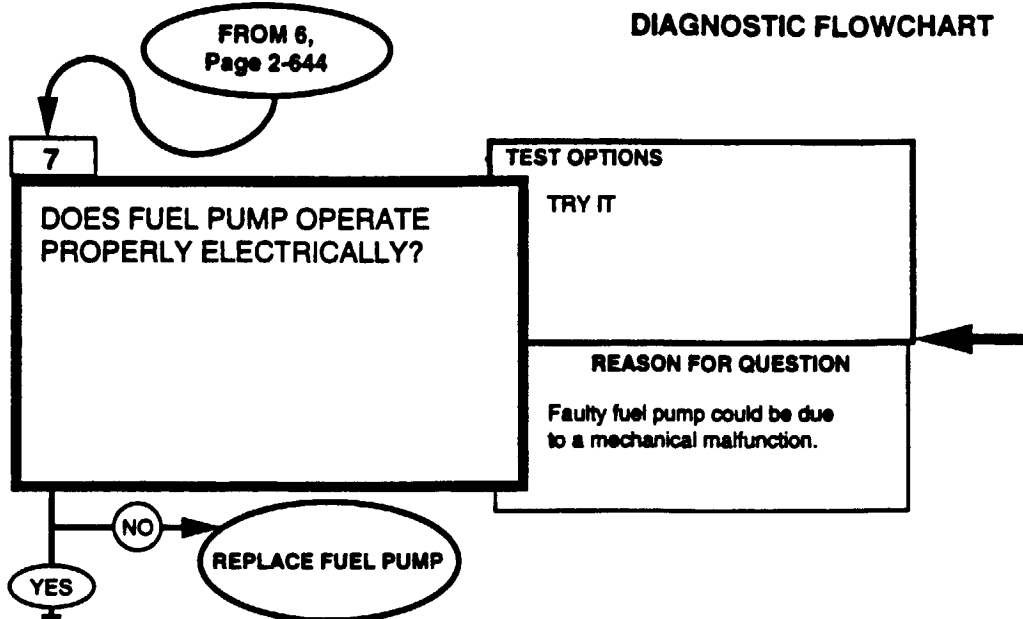
<p>6</p> <p>IS THERE CONTINUITY BETWEEN FUEL PUMP LEAD 798 AND GROUND?</p>	<p>TEST OPTIONS</p> <p>TRY IT</p> <hr/> <p>REASON FOR QUESTION</p> <p>No continuity would indicate a damaged lead.</p>
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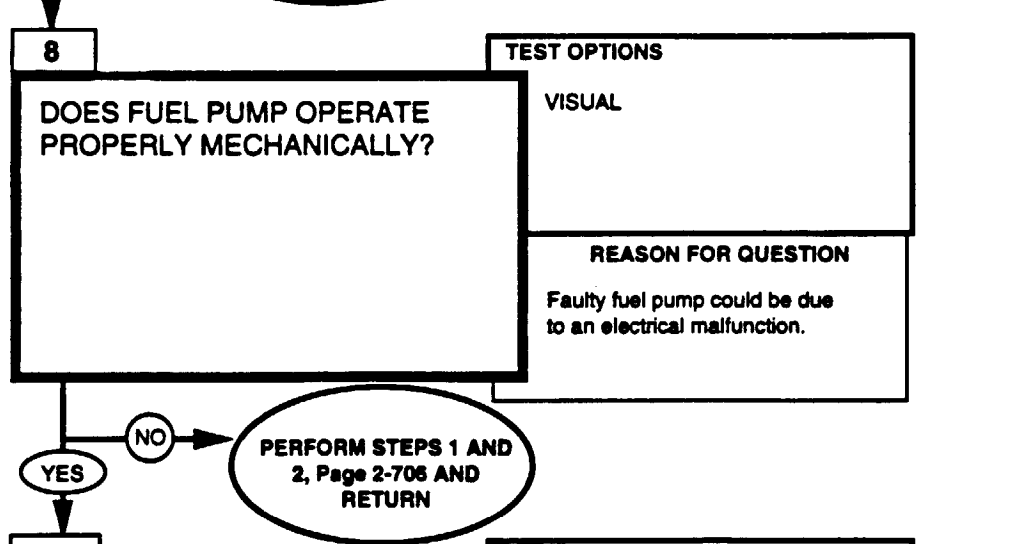
**AMBULANCE
(Heater Starting)
(Refer to Figs. 14-16.)**

DIAGNOSTIC FLOWCHART

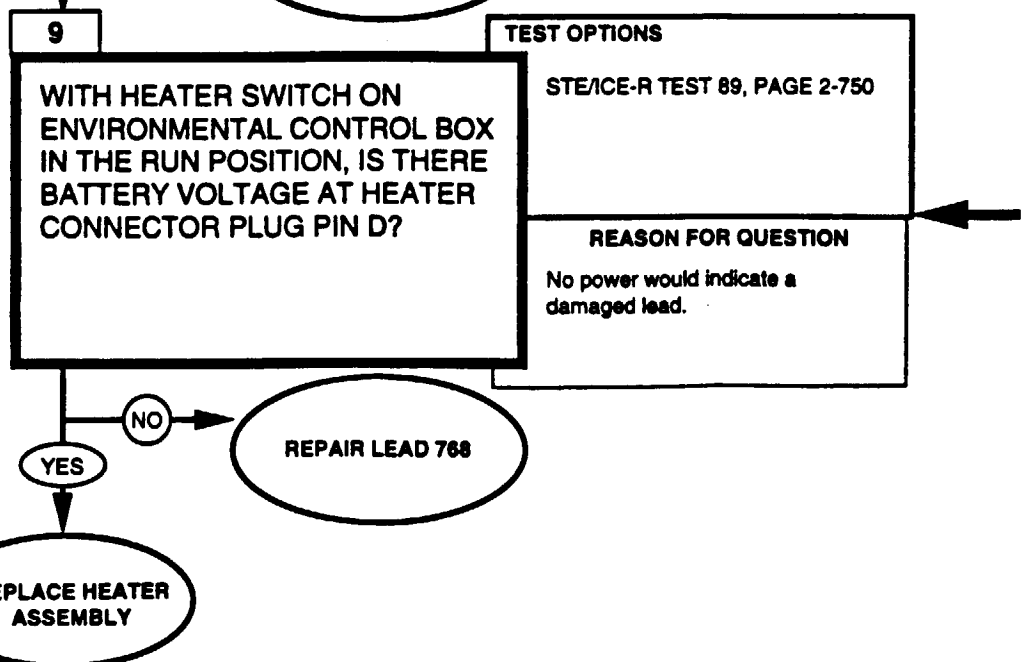
KNOWN INFO
LEAD 723 D OK ROLLOVER SWITCH OK LEAD 723 B OK LEAD 723 A OK LEAD 798 OK
POSSIBLE PROBLEMS
HEATER ASSEMBLY FUEL PUMP LEAD 768



KNOWN INFO
LEAD 723 D OK ROLLOVER SWITCH OK LEAD 723 B OK LEAD 723 A OK LEAD 798 OK
POSSIBLE PROBLEMS
HEATER ASSEMBLY FUEL PUMP LEAD 768



KNOWN INFO
LEAD 723 D OK ROLLOVER SWITCH OK LEAD 723 B OK LEAD 723 A OK LEAD 798 OK FUEL PUMP OK
POSSIBLE PROBLEMS
HEATER ASSEMBLY LEAD 768



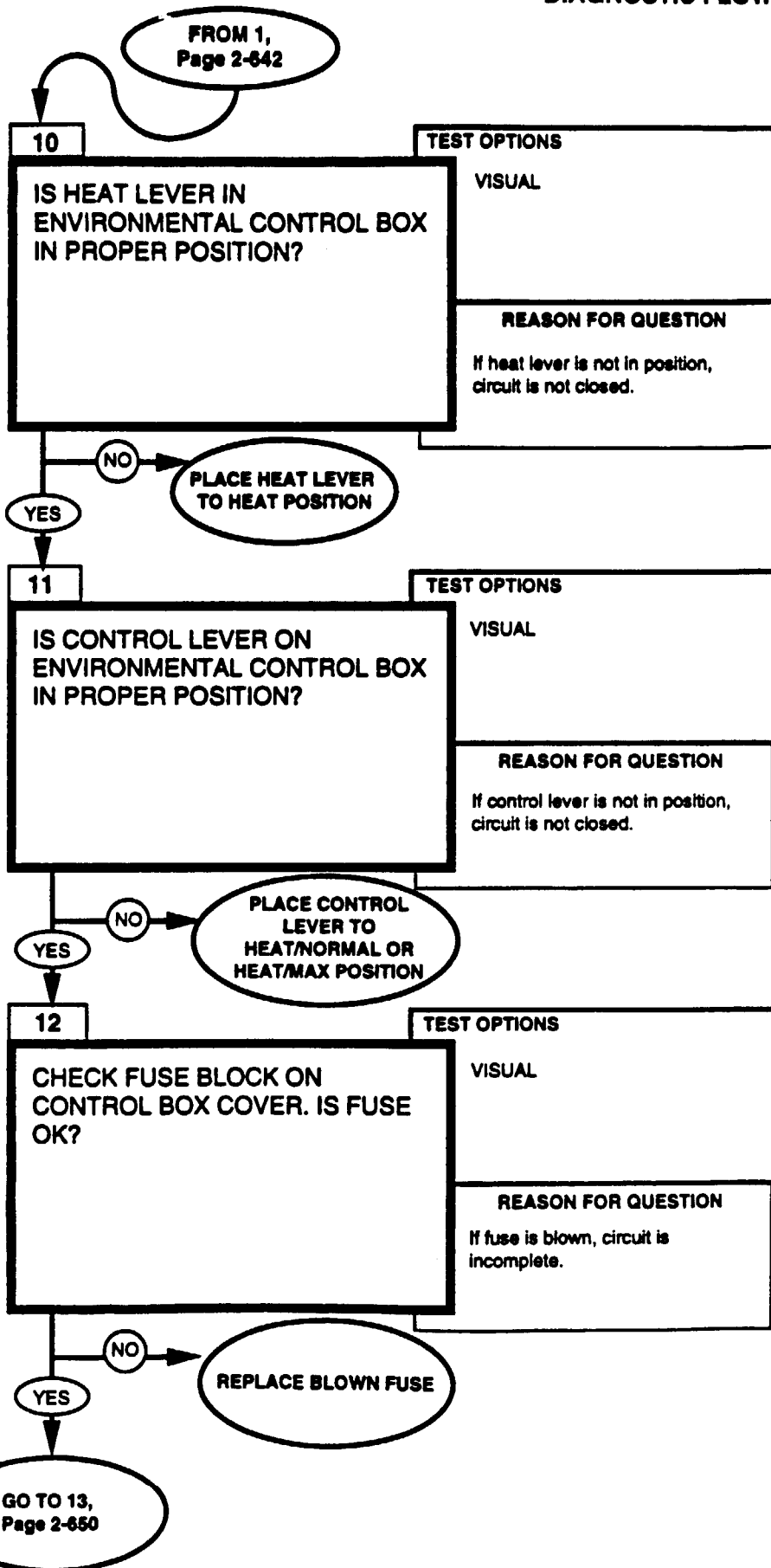
AMBULANCE
(Heater Starting)
 (Refer to Figs. 14-16.)

DIAGNOSTIC FLOWCHART

KNOWN INFO
POSSIBLE PROBLEMS
HEAT LEVER POSITION CONTROL LEVER POSITION FUSE BATTERY CABLE 660 LEAD 660 B LEAD 722 LEAD 722 A CONTINUITY SWITCHES LEAD 722 B LEAD 722 C HEATER SWITCH LEAD 769 LEAD 799 N HEATER ASSEMBLY

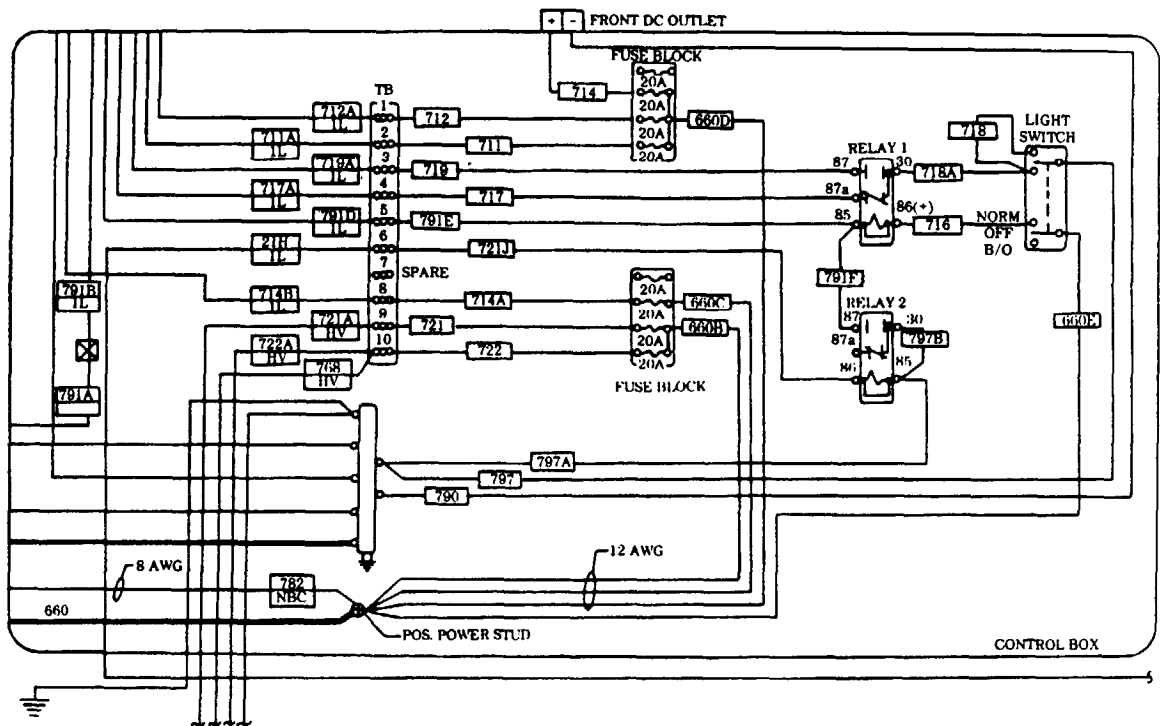
KNOWN INFO
HEAT LEVER POSITION OK
POSSIBLE PROBLEMS
CONTROL LEVER POSITION OK FUSE BATTERY CABLE 660 LEAD 660 B LEAD 722 LEAD 722 A CONTINUITY SWITCHES LEAD 722 B LEAD 722 C HEATER SWITCH LEAD 769 LEAD 799 N HEATER ASSEMBLY

KNOWN INFO
HEAT LEVER POSITION OK CONTROL LEVER POSITION OK
POSSIBLE PROBLEMS
FUSE BATTERY CABLE 660 LEAD 660 B LEAD 722 LEAD 722 A CONTINUITY SWITCHES LEAD 722 B LEAD 722 C HEATER SWITCH LEAD 769 LEAD 799 N HEATER ASSEMBLY



REFERENCE INFORMATION

AMBULANCE



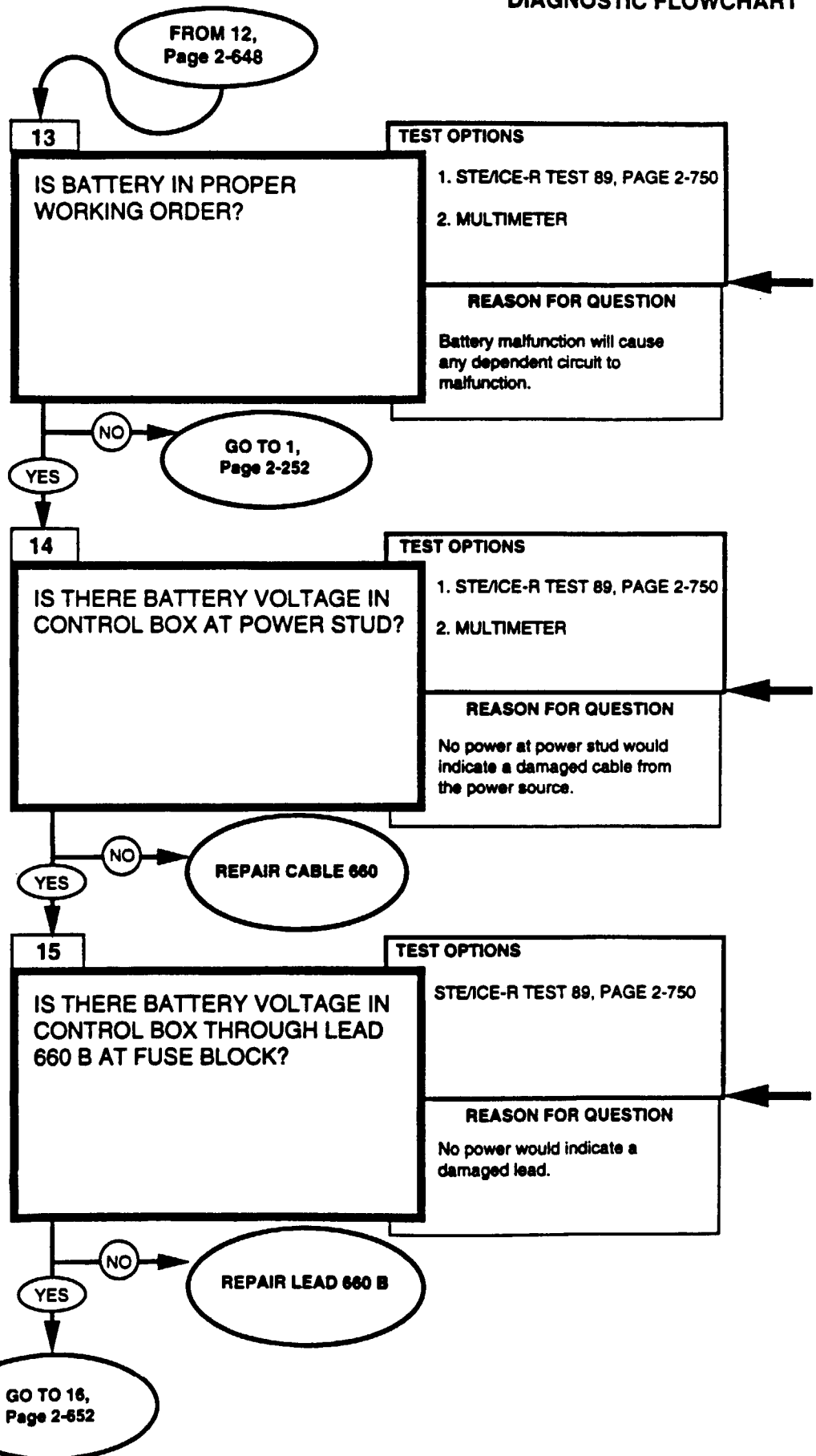
**AMBULANCE
(Heater Starting)
(Refer to Figs. 14-16.)**

DIAGNOSTIC FLOWCHART

KNOWN INFO
HEAT LEVER POSITION OK CONTROL LEVER POSITION OK FUSE OK
POSSIBLE PROBLEMS
FUSE BATTERY CABLE 660 LEAD 660 B LEAD 722 LEAD 722 A CONTINUITY SWITCHES LEAD 722 B LEAD 722 C HEATER SWITCH LEAD 769 LEAD 799 N HEATER ASSEMBLY

KNOWN INFO
HEAT LEVER POSITION OK CONTROL LEVER POSITION OK FUSE OK BATTERY OK
POSSIBLE PROBLEMS
CABLE 660 LEAD 660 B LEAD 722 LEAD 722 A CONTINUITY SWITCHES LEAD 722 B LEAD 722 C HEATER SWITCH LEAD 769 LEAD 799 N HEATER ASSEMBLY

KNOWN INFO
HEAT LEVER POSITION OK CONTROL LEVER POSITION OK FUSE OK BATTERY OK CABLE 660 OK
POSSIBLE PROBLEMS
LEAD 660 B LEAD 722 LEAD 722 A CONTINUITY SWITCHES LEAD 722 B LEAD 722 C HEATER SWITCH LEAD 769 LEAD 799 N HEATER ASSEMBLY

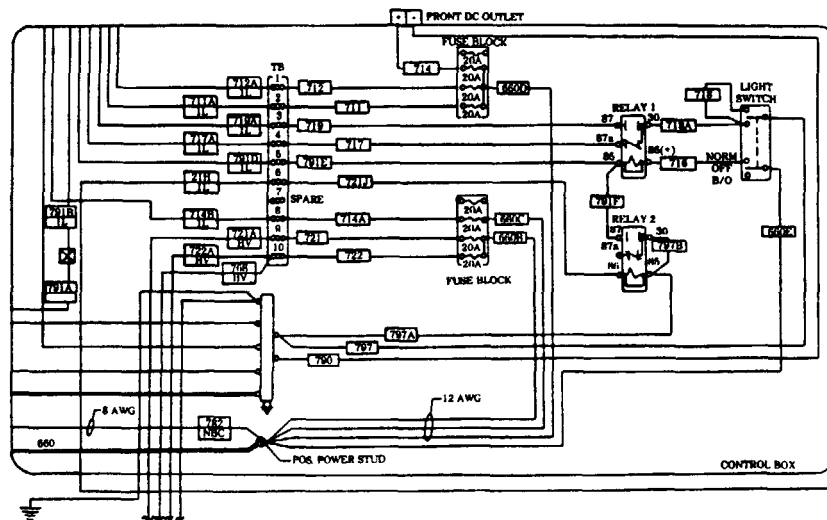


REFERENCE INFORMATION

AMBULANCE

<p>0-45 DC VOLTS STE/CE-R TEST 89</p>
<p>1. Connect RED clip to the indicated test point, BLACK clip to negative or ground.</p> <p>2. Start Test 89, DC volts.</p> <p>3. Displayed reading is in volts.</p>
<p>BATTERY VOLTAGE MULTIMETER</p>
<p>1. Set the voltmeter to a DC volts scale of at least 40 volts.</p> <p>2. Connect the RED lead to positive and the BLACK lead to negative.</p> <p>3. Be sure to read the correct scale.</p>

Repair lead, refer to (para. 4-85).



Repair lead, refer to (para. 4-85).
 Repair lead connector, refer to (para. 4-85).

**AMBULANCE
(Heater Starting)
(Refer to Figs. 14-16.)**

DIAGNOSTIC FLOWCHART

KNOWN INFO
HEAT LEVER POSITION OK CONTROL LEVER POSITION OK FUSE OK BATTERY OK CABLE 660 OK LEAD 660 B OK

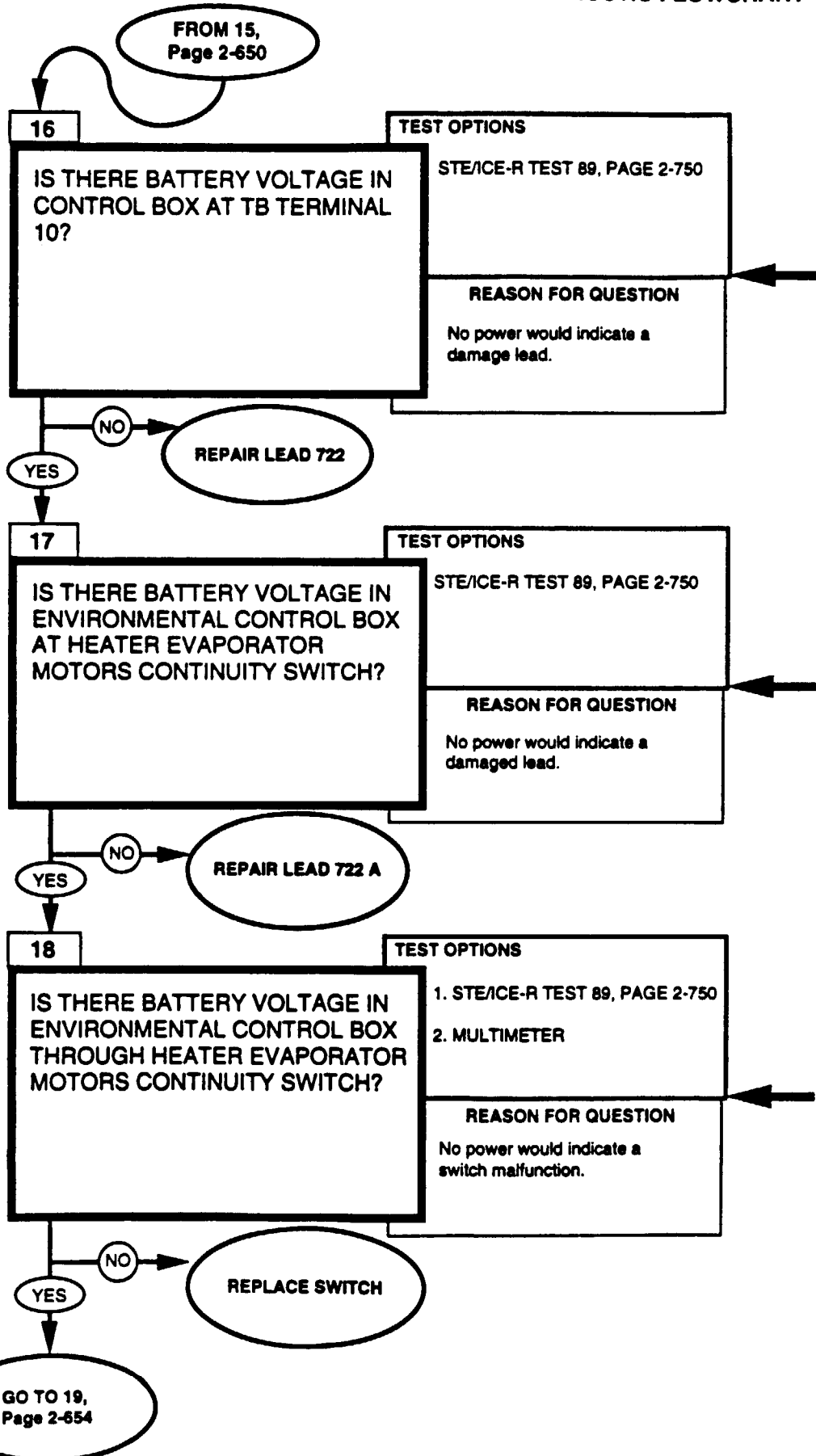
POSSIBLE PROBLEMS
LEAD 722 LEAD 722 A CONTINUITY SWITCHES LEAD 722 B LEAD 722 C HEATER SWITCH LEAD 769 LEAD 799 N HEATER ASSEMBLY

KNOWN INFO
HEAT LEVER POSITION OK CONTROL LEVER POSITION OK FUSE OK BATTERY OK CABLE 660 OK LEAD 660 B OK LEAD 722 OK

POSSIBLE PROBLEMS
LEAD 722 A CONTINUITY SWITCHES LEAD 722 B LEAD 722 C HEATER SWITCH LEAD 769 LEAD 799 N HEATER ASSEMBLY

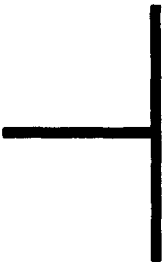
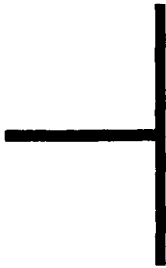
KNOWN INFO
HEAT LEVER POSITION OK CONTROL LEVER POSITION OK FUSE OK BATTERY OK CABLE 660 OK LEAD 660 B OK LEAD 722 OK LEAD 722 A OK

POSSIBLE PROBLEMS
CONTINUITY SWITCHES LEAD 722 B LEAD 722 C HEATER SWITCH LEAD 769 LEAD 799 N HEATER ASSEMBLY

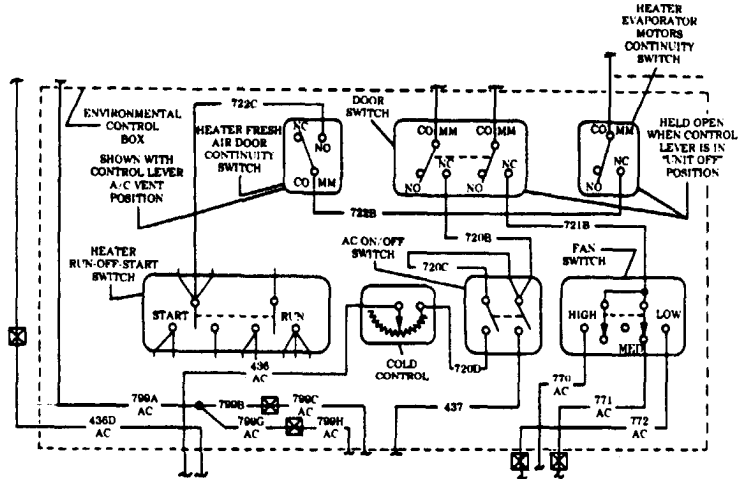


REFERENCE INFORMATION

AMBULANCE



Repair lead, refer to (para. 4-85).
 Repair lead connector, refer to (para. 4-85).



Replace Heater Evaporator
 Motors continuity switch,
 refer to DS Maintenance.

<p>0-45 DC VOLTS STE/ICE-R TEST 89</p>
<ol style="list-style-type: none"> 1. Connect RED clip to the indicated test point, BLACK clip to negative or ground. 2. Start Test 89, DC volts. 3. Displayed reading is in volts.
<p>BATTERY VOLTAGE MULTIMETER</p>
<ol style="list-style-type: none"> 1. Set the voltmeter to volts scale of at least 40 volts. 2. Connect the RED lead to positive and the black lead to negative. 3. Be sure to read the correct scale.

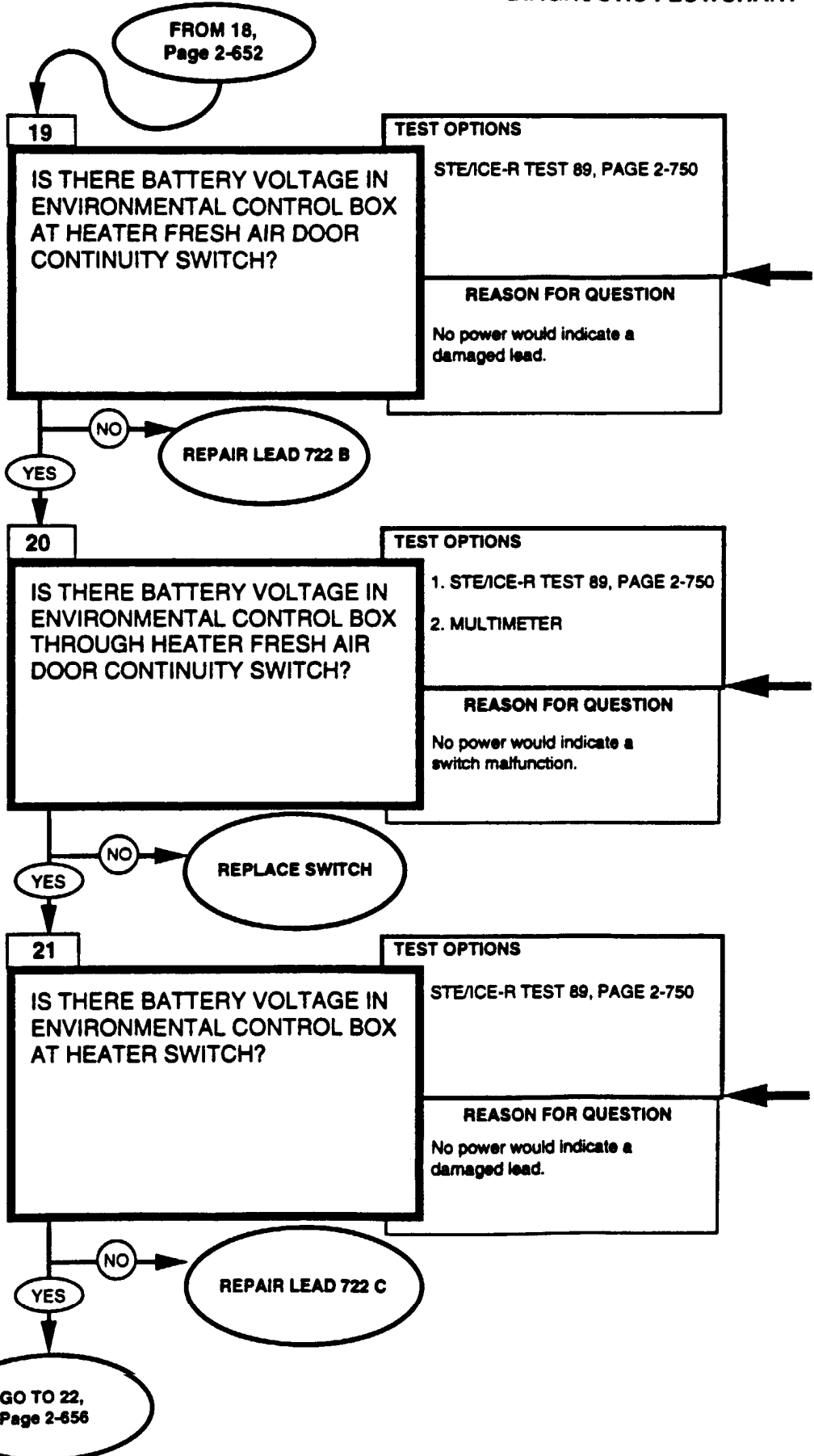
**AMBULANCE
(Heater Starting)
(Refer to Figs. 14-16.)**

DIAGNOSTIC FLOWCHART

KNOWN INFO
HEAT LEVER POSITION OK CONTROL LEVER POSITION OK FUSE OK BATTERY OK CABLE 660 OK LEAD 660 B LEAD 722 OK LEAD 722 A OK
POSSIBLE PROBLEMS
CONTINUITY SWITCHES LEAD 722 B LEAD 722 C HEATER SWITCH LEAD 769 LEAD 799 N HEATER ASSEMBLY

KNOWN INFO
HEAT LEVER POSITION OK CONTROL LEVER POSITION OK FUSE OK BATTERY OK CABLE 660 OK LEAD 660 B OK LEAD 722 OK LEAD 722 A OK LEAD 722 B OK
POSSIBLE PROBLEMS
LEAD 722 C HEATER SWITCH LEAD 769 LEAD 799 N HEATER ASSEMBLY

KNOWN INFO
HEAT LEVER POSITION OK CONTROL LEVER POSITION OK FUSE OK BATTERY OK CABLE 660 OK LEAD 660 B OK LEAD 722 OK LEAD 722 A OK CONTINUITY SWITCHES OK LEAD 722 B OK
POSSIBLE PROBLEMS
LEAD 722 C HEATER SWITCH LEAD 769 LEAD 799 N HEATER ASSEMBLY

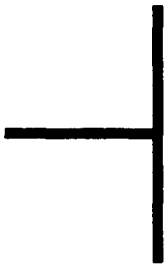


REFERENCE INFORMATION

AMBULANCE



Repair lead, refer to (para. 4-85).

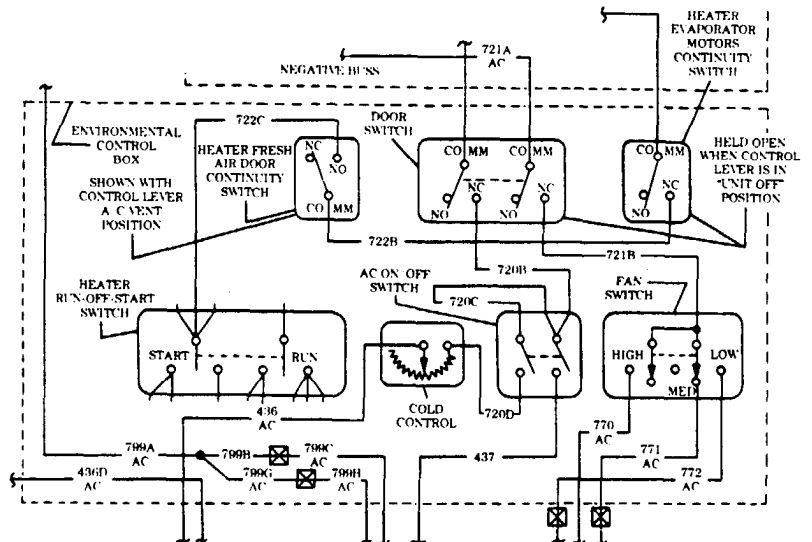


Replace heater fresh air door continuity switch, refer to DS Maintenance.



Repair lead, refer to (para. 4-85).

0-45 DC VOLTS STE/CE-R TEST 89
<ol style="list-style-type: none"> 1. Connect RED clip to the indicated test point, BLACK clip to negative or ground. 2. Start Test 89, DC volts. 3. Displayed reading is in volts.
BATTERY VOLTAGE MULTIMETER
<ol style="list-style-type: none"> 1. Set the voltmeter to volts scale of at least 40 volts. 2. Connect the RED lead to positive and the black lead to negative. 3. Be sure to read the correct scale.



**AMBULANCE
(Heater Starting)**
(Refer to Figs. 14-16.)

DIAGNOSTIC FLOWCHART

KNOWN INFO
HEAT LEVER POSITION OK CONTROL LEVER POSITION OK FUSE OK BATTERY OK CABLE 660 OK LEAD 660 B OK LEAD 772 OK LEAD 772 A OK CONTINUITY SWITCHES OK LEAD 722 B OK LEAD 722 C OK

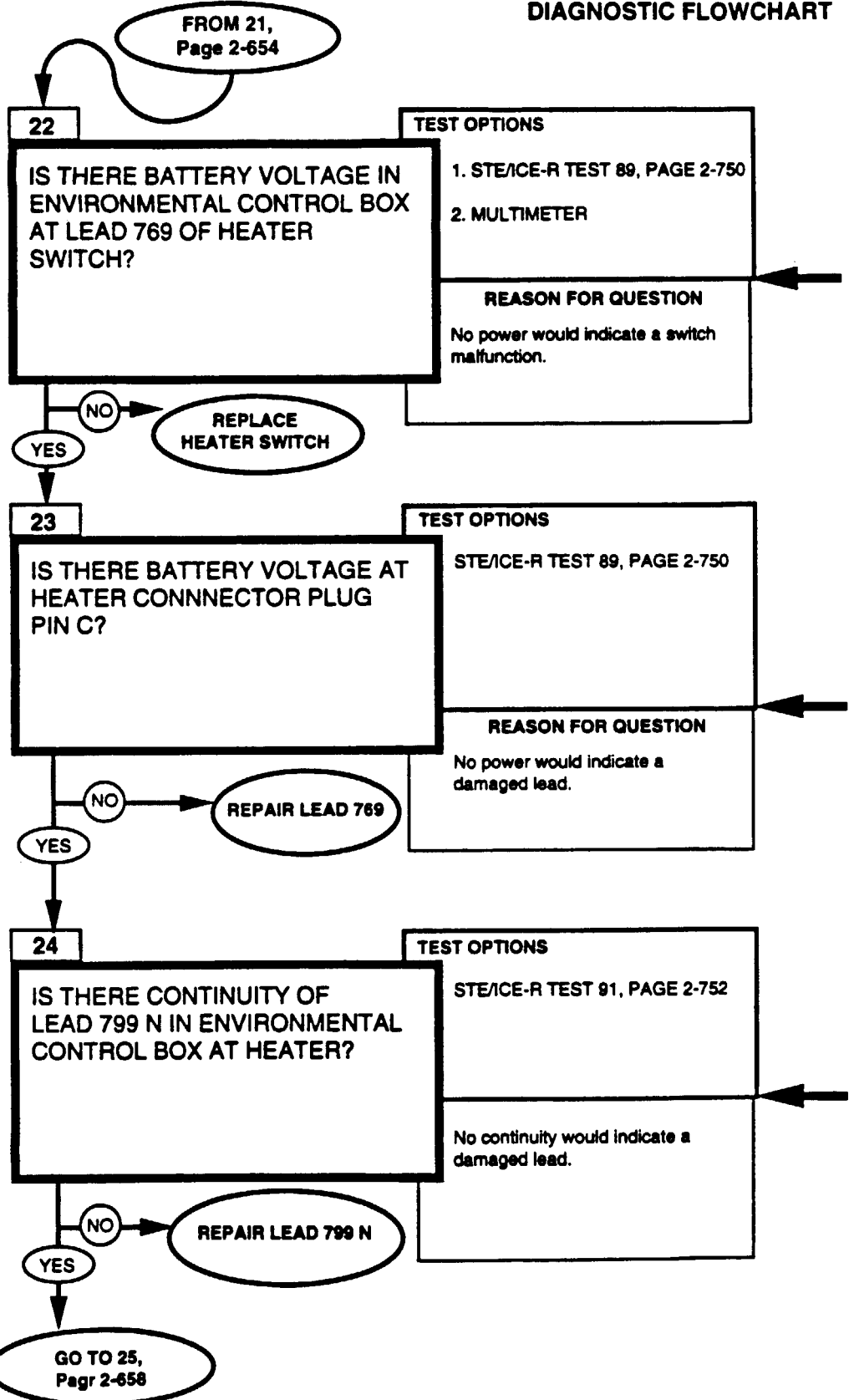
POSSIBLE PROBLEMS
HEATER SWITCH LEAD 769 LEAD 799 N HEATER ASSEMBLY

KNOWN INFO
HEAT LEVER POSITION OK CONTROL LEVER POSITION OK FUSE OK BATTERY OK CABLE 660 OK LEAD 660 B OK LEAD 772 OK LEAD 772 A OK CONTINUITY SWITCHES OK LEAD 722 B OK LEAD 722 C OK HEATER SWITCH OK

POSSIBLE PROBLEMS
LEAD 769 LEAD 769 N HEATER ASSEMBLY

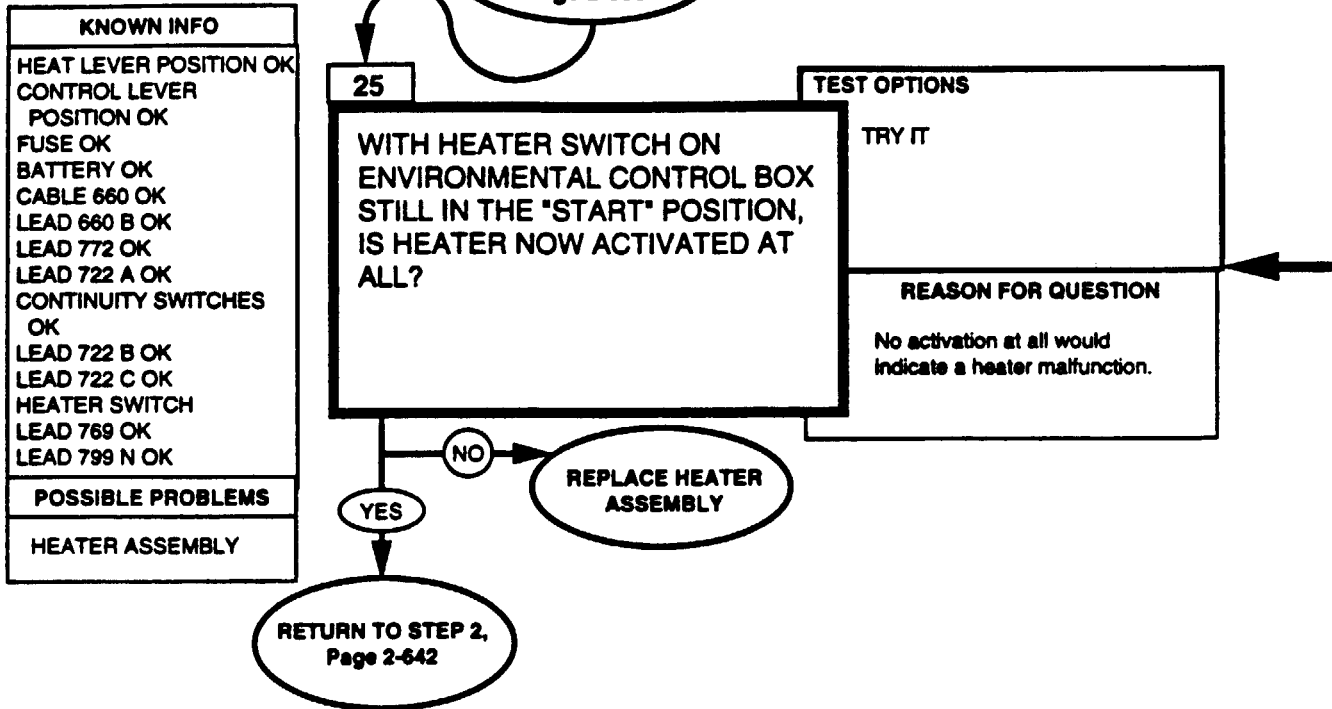
KNOWN INFO
HEAT LEVER POSITION OK CONTROL LEVER POSITION OK FUSE OK BATTERY OK CABLE 660 OK LEAD 660 B OK LEAD 722 OK CONTINUITY SWITCHES OK LEAD 722 B OK LEAD 722 C OK HEATER SWITCH OK LEAD 769 OK

POSSIBLE PROBLEMS
LEAD 799 N HEATER ASSEMBLY



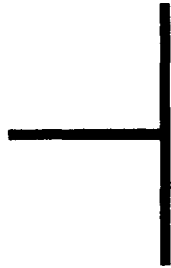
**AMBULANCE
(Heater Starting)
(Refer to Figs. 14-16.)**

DIAGNOSTIC FLOWCHART



REFERENCE INFORMATION

AMBULANCE

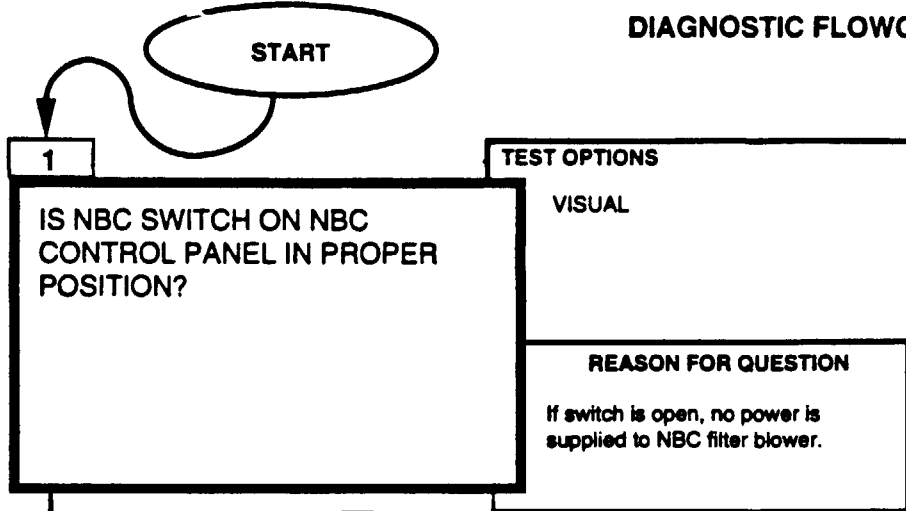


Replace heater assembly,
refer to (paras.11-190 or 11-209).

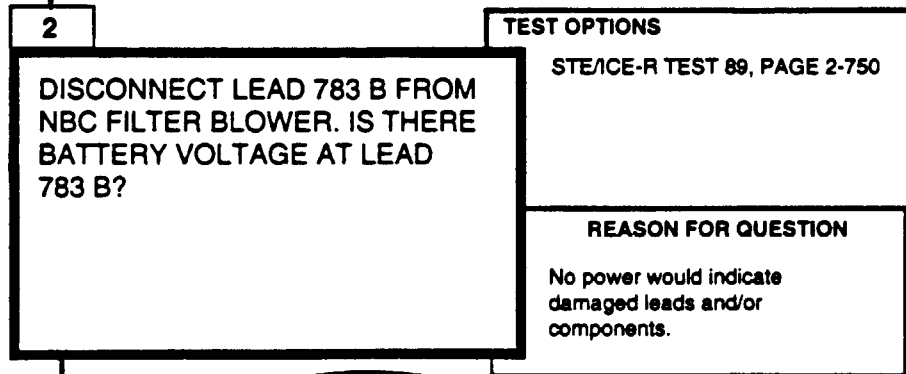
**AMBULANCE
(NBC Filter Blower)
(Refer to Fig. 17.)**

DIAGNOSTIC FLOWCHART

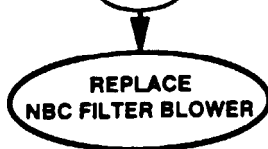
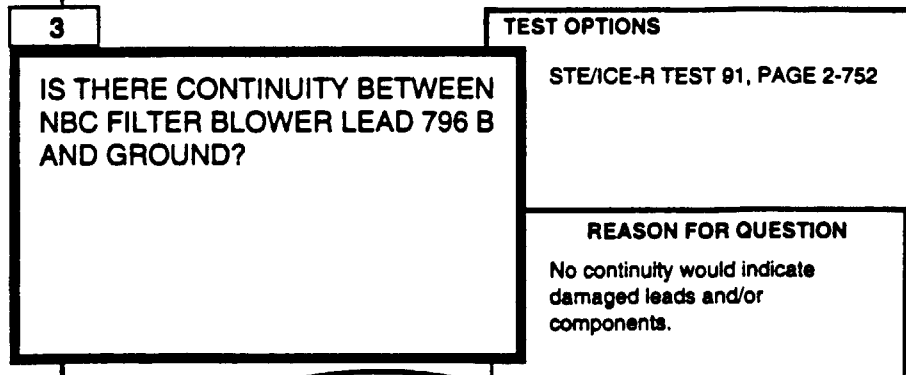
KNOWN INFO
NOTHING
POSSIBLE PROBLEMS
NBC SWITCH POSITION DAMAGED LEADS/ COMPONENTS NBC FILTER BLOWER



KNOWN INFO
NBC SWITCH POSITION OK
POSSIBLE PROBLEMS
DAMAGED LEADS/ COMPONENTS NBC FILTER BLOWER

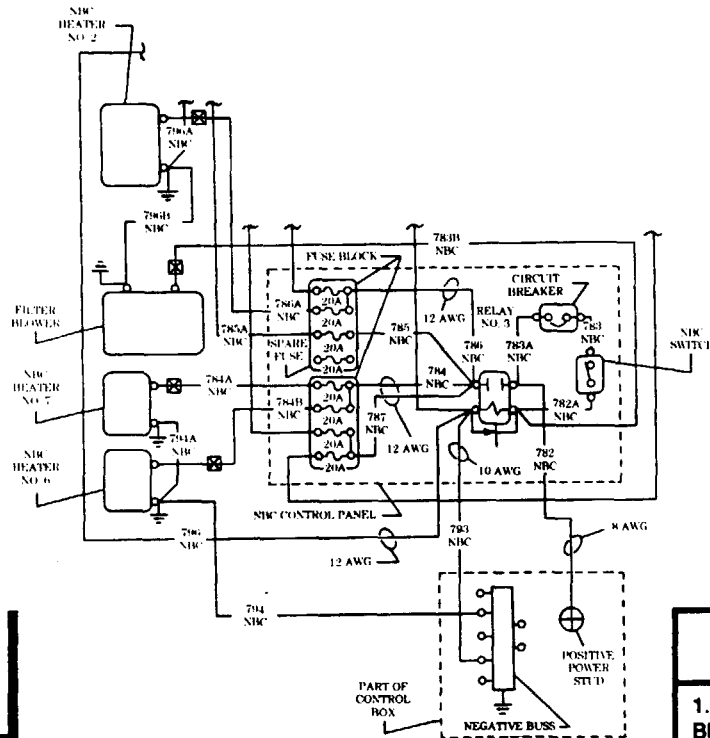


KNOWN INFO
NBC SWITCH POSITION OK
POSSIBLE PROBLEMS
DAMAGED LEADS/ COMPONENTS NBC FILTER BLOWER



REFERENCE INFORMATION

AMBULANCE



**0-45 DC VOLTS
STE/ICE-R TEST 89**

1. Connect RED clip to the indicated test point, BLACK clip to negative or ground.
2. Start Test 89, DC volts.
3. Displayed reading is in volts.



Replace NBC filter blower, refer to DS Maintenance.

**0-4500 OHMS
STE/ICE-R TEST 91**

1. Connect RED clip and BLACK clip to the indicated terminals in question; RED to the first, BLACK to the second.
2. Start Test 91, 0-4500 ohms.
3. Displayed reading is in ohms. Less than 5 ohms is continuity. If the resistance is over 4500 ohms, STE/ICE displays "9.9.9.9."

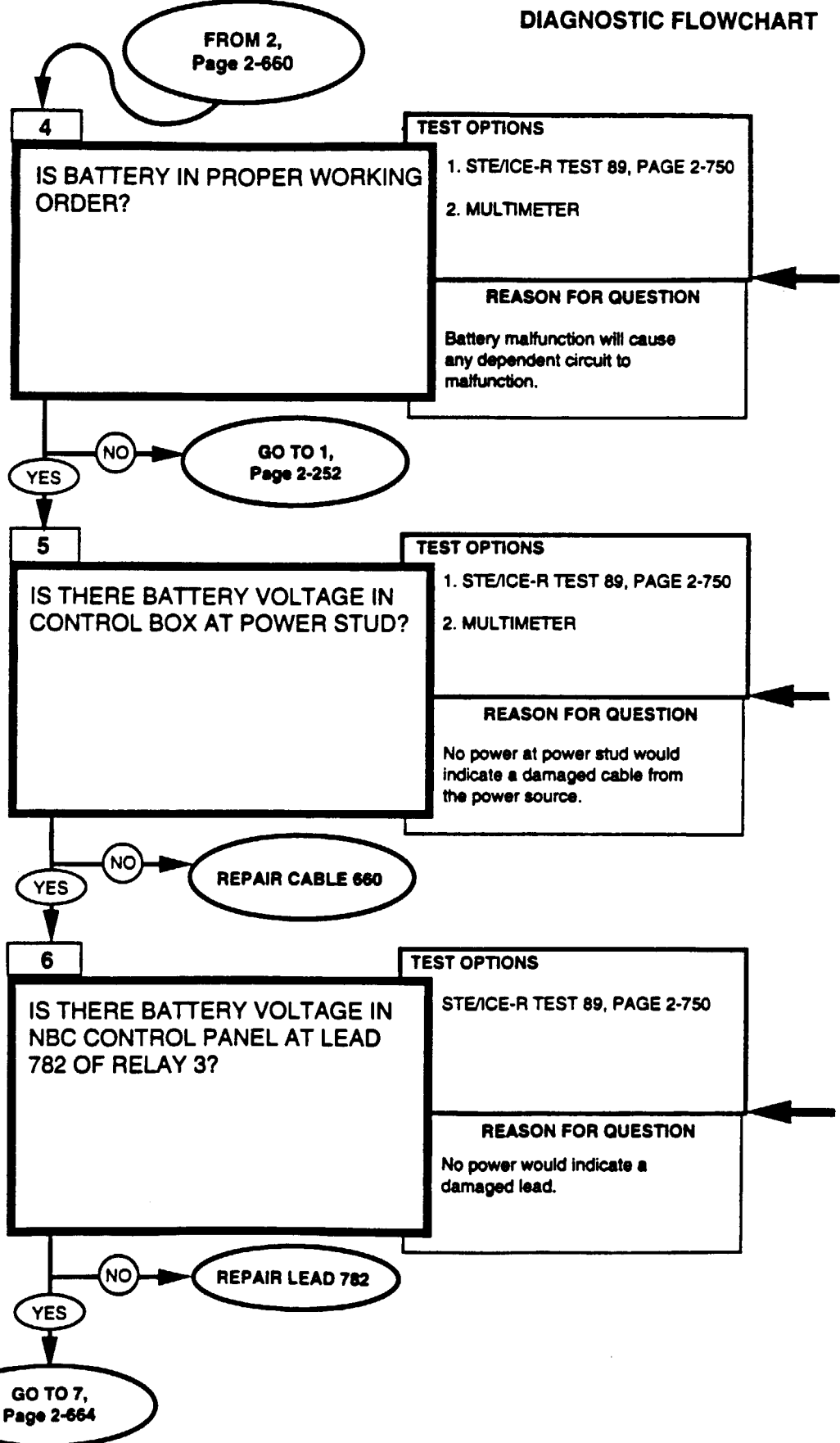
AMBULANCE
(NBC Filter Blower)
 (Refer to Fig. 17.)

DIAGNOSTIC FLOWCHART

KNOWN INFO
PREVIOUSLY CORRECTED INFORMATION
POSSIBLE PROBLEMS
BATTERY CABLE 660 LEAD 782 LEAD 782 A CIRCUIT BREAKER LEAD 783 NBC SWITCH LEAD 783 A LEAD 783 B

KNOWN INFO
BATTERY OK
POSSIBLE PROBLEMS
CABLE 660 LEAD 782 LEAD 782 A CIRCUIT BREAKER LEAD 783 NBC SWITCH LEAD 783 A LEAD 783 B

KNOWN INFO
BATTERY OK CABLE 660 OK
POSSIBLE PROBLEMS
LEAD 782 LEAD 782 A CIRCUIT BREAKER LEAD 783 NBC SWITCH LEAD 783 A LEAD 783 B



REFERENCE INFORMATION

AMBULANCE

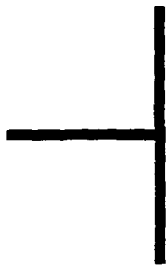


**0-45 DC VOLTS
STE/CE-R TEST 89**

1. Connect RED clip to the indicated test point, BLACK clip to negative or ground.
2. Start Test 89, DC volts.
3. Displayed reading is in volts.

**BATTERY VOLTAGE
MULTIMETER**

1. Set the voltmeter to a DC volts scale of at least 40 volts.
2. Connect the RED lead to positive and the BLACK lead to negative.
3. Be sure to read the correct scale.

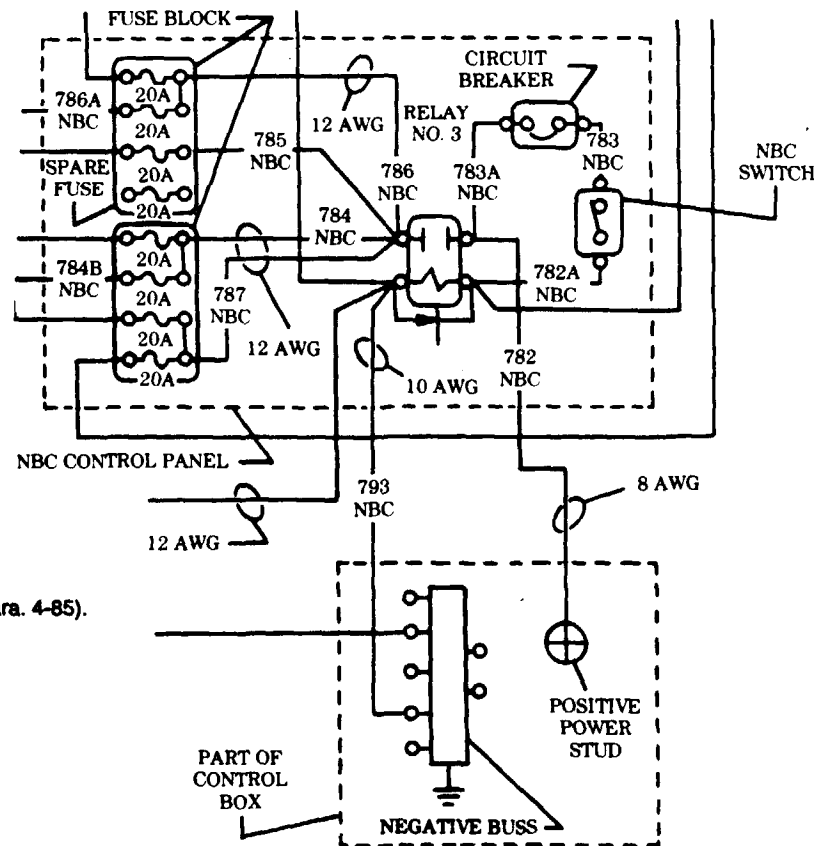


Repair lead, refer to (para. 4-85).



Repair lead, refer to (para. 4-85).

Repair lead connector, refer to (para. 4-85).



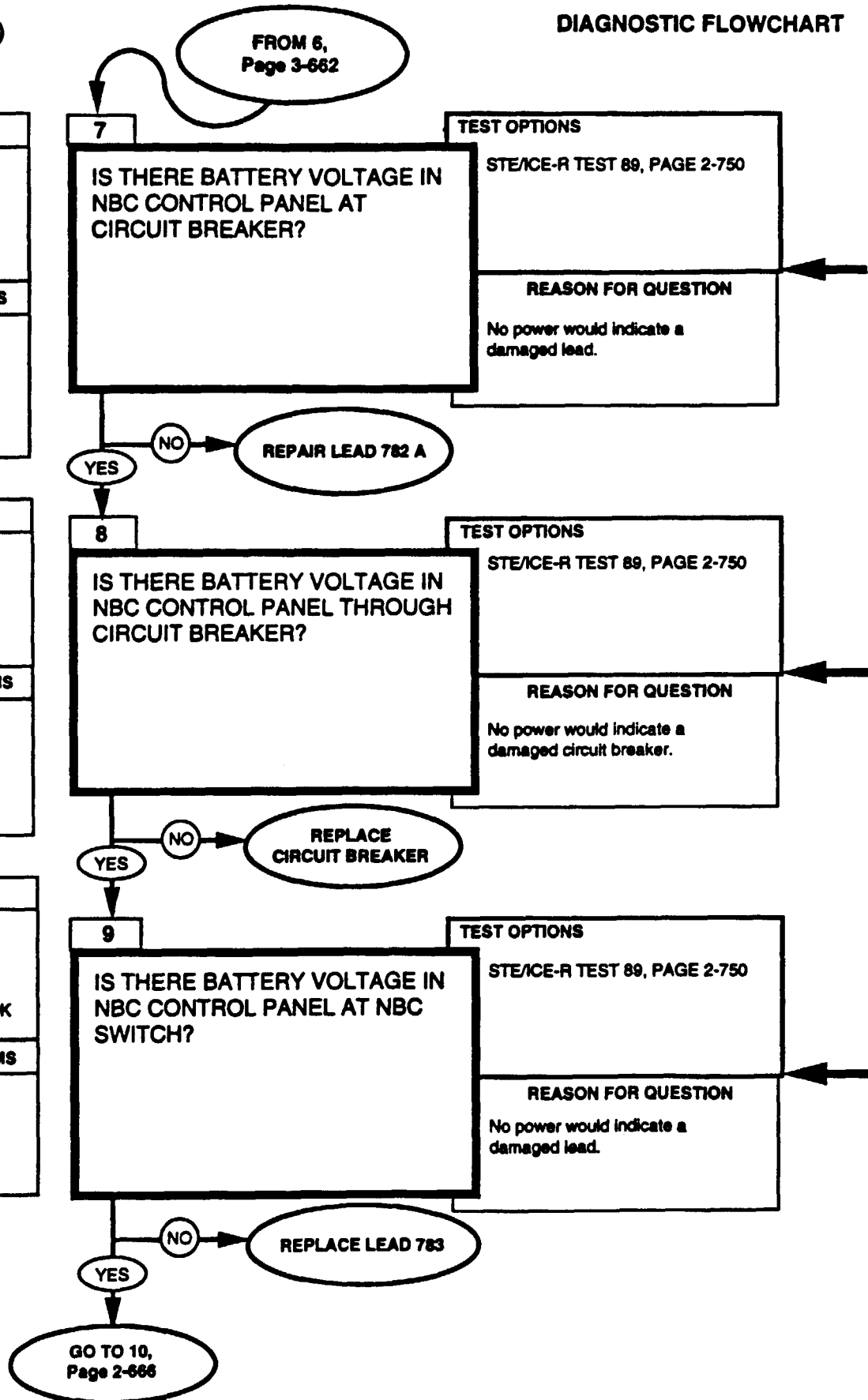
**AMBULANCE
(NBC Filter Blower)
(Refer to Fig. 17.)**

DIAGNOSTIC FLOWCHART

KNOWN INFO
BATTERY OK CABLE 660 OK LEAD 782 OK
POSSIBLE PROBLEMS
LEAD 782 A CIRCUIT BREAKER LEAD 783 NBC SWITCH LEAD 783 A LEAD 783 B

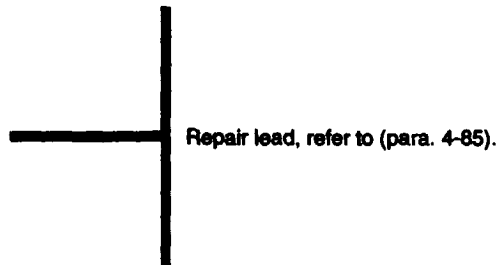
KNOWN INFO
BATTERY OK CABLE 660 OK LEAD 782 OK LEAD 782 A OK
POSSIBLE PROBLEMS
CIRCUIT BREAKER LEAD 783 NBC SWITCH LEAD 783 A LEAD 783 B

KNOWN INFO
BATTERY OK CABLE 660 OK LEAD 782 OK LEAD 782 A OK CIRCUIT BREAKER OK
POSSIBLE PROBLEMS
LEAD 783 NBC SWITCH LEAD 783 A LEAD 783 B

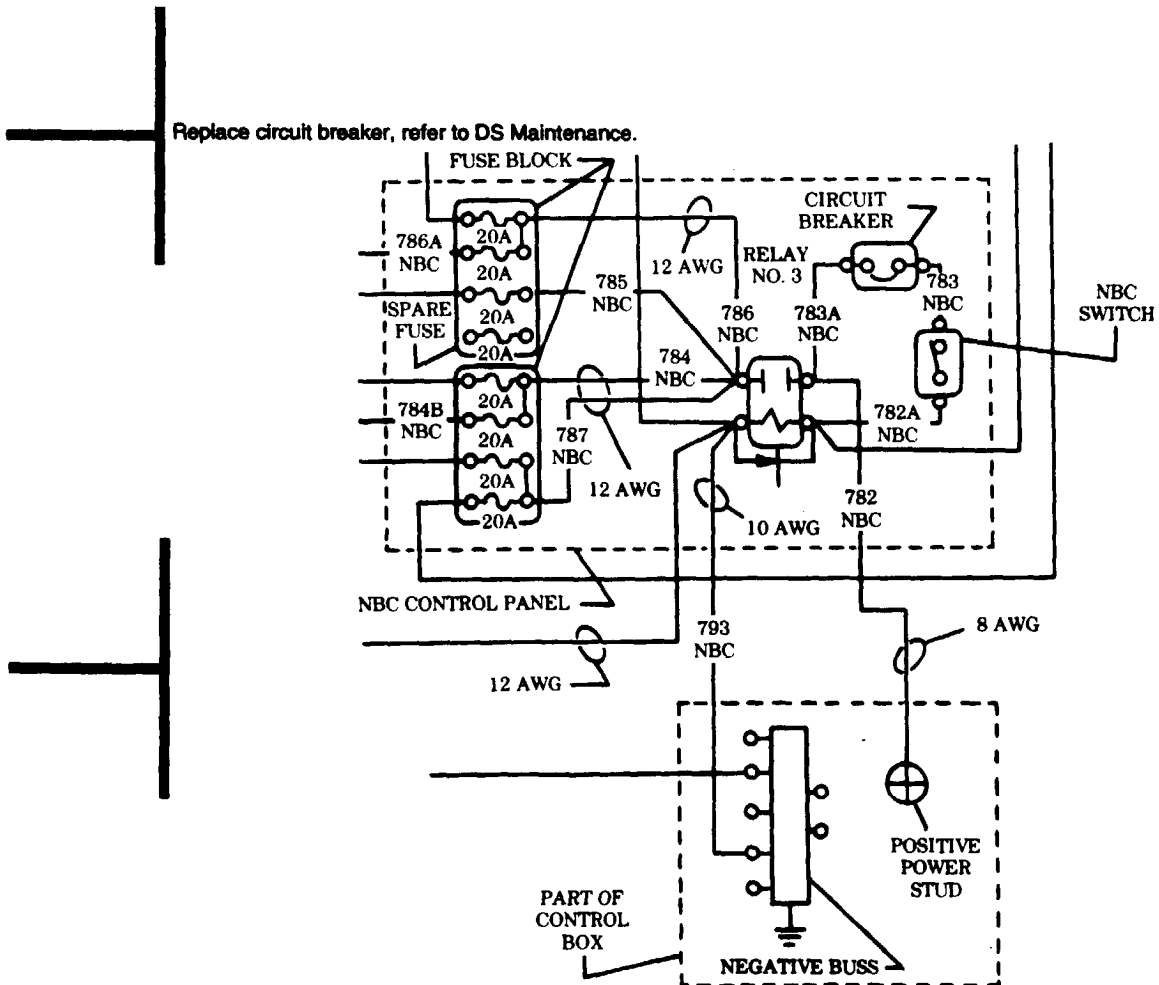


REFERENCE INFORMATION

AMBULANCE

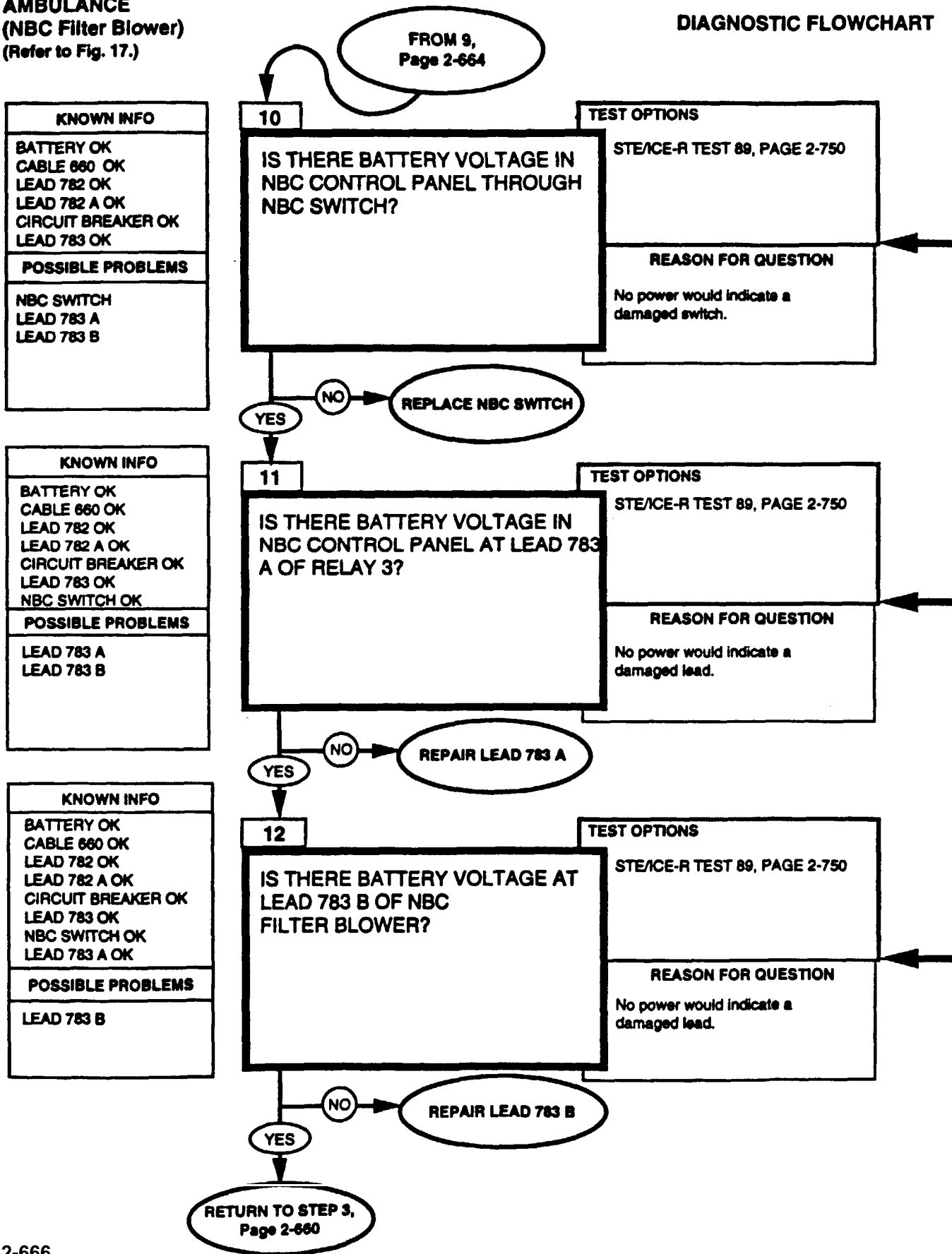


0-45 DC VOLTS STE/ICE-R TEST 89	
1.	Connect RED clip to the indicated test point, BLACK clip to negative or ground.
2.	Start Test 89, DC volts.
3.	Displayed reading is in volts.



**AMBULANCE
(NBC Filter Blower)
(Refer to Fig. 17.)**

DIAGNOSTIC FLOWCHART



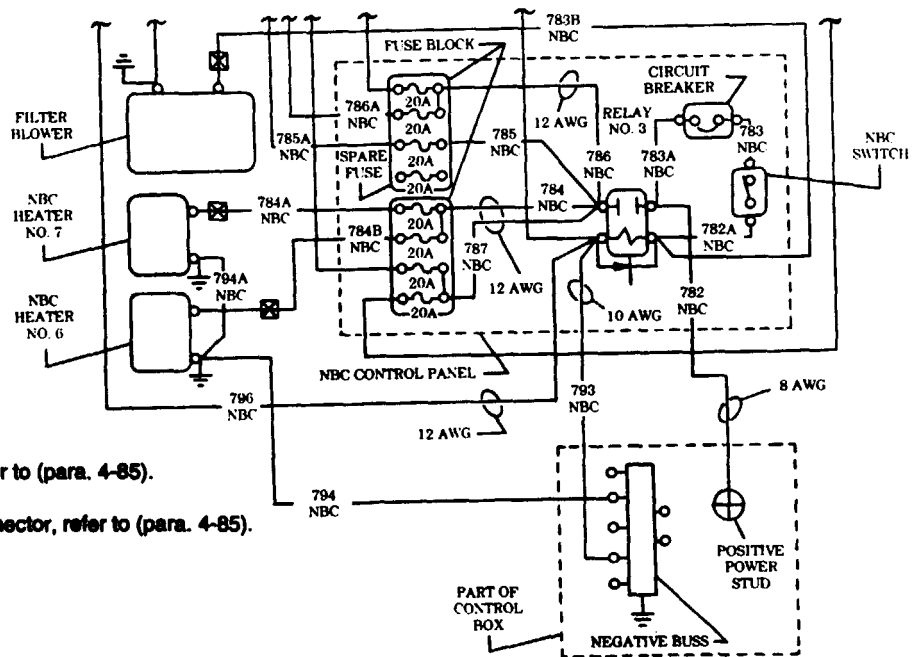
REFERENCE INFORMATION

AMBULANCE

Replace NBC switch, refer to DS Maintenance.

0-45 DC VOLTS STE/CE-R TEST 89	
1.	Connect RED clip to the indicated test point, BLACK clip to negative or ground.
2.	Start Test 89, DC volts.
3.	Displayed reading is in volts.

Repair lead, refer to (para. 4-85).

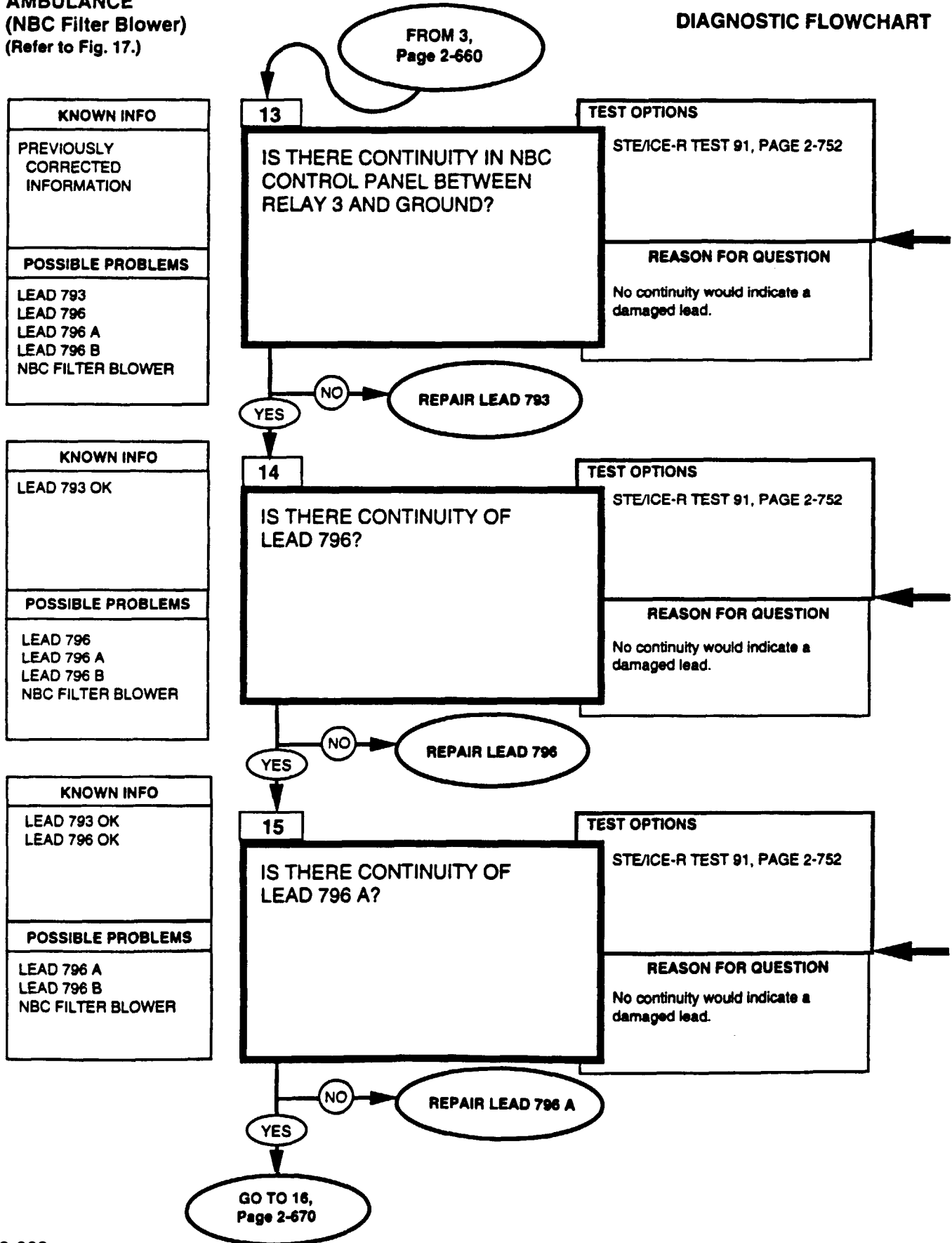


Repair lead, refer to (para. 4-85).

Repair lead connector, refer to (para. 4-85).

**AMBULANCE
(NBC Filter Blower)
(Refer to Fig. 17.)**

DIAGNOSTIC FLOWCHART



REFERENCE INFORMATION

AMBULANCE

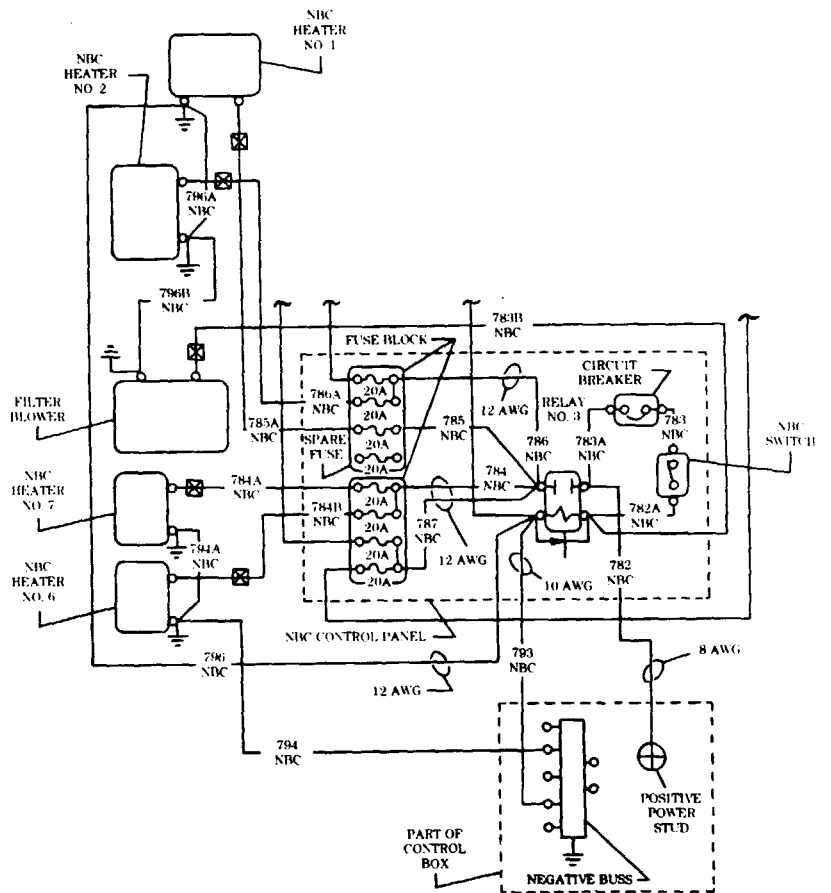
Repair lead, refer to (para. 4-85).
 Repair lead connector, refer to (para. 4-85).

**0-4500 OHMS
 STE/ICE-R TEST 91**

1. Connect RED clip and BLACK clip to the indicated terminals in question; RED to the first, BLACK to the second.
2. Start Test 91, 0-4500 ohms.
3. Displayed reading in ohms. Less than 5 ohms is continuity. If the resistance is over 4500 ohms, STE/ICE displays "9.9.9.9."

Repair lead, refer to (para. 4-85).

Repair lead, refer to (para. 4-85).

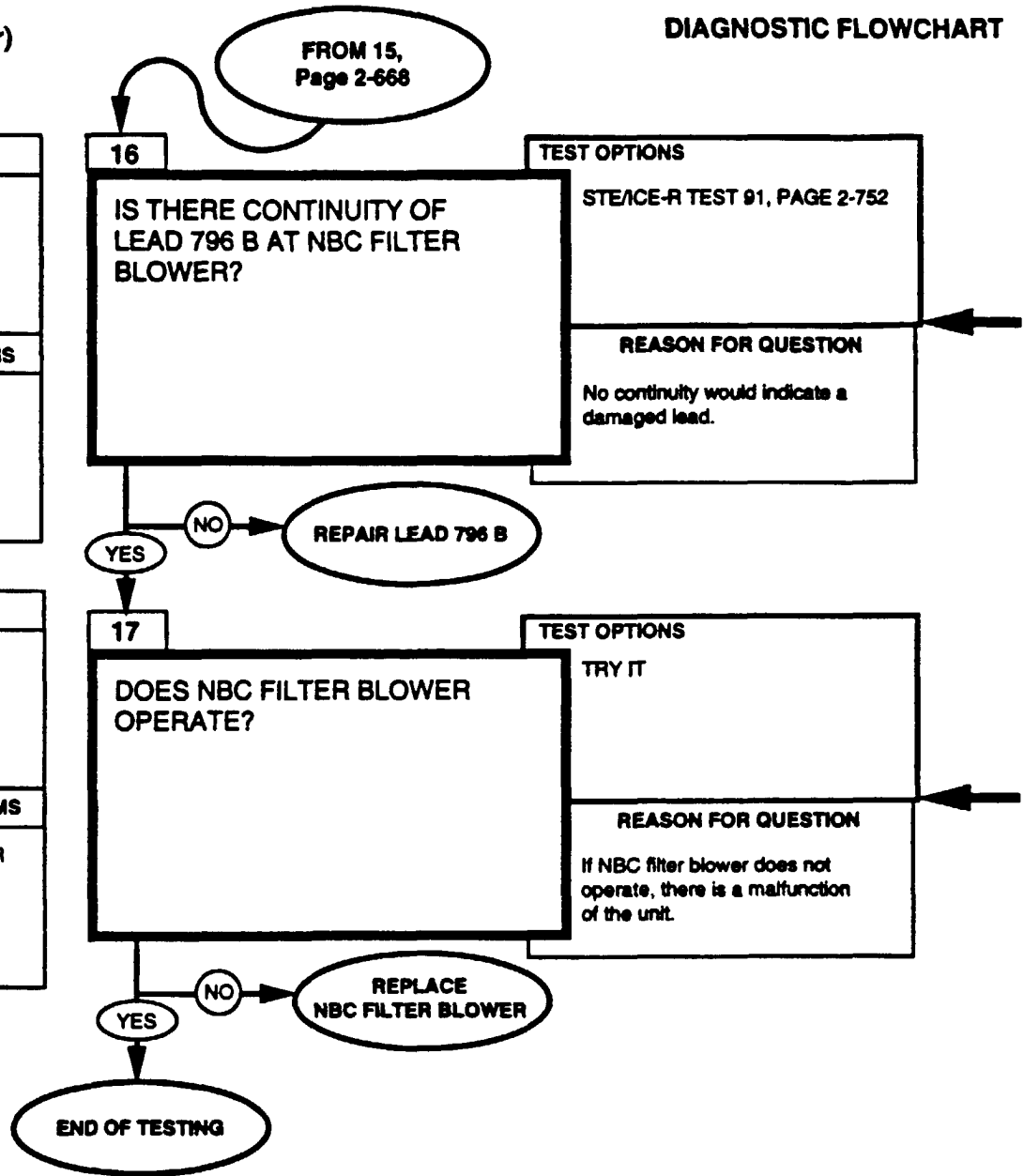


**AMBULANCE
(NBC Filter Blower)
(Refer to Fig. 17.)**

DIAGNOSTIC FLOWCHART

KNOWN INFO
LEAD 793 OK LEAD 796 OK LEAD 796 A OK
POSSIBLE PROBLEMS
LEAD 796 B NBC FILTER BLOWER

KNOWN INFO
LEAD 793 OK LEAD 796 OK LEAD 796 A OK LEAD 796 B OK
POSSIBLE PROBLEMS
NBC FILTER BLOWER



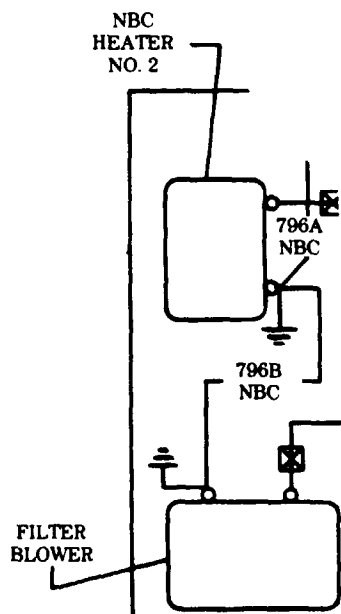
REFERENCE INFORMATION

AMBULANCE

Repair lead, refer to (para. 4-85).

0-4500 OHMS STE/ICE-R TEST 91
1. Connect RED clip and BLACK clip to the indicated terminals in question; RED to the first, BLACK to the second.
2. Start Test 91, 0-4500 ohms.
3. Displayed reading in ohms. Less than 5 ohms is continuity. If the resistance is over 4500 ohms, STE/ICE displays "9.9.9.9."

Replace NBC filter blower, refer to DS Maintenance.



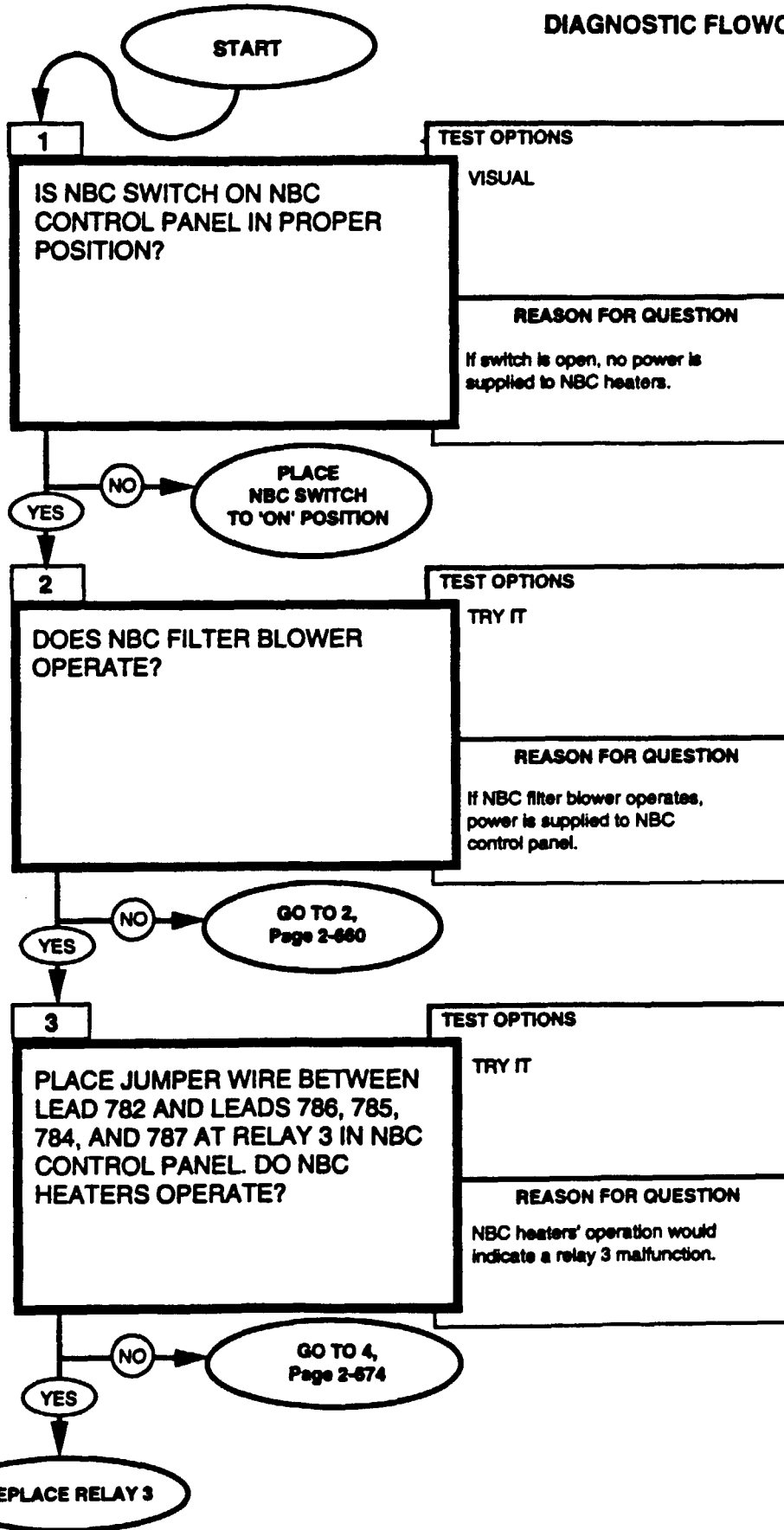
**Ambulance
(NBC Heaters)
(Refer to Fig. 17.)**

DIAGNOSTIC FLOWCHART

KNOWN INFO
NOTHING
POSSIBLE PROBLEMS
RELAY 3

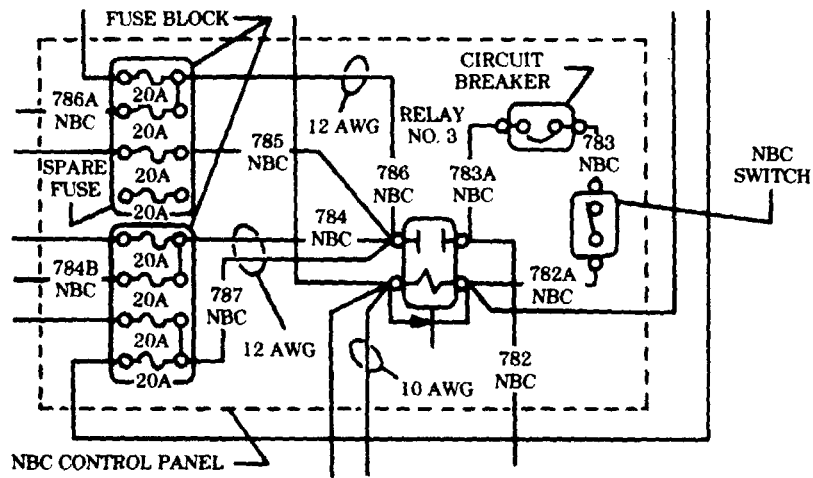
KNOWN INFO
POSSIBLE PROBLEMS
RELAY 3

KNOWN INFO
POSSIBLE PROBLEMS
RELAY 3



REFERENCE INFORMATION

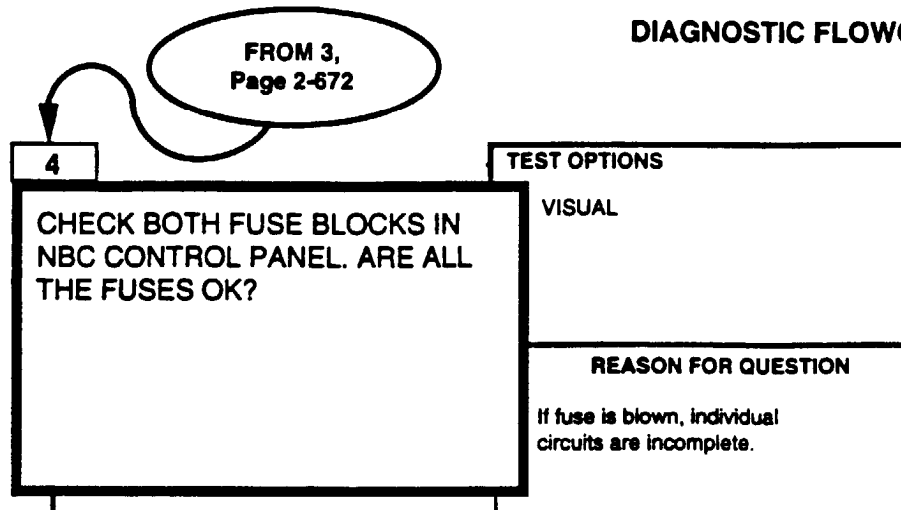
AMBULANCE



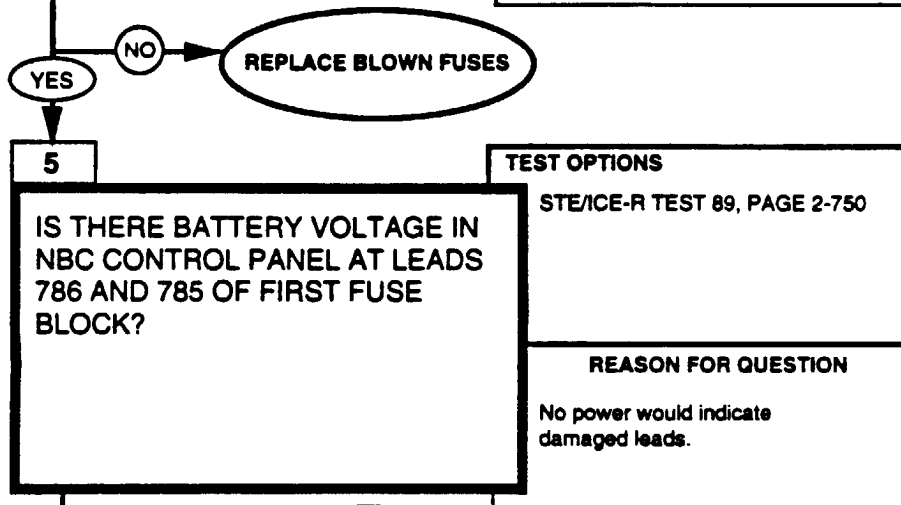
**AMBULANCE
(NBC Heaters)
(Refer to Fig. 17.)**

DIAGNOSTIC FLOWCHART

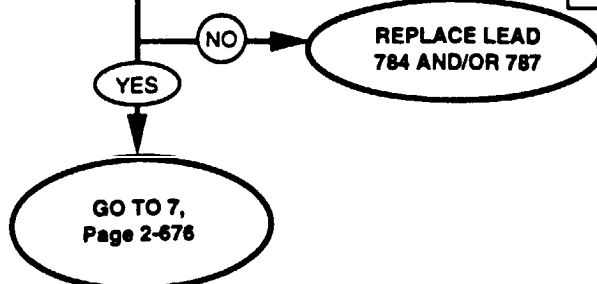
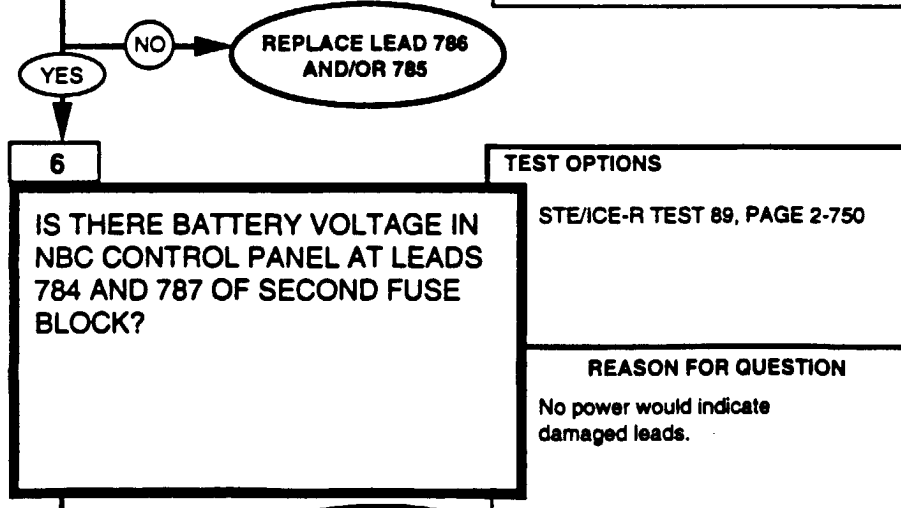
KNOWN INFO
PREVIOUSLY CORRECTED INFORMATION
POSSIBLE PROBLEMS
FUSES LEAD 786 LEAD 785 LEAD 784 LEAD 787 DAMAGED LEADS



KNOWN INFO
FUSES OK
POSSIBLE PROBLEMS
LEAD 786 LEAD 785 LEAD 784 LEAD 787 DAMAGED LEADS

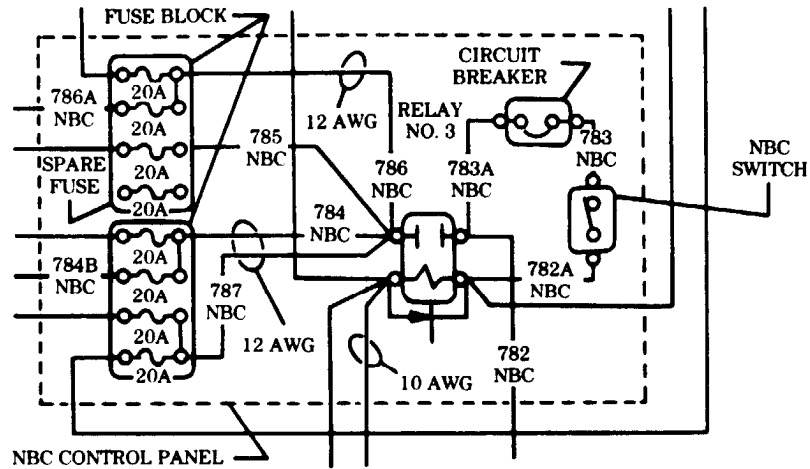


KNOWN INFO
FUSES OK LEAD 786 OK LEAD 785 OK
POSSIBLE PROBLEMS
LEAD 784 LEAD 787 DAMAGED LEADS



REFERENCE INFORMATION

AMBULANCE

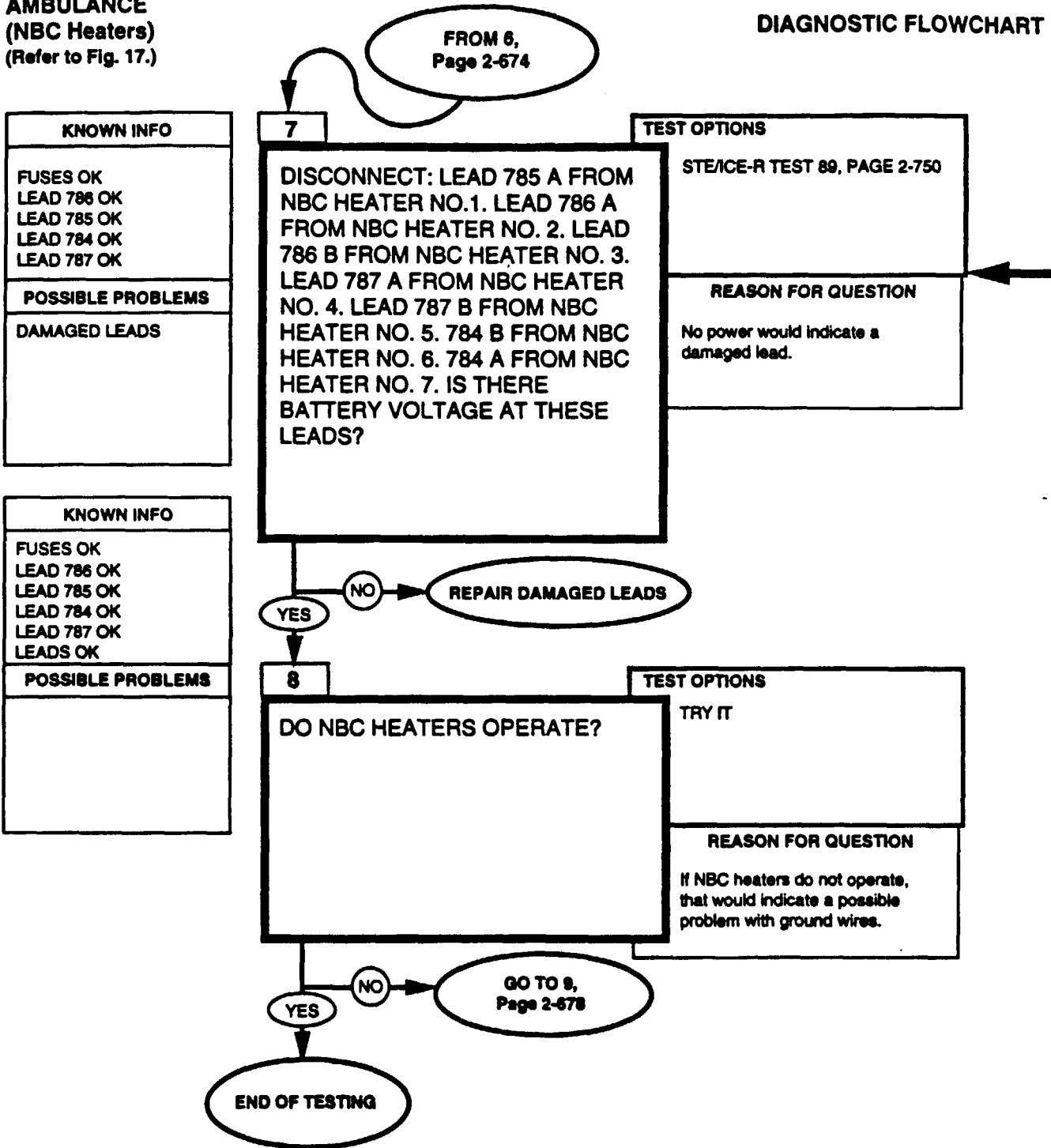


0-45 DC VOLTS STE/CE-R TEST 89
1. Connect RED clip to the indicated test point, BLACK clip to negative or ground.
2. Start Test 89, DC volts.
3. Displayed reading is in volts.



**AMBULANCE
(NBC Heaters)
(Refer to Fig. 17.)**

DIAGNOSTIC FLOWCHART



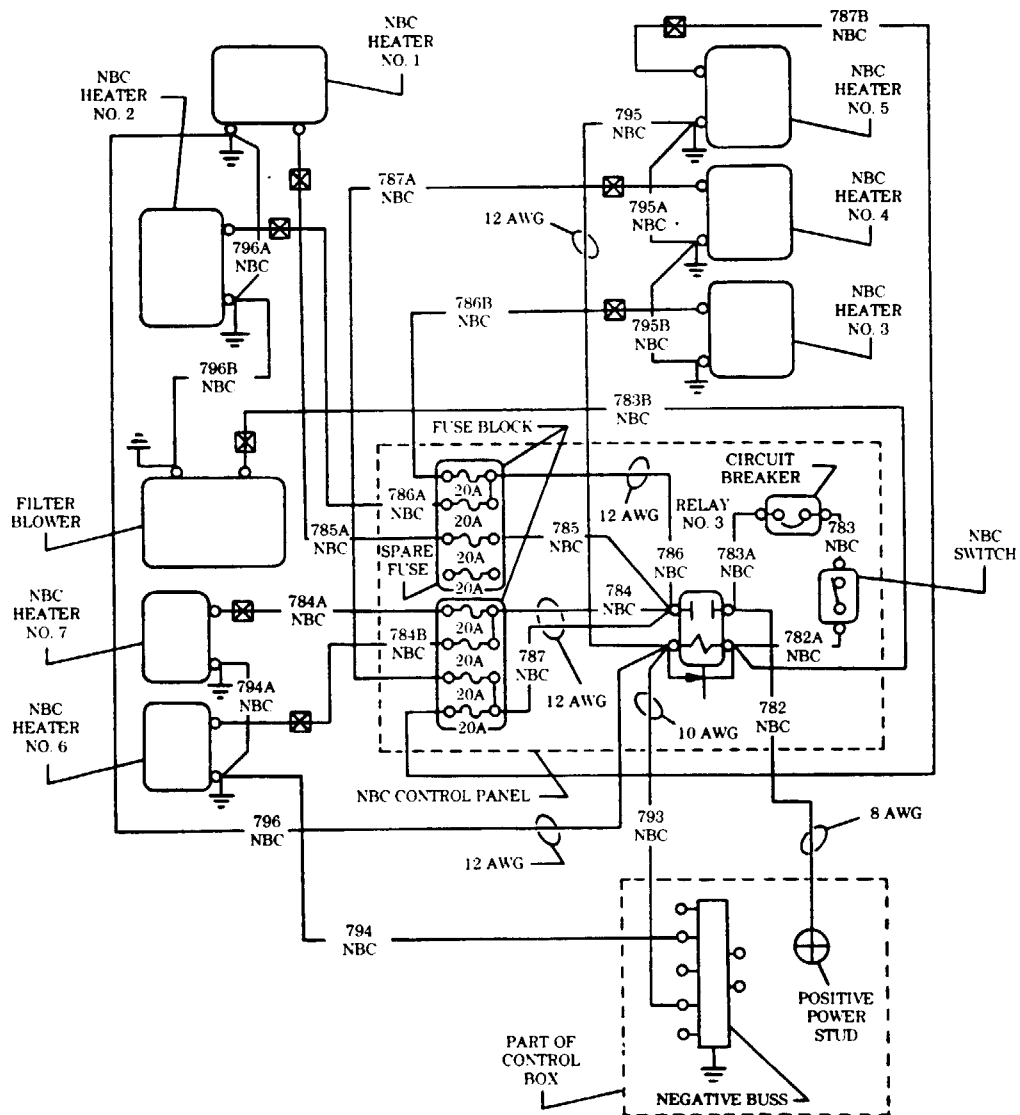
REFERENCE INFORMATION

AMBULANCE



**0-45 DC VOLTS
STE/ICE-R TEST 89**

1. Connect RED clip to the indicated test point, BLACK clip to negative or ground.
2. Start Test 89, DC volts.
3. Displayed reading is in volts.



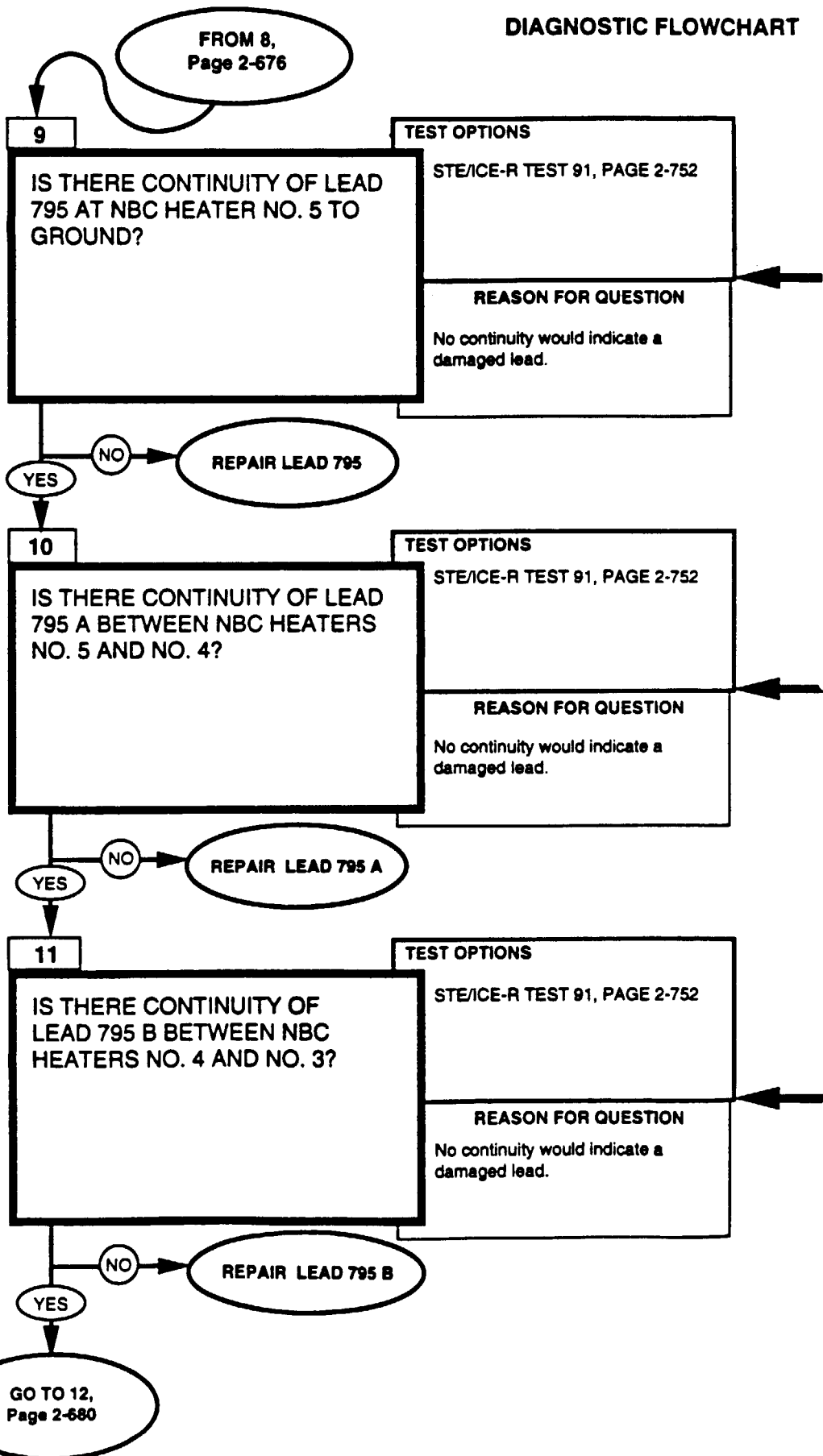
**AMBULANCE
(NBC Heaters)
(Refer to Fig. 17.)**

DIAGNOSTIC FLOWCHART

KNOWN INFO
PREVIOUSLY CORRECTED INFORMATION
POSSIBLE PROBLEMS
LEAD 795 LEAD 795 A LEAD 795 B LEAD 794 LEAD 794 A NBC HEATERS

KNOWN INFO
LEAD 795 OK
POSSIBLE PROBLEMS
LEAD 795 A LEAD 795 B LEAD 794 LEAD 794 A NBC HEATERS

KNOWN INFO
LEAD 795 OK LEAD 795 A OK
POSSIBLE PROBLEMS
LEAD 795 B LEAD 794 LEAD 794 A NBC HEATERS



REFERENCE INFORMATION

AMBULANCE

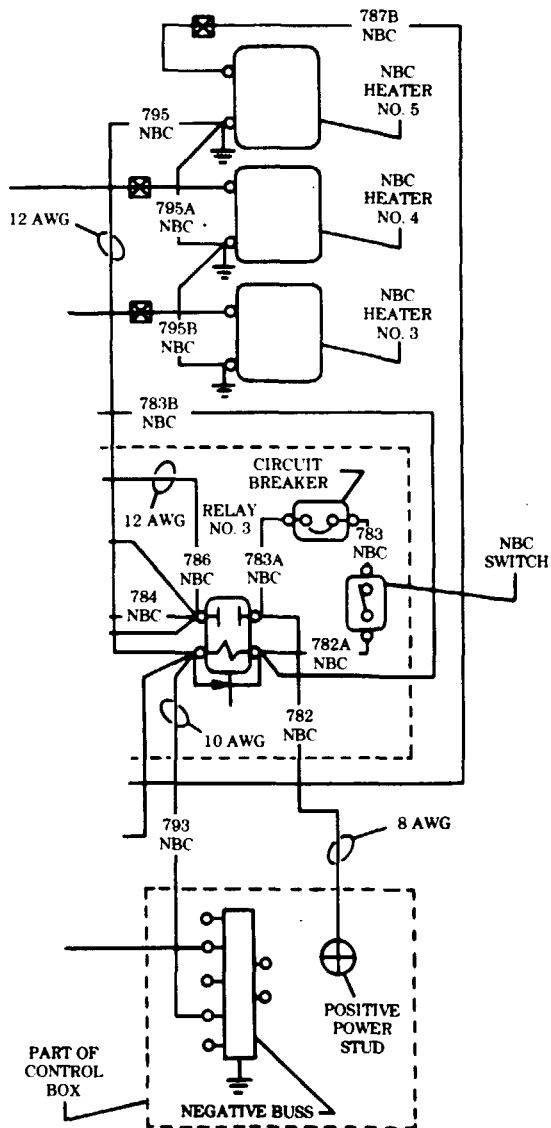
Repair lead, refer to (para. 4-85).

Repair lead, refer to (para. 4-85).

Repair lead, refer to (para. 4-85).

**0-4500 OHMS
STE/ICE-R TEST 91**

1. Connect RED clip and BLACK clip to the indicated terminals in question; RED to the first, BLACK to the second.
2. Start Test 91, 0-4500 ohms.
3. Displayed reading is in ohms. Less than 5 ohms is continuity. If the resistance is over 4500 ohms, STE/ICE displays "9.9.9.9."



**AMBULANCE
(NBC Heaters)
(Refer to Fig. 17.)**

DIAGNOSTIC FLOWCHART

KNOWN INFO
LEAD 795 OK LEAD 795 A OK LEAD 795 B OK
POSSIBLE PROBLEMS
LEAD 794 LEAD 794 A NBC HEATERS



12

IS THERE CONTINUITY OF LEAD 794 AT NBC HEATER NO. 6 TO GROUND?

TEST OPTIONS

STE/ICE-R TEST 91, PAGE 2-752

REASON FOR QUESTION

No continuity would indicate a damaged lead.



KNOWN INFO
LEAD 795 OK LEAD 795 A OK LEAD 795 B OK LEAD 794 OK
POSSIBLE PROBLEMS
LEAD 794 A NBC HEATERS

13

IS THERE CONTINUITY OF LEAD 794 A BETWEEN NBC HEATERS NO. 6 AND NO. 7?

TEST OPTIONS

STE/ICE-R TEST 91, PAGE 2-752

REASON FOR QUESTION

No continuity would indicate a damaged lead.



KNOWN INFO
LEAD 795 OK LEAD 795 A OK LEAD 795 B OK LEAD 794 OK LEAD 794 A OK
POSSIBLE PROBLEMS
NBC HEATERS

14

DO NBC HEATERS OPERATE?

TEST OPTIONS

TRY IT

REASON FOR QUESTION

If NBC heaters do not operate, that would indicate heater malfunction.

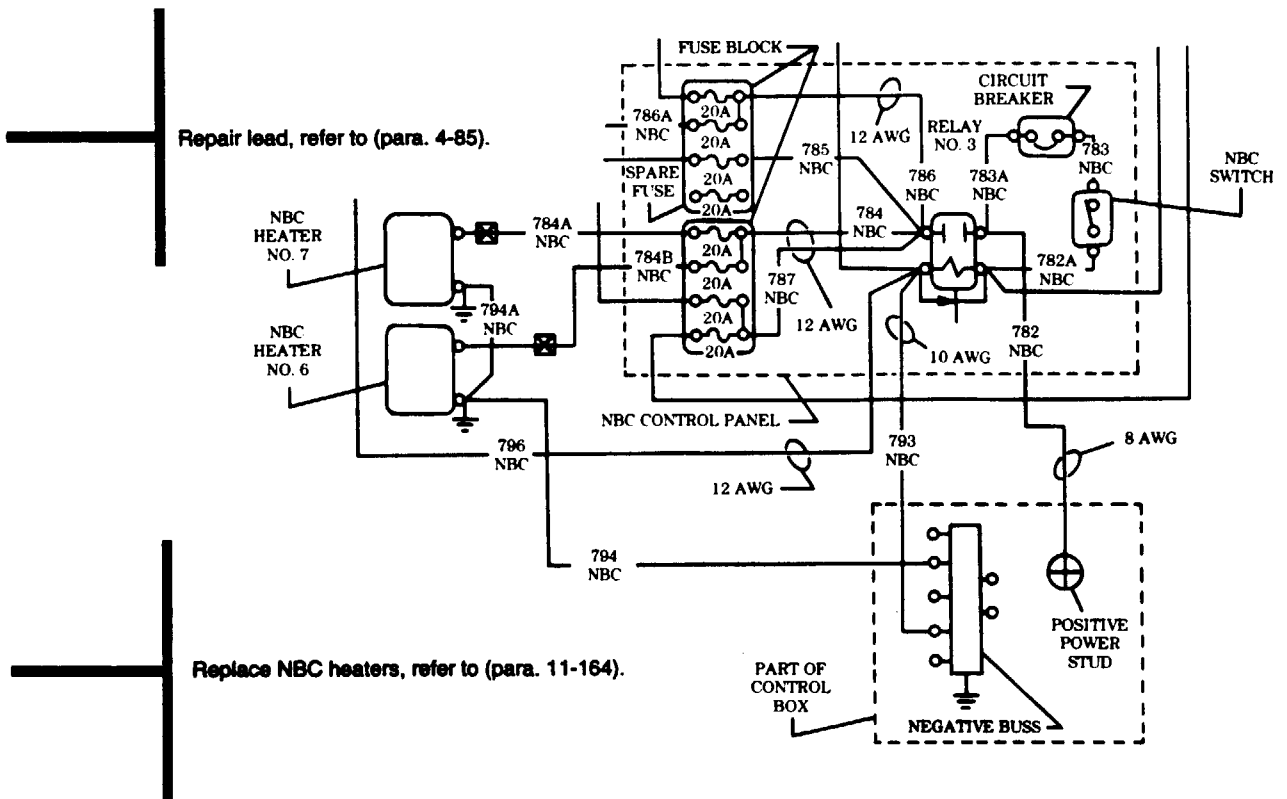


REFERENCE INFORMATION

AMBULANCE

Repair lead, refer to (para. 4-85).

0-4500 OHMS STE/ICE-R TEST 91
1. Connect RED clip and BLACK clip to the indicated terminals in question; RED to the first, BLACK to the second.
2. Start Test 91, 0-4500 ohms.
3. Displayed reading is in ohms. Less than 5 ohms is continuity. If the resistance is over 4500 ohms, STE/ICE displays "9.9.9.9."



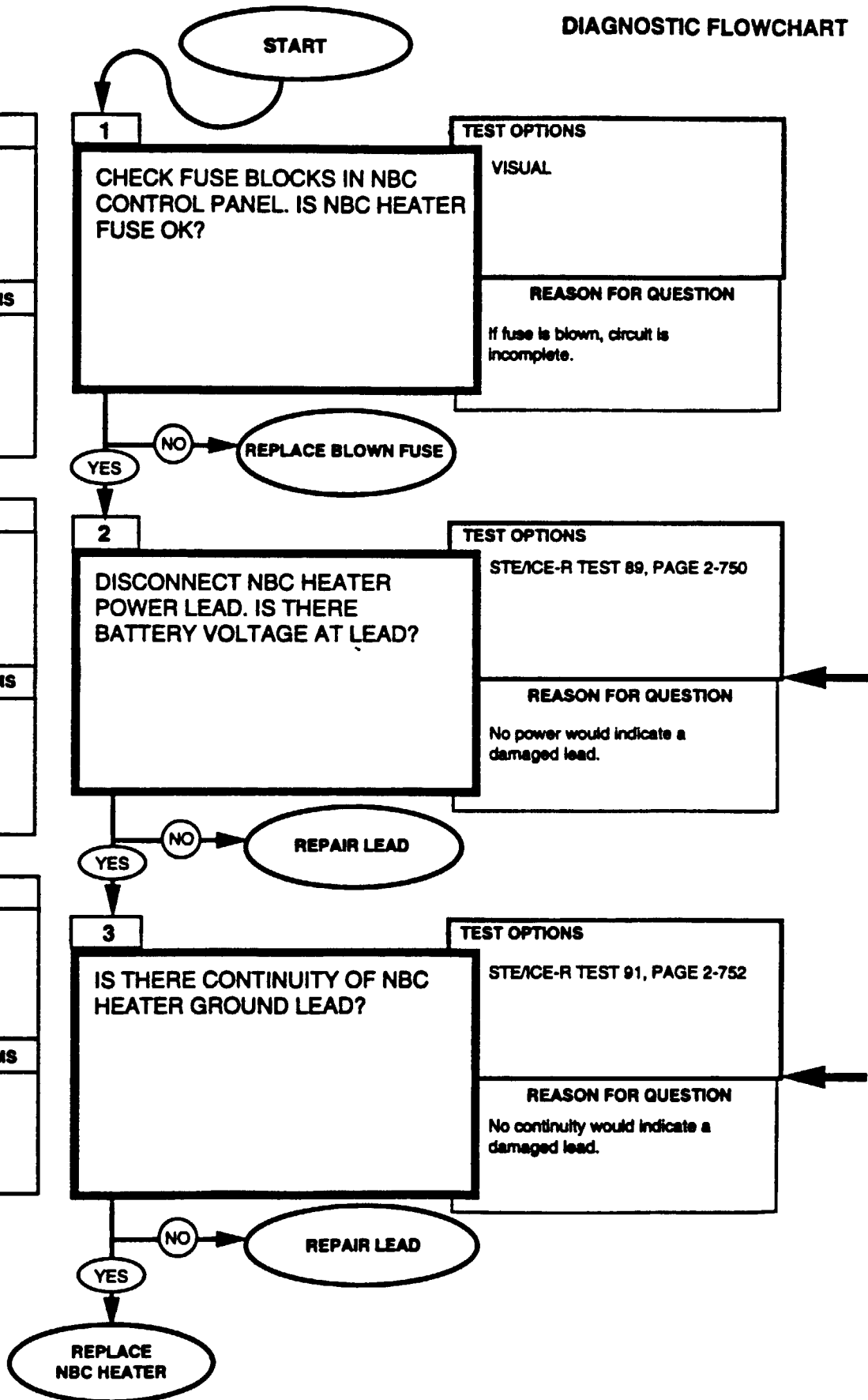
**AMBULANCE
(NBC Heater)
(Refer to Fig. 17.)**

DIAGNOSTIC FLOWCHART

KNOWN INFO
NOTHING
POSSIBLE PROBLEMS
FUSE POWER LEAD NBC HEATER GROUND LEAD

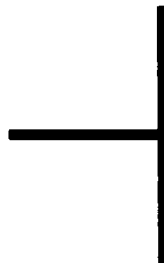
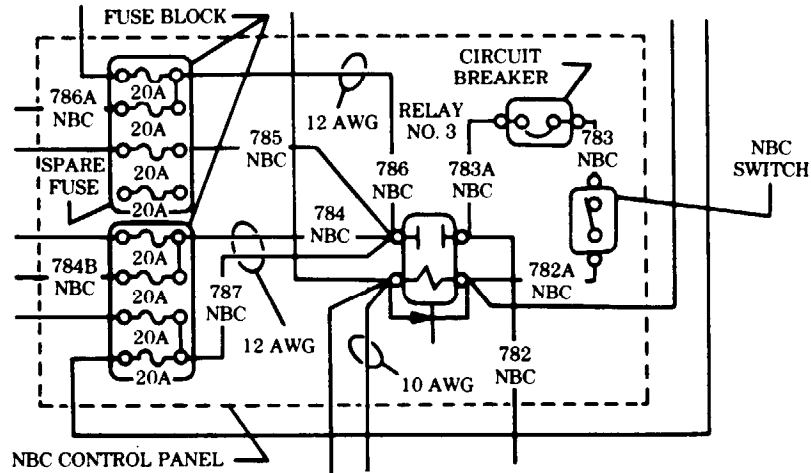
KNOWN INFO
FUSE OK
POSSIBLE PROBLEMS
POWER LEAD NBC HEATER GROUND LEAD

KNOWN INFO
FUSE OK POWER LEAD OK
POSSIBLE PROBLEMS
NBC HEATER GROUND LEAD



REFERENCE INFORMATION

AMBULANCE



Repair lead, refer to (para. 4-85).
 Repair lead connector, refer to (para. 4-85).

<p>0-45 DC VOLTS STE/ICE-R TEST 89</p>
<p>1. Connect RED clip to the indicated test point, BLACK clip to negative or ground.</p> <p>2. Start Test 89, DC volts.</p> <p>3. Displayed reading is in volts.</p>



Repair lead, refer to (para. 4-85).
 Replace NBC heater, refer to (para. 11-164).

<p>0-4500 OHMS STE/ICE-R TEST 91</p>
<p>1. Connect RED clip and BLACK clip to the indicated terminals in question; RED to the first, BLACK to the second.</p> <p>2. Start Test 91, 0-4500 ohms.</p> <p>3. Displayed reading is in ohms. Less than 5 ohms is continuity. If the resistance is over 4500 ohms, STE/ICE displays "9.9.9.9."</p>

Electrical Troubleshooting

MALFUNCTION TEST OR INSPECTION

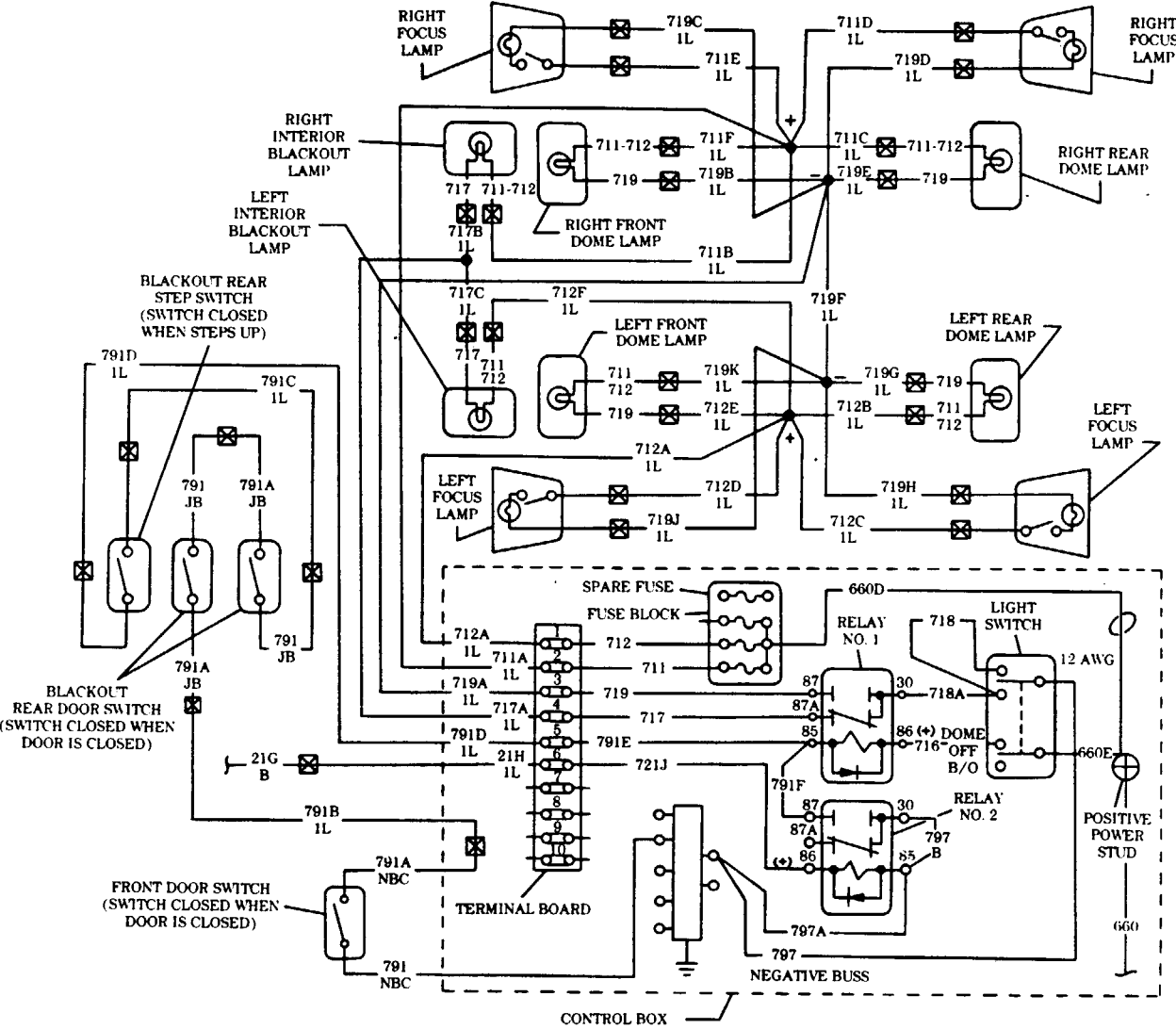


Figure 11. Lighting System

MALFUNCTION TEST OR INSPECTION

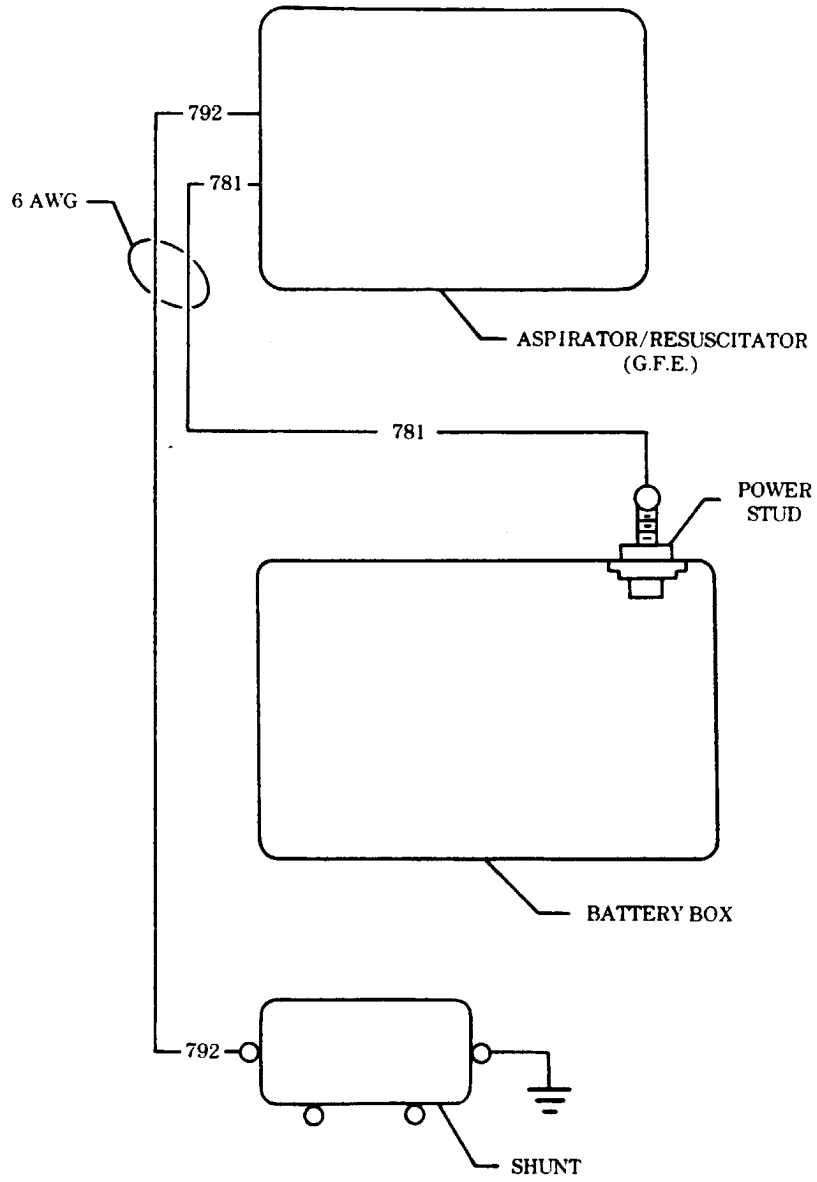


Figure 12. Aspirator System

Electrical Troubleshooting

**MALFUNCTION
TEST OR INSPECTION**

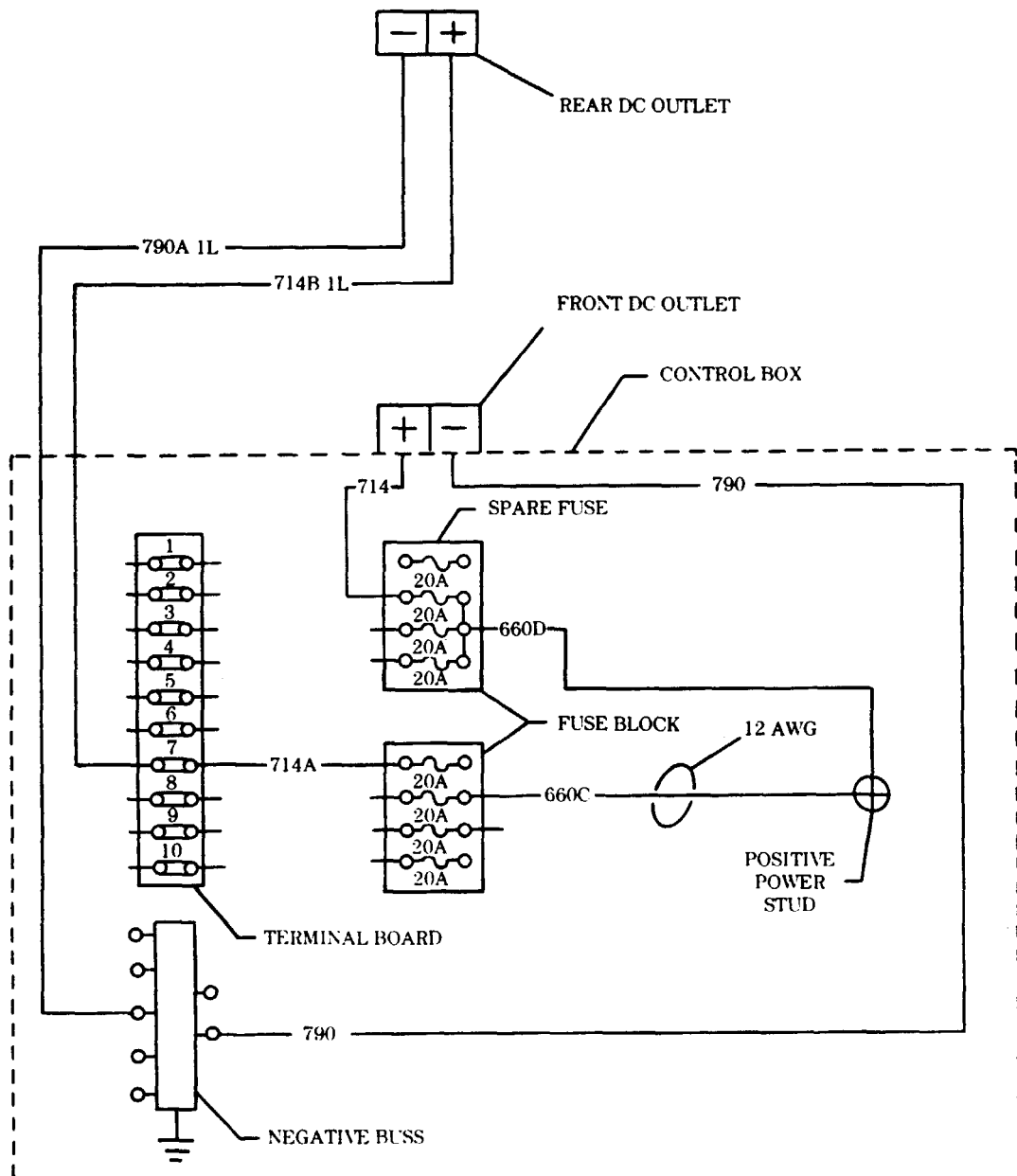


Figure 13. DC Voltage System

**MALFUNCTION
TEST OR INSPECTION**

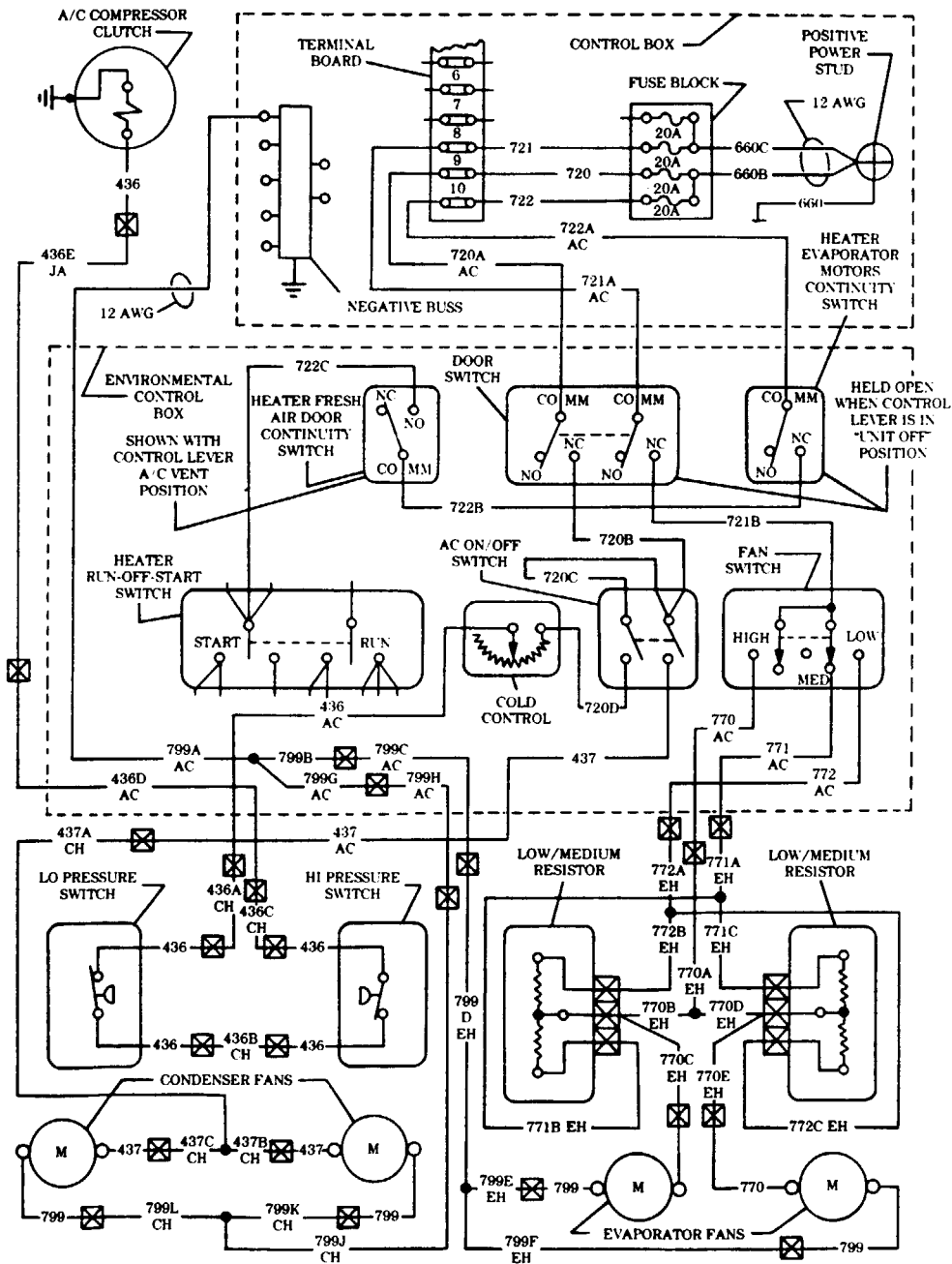


Figure 14. Air-Conditioning Control System

Electrical Troubleshooting

**MALFUNCTION
TEST OR INSPECTION**

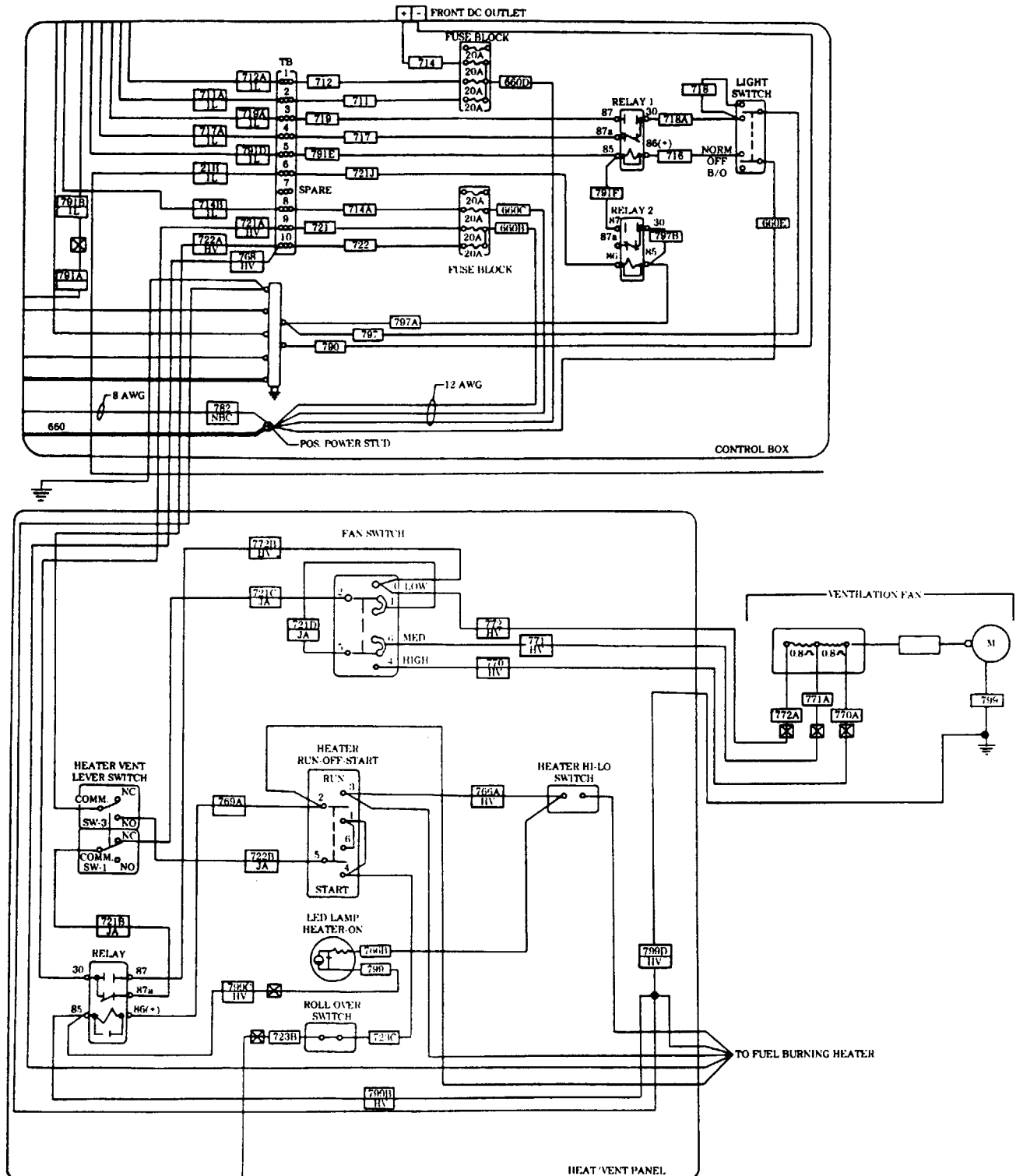


Figure 15. M996 and M996A1 Heater/Ventilation Control Box and Blower Fan

**MALFUNCTION
TEST OR INSPECTION**

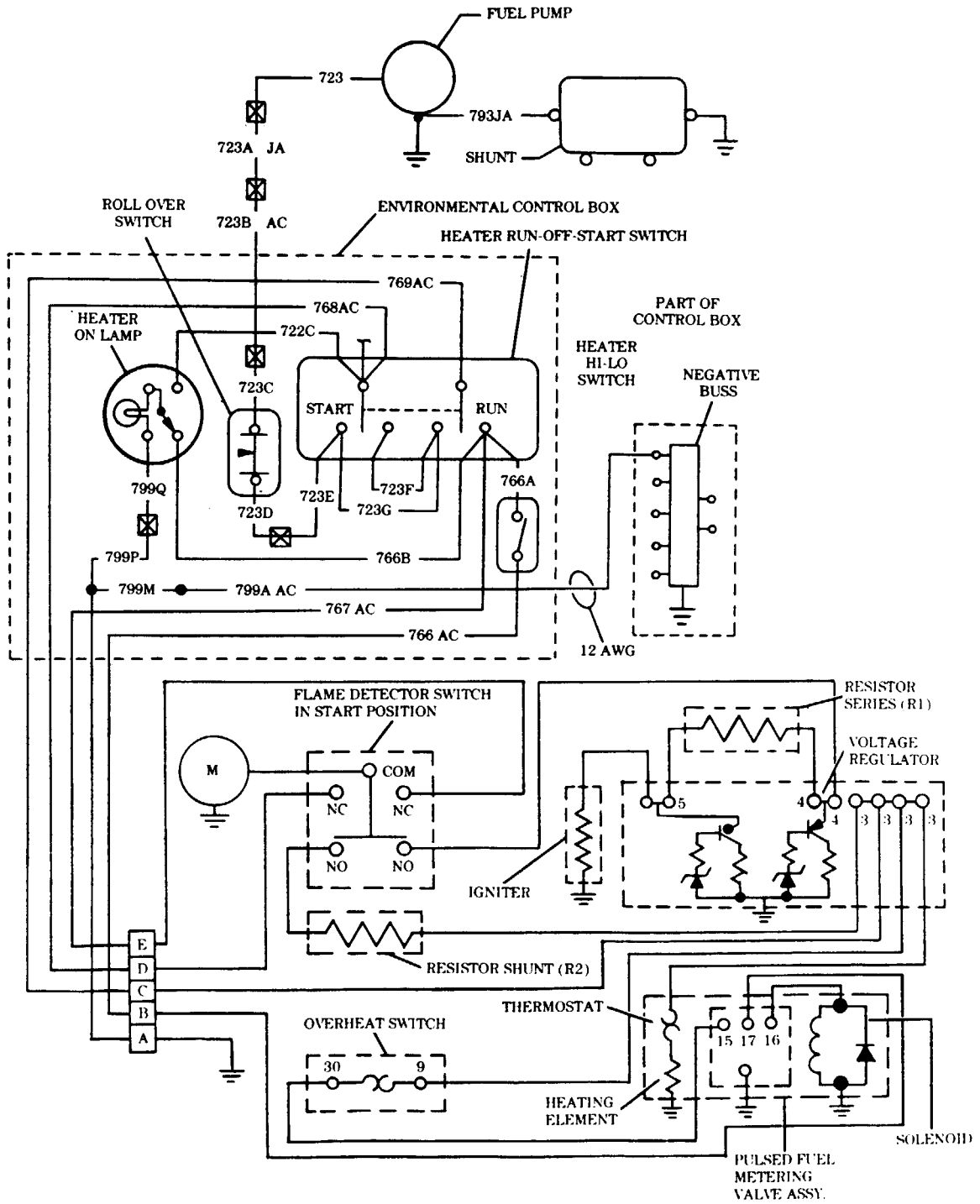


Figure 16. Heater Control System

**MALFUNCTION
TEST OR INSPECTION**

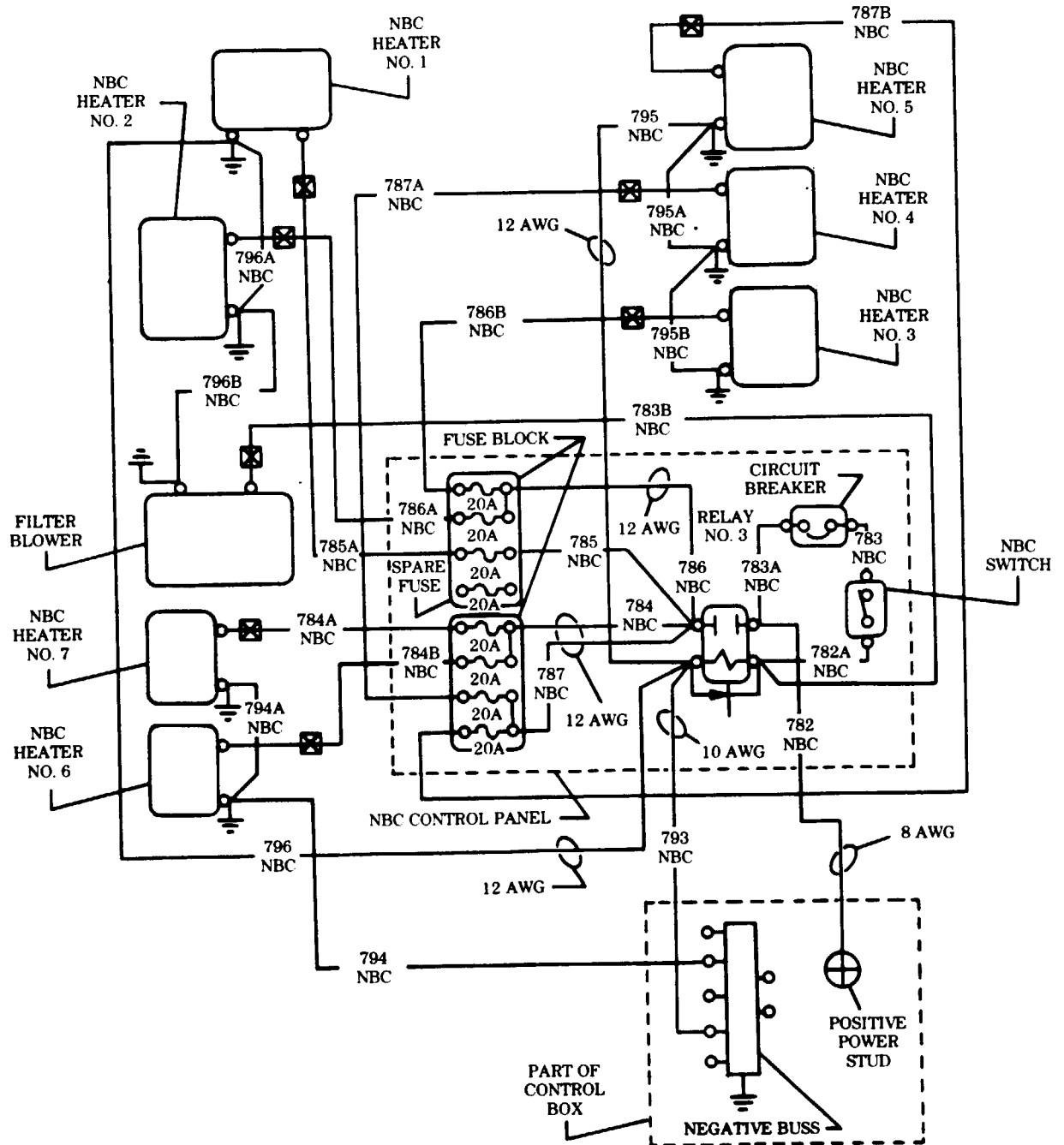


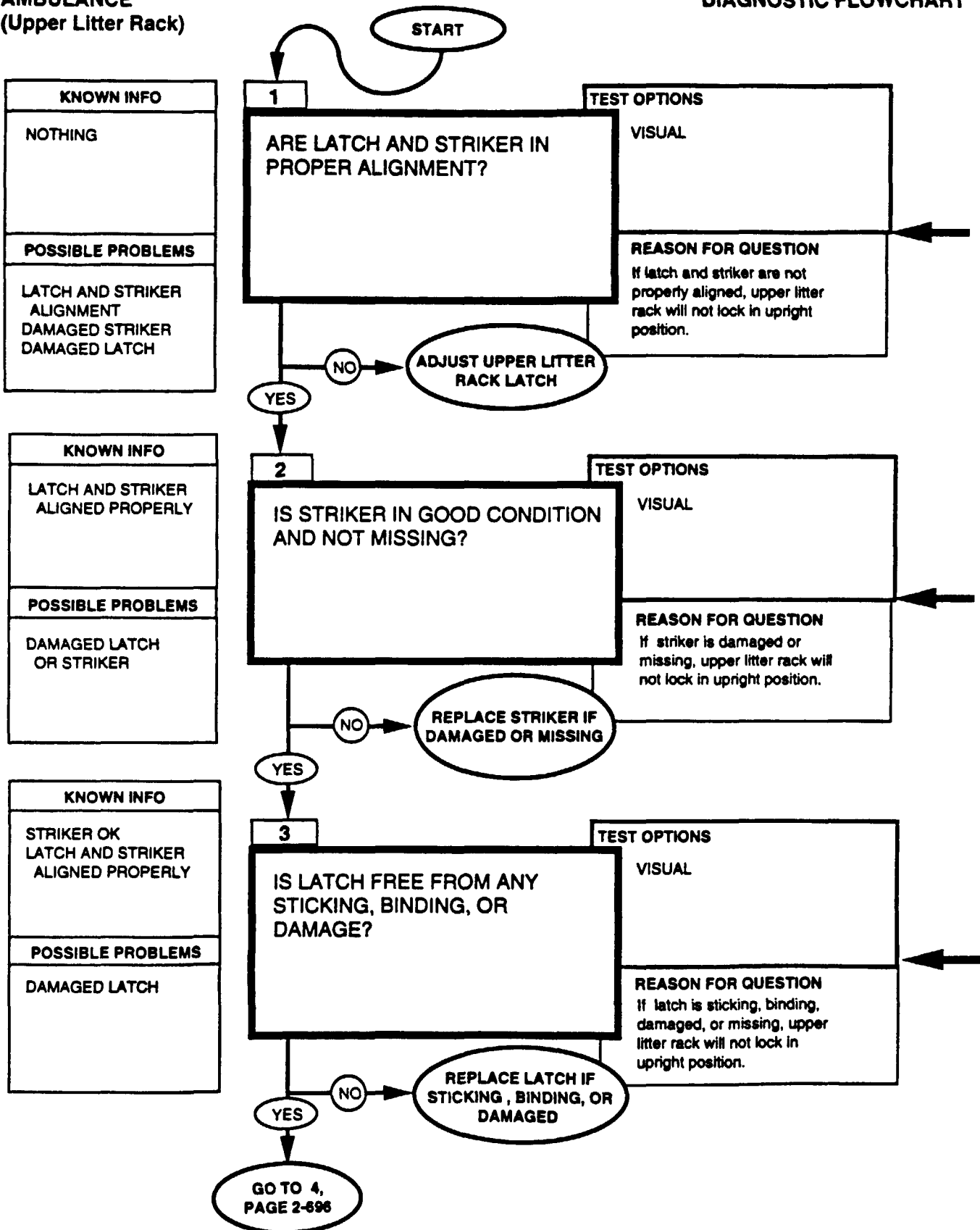
Figure 17. NBC Control System

2-40. AMBULANCE MECHANICAL SYSTEM TESTS

These ambulance system mechanical tests may be run anytime you think you have an ambulance mechanical problem or if you were sent here by another test chain. Just follow the path, answering the questions. Additional information and notes are given on the facing page when necessary.

**AMBULANCE
(Upper Litter Rack)**

DIAGNOSTIC FLOWCHART




REFERENCE INFORMATION

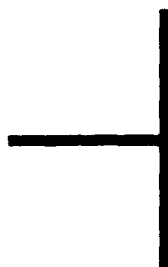
AMBULANCE



Adjust upper litter rack latch, refer to (para. 11-142).



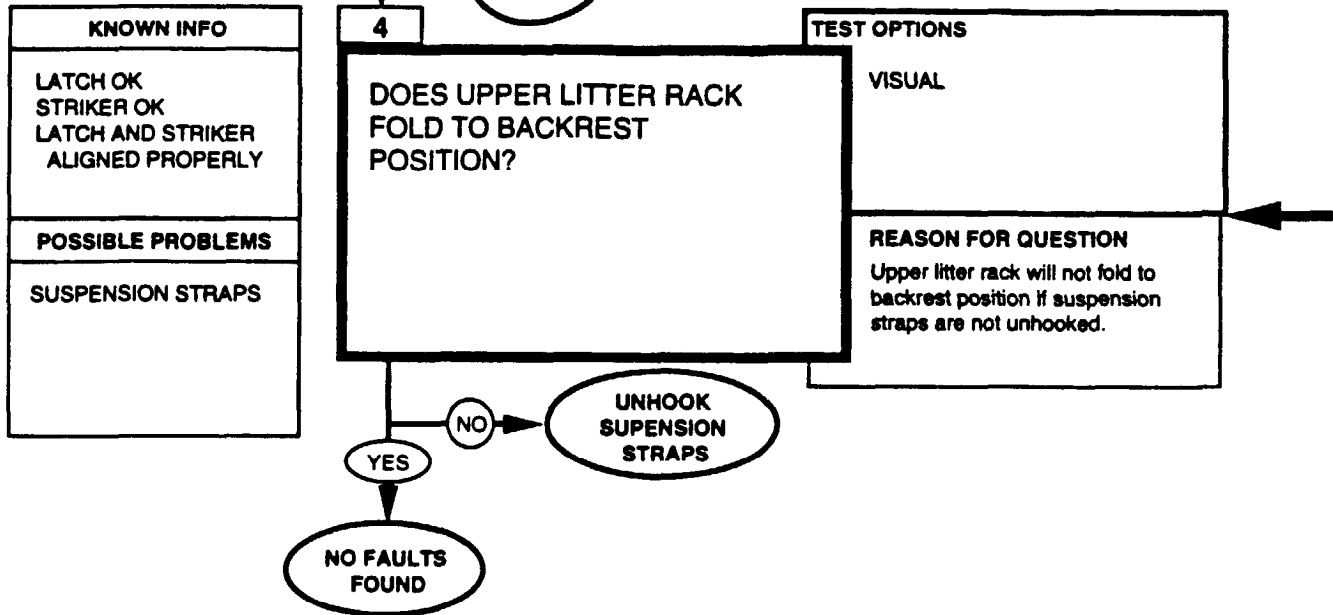
Replace striker, refer to (para. 11-139).



Replace latch, refer to (para. 11-142).

**AMBULANCE SYSTEM
(Upper Litter Rack)**

DIAGNOSTIC FLOWCHART



REFERENCE INFORMATION

AMBULANCE



Unhook suspension straps, refer to (TM 9-2320-280-10).

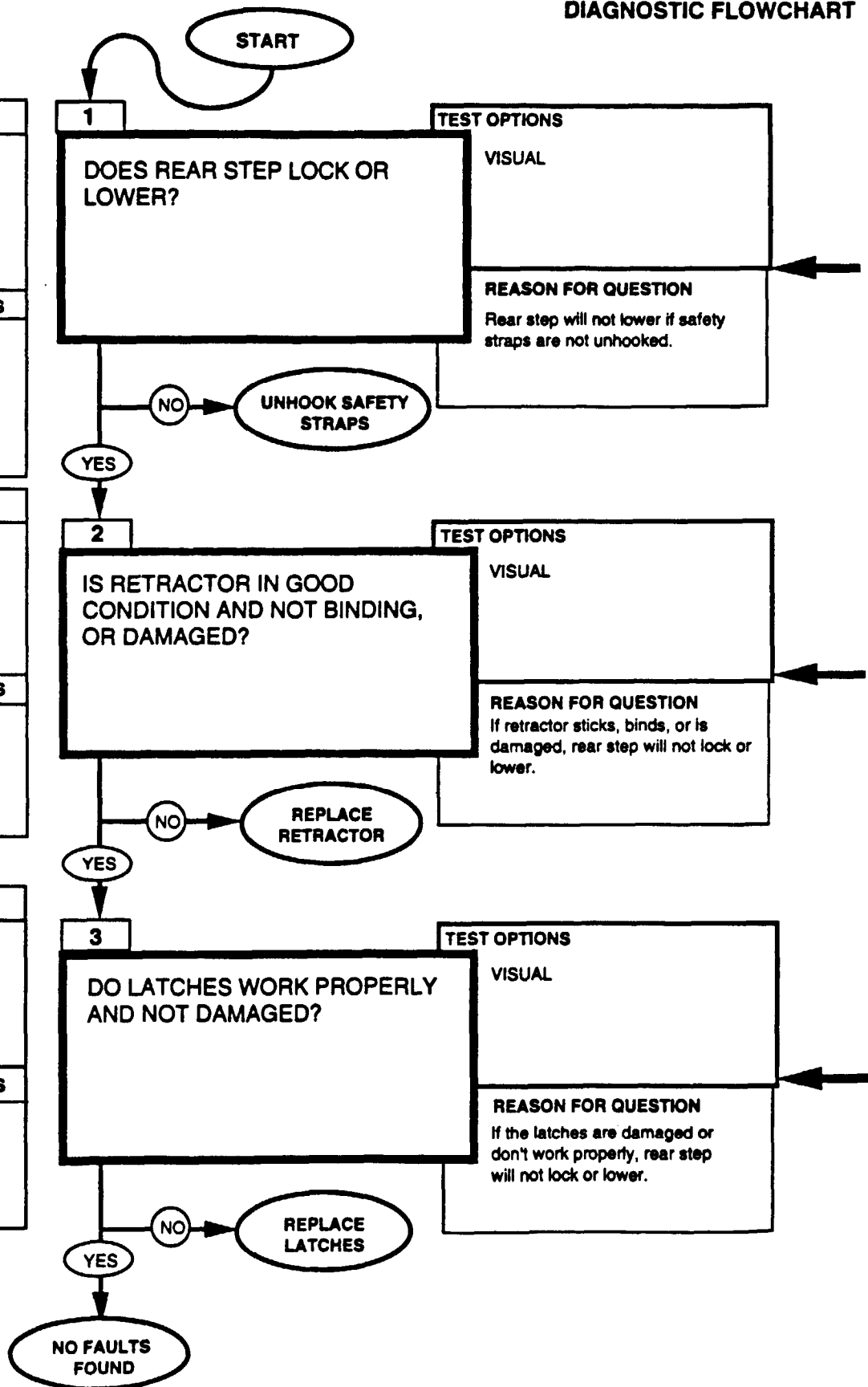
**AMBULANCE
(Rear Step)**

DIAGNOSTIC FLOWCHART

KNOWN INFO
NOTHING
POSSIBLE PROBLEMS
SAFETY STRAPS RETRACTOR LATCHES


KNOWN INFO
SAFETY STRAPS OK
POSSIBLE PROBLEMS
RETRACTOR LATCHES

KNOWN INFO
SAFETY STRAPS OK RETRACTOR OK
POSSIBLE PROBLEMS
LATCHES




REFERENCE INFORMATION

AMBULANCE

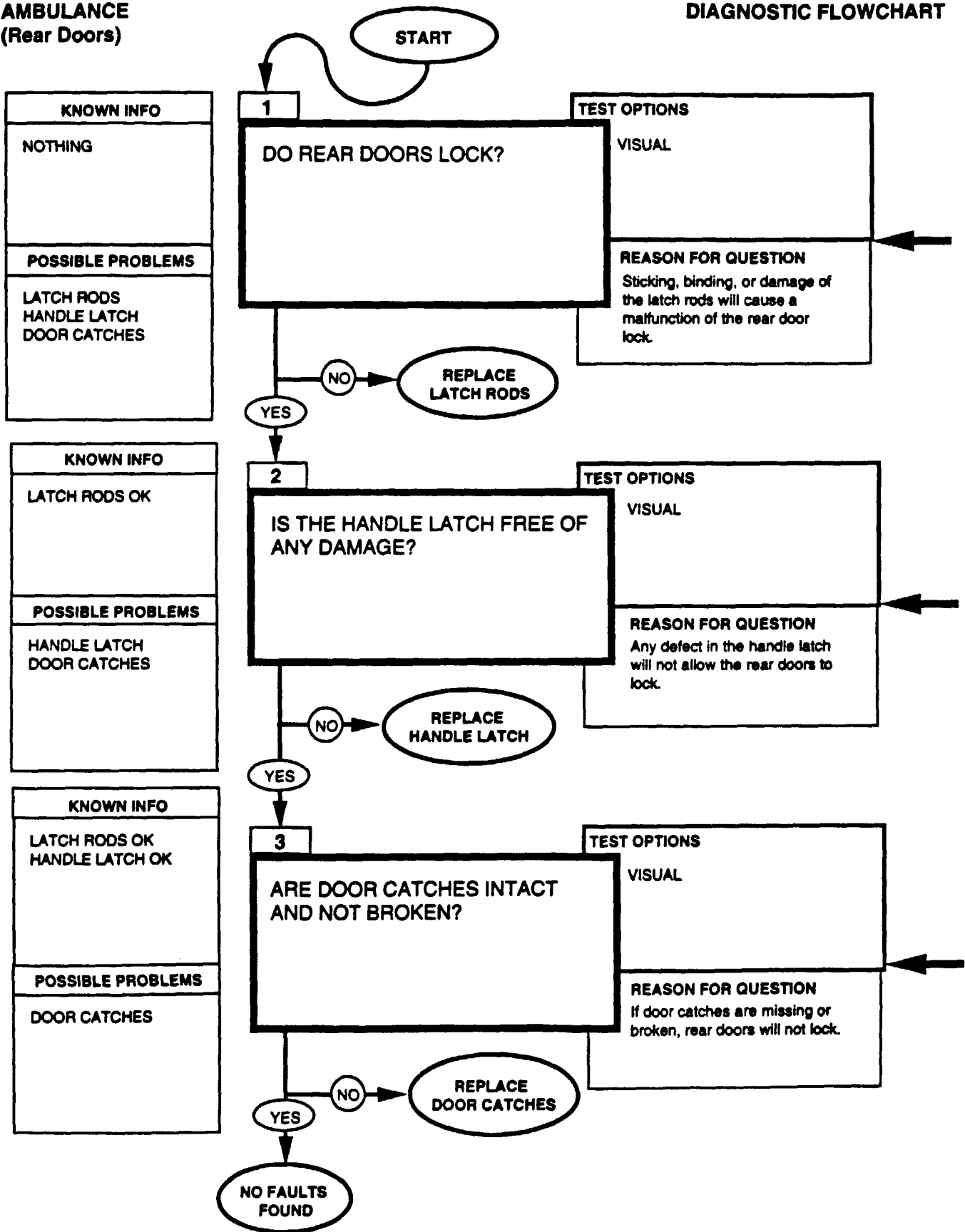
 Unhook safety straps, refer to (TM 9-2320-280-10).

 Replace retractor, refer to (para. 11-137).

 Replace latches, refer to (para. 11-135).

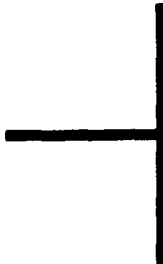
**AMBULANCE
(Rear Doors)**

DIAGNOSTIC FLOWCHART



REFERENCE INFORMATION

AMBULANCE



Replace latch rods, refer to (para. 11-128).



Replace handle latch, refer to (para. 11-128).

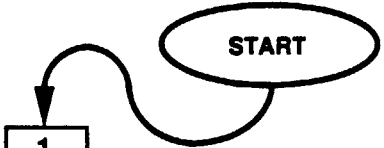


Replace door catches, refer to (para. 11-131).

**AMBULANCE
(Attendant Seat)**

DIAGNOSTIC FLOWCHART

KNOWN INFO
NOTHING
POSSIBLE PROBLEMS
SEAT TRACKS AND RAILS SEAT LATCH LATCH SPRING



1

TEST OPTIONS
 VISUAL

ARE SEAT TRACKS AND RAILS PROPERLY ALIGNED?

REASON FOR QUESTION
 Without proper alignment of seat tracks and rails, attendant seat will not lock in desired position.



KNOWN INFO
SEAT TRACKS AND RAILS OK
POSSIBLE PROBLEMS
SEAT LATCH LATCH SPRING

2

TEST OPTIONS
 VISUAL

IS SEAT LATCH FREE FROM STICKING, BINDING, OR ANY OTHER DAMAGE?

REASON FOR QUESTION
 Attendant seat will not lock in desired position if seat latch sticks, binds, or is damaged.



KNOWN INFO
SEAT TRACKS AND RAILS OK SEAT LATCH OK
POSSIBLE PROBLEMS
LATCH SPRING

3

TEST OPTIONS
 VISUAL

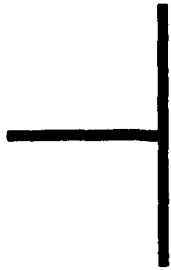
IS SEAT LATCH SPRING IN GOOD CONDITION?

REASON FOR QUESTION
 If any damage occurs to the seat latch spring, attendant seat will not lock in desired position.

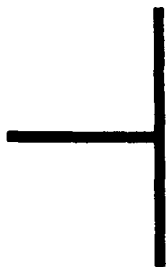


REFERENCE INFORMATION

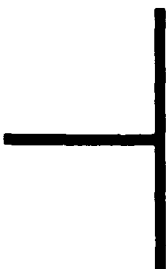
AMBULANCE



To ensure the proper alignment of attendant seat tracks and rails, remove and reinstall attendant seat making sure that tracks fully engage. Refer to (para. 11-157).



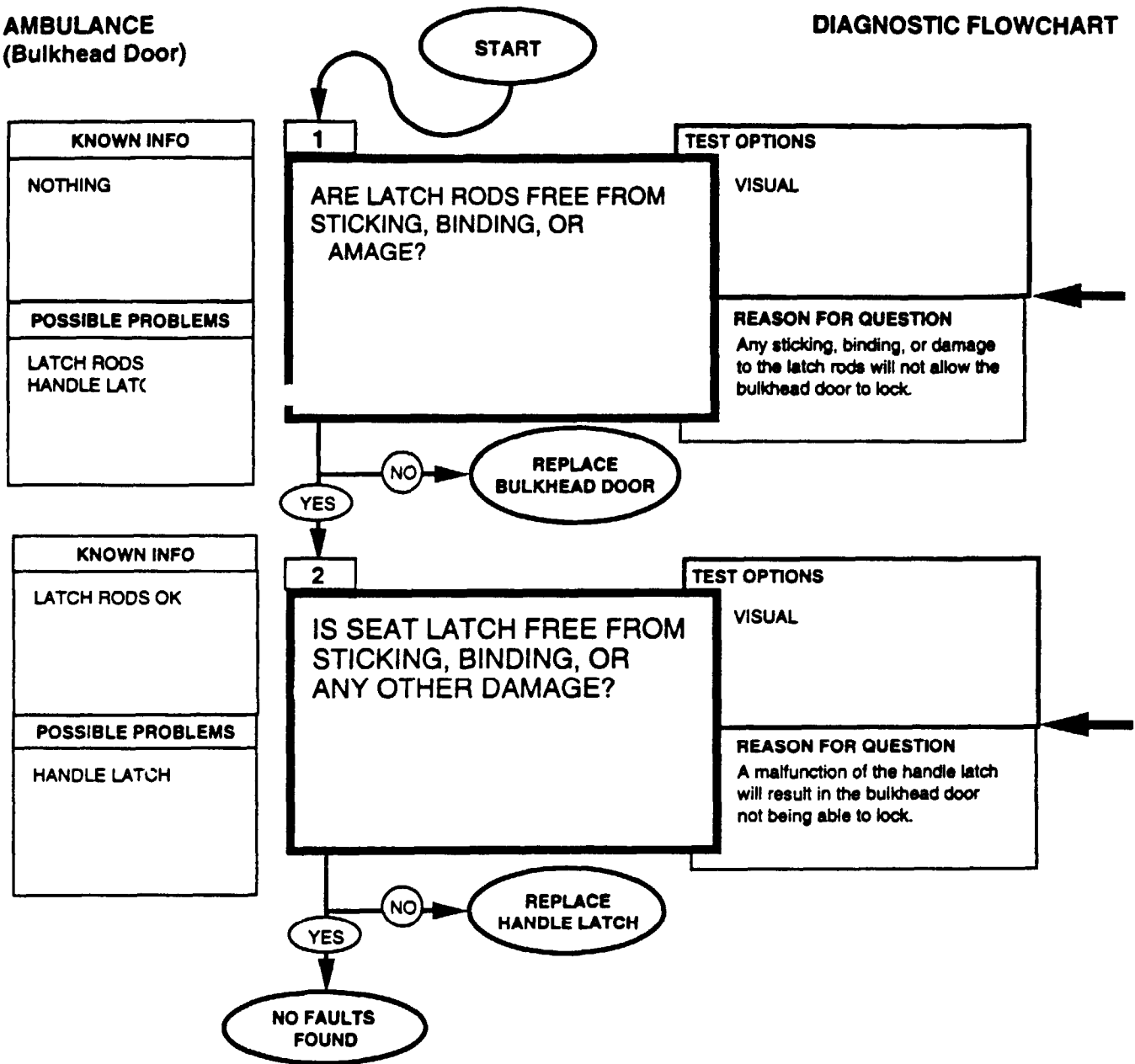
Replace latch, refer to (para. 11-157).



Replace spring, refer to (para. 11-157).

**AMBULANCE
(Bulkhead Door)**

DIAGNOSTIC FLOWCHART



REFERENCE INFORMATION

AMBULANCE



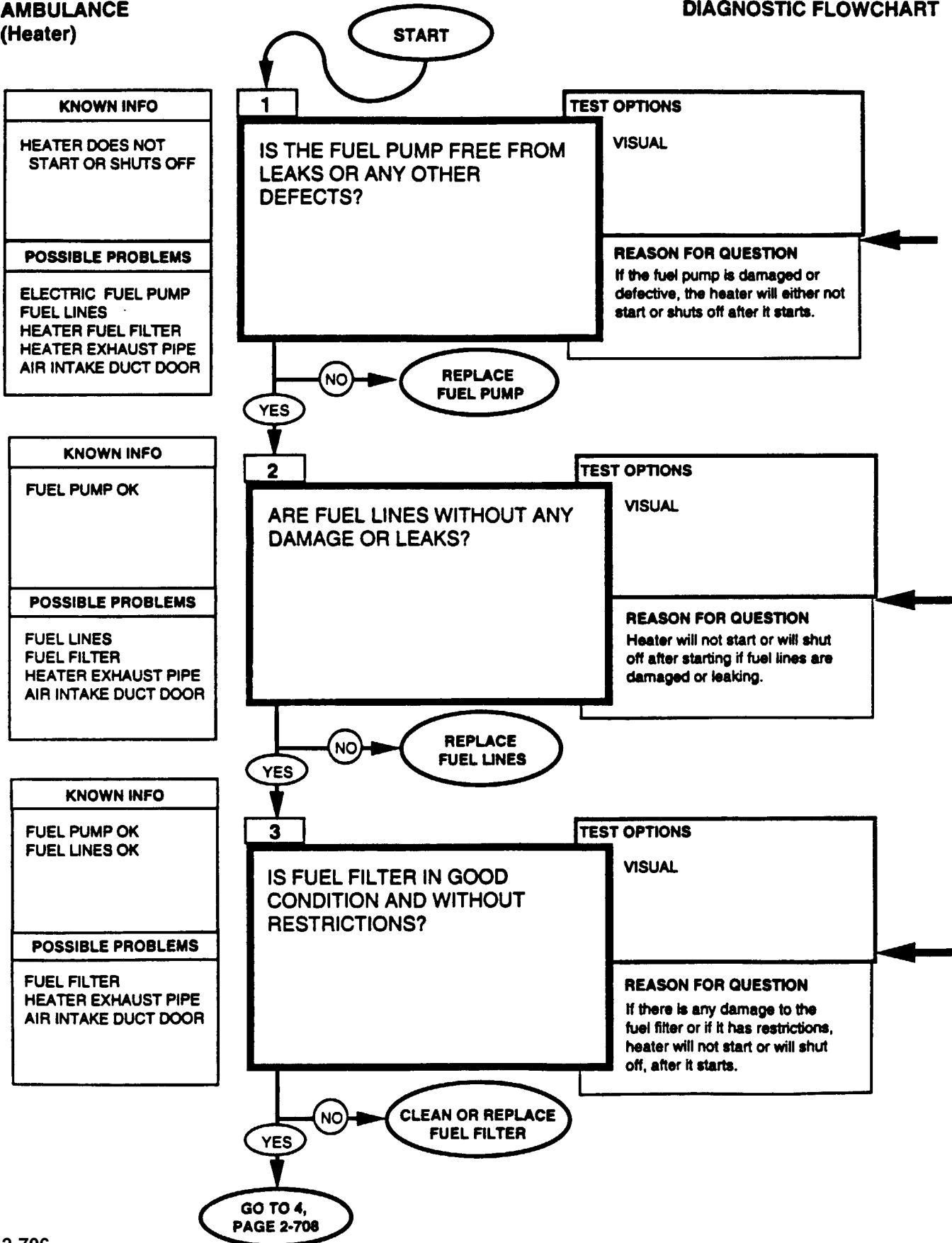
Replace bulkhead door, refer to (para. 11-155).



Replace handle latch, refer to (para. 11-156).

**AMBULANCE
(Heater)**

DIAGNOSTIC FLOWCHART



REFERENCE INFORMATION

AMBULANCE



Replace fuel pump refer to (para. 11-194).



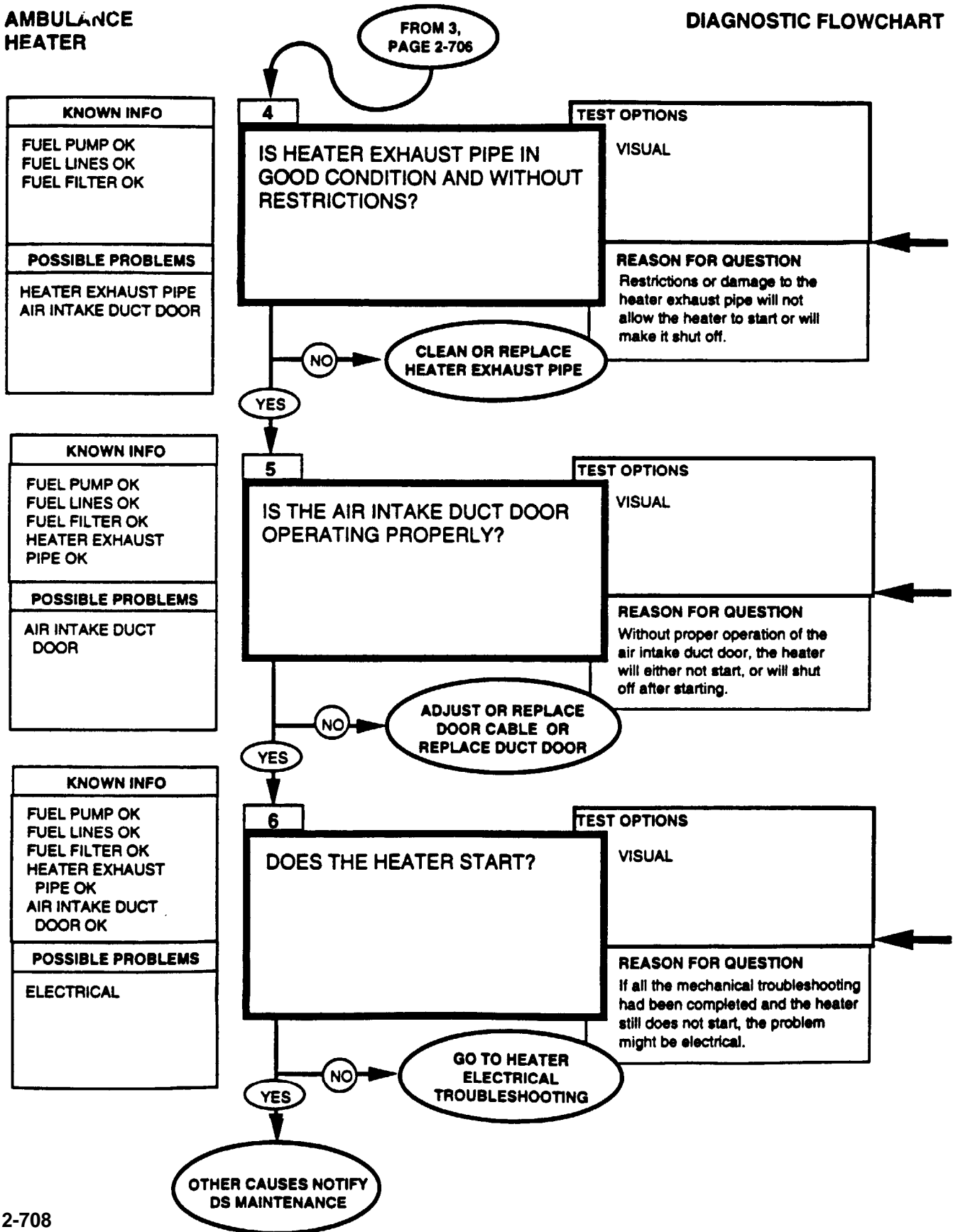
Replace fuel lines refer to (para. 11-193).



Clean or replae fuel filter refer to (para. 11-192).


**AMBULANCE
HEATER**

DIAGNOSTIC FLOWCHART




REFERENCE INFORMATION


AMBULANCE



Clean or replace heater exhaust pipe, refer to (para. 11-189 or 11-207).



Adjust or replace door cable, refer to (para. 11-199).
Replace duct door, refer to (para. 11-185).



At the completion of the mechanical troubleshooting steps, the heater should start. If not, there might be an electrical problem. Refer to electrical troubleshooting section, para. 2-39 (heater electrical troubleshooting, page 2-636).

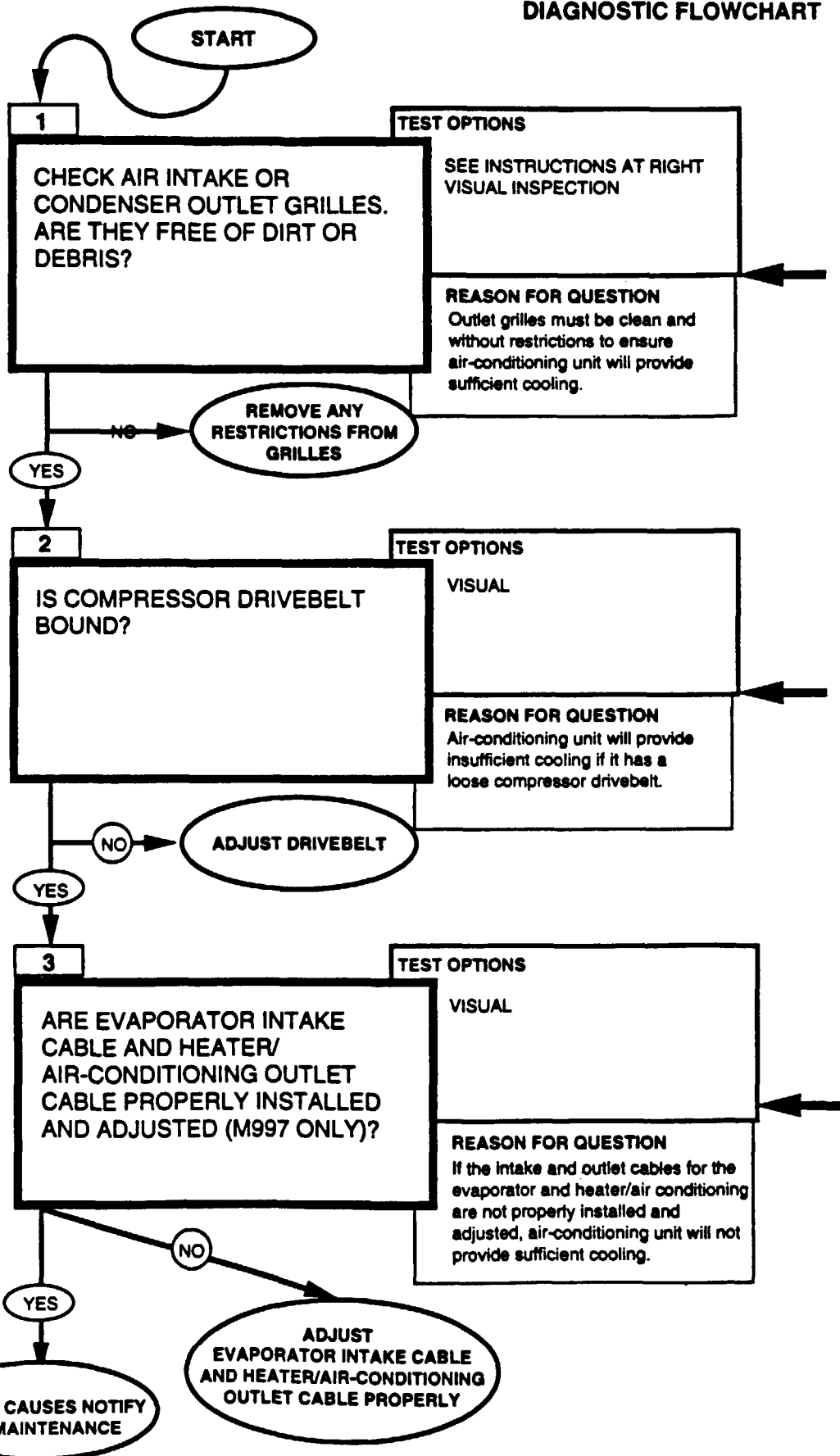
**AMBULANCE
(Air-Conditioning Unit)**


DIAGNOSTIC FLOWCHART

KNOWN INFO
AIR-CONDITIONING UNIT PROVIDES INSUFFICIENT COOLING
POSSIBLE PROBLEMS
OUTLET GRILLES COMPRESSOR DRIVEBELT EVAPORATOR INTAKE CABLE HEATER/AIR-CONDITIONING OUTLET CABLE

KNOWN INFO
OUTLET GRILLES OK
POSSIBLE PROBLEMS
COMPRESSOR DRIVEBELTS EVAPORATOR INTAKE CABLE HEATER/AIR-CONDITIONING OUTLET CABLE

KNOWN INFO
OUTLET GRILLES OK COMPRESSOR DRIVEBELT OK
POSSIBLE PROBLEMS
EVAPORATOR INTAKE CABLE HEATER/AIR-CONDITIONING OUTLET CABLE



REFERENCE INFORMATION**AMBULANCE**

Turn on air-conditioning and set controls to maximum cooling and blower speed settings (TM 9-2320-280-10). Maintain engine speed at 1500 rpm with hand throttle. Verify rpm with STE/ICE equipment. Open ambulance body doors to allow flow of fresh air through vehicle. Run air-conditioner five minutes to allow temperature and pressure to stabilize. Check outlet ducts for cool air.



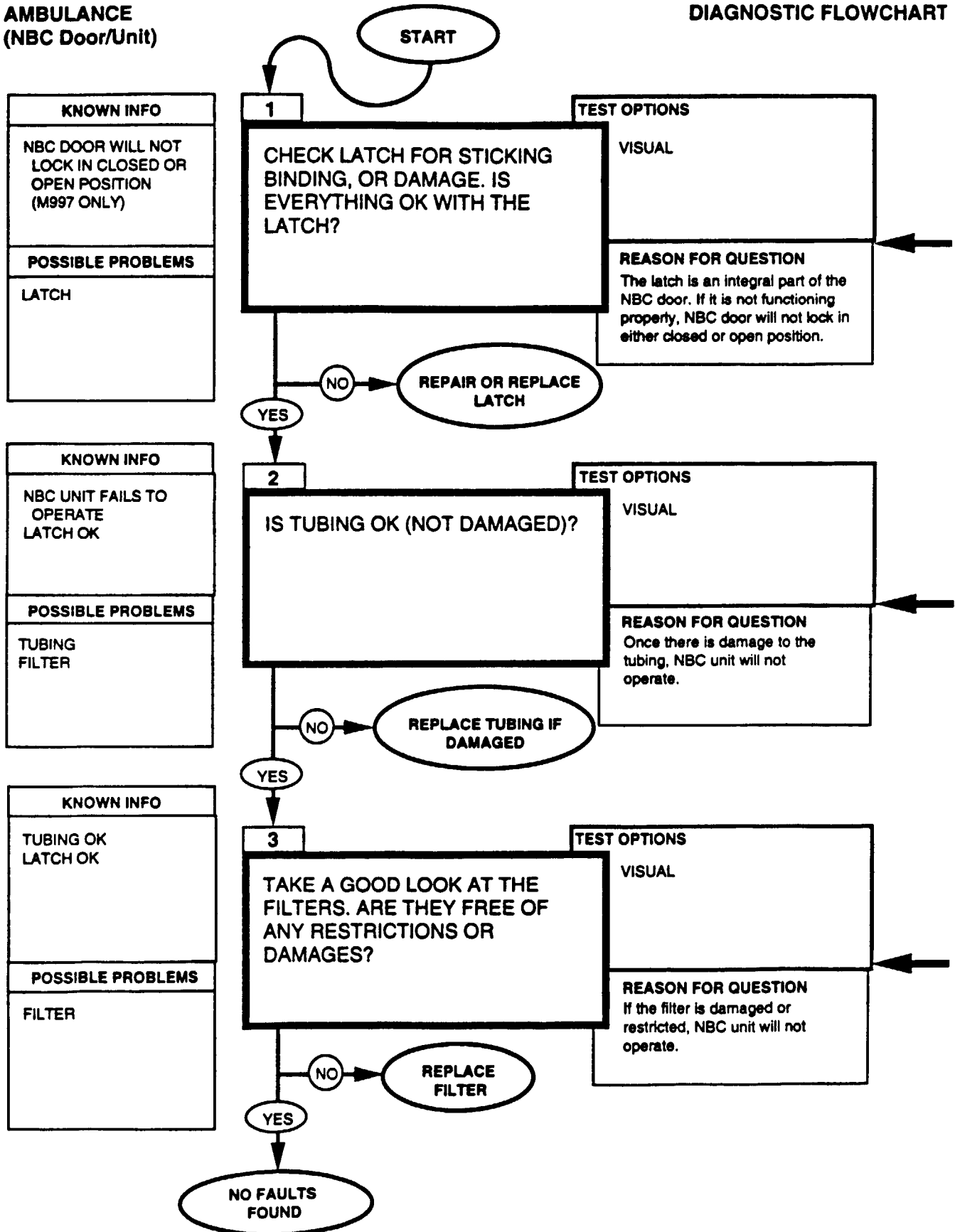
Adjust drivebelt, refer to (para. 11-202).



Properly adjust evaporator intake cable and heater/air-conditioning outlet cable, refer to (para. 11-199).

**AMBULANCE
(NBC Door/Unit)**

DIAGNOSTIC FLOWCHART




AMBULANCE


REFERENCE INFORMATION



Repair or replace latch, refer to (para. 11-163).



Replace tubing if damaged, refer to (para. 11-166).



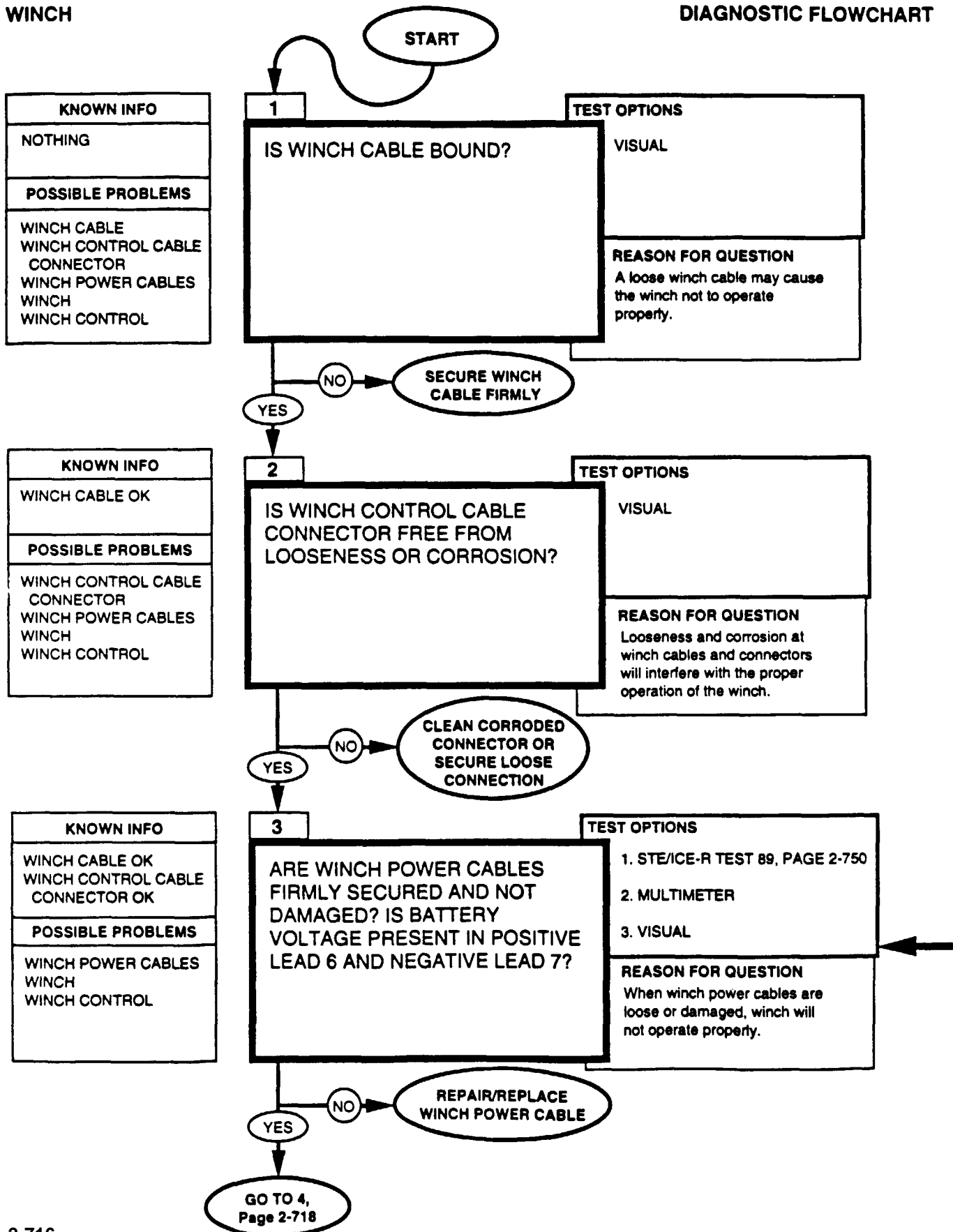
Replace filter, refer to (para. 11-168).

2-41. WINCH SYSTEM TESTS

These winch system tests may be run anytime you think you have a winch problem or if you were sent here by another test chain, Just follow the path and answer the questions. Additional information and notes are given on the facing page when necessary.


WINCH

DIAGNOSTIC FLOWCHART



REFERENCE INFORMATION

WINCH



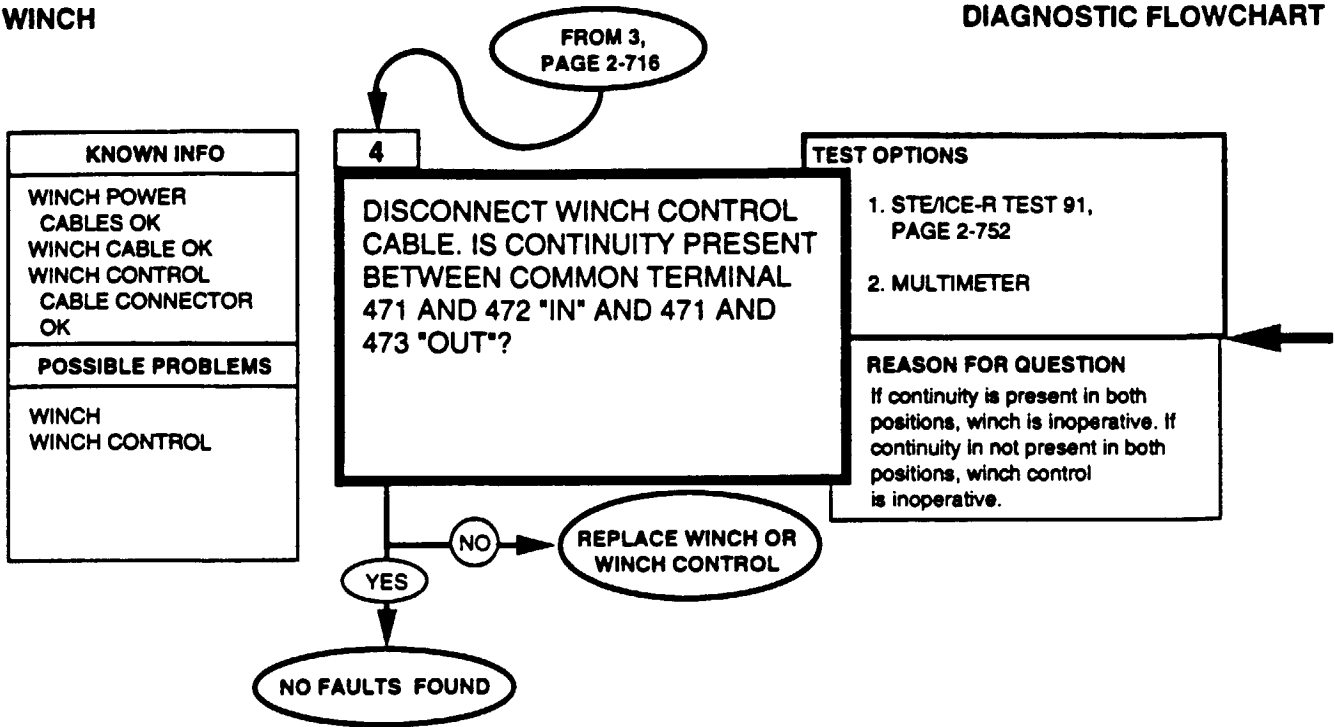
Repair/replace winch power cables, refer to (para. 10-107 or 10-108).

<p>0-45 DC VOLTS STE/ICE-R TEST 89</p>
<p>1. Connect RED clip to the indicated test point, BLACK clip to negative or ground.</p> <p>2. Start Test 89, DC volts.</p> <p>3. Displayed reading is in volts.</p>

<p>BATTERY VOLTAGE MULTIMETER</p>
<p>1. Set the voltmeter to a DC volts scale of at least 40 volts.</p> <p>2. Connect the RED lead to positive and the BLACK lead to negative.</p> <p>3. Be sure to read the correct scale.</p>

WINCH

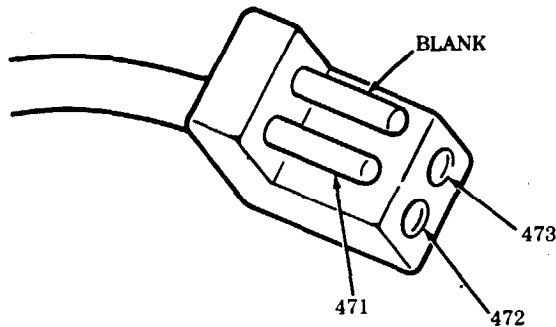
DIAGNOSTIC FLOWCHART



REFERENCE INFORMATION

WINCH

Replace winch or winch control, refer to (paras. 10-107, 10-108, or 10-109).



**0-4500 OHMS
STE/ICE-R TEST 91**

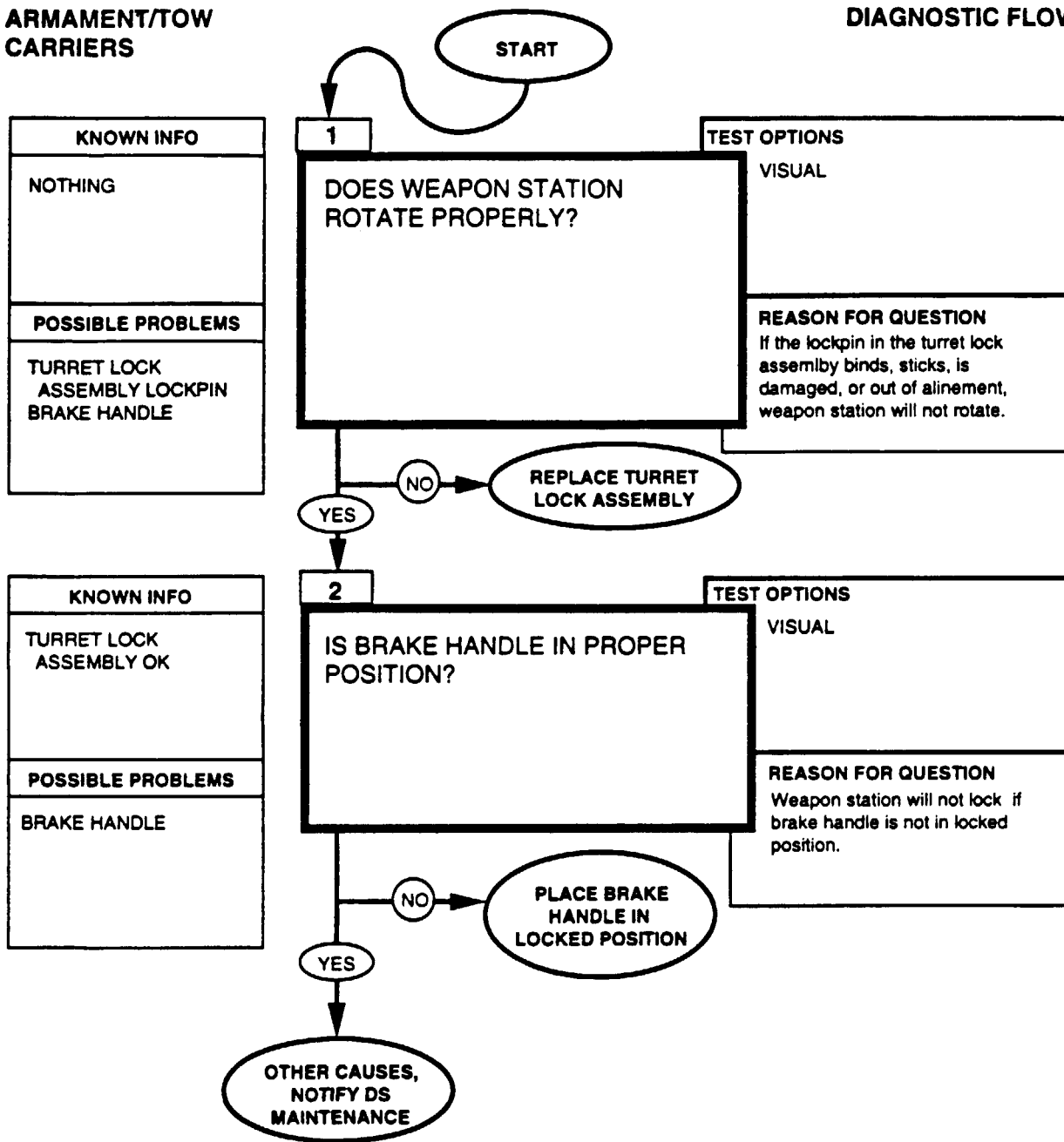
1. Connect RED clip and BLACK clip to the indicated terminals in question; RED to the first, BLACK to the second.
2. Start test 91, 0-4500 ohms.
3. Displayed reading is in ohms. Less than 5 ohms is continuity. If the resistance is over 4500 ohms, STE/ICE displays, "9.9.9.9."

**CONTINUITY (RESISTANCE)
MULTIMETER**

1. Set the voltmeter to an ohms scale of about 1000 ohms.
2. Connect the RED and BLACK leads to the connections stated in the question.
3. Be sure to read the correct scale. Less than 5 ohms indicates continuity. For an open circuit, the meter should peg full scale (needle all the way to the left).

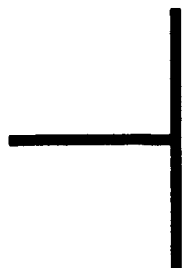
ARMAMENT/TOW CARRIERS

DIAGNOSTIC FLOWCHART

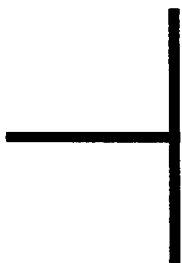


REFERENCE INFORMATION

ARMAMENT/TOW CARRIERS



Replace turret lock assembly, refer to (para. 11-56).



Place brake handle in locked position, refer to (TM 9-2320-280-10).

2-42. DCA TROUBLESHOOTING

These DCA tests can be run anytime you think there is a problem with the vehicle's DCA or its on board transducers. Do not use this paragraph to test the STE/ICE-R and its cables and transducers. Refer to TM 9-4910-571-12&P to test the STE/ICE-R. This paragraph will also supply instructions on how to use the STE/ICE-R in the TK mode to substitute for tests run through the DCA.

The HMMWV is equipped with three transducers - the pulse tachometer, the fuel pressure transducer, and the current shunt. A power test (12, 13) or RPM test (10) uses the pulse tachometer. The fuel pressure test (24) uses the pressure transducer. All of the starting circuit tests and battery tests done through the DCA use the shunt. Check to see that the wires are connected to the transducer for the test you're trying to run. There is a four wire connector for the fuel pressure transducer, a two wire connector for the pulse tachometer, and there are four wires connected to the shunt in addition to the battery cables.

The fold-out page FO-16 gives a cross reference between DCA tests and TK tests. Use this cross reference to find out how to substitute TK tests for DCA tests if you have a bad DCA. The Location of Parts page has a schematic of the HMMWV DCA.

DCA TROUBLESHOOTING

DIAGNOSTIC FLOWCHART

KNOWN INFO
STE/ICE-R OK CABLES OK TK OK RUNNING A DCA TEST
POSSIBLE PROBLEMS
DCA TRANSDUCERS VEHICLE SYSTEMS

1

WERE YOU RUNNING A FUEL PRESSURE, RPM, OR POWER TEST?

TEST OPTIONS

SEE NOTE TO RIGHT ABOUT THIS PARAGRAPH.

REASON FOR QUESTION
You need to know which transducer is causing the problem.

NO → GO TO A
Page 2-728

YES

KNOWN INFO
STE/ICE-R OK W1 CABLE OK
POSSIBLE PROBLEMS
DCA TRANSDUCERS VEHICLE SYSTEMS

2

WERE YOU RUNNING STE/ICE-R TEST #24, FUEL PRESSURE?

TEST OPTIONS

N/A

REASON FOR QUESTION
You need to know which transducer is causing the problem.

NO → GO TO B
Page 2-730

YES

KNOWN INFO
STE/ICE-R OK W1 CABLE OK RUNNING TEST 24
POSSIBLE PROBLEMS
DCA TRANSDUCERS VEHICLE SYSTEMS

3

DISCONNECT CONNECTOR DIRECTLY BEFORE FUEL PRESSURE TRANSDUCER. INSPECT FOR BENT PINS. DOES EVERYTHING LOOK OK?

TEST OPTIONS

VISUAL INSPECTION

REASON FOR QUESTION
If the transducer pins are bent or broken you will get bad measurements.


NO → REPAIR OR REPLACE WIRING/
TRANSDUCER AS NEEDED

YES

GO TO 4,
Page 2-726

REFERENCE INFORMATION

DCA TROUBLESHOOTING

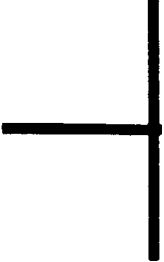
NOTE

The diagnostics in this chapter assume you have already run a test through the DCA. If you haven't run a test and are here to test the entire DCA, run tests 10 (RPM), 24 (Fuel Pressure) and 80 (BatteryCurrent) Make note of the results for later.

If you want to test the entire DCA harness, answer YES here and then return and answer NO when you've finished the test chain. Answer NO here to test the shunt.



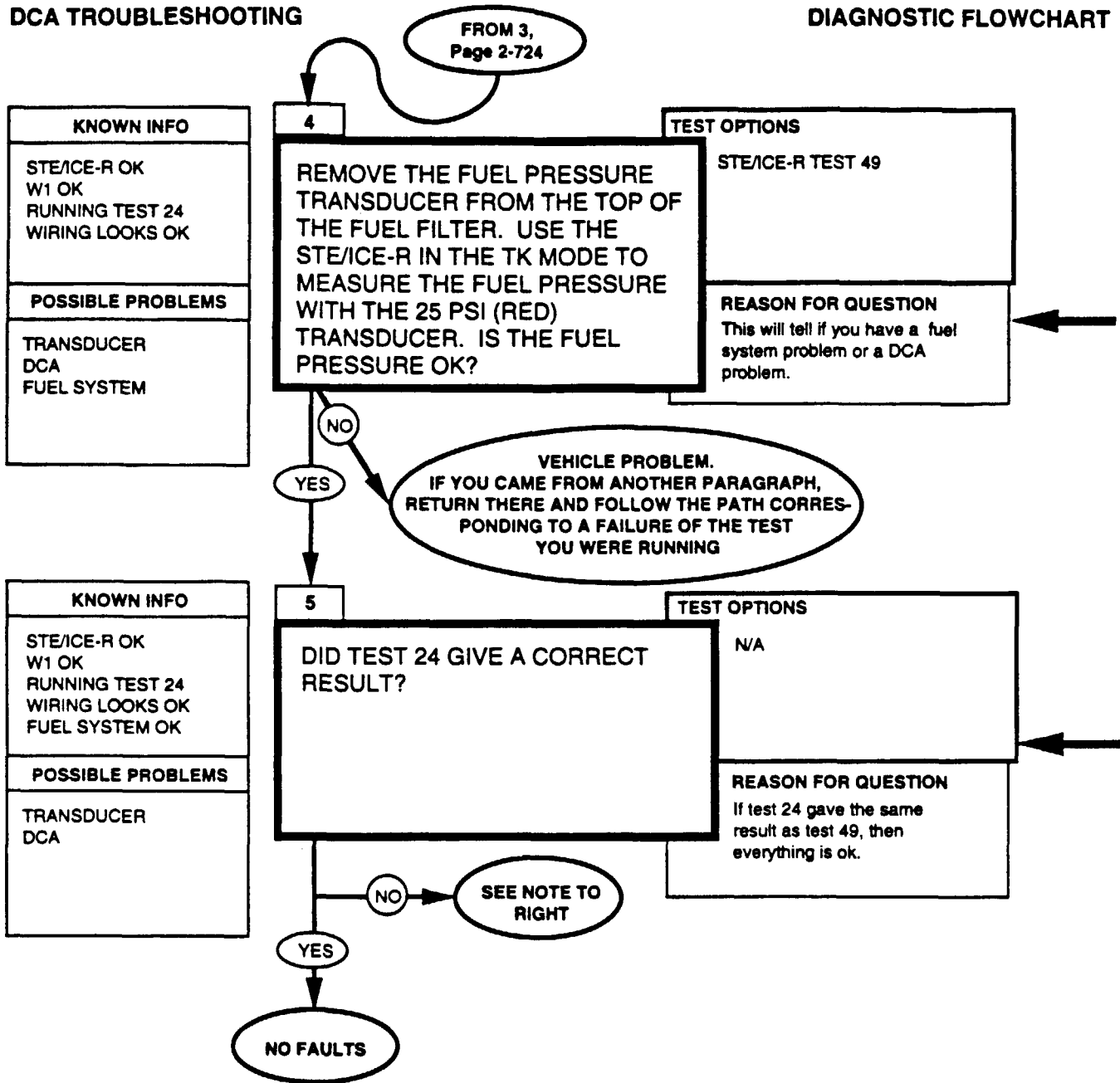
Answer NO here to test the pulse tachometer.



Repair wiring or replace transducer, refer to (para 4-26).

DCA TROUBLESHOOTING

DIAGNOSTIC FLOWCHART



REFERENCE INFORMATION

DCA TROUBLESHOOTING

The fuel pressure should always be greater than 3 psi. If you get about the same pressure with the 2 transducers, then you have a fuel system problem. Remove fuel pressure transducer, refer to (para 4-26). Make sure the STE/ICE-R is powered by a W5 cable.

**STE/ICE-R TEST 49
0 TO 25 PSIG PRESSURE**

1. CONNECT RED TRANSDUCER TO FUEL FILTER.
2. CONNECT TRANSDUCER TO A W4 CABLE. MAKE SURE THE SYSTEM UNDER TEST IS NOT PRESSURIZED. CONNECT OTHER END OF W4 TO J2 OR J3. PERFORM OFFSET TEST.
3. TURN ON SYSTEM AND READ PRESSURE.

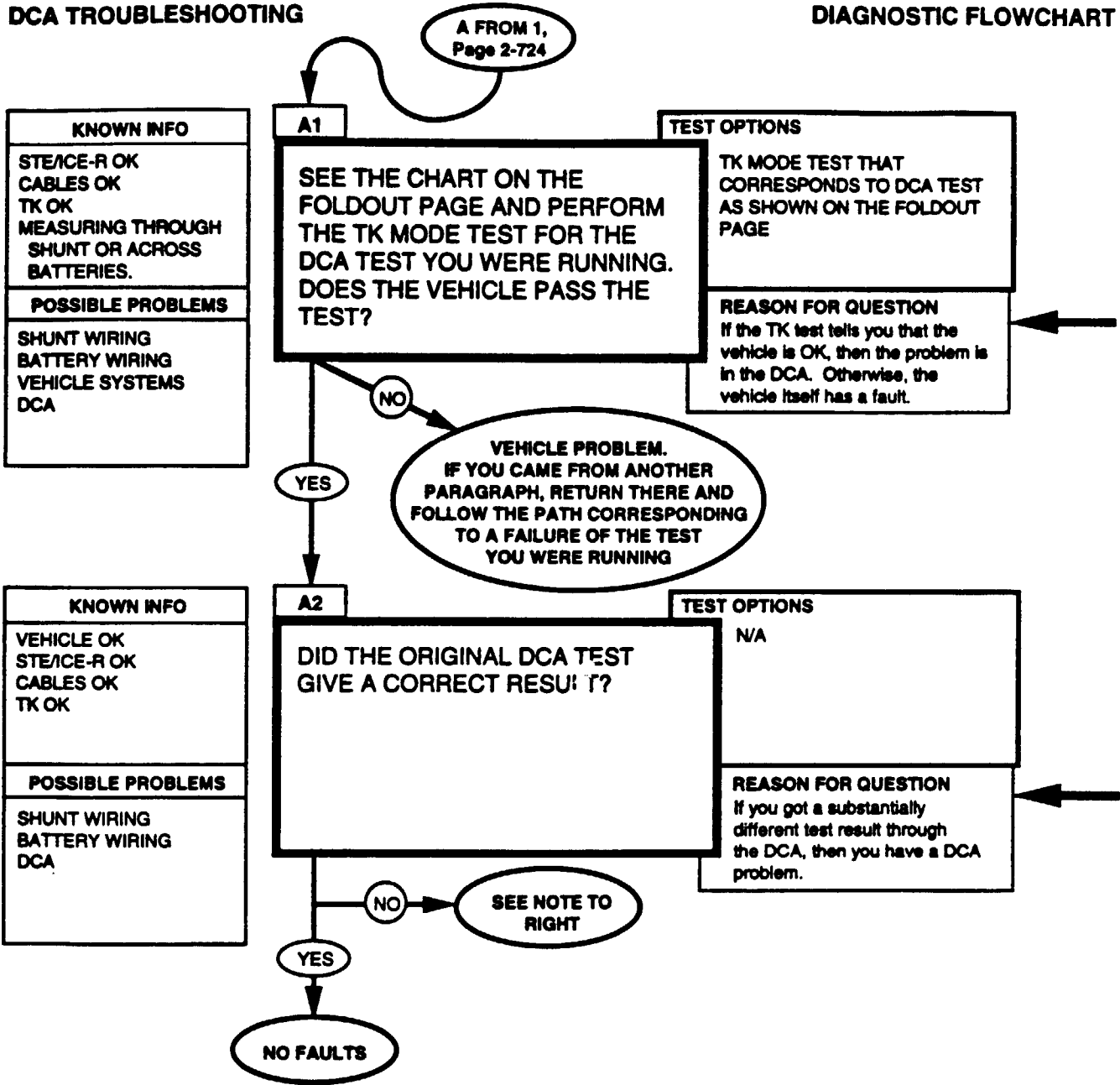
You will have to decide if test 24 gave the wrong result. If test 24 gave a substantially different result than test 49, answer NO to this question.

NOTE

VEHICLE DCA FAULTY. Use the STE/ICE-R in the TK mode for the rest of your testing. See the chart on the foldout page for a way to run the rest of the DCA tests in the TK Mode. Have DS maintenance repair the DCA when you're finished.

DCA TROUBLESHOOTING

DIAGNOSTIC FLOWCHART



REFERENCE INFORMATION

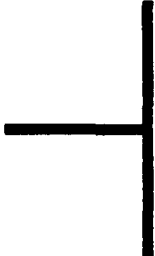
DCA TROUBLESHOOTING



Make sure the STE/ICE-R is powered by a W5 cable.

If the TK mode test tells you that the vehicle has a fault, then return to the paragraph you came from. If the vehicle tests OK, continue here.

You will have to decide if the DCA test result is wrong. If the TK test gave a substantially different result than the DCA test, answer NO to this question.

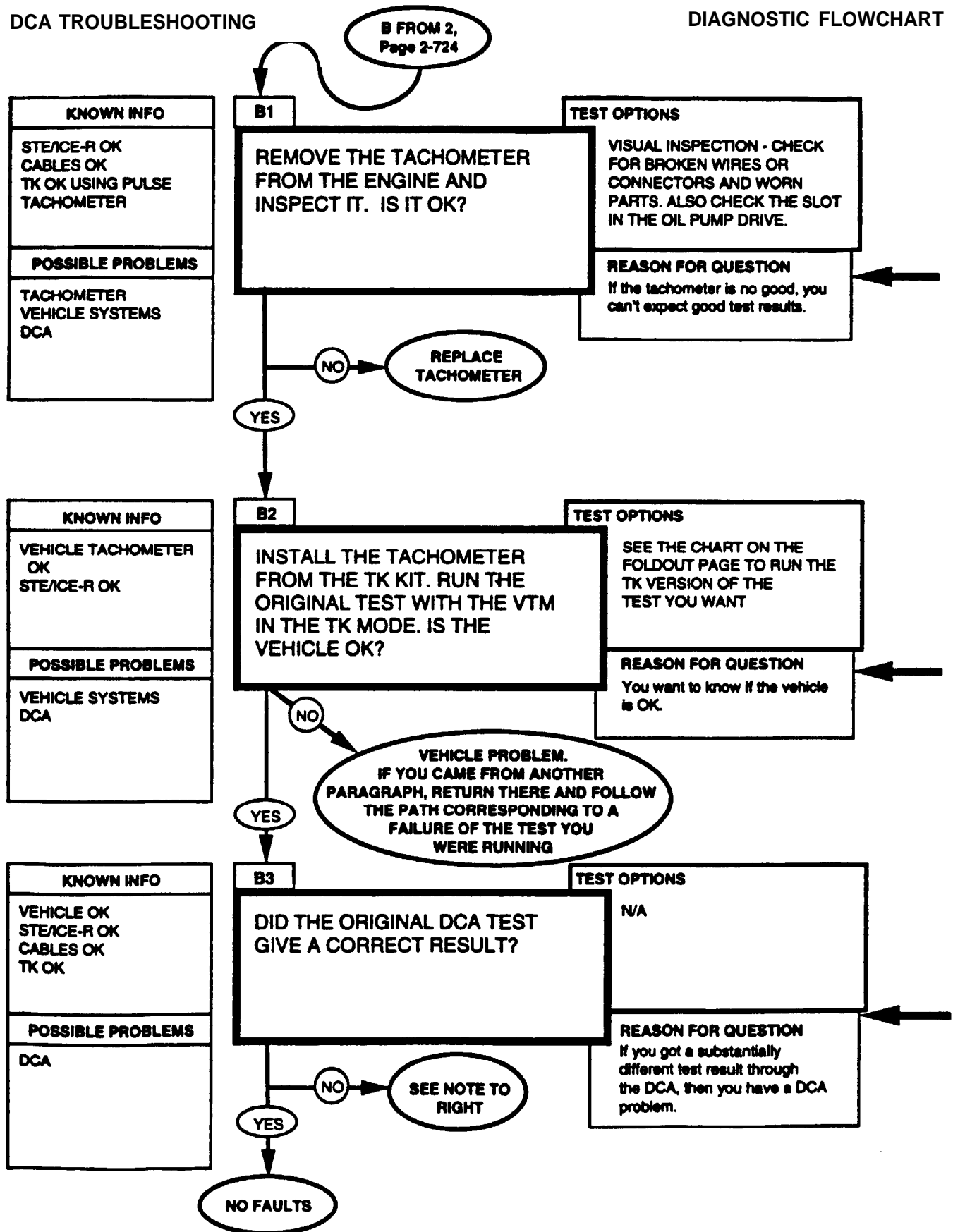
NOTE

VEHICLE DCA FAULTY. Use the STE/ICE-R in the TK mode for the rest of your testing. See the chart on the foldout page for a way to run the rest of the DCA tests in the TK Mode. Have DS maintenance repair the DCA when you're finished.

You can check the connections at the shunt and the power stud to see if they are OK. Look at the schematic for help.

DCA TROUBLESHOOTING

DIAGNOSTIC FLOWCHART



REFERENCE INFORMATION

DCA TROUBLESHOOTING

Remove tachometer, refer to (para 4-13). If you find the tachometer defective, replace it and return to where you came from and rerun the original DCA test. If it fails again return to this question and answer "YES".

Make sure the STE/ICE-R is powered by the W5 cable.

If you don't find any faults in the vehicle, the slot in the oil pump drive could be too worn to drive the tachometer. If you see this, notify DS maintenance.

You will have to decide if the DCA test result is wrong. If the TK test gave a substantially different result than the DCA test, answer "NO" to this question.

NOTE

Vehicle DCA faulty. Use the STE/ICE-R in the TK mode for the rest of your testing. See the chart on the foldout page for a way to run the rest of the DCA tests in the TK mode. Have DS maintenance repair the DCA when you're finished.

2-43. STE/ICE-R TEST PROCEDURES

This paragraph will be helpful when using the STE/ICE-R to answer diagnostic questions. Use this paragraph as a reference if you need additional information about a specific test. This paragraph contains information such as possible errors, test procedure, control codes, and additional notes as necessary. The following chart will help you find the test you need. The STE/ICE setup and internal checks (test no. G01, Page 2-763) must be performed prior to performing tests. A complete description and operation of the STE/ICE-R is found on Page 2-753. See TM 9-4910-571-12&P for additional information.

TEST NAME	TEST #	PAGE #
ENGINE RPM (AVERAGE)	10	2-734
POWER TEST (RPM/SEC)	12	2-735
POWER TEST (PERCENT)	13	2-736
COMPRESSION UNBALANCE TEST	14	2-737
FUEL SUPPLY PRESSURE (PSI)	24	2-733
PRESSURE (PSI) 0 TO 1000	50	2-739
BATTERY VOLTAGE	67	2-740
STARTER MOTOR VOLTAGE	68	2-741
STARTER NEGATIVE CABLE VOLTAGE DROP	69	2-742
STARTER SOLENOID VOLTS	70	2-743
STARTER CURRENT AVERAGE	71	2-744
CURRENT FIRST PEAK	72	2-745
BATTERY INTERNAL RESISTANCE	73	2-746
STARTER CIRCUIT RESISTANCE	74	2-747
BATTERY RESISTANCE CHANGE	75	2-748
BATTERY CURRENT	80	2-749
DC VOLTAGE 0 TO 45 VOLTS	39	2-750
DC CURRENT 0 TO 1500 AMPS	90	2-751
RESISTANCE AND CONTINUITY 0 TO 4500 OHMS	91	2-752

ENGINE RPM (Average) TEST #10

Description:

This procedure measures engine speed in the range 50 to 5000 RPM. At speeds below 50 RPM the VTM will display 0. At speeds above 5000 RPM the display may give a false reading. Test requires DCA hookup only.

Pre-Test Procedures

Run Confidence Test.

Typical Applications:

Check Engine Speed

Possible Error Messages

E014 Incorrect # of cylinders entered

Test Procedure:

1. Set TEST SELECT switches to 10
2. Press and release TEST button
3. Start engine
4. Observe displayed value (RPM).

POWER TEST (RPM/SEC) TEST #12

Description:

This procedure measures an engine's power producing potential in units of RFM/SEC. Test requires DCA hookup only.

Typical Applications:

Check engine power in units of RPM/SEC.

Test Procedure:

1. Start and idle engine
2. Set TEST SELECT switches to 10
3. Press and release TEST button
4. Observe displayed value (RPM) to adjust idle Speed if necessary.
5. Press down sharply on accelerator end observe displayed value (RPM) to adjust governor speed if necessary.
6. Set TEST SELECT switches to 12.
7. Press and release TEST button.
8. Wait for prompting message CIP to appear.
9. When CIP appears on display, press down sharply on engine accelerator end hold it to the floor. When VTM displays a number, release accelerator.
10. Observe displayed value (RFM/SEC).

Pre-Test Procedures:

Run Confidence Test. Warm up engine to operating temperature.

Possible Error Messages:

- E009 Engine not running at start of test.
- E011 Throttle control operated incorrectly.
- E012 Ignition adapter/pulse tachometer missing.
- E014 Incorrect number of cylinder entries.
- E033 Error in entry of power test **constants**

NOTES

Engine idle speed must rechecked before performing power test. Idle speed must be within the range 625-675 RPM (6.2L and 6.5L) range to run test.
 Engine governor no bad speed must be checked before performing power test. Governor no-load speed must be within the 3900-4100 RPM (6.2L) end 3600-3600 RPM (6.5L) range to run test.

POWER TEST (PERCENT) TEST #13

Description:

This procedure measures the percentage of engine's power producing potential as compared to a good engine. Test requires DCA hookup only.

Pm-lest Procedures:

Run Confidence Test. Warm up engine to operating temperature.

Typical Applications:

Check engine power

Possible Error Messages:

E009 Engine not running at start of test.
E011 Throttle control operated incorrectly.
E012 Ignition adapter/pulse tachometer missing.
E024 Test not valid for VID entered

Test Procedure:

1. Start and idle engine
2. Set TEST SELECT switches to 10
3. Press and release TEST button
4. Observe displayed value (RPM) to adjust idle speed if necessary.
5. Press down sharply on on engine accelerator and observe displayed value (RPM) to adjust governor speed if necessary.
6. Set TEST SELECT switches to 13.
7. Press and release TEST button.
8. Wait for prompting message CIP to appear.
9. When CIP appears on display, press down sharply on engine accelerator and hold it to the floor. When VTM displays OFF, release accelerator.
10. A number will be displayed after the engine has returned to idle speed. This number is the test result in units of percent of nominal rated power.

NOTES:

Engine idle speed must be checked before performing power test. Idle speed must be within the 625-675 RPM (6.2L and 6.5L) range to run test. Engine governor no load speed must be checked before performing power test. Governor no load speed must be within the 3600-3800 RPM (6.2L) and 3900-4100 RPM (6.5L) range to run test.

COMPRESSION UNBALANCE TEST #14 (6.2L ONLY)

Description:

This procedure compares the compression between the highest and lowest cylinders and displays the unbalance in percent. Test requires DCA hookup only.

Pre-Test Procedures:

Run Confidence Test. Warmup engine to operating temperature. Run first-peak series tests 72,73,74, 75.

Typical Applications:

Check compression unbalance of engine with VTM powered from battery of vehicle being tested.

Possible Error Messages:

E006 VTM doesn't detect battery Voltage.
 E013 VTM cannot use data received.
 E027 Error in entry of compression Unbalance constants.
 E032 Vehicle's cranking speed is varying too much for a compression unbalance measurement.

Test Procedure:

1. Set up engine to prevent Starting by disconnecting wire 54A. Stop Engine. Shut off fuel before cranking. Crank engine without fuel for 5 seconds to clear fuel from cylinders.
2. Set TEST SELECT switches to 14.
3. Press and release TEST button.
4. Wait until GO appears on display before proceeding.
5. When GO appears, crank engine. Display will change to while engine is turning.
6. When OFF or E013 appears, stop cranking.
7. If OFF appears, wait for message to appear.
 - (A) The number displayed will be the percent unbalance between the highest and lowest cylinders. A number above 25 is a failure.
 - (B) If GO appears, repeat from step 2.
 - (C) A FAIL message usually means compression is too far unbalanced to measure with STE/ICE.

NOTE

If E013 appears, test data cannot be analyzed because of weak batteries, or interrupted cranking during test. Correct problem and repeat from Step 2.

FUEL SUPPLY PRESSURE (psi) TEST # 24

Description:

This procedure measures the return pressure, in order to detect line blockage, leaks or insufficient restrictor back pressure. Test requires DCA hookup only.

Pre-Test Procedure-

Run Confidence Test. Wait for 1 minute after turning engine off to run this test.

Typical Applications:

Fuel Supply Pressure

Control Functions:

01,02,03,04,06

Test Procedure:

1. Turn off vehicle.
2. Set TEST SELECT switch to 24.
3. Press and hold TEST button until CAL appears on display.
4. Release TEST button and wait for offset value to appear on display. If offset is within -15 to 15 proceed. If not, go to DCA Troubleshooting Procedure
5. Press and release TEST button.
6. Start engine
7. Observe displayed value.

Possible Error Messages:

E005 offset not performed.

PRESSURE (psi) 0 TO 1000 TEST #50**Description:**

This procedure measures pressure, in the 0 to 1000 PSIG range. Test requires the use of the TK adapters and transducers.

Pre-Test Procedures

Run Confidence Test.

Typical Applications:

Oil Pressure

Control Functions:

01,02,03,04,06

Test Procedure:

1. Attach connector P1 of cable W4 to J2 TK or J3 TK.
2. Install blue striped pressure transducer where pressure is to be measured. Attach connector P2 of cable W4 to transducer.
3. Set TEST SELECT switch to 50. Press and hold TEST button until CAL appears on display.
4. Release TEST button and wait for offset value to appear on display. If offset is within -150 to 150 proceed. If not, go to DCA Troubleshooting Procedure.
5. Energize system
6. Press and release TEST button.
7. Observe displayed value.

Possible Error Messages

E005 Offset not performed.
E002 Transducer not connected

BATTERY VOLTAGE TEST #67

Description:

This procedure measures battery voltage in the 9 to 32 range volts. The voltage is measured directly at the power source of the VTM, and maybe done with the vehicle operating or shut down. Test requires DCA hookup only.

Pre-Test Procedures:

Run Confidence Test.

Typical Applications:

Check Battery Voltage

Control Functions:

01,02,03,04,06

Test Procedure:

1. Set TEST SELECT switch to 67.
2. Press and release TEST button.
3. If .9.9.9.9 is displayed, voltage is not within the test range.
4. Observe displayed value (volts).

Possible Error Messages:

none

STARTER MOTOR VOLTAGE TEST #68

Description:

This procedure measures the voltage present at the starter motor positive terminal, in the 0-32 volts range. Test requires DCA hookup only.

Pm-Test Procedures:

Run Confidence Test.

Typical Applications:

Check Starter Motor Voltage

Control Functions:

01,02,03,04,06

Test Procedure:

1. Disconnect Fuel Solenoid wire 54A to prevent starting.
2. Set TEST SELECT switch to 68.
3. Press and release TEST button.
4. Crank the engine and observe the displayed Voltage.

Possible Error Messages:

none

STARTER NEGATIVE CABLE VOLTAGE DROP TEST #69

Description:

This procedure measures the voltage drop on the starter path. A high voltage (>2V) indicates excessive ground path resistance. Test requires DCA hookup only.

Pre-Test Procedures:

Run Confidence Test.

Typical Applications:

Check Starter Negative Cable Voltage Drop.

Control Functions:

01,02,03,04,06

Test Procedure:

1. Disconnect Fuel Solenoid wire 54A to prevent starting.
2. Set TEST SELECT switch to 69.
3. Press and release TEST button.
4. Crank the engine and observe the displayed voltage.

Possible Error Messages:

None

STARTER SOLENOID VOLTS TEST #70**Description:**

This procedure measures the voltage present at the starter solenoids positive terminal. Test requires DCA hookup only.

Pre-Test Procedures:

Run Confidence Test.

Typical Applications:

Check Starter Solenoid Volts.

Control Functions:

01,02,03,04,08

Test Procedure:

1. Disconnected Fuel Solenoid wire 54A to prevent starting.
2. Set TEST SELECT switch to 70.
3. Press and release TEST button.
4. Crank the engine and observe the displayed voltage.

Possible Error Messages:

None

STARTER CURRENT AVERAGE TEST #71

Description:

This procedure measures the average starter current in the 0 - 1000 amps range. Test requires DCA hookup only.

Pre-Test Procedures

Run Confidence Test.

Typical Applications:

Check Starter Current.

Control Functions:

01,02,03,04,08

Test Procedure:

1. Disconnect fuel solenoid wire 54A to prevent starting.
2. Set TEST SELECT switch to 71.
3. Press and hold TEST button until CAL appears on display.
4. Release TEST button and wait for offset value to appear on display. If offset is within -150 to 150, proceed. If not, go to DCA .Troubleshooting Procedure.
5. Press and release TEST button.
6. Crank engine.
7. Observe the displayed starter current.

Possible Error Messages

E005 Offset not performed.

CURRENT FIRST PEAK TEST #72

Description:

This procedure measures the overall condition of the complete starting system. Test requires DCA hookup only.

Pre-Test Procedures:

Run Confidence Test. Warm up engine to operating temperature. Turn off all electrical accessories.

Typical Applications:

Check condition of starting system on C1 engines with VTM trdnpowered from battery of vehicle tested.

Possible Error Messages:

E002 Transducer not connected.
 E005 Offset not performed.
 E008 VTM does not detect battery voltage.
 E013 VTM cannot use data received.
 E020 No first peak information was detected by the VTM.
 E021 VTM cannot calculate result because current is over current probe's range.

Test Procedure:

1. Disconnect fuel solenoid wire 54A to prevent starting.
2. Make sure all vehicle accessories are off.
3. Set TEST SELECT switches to 72.
4. Press and hold TEST button until CAL appears on display.
5. Release TEST button and wait for offset value to appear on display. If offset is within the range -150 to 150, proceed. If not, go to DCA Troubleshooting Procedure.
6. Press and release TEST button.
7. When GO appears on display, crank engine for 2 seconds or until one of the following appears on the display OFF
 - .9.9.9.9
 - A number
 - An error message
8. Observe displayed value (amps).

NOTES:

If .9.9.9.9 is displayed, current first peak was too high and cannot be measured with VTM.

If E013 is displayed, then check battery connections and correct as necessary. Repeat Step 6. If E013 persists after 3 tests, VTM cannot perform test.

BATTERY INTERNAL RESISTANCE TEST #73

Description:

This procedure measures the internal battery resistance. Internal battery resistance is a measure of the state of the batteries. Test requires DCA hookup only.

Pre-Test Procedures:

Run Confidence Test. Turn off all electrical accessories.

Typical Applications:

Evaluate batteries on CI engines with VTM being powered from battery of vehicle tested.

Possible Error Messages:

E002 Transducer not connected
E005 Offset not performed
E008 VTM does not detect battery voltage
E013 VTM cannot use data received.
E020 No first peak information was detected by the VTM.
E021 VTM cannot calculate result because current is over current probe's range.

Test Procedure:

1. Disconnect fuel solenoid wire 54A from the injector pump to prevent starting.
2. Make sure all vehicle accessories are off.
3. Set TEST SELECT switches to 73.
4. Press and hold TEST button until CAL appears on display.
5. Release TEST button and wait for offset value to appear on display. If offset is within the -150 to 150 range, proceed. If not, go to DCA Troubleshooting Procedure
6. Press and release TEST button.
7. When GO appears on display, crank engine for 2 seconds or until one of the following appears on the display
OFF
.9.9.9.9
A number
An error message
8. Observe displayed value (milliohms). The limit is 25 milliohms per battery pair.
9. Test #75 is Battery Resistance Change. You can run that test after this one if you want to.

NOTES:

If .9.9.9.9 is displayed, battery internal resistance was too high and cannot be measured with VTM.

If E013 is displayed, then check battery connections and correct as necessary. Repeat Step 6. If E013 persists after 3 tests, VTM cannot perform test.

STARTER CIRCUIT RESISTANCE TEST #74

Description:

This procedure measures starter circuit resistance. Test requires DCA hookup only.

Pre-Test Procedures:

Run Confidence Test Warm up engine to operating temperature. Turn off all electrical accessories.

Typical Applications:

Check resistance of complete starting system in CI engines with VTM powered from batteries of Vehicle being tested.

Possible Error Messages

E002 Transducer not connected.
 E005 Offset not performed.
 E003 VTM does not detect battery voltage.
 E013 VTM cannot use data received.
 E020 No first peak information was detected by the VTM.
 E021 VTM cannot calculate result because current is over current probe's range.

Test Procedure:

1. Disconnect fuel Solenoid wire 54A to prevent starting.
2. Make sure all vehicle accessories are off.
3. Set TEST SELECT switches to 74.
4. Press and hold TEST button until CAL appears on display.
5. Release TEST button and wait for offset value to appear on display. If offset is within the range -150 to 150, proceed. If not, go to DCA Troubleshooting Procedure.
6. Press and release TEST button.
7. When GO appears on display, crank engine for 2 seconds or until one of the following appears on the display OFF
 - .9.9.9.9
 - A number
 - An error message
8. Observe displayed value(milliohms).

NOTES

If .9.9.9.9 is displayed, the starter circuit resistance value was too high and cannot be measured with VTM.

If E013 is displayed, then check battery connections and correct as necessary. Repeat Step 6. If E013 persists after 3 tests, VTM cannot perform test.

BATTERY RESISTANCE CHANGE TEST #75

Description:

This procedure measures the change of battery resistance. Test requires DCA hookup only.

Pre-Test Procedures:

Run Confidence Test. Warm up engine to operating temperature. Turn off all electrical accessories.

Typical Applications:

Evaluate batteries in CI engines with VTM powered from batteries of vehicle being tested.

Possible Error Messages

E002 Transducer not connected.
E005 Offset not performed.
E006 VTM does not detect battery voltage.
E013 VTM cannot use data received.
E020 No first peak information was detected by the VTM.
E021 VTM cannot calculate result because current is over current probe's range.

Test Procedure:

1. Disconnect fuel solenoid wire 54A to prevent starting.
2. Make sure all vehicle accessories are off.
3. Set TEST SELECT switches to 75.
4. Press and hold TEST button until CAL appears on display.
5. Release TEST button and wait for offset value to appear on display. If offset is within the -150 to 150 range, proceed. If not, go to DCA Troubleshooting Procedure.
6. Press and release TEST button.
7. When GO appears on display, engage starter for 2 seconds or until one of the following appears on the display
OFF
.9.9.9.9
A number
An error message
8. Observe displayed value (milliohms/second). The limit is 50 milliohms per battery pair. A lower number is better than a higher one.

NOTES

If .9.9.9.9 is displayed, the battery resistance change value is beyond the range of the VTM and cannot be measured with the VTM.

If E013 is displayed, then check battery connections and correct as necessary. Repeat Step 6. If E013 persists after 3 tests, VTM cannot perform test.

BATTERY CURRENT TEST #80

Description:

This procedure measures current to or from the battery. Test requires DCA hookup only.

Pre-Test Procedures:

Run Confidence Test.

Typical Applications:

Evaluate batteries in CI engines.

Control Functions

01,02,03,04

Test Procedure:

1. set TEST SELECT switch to 80.
2. Press and hold TEST button until CAL appears on display.
3. Release TEST button and wait for offset value to appear on display. If offset is within -150 to 150, proceed. If not, go to DCA Troubleshooting Procedure.
4. Press and release TEST button.
5. Observe displayed value (amps).

Possible Error Messages:

E005 Offset not Performed.

DC VOLTAGE 0 TO 45 VOLTS TEST #89

Description:

This procedure measures voltage in the range of -45 to 45 volts. The VTM is used as a DC voltmeter with the decimal point in the correct position. This test must be done with the component being tested turned on. Test requires the use of the TK adapters and transducers

Pre-Test Procedures

Run Confidence Test.

Typical Applications:

- Fuel Solenoid
- Starter Solenoid
- Alternator Output
- Any DC Voltage measurement

Control Functions:

01,02,03,04,06

Test Procedure:

1. Connect test probe cable W2. Attach P1 to J4.
2. Connect the desired test leads to P2.
3. Set TEST SELECT switch to 89.
4. Short leads together. Press and hold TEST button until CAL appears on display.
5. Release TEST button and wait for offset value to appear on display.
6. If offset is within -6.8 to 6.8 proceed. If not, go to DCA Troubleshooting Procedure.
7. Press and release TEST button. Observe displayed value.

Possible Error Messages

E005 Offset not performed.

DC CURRENT 0 TO 1500 AMPS TEST #90

Description:

This procedure measures DC current in the range of 0 to 1500 amps. The VTM is used as an ammeter with the decimal point in the right position. This test may be done with the vehicle/equipment operating. Test requires the use of the TK adapters and transducers.

Pre-Test Procedures

Run Confidence Test.

Typical Applications:

- **Alternator output**
- **Average Starter Current**
- **Battery Current**
- **Any DC Current up to 1500 Amps**

Control Functions:

01,02,03,04,06

Test Procedure:

1. Connect test probe cable W4.
2. Attach P1 to J2 or J3. Connect the Current Probe to P2.
3. Set TEST SELECT switch to 90.
4. Clamp probe to de-energized wire.
5. Press and hold TEST button until CAL appears on display.
6. Release TEST button and wait for offset value to appear on display. If offset is within 225 to -225 proceed. If not, go to DCA Troubleshooting Procedure.
7. Energize circuit. Press and release TEST button.
8. Observe displayed value. A negative reading indicates the probe is backwards. Reverse and repeat from step 4.

Possible Error Messages

E002 Offset not performed.
E005 Transducer not connected.

RESISTANCE AND CONTINUITY 0 TO 4500 OHMS TEST #91

Description:

This procedure measures resistance in the range of 0 to 4500 ohms. The VTM is used as an ohmmeter, and test results are always displayed with the decimal point in the right position. Additionally, any voltage present in the device being tested will adversely affect test results. Make sure the circuit or component being tested is shut off. Test requires the use of the TK adapters and transducers.

Typical Applications:

- Continuity checks
- Resistance measurements
- Switch and relay functions

Test Procedure:

1. Connect test probe cable W2. Attach P1 to J4.
2. Connect the desired test leads to P2.
3. Set TEST SELECT switch to 91.
4. Short leads together. Press and hold TEST button until CAL appears on display.
5. Release TEST button and wait for offset value to appear on display.
6. If offset is within -225 to 225 proceed. If no go to DCA Troubleshooting Procedure
7. Press and release TEST button. Observe displayed value.

Pre-Test Procedures

Run Confidence Test.

Control Functions:

01,02,03,04,06

Possible Error Messages

E005 Offset not Performed.
E022 External voltage detected while measuring resistance.

a. STE/ICE-R Description and Operation. The following describes the operation of the Simplified Teat Equipment/Internal Combustion Engines (STE/ICE-R) system and contains detailed operating procedures. It is used to test the serviceability of HMMWV vehicles and to perform primary fault detection and isolation. After the technician has identified a faulty part or subsystem, he is referred to a paragraph number for replacement or repair procedures for individual parts.

b. Description and Operation. STE/ICE-R is a testing system that performs tests and measurement on internal combustion engines. STE/ICE-R measures standard voltage, current, resistance, pressure, temperature, and speed. Special tests, such as compression balance tests and starter system evaluations, are performed by STE/ICE-R. Standard equipment functions including vacuum pressure gauge, compression gauge, low-current tester, and multimeter are features of the STE/ICE-R set. STE/ICE-R is portable and operates on either 12- or 24-volt vehicle batteries or equivalent power source. The STE/ICE-R system consists of a vehicle test meter (VTM), a transducer kit (TK), four electrical cables, a transit case, and technical publications.

c. Vehicle Test Meter.

1. General. The VTM provides a method for the technician to test vehicle electrical and mechanical components. Readings are either pass/fail indications or digital displays in units familiar to the technician (psi, rpm, volts, ohms, amps, etc.). The diagnostic connector assembly (DCA) is permanently mounted in the vehicle and provides accessibility to the most frequently needed test points. The use of the VTM through the DCA is referred to as DCA mode. The VTM interfaces with the vehicle directly with a transducer from the transducer kit (TK). The use of the VTM through the TK is referred to as TK mode. The DCA and the TK can be used at the same time. This may be necessary when the diagnostic connector assembly has a missing transducer. If a transducer is missing, a no sensor indication (E002) is displayed when a measurement is made. If this happens, the TK mode can be used to make the measurement. The use of the VTM through the DCA and TK is referred to as the combined mode. Additional tests can be done that involve manually probing and/or connecting transducer to appropriate test points. Operating power for the VTM is drawn from the vehicle batteries or some equivalent battery source. Power is routed to the VTM through the DCA connected to the battery. The STE/ICE-R general purpose testing capabilities that maybe applied to the vehicle are: 0-1000 psi pressure, 0-45 volts dc and 0-40k ohms resistance. The following control functions can be performed in conjunction with the special tests: interleave (displays rpm with next test), display maximum value, and display minimum value, and display peak-to-peak value.

2. Controls and Indicators. The controls and readout display on the VTM are illustrated. The following paragraphs describe how the controls are used and how the display functions.

(a) Power Switch (PUSH ON/PULL OFF). The power switch controls DC power to the VTM. The VTM can operate from a 12-volt or 24-volt battery system. When the power switch is pushed in (PUSH ON), the VTM power is on. To shut the VTM off, pull out the power switch (PULL OFF). The power switch contains a 4-amp circuit breaker. The power switch will pop out automatically if something is wrong which causes the VTM to use more power than it should. If the switch pops out, check your hookup carefully and try again before returning the VTM to direct support maintenance.

(b) TEST SELECT Switches. The TEST SELECT switches are used to select the actual test to be performed. There are ten positions on each switch numbered 0 through 9. The number dialed into these switches is read by the VTM when you press the test button. Changing the TEST SELECT switch positions has no effect until the TEST button is pushed.

(c) TEST Button. Depressing and releasing the TEST button causes the test measurement to begin. Observe the measured value on the readout display. The reading will be in units normally used for the particular vehicle measurement. These units are listed on the flip cards. The TEST button must be pressed and immediately released. Depressing and holding the TEST button down initiates an offset test. Offset tests are described in TM 9-4910-571-12&P.

(d) Readout Display. The readout display will show different types of readouts during testing up to a maximum of 4-characters (for example .8.8.8.8). The types of readouts are described in detail in paragraph 3 below and are summarized as follows:

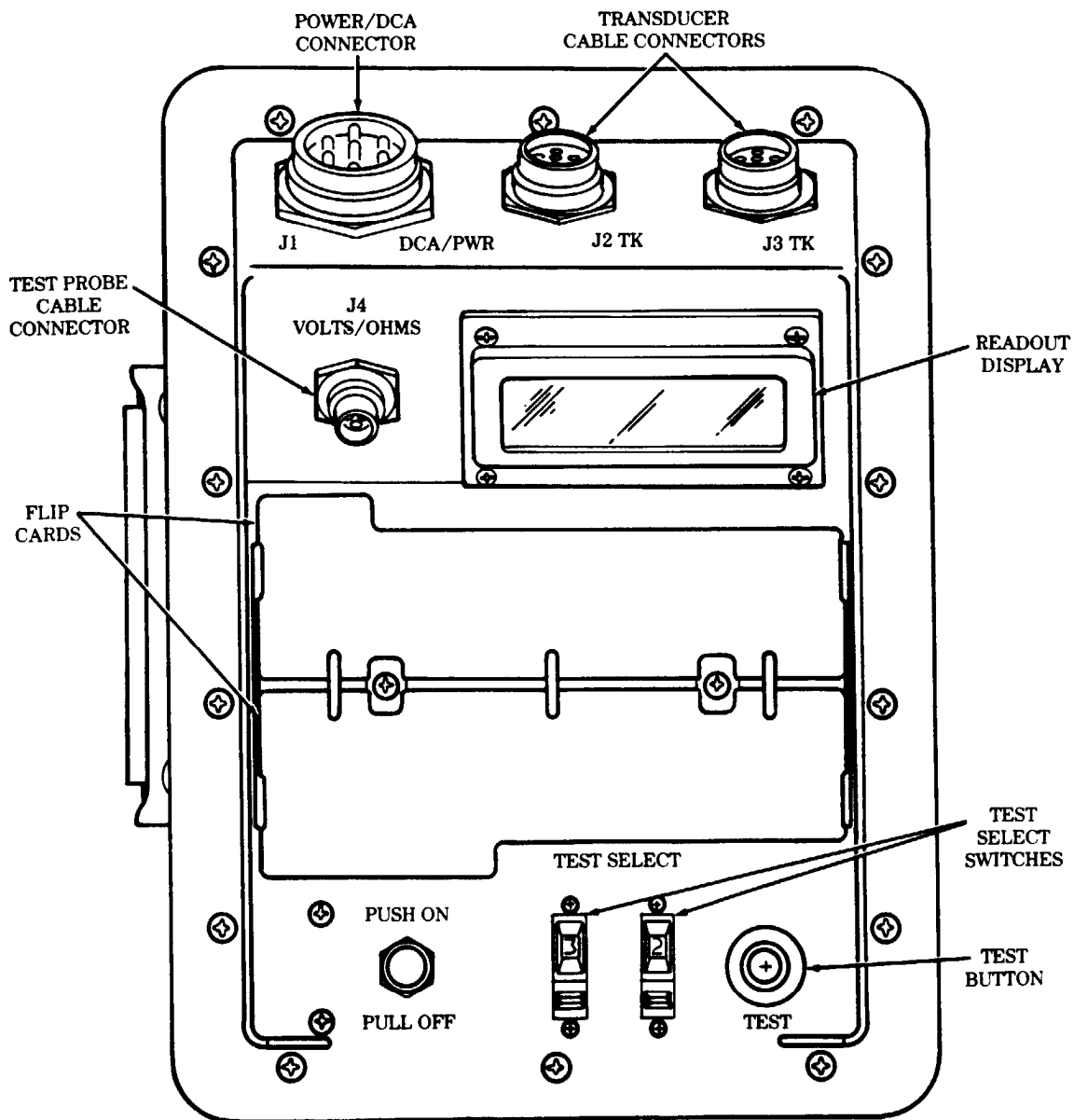
(1) Statue Readout. This type of readout keeps the technician informed of what is happening, such as power applied, failed test, etc.

(2) **Numerical Readout.** This type of readout is the measured value in units of the measurement being made. If you are measuring 0-45 volts dc, the number 24 on the display indicates 24 volts.

(3) **Error Readout.** This type of readout indicates that the wrong test number was selected, the transducer is not connected, or the VTM is faulty.

(e) **Flip Cards.** The flip cards list the 2-digit test number system for selecting the various tests. The cards also summarize the test and operating instructions contained herein.

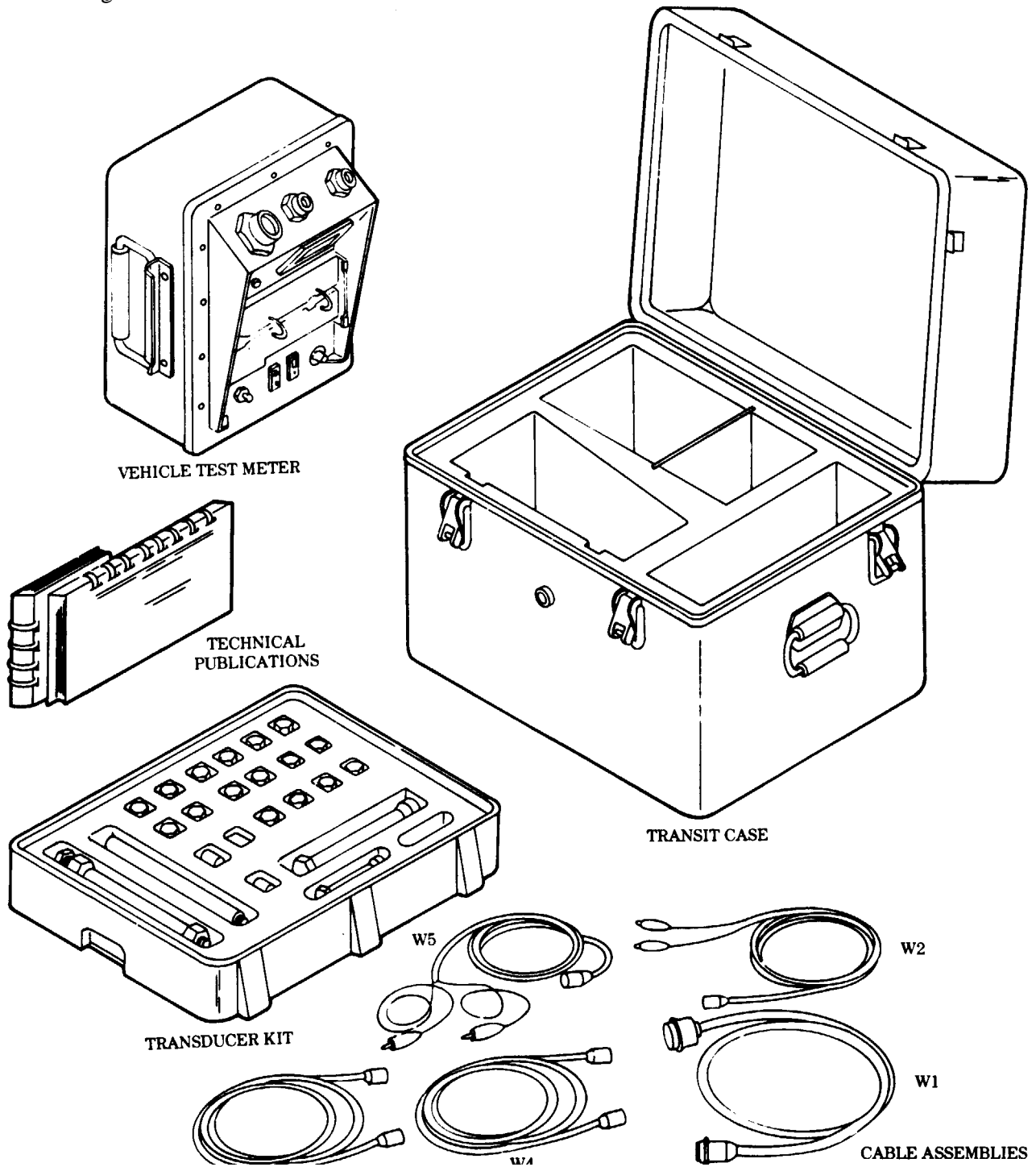
(f) **Power/DCA Connector J1.** Connector J1 connects the VTM to either a vehicle diagnostic connector using the DCA cable, or to the vehicle batteries using the power cable. Operating power and signals from the installed transducers are supplied to the VTM through the DCA cable.



VTM CONTROLS AND READOUT DISPLAY

(g) Transducer Cable Connectors J2, J3. Connector J2 or J3 connects the VTM to any transducer in the transducer kit. Operating power is supplied to the transducer and signals from the transducers are supplied to the VTM through the cable. Connectors J2 and J3 are identical and can be interchanged with each other or used in combination.

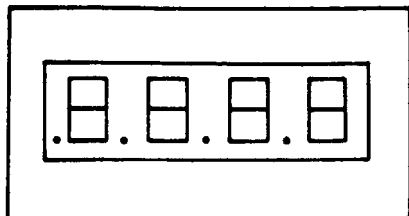
(h) Test Probe Cable Connector J4. Connector J4 connects test leads to the VTM when doing manual voltage resistance tests.



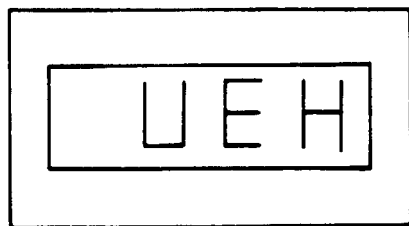
SIMPLIFIED TEST EQUIPMENT INTERNAL COMBUSTION ENGINE (STE/ICE) SYSTEM

3. Readouts. The following paragraphs describe the different types of readouts that can occur during testing.

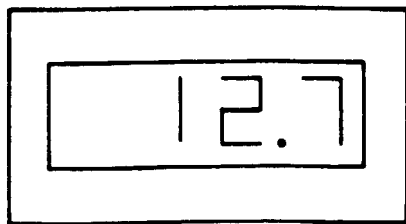
(a) Status Readout. A status readout keeps the technician informed of what is happening. For example, .8.8.8.8 is displayed each time the power switch is pushed on. It means that power is applied, and that all elements of the display are operative, it changes to --- 1.5 seconds later, indicating that the VTM is ready to be used for testing. The status readout displays are described in table 2-1.



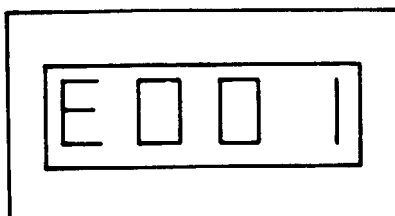
(b) Prompting Message. A prompting message is a technician action message. It is a signal for you to do something such as crank the engine. For example, UEH tells you to enter the vehicle type identification number into the VTM. After the technical action is performed, the test will automatically continue. Prompting messages are listed in table 2-2.



(c) Numerical Readout. A numerical readout is the measured value in units of the measurement being made. For example, if you are measuring 0-45 volts dc, 12.7 is volts dc. If you are measuring 0-25 psig pressure, 12.7 is psig. The units for each test are listed on the flip card. The numbers displayed in the VTM are always positive unless there is a minus shown to make them negative.



(d) Error Readout. E0001 is a typical error readout. There are 15 different readouts. All error readouts start with E. An error readout is a warning that you forgot to connect the transducer, selected a wrong test number, failed to start the engine, etc. All of the error messages mean you must correct the problem before continuing testing. Error readouts are listed in table 2-3. If the error message does not go away after corrective action, refer to TM 9-4910-571-12&P.



(e) Confidence Error Readouts. C004 is a typical error readout resulting from the detection of a faulty VTM during confidence test. For detailed information concerning confidence error readouts refer to TM 9-4910-571-12&P.

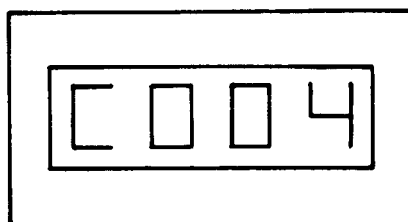


Table 2-1. Status Readouts.

VTM Readout	Interpretation
.8.8.8.8	A readout of .8.8.8.8 appears for 1 to 2 seconds each time the power is applied to the VTM. It means that there is power to the VTM, and that all elements of the readout display are operative.
---	A readout of ---- indicates the following (1) After power turn on it signifies that the VTM is ready for testing. (2) During a compression unbalance test it signifies testing is in progress.
.9.9.9.9	A readout of .9.9.9.9 indicates that the VTM is reading a test value beyond the range of its measurement, capability. Either (1) the wrong test number is selected for the parameter being measured, or (2) there is a fault in the vehicle.
PASS FAIL	A PASS or FAIL readout is the result of a test that checks the condition of a component being measured. A PASS/FAIL readout means just that — the component either passes the test or fails the test.

Table 2-2. Prompting Messages

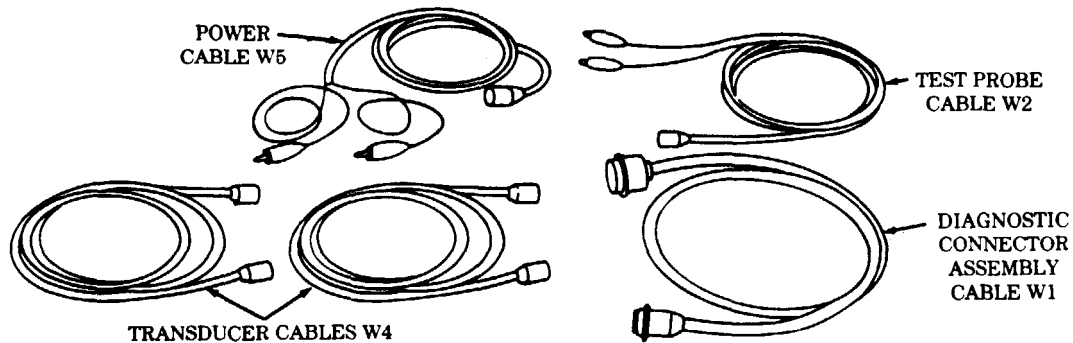
VTM Readout	Interpretation
UEH	Signal to ECT switches. Vehicle ID numbers are found under TEST DATA on the flip card, on the vehicle test cards.
Go	Signal to technician to crank engine in compression balance or first peak tests.
OFF	Signal to technician to stop cranking in compression balance test or to release the accelerator in the CI over test.
CAL	Signal to the technician to release the TEST button during an offset test.
66	Numbers are used for prompting messages in several tests. In confidence test, a readout of 66 signals the technician to dial in 99. In test no. 12, the first numerical readout signals the technician to shut off fuel.

Table 2-3. Error Readouts

VTM Readout	Interpretation
E000	Occurs if you request the VTM for information it does not have. For example, if you request the vehicle ID and it has not been entered.
E001	Occurs in either the DCA or TK mode of operation. It indicates that a non-existent test number has been dialed into the TEST SELECT switches.
E002	Indicates that the required transducer is not connected.
E003	Indicates that a test number has been dialed which does not apply to the vehicle under test. It can only occur in the DCA mode.
E004	Indicates that a vehicle identification number or number of cylinders information has not been entered.
E005	Indicates that the transducer offset test was not performed.
E007	Indicates a conflict between the vehicle identification number (VID) dialed in the the number of cylinders dialed in. It may occur in response to either VID entry or number-of-cylinders entry.
E008	Indicates the VTM is not receiving the required voltage signal for the test selected. This error code is related only to starter and compression balance tests.
E009	Indicates that the engine was not running at the start of the test.
E010	Indicates that a wrong vehicle identification number was dialed into the VTM.
E011	Indicates that throttle control was operated incorrectly during power test taking too much time to either accelerate or decelerate.
E013	Indicates bad data were taken for the test in progress. Repeat the test one (1) time.
E014	Indicates that a wrong number of cylinders was dialed into the VTM.
E018	Indicates that an engine RPM or AC frequency test was terminated automatically to protect the VTM. Termination is only after several minutes of no-signal operation. Most likely the VTM was left on the vehicle and the engine stalled.

d. Cable Assemblies.

1. General. The cable assemblies are shown below and are referred to by the cable number and by a name which describes how the cable is used. If necessary, the two transducer cables (W4) can be joined with the adapter supplied in the transducer kit to make one long cable.



CABLE ASSEMBLIES

2. Installation. When cables are connected, large key on the cable connector mates with a keyway on the transducer connector or the VTM connector for proper installation. If you experience any difficulty during testing and suspect that a cable is bad, refer to TM 9-4910-571-12&P for checking cable continuity.

e. Transducer Kit.

Table 2-4. Transducer Kit Components

ITEM NO.	TK NO.	PART NO.	QTY	ITEM
1	10	11669227	1	Hose and fitting assy (spark plug adapter)
2	11	12258878	1	Current probe
3	12	12258853-1	1	Pipe thread reducer, 3/4 MPT to 1/4 FPT
4	13	12258853-3	1	Pipe thread reducer, 1/2 MPT to 1/4 FPT
5	14	12258853-2	2	Pipe thread reducer, 3/8 MPT to 1/4 FPT
6	15	444620	1	Hex head plug, 1/4 MPT
7	16	5327970	1	Hex head plug, 1/8 MPT
8	17	12258876	1	Pressure transducer, 0-1000 psig
9	21	12258881	1	Snubber
10	20	3204X2	2	Adapter, 1/8 MPT to 1/4 FPT
11	19	3304X2	1	Coupling reducer, 1/8 FPT to 1/4 FPT
12	18	234X5	1	Male connector, 5/16 tube to 1/4 MPT
13	22	12258877	1	Pressure transducer, -30 in. Hg to 25 psig
14	23	444152	1	Street tee, 1/2 pipe thread
15	24	3750X4	1	Street tee, 1/4 pipe thread
16	25	547002	1	Street tee, 1/8 pipe thread
17	26	12258879-2	1	Street elbow, 1/4 pipe thread
18	27	12258879-1	1	Street elbow, 1/8 pipe thread
19	34	12258875	1	Pulse tachometer
20	32	12258880	1	Fuel line adapter
21	31	MS53099-2	1	Tachometer drive adapter
22	30	7540877	1	Ignition adapter
23	29	MS3119E14-19	1	Adapter (connector-to-connector)
24	28	12258762	1	Tee, inverted flare
25	33	8840543	1	Air chuck
26	35	11669236	1	Hose assembly, 1/8 MPT
27	36	12258852	1	Pipe nipple, 1/8 MPT

1. General. The transducer kit contains a pulse tachometer transducer, a pressure and a vacuum transducer and the necessary adapters (bushing, plugs, tees, etc.). Also included in the kit is a current probe for measuring current and a test probe cable for measuring voltage and resistance.

Not all fittings have part number markings. The legend will help to identify the items.

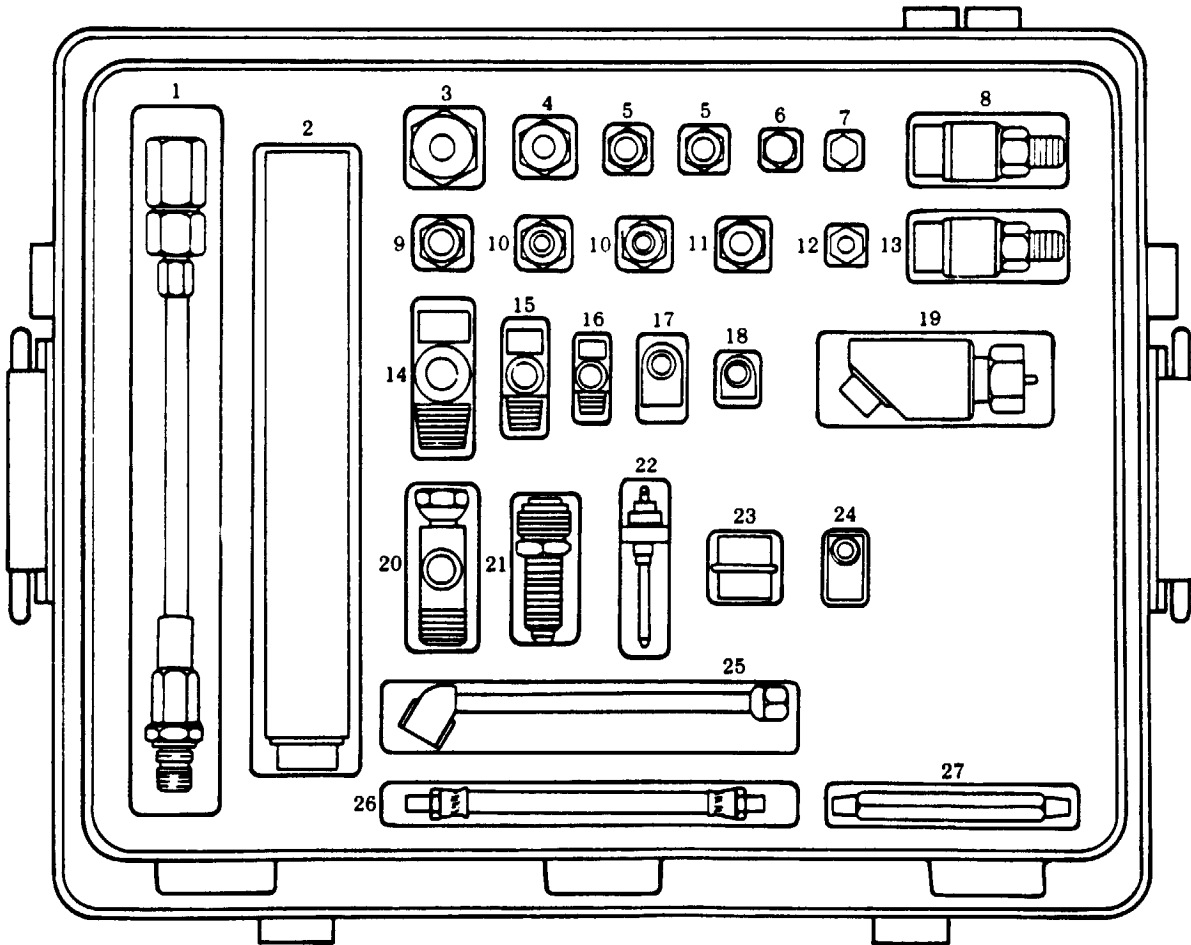
Before installing any transducer kit item on the vehicle, be sure to clean the mounting surfaces. This is particularly important if you are going to open fuel lines or tap into manifolds. Dirt particles entering the engine can cause damage to both the engine and the transducer kit item.

The transducers should be kept clean, free of dirt and grease, and handled with reasonable care.

2. Pressure Transducer. The pressure transducers have a small breather hole on the side of the housing which should be kept unplugged. Do not use high pressure.

3. Pulse Tachometer. Make sure that the slotted hole in the engine tachometer drive shaft is clear and not hard packed before installing the pulse tachometer.

4. Threaded Adapters. Observe threaded fittings carefully to avoid engaging straight threads with pipe threads. Each measurement device (transducer) in the transducer kit has its own identification resistor. The VTM uses this identification resistor to check that the correct transducer is connected for the measurement being made. If the correct transducer is not connected, error code E002 will be displayed.



TRANSDUCER KIT

2-44. VEHICLE TESTING

a. General. To troubleshoot a vehicle problem, the technician can use the STE/ICE-R (vehicle test meter and transducers) and the vehicle test card.

b. Data Entry Tests. For information regarding Data Entry, Cylinder Entry, Vehicle ID Entry, and Data Display Tests, refer to TM 9-4910-571-12&P.

c. Offset Tests. The STE/ICE-R VTM performs a test by setting the TEST Select switches to the test number and pressing the TEST button. For some tests, an offset test is required before the test itself can be performed. This is done by selecting the number of the desired test and holding the TEST button down for several seconds.

The offset test nulls out characteristic differences in the VTM, test leads, and transducers. It zeros the meter. Once the offset is performed, the VTM automatically corrects for the offset before displaying measured values. The displayed offset value should be checked against limits on the vehicle test card. If the displayed value is outside these limits, either the transducer or the test cable is faulty and must be replaced. This is another form of self-test. The offset is performed when each transducer is connected. All tests requiring offset are identified by a star (*) on the flip cards and by OFFSET LIMITS on the vehicle test cards. The offset test is performed with the test probe cable or transducer connected to the VTM. Care should be taken to see that no stimulus is applied to the transducer. Test probe cable leads should be shorted together. To perform an offset test, dial the test number into the TEST SELECT switches. Press and hold the TEST button until the prompting message CAL appears on the display. A few seconds after release of the TEST button, a number will appear. This is the measured offset value associated with the test probe cable or transducer and cable.

d. Control Tests. These tests are used to change (or control) the way a vehicle test is displayed or the way it is run. There are five control tests:

- 01 Interleave (displays RPM with next test).
- 02 Display minimum value for next test.
- 03 Display maximum value for next test.
- 04 Display peak-to-peak value for next test.
- 06 Interleave.

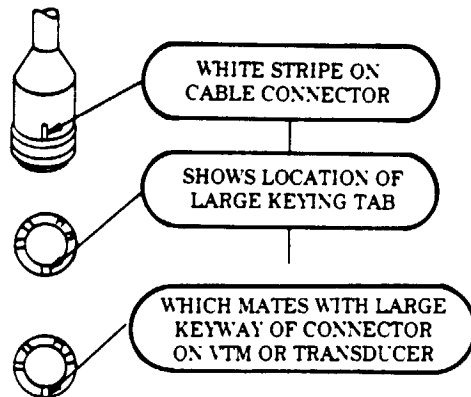
Control tests 01, 02, 03, 04, and 06 specify the action to be taken by the next test only. A subsequent test will reset the control.

1. Interleave (Test 01). This test alternately measures engine speed and a second parameter such as fuel pressure or alternator voltage. To initiate interleave, dial 01 into the TEST SELECT switches and press and release the TEST button. The prompting message CON will signal the technician to dial into the second test number and again press and release the TEST button.

2. Minimum Value (Test 02). This test displays the minimum value measured during a test. To initiate a minimum value display, dial 02 into the TEST SELECT switches and press and release the TEST button. The prompting message PASS will signal the technician to dial in the desired test number and again press and release the TEST button. The minimum value is displayed and updated whenever a lower minimum value is measured. Entering 02 and the test number again will reset the process and a new minimum value will be displayed.

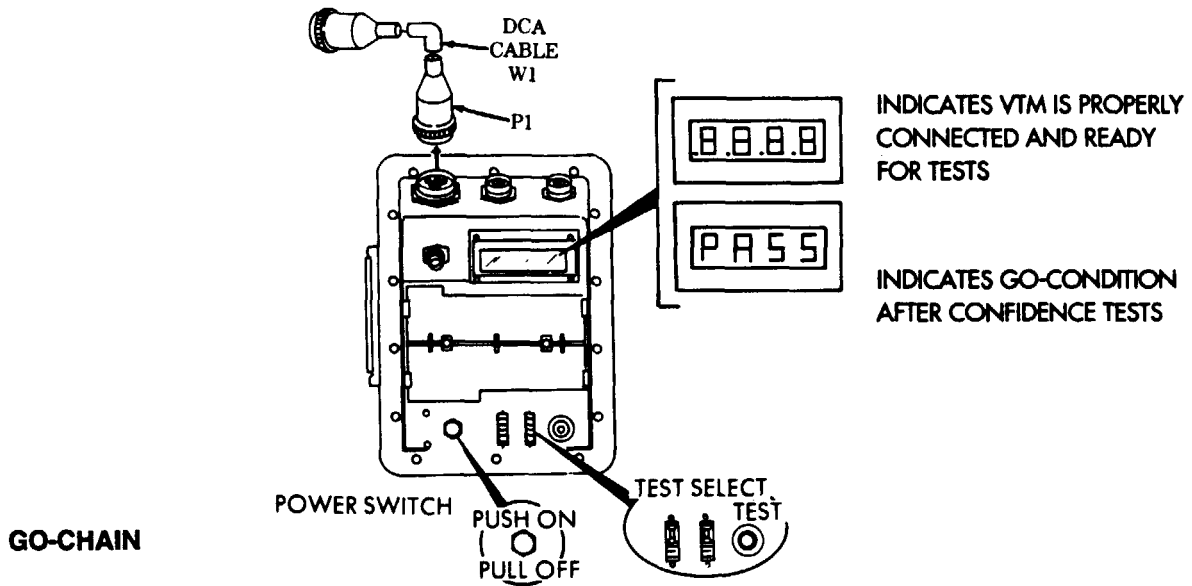
3. Maximum Value (Test 03). This test displays the maximum value measured during a test. To initiate a maximum value display, dial 03 into the TEST SELECT switches and press and release the TEST button. The prompting message PASS will signal the technician to dial in the desired test number and again press and release the TEST button. The maximum value is displayed and updated whenever a higher maximum value is measured. Entering 03 and the test number again will reset the process and a new maximum value will be displayed.

4. Peak-to-Peak Value (Test 04). This test displays the peak-to-peak value of 0-45 volts DC (89), 0-1500 amps DC (90), and battery volts (67). To start a peak-to-peak measurement, dial 04 into the TEST SELECT switches and press the TEST button. The prompting message PASS will signal the operator to dial in one of the three numbers (89, 90, 67) and again press the TEST button.



CONNECTOR KEY LOCATION

Table 2-1. STE/ICE-R GO-Chain Tests.



NOTE

Perform all GO steps until a NO-GO condition exists, then perform the NO-GO step indicated.

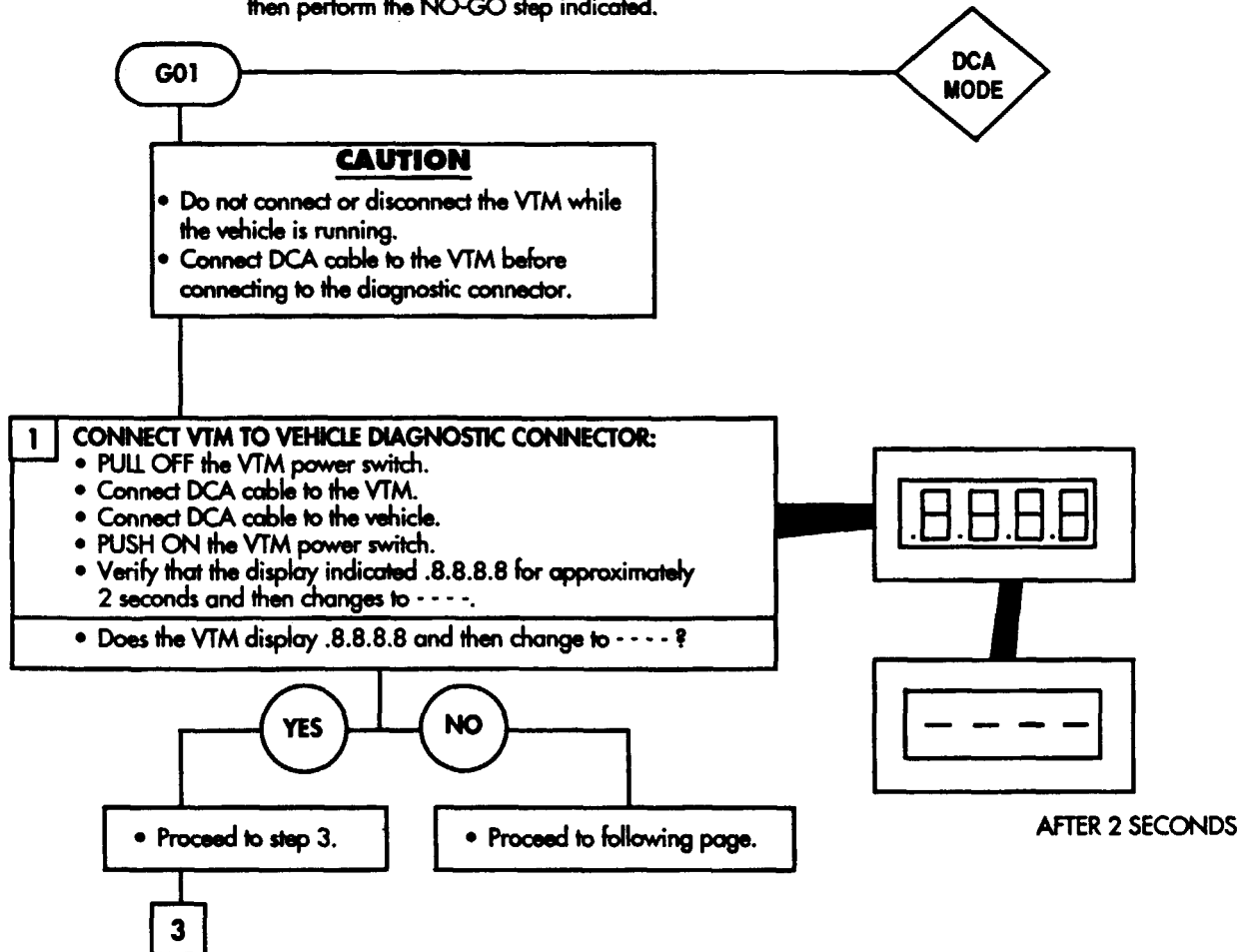


Table 2-1. STE/ICE-R GO-Chain Tests. (Cont'd)

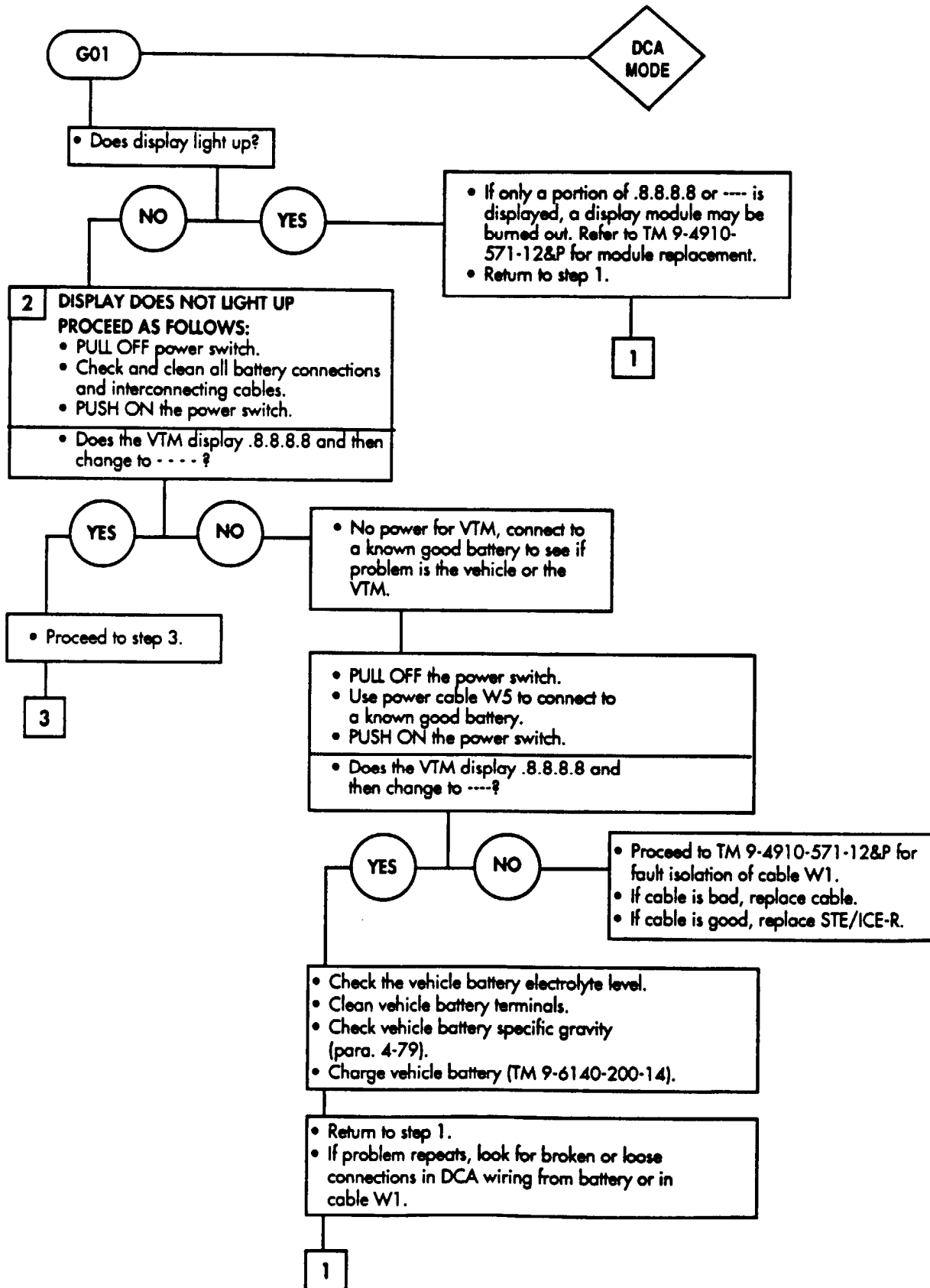
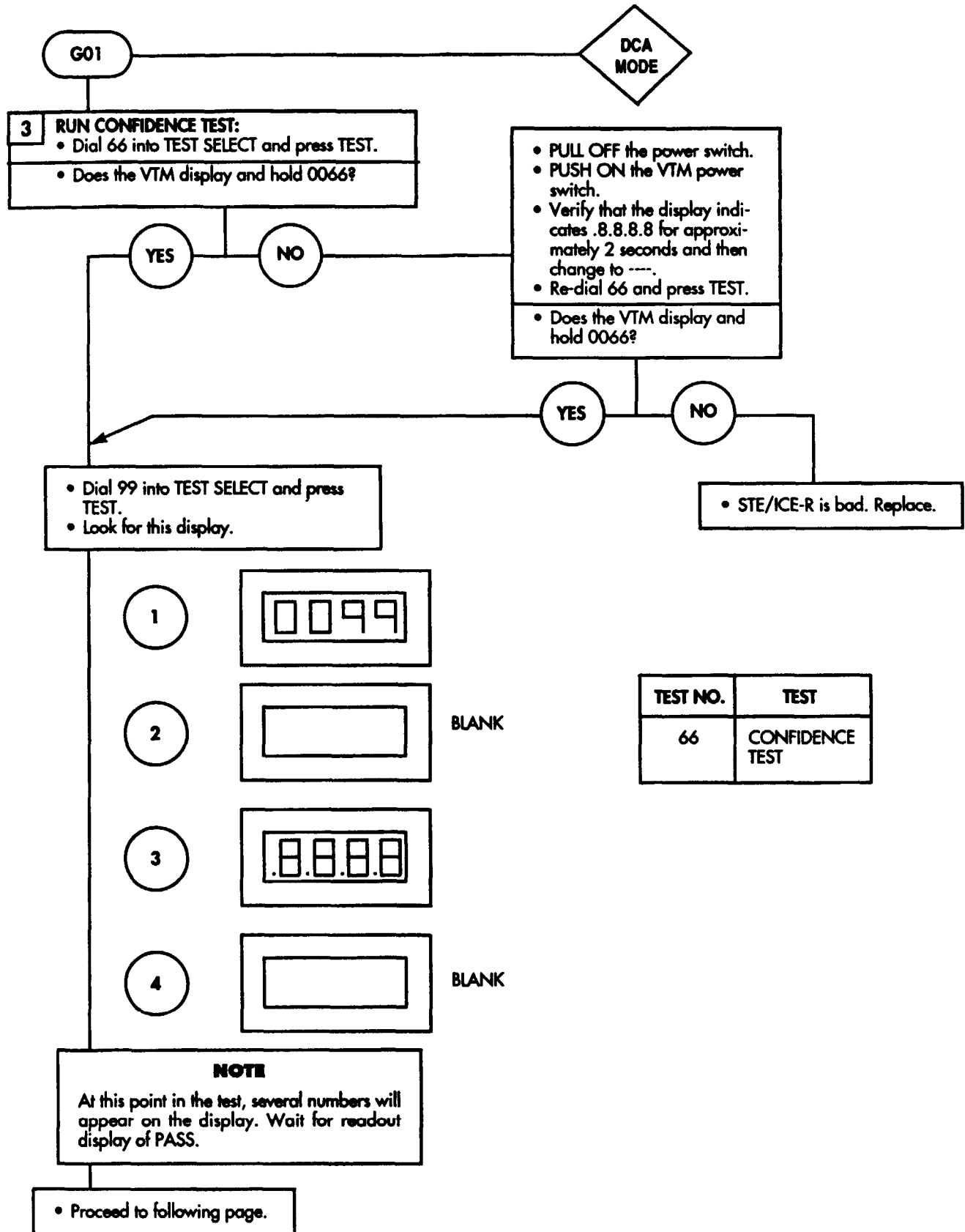
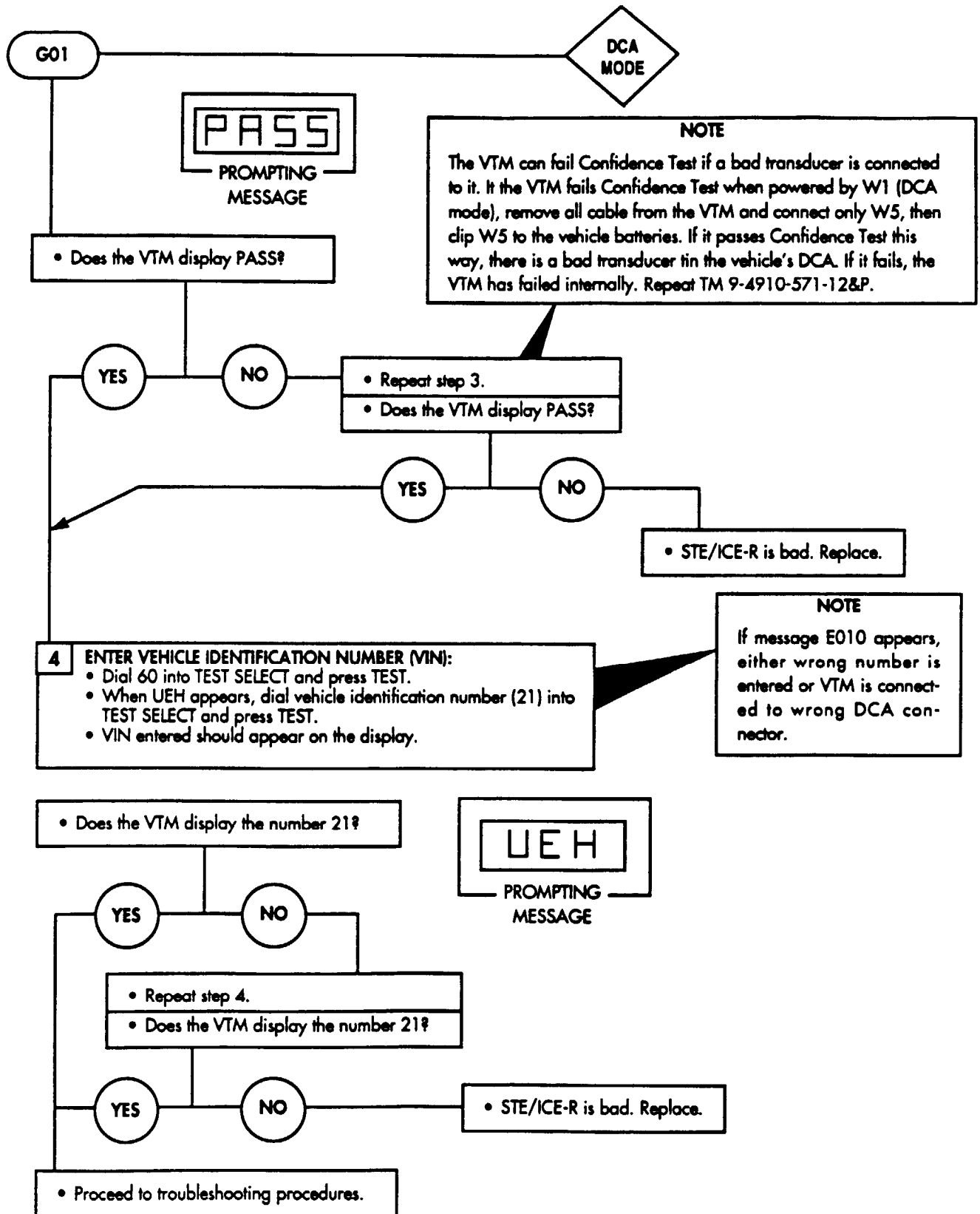


Table 2-1. STE/ICE-R GO-Chain Tests. (Cont'd)



TEST NO.	TEST
66	CONFIDENCE TEST

Table 2-1. STE/ICE-R GO-Chain Tests. (Cont'd)



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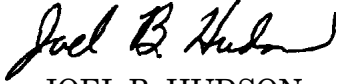
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PAGE NO.	COLM NO.	LINE NO.	NATIONAL STOCK NUMBER	REFERENCE NO.	FIGURE NO.	ITEM NO.	TOTAL NO. OF MAJOR ITEMS SUPPORTED	RECOMMENDED ACTION
<h1>SAMPLE</h1>								

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TYPED NAME, GRADE, OR TITLE	TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION	SIGNATURE
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RECOMMENDED CHANGES TO PUBLICATIONS AND BLANK FORMS For use of this form, see AR 25-30; the proponent agency is ODISC4.	Use Part II (reverse) for Repair Parts and Special Tools Lists (RPSTL) and Supply Catalogs/Supply Manuals (SC/SM).	DATE:
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PUBLICATION/FORM NUMBER TM 9-2320-280-20-1	DATE 31 JAN 96	TITLE TECHNICAL MANUAL, UNIT MAINTENANCE
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ITEM NO.	PAGE NO.	PARA-GRAPH	LINE NO.*	FIGURE NO.	TABLE NO.	RECOMMENDED CHANGES AND REASON <i>(Provide exact wording of recommended changes, if possible).</i>

**Reference to line numbers within the paragraph or subparagraph.*

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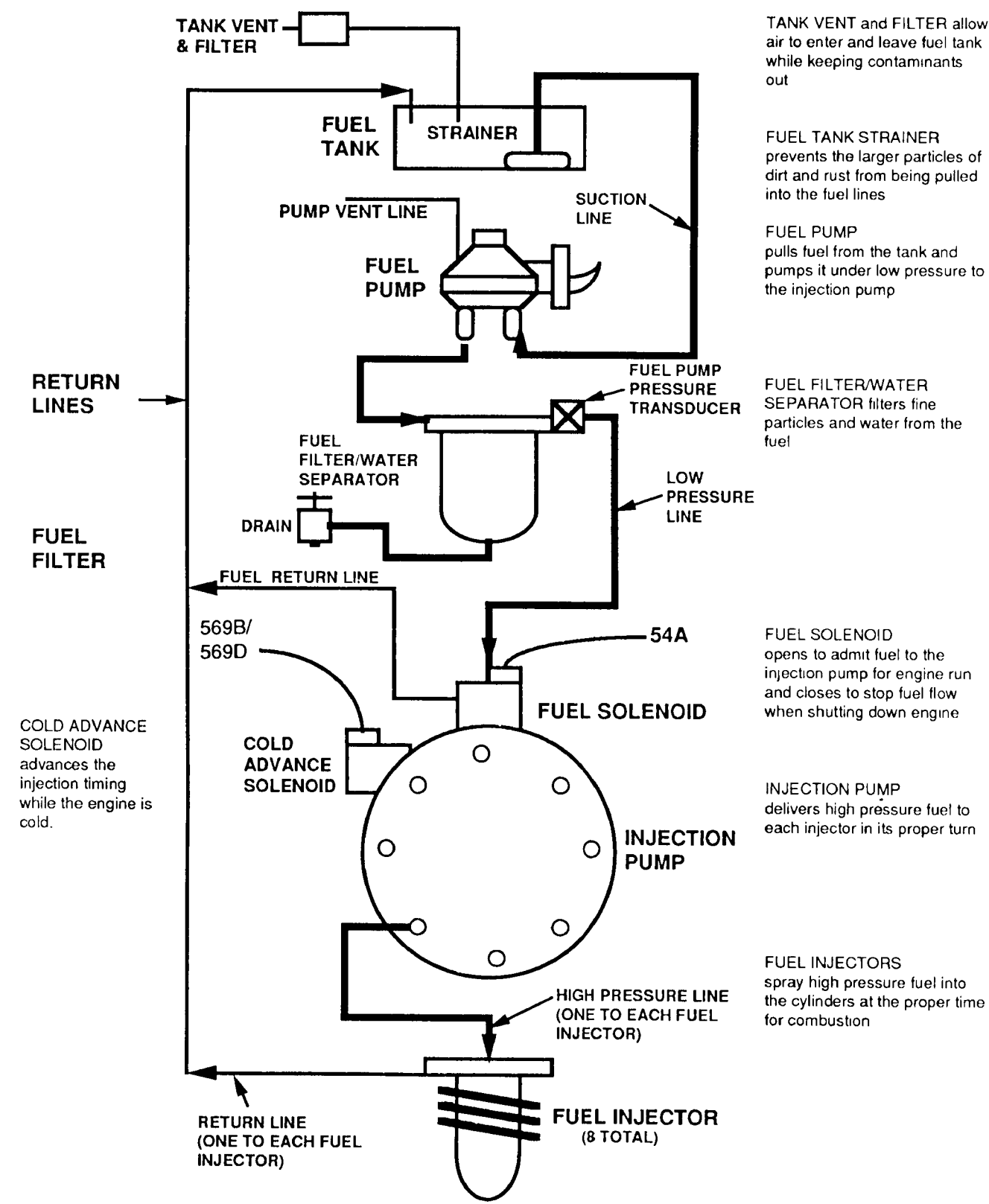
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PUBLICATION/FORM NUMBER				DATE		TITLE		
PAGE NO.	COLM NO.	LINE NO.	NATIONAL STOCK NUMBER	REFERENCE NO.	FIGURE NO.	ITEM NO.	TOTAL NO. OF MAJOR ITEMS SUPPORTED	RECOMMENDED ACTION

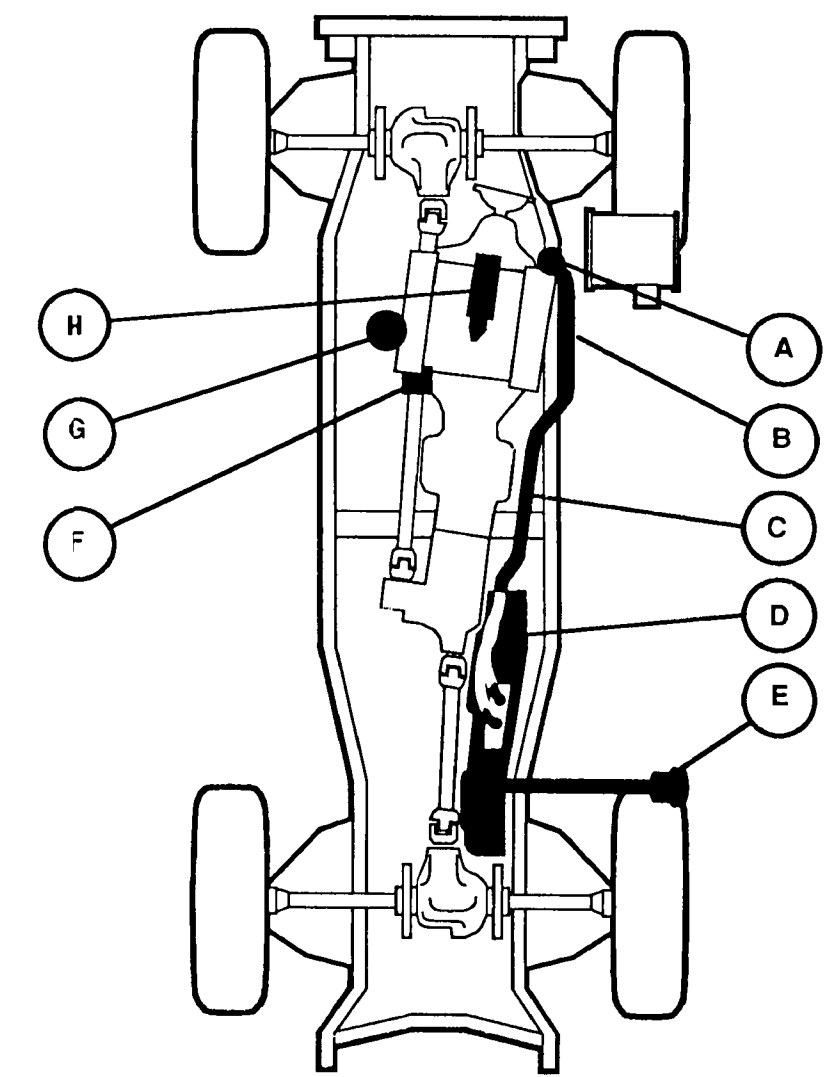
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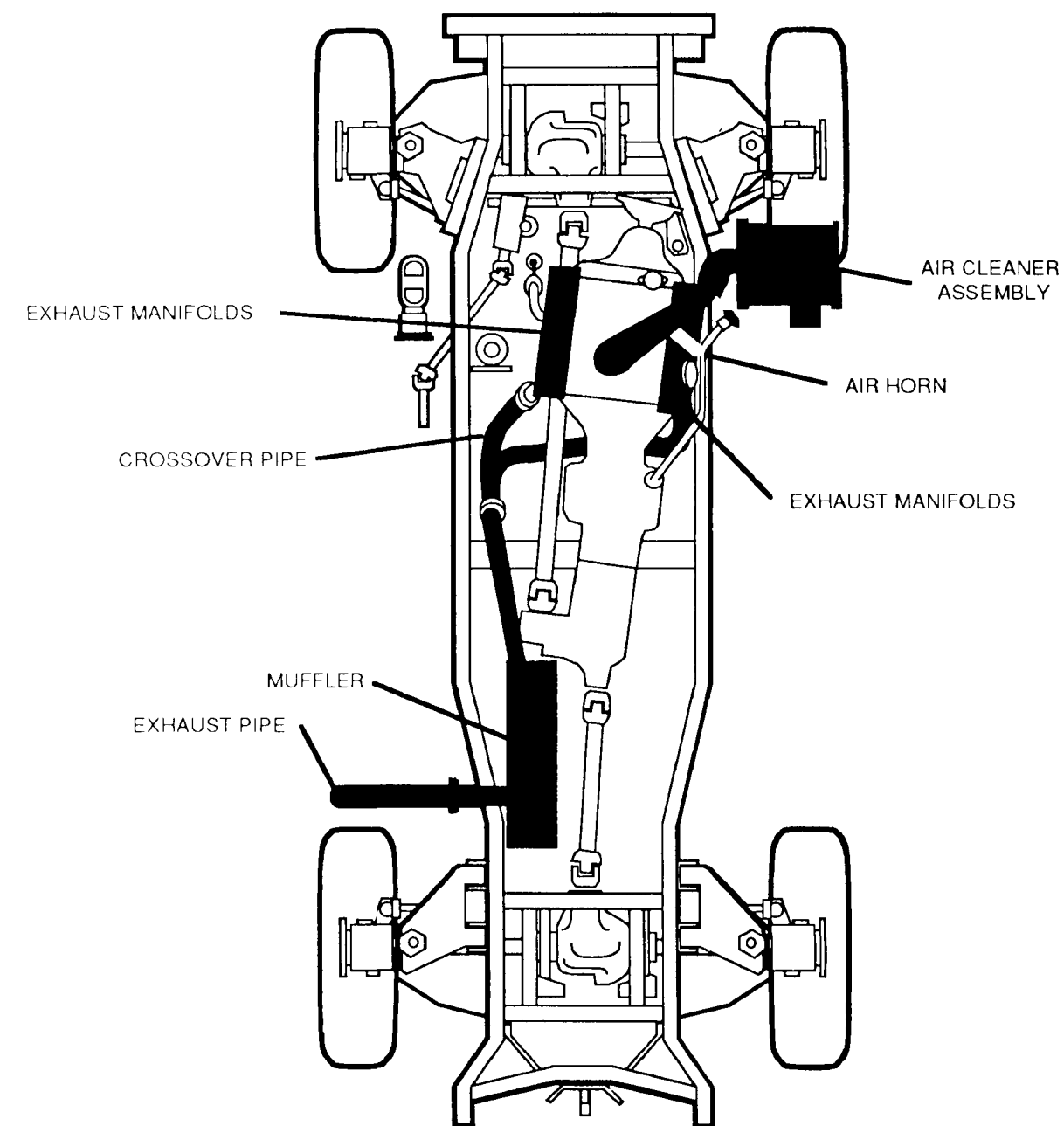


- (A) FJEL LIFT PUMP DRAWS FUEL FROM FUEL TANK THRU THE SUPPLY LINE AND PUMPS IT TO THE FUEL FILTER
- (B) FJEL RETURN LINE DIRECTS UNUSED FUEL FROM THE INJECTION PUMP BACK TO THE FUEL TANK
- (C) FJEL SUPPLY LINE DIRECTS FUEL FROM FUEL TANK TO THE SYSTEM
- (D) FJEL TANK STORES 25 GALLONS OF DIESEL FUEL
- (E) FUEL FILLER CAP LOCATED AT RIGHT REAR SIDE OF VEHICLE, THE CAP IS REMOVED TO PERMIT FUEL TANK SERVICING
- (F) FUEL INJECTORS RECEIVE METERED FUEL FROM THE INJECTION PUMP AND SPRAYS FUEL INTO THE COMBUSTION CHAMBER
- (G) FUEL FILTER/WATER SEPARATOR FILTERS WATER AND SEDIMENT FROM FUEL BEFORE FUEL ENTERS THE INJECTION PUMP
- (H) INJECTION PUMP DIRECTS METERED AND PRESSURIZED FUEL TO THE EIGHT INJECTOR NOZZLES. IT IS MOUNTED ON TOP OF THE ENGINE UNDER THE INTAKE MANIFOLD

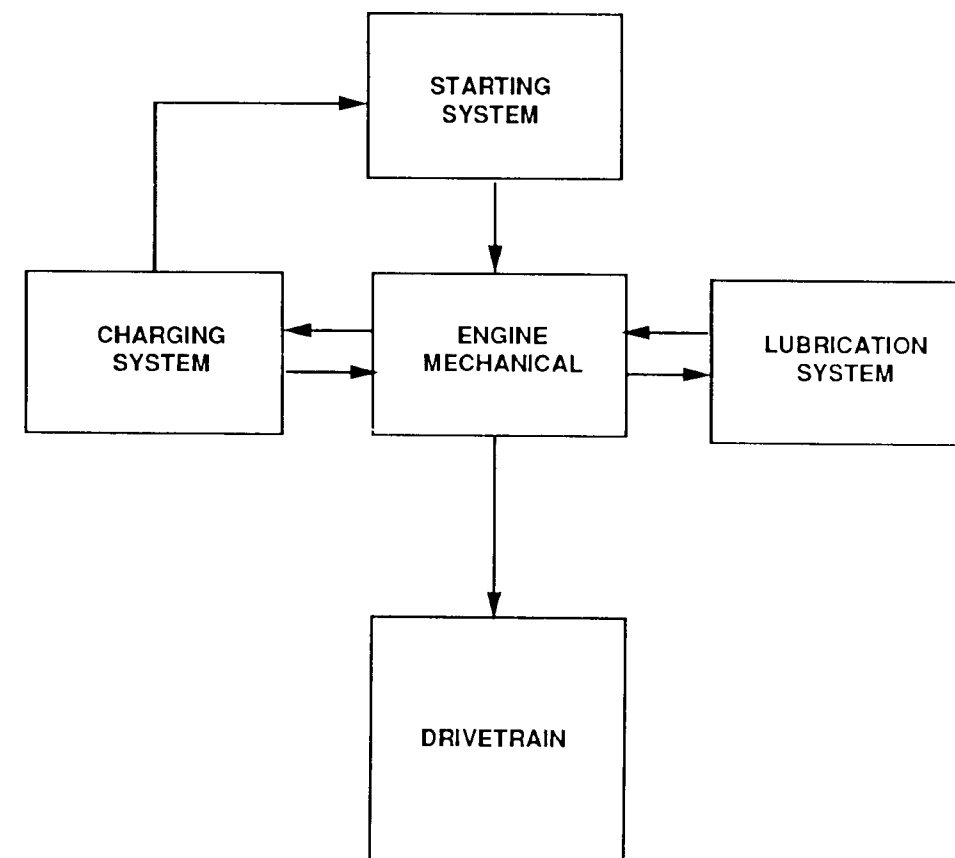


FO-1 Fuel System Functional Flow and Locations of Parts Diagrams

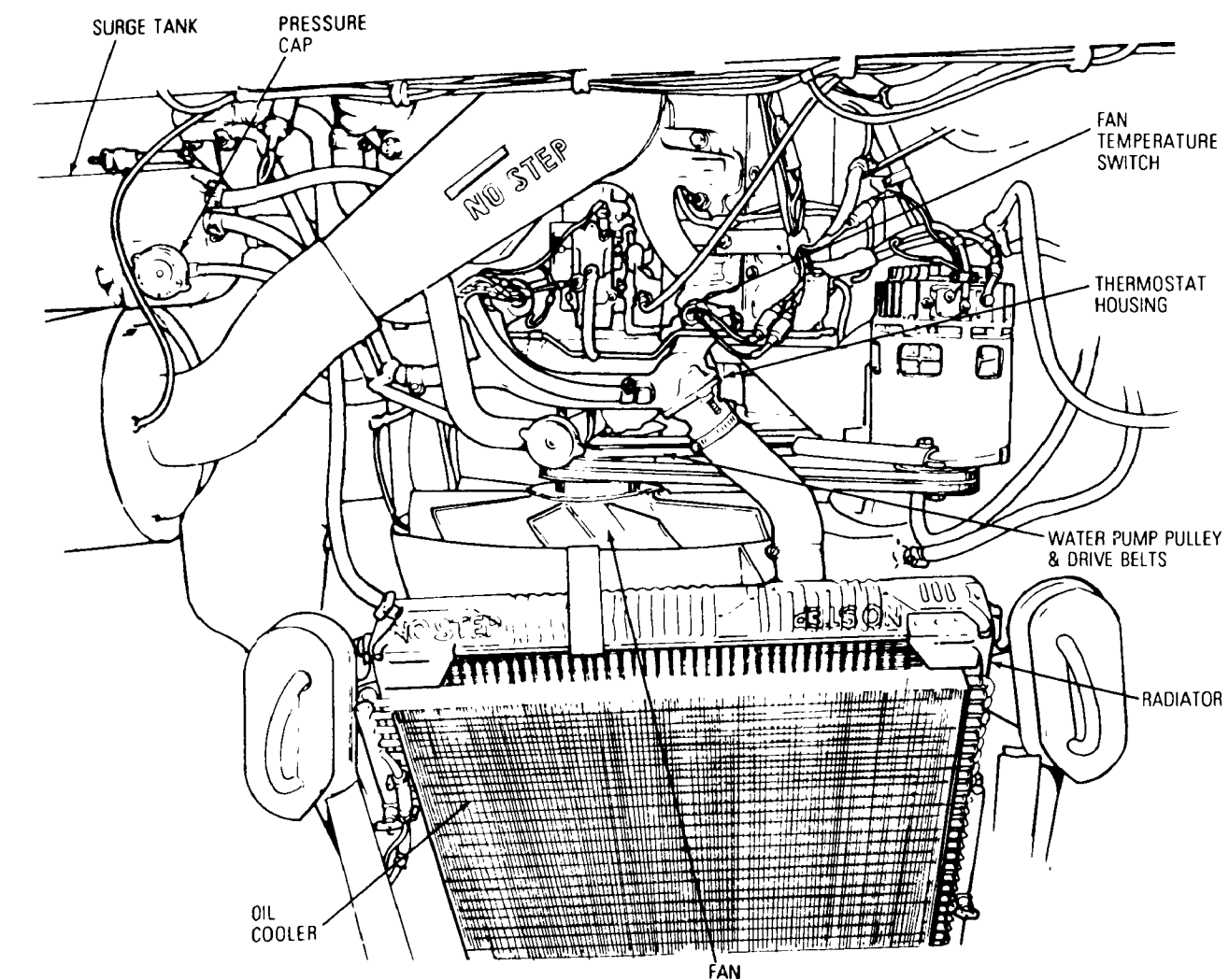
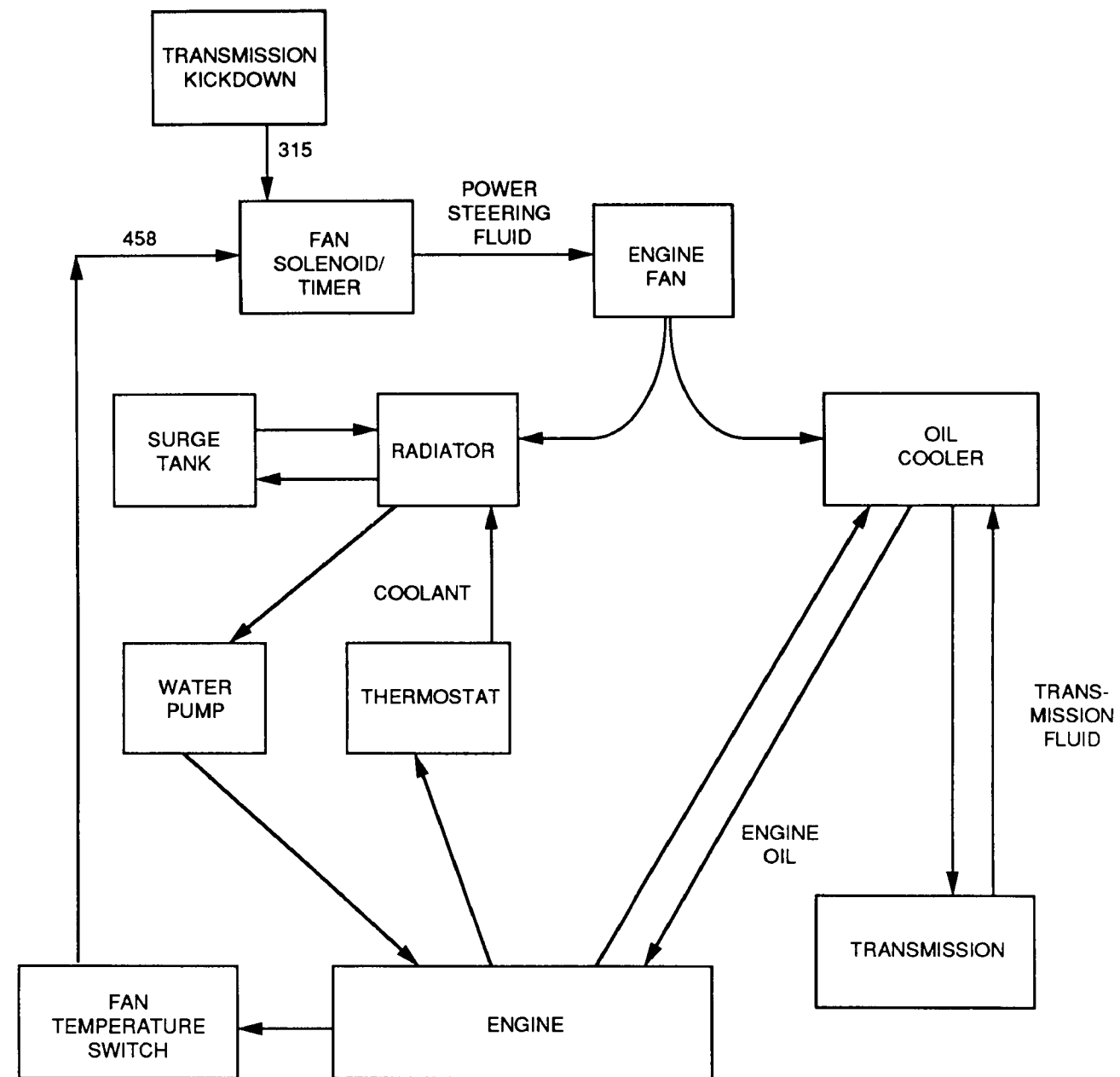
NOT APPLICABLE TO THIS SYSTEM



FO-2 Intake Air/Exhaust Functional Flow and Location of Parts Diagrams
FP-3/(FP-4 Blank)

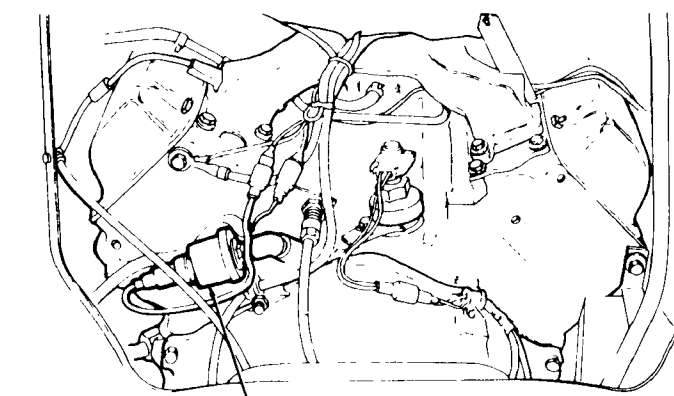
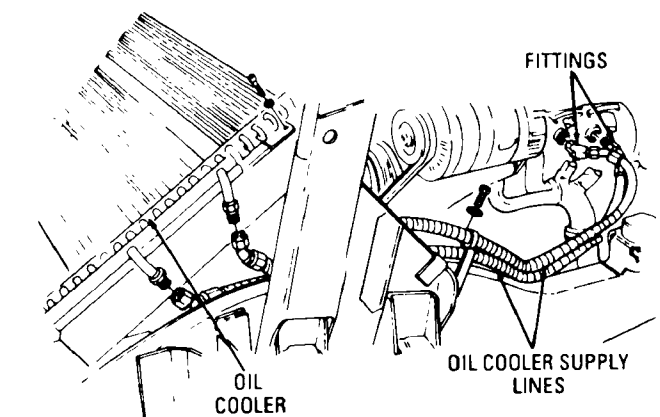
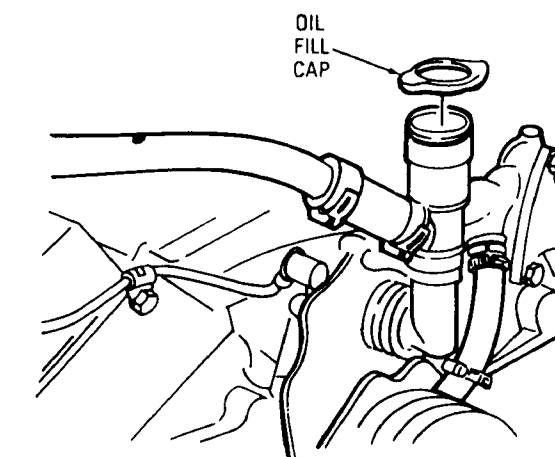
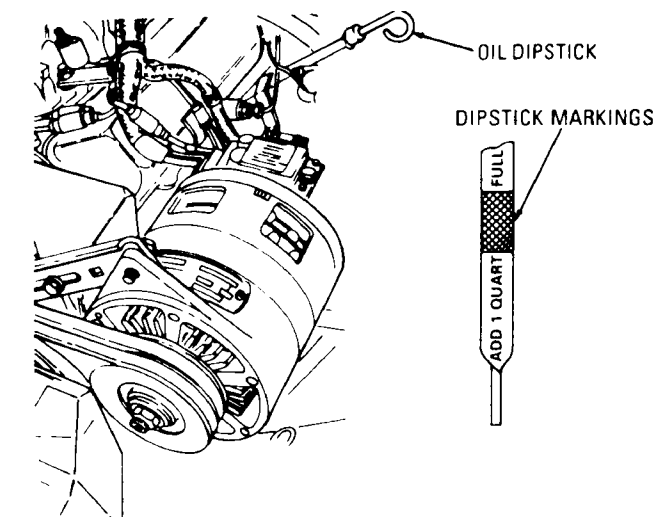
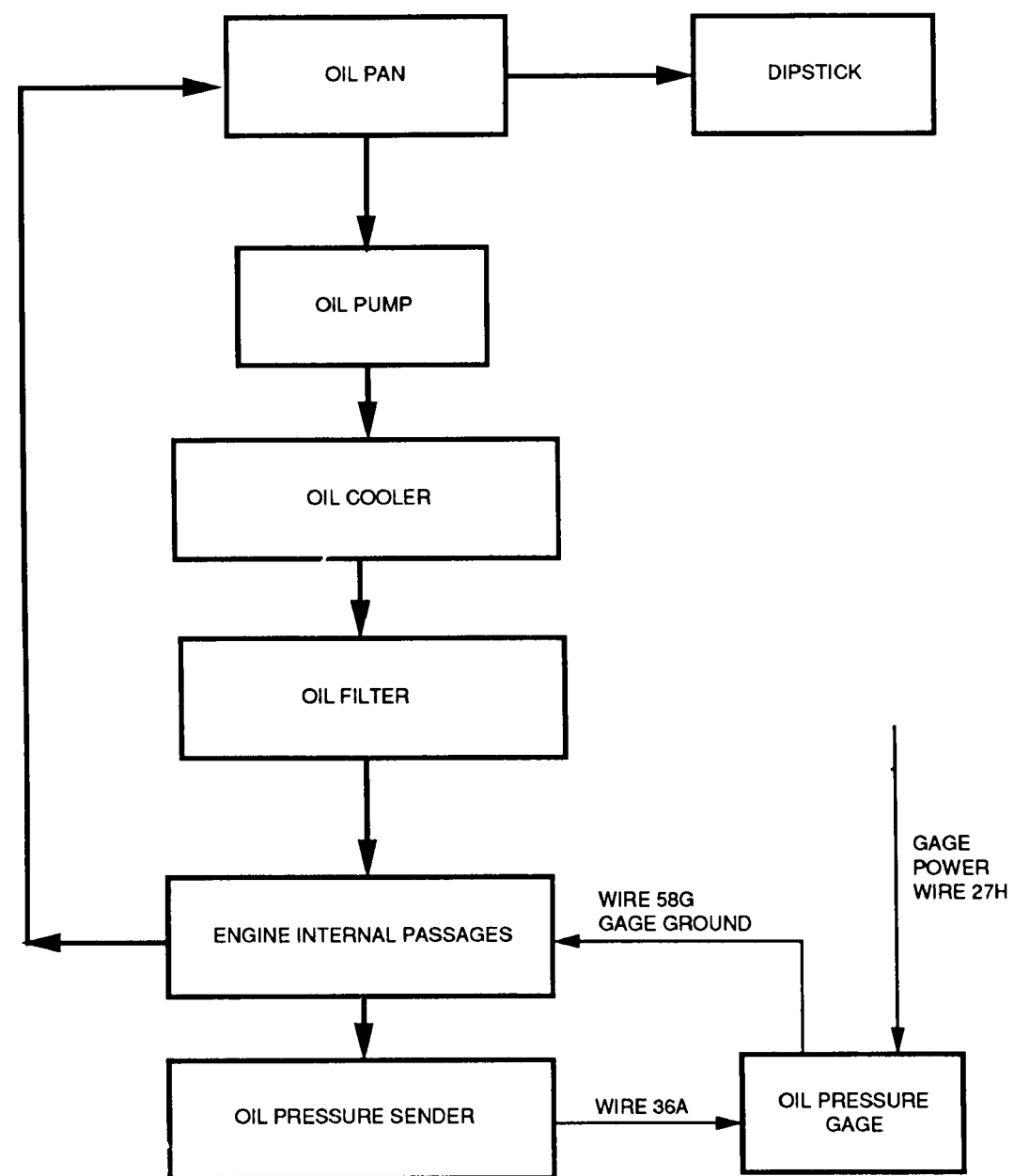


NOT APPLICABLE TO THIS SYSTEM

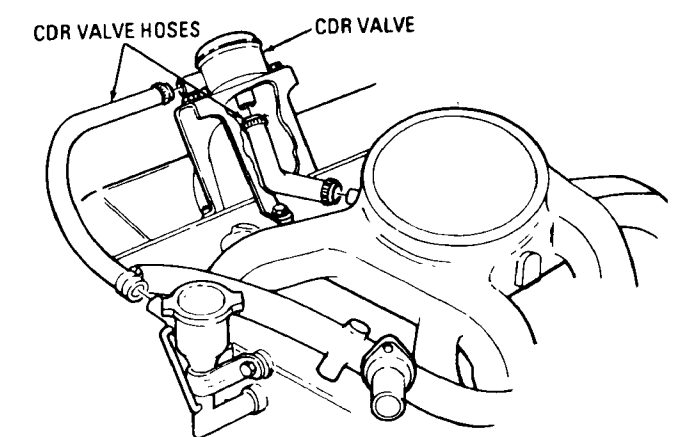
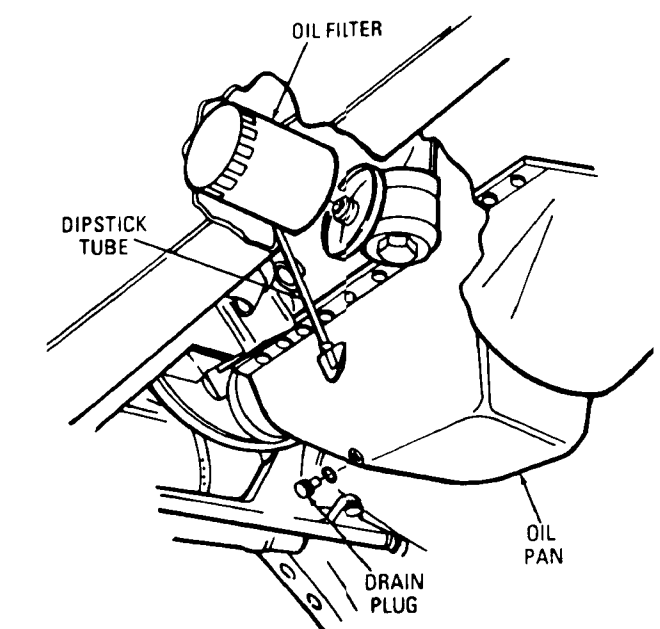


FO-4 Cooling Functional Flow and Location of Parts Diagrams
 FP-7/(FP-8 Blank)

NOTE: HEAVIER LINES INDICATE OIL FLOW AND LIGHTER LINES ARE WIRES

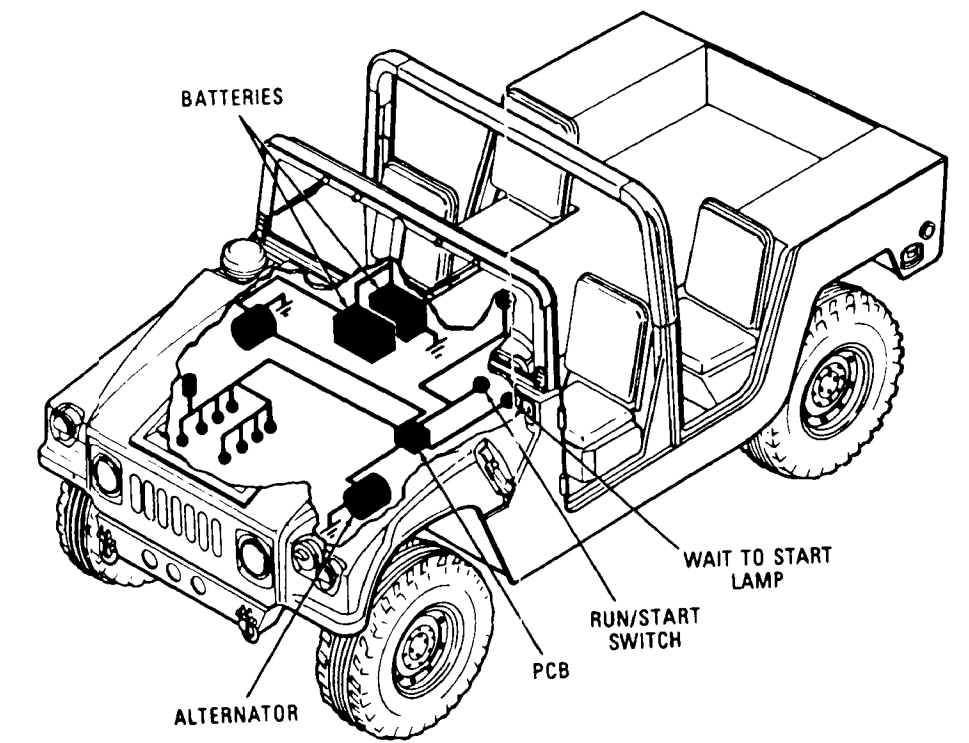
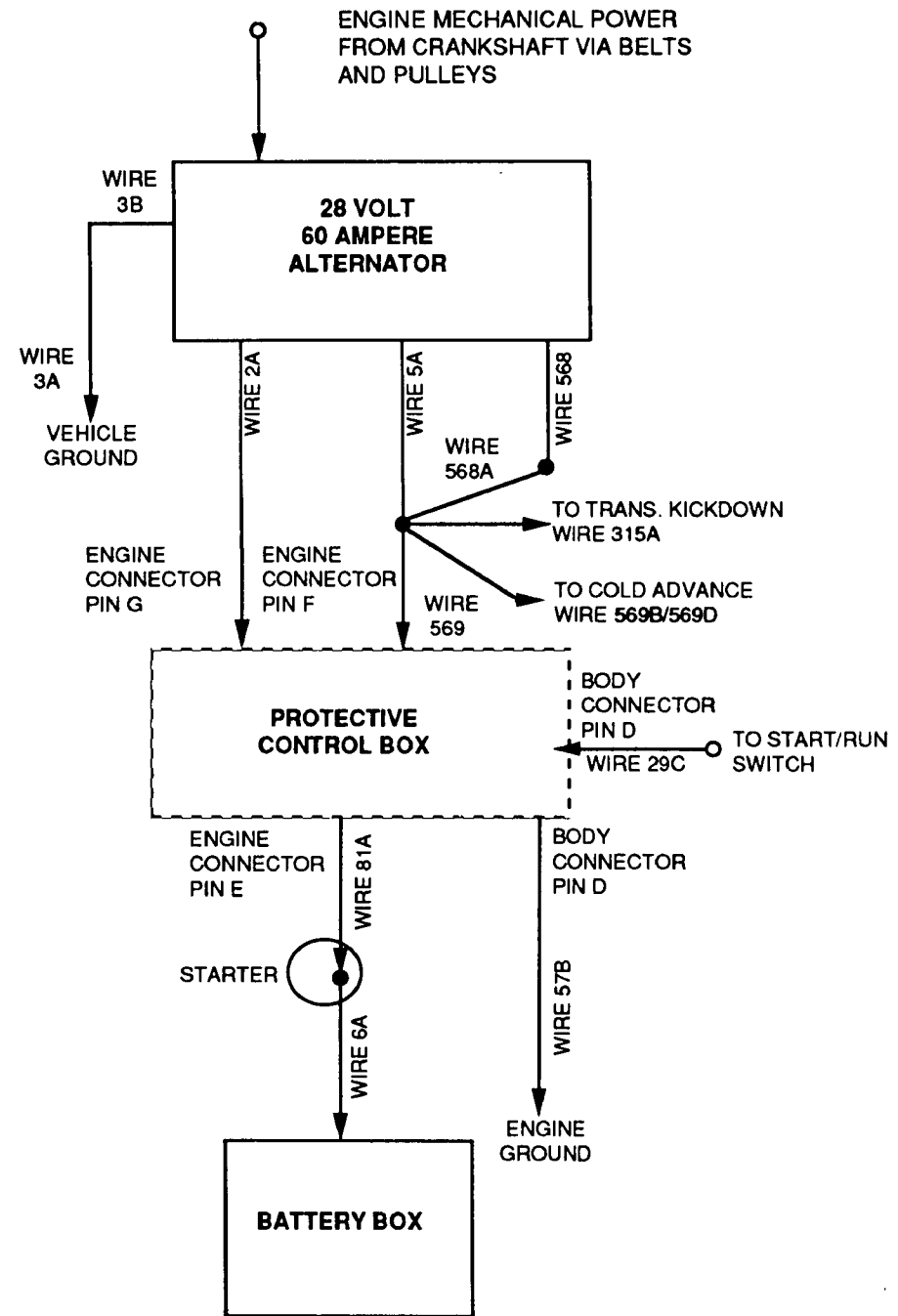


OIL PRESSURE SENDING UNIT

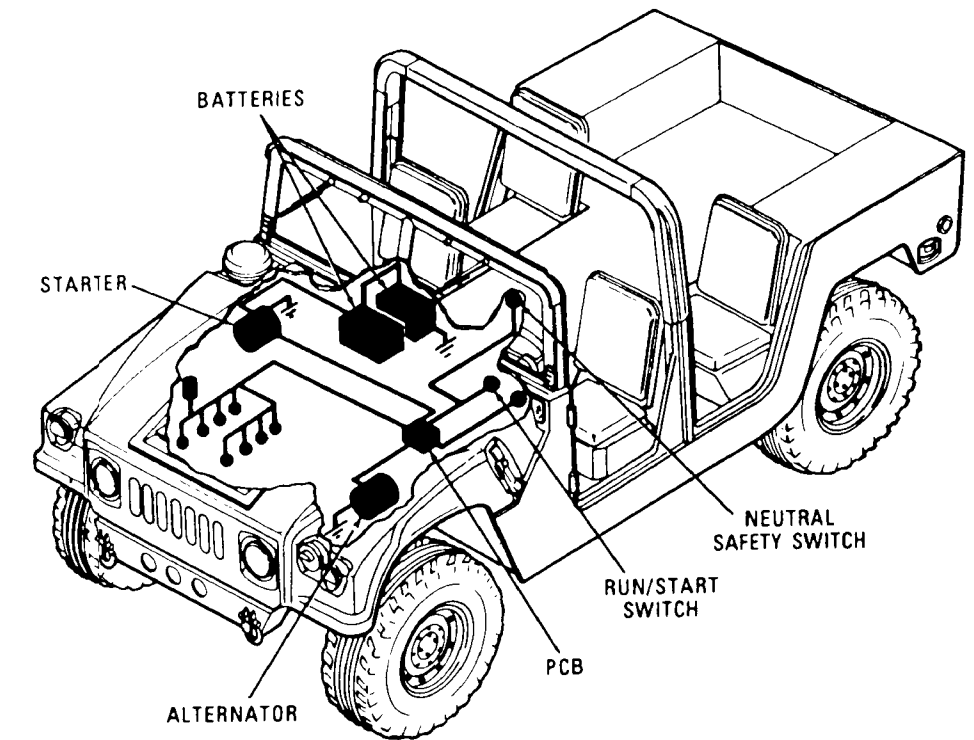
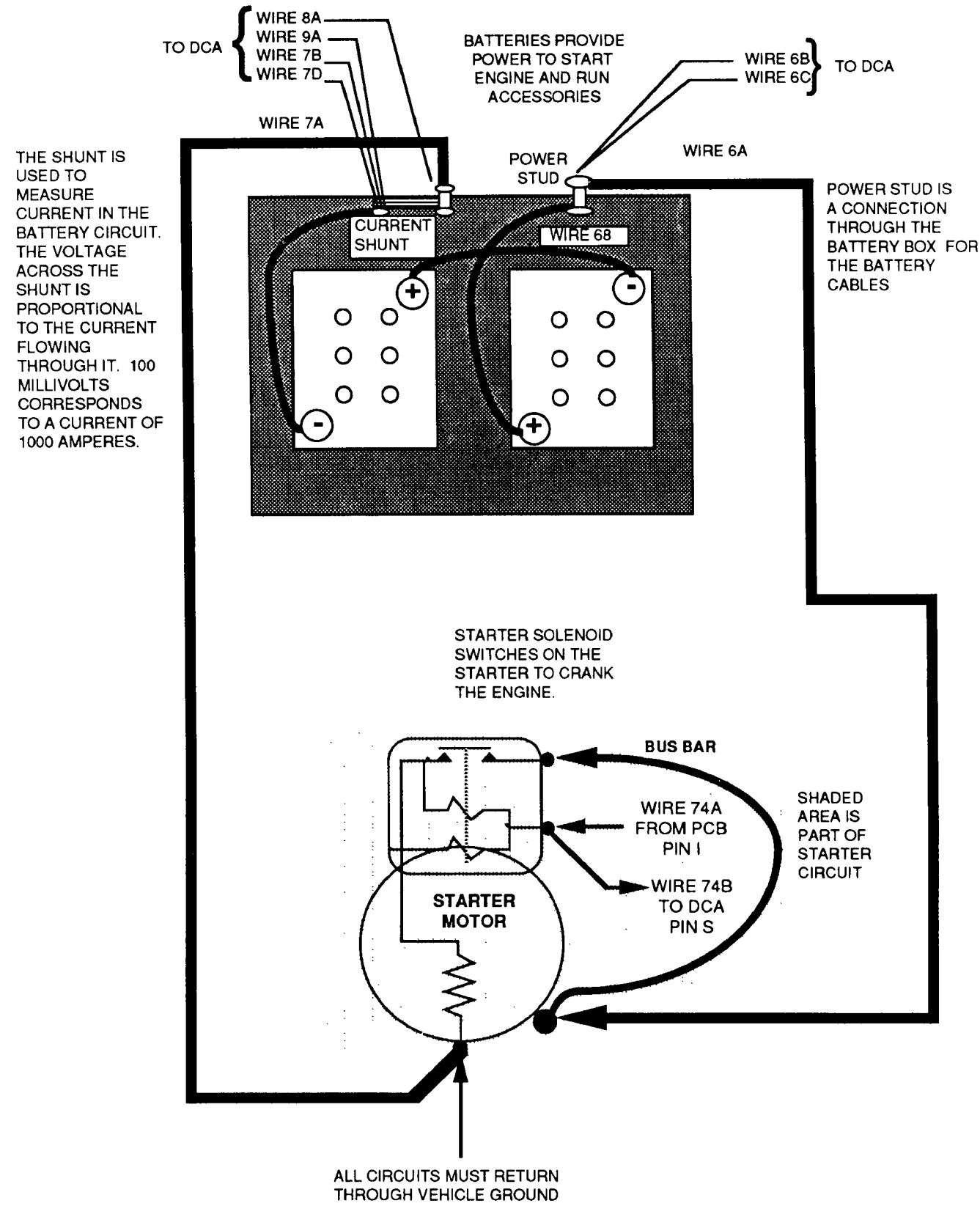


FO-5 Engine Lubrication Functional Flow and Location of Parts Diagrams

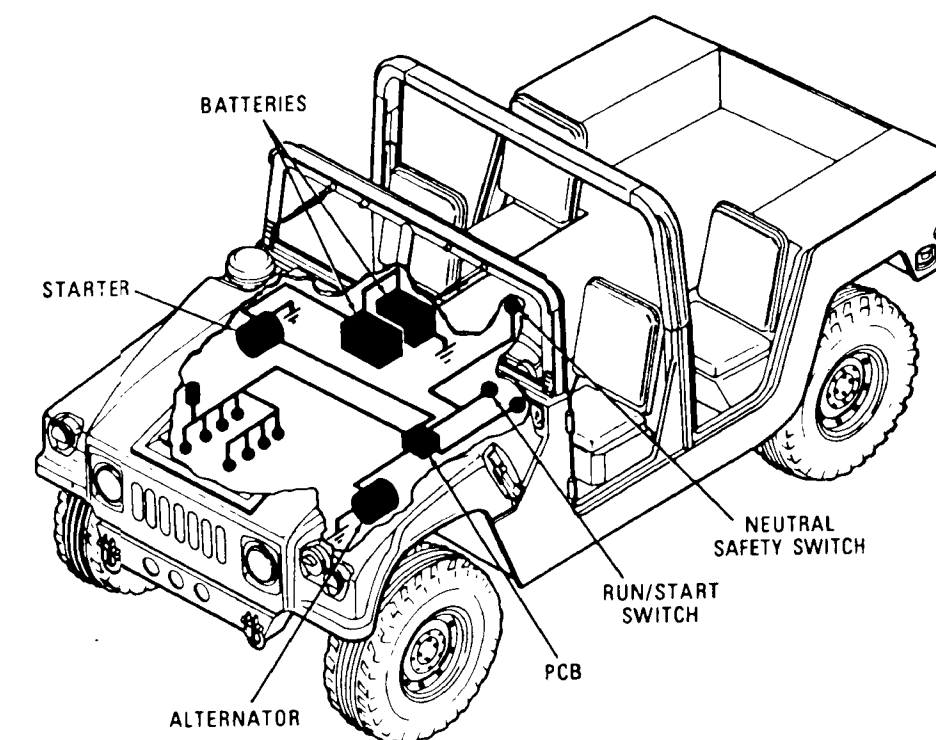
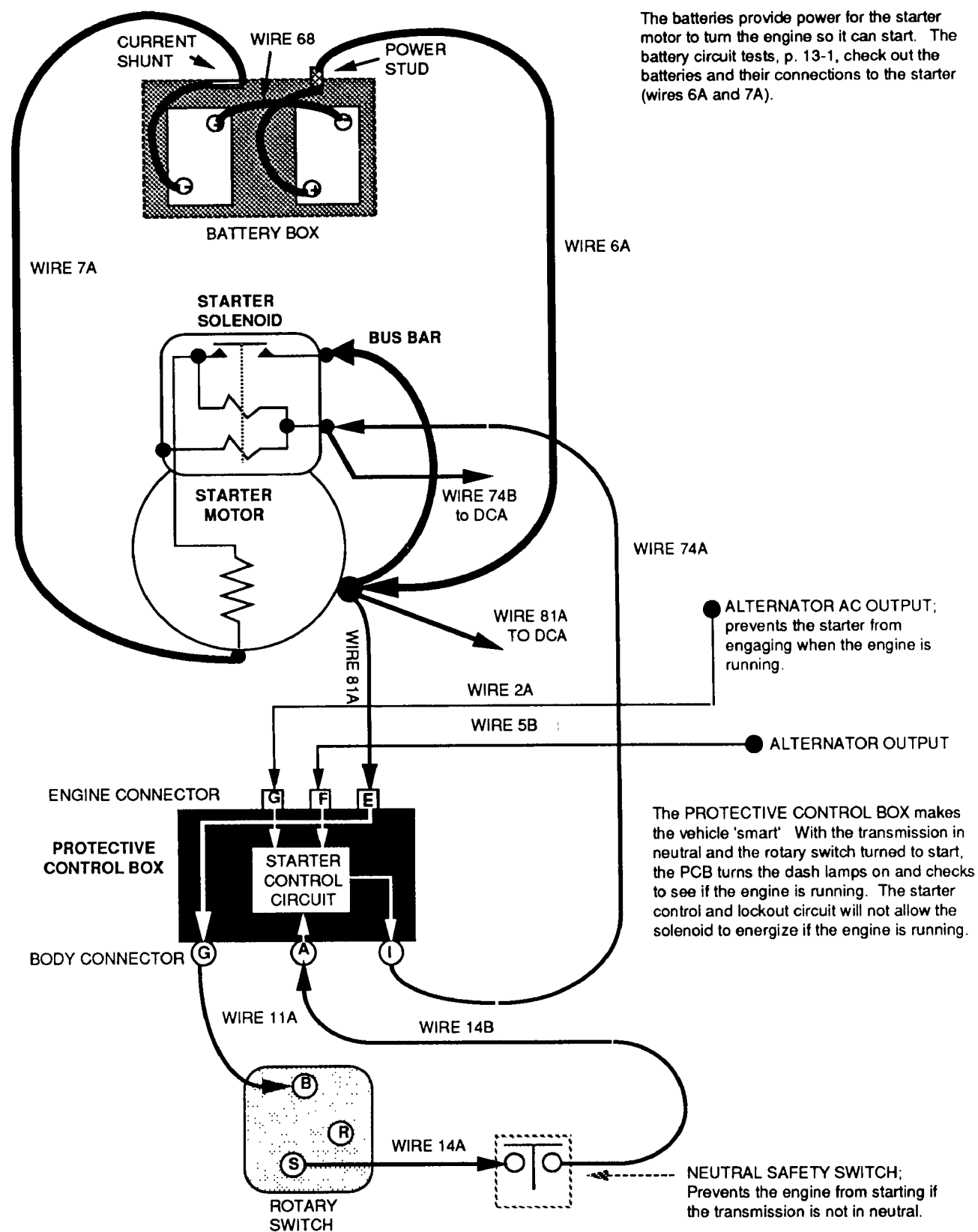
FP-9/(FP-10 Blank)



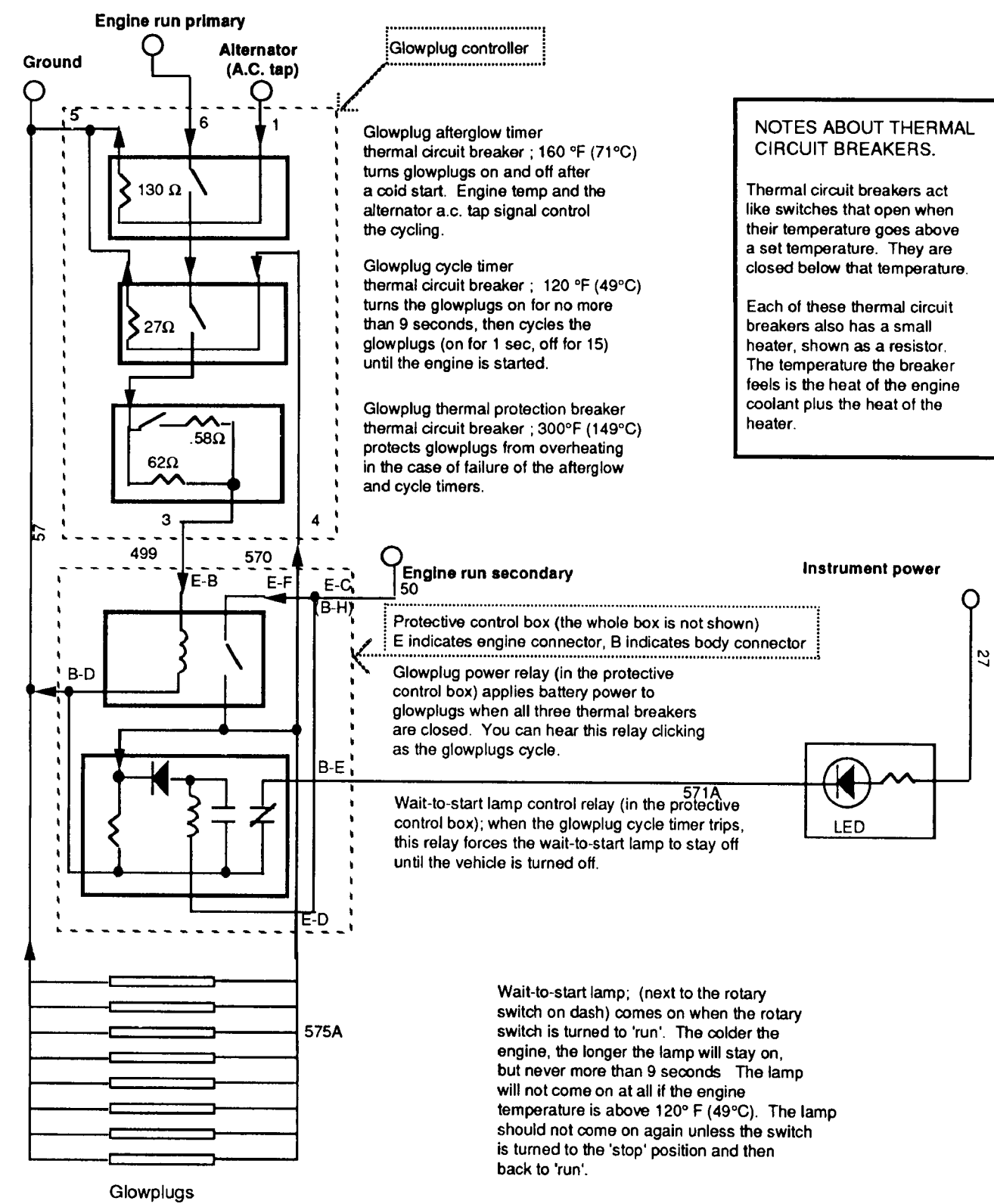
FO-6 Alternator Functional Flow and Location of Parts Diagrams
 FP-11/(FP-12 Blank)



FO-7 Battery Functional Flow and Location of Parts Diagrams
FP-13/(FP-14 Blank)



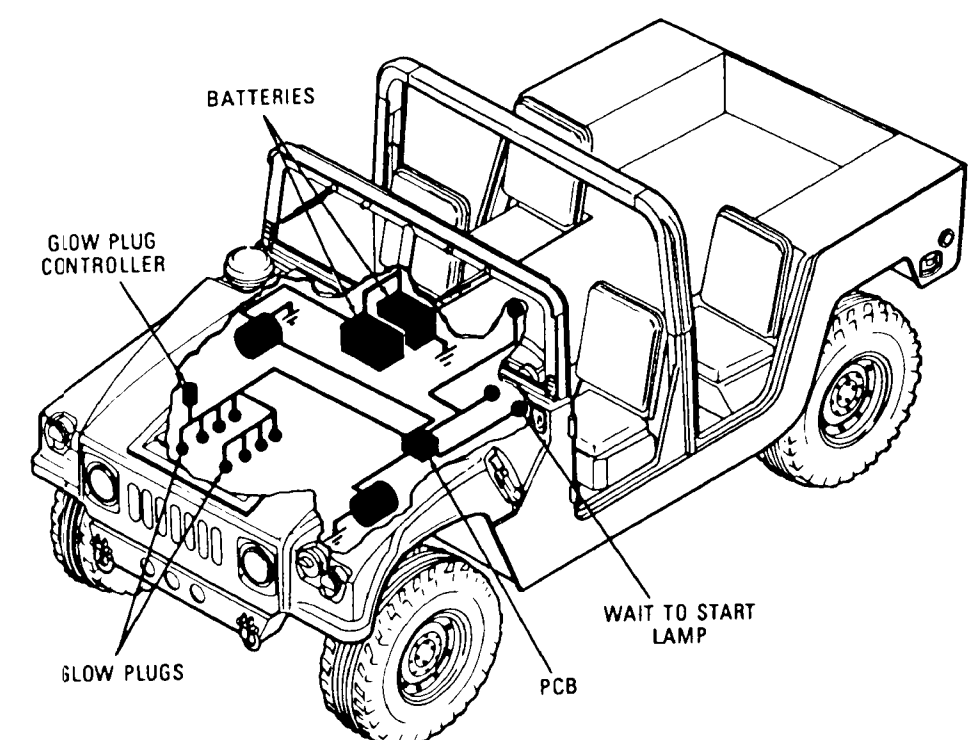
FO-8 Starter Circuit Functional Flow and Location of Parts Diagrams
FP-15/(FP-16 Blank)

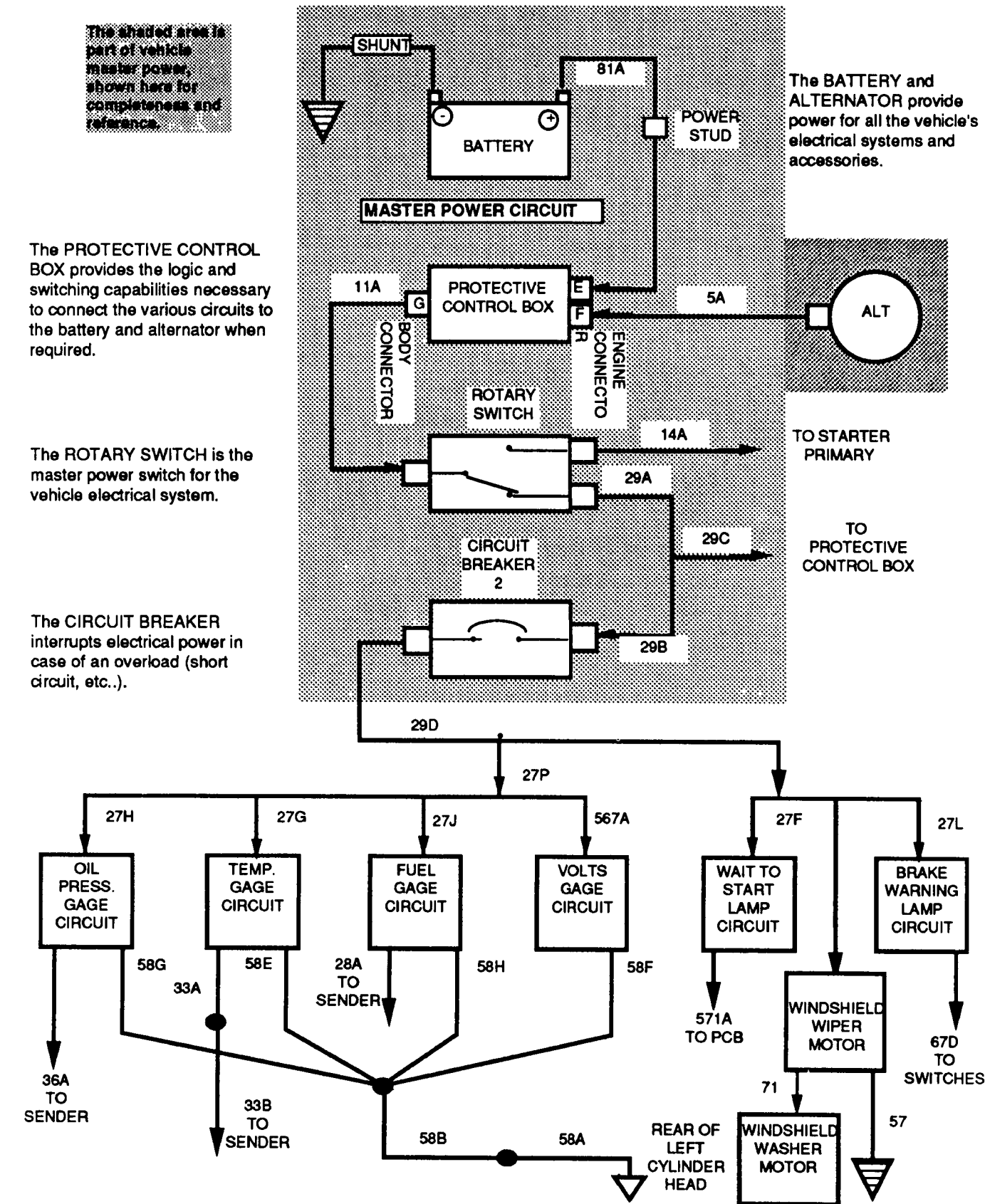


NOTES ABOUT THERMAL CIRCUIT BREAKERS.

Thermal circuit breakers act like switches that open when their temperature goes above a set temperature. They are closed below that temperature.

Each of these thermal circuit breakers also has a small heater, shown as a resistor. The temperature the breaker feels is the heat of the engine coolant plus the heat of the heater.





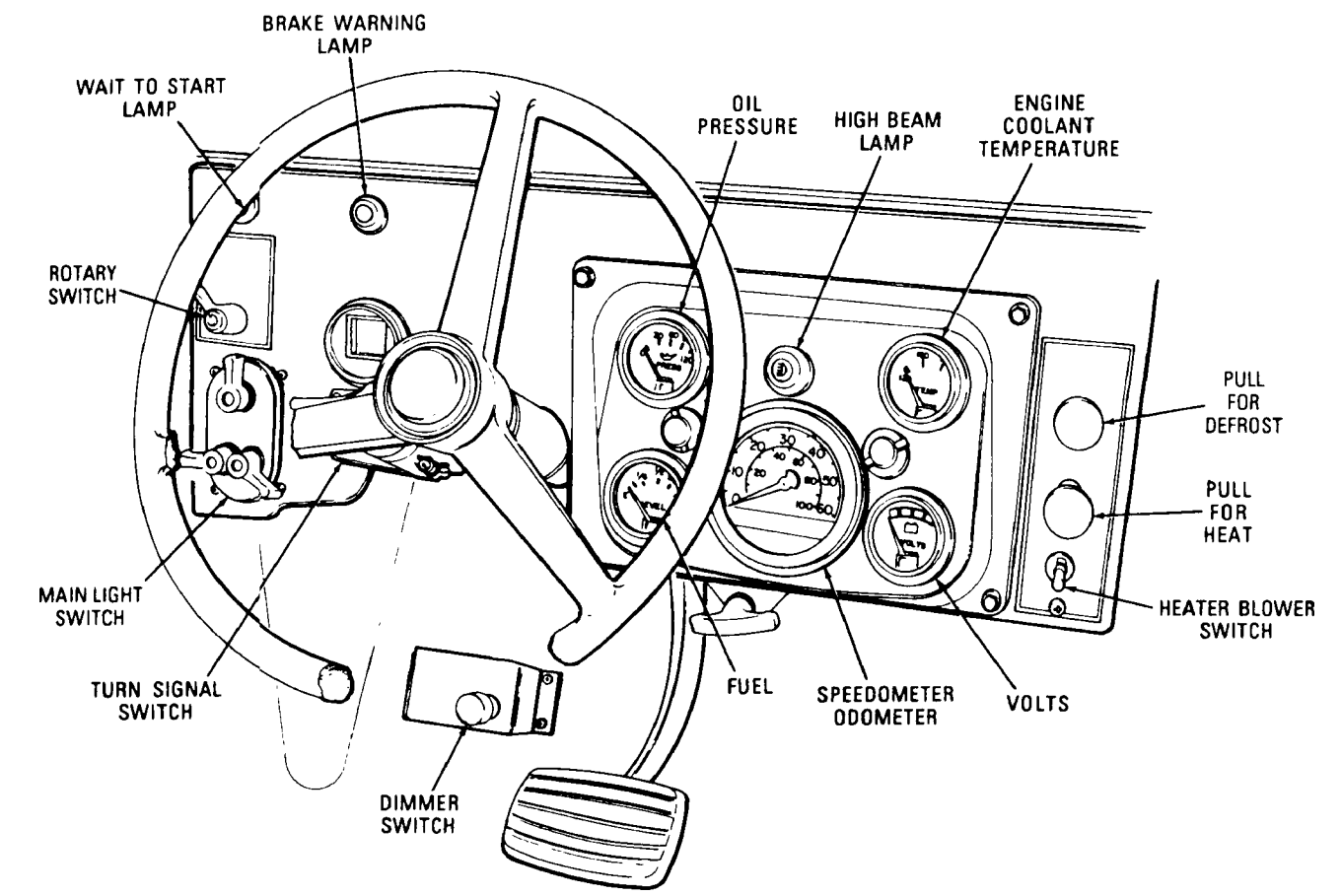
The shaded area is part of vehicle master power, shown here for completeness and reference.

The BATTERY and ALTERNATOR provide power for all the vehicle's electrical systems and accessories.

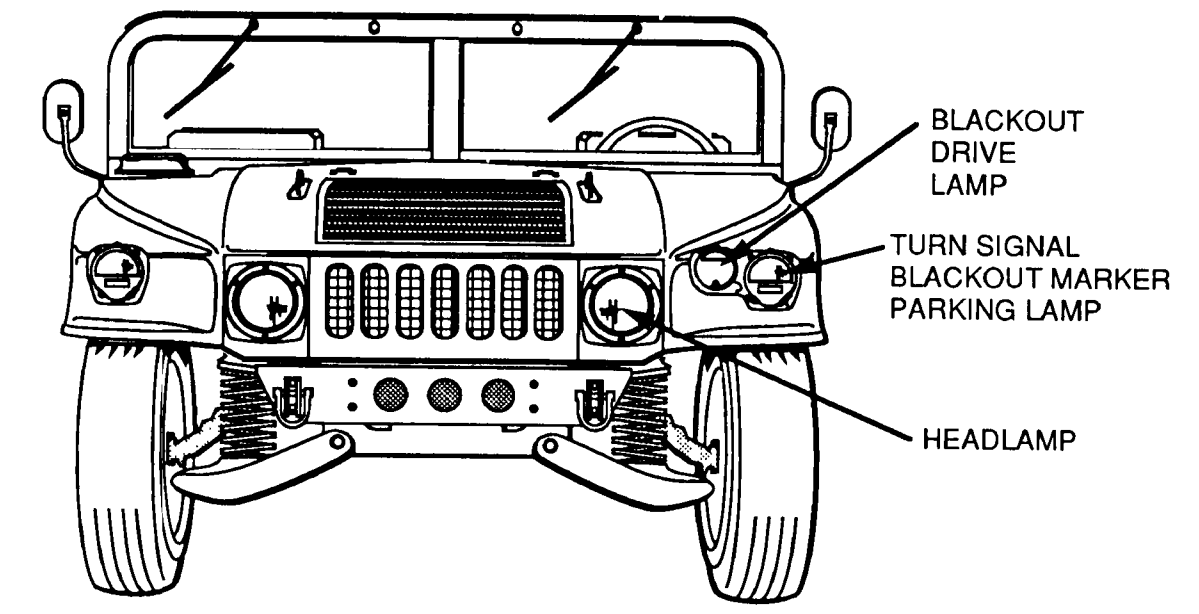
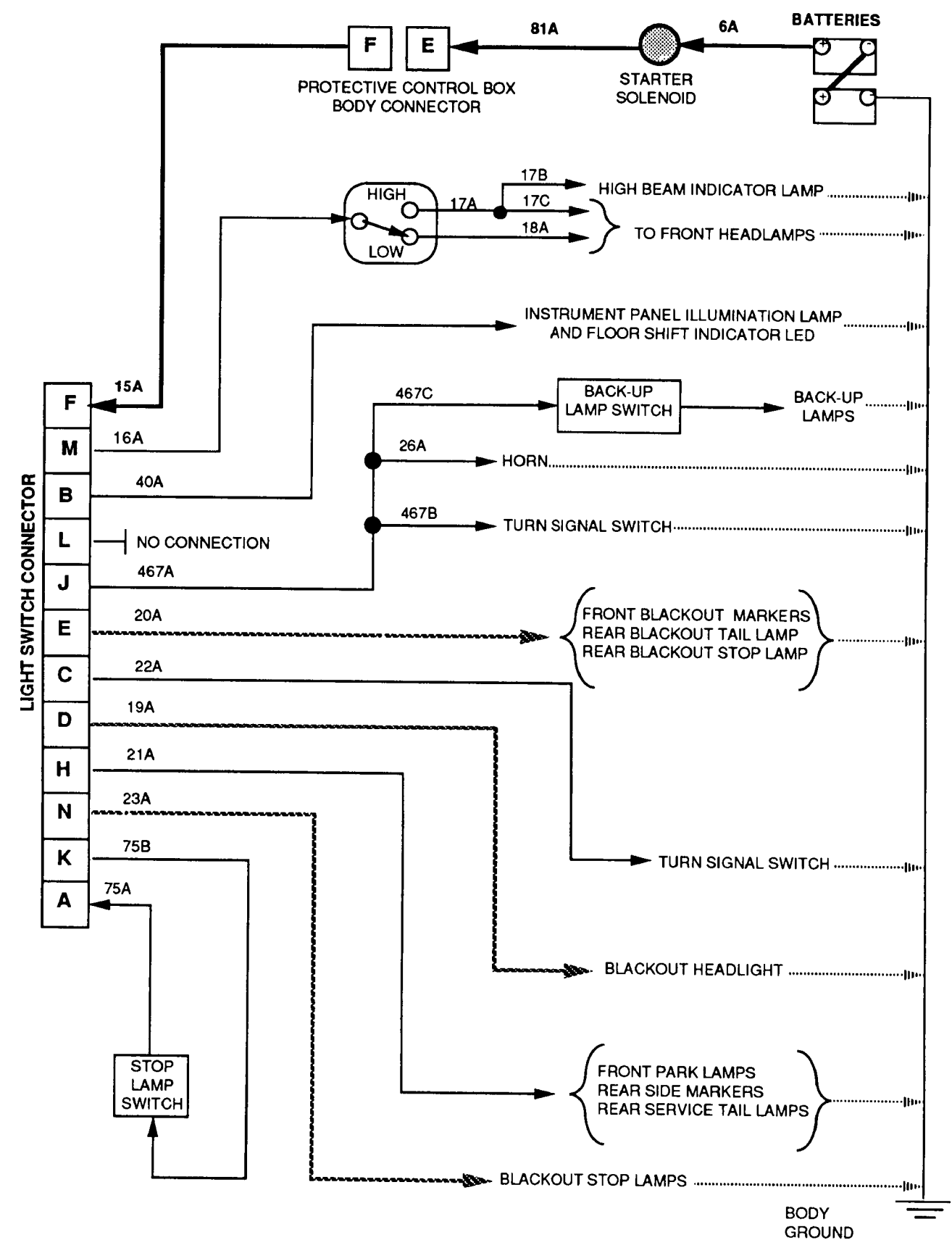
The PROTECTIVE CONTROL BOX provides the logic and switching capabilities necessary to connect the various circuits to the battery and alternator when required.

The ROTARY SWITCH is the master power switch for the vehicle electrical system.

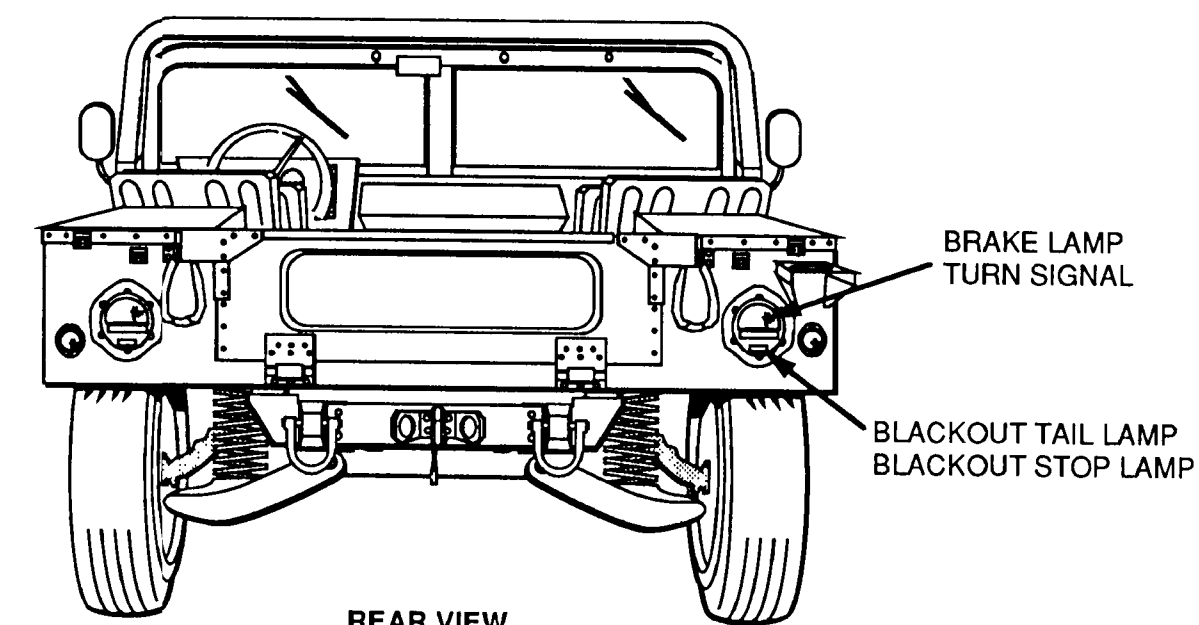
The CIRCUIT BREAKER interrupts electrical power in case of an overload (short circuit, etc.).



FO-10 Instruments Functional Flow and Location of Parts Diagrams
FP-19/(FP-20 Blank)

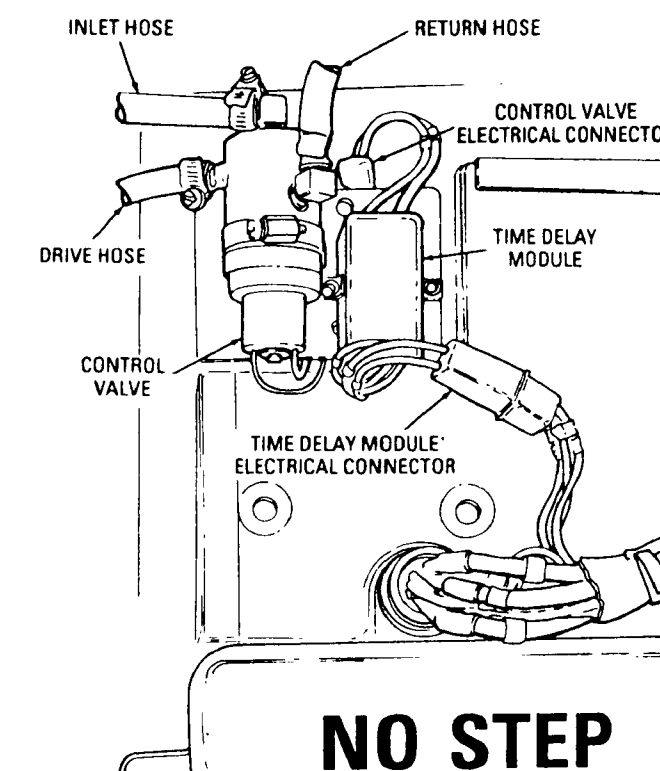
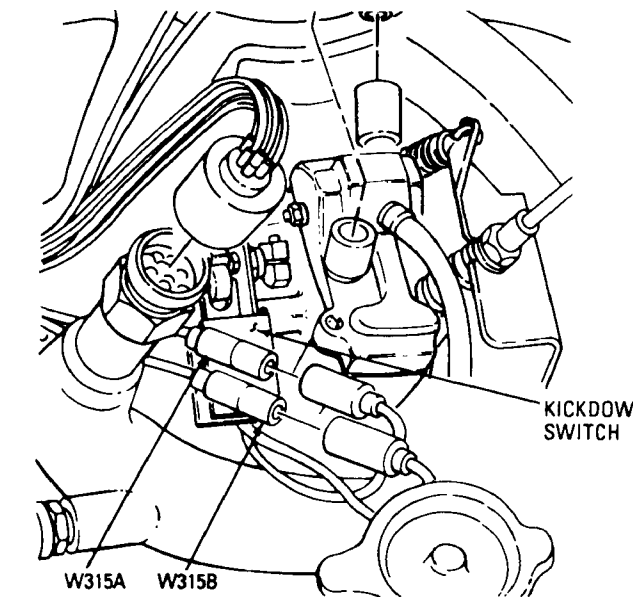
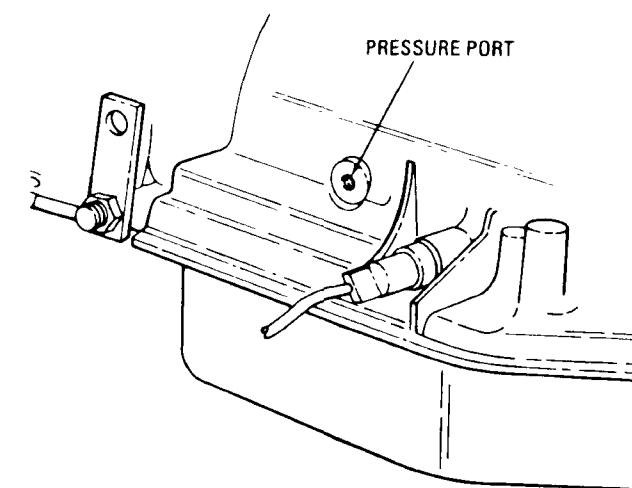
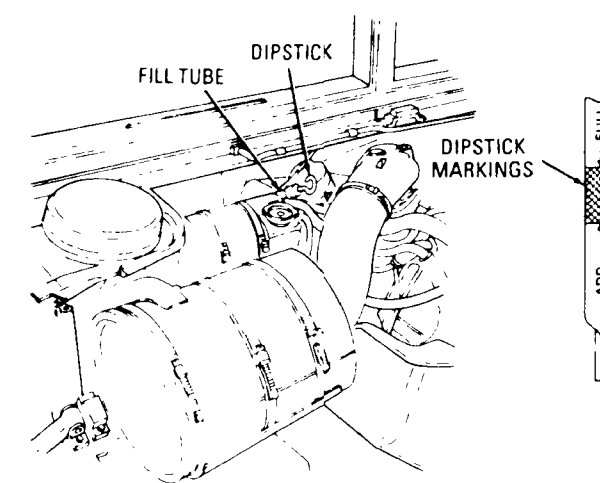
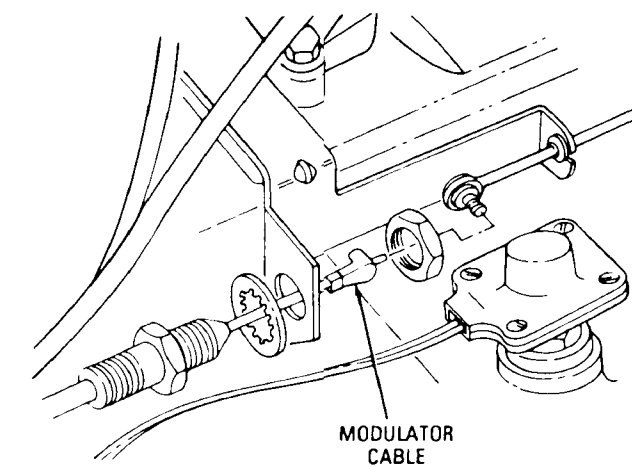
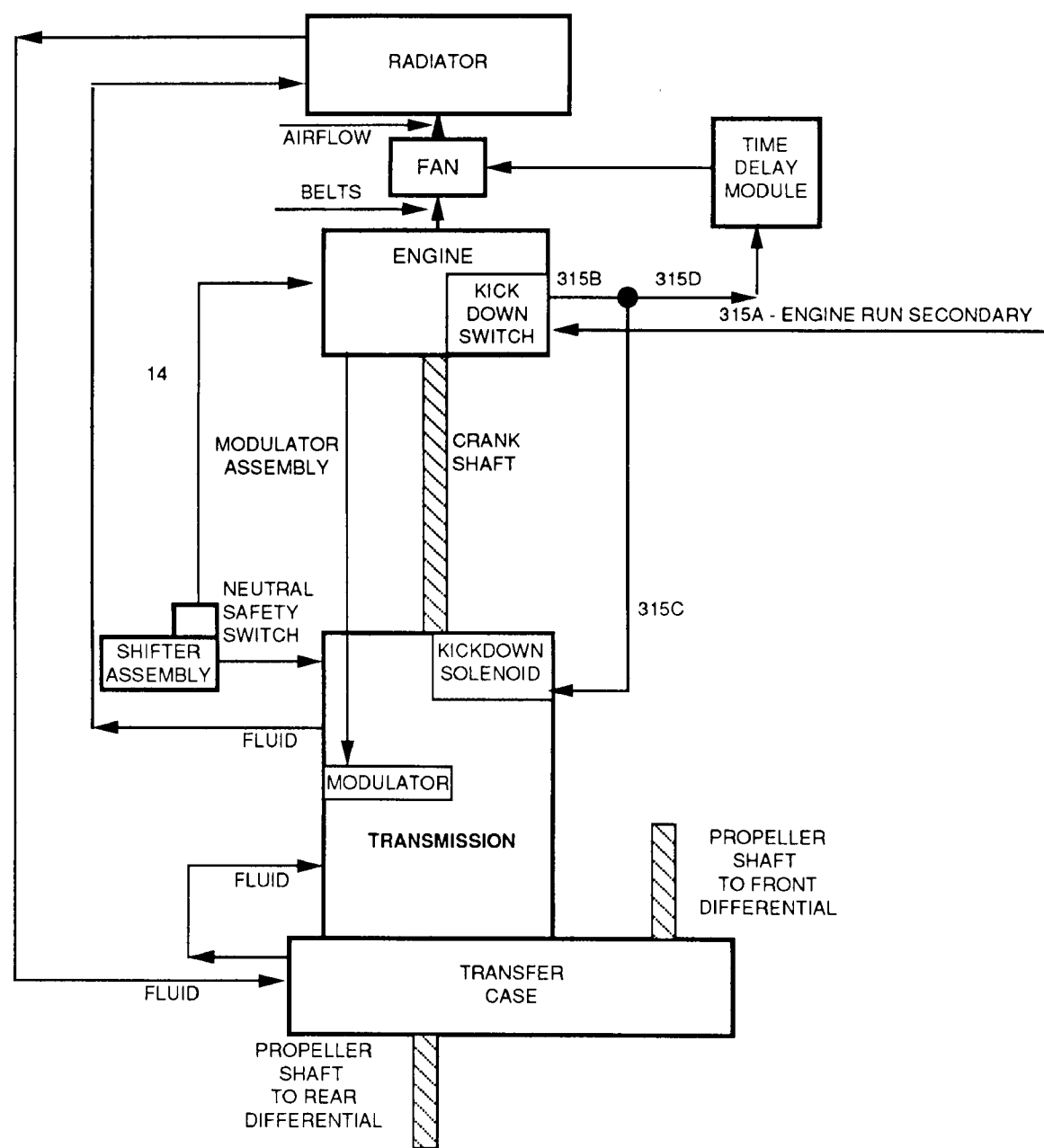


FRONT VIEW

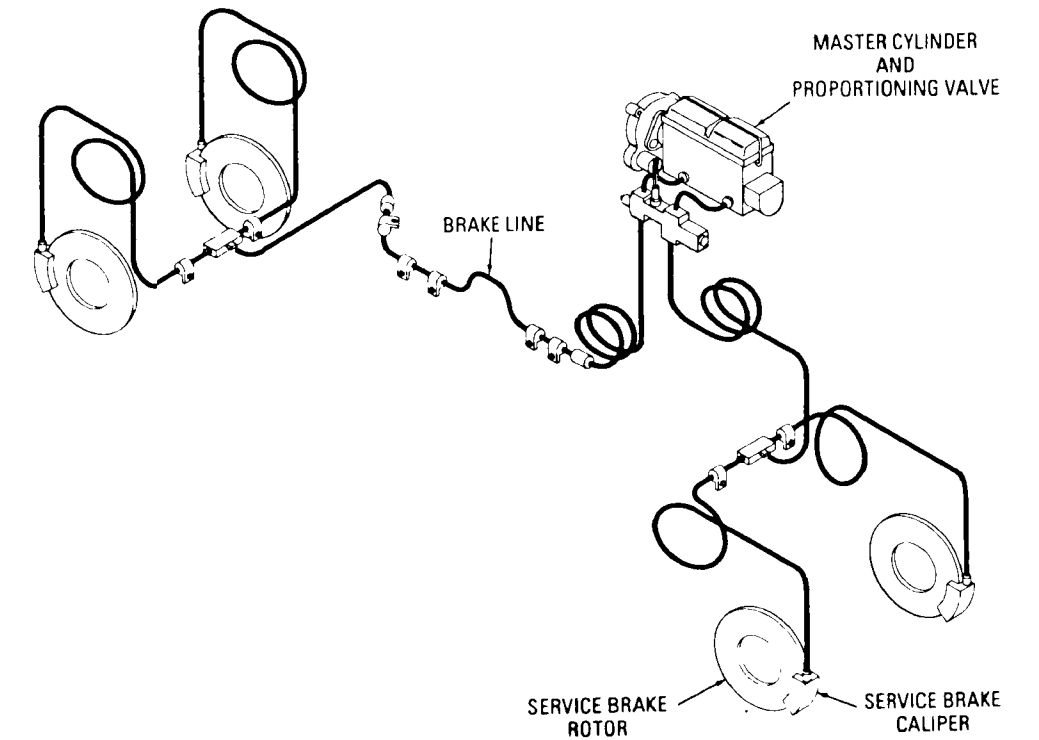
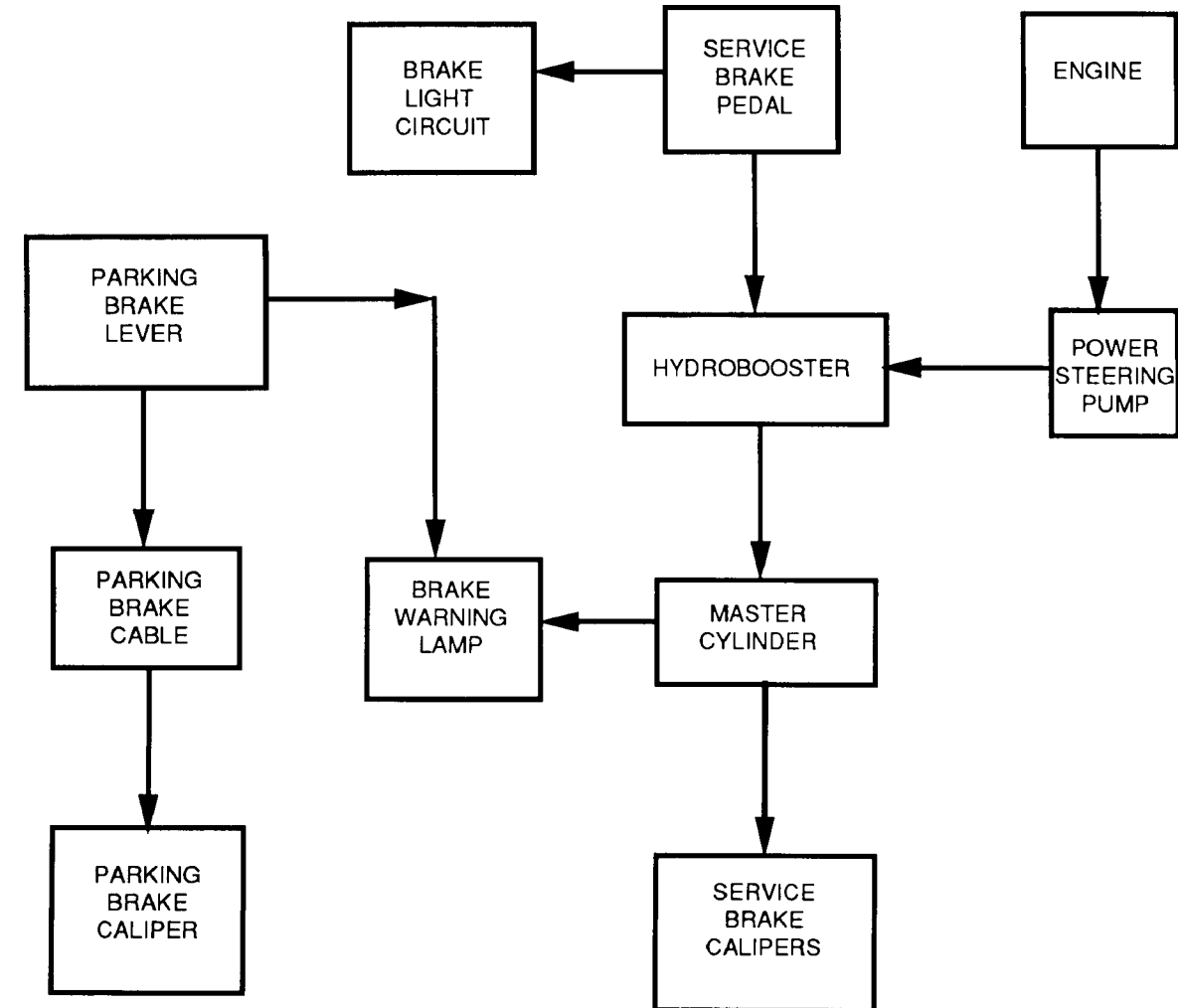


REAR VIEW

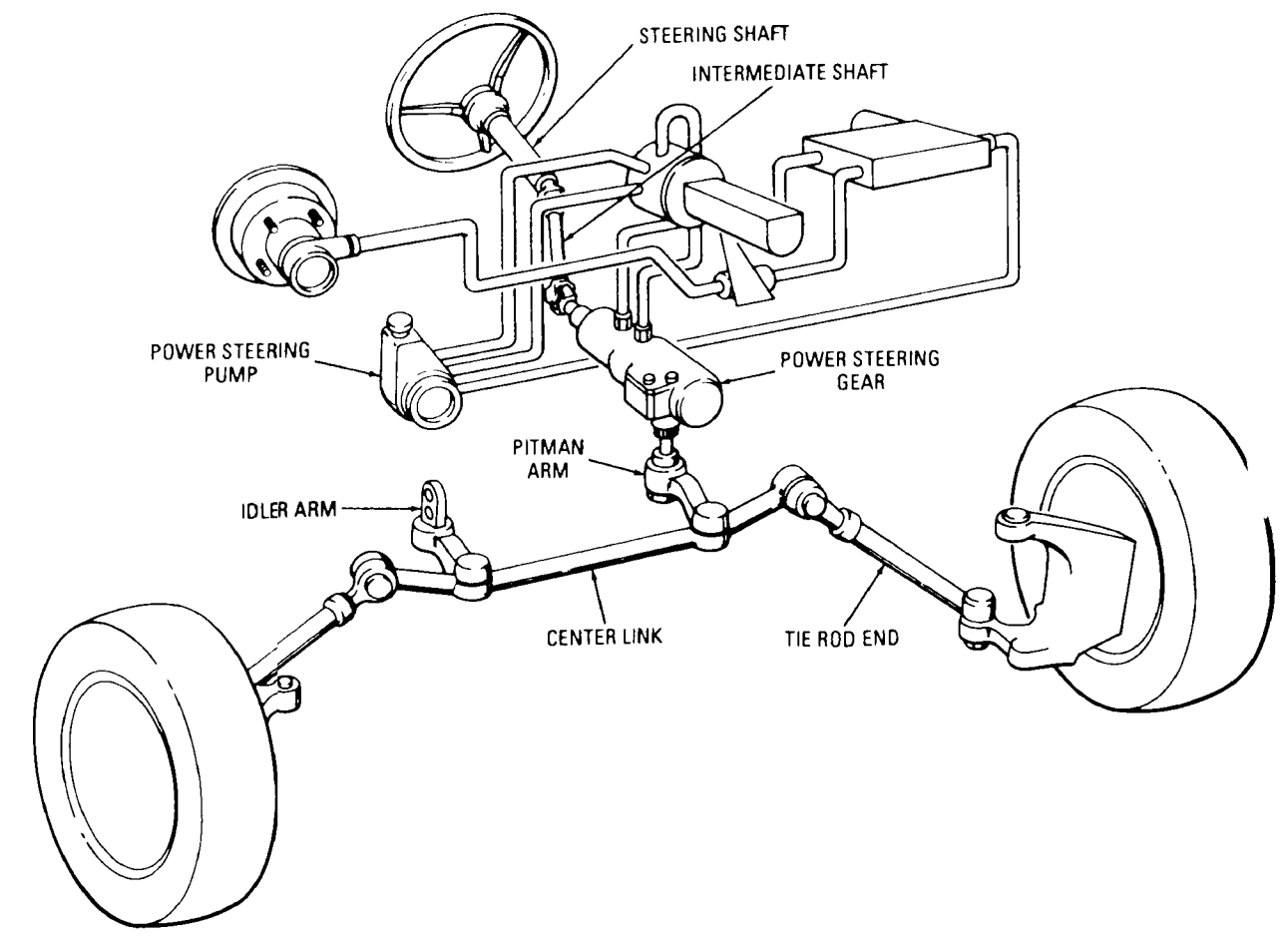
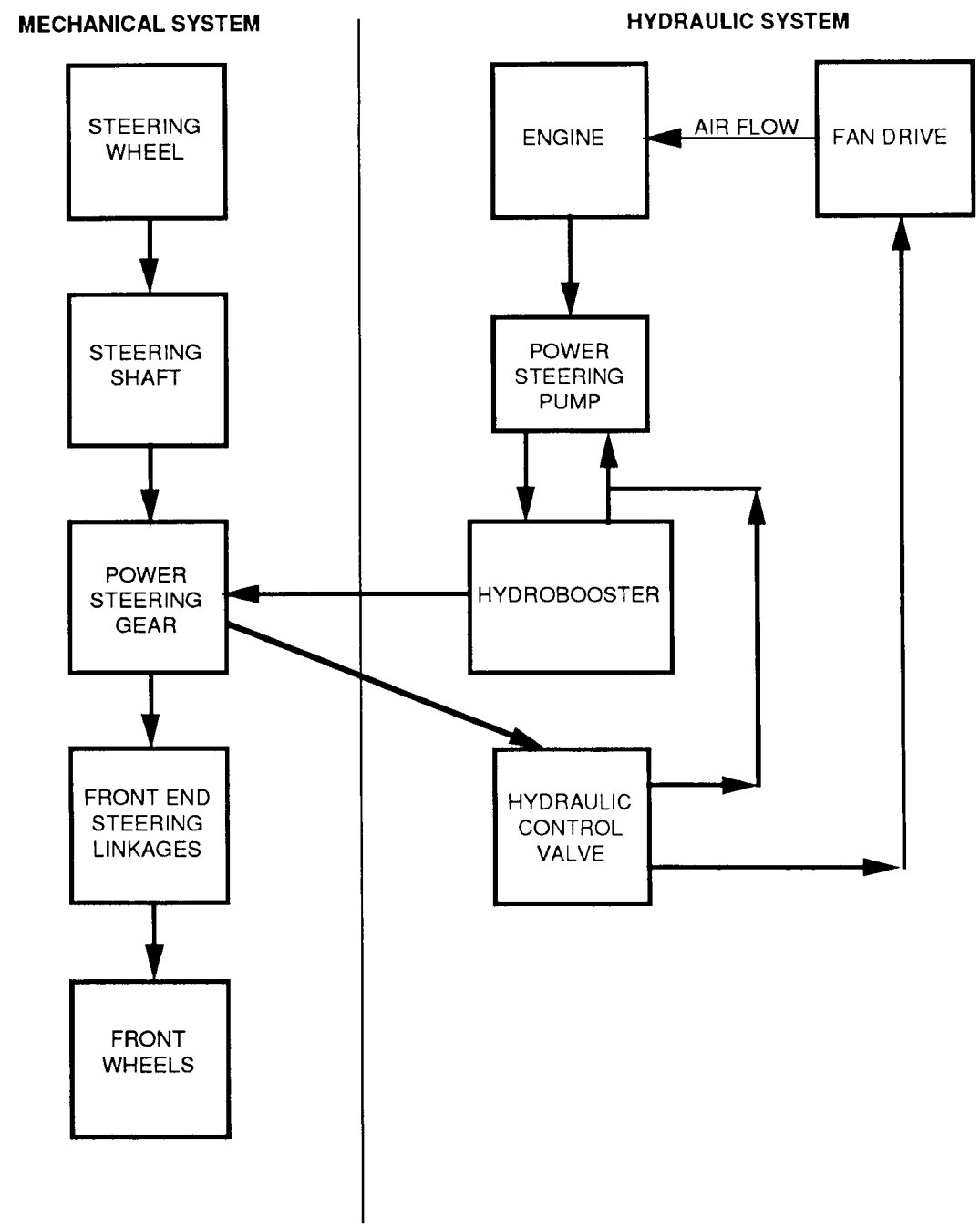
FO-11 Lights Functional Flow and Location of Parts Diagrams
FP-21/(FP-22 Blank)



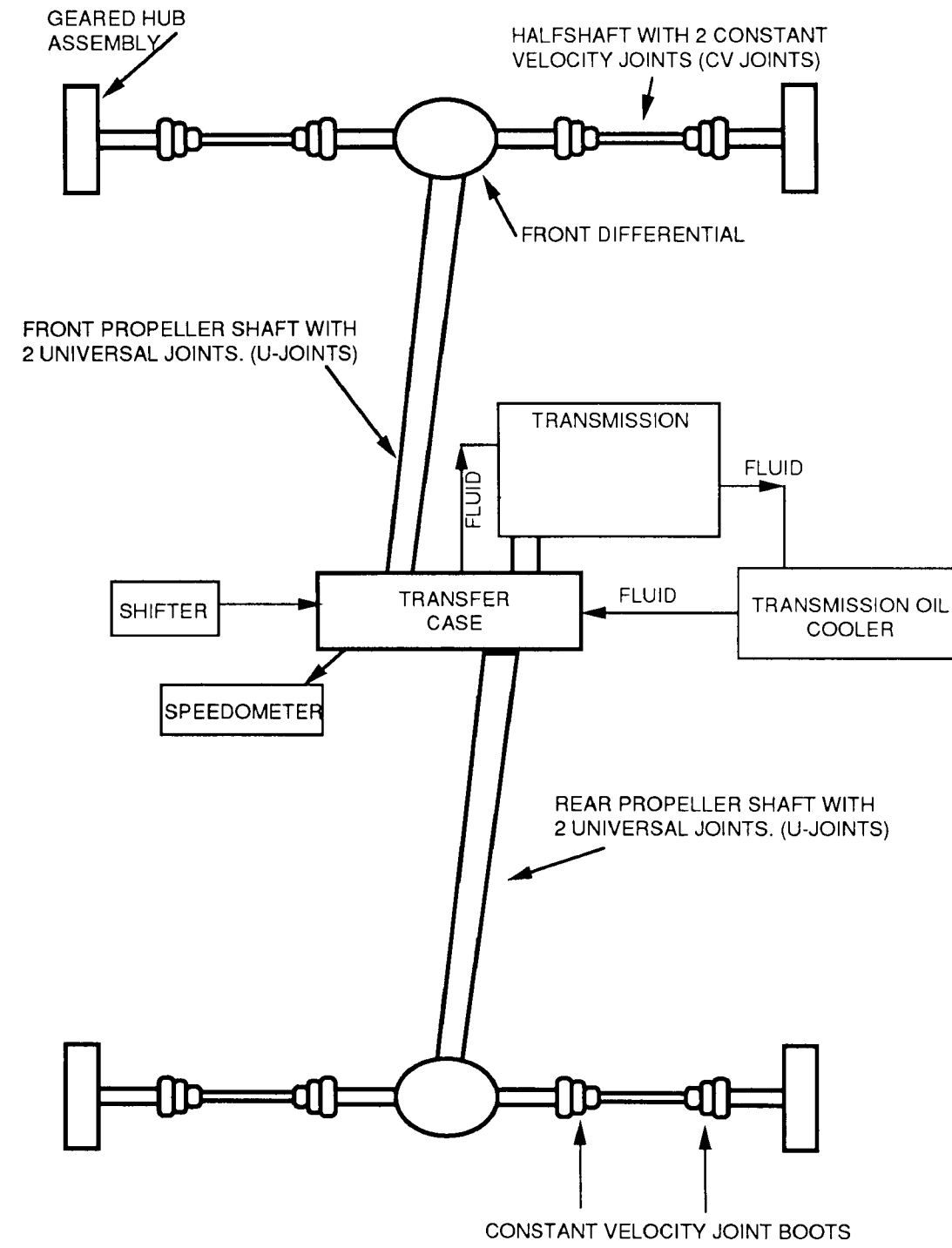
FO-12 Transmission Functional Flow and Location of Parts Diagrams
FP-23/(FP-24 Blank)



FO-13 Brakes Functional Flow and Location of Parts Diagrams
FP-25/(FP-26 Blank)



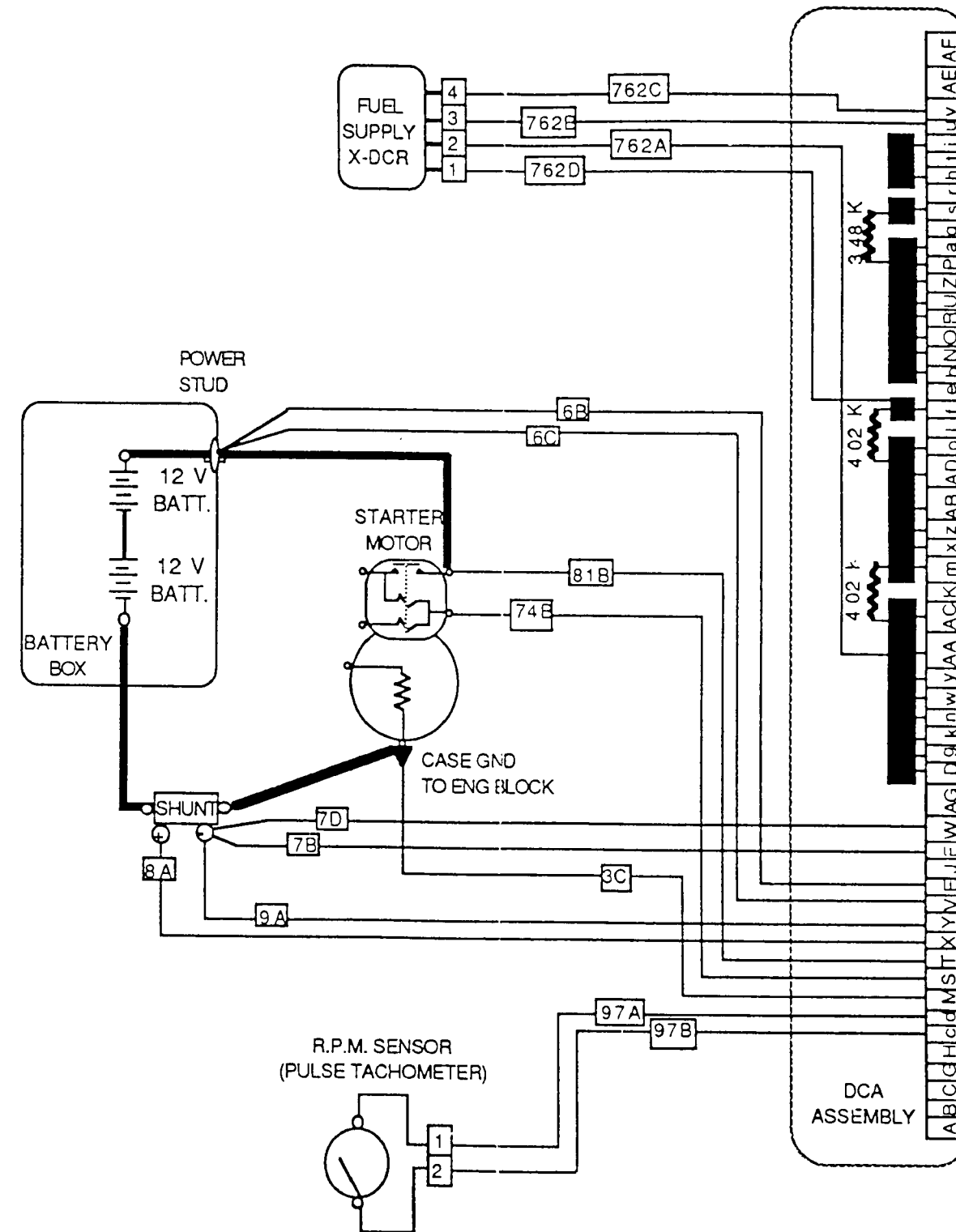
FO-14 Steering Functional Flow and Location of Parts Diagrams
 FP-27/(FP-28 Blank)



NOT APPLICABLE TO THIS SYSTEM

DCA TO TK CROSS REFERENCE

This table assumes that the VTM is powered by the W5 cable. For additional information on any of these tests, see Chapter 23 or TM 9-4910-571-12&P. Tests 72,73,74, and 75 are known as a first peak series, and data for all four of these tests is taken simultaneously.



DCA TEST	PARAMETER	USE TK ITEM	TEST NO.	MEASUREMENT POINTS
10	RPM	34-PULSE TACH. WITH A W4 CABLE	10	PUT IN PLACE OF VEHICLE TACH.
12	POWER (RPM/SEC)	34-PULSE TACH. WITH A W4 CABLE	12	PUT IN PLACE OF VEHICLE TACH.
13	POWER (PERCENT)	34-PULSE TACH. WITH A W4 CABLE	13	PUT IN PLACE OF VEHICLE TACH.
14	COMPRESSION UNBALANCE	NONE REQUIRED	14	VTM TAKES DATA THROUGH W5 (POWER) CABLE
24	FUEL PRESSURE	22-RED PRESSURE TRANSDUCER	49	INSTALL IN PLACE OF VEHICLE FUEL PRESSURE TRANSDUCER.
67	BATTERY VOLTAGE	NONE REQUIRED	67	VTM TAKES DATA THROUGH W5 (POWER) CABLE
68	STARTER MOTOR VOLTS	W2 CABLE	89	ATTACH RED CLIP TO STARTER POSITIVE TERMINAL (WIRE 6A),BLACK TO BATTERY SIDE OF SHUNT
69	STARTER NEG. CABLE DROP	W2 CABLE	89	ATTACH RED CLIP TO STARTER GROUND TERMINAL (WIRE 7A),BLACK TO BATTERY SIDE OF SHUNT
70	STARTER SOL. VOLTS	W2 CABLE	89	ATTACH RED CLIP TO STARTER SOLENOID TERMINAL (WIRE 74A),BLACK TO STARTER GROUND TERMINAL
71	STARTER CURRENT	11- CURRENT PROBE	90	PUT PROBE AROUND NEGATIVE BATTERY CABLE BETWEEN THE SHUNT AND THE BATTERY PACK.
72	CURRENT FIRST PEAK	11- CURRENT PROBE	72	PUT PROBE AROUND NEGATIVE BATTERY CABLE BETWEEN THE SHUNT AND THE BATTERY PACK.
73	BATTERY RESISTANCE	11- CURRENT PROBE	73	PUT PROBE AROUND NEGATIVE BATTERY CABLE BETWEEN THE SHUNT AND THE BATTERY PACK.
74	STARTER CIRCUIT RESISTANCE	11- CURRENT PROBE	74	PUT PROBE AROUND NEGATIVE BATTERY CABLE BETWEEN THE SHUNT AND THE BATTERY PACK.
75	BATTERY RESISTANCE CHANGE	11- CURRENT PROBE	75	PUT PROBE AROUND NEGATIVE BATTERY CABLE BETWEEN THE SHUNT AND THE BATTERY PACK.
80	BATTERY CURRENT	11- CURRENT PROBE	90	PUT PROBE AROUND NEGATIVE BATTERY CABLE BETWEEN THE SHUNT AND THE BATTERY PACK.

THE METRIC SYSTEM AND EQUIVALENTS

LINEAR MEASURE

- 1 Centimeter = 10 Millimeters = 0.01 Meters = 0.3937 Inches
- 1 Meter = 100 Centimeters = 1,000 Millimeters = 39.37 Inches
- 1 Kilometer = 1,000 Meters = 0.621 Miles

SQUARE MEASURE

- 1 Sq Centimeter = 100 Sq Millimeters = 0.155 Sq Inches
- 1 Sq Meter = 10,000 Sq Centimeters = 10.76 Sq Feet
- 1 Sq Kilometer = 1,000,000 Sq Meters = 0.386 Sq Miles

CUBIC MEASURE

- 1 Cu Centimeter = 1,000 Cu Millimeters = 0.06 Cu Inches
- 1 Cu Meter = 1,000,000 Cu Centimeters = 35.31 Cu Feet

LIQUID MEASURE

- 1 Milliliter = 0.001 Liters = 0.0338 Fluid Ounces
- 1 Liter = 1,000 Milliliters = 33.82 Fluid Ounces

TEMPERATURE

- Degrees Fahrenheit (F) = $^{\circ}\text{C} \cdot 9 \div 5 + 32$
- Degrees Celsius (C) = $\text{F}^{\circ} - 32 \cdot 5 \div 9$
- 212° Fahrenheit is equivalent to 100° Celsius
- 90° Fahrenheit is equivalent to 32.2° Celsius
- 32° Fahrenheit is equivalent to 0° Celsius

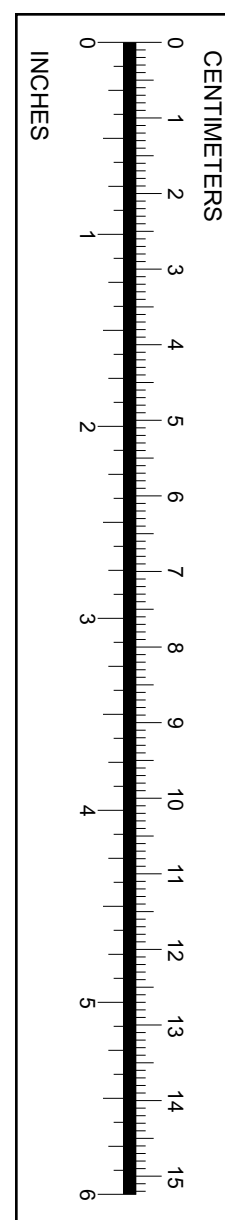
WEIGHTS

- 1 Gram = 0.001 Kilograms = 1,000 Milligrams = 0.035 Ounces
- 1 Kilogram = 1,000 Grams = 2.2 Lb
- 1 Metric Ton = 1,000 Kilograms = 1 Megagram = 1.1 Short Tons

APPROXIMATE CONVERSION FACTORS

TO CHANGE	TO	MULTIPLY BY
Inches	Millimeters	25.4
Inches	Centimeters	2.540
Feet	Meters	0.305
Yards	Meters	0.914
Miles	Kilometers	1.609
Square Inches	Square Centimeters	6.451
Square Feet	Square Meters	0.093
Square Yards	Square Meters	0.836
Square Miles	Square Kilometers	2.590
Acres	Square Hectometers	0.405
Cubic Feet	Cubic Meters	0.028
Cubic Yards	Cubic Meters	0.765
Fluid Ounces	Milliliters	29.573
Pints	Liters	0.473
Quarts	Liters	0.946
Gallons	Liters	3.785
Ounces	Grams	28.349
Pounds	Kilograms	0.4536
Short Tons	Metric Tons	0.907
Pound-Feet	Newton-Meters	1.356
Pounds Per Square Inch	Kilopascals	6.895
Miles Per Gallon	Kilometers Per Liter	0.425
Miles Per Hour	Kilometers Per Hour	1.609

TO CHANGE	TO	MULTIPLY BY
Millimeters	Inches	0.03937
Centimeters	Inches	0.3937
Meters	Feet	3.280
Meters	Yards	1.094
Kilometers	Miles	0.621
Square Centimeters	Square Inches	0.155
Square Meters	Square Feet	10.764
Square Meters	Square Yards	1.196
Square Kilometers	Square Miles	0.386
Square Hectometers	Acres	2.471
Cubic Meters	Cubic Feet	35.315
Cubic Meters	Cubic Yards	1.308
Milliliters	Fluid Ounces	0.034
Liters	Pints	2.113
Liters	Quarts	1.057
Liters	Gallons	0.264
Grams	Ounces	0.035
Kilograms	Pounds	2.2046
Metric Tons	Short Tons	1.102
Newton-Meters	Pound-Feet	0.738
Kilopascals	Pounds Per Square Inch	0.145
Kilometers Per Liter	Miles Per Gallon	2.354
Kilometers Per Hour	Miles Per Hour	0.621



**TECHNICAL MANUAL
UNIT MAINTENANCE**

ENGINE SYSTEMS MAINTENANCE	3-1
---------------------------------------	------------

TRUCK, UTILITY: CARGO/TROOP CARRIER, 1-1/4 TON, 4X4, M998
(2320-01-107-7155) (EIC: BBD); M998A1 (2320-01-371-9577) (EIC: BBN);

ELECTRICAL SYSTEM MAINTENANCE	4-1
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TRUCK, UTILITY: CARGO/TROOP CARRIER, 1-1/4 TON, 4X4, W/WINCH, M1038 (2320-01-107-7156) (EIC: BBE); M1038A1 (2320-01-371-9578) (EIC: BBP);

TRANSMISSION AND TRANSFER CASE MAINTENANCE	5-1
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TRUCK, UTILITY: HEAVY VARIANT, 4X4, M1097 (2320-01-346-9317) (EIC: BBM);
M1097A1 (2320-01-371-9583) (EIC: BBU); M1097A2 (2320-01-380-8604) (EIC: BB6);
M1123 (2320-01-455-9593) (EIC: B6G);

TRUCK, UTILITY: TOW CARRIER, ARMORED, 1-1/4 TON, 4X4,
M966 (2320-01-107-7153) (EIC: BBC); M966A1 (2320-01-372-3932) (EIC: BBX);
M1121 (2320-01-456-1282) (EIC: B6H);

PROPELLER SHAFTS, AXLES, AND SUSPENSION MAINTENANCE	6-1
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TRUCK, UTILITY: TOW CARRIER, ARMORED, 1-1/4 TON, 4X4, W/WINCH,
M1036 (2320-01-107-7154) (EIC: BBH);

TRUCK, UTILITY: TOW CARRIER, W/SUPPLEMENTAL ARMOR, 1-1/4 TON, 4X4,
M1045 (2320-01-146-7191); M1045A1 (2320-01-371-9580) (EIC: BBR);
M1045A2 (2320-01-380-8229) (EIC: BB5);

BRAKE SYSTEM MAINTENANCE	7-1
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TRUCK, UTILITY: TOW CARRIER, W/SUPPLEMENTAL ARMOR, 1-1/4 TON, 4X4,
W/WINCH, M1046 (2320-01-146-7188); M1046A1 (2320-01-371-9582) (EIC: BBT);

TRUCK, UTILITY: ARMAMENT CARRIER, ARMORED, 1-1/4 TON, 4X4, M1025
(2320-01-128-9551) (EIC: BBF); M1025A1 (2320-01-371-9584) (EIC: BBV);
M1025A2 (2320-01-380-8233) (EIC: BB3);

WHEELS AND STEERING MAINTENANCE	8-1
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TRUCK, UTILITY: ARMAMENT CARRIER, ARMORED, 1-1/4 TON, 4X4, W/WINCH, M1026
(2320-01-128-9552) (EIC: BBG); M1026A1 (2320-01-371-9579) (EIC: BBQ);

TRUCK, UTILITY: ARMAMENT CARRIER, W/SUPPLEMENTAL ARMOR, 1-1/4 TON, 4X4,
M1043 (2320-01-146-7190); M1043A1 (2320-01-372-3933) (EIC: BBY);
M1043A2 (2320-01-380-8213) (EIC: BB4);

FRAME MAINTENANCE	9-1
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TRUCK, UTILITY: ARMAMENT CARRIER, W/SUPPLEMENTAL ARMOR, 1-1/4 TON, 4X4,
W/WINCH, M1044 (2320-01-146-7189); M1044A1 (2320-01-371-9581) (EIC: BBS);

TRUCK, UTILITY: S250 SHELTER CARRIER, 4X4, M1037 (2320-01-146-7193) (EIC: BBK);
TRUCK, UTILITY: S250 SHELTER CARRIER, 4X4, W/WINCH, M1042 (2320-01-146-7187);

TRUCK, AMBULANCE, 2-LITTER, ARMORED, 4X4, M996 (2310-01-111-2275)
(EIC: BBB); M996A1 (2310-01-372-3935) (EIC: BB2);

TRUCK, AMBULANCE, 4-LITTER, ARMORED, 4X4, M997 (2310-01-111-2274)(EIC: BBA);
M997A1 (2310-01-372-3934) (EIC: BBZ); M997A2 (2310-01-380-8225) (EIC: BB8);

TRUCK, AMBULANCE, 2-LITTER, SOFT TOP, 4X4, M1035 (2310-01-146-7194);
M1035A1 (2310-01-371-9585) (EIC: BBW); M1035A2 (2310-01-380-8290) (EIC: BB9).

Approved for public release; distribution is unlimited.

**HEADQUARTERS, DEPARTMENTS OF THE ARMY,
THE AIR FORCE, AND MARINE CORPS**

JANUARY 1996

WARNING**EXHAUST GASES CAN KILL**

Brain damage or death can result from heavy exposure. Precautions must be followed to ensure crew safety when the personnel heater, main, or auxiliary engine of any vehicle is operated for any purpose.

1. Do not operate your vehicle engine in enclosed areas.
2. Do not idle vehicle engine with vehicle windows closed.
3. Be alert at all times for exhaust odors.
4. Be alert for exhaust poisoning symptoms. they are:
 - Headache
 - Dizziness
 - Sleepiness
 - Loss of muscular control
5. If you see another person with exhaust poisoning symptoms:
 - Remove person from area
 - Expose to open air
 - Keep person warm
 - Do not permit physical exercise
 - Administer artificial respiration, if necessary*
 - Notify a medic

*For artificial respiration, refer to FM 21-11.

6. BE AWARE, the field protective mask for nuclear, biological or chemical (NBC) protection will not protect you from carbon monoxide poisoning.

THE BEST DEFENSE AGAINST EXHAUST POISONING IS ADEQUATE VENTILATION.

WARNING SUMMARY

- Drycleaning solvent is flammable and will not be used near an open flame. A fire extinguisher will be kept nearby when the solvent is used. Use only in well-ventilated places. Failure to do this may result in injury to personnel and/or damage to equipment.
- Compressed air used for cleaning purposes will not exceed 30 psi (207 kPa). Use only with effective chip guarding and personal protective equipment (goggles/shield, gloves, etc.).
- Diesel fuel is highly flammable. Do not perform any procedure near fire, flames, or sparks. Severe injury or death will result.
- Do not touch hot exhaust system components with bare hands. Severe injury will result.
- Do not remove surge tank filler cap before releasing internal pressure when engine temperature is above 190°F (88°C). Steam or hot coolant under pressure will cause injury.
- Do not drain oil when engine is hot. Severe injury to personnel will result.
- Always wear eye protection when bleeding brakes. Failure to do this may cause injury if brake fluid comes in contact with eyes.
- Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry or disconnected battery ground cable contacts battery terminal, a direct short will result, causing injury to personnel, or damage to equipment.
- Keep hands and arms away from fan blade and drive belts while engine is running, or serious injury may result.
- Battery acid (electrolyte) is extremely harmful. Always wear safety goggles and rubber gloves, and do not smoke when performing maintenance on batteries. Injury will result if acid contacts eyes or skin.
- When removing battery cable clamps, disconnect ground cable first. Ensure all switches are in OFF position before disconnecting ground cable. Do not allow tools to come in contact with vehicle when disconnecting cable clamps. A direct short can result, causing instant heating of tools, tool damage, battery damage, or battery explosion.
- Allow transmission/transfer case to cool before performing maintenance. Failure to do this may cause injury.
- Always apply parking brake and chock opposite wheel before removing wheel. Avoid removing wheel when vehicle is on sloping terrain. Injury to personnel or damage to equipment may result.

WARNING SUMMARY (Cont'd)

- Hydraulic jacks are used for raising and lowering, and are not used to support vehicle. Never work under vehicle unless wheels are blocked and it is properly supported. Injury or damage to equipment may result if vehicle suddenly shifts or moves.
- Remove only the inner group of nuts when removing a wheel from the vehicle. Removing the outer nuts which hold the rim together while the assembly is inflated could result in serious injury or death.
- In all disassembly of the wheel assembly operations, ensure the tire is totally deflated before removing wheel nuts. Failure to follow proper safety precautions could cause serious injury or death.
- Never inflate a wheel assembly with the wheel locknuts removed in an attempt to separate inner and outer rim halves. The assembly will separate under pressure resulting in serious injury or death.
- Never use wheel assemblies with studs which are damaged, loose, or have damaged threads. Damaged studs can cause improper assembly, which could cause individual fasteners to fail. Any of these situations could cause serious injury or death.
- Never use tubes in wheel assemblies. Use of a tube defeats built-in-safety features, and could allow the wheel to come apart under pressure, resulting in serious injury or death.
- Use only replacement parts specified in TM 9-2320-280-24P. Wheels assembled with components which do not meet specifications could cause the assembly to separate under pressure, resulting in serious injury or death.
- Never inflate a wheel assembly without having checked wheel locknut torques to ensure the wheel locknuts are tightened to specifications. An assembly with improperly tightened locknuts could separate under pressure resulting in injury or death.
- Always use a tire inflation cage for inflation purposes. Stand on one side of cage, during inflation, never directly in front. Keep hands out of the cage during inflation. Inflate assembly to recommended pressure, using a clip-on air chuck. Do not exceed 30 psi (207 kPa) cold inflation pressure. Failure to follow these instructions may result in serious injury or death.
- Radial tires and bias ply tires should not be mixed on the same vehicle. Injury to personnel or damage to equipment may result.
- Never install radial tire on eight bolt wheel. Damage to equipment may result, causing injury to personnel.
- Ensure that during assembly indexing hole on inner and outer rim halves is aligned. Failure to do so may cause damage to equipment or injury to personnel.

CHANGE

NO. 3

HEADQUARTERS,
DEPARTMENTS OF THE ARMY,
THE AIR FORCE, AND MARINE CORPS
WASHINGTON, D.C., 15 July 2004

**TECHNICAL MANUAL
VOLUME 2 OF 3
UNIT MAINTENANCE**

TRUCK, UTILITY: CARGO/TROOP CARRIER, 1-1/4 TON, 4X4,
M998 (2320-01-107-7155) (EIC: BBD); M998A1 (2320-01-371-9577) (EIC: BBN);

TRUCK, UTILITY: CARGO/TROOP CARRIER, 1-1/4 TON, 4X4, W/WINCH,
M1038 (2320-01-107-7156) (EIC: BBE); M1038A1 (2320-01-371-9578) (EIC: BBP);

TRUCK, UTILITY: HEAVY VARIANT, 4X4, M1097 (2320-01-346-9317) (EIC: BBM);
M1097A1 (2320-01-371-9583) (EIC: BBU); M1097A2 (2320-01-380-8604) (EIC: BB6);
M1123 (2320-01-455-9593) (EIC: B6G);

TRUCK, UTILITY: TOW CARRIER, ARMORED, 1-1/4 TON, 4X4,
M966 (2320-01-107-7153) (EIC: BBC); M966A1 (2320-01-372-3932) (EIC: BBX);
M1121 (2320-01-456-1282) (EIC: B6H);

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M1036 (2320-01-107-7154) (EIC: BBH);

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TRUCK, UTILITY: ARMAMENT CARRIER, ARMORED, 1-1/4 TON, 4X4,
M1025 (2320-01-128-9551) (EIC: BBF); M1025A1 (2320-01-371-9584) (EIC: BBV); M1025A2 (2320-01-380-8233) (EIC: BB3);

TRUCK, UTILITY: ARMAMENT CARRIER, ARMORED, 1-1/4 TON, 4X4, W/WINCH,
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TRUCK, AMBULANCE, 4-LITTER, ARMORED, 4X4, M997 (2310-01-111-2274) (EIC: BBA);
M997A1 (2310-01-372-3934) (EIC: BBZ); M997A2 (2310-01-380-8225) (EIC: BB8);

TRUCK, AMBULANCE, 2-LITTER, SOFT TOP, 4X4,
M1035 (2310-01-146-7194); M1035A1 (2310-01-371-9585) (EIC: BBW); M1035A2 (2310-01-380-8290) (EIC: BB9).

TM 9-2320-280-20-2, 31 January 1996, is changed as follows:

1. Remove old pages and insert new pages as indicated below.
2. New or changed material is indicated by a vertical bar in the margin of the page.

Remove pages

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A and B
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3-71 and 3-72
3-77 through 3-106
3-109 and 3-110
3-117 and 3-118
3-125 and 3-126

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Remove pages

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Index 15 through Index 26

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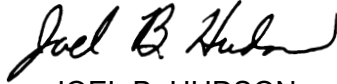
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8-81 through 8-84
8-87 and 8-88
9-1 through 9-16
9-19 through 9-24
Index 1 and Index 2
Index 7 through Index 10
Index 15 through Index 26

3. File this change sheet in front of the publication for reference purposes.

By Order of the Secretary of the Army:

Peter J. Schoomaker
General, United States Army
Chief of Staff

Official:



JOEL B. HUDSON
Administrative Assistant to the
Secretary of the Army
0223405

By Order of the Secretary of the Air Force:

RONALD R. FOGLEMAN
General, United States Air Force
Chief of Staff

Official:

HENRY VICCELLIO, JR.
General, United States Air Force
Commander, Air Force Materiel Command

By Order of the Marine Corps:

R. P. SHOCKEY
Director, Program Support
Marine Corps Systems Command

Distribution:

To be distributed in accordance with the initial distribution number (IDN) 380900, requirements for TM 9-2320-280-20-2.

CHANGE

NO. 2

HEADQUARTERS,
DEPARTMENTS OF THE ARMY,
THE AIR FORCE, AND MARINE CORPS
WASHINGTON, D.C., 30 JUNE 1999

TECHNICAL MANUAL
VOLUME 2 OF 3
UNIT MAINTENANCE

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TM 9-2320-280-20-2, 31 January 1996, is changed as follows:

1. Two new models have been added to the front cover. The new cover, located at the end of the change package, replaces the existing cover.
2. Remove old pages and insert new pages as indicated below.
3. New or changed material is indicated by a vertical bar in the margin of the page.

Remove pages

None
i and ii
3-5 and 3-6
3-13 and 3-14
3-19 through 3-22
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3-35 through 3-38

Insert pages

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3-35 through 3-38

Remove pages

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Index 1 through Index 23
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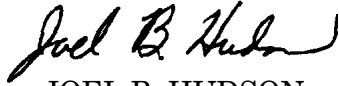
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Index 1 through Index 26
cover

4. File this change sheet in front of the publication for reference purposes.

By Order of the Secretary of the Army:

ERIC K. SHINSEKI
General, United States Army
Chief of Staff

Official:



JOEL B. HUDSON
Administrative Assistant to the
Secretary of the Army
05692

By Order of the Secretary of the Air Force:

RONALD R. FOGLEMAN
General, United States Air Force
Chief of Staff

Official:

HENRY VICCELLIO, JR.
General, United States Air Force
Commander, Air Force Materiel Command

By Order of the Marine Corps:

D.R. BLOOMER
Colonel, USMC
Director, Program Support
Marine Corps Systems Command

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WASHINGTON, D.C., 14 September 1998

CHANGE

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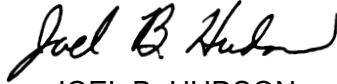
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4-13 through 4-14.2

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TECHNICAL MANUAL
NO. 9-2320-280-20-2
NO. 2320-20/7B

HEADQUARTERS,
DEPARTMENTS OF THE ARMY,
THE AIR FORCE, AND MARINE CORPS
WASHINGTON, D.C., 31 January 1996

TECHNICAL ORDER
NO. 36A12-1A-2092-1-2

TECHNICAL MANUAL VOLUME 2 OF 3

UNIT MAINTENANCE

- TRUCK, UTILITY: CARGO/TROOP CARRIER, 1-1/4 TON, 4X4, M998 (2320-01-107-7155) (EIC: BBD);
M998A1 (2320-01-371-9577) (EIC: BBN);
- TRUCK, UTILITY: CARGO/TROOP CARRIER, 1-1/4 TON, 4X4, W/WINCH, M1038 (2320-01-107-7156) (EIC: BBE);
M1038A1 (2320-01-371-9578) (EIC: BBP);
- TRUCK, UTILITY: HEAVY VARIANT, 4X4, M1097 (2320-01-346-9317) (EIC: BBM); M1097A1 (2320-01-371-9583) (EIC: BBU);
M1097A2 (2320-01-380-8604) (EIC: BB6); M1123 (2320-01-455-9593) (EIC: B6G);
- TRUCK, UTILITY: TOW CARRIER, ARMORED, 1-1/4 TON, 4X4, M966 (2320-01-107-7153) (EIC: BBC);
M966A1 (2320-01-372-3932) (EIC: BBX); M1121 (2320-01-456-1282) (EIC: B6H);
- TRUCK, UTILITY: TOW CARRIER, ARMORED, 1-1/4 TON, 4X4, W/WINCH, M1036 (2320-01-107-7154) (EIC: BBH);
- TRUCK, UTILITY: TOW CARRIER, W/SUPPLEMENTAL ARMOR, 1-1/4 TON, 4X4, M1045 (2320-01-146-7191);
M1045A1 (2320-01-371-9580) (EIC: BBR); M1045A2 (2320-01-380-8229) (EIC: BB5);
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M1025A1 (2320-01-371-9584) (EIC: BBV); M1025A2 (2320-01-380-8233) (EIC: BB3);
- TRUCK, UTILITY: ARMAMENT CARRIER, ARMORED, 1-1/4 TON, 4X4, W/WINCH, M1026 (2320-01-128-9552) (EIC: BBG);
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- TRUCK, UTILITY: ARMAMENT CARRIER, W/SUPPLEMENTAL ARMOR, 1-1/4 TON, 4X4, M1043 (2320-01-146-7190);
M1043A1 (2320-01-372-3933); M1043A2 (2320-01-380-8213) (EIC: BB4);
- TRUCK, UTILITY: ARMAMENT CARRIER, W/SUPPLEMENTAL ARMOR, 1-1/4 TON, 4X4, W/WINCH, M1044 (2320-01-146-
7189); M1044A1 (2320-01-371-9581);
- TRUCK, UTILITY: S250 SHELTER CARRIER, 4X4, M1037 (2320-01-146-7193) (EIC: BBK);
- TRUCK, UTILITY: S250 SHELTER CARRIER, 4X4, W/WINCH, M1042 (2320-01-146-7187);
- TRUCK, AMBULANCE, 2-LITTER, ARMORED, 4X4, M996 (2310-01-111-2275) (EIC: BBB); M996A1 (2310-01-372-3935) (EIC: BB2);
- TRUCK, AMBULANCE, 4-LITTER, ARMORED, 4X4, M997 (2310-01-111-2274)
(EIC: BBA); M997A1 (2310-01-372-3934) (EIC: BBZ); M997A2 (2310-01-380-8225) (EIC: BB8);
- TRUCK, AMBULANCE, 2-LITTER, SOFT TOP, 4X4, M1035 (2310-01-146-7194);
M1035A1 (2310-01-371-9585) (EIC: BBW); M1035A2 (2310-01-380-8290) (EIC: BB9).

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This manual is published in three parts. TM 9-2320-280-20-1 contains chapters 1 and 2, TM 9-2320-280-20-2 contains chapters 3 through 9, and TM 9-2320-280-20-3 contains chapters 10 through 13 and Appendices a through g.

This manual contains a table of contents and alphabetized index for chapters 3 through 9.

*This publication supersedes TM 9-2320-280-20-2 dated 19 January 1990 and all changes.

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CHAPTER 3 ENGINE SYSTEMS MAINTENANCE

Section I. LUBRICATION SYSTEM MAINTENANCE

3-1. LUBRICATION SYSTEM MAINTENANCE TASK SUMMARY

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3-2. ENGINE OIL DIPSTICK TUBE REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Special Tools

Hex-head driver, 8 mm
(Appendix B, Item 156)

Equipment Condition

Hood raised and secured (TM 9-2320-280-10).

Materials/Parts

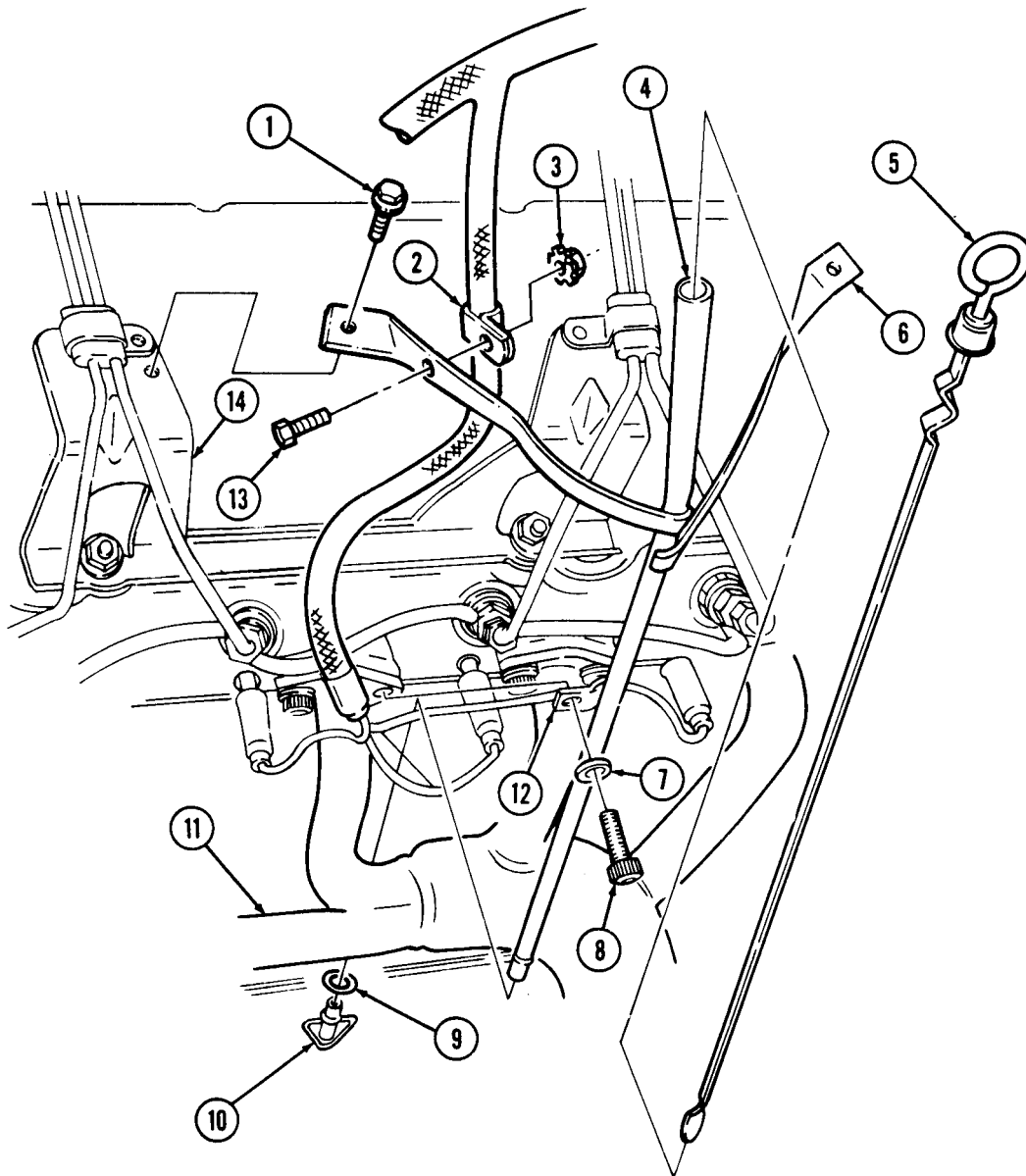
O-ring (Appendix G, Item 209)
Plain-assembled nut (Appendix G, Item 201)
Sealant (Appendix C, Item 38)

a. Removal

1. Remove oil dipstick (5) from oil dipstick tube (4).
2. Remove plain-assembled nut (3) and capscrew (13) from harness clamp (2) and upper dipstick tube bracket (6). Discard plain-assembled nut (3).
3. Using hex-head driver, remove socket-head screw (8) and washer (7) from lower dipstick tube bracket (12) and exhaust manifold (11).
4. Remove two assembled-washer screws (1) from upper dipstick tube bracket (6) and fuel line bracket (14).
5. Remove oil dipstick tube (4) from engine oil pan (10). Remove and discard O-ring (9).

b. Installation

1. Apply RTV sealant to O-ring (9) and install O-ring (9) on oil dipstick tube (4).
2. Install oil dipstick tube (4) in engine oil pan (10).
3. Using hex-head driver, secure lower dipstick tube bracket (12) to exhaust manifold (11) with washer (7) and socket-head screw (8). Tighten socket-head screw (8) to 25-33 lb-ft (34-45 N•m).
4. Secure upper dipstick tube bracket (6) to fuel line bracket (14) with two assembled-washer screws (1). Tighten assembled-washer screws (1) to 3-4 lb-ft (4-5 N•m).
5. Secure harness clamp (2) to upper dipstick tube bracket (6) with capscrew (13) and plain-assembled nut (3).
6. Install oil dipstick (5) into oil dipstick tube (4).

3-2. ENGINE OIL DIPSTICK TUBE REPLACEMENT (Cont'd)

- FOLLOW-ON TASKS:**
- Start engine (TM 9-2320-280-10) and check for oil leaks.
 - Lower and secure hood (TM 9-2320-280-10).

3-3. ENGINE OIL FILLER TUBE REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Materials/Parts

Lubricating oil (Appendix C, Item 31)

Equipment Condition

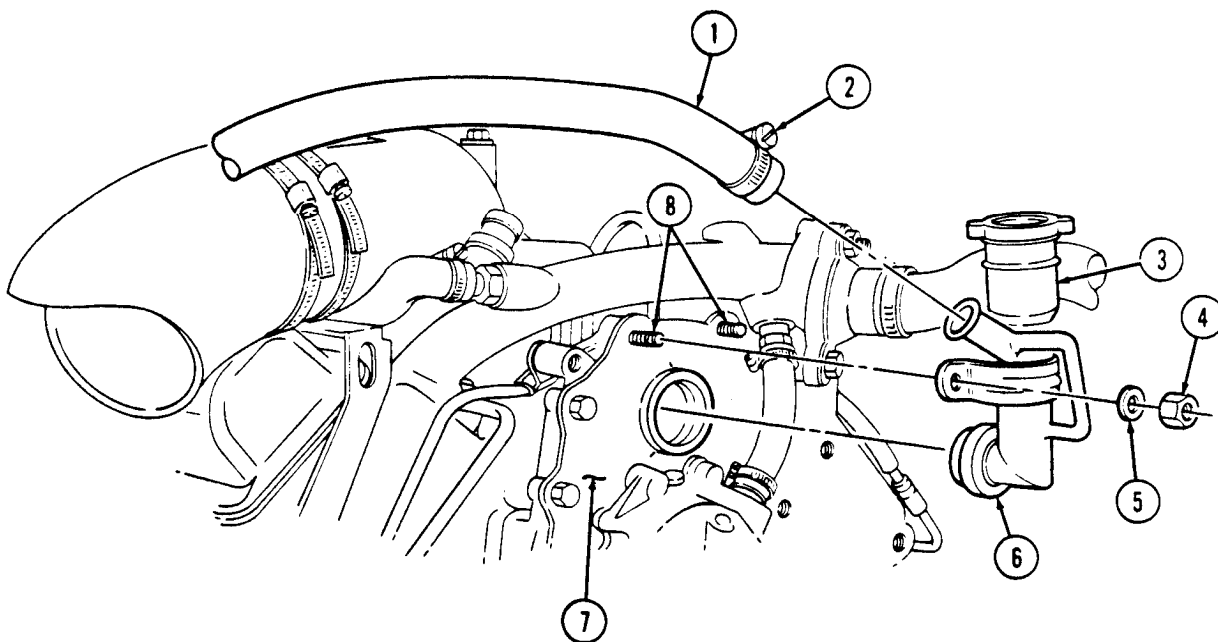
Hood raised and secured (TM 9-2320-280-10).

a. Removal

1. Loosen clamp (2) and disconnect CDR valve hose (1) from engine oil filler tube (3).
2. Remove two nuts (4), washers (5), and engine oil filler tube (3) from timing chain cover (7) and studs (8).
3. Inspect grommet (6) for breaks or cracks. Replace if defective.

b. Installation

1. Coat grommet (6) with lubricating oil.
2. Install engine oil filler tube (3) into timing chain cover (7) with two washers (5) and nuts (4). Tighten nuts (4) to 13-20 lb-ft (18-27 N•m).
3. Connect CDR valve hose (1) to engine oil filler tube (3) and tighten clamp (2).



FOLLOW-ON TASK: Lower and secure hood (TM 9-2320-280-10).

3-4. ENGINE OIL FILTER ADAPTER REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-24P

Materials/Parts

Gasket (Appendix G, Item 53)
Two O-rings (Appendix G, Item 210)
O-ring (Appendix G, Item 211)

Equipment Condition

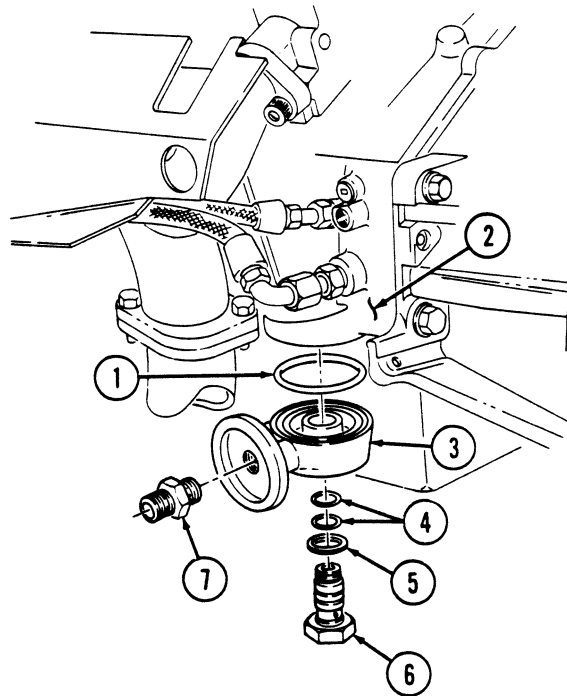
Engine oil filter removed (para. 3-5).

a. Removal

1. Remove adapter bolt (6), gasket (5), two O-rings (4), engine oil filter adapter (3), and O-ring (1) from cylinder block (2). Discard O-ring (1), two O-rings (4), and gasket (5).
2. Remove reducer boss (7) from oil adapter (3).
3. Inspect reducer boss (7) for damaged threads or cracks. Replace if defective.

b. Installation

1. Install reducer boss (7) into oil filter adapter (3) and tighten to 25 lb-ft (34 N•m).
2. Install engine oil filter adapter (3) and O-ring (1) on cylinder block (2) with two O-rings (4), gasket (5), and adapter bolt (6). Tighten adapter bolt (6) to 50 lb-ft (68 N•m).



FOLLOW-ON TASK: Install engine oil filter (para. 3-5).

3-5. ENGINE OIL SERVICE

This task covers:

- | | |
|--|--|
| <p>a. Draining Oil</p> <p>b. Removing Filter</p> | <p>c. Installing Filter</p> <p>d. Replenishing Oil</p> |
|--|--|

INITIAL SETUP:

Tools

General mechanic's tool kit:
 automotive (Appendix B, Item 1)
 Oil filter removal tool (Appendix B, Item 2)

Materials/Parts

Oil filter (Appendix G, Item 206) (6.2L only)
 Oil filter (Appendix G, Item 206.1)
 (6.5L and 6.5L detuned only)
 Lubricating oil (Appendix C, Item 31)

Manual References

TM 9-2320-280-10
 TM 9-2320-280-24P

Equipment Condition

Hood raised and secured (TM 9-2320-280-10).

General Safety Instructions

Do not drain oil when engine is hot.

a. Draining Oil

WARNING

Do not drain oil when engine is hot. Severe injury to personnel will result.

NOTE

- Park vehicle on a firm, level surface.
 - Have drainage container ready to catch oil.
1. Remove drainplug (5) and gasket (4) from oil pan (3). Allow oil to drain completely.
 2. Install gasket (4) and drainplug (5). Tighten drainplug (5) to 20 lb-ft (27 N•m).

b. Removing Filter

NOTE

Have drainage container ready to catch oil.

Remove oil filter (1) from filter adapter (2). Discard filter (1).

c. Installing Filter

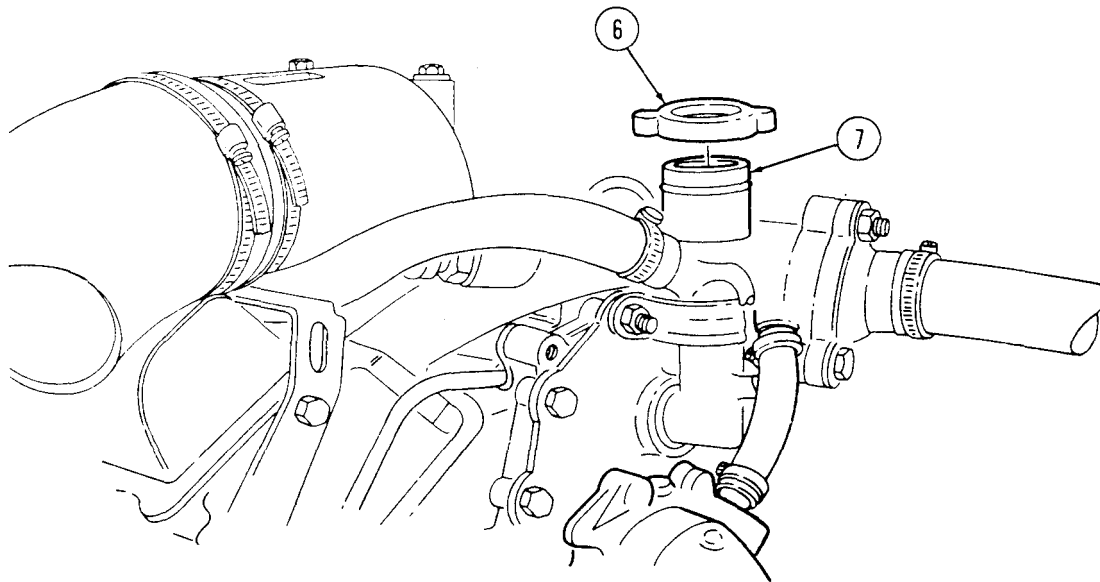
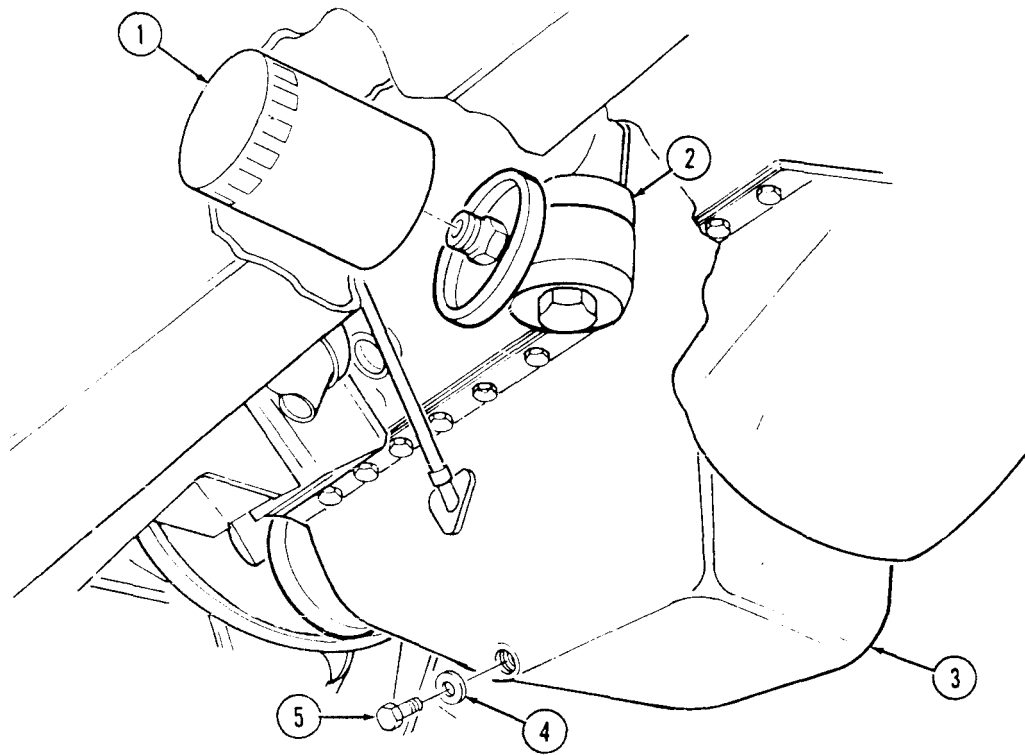
1. Apply a light coat of oil to filter gasket prior to installation
2. Install oil filter (1) on oil filter adapter (2) and tighten by hand until gasket contacts filter adapter (2). Tighten additional 1/2-3/4 turn by hand.

d. Replenishing Oil

CAUTION

Install a non-vented filler cap only. An incorrect filler cap will not seal properly, causing water to enter and damage engine.

1. Remove filler cap (6) from filler tube (7). Fill with oil according to TM 9-2320-280-10.
2. Install filler cap (6) on filler tube (7).

3-5. ENGINE OIL SERVICE (Cont'd)

- FOLLOW-ON TASKS:**
- Lower and secure hood (TM 9-2320-280-10).
 - Start engine (TM 9-2320-280-10) and inspect for leaks at oil filter and drainplug.

3-6. OIL PAN REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Oil seal retainer (Appendix G, Item 207)
Two lockwashers (Appendix G, Item 135)
Oil pan gasket (Appendix G, Item 61)
(optional - used on 6.2 L only)
Sealant (Appendix C, Item 38)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

- Starter removed (para. 4-8).
- Oil dipstick tube removed (para. 3-2).

General Safety Instructions

Do not drain oil when engine is hot.

a. Removal

WARNING

Do not drain oil when engine is hot. Severe injury to personnel will result.

NOTE

Have drainage container ready to catch oil.

1. Remove oil drainplug (8) and gasket (7) and drain oil. Install gasket (7) and oil drainplug (8) after oil is drained.
2. Remove two nuts (9), lockwashers (10), and starter cable support bracket (11) from studs (14). Discard lockwashers (10).

NOTE

Optional gasket applies to 6.2 L only.

3. Remove twenty capscrews (6), two large capscrews (13), studs (14), oil pan gasket (4) (if installed), and oil pan (12) from cylinder block (2). Remove any sealant remains.
4. Remove oil pan rear seal retainer (15) from rear main cap (1). Discard oil pan rear seal retainer (15).

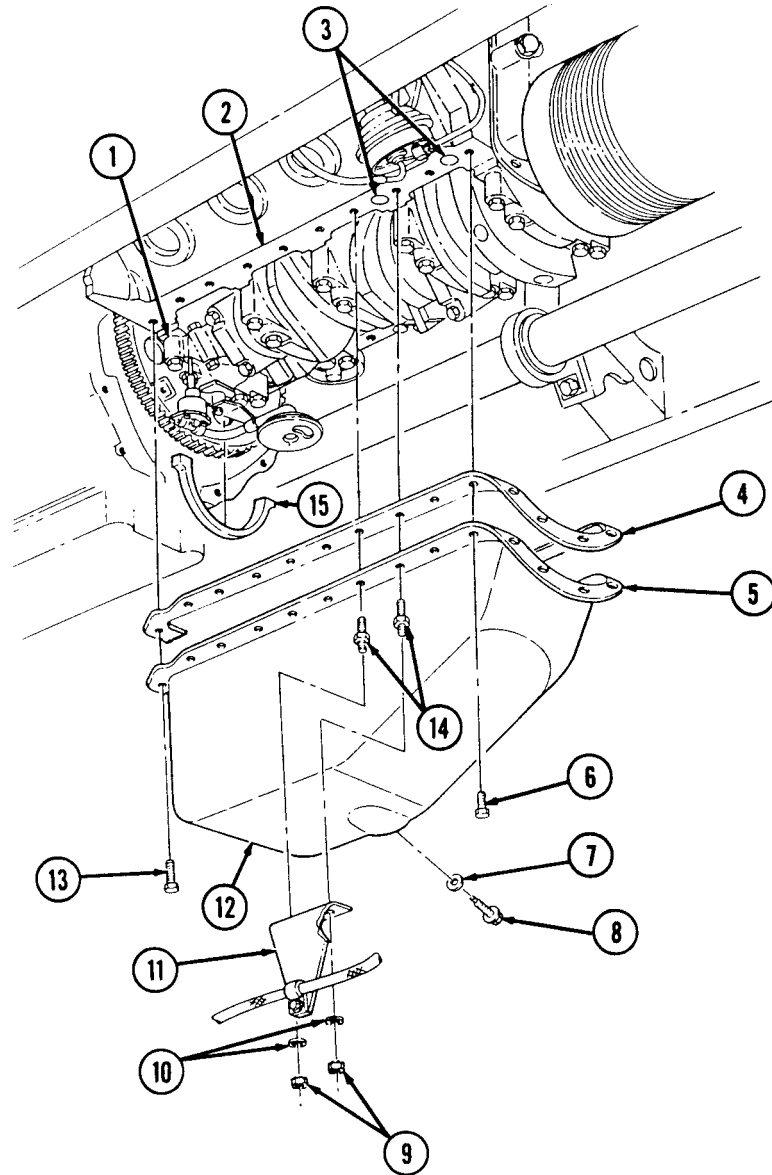
b. Installation

1. Apply a bead of sealant to each end of seal retainer (15) and install oil pan rear seal retainer (15) on rear main cap (1).

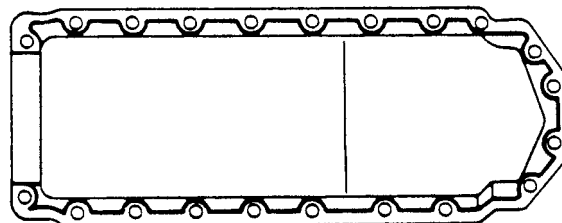
NOTE

- Perform step 2 for oil pan gasket (if installed). Perform step 3 for applying sealant.
 - Immediately install oil pan after application of sealant.
2. Install oil pan gasket (4) on lip of oil pan (12) and align with bolt holes.
 3. Apply a 3/16 in. (5mm) bead of sealant around two large holes (3) on cylinder block (2). Apply a 3/16 in. (5mm) bead of sealant around oil pan sealing surface (5) following sealant diagram shown.
 4. Install oil pan (12) on cylinder block (2) with twenty capscrews (6), two large capscrews (13), and studs (14). Tighten capscrews (6) and studs (14) to 4-10 lb-ft (5-14 N•m). Tighten large capscrews (13) to 13-20 lb-ft (18-27 N•m).
 5. Install starter cable support bracket (11) on studs (14) with two lockwashers (10) and nuts (9).
 6. Tighten oil drainplug (8) to 20 lb-ft (27 N•m).

3-6. OIL PAN REPLACEMENT (Cont'd)



SEALANT DIAGRAM



- FOLLOW-ON TASKS:
- Replenish engine oil (TM 9-2320-280-10).
 - Install oil dipstick tube (para. 3-2).
 - Install starter (para. 4-8).

3-7. ENGINE OIL COOLER SUPPLY AND RETURN LINES MAINTENANCE

This task covers:

- | | |
|--|------------------------------------|
| <p>a. Supply Line Removal</p> <p>b. Inspection</p> | <p>c. Supply Line Installation</p> |
|--|------------------------------------|

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Tiedown strap (Appendix G, Item 306)
Lockwasher (Appendix G, Item 133)
Locknut (Appendix G, Item 72)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

- Engine left splash shield removed (para. 10-17).
- Engine access cover removed (para. 10-15).

General Safety Instructions

Do not drain oil when engine is hot.

a. Removal

WARNING

Do not drain oil when engine is hot. Severe injury to personnel will result.

CAUTION

Cover or plug all hoses and connections immediately after disconnection to prevent contamination. Remove all plugs prior to connection.

NOTE

- Engine oil cooler supply and return lines are replaced basically the same. This procedure covers supply line replacement.
- Have drainage container ready to catch oil.
- Left splash shield can be modified to add engine access cover. Refer to appendix D, Figs. D-86 and D-87 for installation.

1. Disconnect supply line connector (5) from adapter (4) and allow oil to drain.
2. Disconnect supply line connector (16) from oil cooler port (17).
3. Remove locknut (3), washer (2), capscrew (15), and washer (2) from supply line clamp (14), brake line clamp (1), and frame bracket (13). Discard locknut (3).
4. Remove capscrew (7), lockwasher (8), and clamp (9) from supply line (12) and engine mount bracket (10). Discard lockwasher (8).
5. Remove tiedown strap (11) from supply line (12) and return line (6). Discard tiedown strap (11).

b. Inspection

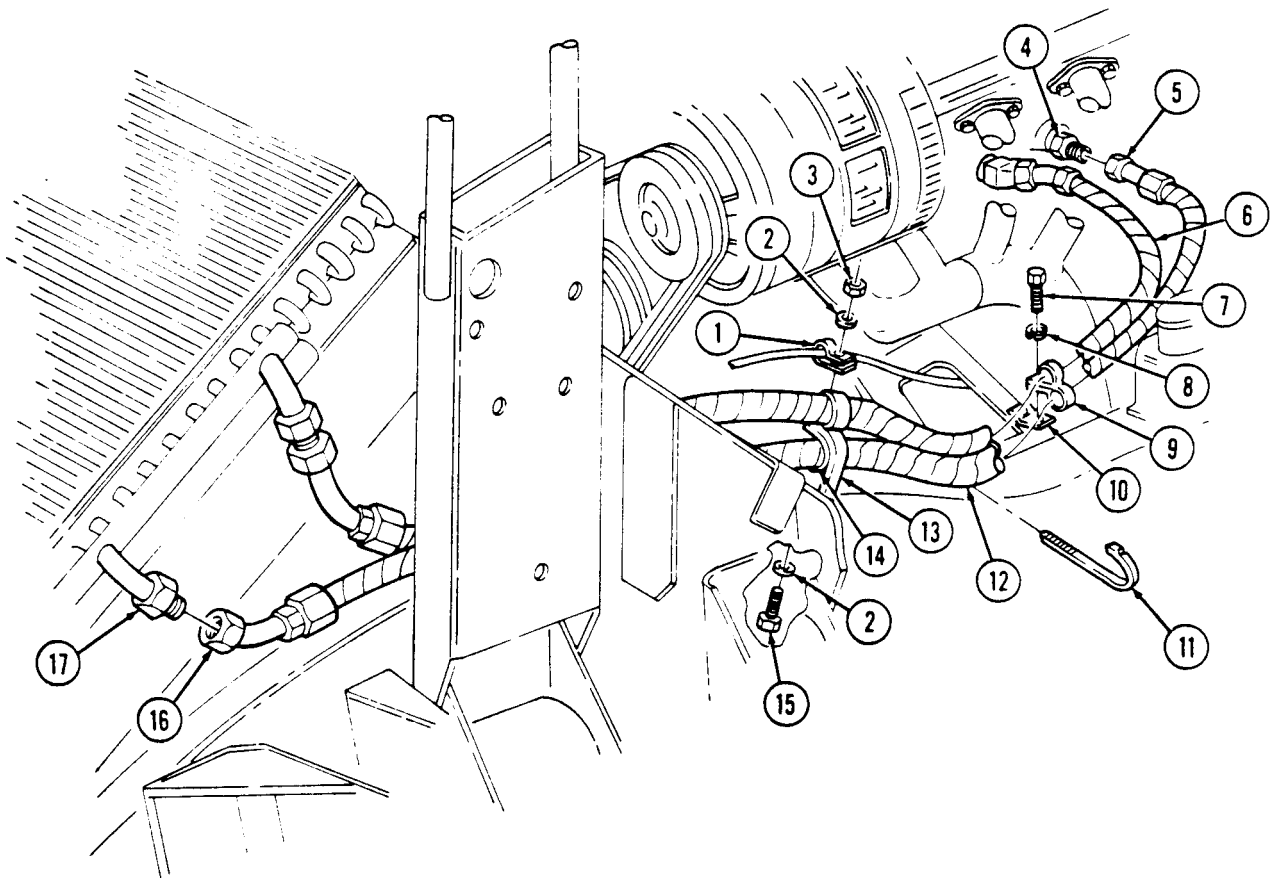
Inspect adapter (4) for damaged threads or cracks. Replace if defective.

c. Installation

1. Position supply line (12) in approximate mounting location along frame.
2. Install supply line clamp (14) and brake line clamp (1) on frame bracket (13) with washer (2), capscrew (15), washer (2), and locknut (3). Tighten locknut (3) to 6 lb-ft (8 N•m).
3. Connect supply line connector (16) to oil cooler port (17).

3-7. ENGINE OIL COOLER SUPPLY AND RETURN LINES REPLACEMENT (Cont'd)

4. Connect supply line connector (5) to adapter (4).
5. Secure supply line (12) to engine mount bracket (10) with clamp (9), lockwasher (8), and capscrew (7).
6. Secure supply line (12) to return line (6) with tiedown strap (11).



- FOLLOW-ON TASKS:**
- Install engine left splash shield (para. 10-17).
 - Fill oil to proper level (TM 9-2320-280-10).
 - Start engine (TM 9-2320-280-10) and inspect for leaks at engine oil cooler, supply and return lines.
 - Install engine access cover (para. 10-15).

3-8. ENGINE AND TRANSMISSION OIL COOLER ASSEMBLY MAINTENANCE

This task covers:

- a. Removal
- b. Installation

c. Cleaning and Inspection

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

- Engine left splash shield removed (para. 10-17).
- Power steering cooler removed (para. 8-28).

General Safety Instructions

- Do not drain oil when engine is hot.
- Compressed air used for cleaning purposes will not exceed 30 psi (207 kPa).

CAUTION

Do not bend transmission oil cooler fins. Damaged fins reduce cooling efficiency, which may damage engine and/or transmission.

a. Removal

WARNING

Do not drain oil when engine is hot. Severe injury to personnel will result.

CAUTION

Cover or plug all hoses and connections immediately after disconnection to prevent contamination. Remove all plugs prior to connection.

NOTE

- Have drainage container ready to catch oil.
- Note position of hoses for installation.

1. Disconnect two engine oil cooler supply and return lines (7) from engine oil cooler ports (9).
2. Loosen two hose clamps (2) and disconnect two transmission oil cooler line connector hoses (1) from transmission oil cooler ports (3).
3. Remove four socket-head screw and washer assemblies (5), washers (6) and oil cooler (4) from radiator (8).

b. Installation

1. Install oil cooler (4) on radiator (8) with four washers (6) and socket-head screw and washer assemblies (5).
2. Connect two transmission oil cooler line connector hoses (1) to transmission oil cooler ports (3) and tighten two hose clamps (2). Tighten clamps (2) to 10-20 lb-in. (1-2 N•m).
3. Connect two engine oil cooler supply and return lines (7) to engine oil cooler ports (9).

c. Cleaning and Inspection

1. Remove four socket-head screw and washer assemblies (5) and washers (6) securing oil cooler (4) to radiator (8).
2. Make four two-by-four wood blocks, 2-1/2 inches (63 mm) long. Raise oil cooler (4) 1-1/2 inches (38 mm) and place one block under each corner between oil cooler (4) and radiator (8).

3-8. ENGINE AND TRANSMISSION OIL COOLER ASSEMBLY MAINTENANCE (Cont'd)

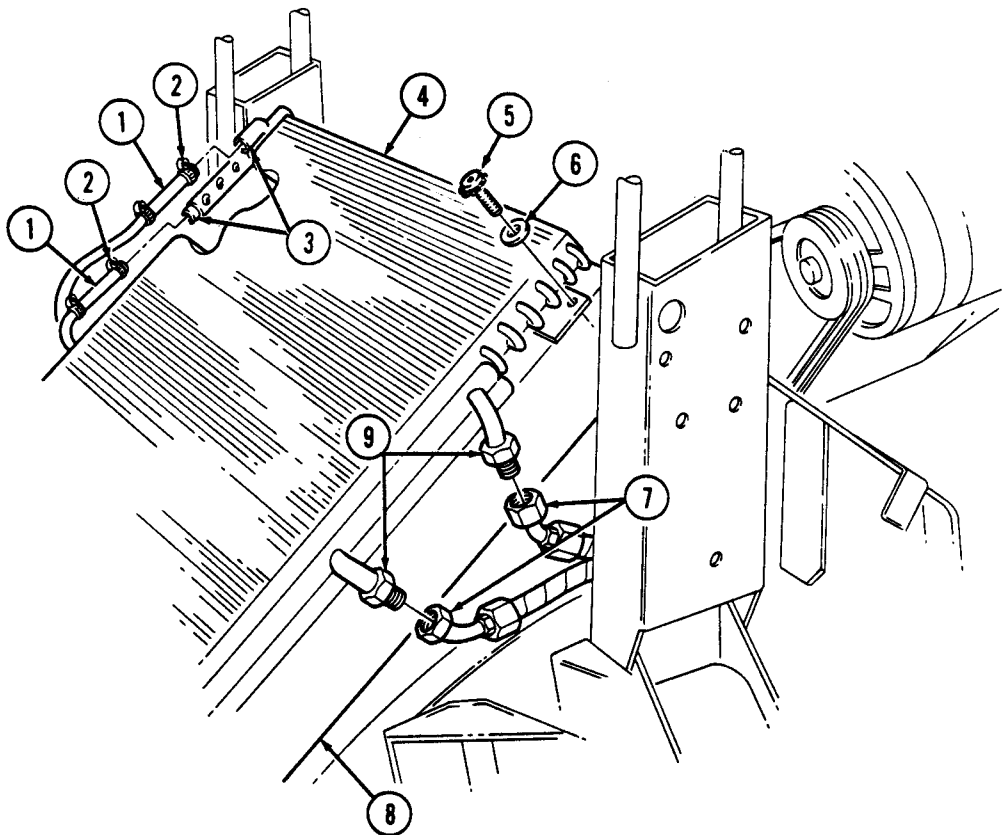
WARNING

Compressed air used for cleaning purposes will not exceed 30 psi (207 kPa). Use only with effective chip guarding and personal protective equipment (goggles/shield, gloves, etc.).

CAUTION

Using high water pressure when cleaning engine and transmission oil cooler and radiator can cause damage. High water pressure should not be directed at oil cooler or radiator.

3. Using water and compressed air, remove dirt, trash, and insects embedded in oil cooler (4) and radiator fins (8).
4. Inspect oil cooler (4) for breaks, punctures, cracks, and splits. Replace oil cooler (4), if damaged.
5. Remove four wood blocks.
6. Install oil cooler (4) on radiator (8) with four washers (6) and socket-head screw and washer assemblies (5).



- FOLLOW-ON TASKS:**
- Install power steering cooler (para. 8-28).
 - Fill transmission oil to proper level (TM 9-2320-280-10).
 - Fill engine oil to proper level (TM 9-2320-280-10).
 - Install engine left splash shield (para. 10-17).
 - Start engine (TM 9-2320-280-10) and check for leaks.

3-9. CRANKCASE DEPRESSION REGULATOR (CDR) VALVE AND BRACKET MAINTENANCE

This task covers:

- | | |
|---|--|
| <p>a. Testing</p> <p>b. Removal</p> | <p>c. Cleaning and Inspection</p> <p>d. Installation</p> |
|---|--|

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Test Equipment

Manometer, U-tube
(Appendix B, Section IV, Item L)

Equipment Condition

- Hood raised and secured (TM 9-2320-280-10).
- Engine access cover removed (para. 10-15).

a. Testing

1. Remove engine oil dipstick from oil dipstick tube (para. 3-2).
2. Install manometer in dipstick tube.
3. Connect STE/ICE-R unit to DCA connector.

NOTE

To read manometer, add amount the water column travels above zero to the amount the water column travels below zero.

4. Start engine and let idle; record water pressure. Pressure should be zero inches of water or a slight vacuum.
5. Increase engine speed to 2,000 rpm; record water pressure. Pressure should be 2-5 inches.
6. If pressures are not within specifications listed in steps 4 and 5, replace CDR valve (9) and repeat test.
7. Install oil dipstick in engine oil dipstick tube (para. 3-2).

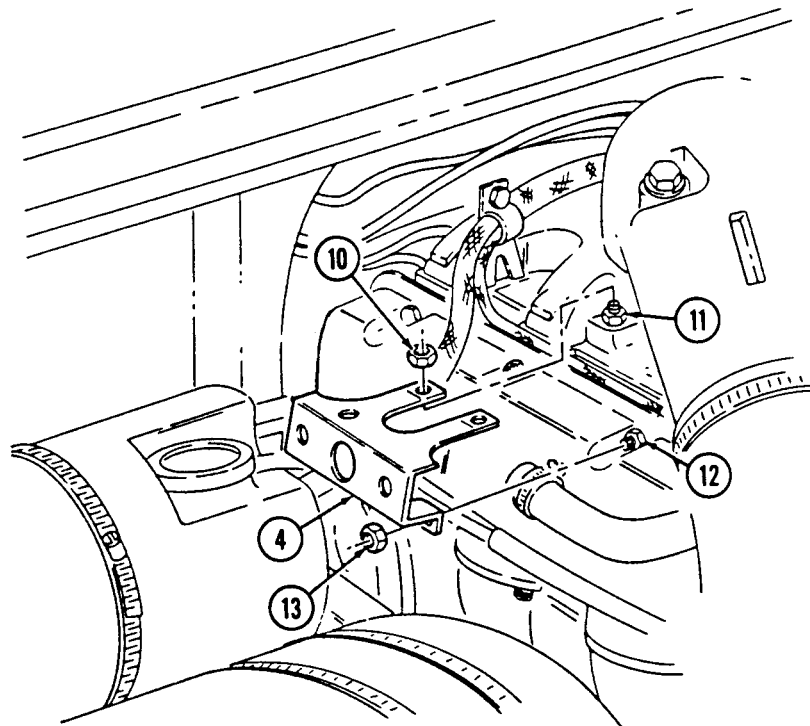
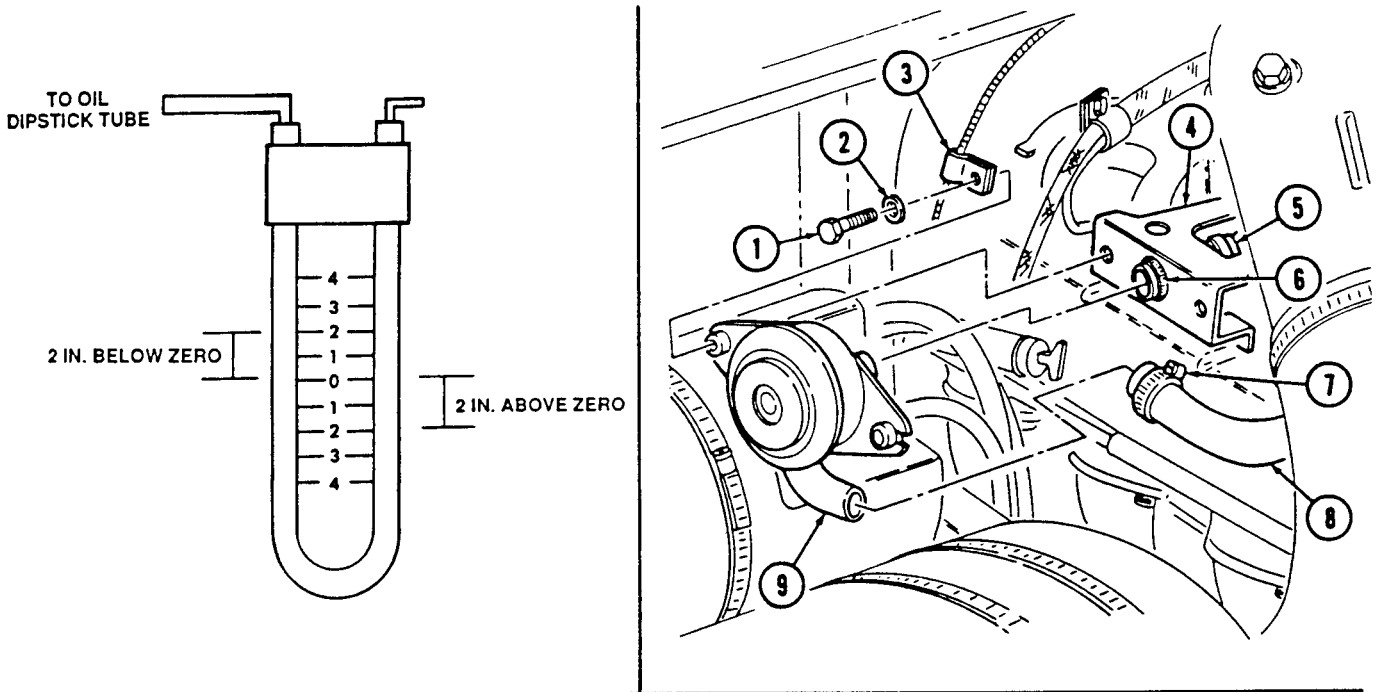
b. Removal

NOTE

CDR valves on vehicles equipped with deep water fording kit contain two additional vent lines.

1. Loosen clamp (7) and disconnect CDR valve oil fill tube hose (8) from CDR valve (9).
2. Loosen clamp (6) on CDR valve intake manifold hose (5).
3. Remove two screws (1), washers (2), CDR valve (9), and heater control cable clamp (3) from CDR valve bracket (4).
4. Remove two nuts (10) from CDR valve bracket (4) and two intake manifold studs (11).
5. Remove two nuts (13) and CDR valve bracket (4) from two valve cover studs (12).

3-9. CRANKCASE DEPRESSION REGULATOR (CDR) VALVE AND BRACKET MAINTENANCE (Cont'd)



3-9. CRANKCASE DEPRESSION REGULATOR (CDR) VALVE AND BRACKET MAINTENANCE (Cont'd)

c Cleaning and Inspection

CAUTION

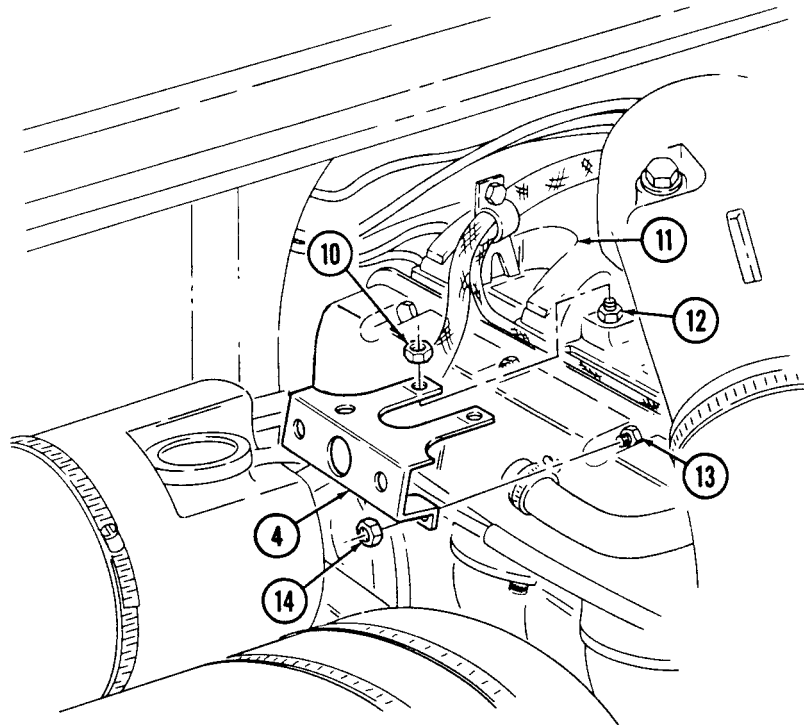
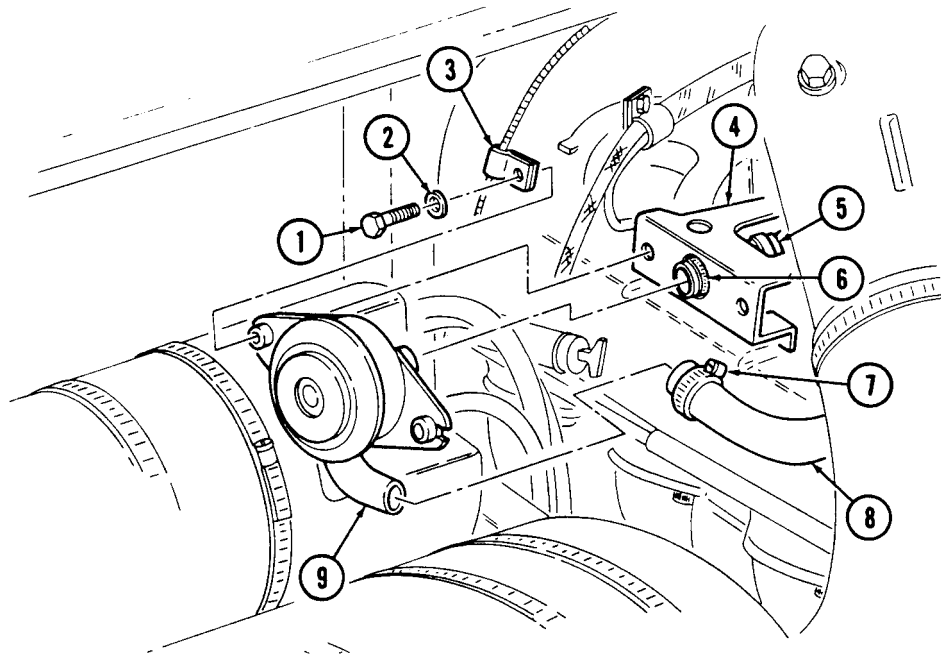
Do not clean CDR valve with drycleaning solvent. Drycleaning solvent will damage the diaphragm inside the CDR valve.

1. Clean oil and carbon deposits from the CDR valve (9) with a clean, lint-free cloth.
2. Inspect the CDR valve (9) and lines for leaks, cracks, and restrictions. Replace if damaged.

d. Installation

1. Install CDR valve bracket (4) on two intake manifold studs (12) and two valve cover studs (13).
2. Secure CDR valve bracket (4) to intake manifold (11) with two nuts (10). Tighten nuts (10) to 15 lb-ft (20 **N•m**).
3. Secure CDR valve bracket (4) to valve cover studs (13) with two nuts (14). Tighten nuts (14) to 10 lb-ft (14 **N•m**).
4. Connect CDR valve (9) to intake manifold hose (5) and tighten clamp (6).
5. Install CDR valve (9) and heater control cable clamp (3) on CDR valve bracket (4) with two washers (2) and screws (1). Tighten screws (1) to 15 lb-ft (20 **N•m**).
6. Connect CDR valve oil fill tube hose (8) to CDR valve (9) and tighten clamp (7).

3-9. CRANKCASE DEPRESSION REGULATOR (CDR) VALVE AND BRACKET
 MAINTENANCE (Cont'd)



- FOLLOW-ON TASKS:
- Lower and secure hood (TM 9-2320-280-10).
 - Install engine access cover (para. 10-15).

3-10. CDR VALVE HOSES REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

- Hood raised and secured (TM 9-2320-280-10).
- Engine access cover removed (para. 10-15).
- CDR valve and bracket removed (para. 3-9).

Manual References

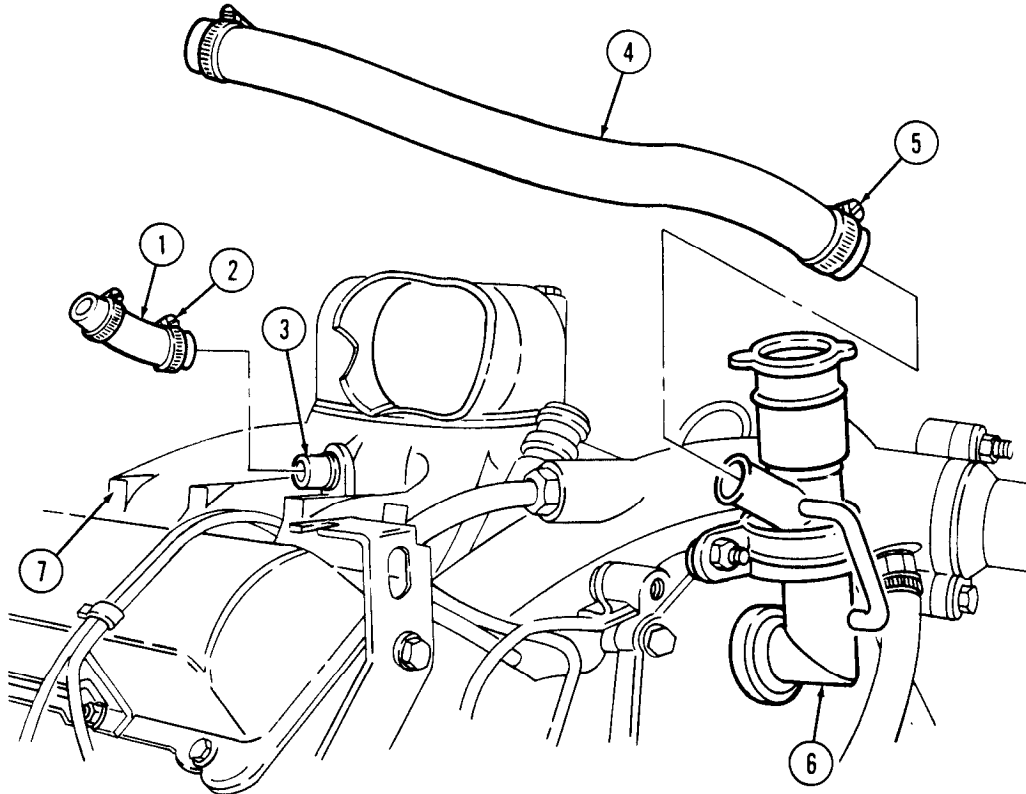
TM 9-2320-280-10
TM 9-2320-280-24P

a. Removal

1. Loosen clamp (2) and disconnect CDR valve intake manifold hose (1) from intake manifold (7).
2. Inspect adapter (3) for breaks or cracks. Replace if defective.
3. Loosen clamp (5) and disconnect CDR valve oil fill tube hose (4) from oil fill tube (6).

b. Installation

1. Connect CDR valve oil fill tube hose (4) to oil fill tube (6) and tighten clamp (5).
2. Connect to CDR valve intake manifold hose (1) to intake manifold (7) and tighten clamp (2).



- FOLLOW-ON TASKS:
- Install CDR valve and bracket (para. 3-9).
 - Lower and secure hood (TM 9-2320-280-10).
 - Install engine access cover (para. 10-15).

Section II. FUEL SYSTEM MAINTENANCE

3-11. FUEL SYSTEM MAINTENANCE TASK SUMMARY

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3-12. AIR CLEANER ASSEMBLY AND DUST UNLOADER MAINTENANCE

This task covers:

- | | |
|--|------------------------|
| <p>a. Removal</p> <p>b. Inspection</p> | <p>c. Installation</p> |
|--|------------------------|

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

Hood raised and secured (TM 9-2320-280-10).

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

NOTE

For dust unloader replacement, perform steps 1 and 2 only.

a. Removal

1. Remove four screws (18) and dust unloader cover (17) from support brackets (4).
2. Loosen clamp (15) and remove dust unloader (16) from air cleaner assembly (9).
3. Loosen clamp (5) and disconnect elbow (6) from air cleaner assembly (9).
4. Disconnect air restriction gauge hose (7) from fitting (8).
5. Remove outer strap clamps (10) and (12) securing air cleaner assembly (9) to support brackets (4).
6. Disconnect vent line (3) from elbow (2).
7. Remove air cleaner assembly (9) from support bracket (4).
8. Remove elbow (2) from air cleaner assembly (9).
9. Remove adapter (14) and tube (13) from air cleaner assembly (9).
10. Remove fitting (8) from air cleaner assembly (9).
11. Remove clamp (11) from air cleaner assembly (9).

b. Inspection

1. Inspect gasket (1) for cracks or breaks. Replace gasket (1) if defective.
2. Inspect elbow (2), fitting (8), and adapter (14) for damaged threads or cracks. Replace if defective.

c. Installation

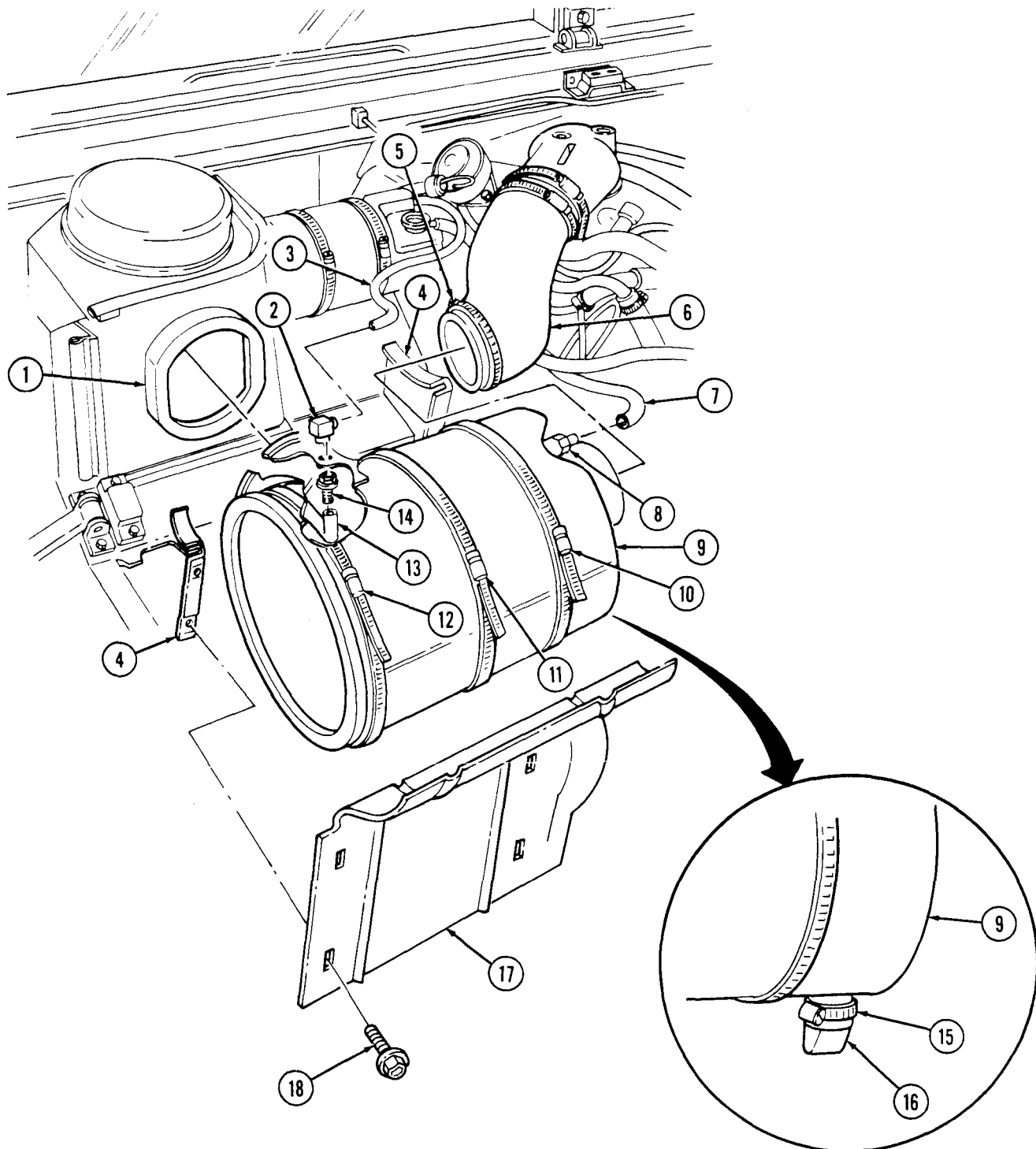
NOTE

For dust unloader replacement, perform steps 10 and 11 only.

1. Install clamp (11) on air cleaner assembly (9).
2. Install fitting (8) on air cleaner assembly (9).
3. Install tube (13) on adapter (14).
4. Install tube (13) and adapter (14) on air cleaner assembly (9).
5. Install elbow (2) to air cleaner assembly (9).
6. Install air cleaner assembly (9) on support brackets (4) with strap clamps (10) and (12). Make sure clamp tabs are facing downward away from cab before tightening. Tighten the following clamps in sequence as follows: (10), (11), and (12).
7. Connect elbow (6) to air cleaner assembly (9) and tighten clamp (5).
8. Connect air restriction gauge hose (7) to fitting (8).
9. Connect vent line (3) to elbow (2).

3-12. AIR CLEANER ASSEMBLY AND DUST UNLOADER MAINTENANCE (Cont'd)

10. Install dust unloader (16) on air cleaner assembly (9) and tighten clamp (15) to 45-50 lb-in. (5-6 N•m).
11. Install dust unloader cover (17) on support brackets (4) with four screws (18).



FOLLOW-ON TASK: Lower and secure hood (TM 9-2320-280-10).

3-13. AIR CLEANER FILTER ELEMENT SERVICING

This task covers:

- | | |
|--|--|
| <ul style="list-style-type: none"> a. Removal b. Inspection c. Emergency Cleaning | <ul style="list-style-type: none"> d. Cleaning e. Installation |
|--|--|

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Detergent (Appendix C, Item 17)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

Hood raised and secured (TM 9-2320-280-10).

General Safety Instructions

- Compressed air used for cleaning purposes will not exceed 30 psi (207 kPa).
- If NBC contamination is suspected, consult NBC officer or NBC NCO for appropriate handling instructions.

WARNING

- Improper cleaning methods and use of unauthorized cleaning liquids can injure personnel and cause damage to equipment. Do not use anything other than compressed air, water, and detergent to clean elements.
- If NBC contamination is suspected, consult NBC officer or NBC NCO for appropriate handling instructions.

a. Removal

1. Loosen bolt (8), and remove ring clamp (1), cover (2), and gasket (3) from air cleaner assembly (6).
2. Remove nut and washer assembly (7) and filter element (4) from stud (5) and air cleaner assembly (6).
3. Cover housing opening with screen or rag to prevent contaminants from entering the air intake system and damaging your engine.

b. Inspection

1. Check gasket (3) for dents, tears, rips, and other damage. Make sure the gasket has not taken a set. Make sure there are no hard dirt ridges on the sealing surfaces.
2. Inspect filter element (4) for holes and tears by looking through the element toward a bright light. If pinpoint of light shine through, replace the element. Holes that are large enough to let light through are large enough to let contaminants through. Another way to check for leaks or damage is to look for uneven dirt patterns. Make sure there is no rust or flaking paint on metal parts of the filter. If the filter has already been cleaned three times, or if you find damage, replace it.
3. Check air cleaner assembly (6) for holes, dents, rust, or any other damage that will interfere with proper sealing and allow unfiltered air to enter and destroy engine.

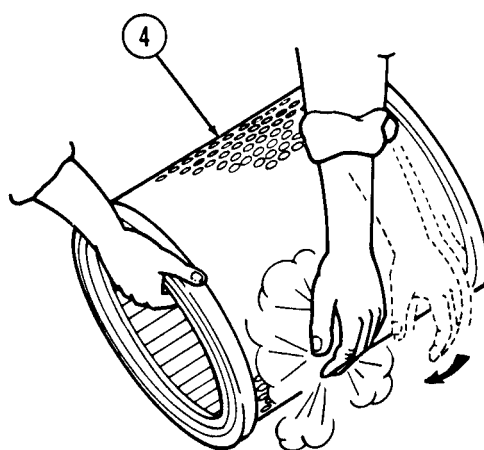
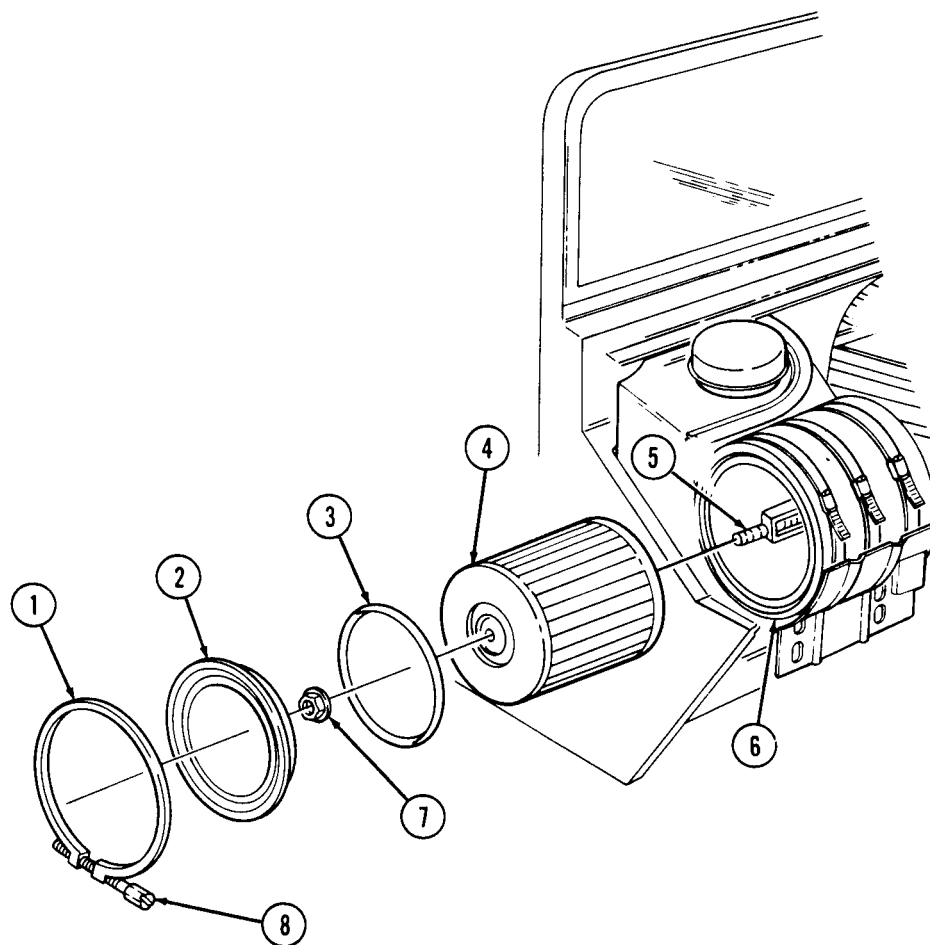
c. Emergency Cleaning

CAUTION

Do not strike ends of filter element on hard surface or damage to filter element may result.

Remove dust or sand from filter element (4) by holding it so neither end faces ground. Gently tap around filter element (4) to free dust and sand.

3-13. AIR CLEANER FILTER ELEMENT SERVICING (Cont'd)



3-13. AIR CLEANER FILTER ELEMENT SERVICING (Cont'd)

WARNING

Compressed air used for cleaning purpose will not exceed 30 psi (207 kPa). Use only with effective chip guarding and personnel protective equipment (goggles/shield, gloves, etc.).

d. Cleaning

1. Hold nozzle at least one inch away from element (1) and direct compressed air against clean side of element (1) (in direction opposite to normal air flow). Move air stream up and down length of pleats until you can not see dust being blown out.
2. Prepare a solution of five gallons warm water (80-110° F (26.7-43.3° C)) and approximately one cup of non-sudsing detergent in a container large enough to submerge the element (1). Never use gasoline or solvents of any kind to clean elements.
3. Immerse the element (1) completely in the cleaning solution. Swish for two minutes. Soak the element in the cleaning solution for 15 to 20 minutes, then swish it around again to remove contaminants.
4. Remove the element (1) from the solution and let it drain.
5. Rinse the element with cool water (35-80° F (1.7-26.7° C)) from clean side to dirty side (in direction opposite to normal air flow) with a gentle stream of water (no more than 40 psi (275.8 kpa)). If the clean side was contaminated during the soak cycle, rinse the element from both sides.
6. Air dry the element (1) at normal room temperature until completely dry. Usually overnight is adequate, but temperature and humidity will effect drying time. If you use circulating air, do not exceed 180° F (82.2° C). Do not use compressed air to speed drying time, you will damage your element.
7. Reinspect the element (1) and discard if damaged. If it checks out O.K., mark the date of cleaning on it.

e. Installation

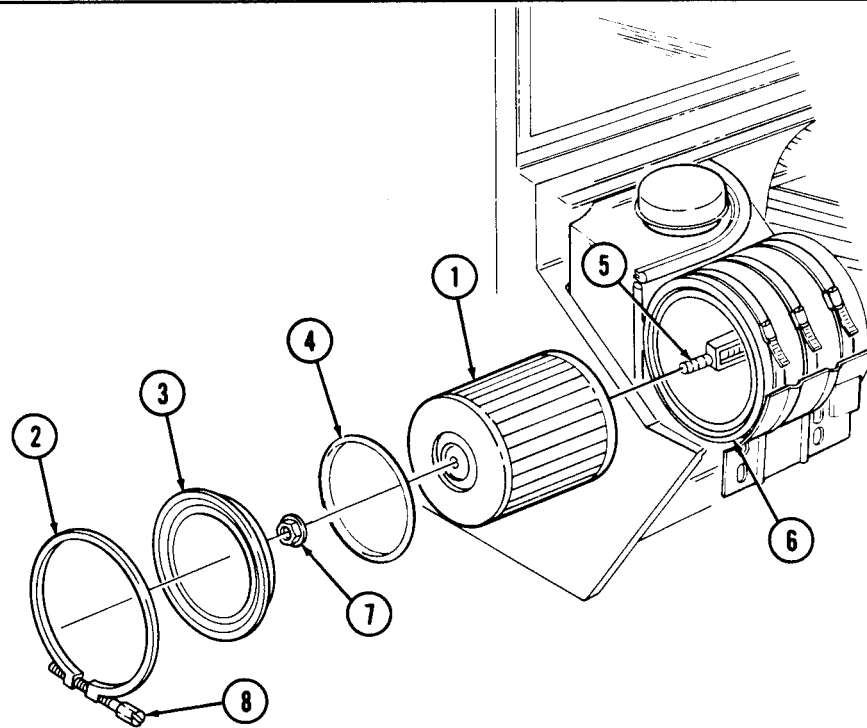
1. Remove screen or rag from housing opening.
2. Install filter element (1) into air cleaner assembly (6) and on stud (5) with nut and washer assembly (7). Tighten nut and washer assembly (7) to 20-40 lb-in (2-4 **N•m**).

CAUTION

When cover clamp is secured to end of filter body assembly, ensure the clamp bolt is between the three and six o'clock position to prevent damaging hood when hood is closed.

3. Install cover (3) and gasket (4) on air cleaner assembly (6) with ring clamp (2) as shown. Tighten bolt (8) to 35-40 lb-in (3-4 **N•m**).

3-13. AIR CLEANER FILTER ELEMENT SERVICING (Cont'd)



- FOLLOW-ON TASKS:
- Lower and secure hood (TM 9-2320-280-10).
 - Start engine (TM 9-2320-280-10) and ensure air restriction gauge on instrument panel does not show red.

3-14. AIR HORN REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Materials/Parts

Two flat washers (Appendix G, Item 37)
Gasket (Appendix G, Item 41)
Sealing compound (Appendix C, Item 40)

Equipment Condition

Hood raised and secured (TM 9-2320-280-10).

a. Removal

1. Remove two screws (2), washers (3), and flat washers (4) securing air horn (5) to intake manifold (7). Discard flat washers (4).
2. Loosen clamp (10) and disconnect air intake elbow (9) from air horn (5).

CAUTION

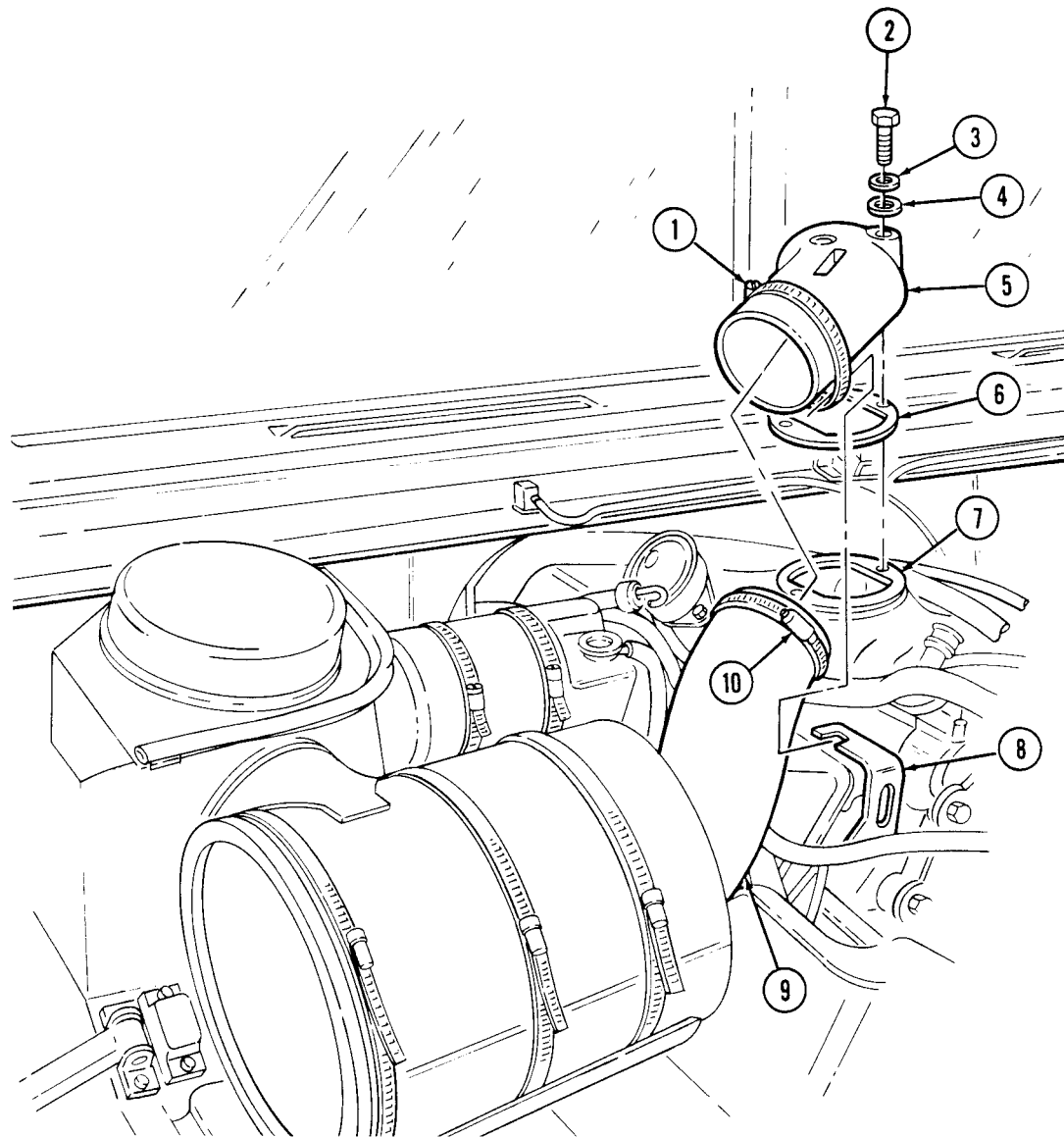
Cover opening of intake manifold to prevent foreign material from entering engine.

3. Loosen clamp (1) securing air horn (5) to engine lift bracket (8) and slide clamp (1) from engine lift bracket (8). Remove air horn (5) from intake manifold (7).
4. Remove gasket (6) from intake manifold (7). Discard gasket (6).
5. Remove clamp (1) from air horn (5).

b. Installation

1. Install clamp (1) on air horn (5).
2. Install gasket (6) on intake manifold (7).
3. Coat threads of screws (2) with sealing compound. Install air horn (5) on intake manifold (7) with two flat washers (4), washers (3), and screws (2). Tighten screws (2) to 40-45 lb-in. (5-6 N•m).
4. Connect elbow (9) to air horn (5) and tighten clamp (10) to 45-50 lb-in. (5-6 N•m).
5. Slide clamp (1) on engine lift bracket (8) and air horn (5) and tighten clamp (1) to 40-45 lb-in. (5-6 N•m).

3-14. AIR HORN REPLACEMENT (Cont'd)



FOLLOW-ON TASK: Lower and secure hood (TM 9-2320-280-10).

3-15. AIR HORN-TO-AIR CLEANER ELBOW REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

Hood raised and secured (TM 9-2320-280-10).

Manual References

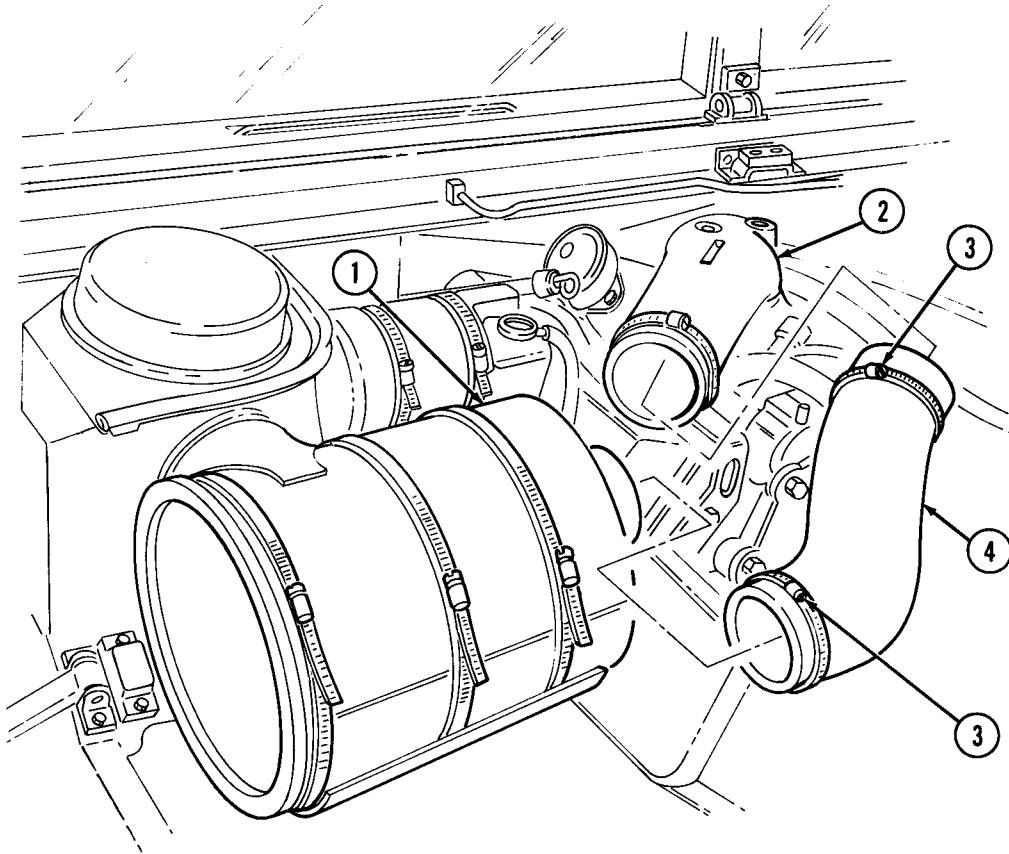
TM 9-2320-280-10
TM 9-2320-280-24P

a. Removal

1. Loosen two clamps (3) and remove elbow (4) from air cleaner assembly (1) and air horn (2).
2. Remove two clamps (3) from elbow (4).

b. Installation

1. Install two clamps (3) on elbow (4).
2. Connect elbow (4) to air cleaner assembly (1) and air horn (2) and tighten two clamps (3). Tighten clamps (3) to 40-45 lb-in. (5-6 N•m).



FOLLOW-ON TASK: Lower and secure hood (TM 9-2320-280-10).

3-16. AIR HORN SUPPORT BRACKET REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

All models except M997, M997A1, M997A2, M1036, M1037, M1042

Manual References

TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

Air horn removed (para. 3-14).

Materials/Parts

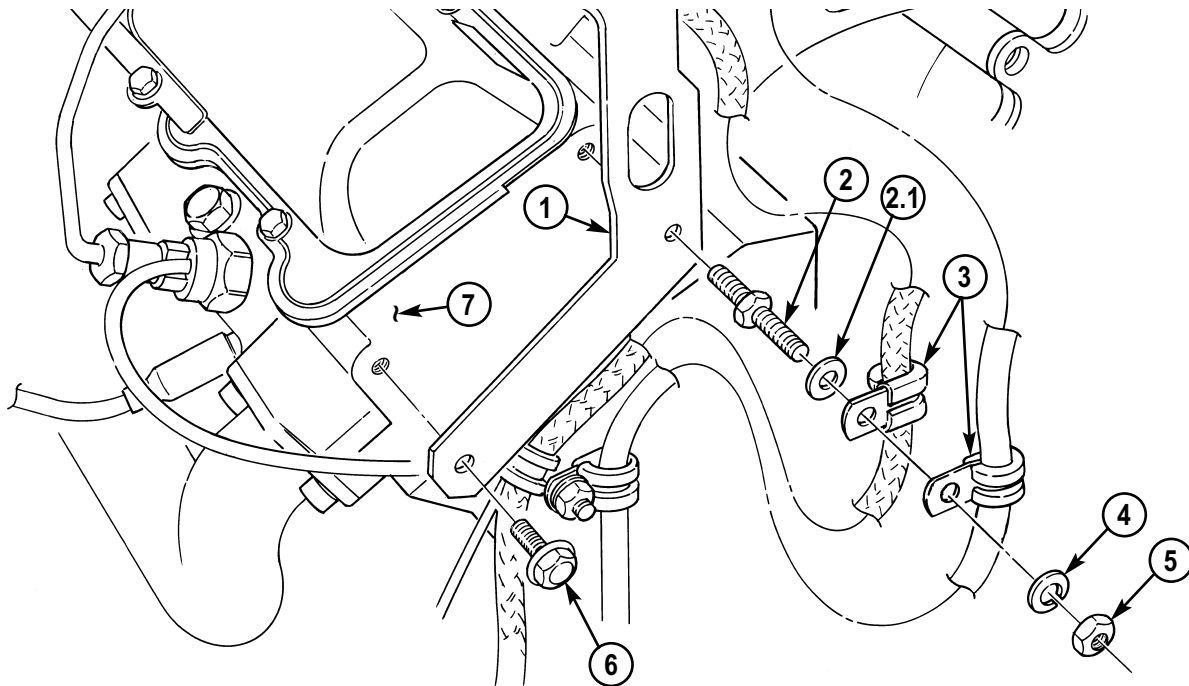
Lockwasher (Appendix G, Item 191)

a. Removal

1. Remove nut (5), lockwasher (4), two clamps (3), washer (2.1), and stud (2) from air horn support bracket (1) and cylinder head (7). Discard lockwasher (4).
2. Remove capscrew (6) and support bracket (1) from cylinder head (7).

b. Installation

1. Install air horn support bracket (1) on cylinder head (7) with stud (2).
2. Secure air horn support bracket (1) to cylinder head (7) with capscrew (6). Tighten capscrew (6) and stud (2) to 40 lb-ft (54 N•m).
3. Install washer (2.1) and two clamps (3) on stud (2) with lockwasher (4) and nut (5).



FOLLOW-ON TASK: Install air horn (para. 3-14).

3-17. AIR RESTRICTION GAUGE REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

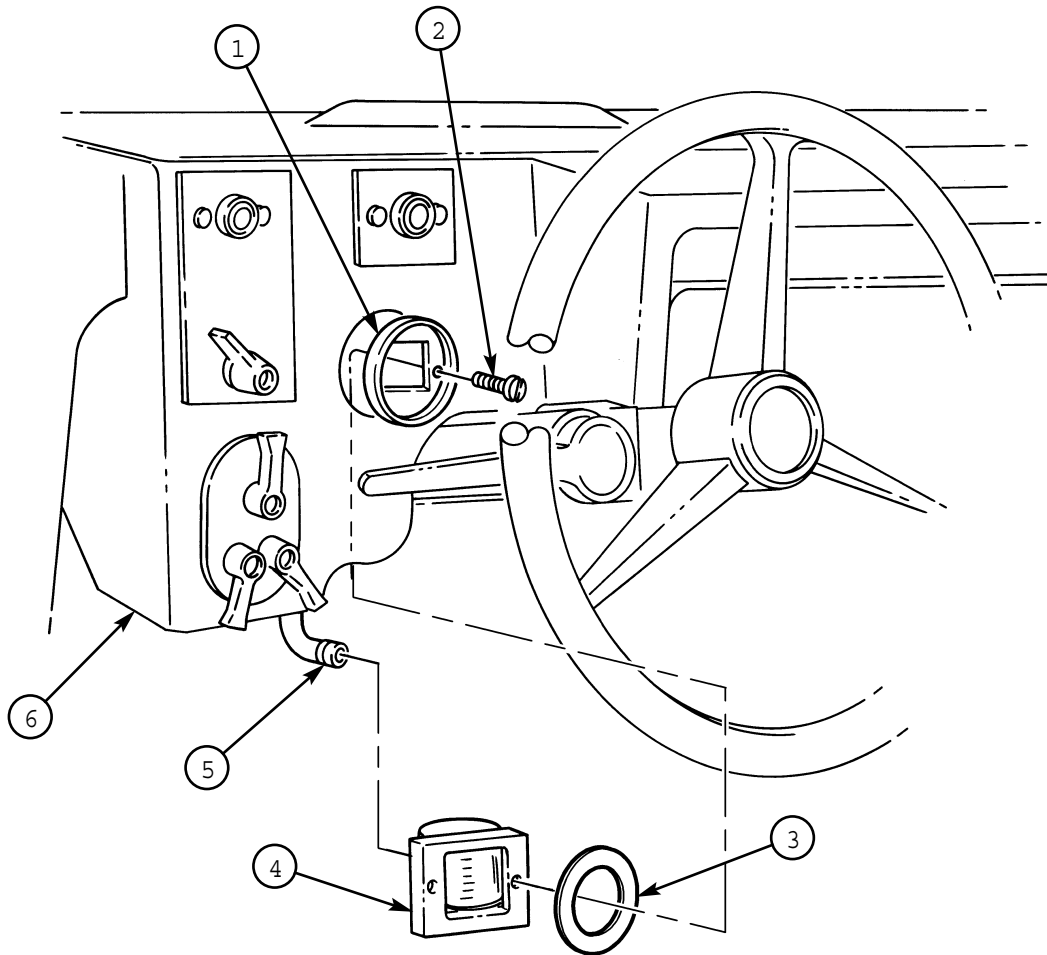
TM 9-2320-280-10
TM 9-2320-280-24P

a. Removal

1. Remove two screws (2) and bezel (1) from air restriction gauge (4), and remove gauge (4) and gasket (3) from behind dash panel (6).
2. Disconnect air restriction gauge hose (5) from gauge (4) and remove gauge (4).

b. Installation

1. Connect hose (5) to gauge (4).
2. Position gauge (4) and gasket (3) behind dash panel (6) and secure to bezel (1) with two screws (2).



FOLLOW-ON TASK: Start engine (TM 9-2320-280-10) and check operation of air restriction gauge.

3-18. WEATHERCAP REPLACEMENT

This task covers:

a. Removal**b. Installation**

INITIAL SETUP:

Tools

General mechanic's tool kit
automotive (Appendix B, Item 1)

Manual References

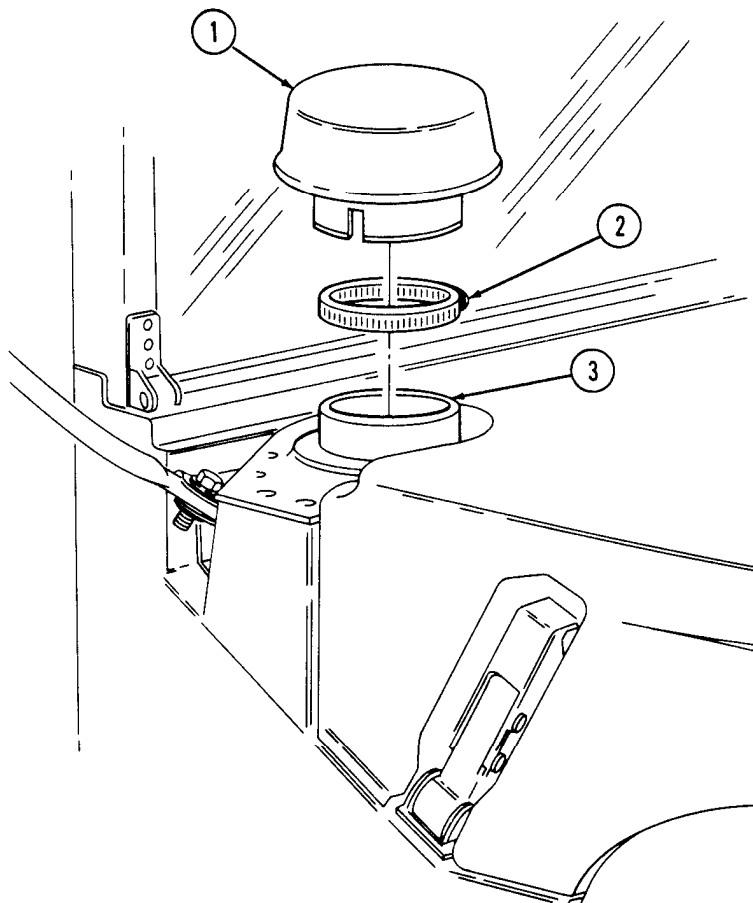
TM 9-2320-280-24P

a. Removal

Loosen clamp (2) and remove weathercap (1) from air intake duct (3).

b. Installation

Install weathercap (1) on air intake duct (3) with clamp (2). Tighten clamp (2) to 45-50 lb-in. (5-6 N•m).



3-19. AIR RESTRICTION GAUGE HOSE REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

- Engine access cover removed (para. 10-15).
- Hood raised and secured (TM 9-2320-280-10).

Manual References

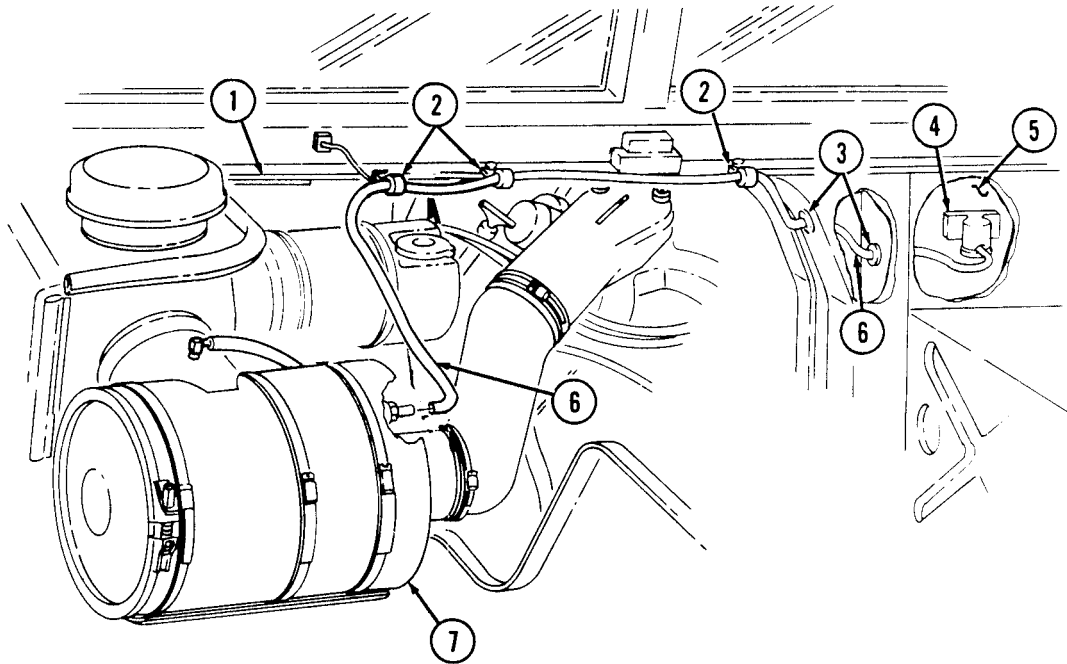
TM 9-2320-280-10
TM 9-2320-280-24P

a. Removal

1. Loosen three clamps (2) from air restriction gauge hose (6) and "A" beam (1).
2. Disconnect hose (6) from air cleaner assembly (7).
3. Disconnect hose (6) from air restriction gauge (4) located behind instrument panel (5).
4. Remove hose (6) by routing out from three clamps (2) through two grommets (3) in "A" beam (1).

b. Installation

1. Route hose (6) through three clamps (2) and two grommets (3) in "A" beam (1) to air cleaner assembly (7) and gauge (4).
2. Connect hose (6) to air cleaner assembly (7).
3. Connect hose (6) to gauge (4).
4. Tighten three clamps (2) on hose (6) and "A" beam (1).



- FOLLOW-ON TASKS:
- Install engine access cover (para. 10-15).
 - Lower and secure hood (TM 9-2320-280-10).

3-20. AIR INTAKE AND FUEL PUMP VENT LINES REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

Hood raised and secured (TM 9-2320-280-10).

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

NOTE

For fuel pump vent line replacement, perform steps 2, 3, and 4 only.

a. Removal

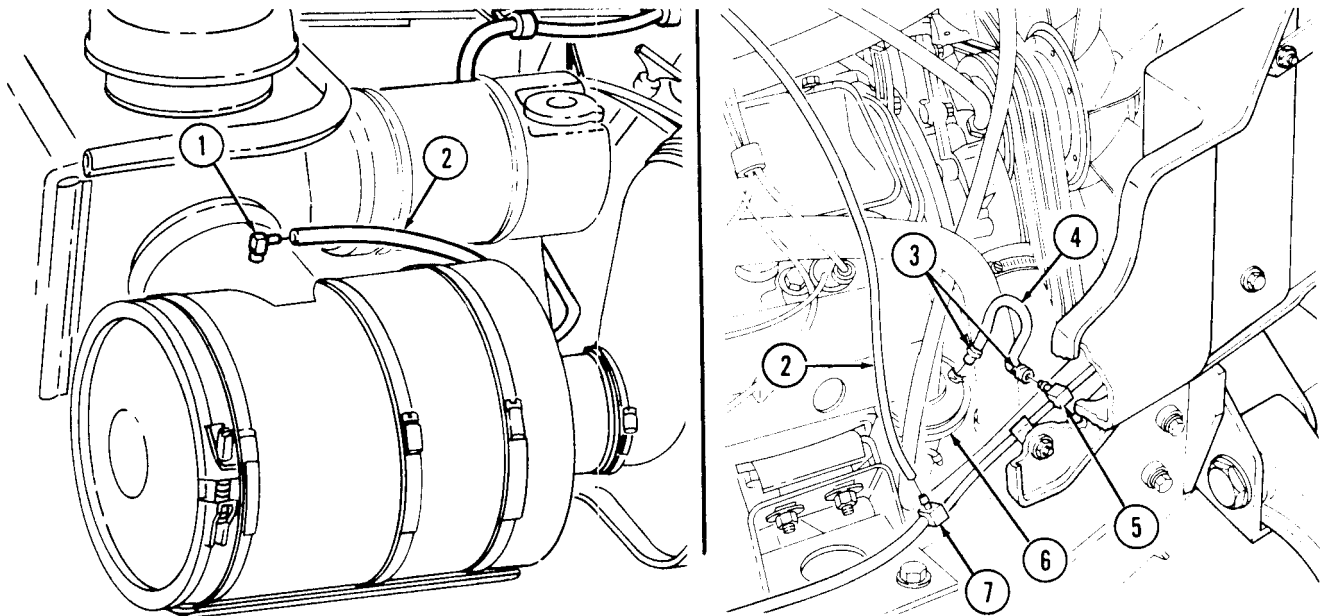
1. Remove vent line (2) from air cleaner fitting (1) and tee fitting (7).
2. Loosen clamp (3) and disconnect vent line (4) from fuel pump (6).
3. Loosen clamp (3) and remove vent line (4) from tee fitting (5).
4. Remove two clamps (3) from vent line (4).

b. Installation

NOTE

For fuel pump vent line replacement, perform steps 2 and 3.

1. Connect vent line (2) to tee fitting (7) and air cleaner fitting (1).
2. Install two clamps (3) to vent line (4).
3. Install vent line (4) on tee fitting (5) and fuel pump (6) and tighten two clamps (3).



FOLLOW-ON TASK: Lower and secure hood (TM 9-2320-280-10).

3-21. DRAINAGE BRACKET REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

Air cleaner assembly removed (para. 3-12).

Manual References

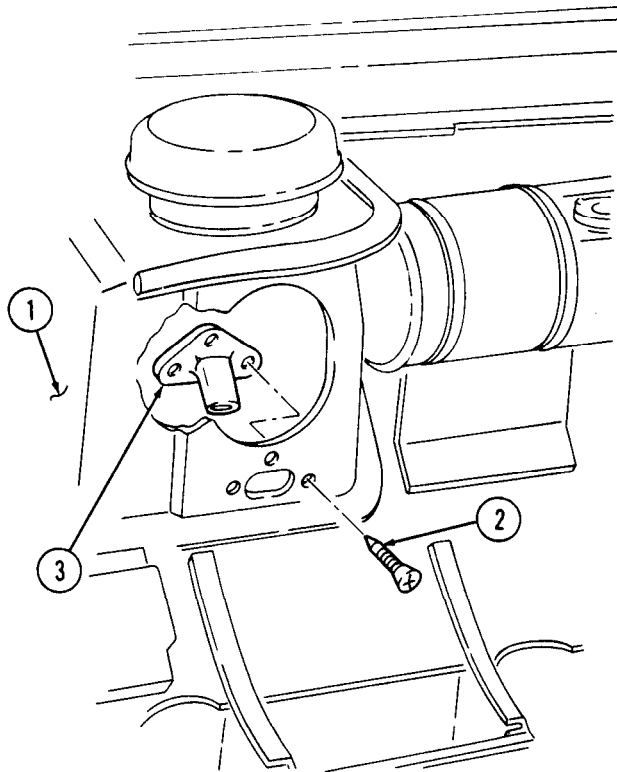
TM 9-2320-280-24P

a. Removal

Remove three screws (2) and drainage bracket (3) from body (1).

b. Installation

Install drainage bracket (3) on body (1) with three screws (2).



FOLLOW-ON TASK: Install air cleaner assembly (para. 3-12).

3-22. FUEL INJECTION PUMP BOOT REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

Hood raised and secured (TM 9-2320-280-10).

Manual References

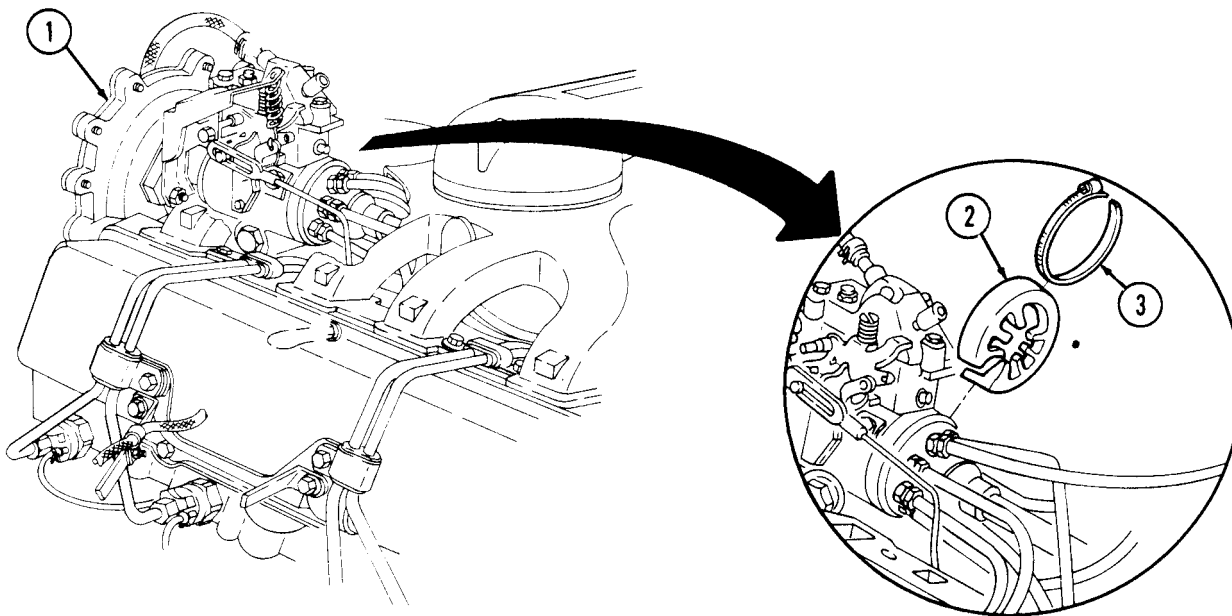
TM 9-2320-280-10
TM 9-2320-280-24P

a. Removal

Remove clamp (3) and boot (2) from injection pump (1).

b. Installation

Install boot (2) on injection pump (1) with clamp (3).



FOLLOW-ON TASK: Lower and secure hood (TM 9-2320-280-10)

3-23. FUEL PUMP REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Mounting plate gasket (Appendix G, Item 198)
Fuel pump gasket (Appendix G, Item 40)
Grease (Appendix C, Item 22)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

Battery ground cable disconnected (para. 4-73).

General Safety Instructions

- Do not perform this procedure near fire, flames, or sparks.
- Gaskets installed on some 6.2L engines assembled prior to 1991 may contain asbestos. Gaskets should be disposed of IAW current directives.

WARNING

Diesel fuel is highly flammable. Do not perform this procedure near fire, flames, or sparks. Severe injury or death will result.

a. Removal

CAUTION

Cover or plug all open hoses and connections immediately after disconnection to prevent contamination. Remove all plugs prior to connection.

NOTE

Have drainage container ready to catch fuel.

1. Loosen clamp (14) and disconnect fuel inlet line (13) from fuel pump (2) and allow fuel to drain into container.
2. Disconnect fuel outlet line (12) from fuel pump (2) and allow fuel to drain into container.
3. Loosen clamp (3) and disconnect vent line (4) from fuel pump (2).

WARNING

Gaskets installed on some 6.2L engines assembled prior to 1991 may contain asbestos. Gaskets should be removed with a scraper or putty knife and then be disposed of IAW current directives. Inhalation of asbestos fibers can cause respiratory ailments.

4. Remove two capscrews (1), fuel pump (2) and gasket (6) from fuel pump mounting plate (7). Discard gasket (6).
5. Remove two capscrews (11), fuel pump mounting plate (7) and gasket (8) from cylinder block (10). Discard gasket (8).
6. Remove pushrod (9) from cylinder block (10).

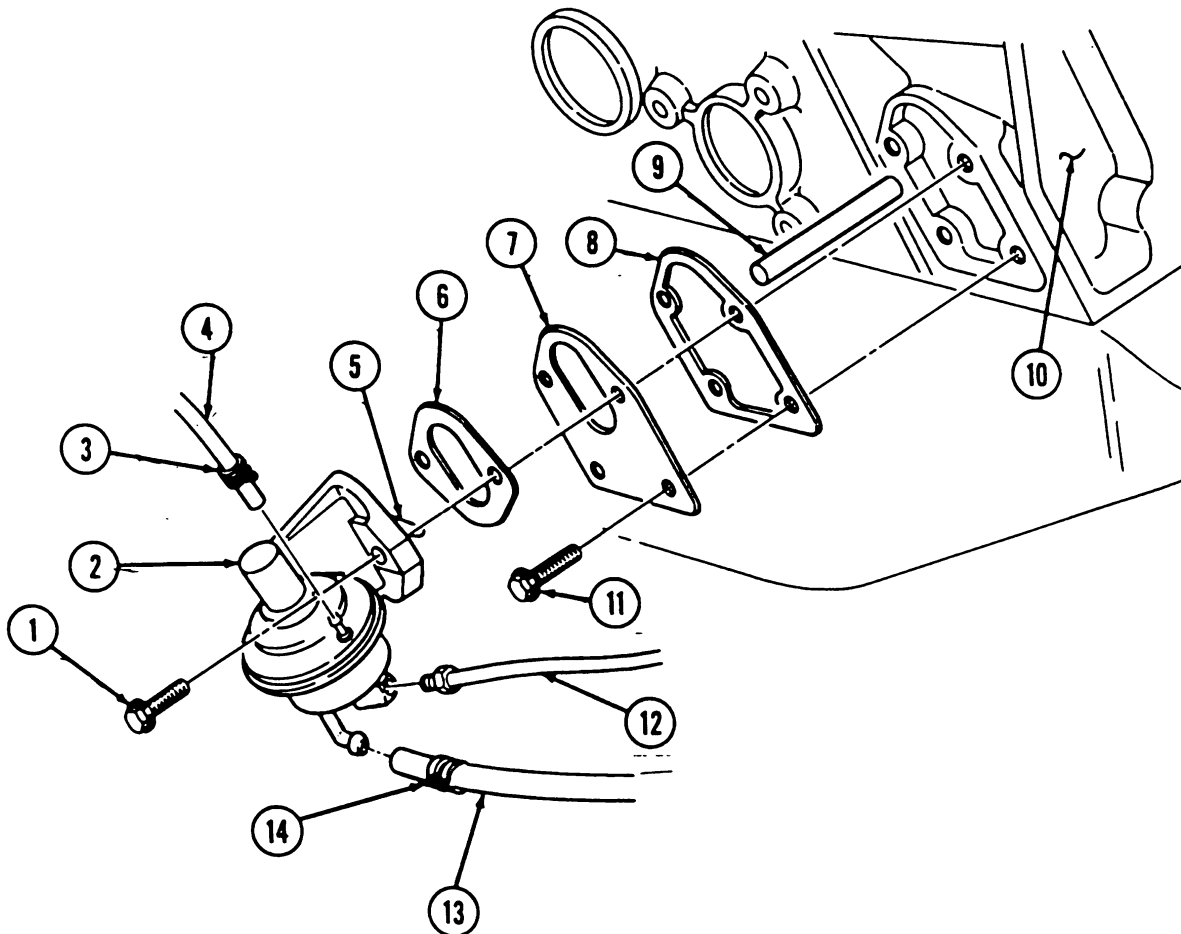
3-23. FUEL PUMP REPLACEMENT (Cont'd)

b. Installation

NOTE

Place GAA grease on pushrod to retain in cylinder block during installation.

1. Insert pushrod (9) into cylinder block (10).
2. Install gasket (8) and mounting plate (7) into block (10) with two capscrews (1) for alignment of pump (2) to cylinder block (10).
3. Secure gasket (8) and mounting plate (7) to cylinder block (10) with two capscrews (11). Tighten capscrews (11) to 4-7 lb-ft (5-10 N•m) then remove two capscrews (1).
4. Install gasket (6) and fuel pump (2) on fuel pump mounting plate (7) and block (10), ensuring alignment of lever (5) to pushrod (9) with two capscrews (1). Tighten capscrews (1) to 20-30 lb-ft (27-41 N•m).
5. Connect vent line (4) to fuel pump (2) and tighten clamp (3) to 10-20 lb-in. (1-2 N•m).
6. Connect fuel outlet line (12) to fuel pump (2).
7. Connect fuel inlet line (13) to fuel pump (2) and tighten clamp (14).



- FOLLOW-ON TASKS:
- Connect battery ground cable (para 4-73).
 - Start engine (TM 9-2320-280-10) and check fuel pump and hoses for fuel leaks.

3-24. FUEL TANK MAINTENANCE (Cont'd)

This task covers:

- | | |
|---|--|
| <ul style="list-style-type: none"> a. Draining b. Removal c. Disassembly | <ul style="list-style-type: none"> d. Cleaning and Inspection e. Assembly f. Installation |
|---|--|

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Materials/Parts

- Access cover gasket (Appendix G, Item 1)
- Fifteen locknuts (Appendix G, Item 70)
- Adhesive (Appendix C, Item 1)
- Sealing compound (Appendix C, Item 46)
- Drycleaning solvent (Appendix C, Item 18)
- Twelve O-rings (Appendix G, Item 215)

Equipment Condition

- Battery ground cable disconnected (para. 4-73).
- Rear propeller shaft removed (para. 6-4).

General Safety Instructions

- Do not perform this procedure near fire, flames, or sparks.
- Cleaning will be done in a well-ventilated area and a fire extinguisher will be kept nearby when solvent is used.

Personnel Required

One mechanic
One assistant

WARNING

Diesel fuel is highly flammable. Do not perform this procedure near fire, flames, or sparks. Severe injury or death will result.

NOTE

Have drainage container ready to catch fuel.

a. Draining

1. Remove fuel tank filler cap (1).
2. Remove drainplug (3) from fuel tank (2). Allow fuel to completely drain into container.

CAUTION

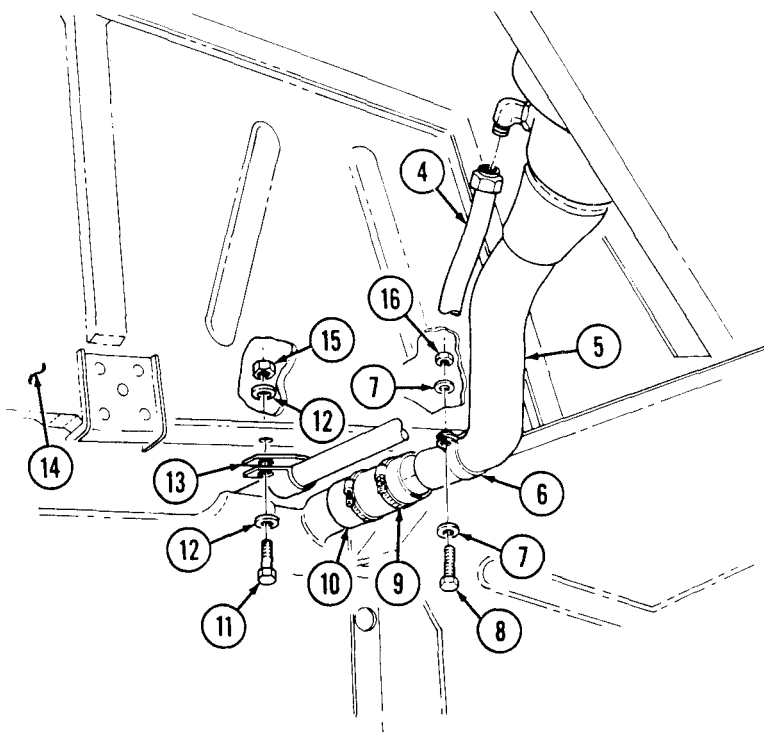
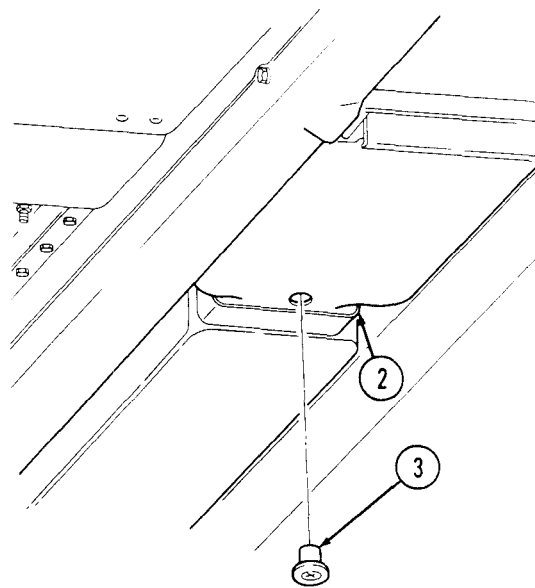
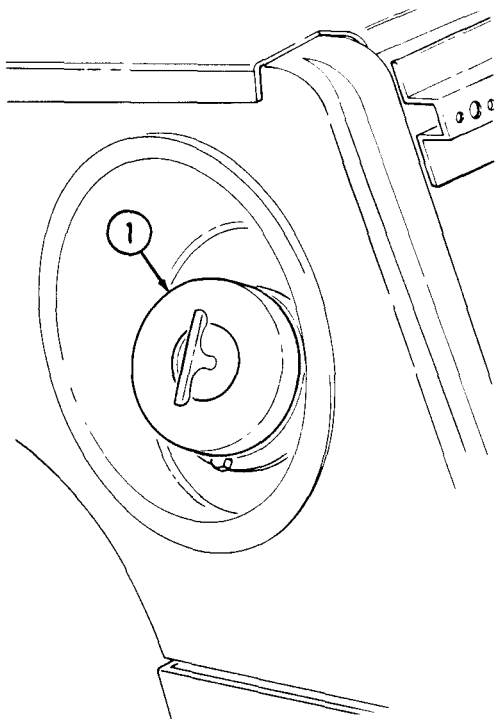
Do not overtighten drainplug. Drainplug must not turn in hole. Sharp edge of hole may cut rubber.

3. Install drainplug (3) flush with bottom of fuel tank (2) and tighten.

b. Removal

1. Disconnect large vent line (4) from filler spout (5).
2. Remove locknut (15), washer (12), capscrew (11), washer (12), and clamp (13) from vent line (4) and body (14). Discard locknut (15).
3. Remove locknut (16), washer (7), capscrew (8), washer (7) and clamp (6) from filler spout (5). Discard locknut (16).
4. Loosen clamp (9) and remove hose (10) from filler spout (5).

3-24. FUEL TANK MAINTENANCE (Cont'd)



3-24. FUEL TANK MAINTENANCE (Cont'd)

5. Remove two nuts (15), washers (14), and capscrews (7) from fuel tank support straps (6) and (12) and remove lower straps (13).
6. Loosen two clamps (3) and disconnect fuel supply hoses (1) and (2) from fuel return line (4) and supply line (5).

NOTE

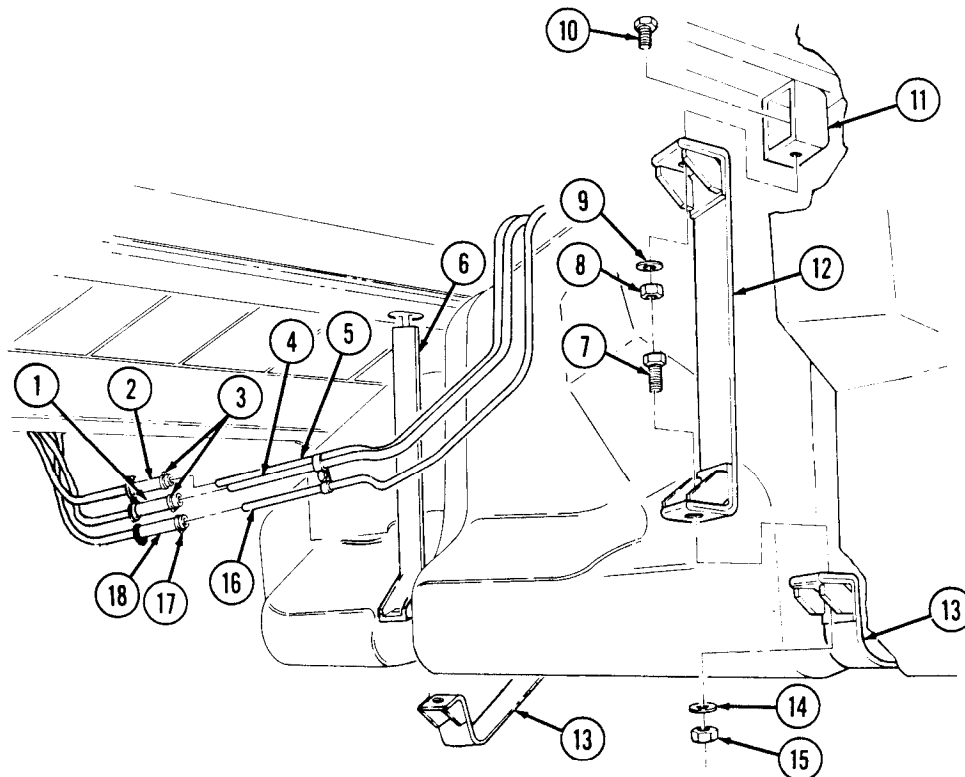
Perform step 7 if vehicle is equipped with an arctic heater and/or troop/cargo wintenzation kit.

7. Loosen clamp (17) and disconnect fuel supply hose (18) from arctic heater and/or troop/cargo heater fuel supply line (16).
8. Disconnect vent line (20) from tee (19).
9. Remove capscrew (22) and clamp (23) securing vent line (20) to body (24).
10. Remove locknut (8), washer (9), capscrew (10) and rear strap (12) from strap bracket (11). Discard locknut (8).
11. Lower fuel tank (21) for access to vent line (29) and clamp (28).
12. Disconnect vent line (20) from fitting (25) on fuel tank (21).
13. Remove locknut (26) and washer (27) securing clamp (28) and vent line (29) to fuel tank (21). Discard locknut (26).
14. Disconnect vent line (29) from vent line housing (30).

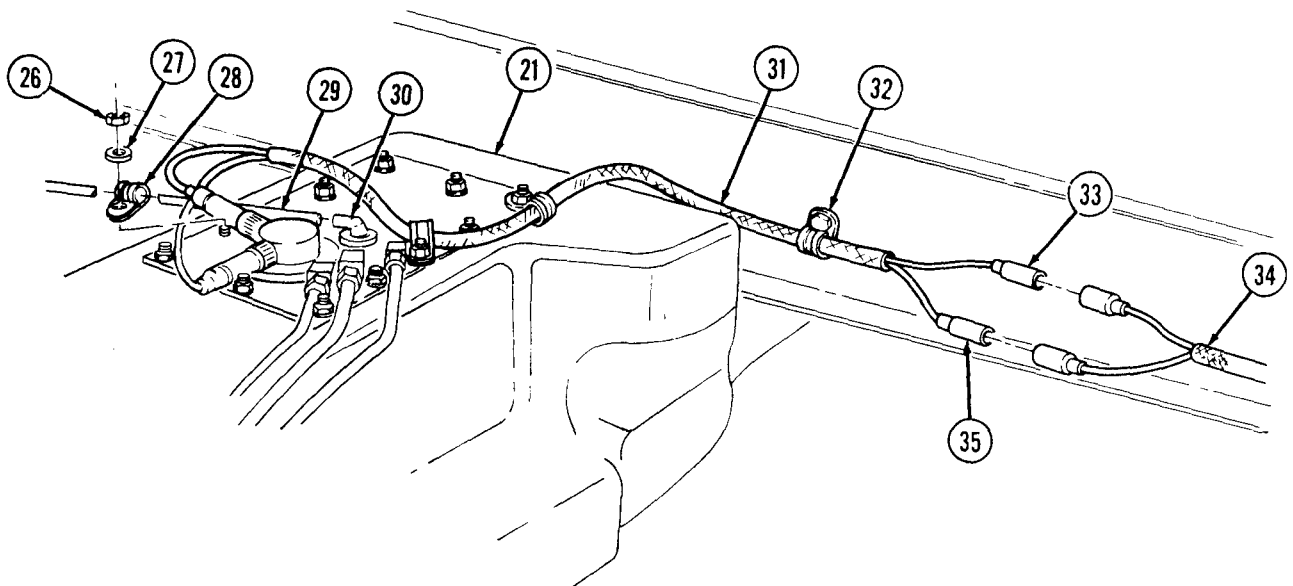
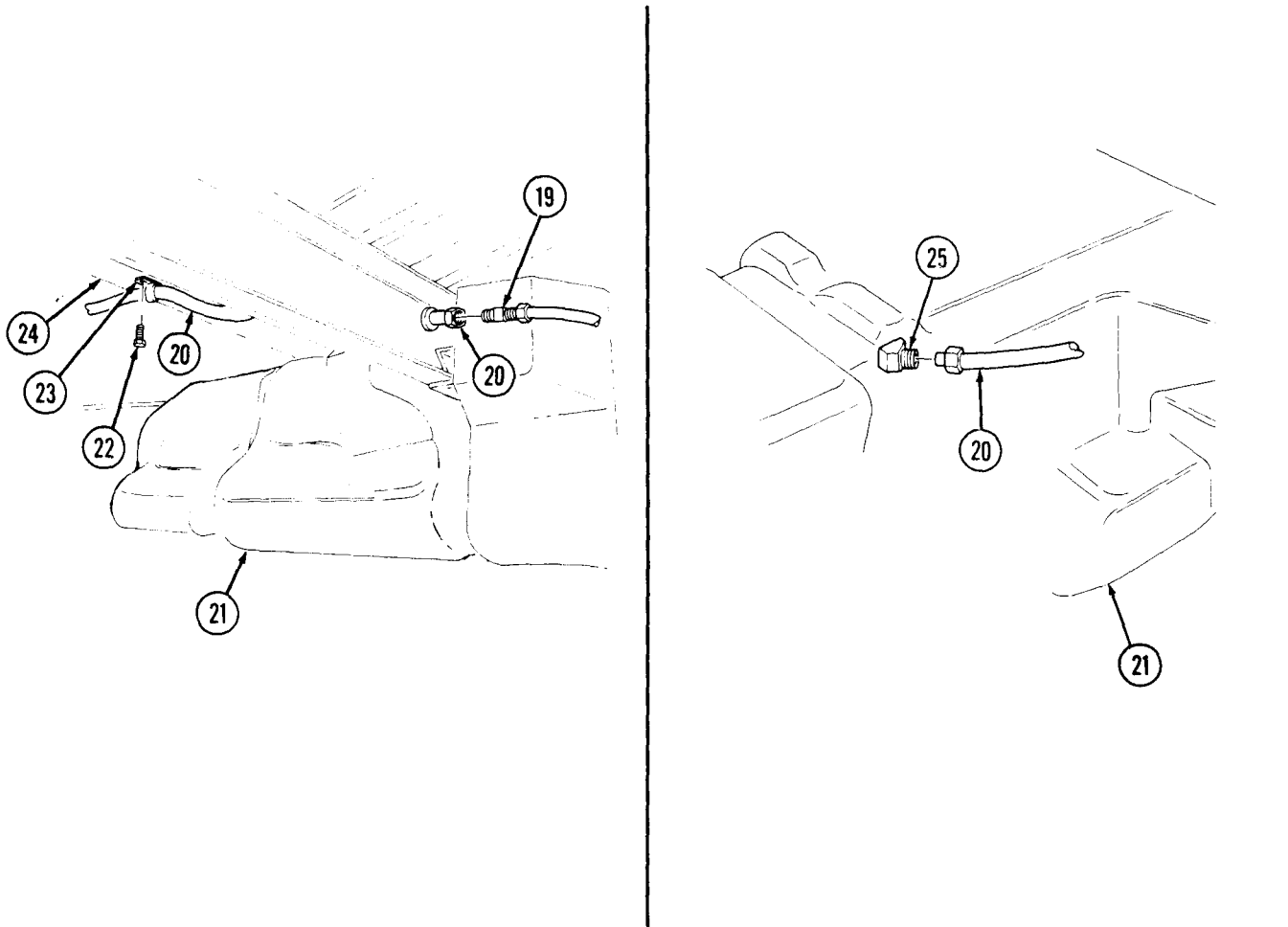
NOTE

Prior to removal, tag leads for installation.

15. Disconnect jumper leads 58J (33) and 28B (35) from body wiring harness (34).
16. Bend clamp (32) down and remove jumper harness (31).
17. Remove fuel tank (21) from vehicle.



3-24. FUEL TANK MAINTENANCE (Cont'd)



3-24. FUEL TANK MAINTENANCE (Cont'd)

c. Disassembly

1. Thoroughly clean outside of tank (17) to prevent dirt contamination.
2. Disconnect fuel supply line (26) from fuel supply tube (12) and fuel return line (25) from fuel return tube (29).

NOTE

Perform step 3 if vehicle is equipped with an arctic heater.

3. Disconnect arctic heater fuel supply line (20) from arctic heater fuel supply tube (13).
4. Remove capscrew (22) and clamp (24) securing fuel supply line (26), fuel return line (25), and shield (21) to fuel tank (17). Remove arctic heater fuel supply line (20), and clamp (23) if installed.
5. Remove two locknuts (6) and washers (7) securing two clamps (8) and jumper harness (5) to access cover (11). Discard locknuts (6).

NOTE

Prior to removal, tag leads for installation.

6. Disconnect jumper harness leads 28B (1) and 58J (2) from fuel level sender (30) and remove jumper harness (5).

NOTE

Perform steps 7 and 8 for vehicles with fuel tank P/N 12358588.

7. Remove nine locknuts (9) and washers (10) securing access cover (11), gasket (28), and retainer (27) to fuel tank (17). Discard locknuts (9).
8. Remove access cover (11), gasket (28), and retainer (27) from fuel tank (17). Discard gasket (28).

NOTE

Perform steps 8.1 through 8.5 for vehicles with fuel tank P/N 12460105.

- 8.1. Remove nine locknuts (9), washers (10), access cover (11), gasket (28), and retainer (19.2) from fuel tank (17). Discard locknuts (9) and gasket (28).
- 8.2. Remove eight capscrews (19.4), washers (19.3), and retainer (19.2) from support baffle (19.8).
- 8.3. Remove twelve O-rings (19.1) from retainer (19.2). Discard O-rings (19.1).
- 8.4. Remove four locknuts (19.6), washers (19.7), and support baffle (19.8) from fuel tank baffle (19.5). Discard locknuts (19.6).
- 8.5. Remove support baffle (19.8) and fuel tank baffle (19.5) from fuel tank (17).
9. Match mark position of elbow fittings on access cover (11).

NOTE

Note position of fuel strainer for installation.

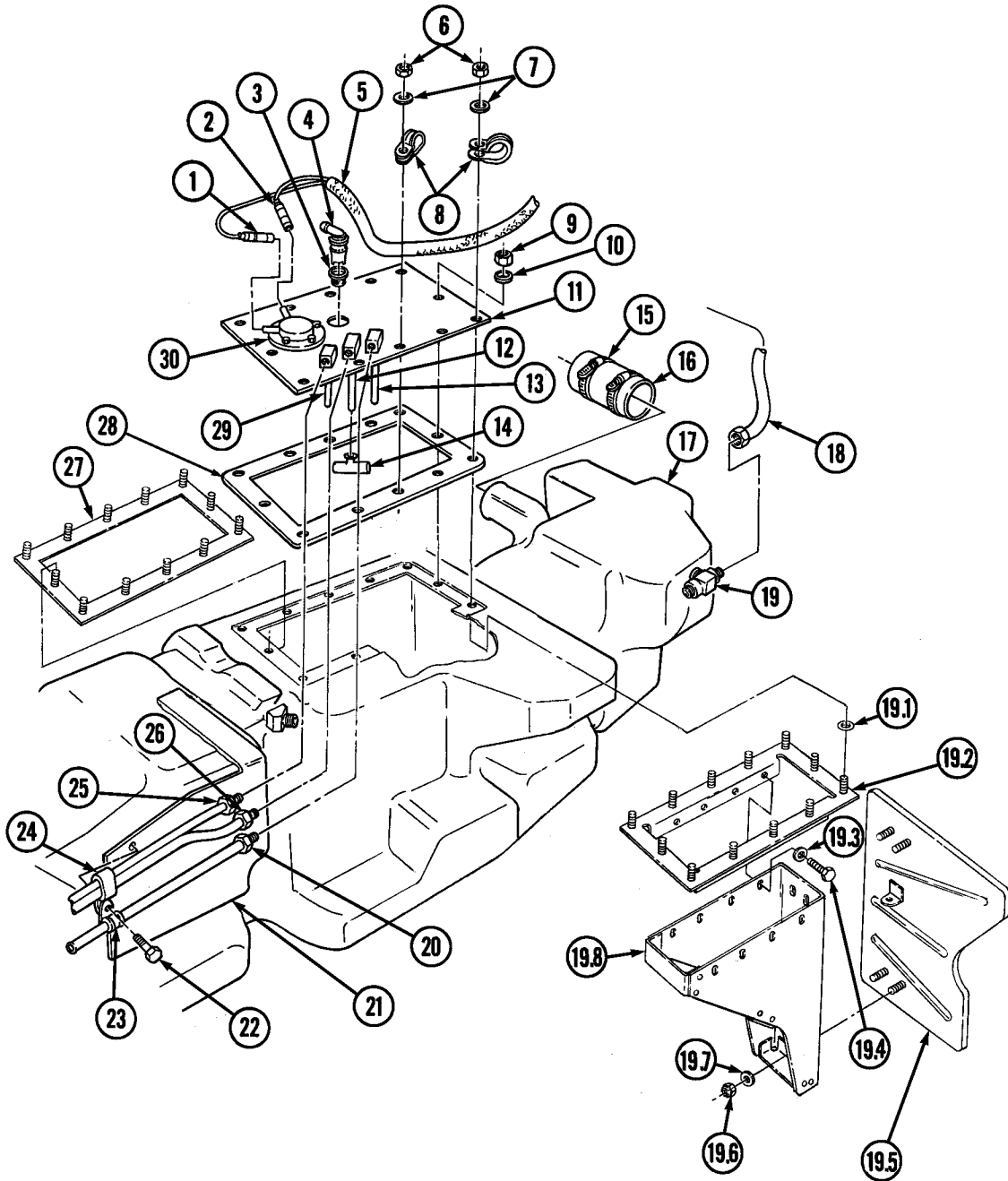
10. Remove fuel strainer (14) from fuel supply tube (12).
11. Remove fuel supply tube (12) from access cover (11).
12. Remove fuel return tube (29) from access cover (11).

NOTE

- Perform step 13 if vehicle is equipped with an arctic heater.
- Vehicles not equipped with an arctic winterization kit will have a plug instead of an arctic heater fuel supply tube.

13. Remove arctic heater fuel supply tube (13) from access cover (11).
14. Remove vent valve (4) and grommet (3) from access cover (11).
15. Remove vent line (18) from tee (19).
16. Loosen clamp (15) and remove filler spout hose (16) from tank (17).

3-24. FUEL TANK MAINTENANCE(Cont'd)



3-24. FUEL TANK MAINTENANCE (Cont'd)

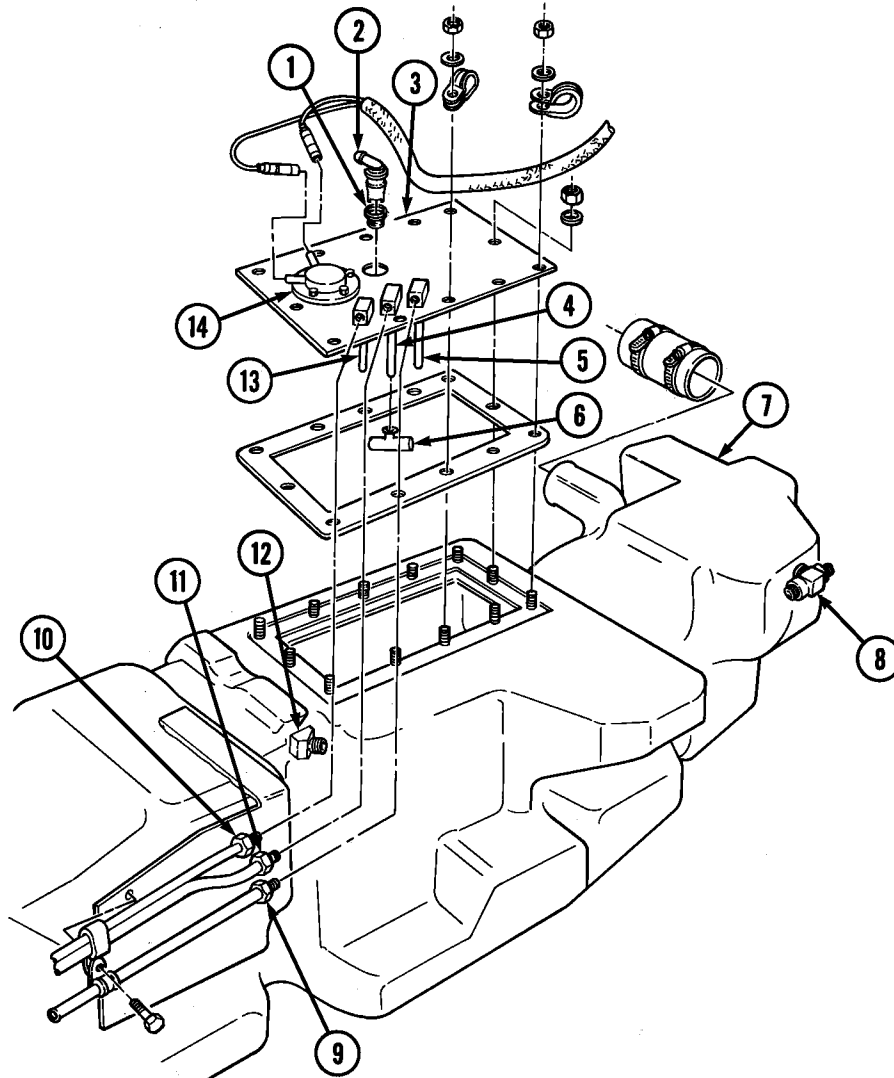
d. Cleaning and Inspection

WARNING

Drycleaning solvent is flammable and will not be used near an open flame. A fire extinguisher will be kept nearby when the solvent is used. Use only in well-ventilated places. Failure to do this may result in injury to personnel or damage to equipment.

1. Use drycleaning solvent to clean access cover (3), fuel supply line (11), fuel return line (10), arctic heater fuel supply line (9), fuel supply tube (4), fuel return tube (13), arctic heater fuel supply tube (5), and inside fuel tank (7).
2. Inspect access cover (3), fuel supply line (11), fuel return line (10), fuel supply tube (4), fuel return tube (13), strainer (6), tee (8), fitting (12), vent line housing (2), and grommet (1) for cracks, wear, and breaks. Replace if cracked, worn, or broken.
3. Inspect arctic heater fuel supply line (9) and arctic heater fuel supply tube (5) for cracks, wear, and breaks, if installed. Replace if cracked, worn, or broken.
4. Inspect sending unit (14) for damage. Replace if damaged.

3-24. FUEL TANK MAINTENANCE(Cont'd)



3-24. FUEL TANK MAINTENANCE (Cont'd)

e. Assembly

NOTE

- Use pipe sealant on all vent line and fuel line connector threads before installation.
- Use fittings from old tank if installing new tank.

1. Install vent line (18) to tee fitting (19).
2. Install filler spout hose (16) on tank (17) and secure with clamp (15).
3. Apply sealing compound to threads of fuel supply tube (12), and install and align fuel supply tube (12) on access cover (11).
4. Apply sealing compound to threads of fuel return tube (29), and install and align fuel return tube (29) on access cover (11).

NOTE

Perform step 5 only if vehicle has an arctic heater installed.

5. Apply sealing compound to threads of arctic heater fuel supply line (13), and install and align arctic heater fuel supply line (13) on access cover (11).
6. Install grommet (3) and vent valve (4) to access cover (11).
7. Install fuel strainer (14) on fuel supply tube (12).

NOTE

Perform steps 7.1 through 7.4 for vehicles with fuel tank P/N 12460105.

- 7.1 Insert fuel tank baffle (19.5) and support baffle (19.8) into fuel tank (17).
- 7.2 Secure support baffle (19.8) to fuel tank baffle (19.5) with four washers (19.7) and locknuts (19.6).
- 7.3 Install twelve O-rings (19.1) on retainer (19.2), and secure retainer (19.2) to support baffle (19.8) with eight washers (19.3) and capscrews (19.4).
- 7.4 Apply adhesive to threads of nine locknuts (9), and install retainer (19.2), gasket (28), and access cover (11) on fuel tank (17) and with nine washers (10) and locknuts (9). Tighten locknuts (9) to 72 lb-in. (8 N•m).

NOTE

Perform step 8 for vehicles with fuel tank P/N 12358588.

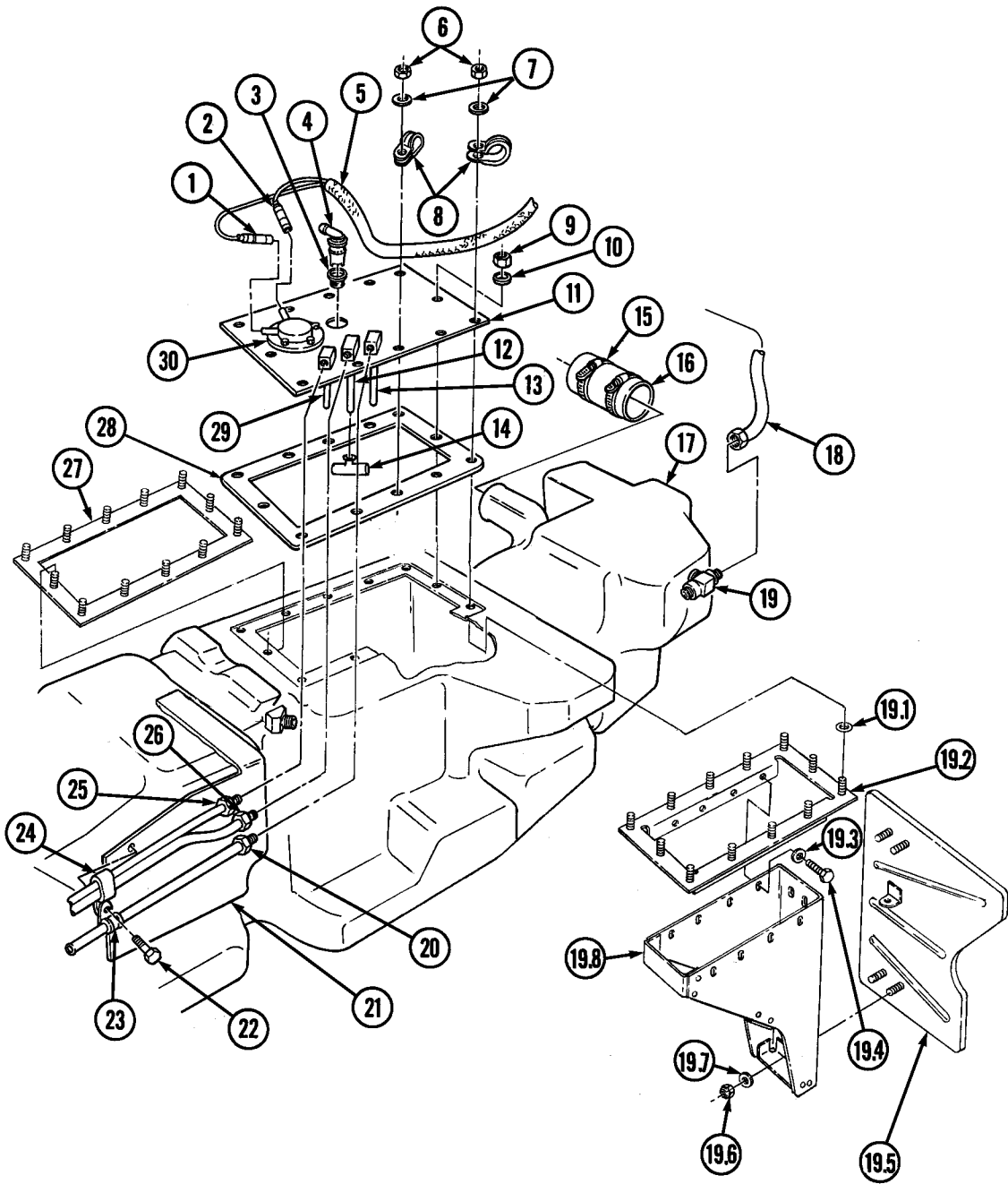
8. Apply adhesive to threads of nine locknuts (9), and install retainer (27), gasket (28), and access cover (11) on fuel tank (17) with nine washers (10) and locknuts (9). Tighten locknuts (9) to 72 lb-in. (8 N•m).
9. Connect jumper harness leads 28B (1) and 58J (2) to fuel level sender (30).
10. Apply adhesive to threads of two locknuts (6) and secure jumper harness (5) to fuel tank (17) with two clamps (8), washers (7), and locknuts (6). Tighten locknuts (6) to 72 lb-in. (8 N•m).
11. Connect fuel supply line (26) to fuel supply tube (12), and fuel return line (25) to fuel return tube (29).

NOTE

Perform step 12 if vehicle has an arctic heater installed.

12. Connect arctic heater fuel supply line (20) to arctic heater fuel supply tube (13).
13. Secure shield (21), return line (25), supply line (26), clamp (24), and arctic heater fuel supply line (20) and clamp (23) if installed, to fuel tank (17) with capscrew (22).

3-24. FUEL TANK MAINTENANCE(Cont'd)



3-24. FUEL TANK MAINTENANCE (Cont'd)

f. Installation

1. Position fuel tank (5) under vehicle.
2. Install jumper harness (6) on clamp (7) and bend clamp (7) up.
3. Connect jumper harness leads 58J (8) and 28B (10) to body wiring harness (9).

NOTE

Use sealing compound on all vent line connector threads before installation.

- 3.1. Connect vent line (4) to vent line housing (4.1).
4. Connect vent line (4) to fuel tank (5) with clamp (3), washer (2), and locknut (1). Tighten locknut (1) to 6 lb-ft (8 N·m).
5. Connect vent line (12) on fitting (11) on fuel tank (5).

NOTE

Apply adhesive to threads of capscrews.

6. Install rear strap (23) on strap bracket (22) with capscrew (21), washer (20), and locknut (19). Tighten locknut (19) to 37 lb-ft (50 N·m).

NOTE

Ensure front straps are flush with fuel tank and to right side of dimple in slot.

7. Raise fuel tank (5) and install two support straps (24) to straps (17) and (23) with two capscrews (18), washers (25), and locknuts (26). Do not tighten locknuts (26).
8. Connect vent line (12) to tee (31) on vent line (38).
9. Secure vent line (12) to body (34) with clamp (33) and screw (32).
10. Connect fuel supply hoses (13) and (30) to fuel return and supply lines (16) and (15) and secure with clamps (14).

NOTE

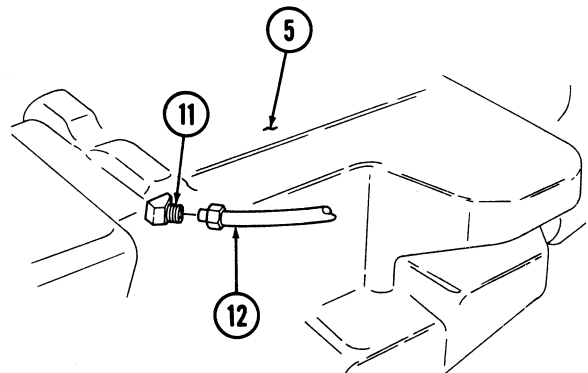
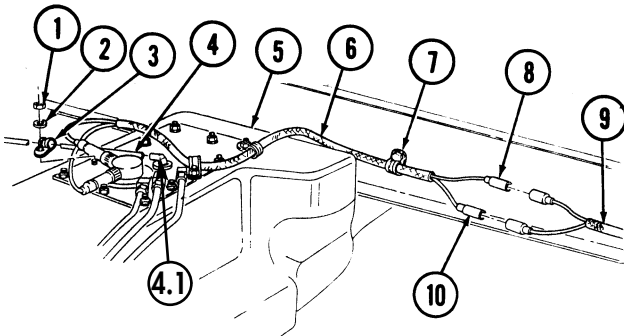
Perform step 11 if vehicle is equipped with an arctic heater and/or troop/cargo winterization kit.

11. Connect fuel supply hose (29) to arctic heater and/or troop/cargo heater fuel supply line (27) and secure with clamp (28).

NOTE

Ensure upper and lower straps are 1/2 in. (12 mm) apart after tightening nuts. Straps should not touch when properly installed. Straps must be replaced if upper or lower straps touch.

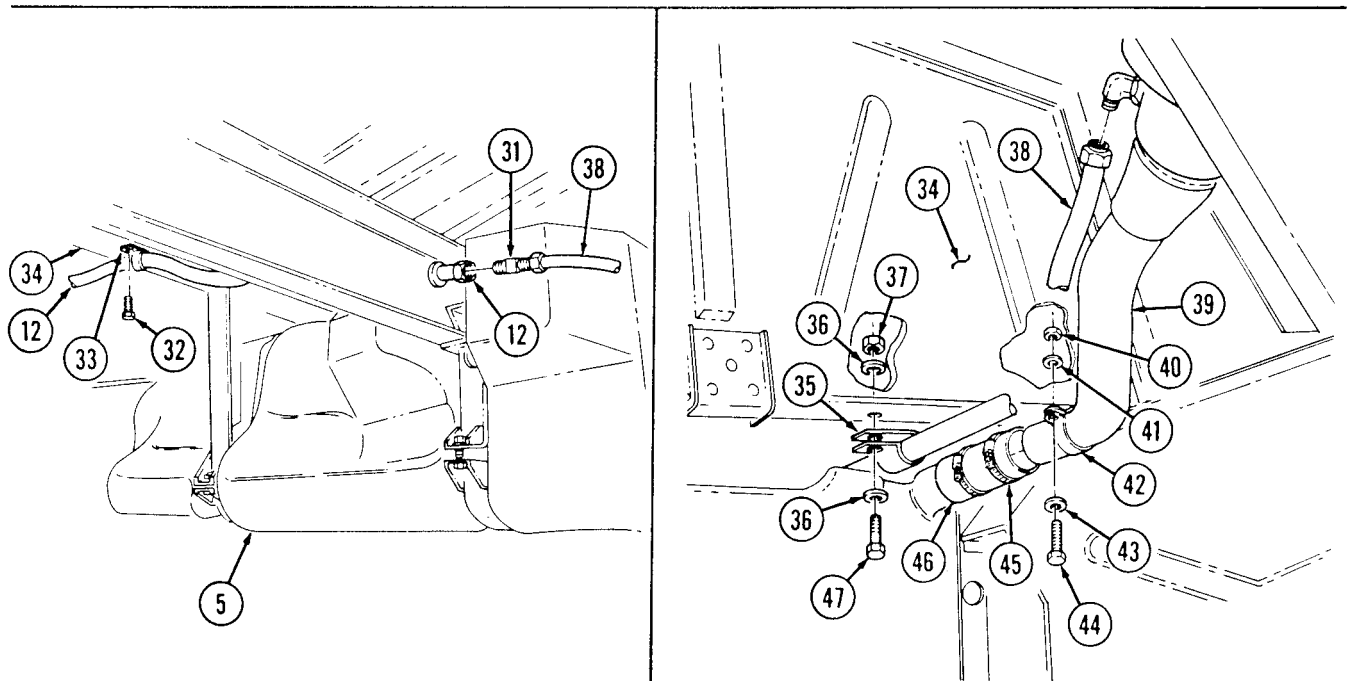
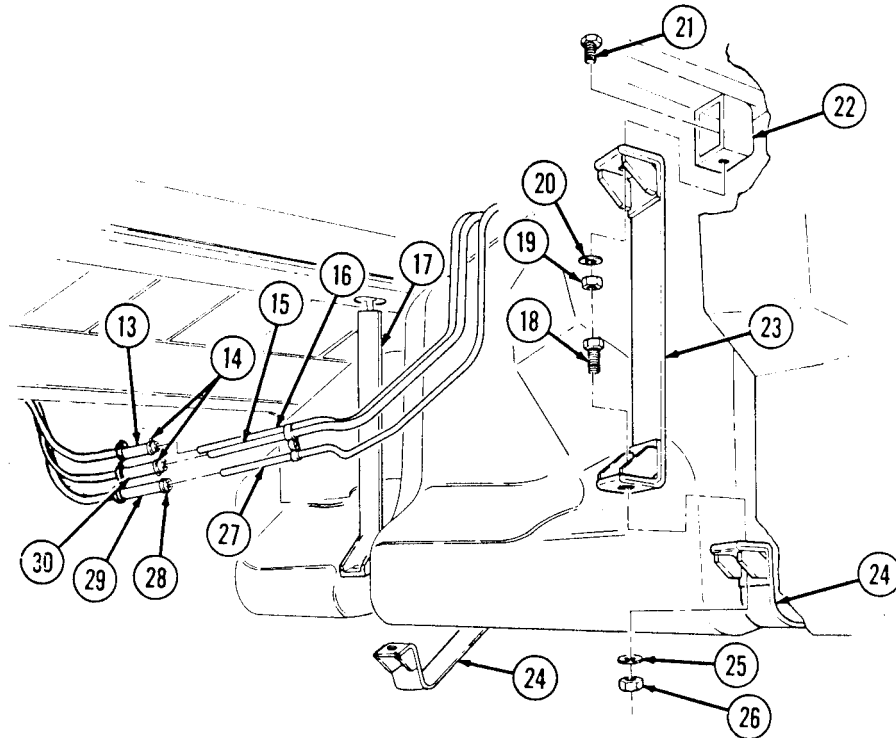
12. Tighten locknuts (26) to 23-27 lb-ft (31-37 N·m).
13. Connect vent line (38) to filler spout (39).
14. Secure vent line (38) to body (34) with clamp (35), washer (36), capscrew (47), washer (36), and locknut (37).



3-24. FUEL TANK MAINTENANCE (Cont'd)

15. Install filler spout (39) into hose (46) and tighten clamp (45).

16. Install filler spout (39) to body (34) with clamp (42), washer (43), capscrew (44), washer (41), and locknut (40). Tighten locknut (40) to 6 lb-ft (8 N•m).



- FOLLOW-ON TASKS:
- Install rear propeller shaft (para. 6-4).
 - Connect battery ground cable (para. 4-73).
 - Fill fuel tank (TM 9-2320-280-10) and check for leaks.

3-25. FUEL TANK SUPPLY AND RETURN LINES REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

Engine right splash shield removed (para. 10-20).

Materials/Parts

Two locknuts (Appendix G, Item 70)

General Safety Instructions

Do not perform this procedure near fire, flames, or sparks.

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

WARNING

Diesel fuel is highly flammable. Do not perform this procedure near fire, flames, or sparks. Severe injury or death will result.

a. Removal

CAUTION

Cover or plug all open hoses and connections immediately after disconnection to prevent contamination. Remove all plugs prior to connection.

NOTE

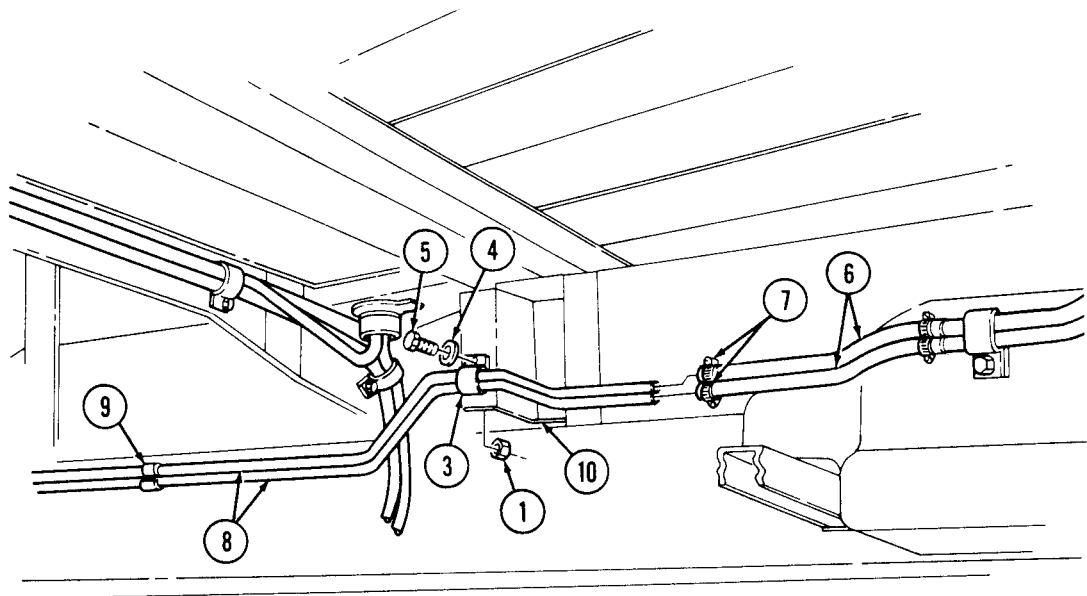
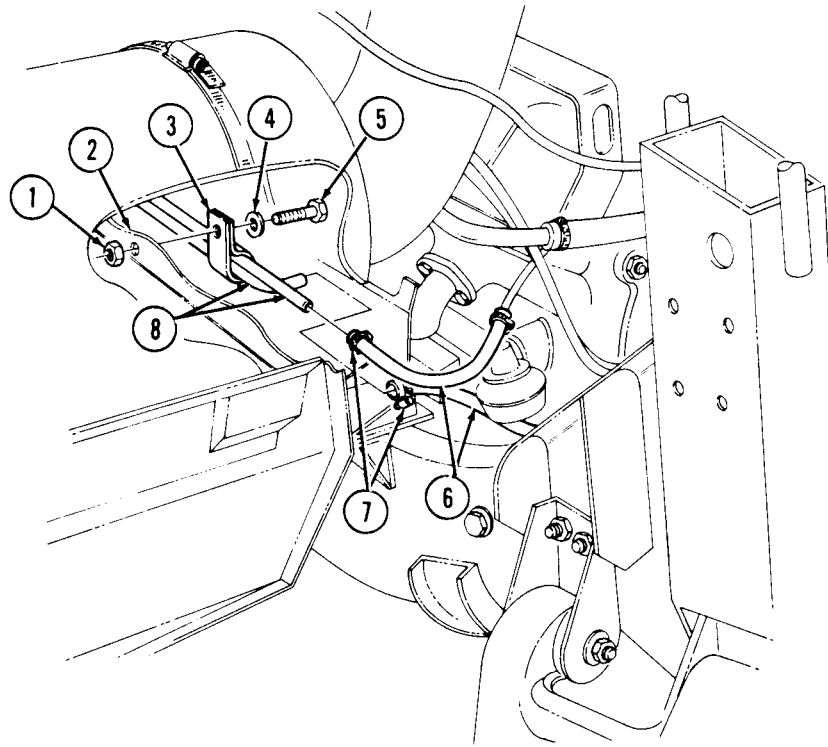
Have drainage container ready to catch fuel.

1. Loosen clamps (7) and disconnect hoses (6) from fuel tank return and supply lines (8).
2. Remove two locknuts (1), capscrews (5), washers (4), clamps (3) and return and supply lines (8) from front body bracket (2) and rear body bracket (10). Discard locknuts (1).
3. Remove three clips (9) securing lines together.

b. Installation

1. Install return and supply lines (8) on front body bracket (2) and rear body bracket (10) with two clamps (3), washers (4), capscrews (5), and locknuts (1).
2. Connect supply and return lines (8) to hoses (6) and tighten clamps (7).
3. Secure fuel supply and return lines (8) together with three clips (9).

3-25. FUEL TANK SUPPLY AND RETURN LINES REPLACEMENT (Cont'd)



- FOLLOW-ON TASKS:
- Install engine right splash shield (para. 10-20).
 - Fill fuel tank (TM 9-2320-280-10) and check for fuel leaks.

3-26. AUXILIARY FUEL PICKUP AND RETURN LINES REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M1097, M1097A1, M1097A2, M1123

Manual References

TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

Fuel tank removed (para. 3-24).

Materials/Parts

Sealing compound (Appendix C, Item 44)
Tiedown strap (Appendix G, Item 311)

General Safety Instructions

Do not perform this procedure near fire, flames, or sparks.

WARNING

Diesel fuel is highly flammable. Do not perform this procedure near fire, flames, or sparks. Severe injury or death will result.

a. Removal

CAUTION

Cover or plug all open hoses and connections immediately after disconnection to prevent contamination. Remove all plugs prior to connection.

NOTE

Have drainage container ready to catch fuel.

1. Remove screw (5) and clamp (7), securing fuel return line (6) and fuel pickup line (4) to fuel line clamp (8).
2. Remove fuel pickup line (4) from supply tube (3) on fuel tank (1).
3. Remove fuel return line (6) from supply tube (2).

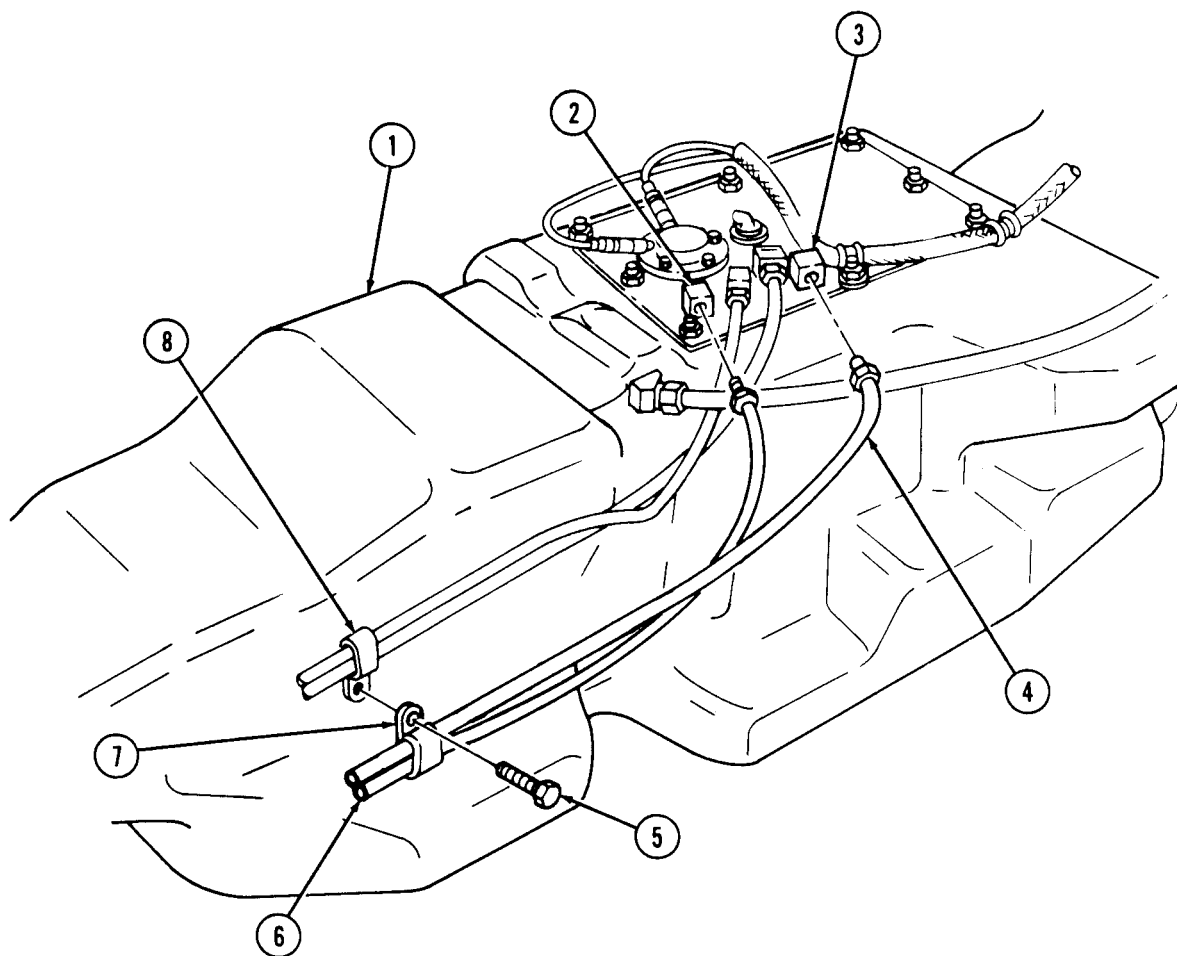
b. Installation

NOTE

Substitute tiedown strap for spring clamp when clamp is not available.

1. Apply sealing compound to threads of fuel return line (6) and fuel pickup line (4).
2. Install fuel return line (6) to supply tube (2) on fuel tank (1).
3. Install fuel pickup line (4) to supply tube (3).
4. Install clamp (7) on fuel return line (6) and fuel pickup line (4) and secure to fuel line clamp (8) with screw (5).

3-26. AUXILIARY FUEL PICKUP AND RETURN LINES REPLACEMENT (Cont'd)



FOLLOW-ON TASK: Install fuel tank (para. 3-24).

3-27. FUEL TANK VENT LINE AND FILTER REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Materials/Parts

Tiedown strap (Appendix G, Item 312)
Locknut (Appendix G, Item 70)

Equipment Condition

- Fuel tank removed (para. 3-24).
- Hood raised and secured (TM 9-2320-280-10).

CAUTION

Cover or plug all open hoses and connections immediately after disconnection to prevent contamination. Remove all plugs prior to connection.

NOTE

For fuel tank vent line filter replacement, perform steps 5, 8, and 9 only.

a. Removal

1. Remove clip (9) securing fuel tank vent line (3) to vent line (6).
2. Remove two capscrews (2) securing clamps (1) and (7) and vent lines (3) and (6) to brackets (8).
3. Remove tiedown strap (4) securing vent line (6) and fuel lines (5). Discard tiedown strap (4).
4. Disconnect vent line (3) from elbow (16).
5. Loosen two clamps (14) and remove vent line (15) from vent line filter (13) and elbow (16).
6. Remove two clamps (14) from vent line (15).
7. Remove two clamps (1) from vent line (3).

NOTE

Perform step 8 only when deep water fording kit is installed.

8. Disconnect deep water fording vent line (19) from vent line filter (13).
9. Remove capscrew (18), washer (11), locknut (12) clamp (10) and vent line filter (13) from body bracket (17). Discard locknut (12).

b. Installation

NOTE

For fuel tank vent line filter replacement, perform steps 1, 2, and 5 only.

1. Install clamp (10) and vent line filter (13) to body bracket (17) with washer (11), capscrew (18), and locknut (12).

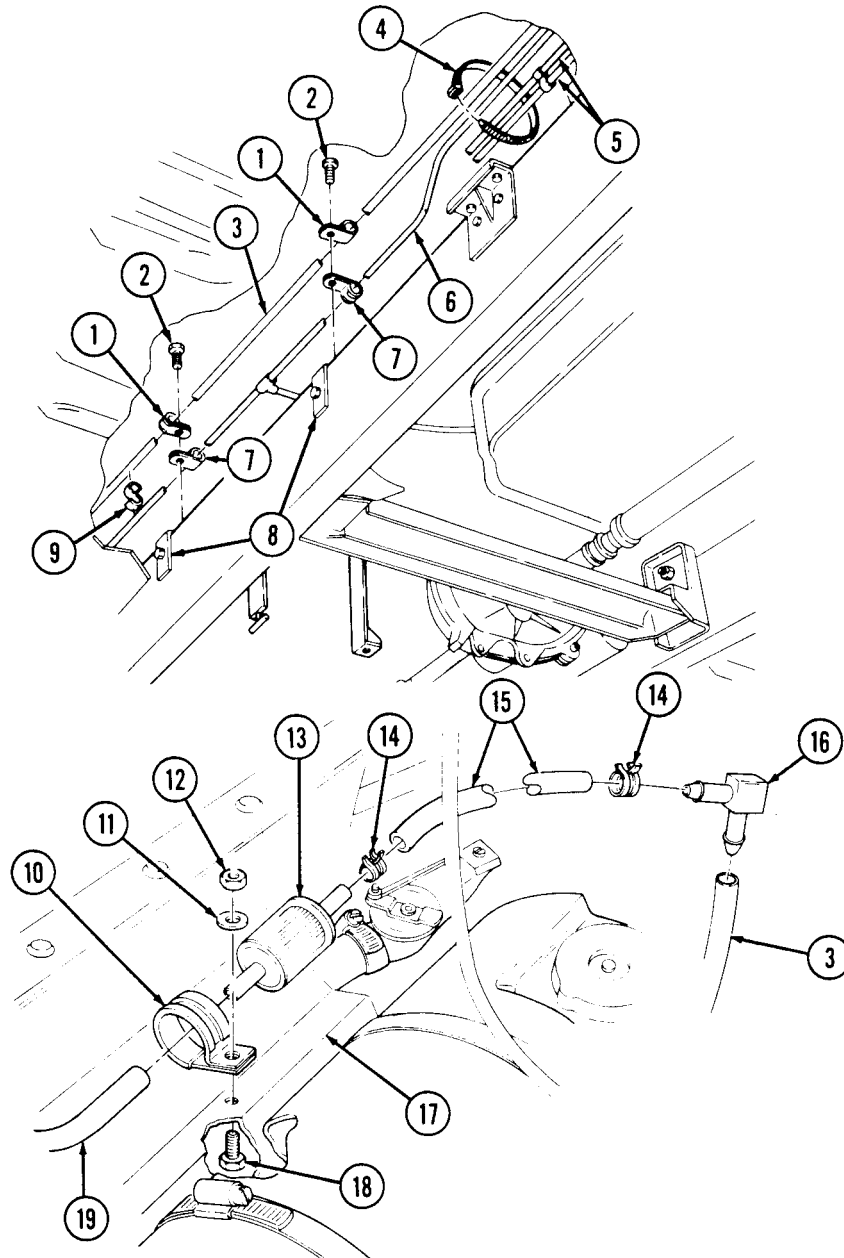
NOTE

Perform step 2 only when deep water fording kit is installed.

2. Connect deep water fording vent line (19) to vent line filter (13).

3-27. FUEL TANK VENT LINE AND FILTER REPLACEMENT (Cont'd)

3. Install two clamps (1) on vent line (3).
4. Install two clamps (14) on vent line (15).
5. Install vent line (15) to vent line filter (13) and elbow (16) and tighten two clamps (14).
6. Connect vent line (3) to elbow (16).
7. Install vent line (3) to vent line (6) and fuel lines (5) with tiedown strap (4).
8. Install vent lines (3) and (6) and two clamps (1) and (7) to brackets (8) with two capscrews (2).
9. Secure vent line (3) to vent line (6) with clip (9).



- FOLLOW-ON TASKS:**
- Install fuel tank (para. 3-24).
 - Lower and secure hood (TM 9-2320-280-10).

3-28. FUEL TANK FILLER CAP AND SPOUT MAINTENANCE

This task covers:

- | | |
|--|---|
| <ul style="list-style-type: none"> a. Removal b. Inspection c. Installation | <ul style="list-style-type: none"> d. Fuel Filler Chain Removal e. Fuel Filler Chain Installation |
|--|---|

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Four locknuts (Appendix G, Item 70)
Sealing compound (Appendix C, Item 44)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

Fuel tank drained (para. 3-24).

General Safety Instructions

Do not perform this procedure near fire, flames, or sparks.

WARNING

Diesel fuel is highly flammable. Do not perform this procedure near fire, flames, or sparks. Severe injury or death will result.

a. Removal

1. Unscrew filler cap "T" handle (7) and remove filler cap (6) from filler spout (12).
2. Detach cap chain clip (8) from filler spout (12) and remove filler cap (6).
3. Disconnect vent line (1) from fitting (2).
4. Remove three locknuts (3), washers (4), capscrews (5), and washers (4) from spout mounting ring (9). Discard locknuts (3).
5. Loosen clamp (17) securing filler spout (12) to hose (18).
6. Remove locknut (13), washer (14), capscrew (16), washer (14), and clamp (15) from filler spout (12). Discard locknut (13).
7. Push filler spout (12) out of spout mounting ring (9) and remove filler spout (12) from hose (18).
8. Remove fitting (2) from filler spout (12).
9. Using handle (10), remove screen (11) from filler spout (12).

b. Inspection

Inspect screen (11) for damage, debris, or blockage. Replace if damaged or if debris or blockage is detected.

c. Installation

1. Apply sealing compound to fitting (2) and install fitting (2) on filler spout (12).
2. Align filler spout (12) with hose (18) and push filler spout (12) into hose (18).
3. Install filler spout mounting ring (9) to body with three washers (4), capscrews (5), washers (4), and locknuts (3).
4. Secure hose (18) to filler spout (12) and tighten clamp (17).
5. Secure filler spout (12) to body with clamp (15), washer (14), capscrew (16), washer (14), and locknut (13). Tighten locknut (13) to 6 lb-ft (8 N•m).
6. Apply sealing compound to fitting (2) and connect vent line (1) to fitting (2).

3-28. FUEL TANK FILLER CAP AND SPOUT MAINTENANCE(Cont'd)

7. Using handle (10), install screen (11) in filler spout (12).
8. Attach filler cap chain clip (8) to filler spout (12).
9. Install filler cap (6) to filler spout (12) and secure with "T" handle (7).

d. Fuel Filler Chain Removal

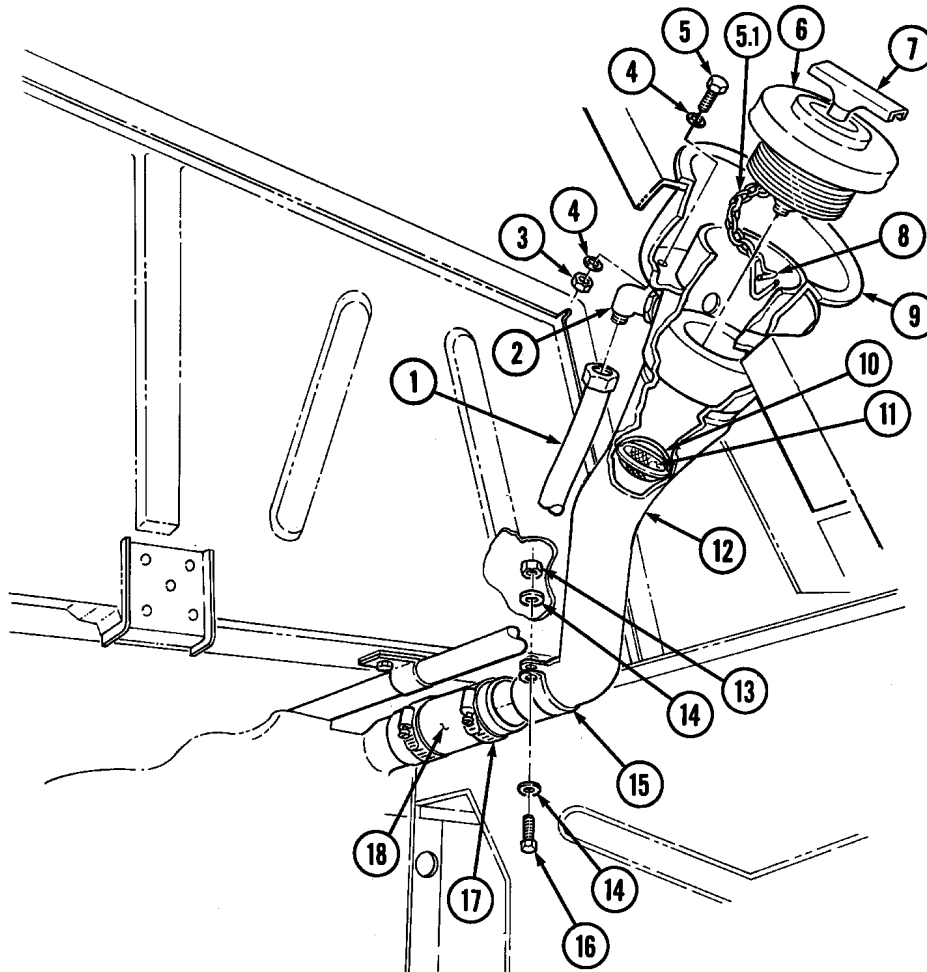
NOTE

Replacement chain manufacturing instructions can be found in appendix D, figure 15.1.

1. Unscrew "T" handle (7) and remove filler cap (6) from filler spout (12).
2. Detach cap chain clip (8) from filler spout (12) and remove chain clip (8) from chain (5.1).
3. Pry open link holding chain (5.1) to cap (6), and remove chain (5.1) from cap (6).

e. Fuel Filler Chain Installation

1. Pry open link on end of chain (5.1) and attach to filler cap (6). Close link.
2. Hook chain clip (8) through last link at opposite end of chain (5.1) and attach to filler spout (12).
3. Install filler cap (6) to filler spout (12) and secure with "T" handle (7).



FOLLOW-ON TASK: Fill fuel tank (TM 9-2320-280-10) and check filler spout for fuel leaks.

3-29. FUEL TANK FILLER SPOUT VENT LINE REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-24P

Materials/Parts

Locknut (Appendix G, Item 70)
Adhesive (Appendix C, Item 1)
Sealing compound (Appendix C, Item 46)

Equipment Condition

Rear propeller shaft removed (para. 6-4).

a. Removal

1. Disconnect vent line (2) from fuel filler spout elbow (3).
2. Remove locknut (7), washer (5), capscrew (4), and washer (5) securing vent line (2) and clamp (6) to body (1). Discard locknut (7).
3. Disconnect and remove vent line (2) from tee (12).
4. Disconnect vent line (10) from tee (12).
5. Remove capscrew (15) securing vent line (10) and clamp (11) to body (1).
6. Loosen two nuts (13) to allow access to elbow (8).
7. Disconnect vent line (10) from elbow (8) on fuel tank (9), cut vent line (10), and remove vent line (10) from crossmember (14).

b. Installation

NOTE

Use sealing compound on all vent line connector threads before installation.

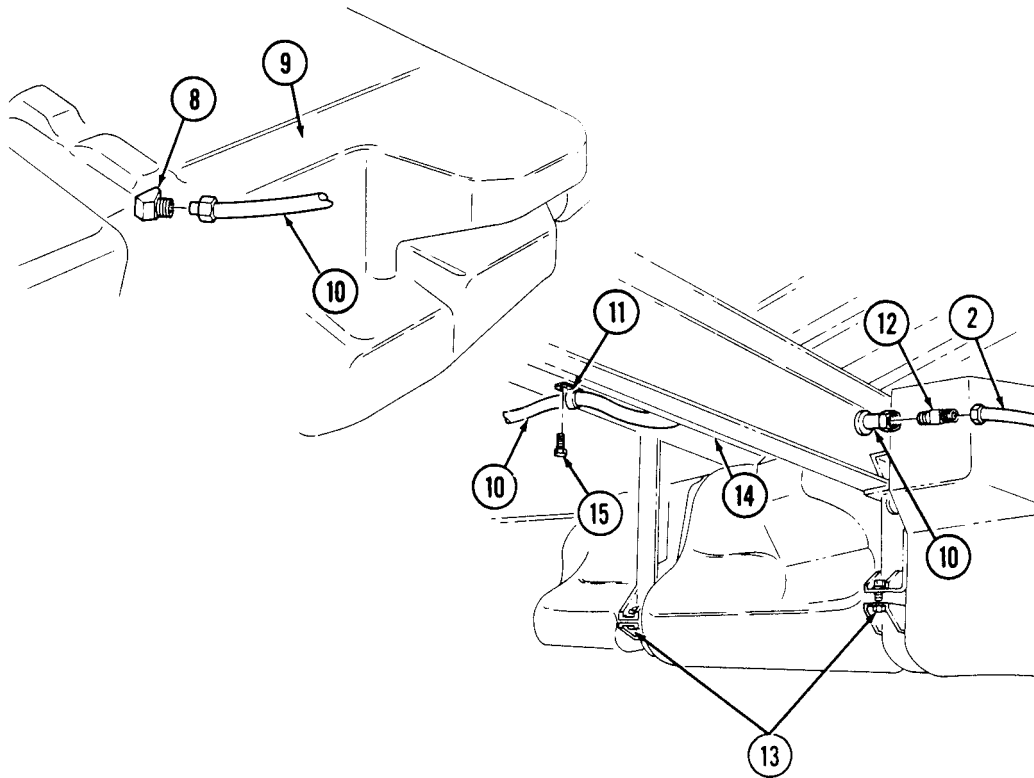
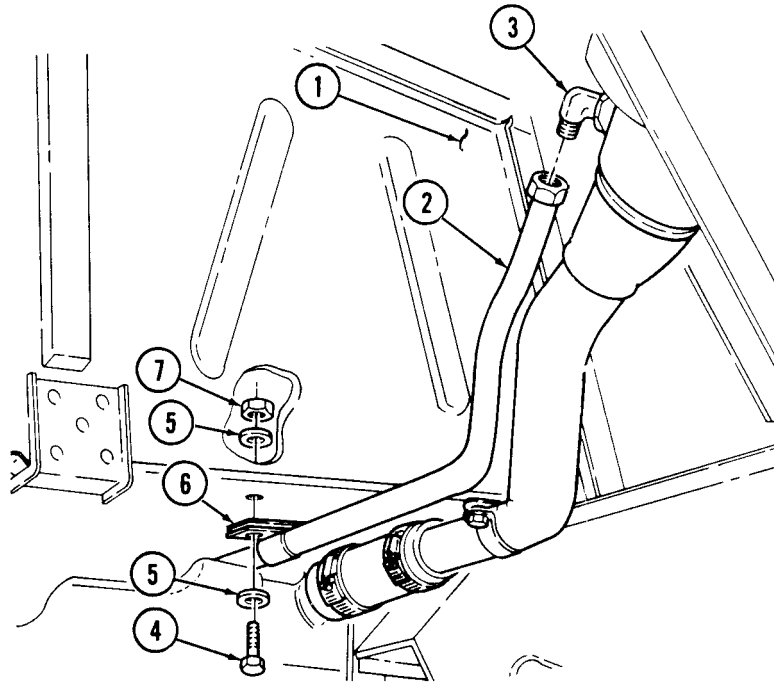
1. Install vent line (10) and connect to elbow (8) on fuel tank (9).

NOTE

Upper and lower straps should be approximately 1/2 in. (12 mm) apart after tightening locknuts. Straps should not touch when properly installed. Straps must be replaced if upper and lower straps touch.

2. Apply adhesive to threads of nuts (13) and tighten nuts (13) to 23-27 lb-in. (3-5 N•m).
3. Install clamp (11) and vent line (10) to body (1) with capscrew (15).
4. Route vent line (10) through crossmember (14).
5. Connect vent line (10) to tee (12).
6. Install vent line (2) and connect to tee (12).
7. Install vent line (2) and clamp (6) on body (1) with washer (5), capscrew (4), washer (5), and locknut (7). Tighten locknut (7) to 6 lb-ft (8 N•m).
8. Connect vent line (2) to fuel filler spout elbow (3).

3-29. FUEL TANK FILLER SPOUT VENT LINE REPLACEMENT (Cont'd)



FOLLOW-ON TASK: Install rear propeller shaft (para. 6-4).

3-30. FILLER SPOUT HOSE REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

Fuel tank drained (para. 3-24).

General Safety Instructions

Do not perform this procedure near fire, flames, or sparks.

WARNING

Diesel fuel is highly flammable. Do not perform this procedure near fire, flames, or sparks. Severe injury or death will result.

a. Removal

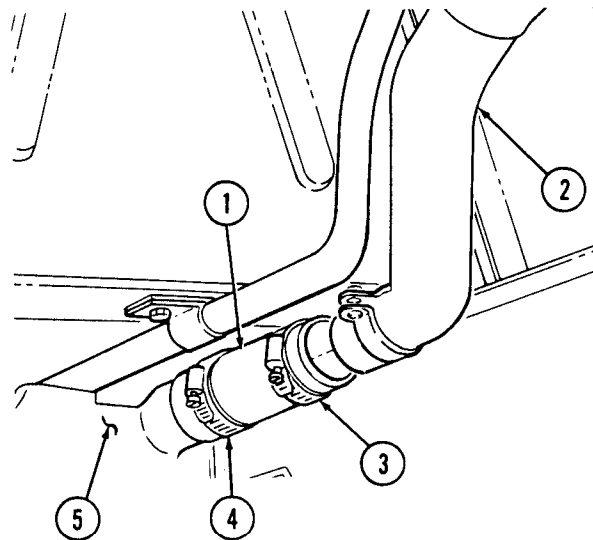
1. Loosen clamps (4) and (3) securing hose (1) to fuel tank (5) and to filler spout (2).
2. Slide hose (1) on to filler spout (2) until disconnected from fuel tank (5). Remove hose (1) from filler spout (2).

b. Installation

NOTE

Position clamps attaching filler hose to fuel tank as shown.

1. Install hose (1) on filler spout (2) and slide on filler spout (2) until the hose (1) clears fuel tank (5).
2. Connect hose (1) to fuel tank (5) and tighten clamps (3) and (4).



FOLLOW-ON TASK: Fill fuel tank (TM 9-2320-280-10) and check for leaks.

3-31. FUEL TANK HANGERS REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-24P

Materials/Parts

Adhesive (Appendix C, Item 1)

Equipment Condition

Fuel tank removed (para. 3-24).

a. Removal

1. Remove two nuts (3), washers (4), screws (5), and rear hangers (7) from supports (6).
2. Twist two front hangers (9) until tee handles (2) clear slots (11) in supports (1) and remove front hangers (9).

NOTE

Perform step 3 for "A2" vehicles only.

3. Inspect four insulators (8) on front and rear hangers (9) and (7). Remove insulators (8) if damaged.

b. Installation

NOTE

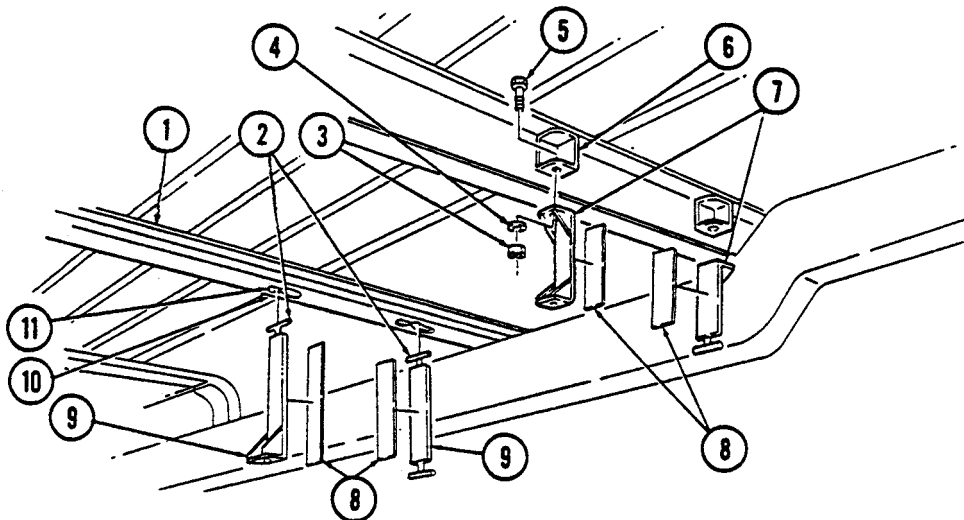
Perform step 1 for "A2" vehicles only.

1. Install four insulators (8) on front and rear hangers (9) and (7) (if removed.)
2. Install two front hangers (9) by inserting tee handles (2) up through slots (11) in supports (1). Twist hangers (9) so that tee handles (2) are resting across slots (11) against side of ridge (10).

NOTE

Apply adhesive to threads of screws.

3. Install two rear hangers (7) on supports (6) with screws (5), washers (4), and nuts (3). Tighten nuts (3) to 37 lb-ft (50 N·m).



FOLLOW-ON TASK: Install fuel tank (para. 3-24).

3-32. FUEL FILTER MAINTENANCE

This task covers:

- | | |
|---|---|
| <ul style="list-style-type: none"> a. Removal b. Installation | <ul style="list-style-type: none"> c. Bleeding |
|---|---|

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Two lockwashers (Appendix G, Item 134)
Sealing compound (Appendix C, Item 44)
Fuel filter bleeder tool (Appendix D, Figure D-63)
(optional)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

- Hood raised and secured (TM 9-2320-280-10).
- Engine access cover removed (para. 10-15).
- Fuel pressure transducer removed (para. 4-26).

General Safety Instructions

Do not perform this procedure near fire, flames, or sparks.

a. Removal

WARNING

Diesel fuel is highly flammable. Do not perform this procedure near fire, flames, or sparks. Severe injury or death will result.

CAUTION

Cover or plug all hoses and connections immediately after disconnection to prevent contamination. Remove all plugs prior to connection.

NOTE

Have drainage container ready to catch fuel.

1. Loosen two hose clamps (2) and disconnect fuel inlet hose (1) and fuel outlet hose (13) from fuel filter (8).
2. Loosen hose clamp (9) and disconnect fuel filter drain hose (10) from fuel filter (8).
3. Pull back insulation to allow access to capscrews (3) and remove two capscrews (3), lockwashers (4), and fuel filter bracket (11) from body (12). Discard lockwashers (4).
4. Loosen capscrew (7) and remove fuel filter (8) from fuel filter bracket (11).
5. Remove three fittings (5) from fuel filter (8).

b. Installation

1. Apply sealing compound to threads of three fittings (5). Install three fittings (5) to fuel filter (8).
2. Install fuel filter (8) in fuel filter bracket (11) and tighten capscrew (7).
3. Install fuel filter bracket (11) on body (12) with two capscrews (3) and lockwashers (4). Tighten capscrews (3) to 15 lb-ft (20 N•m).
4. Connect drain hose (10) to fuel filter (8) and tighten clamp (9) to 10-20 lb-in. (1-2 N•m).
5. Connect fuel inlet hose (1) and fuel outlet hose (13) to fuel filter (8) with two hose clamps (2). Tighten clamps (2) to 10-20 lb-in. (1-2 N•m).

3-32. FUEL FILTER MAINTENANCE (Cont'd)

c. Bleeding

NOTE

The bleeder tool described in 2, 3, and 5 is optional. The tool prevents fuel spilling on engine.

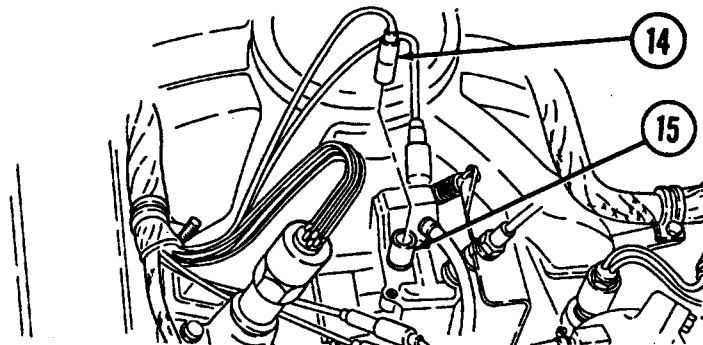
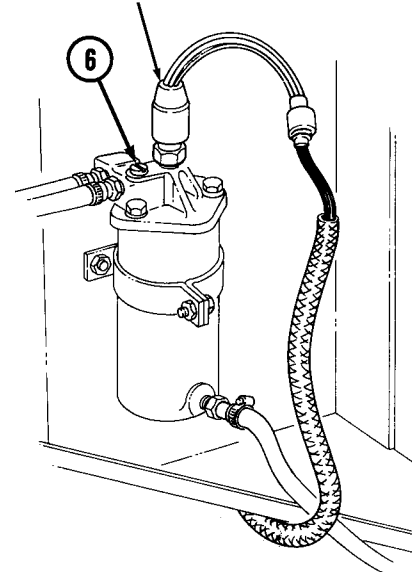
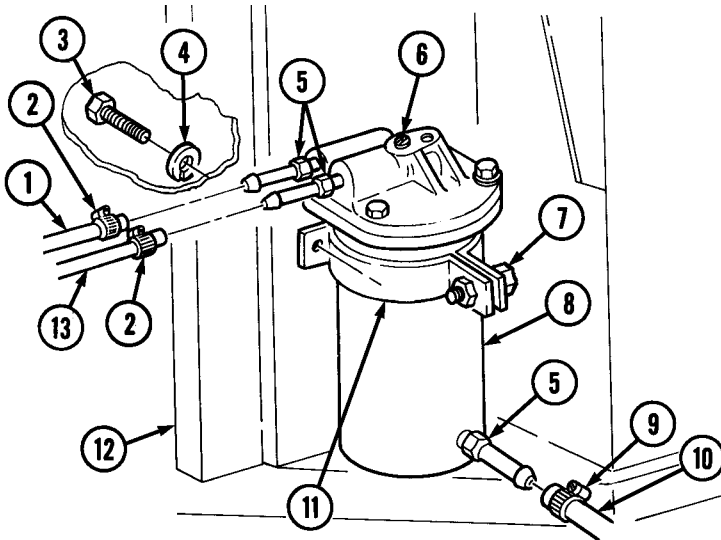
1. Install fuel pressure transducer (para. 4-26).
2. Remove fuel filter bleed screw (6) and install bleeder tool into the hole.
3. Place open end of bleeder tool hose in clean, clear container.
4. Disconnect lead 54A (14) from solenoid (15).

CAUTION

Do not operate starter continuously for more than 20 seconds, wait 10 to 15 seconds between periods of operation. Failure to do this will result in damage to the starter.

5. Crank engine and watch fuel. When air bubbles stop coming through the line, remove bleeder tool and replace bleed screw (6). Dispose of fuel in accordance with local SOP.
6. Tighten bleed screw (6) to 40-50 lb-in. (4-6 N·m).
7. Connect lead 54A (14) to fuel solenoid (15).

PRESSURE TRANSDUCER



- FOLLOW-ON TASKS:**
- Start engine (TM 9-2320-280-10) and check for fuel leaks.
 - Lower and secure hood (TM 9-2320-280-10).
 - Install engine access cover (para. 10-15).

3-33. FUEL FILTER ELEMENT MAINTENANCE

This task covers:

- a. Element Removal
- b. Cleaning and Inspection
- c. Element Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Filter element kit
(Appendix G, Item 32)

Manual References

TM 9-2320-280-24P

Equipment Condition

Fuel pressure transducer removed (para. 4-26).

General Safety Instructions

- Do not perform this procedure near fire, flames, or sparks.
- Cleaning will be done in a well-ventilated area and a fire extinguisher will be kept nearby when solvent is used.

WARNING

Diesel fuel is highly flammable. Do not perform this procedure near fire, flames, or sparks. Severe injury or death will result.

CAUTION

Cover or plug all hoses and connections immediately after disconnection to prevent contamination. Remove all plugs prior to connection.

a. Element Removal

1. Loosen two hose clamps (2), and disconnect fuel inlet hose (1) and fuel outlet hose (15) from fuel filter cover (3).
2. Loosen hose clamp (7) and disconnect fuel filter drain hose (8) from filter housing (6).
3. Remove capscrew (9), nut (11), and filter housing (6) from fuel filter bracket (10).
4. Remove three capscrews (4) washers (5) and cover (3) from filter housing (6).
5. Remove O-ring seal (14) from filter housing (6). Discard O-ring seal (14).
6. Remove filter element (12) and separator (13) from filter housing (6).
7. Remove separator (13) from filter element (12). Discard filter element (12).

b. Cleaning and Inspection

WARNING

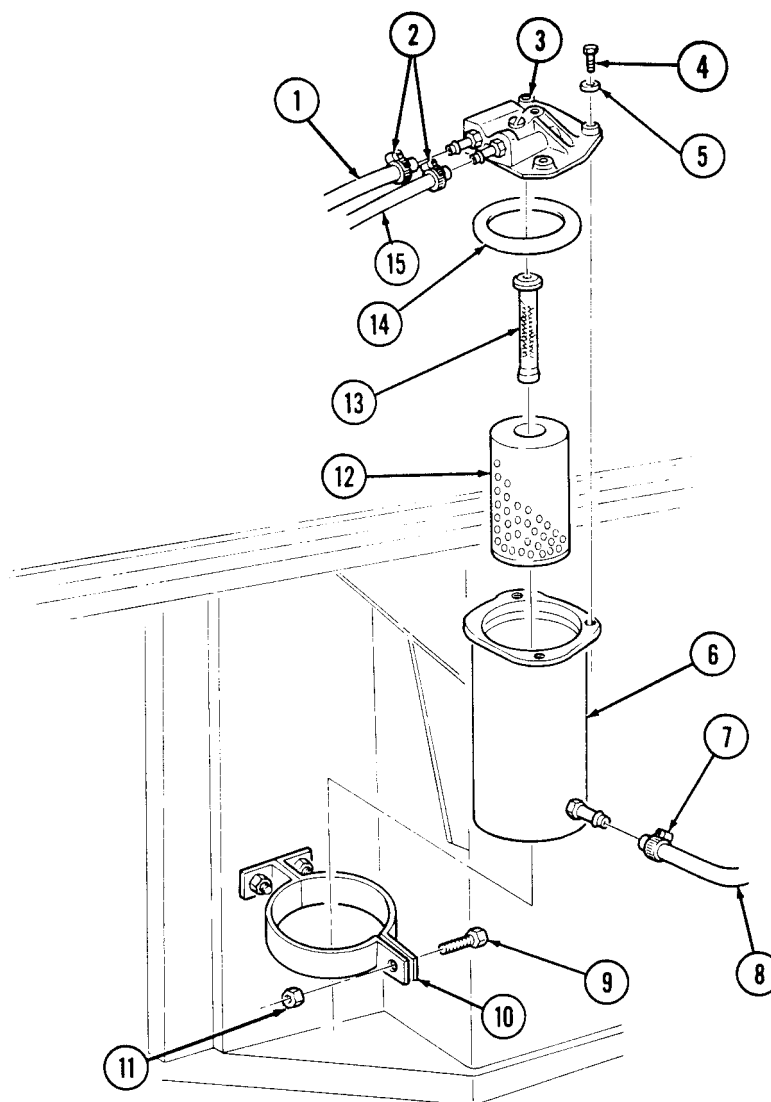
Drycleaning solvent is flammable and will not be used near an open flame. A fire extinguisher will be kept nearby when the solvent is used. Use only in well-ventilated places. Failure to do this may result in injury to personnel and/or damage to equipment.

1. Use drycleaning solvent to clean all metallic parts.
2. Inspect filter housing (6) and cover (3) for distortion or damage. Replace if damaged.
3. Inspect separator (13) for dirt, contamination, or damage. Replace if dirty, contaminated, or damaged.

3-33. FUEL FILTER ELEMENT MAINTENANCE (Cont'd)

c. Element Installation

1. Install filter element (12) into filter housing (6).
2. Install separator (13) on filter element (12).
3. Install O-ring seal (14) into filter housing (6).
4. Install cover (3) on filter housing (6) with three washers (5) and capscrews (4). Tighten capscrews (4) to 50-60 lb-in. (6-7 **N•m**).
5. Install filter housing (6) in fuel filter bracket (10) with capscrew (9) and nut (11).
6. Connect fuel filter drain hose (8) to filter housing (6) and tighten clamp (7) to 10-20 lb-in. (1-2 **N•m**).
7. Connect fuel inlet hose (1) and fuel outlet hose (15) to fuel filter cover (3) and tighten clamps (2) to 10-20 lb-in. (1-2 **N•m**).



FOLLOW-ON TASK: Bleed fuel filter (para. 3-32).

3-34. FUEL FILTER DRAIN HOSE AND VALVE REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Personnel Required

One mechanic
One assistant

Materials/Parts

Plain-assembled nut (Appendix G, Item 201)

Equipment Condition

Hood raised and secured (TM 9-2320-280-10).

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

General Safety Instructions

Do not perform this procedure near fire, flames, or sparks.

WARNING

Diesel fuel is highly flammable. Do not perform this procedure near fire, flames, or sparks. Severe injury or death will result.

a. Removal

CAUTION

Cover or plug all open hoses and connections immediately after disconnection to prevent contamination. Remove all plugs prior to connection.

NOTE

- For fuel filter drain valve replacement, perform steps 5 and 6 only.
- Have drainage container ready to catch fuel.

1. Loosen clamp (2) and disconnect fuel filter drain hose (8) from fuel filter assembly (1).
2. Loosen clamp (7) and disconnect drain hose (8) from fuel filter drain valve (6).
3. Remove plain-assembled nut (5), capscrew (11), clamp (4), and drain hose (8) from cowl panel (3). Discard plain-assembled nut (5).
4. Remove capscrew (10), drain hose (8), and clamp (9) from panel (3).
5. Remove nut (13) and fuel filter drain valve (6) from bracket (12).

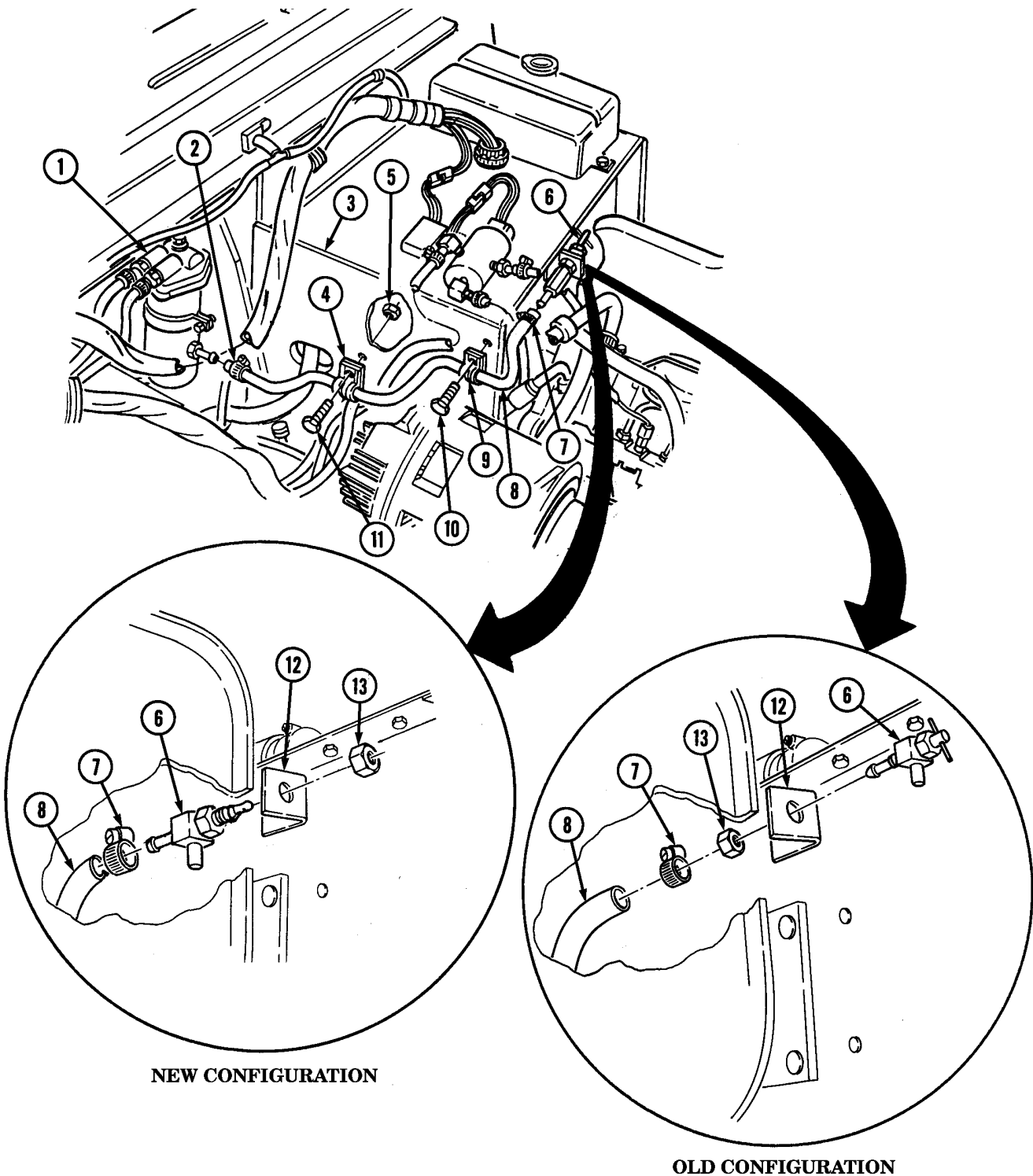
b. Installation

NOTE

For fuel filter drain valve replacement, perform steps 5 and 6 only.

1. Install drain hose (8) and clamp (4) to cowl panel (3) with capscrew (11) and plain-assembled nut (5).
2. Install clamp (9) and drain hose (8) to panel (3) with capscrew (10).
3. Connect drain hose (8) to fuel filter drain valve (6) with clamp (7).
4. Connect drain hose (8) to fuel filter assembly (1) with clamp (2).
5. Install fuel filter drain valve (6) to bracket (12) with nut (13).

3-34. FUEL FILTER DRAIN HOSE AND VALVE REPLACEMENT (Cont'd)



- FOLLOW-ON TASKS:**
- Start engine (TM 9-2320-280-10) and check for oil leaks.
 - Lower and secure hood (TM 9-2320-280-10).

3-35. FUEL INJECTION PUMP RETURN HOSE CHECK VALVE MAINTENANCE

This task covers:

- a. Removal**
- b. Cleaning and Inspection**

- c. Installation**

INITIAL SETUP:

Tools

General mechanic’s tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

- Hood raised and secured (TM 9-2320-280-10).
- Air horn removed (para. 3-14).

General Safety Instructions

- Do not perform this procedure near fire, flames, or sparks.
- Compressed air used for cleaning purposes will not exceed 30 psi (207 kPa).

WARNING

Diesel fuel is highly flammable. Do not perform this procedure near fire, flames, or sparks. Severe injury or death will result.

CAUTION

Cover or plug all hoses and connections immediately after disconnection to prevent contamination. Remove all plugs prior to connection.

a. Removal

1. Loosen clamp (2) and disconnect hose (1) from injection pump check valve (3).
2. Remove check valve (3) from injection pump (4).

WARNING

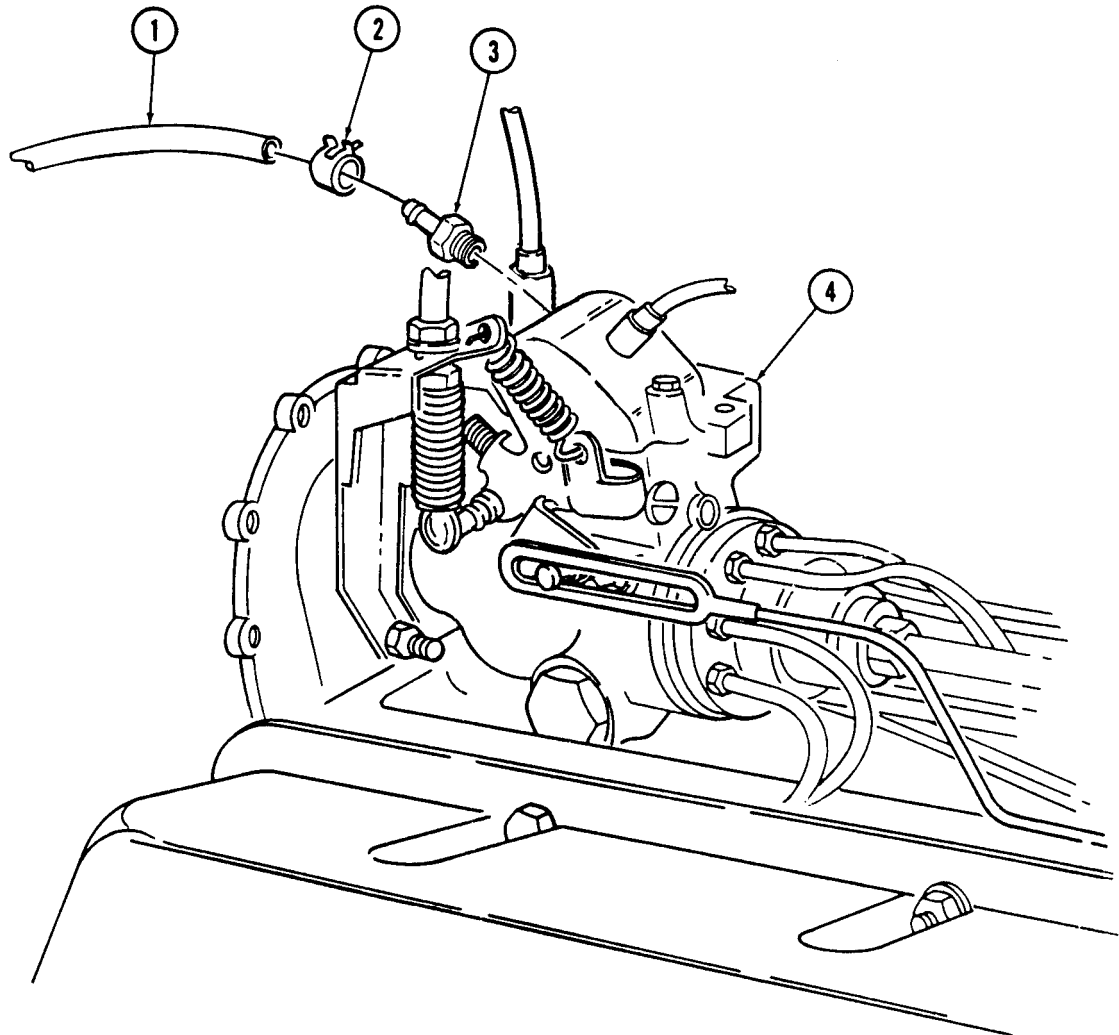
Compressed air used for cleaning purposes will not exceed 30 psi (207 kPa). Use only with effective chip guarding and personal protective equipment (goggles/shield, gloves, etc).

b. Cleaning and Inspection

Examine the lower end of the check valve (3) where the ball seats for evidence of debris. If debris is present, blow compressed air through the check valve. Replace check valve (3) if debris remains or if check valve (3) fails to function properly.

c. Installation

1. Install check valve (3) on injection pump (4).
2. Connect hose (1) on check valve (3) with clamp (2).

3-35. FUEL INJECTION PUMP RETURN HOSE CHECK VALVE MAINTENANCE (Cont'd)

- FOLLOW-ON TASKS:
- Install air horn assembly (para. 3-14).
 - Lower and secure hood (TM 9-2320-280-10).

3-36. FUEL INJECTION RETURN HOSES REPLACEMENT

This task covers:

- | | |
|--|--|
| <ul style="list-style-type: none"> a. Fuel Drain Back Hose Removal b. Fuel Drain Back Hose Installation c. Tube to Nozzle Hose Removal d. Tube to Nozzle Hose Installation | <ul style="list-style-type: none"> e. Nozzle to Nozzle Hose Removal f. Nozzle to Nozzle Hose Installation g. Nozzle Cap Removal h. Nozzle Cap Installation |
|--|--|

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

- Engine access cover removed (para. 10-15).
- Air horn removed (para. 3-14).

General Safety Instructions

Do not perform this procedure near fire, flames, or sparks.

WARNING

Diesel fuel is highly flammable. Do not perform this procedure near fire, flames, or sparks. Severe injury or death will result.

CAUTION

Cover or plug all hoses and connections immediately after disconnection to prevent contamination. Remove all plugs prior to connection.

NOTE

Have drainage container ready to catch fuel.

a. Fuel Drain Back Hose Removal

1. Loosen two clamps (2) and remove hose (3) from injection pump (4) and fuel drain back tube (1).
2. Remove two clamps (2) from hose (3).

b. Fuel Drain Back Hose Installation

1. Install two clamps (2) to hose (3).
2. Connect hose (3) to injection pump (4) and fuel drain back tube (1) with two clamps (2).

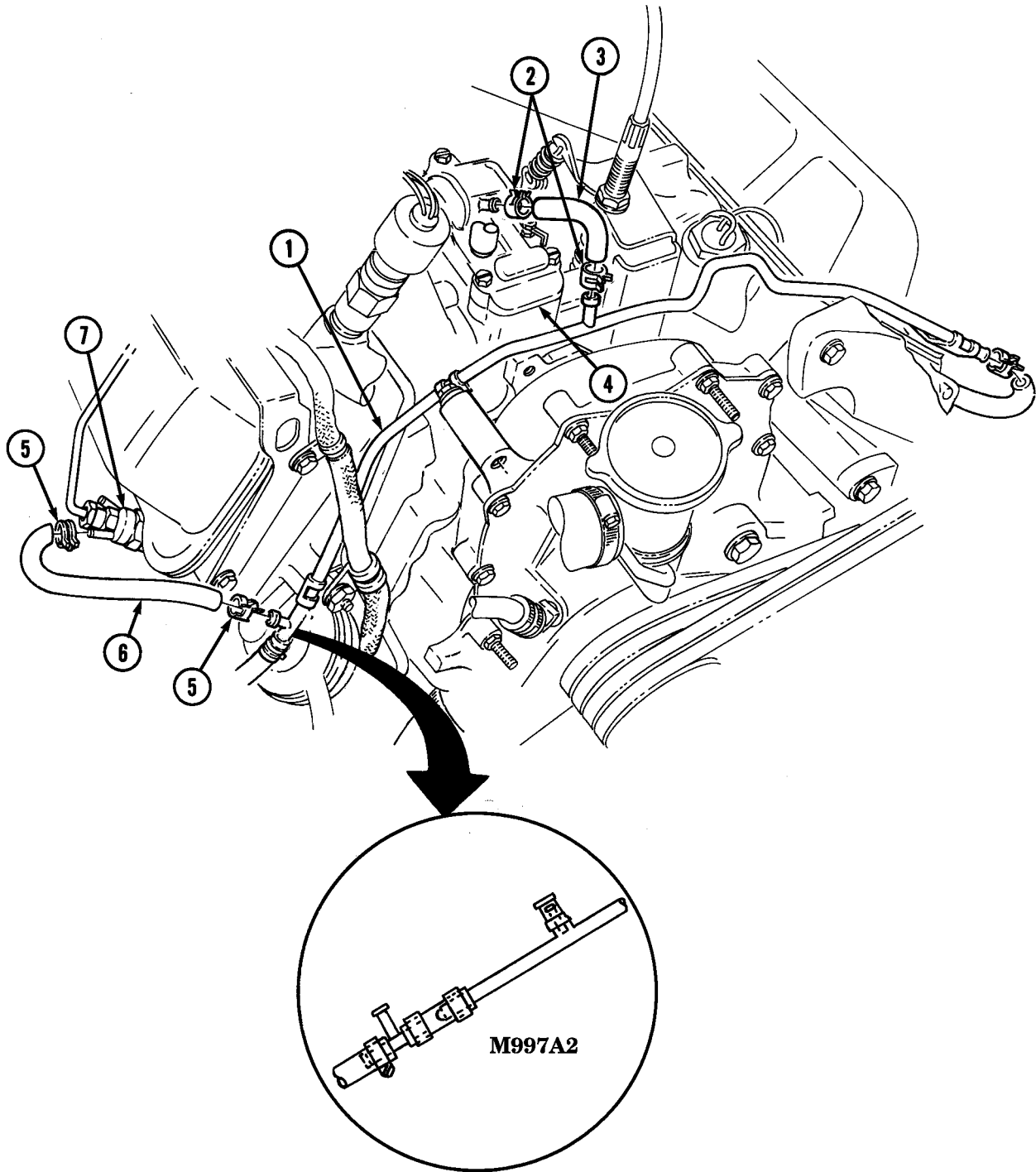
c. Tube to Nozzle Hose Removal

1. Loosen two clamps (5) and remove hose (6) from nozzle (7) and fuel drain back tube (1).
2. Remove two clamps (5) from hose (6).

d. Tube to Nozzle Hose Installation

1. Install two clamps (5) to hose (6).
2. Connect hose (6) to nozzle (7) and fuel drain back tube (1) with two clamps (5).

3-36. FUEL INJECTION RETURN HOSES REPLACEMENT(Cont'd)



3-36. FUEL INJECTION RETURN HOSES REPLACEMENT (Cont'd)

e. Nozzle to Nozzle Hose Removal

1. Loosen two clamps (5) and disconnect hose (6) from two nozzles (4).
2. Remove two clamps (5) from hose (6).

f. Nozzle to Nozzle Hose Installation

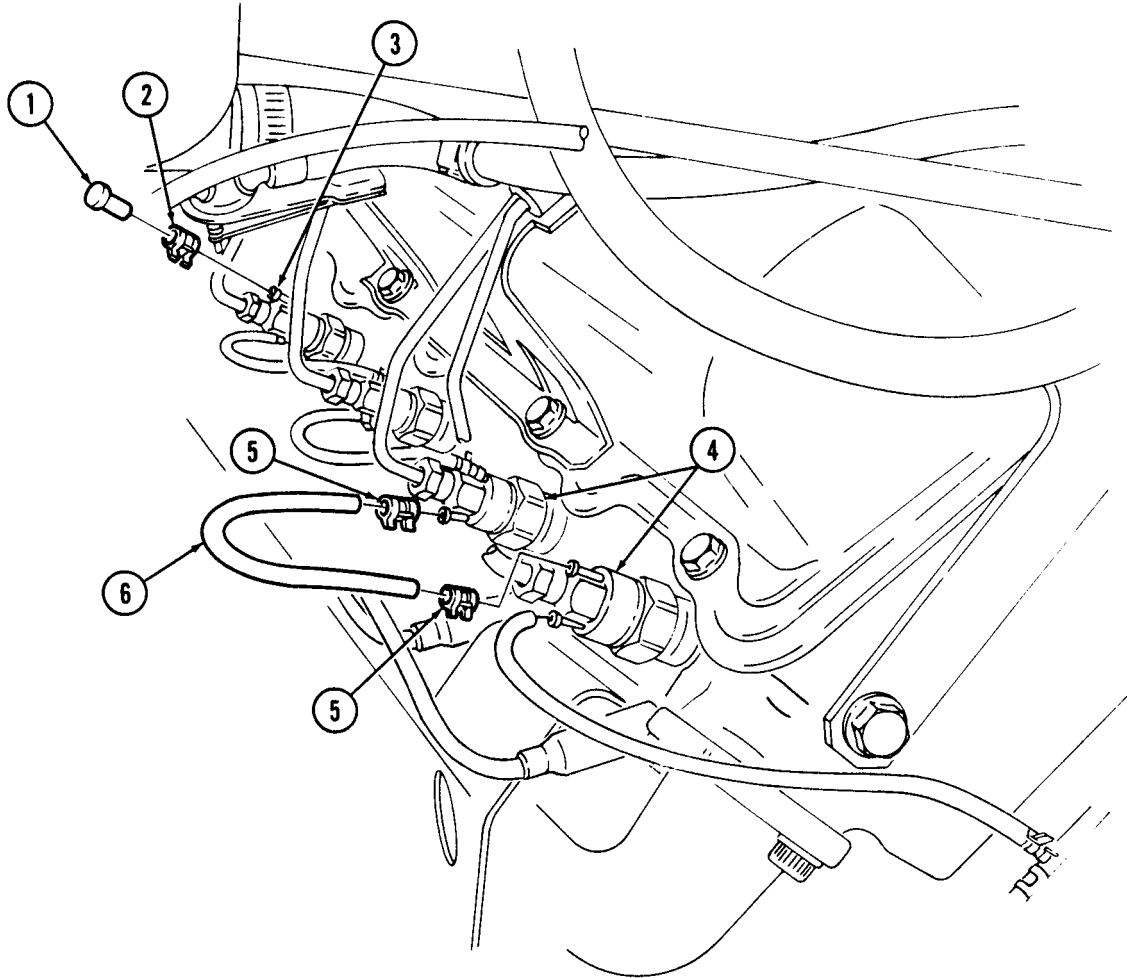
1. Install two clamps (5) to hose (6).
2. Connect hose (6) to two nozzles (4) with two clamps (5).

g. Nozzle Cap Removal

Loosen clamp (2) and remove cap (1) from rear nozzle nipple (3).

h. Nozzle Cap Installation

Install cap (1) on rear nozzle nipple (3) with clamp (2).

3-36. FUEL INJECTION RETURN REPLACEMENT (Cont'd)

- FOLLOW-ON TASKS:
- Install air horn (para. 3-14).
 - Install engine access cover (para. 10-15).
 - Start engine (TM 9-2320-280-10) and check for fuel leaks.

3-37. FUEL DRAIN BACK TUBE REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

Air horn removed (para. 3-14).

Materials/Parts

Lockwasher (Appendix G, Item 191)

General Safety Instructions

Do not perform this procedure near fire, flames, or sparks.

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

WARNING

Diesel fuel is highly flammable. Do not perform this procedure near fire, flames, or sparks. Severe injury or death will result.

a. Removal

CAUTION

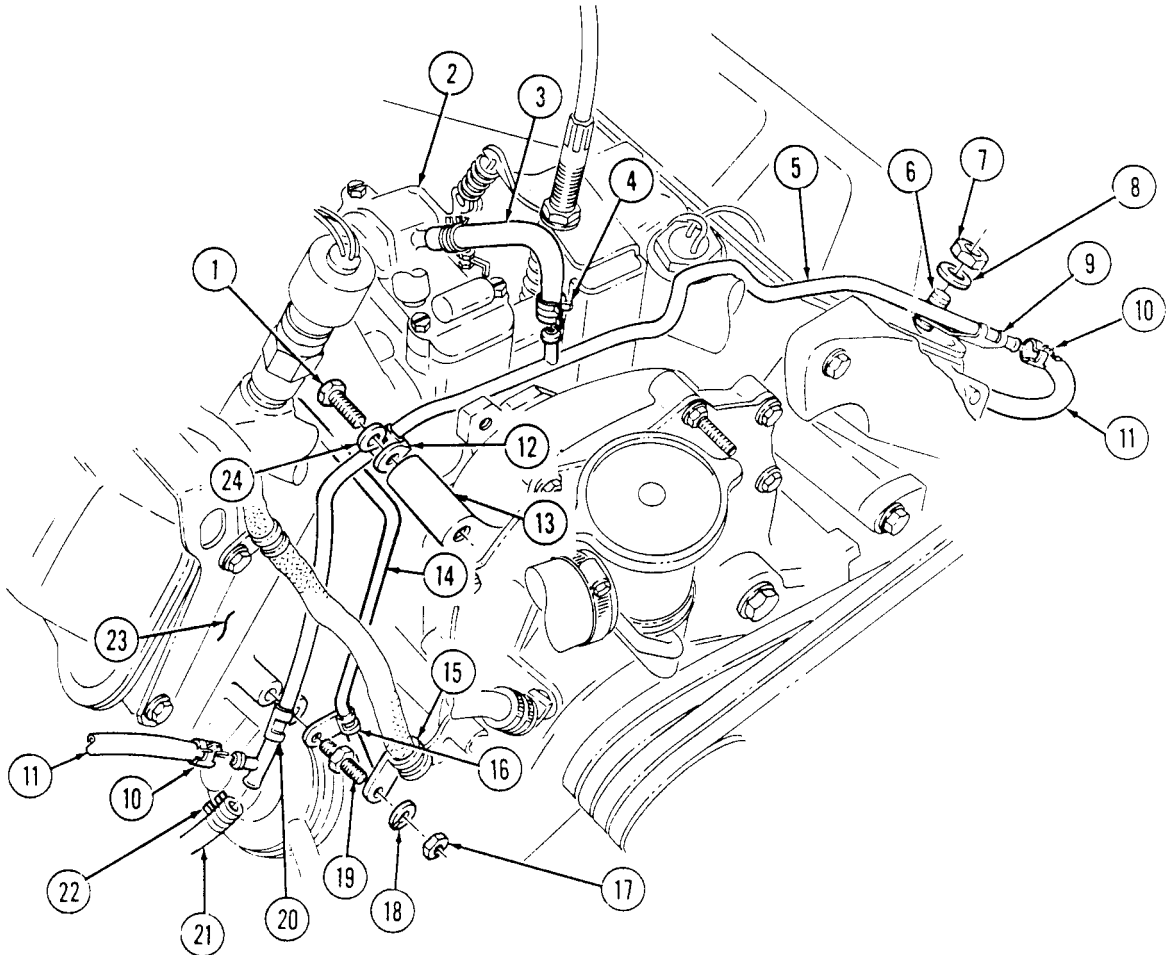
Cover or plug all hoses and connections immediately after disconnection to prevent contamination. Remove all plugs prior to reconnection.

1. Remove nut (17), lockwasher (18), and engine wiring harness clamp (15) from stud (19). Discard lockwasher (18).
2. Remove stud (19) fuel drain back tube (5), clamp (20) fuel supply line (14), and clamp (16) from cylinder head (23).
3. Loosen two clamps (10) and disconnect two hoses (11) from fuel drain back tube (5).
4. Loosen clamp (22) and disconnect fuel return hose (21) from fuel drain back tube (5).
5. Loosen clamp (4) and disconnect fuel drain back hose (3) from fuel drain back tube (5).
6. Remove nut (7), washer (8), clamp (9), and fuel drain back tube (5) from valve cover stud (6).
7. Remove capscrew (1), washer (24), and clamp (12) from front engine cover (13).
8. Remove drain back tube (5).

b. Installation

1. Position fuel drain back tube (5) in front of injection pump (2).
2. Connect fuel return hose (21) to fuel drain back tube (5) with clamp (22).
3. Connect two hoses (11) to fuel drain back tube (5) with two clamps (10).
4. Connect fuel drain back hose (3) to fuel drain back tube (5) with clamp (4).
5. Install fuel drain back tube (5) on valve cover stud (6) with clamp (9), washer (8), and nut (7). Tighten nut (7) to 13-20 lb-ft (18-27 N•m).
6. Install fuel drain back tube (5) on front engine cover (13) with clamp (12), washer (24), and capscrew (1). Tighten capscrew (1) to 40 lb-ft (54 N•m).
7. Install fuel supply line (14), clamp (16), fuel drain back tube (5), and clamp (20) on cylinder head (23) with stud (19).
8. Install wiring harness clamp (15) on stud (19) with lockwasher (18) and nut (17).

3-37. FUEL DRAIN BACK TUBE REPLACEMENT (Cont'd)



- FOLLOW-ON TASKS:
- Install air horn (para. 3-14).
 - Start engine (TM 9-2320-280-10) and check for fuel leaks.

3-38. GLOW PLUG REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Special Tools

Socket, 3/8 in. (Appendix B, Item 155)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

- Battery ground cable disconnected (para. 4-73).
- Hood raised and secured (TM 9-2320-280-10).

a. Removal

1. Disconnect electrical lead 575 (3) from glow plug (2).

NOTE

- If glow plug is damaged or broken, notify unit commander. Damaged or broken glow plugs are removed at DS maintenance.
- To help remove swollen glow plugs, fabricate tool as shown in appendix D, figure 63.1.
- Other tools can be used to aid in glow plug removal. This procedure pertains to tool in appendix D, figure 63.1.

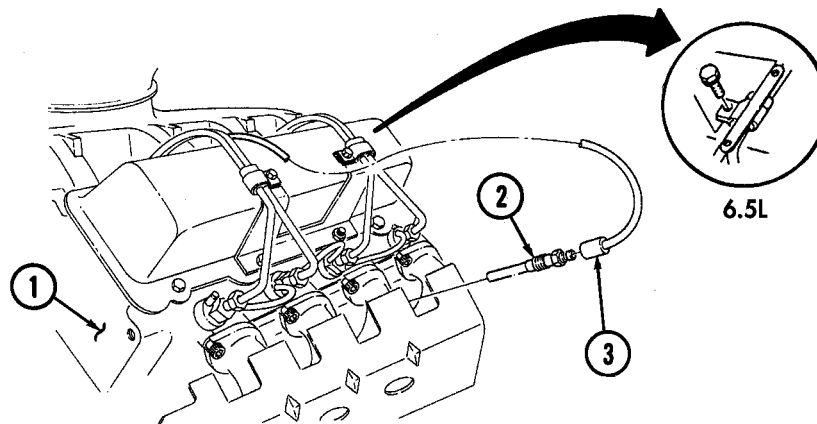
2. Insert forked end of glow plug tool behind hex-head of glow plug (2) and remove glow plug (2) from cylinder head (1).

b. Installation

NOTE

HMMWV glow plugs have bullet-shaped tips, not flat tips.

1. Install glow plug (2) in cylinder head (1). Tighten-glow plug (2) to 8-12 lb-ft (11-16 N•m).
2. Connect electrical lead 575 (3) to glow plug (2).



- FOLLOW-ON TASKS:**
- Connect battery ground cable (para. 4-73).
 - Lower and secure hood (TM 9-2320-280-10).

3-39. RIGHT FUEL INJECTION LINES BRACKET REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

- Engine access cover removed (para. 10-15).
- Air horn removed (para. 3-14).

Manual References

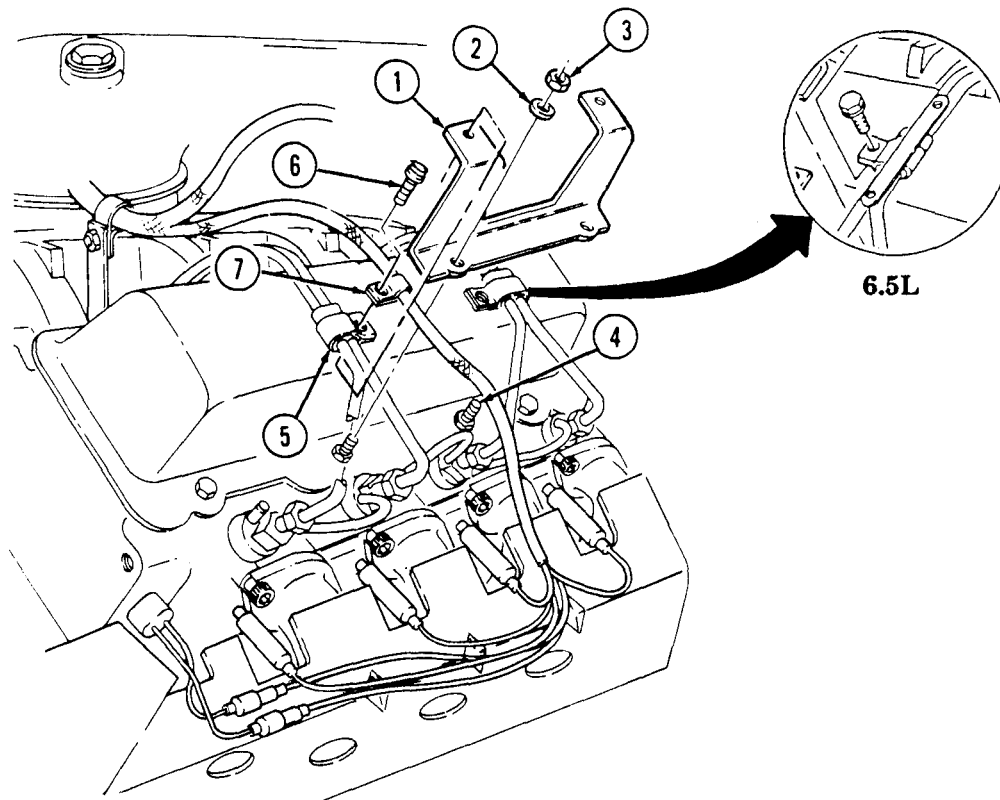
TM 9-2320-280-24P

a. Removal

1. Remove two screw-assembled washers (6), clamps (5), and clamp (7) from bracket (1).
2. Remove two clamps (5) and inspect for cracks or breaks. Replace if defective.
3. Remove two nuts (3), washers (2), and bracket (1) from valve cover studs (4).

b. Installation

1. Install bracket (1) to valve cover studs (4) with two washers (2) and nuts (3). Tighten nuts (3) to 13-20 lb-ft (18-27 **N•m**).
2. Install two clamps (5) and clamp (7) to bracket (1) with two screw-assembled washers (6). Tighten screw-assembled washers (6) to 3-4 lb-ft (4-5 **N•m**).



FOLLOW-ON TASKS: • Install air horn (para. 3-14).
• Install engine access cover (para. 10-15).

3-40. LEFT FUEL INJECTION LINES BRACKET REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

- Hood raised and secured (TM 9-2320-280-10).
- Engine access cover removed (para. 10-15).

Manual References

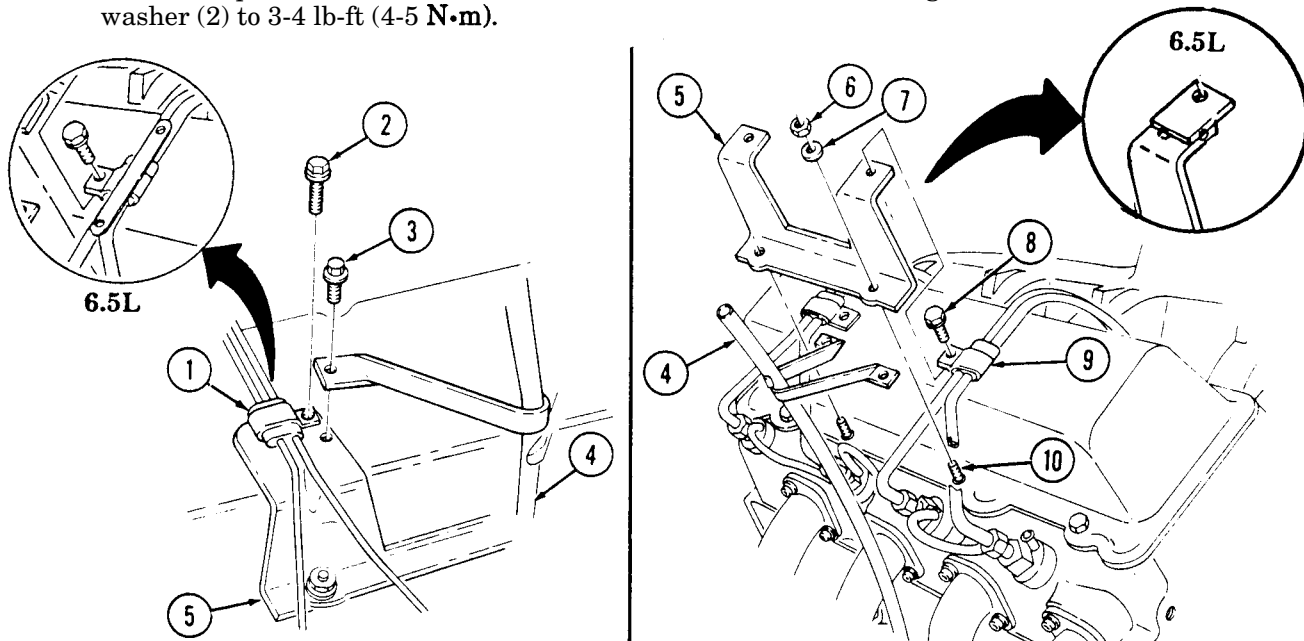
TM 9-2320-280-10
TM 9-2320-280-24P

a. Removal

1. Remove screw-assembled washer (2) and clamp (1) from bracket (5).
2. Remove screw-assembled washer (8) and clamp (9) from bracket (5).
3. Remove two screw-assembled washers (3) and oil dipstick tube (4) from bracket (5).
4. Remove two nuts (6), washers (7) and bracket (5) from valve cover studs (10).

b. Installation

1. Install bracket (5) to valve cover studs (10) with two washers (7) and nuts (6). Tighten nuts (6) to 13-20 lb-ft (18-27 **N•m**).
2. Secure oil dipstick tube (4) to bracket (5) with two screw-assembled washers (3). Tighten screw-assembled washers (3) to 3-4 lb-ft (4-5 **N•m**).
3. Install clamp (9) to bracket (5) with screw-assembled washer (8). Tighten screw-assembled washer (8) to 3-4 lb-ft (4-5 **N•m**).
4. Install clamp (1) to bracket (5) with screw-assembled washer (2). Tighten screw-assembled washer (2) to 3-4 lb-ft (4-5 **N•m**).



- FOLLOW-ON TASKS:**
- Install engine access cover (para. 10-15).
 - Lower and secure hood (TM 9-2320-280-10).

Section III. ACCELERATOR SYSTEM MAINTENANCE

3-41. ACCELERATOR SYSTEM MAINTENANCE TASK SUMMARY

TASK PARA.	PROCEDURES	PAGE NO.
3-42.	Accelerator Linkage Maintenance	3-78
3-43.	Accelerator Pedal Replacement	3-82
3-44.	Engine Idle Speed Adjustment	3-83
3-45.	Hand Throttle Control Cable and Bracket Replacement	3-84

3-42. ACCELERATOR LINKAGE MAINTENANCE

This task covers:

- | | |
|--|---|
| <p>a. Removal</p> <p>b. Inspection</p> | <p>c. Installation</p> <p>d. Adjustment</p> |
|--|---|

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Four locknuts (Appendix G, Item 70)
Cotter pin (Appendix G, Item 11)
Assembled locknut (Appendix G, Item 131)
Lubricating oil, seasonal grade of OE
(Appendix C, Item 32)

Personnel Required

One mechanic
One assistant

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

- Hood raised and secured (TM 9-2320-280-10).
- Engine access cover removed (para. 10-15).

a. Removal

1. Remove cotter pin (15) and washer (16) and disconnect accelerator cable clevis (18) from accelerator pedal rod (14). Discard cotter pin (15).
2. Remove hitch pin (1) and washer (2) and disconnect hand throttle clevis (3) from accelerator pedal rod (14).
3. Remove assembled locknut (19) and harness clamp (21) from lower capscrew (25). Discard assembled locknut (19).
4. Remove three locknuts (22), washers (23), capscrews (25), washers (23) and accelerator rod retainers (24) from cowl (20). Discard locknuts (22).

NOTE

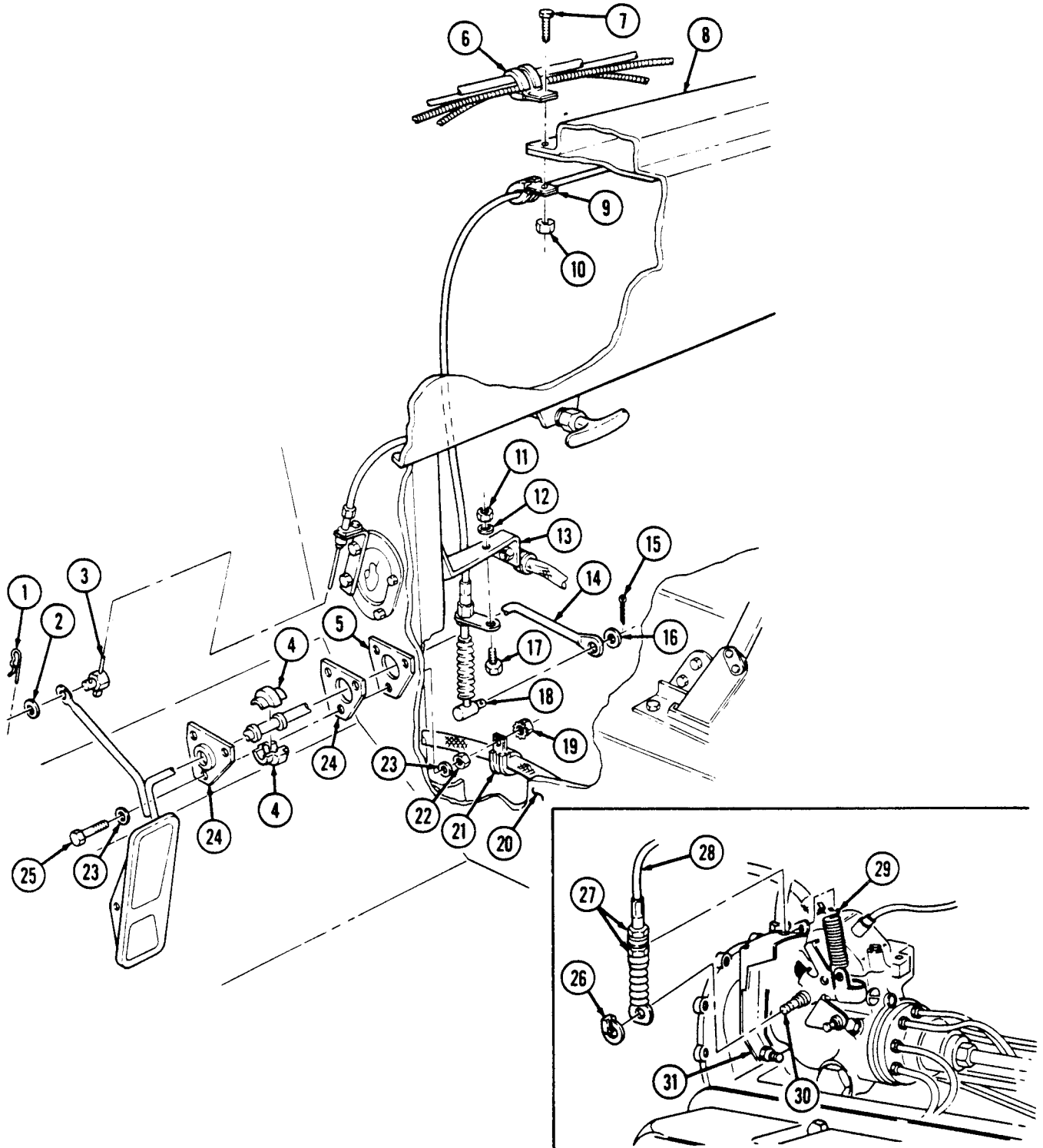
Bushing halves may detach from accelerator pedal rod during removal.

5. Pull accelerator pedal rod (14) forward through gasket (5) in cowl (20) and remove accelerator pedal rod (14).
6. Remove accelerator rod retainers (24) and bushing halves (4) from accelerator pedal rod (14).
7. Remove gasket (5) from cowl (20).
8. Remove locknut (11), washer (12), capscrew (17), and accelerator cable clevis (18) from body bracket (13). Discard locknut (11).
9. Remove nut (10), capscrew (7), and clamps (6) and (9) from A-beam (8).
10. Loosen two nuts (27) and disconnect accelerator cable (28) from engine bracket (31).
11. Disconnect throttle return spring (29) from engine bracket (31).
12. Remove accelerator cable clip (26) and accelerator cable (28) from injection pump throttle shaft (30).

3-42. ACCELERATOR LINKAGE MAINTENANCE (Cont'd)

b. Inspection

Inspect throttle return spring (29) for damage. Replace if defective.



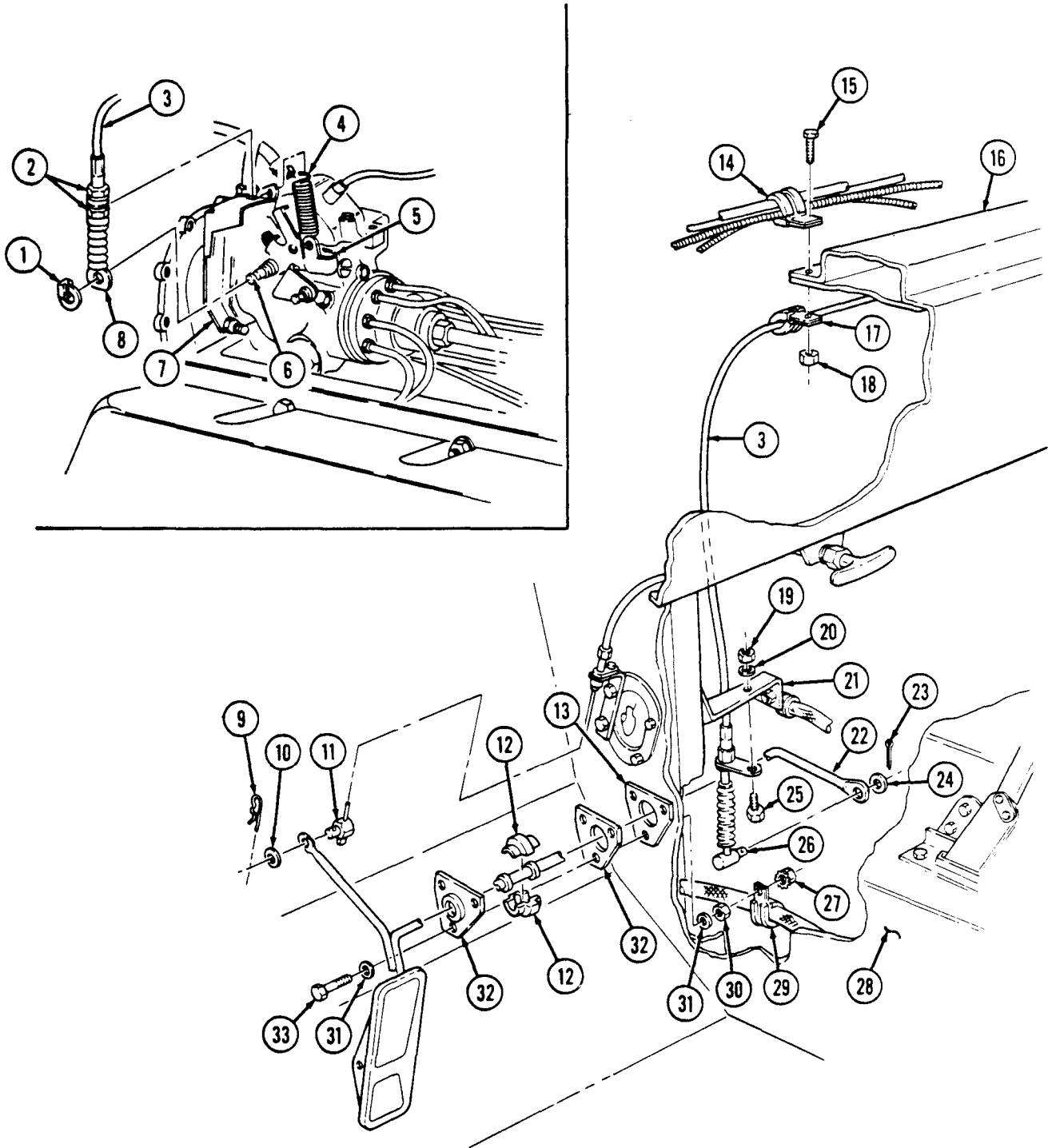
3-42. ACCELERATOR LINKAGE MAINTENANCE (Cont'd)**c. Installation**

1. Connect accelerator cable (3) to injection pump throttle shaft (6).
2. Position throttle shaft lever (5) to full throttle position and install accelerator cable (3) with accelerator cable clip (1) to injection pump throttle shaft (6).
3. Connect throttle return spring (4) to engine bracket (7).
4. Install cable assembly (3) to engine bracket (7) and tighten two nuts (2).
5. Install clamp (17) to cable assembly (3) and install clamps (14) and (17) to "A" beam (16) with capscrew (15) and nut (18).
6. Install accelerator cable clevis (26) to body bracket (21) with capscrew (25), washer (20), and nut (19).
7. Position gasket (13) to cowl (28).
8. Lubricate accelerator bushing halves (12) and accelerator pedal rod (22) at accelerator rod retainer (32) with lubricating oil.
9. Position accelerator rod retainers (32) and bushing halves (12) onto accelerator pedal rod (22) ensuring retainers (32) are properly seated over bushing halves (12).
10. Install accelerator rod retainers (32), accelerator pedal rod (22), and gasket (13) to cowl (28) with three capscrews (33), washers (31), washers (31), and locknuts (30). Install clamp (29) to bottom capscrew (33) with assembled locknut (27).
11. Connect hand throttle clevis (11) to accelerator pedal rod (22) with washer (10) and hitch pin (9).
12. Connect accelerator cable clevis (26) to accelerator pedal rod (22) with washer (24) and cotter pin (23).

d. Adjustment

1. Loosen accelerator cable nuts (2) on engine bracket (7).
2. Fully depress accelerator pedal.
3. Hold throttle shaft lever (5) in full throttle position.
4. Adjust accelerator cable nuts (2) up or down so cable end (8) holds throttle shaft lever (5) in full throttle position.
5. Tighten nuts (2) securing accelerator cable (3) to engine bracket (7).
6. Release accelerator pedal and ensure throttle shaft lever (5) returns all the way to idle position.

3-42. ACCELERATOR LINKAGE MAINTENANCE (Cont'd)



- FOLLOW-ON TASKS:
- Install engine access cover (para. 10-15).
 - Lower and secure hood (TM 9-2320-280-10).
 - Start engine (TM 9-2320-280-10) and check for proper accelerator operation.

3-43. ACCELERATOR PEDAL REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Materials/Parts

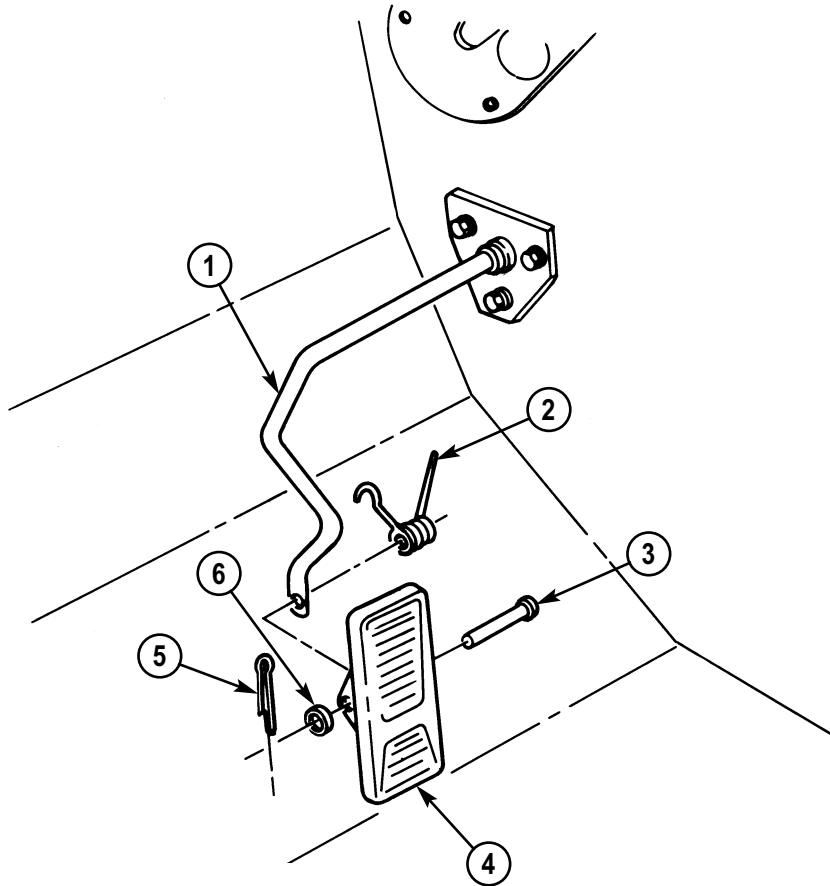
Cotter pin (Appendix G, Item 11)

a. Removal

Remove cotter pin (5), washer (6), and pin (3) from accelerator rod (1), and remove accelerator pedal (4) and spring (2). Discard cotter pin (5).

b. Installation

Install accelerator pedal (4) and spring (2) on accelerator rod (1) with pin (3), washer (6), and cotter pin (5).



FOLLOW-ON TASK: Start engine (TM 9-2320-280-10) and check for proper accelerator operation.

3-44. ENGINE IDLE SPEED ADJUSTMENT

This task covers:

Engine Idle Speed Adjustment

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Test Equipment

STE/ICE-R

Manual References

TM 9-2320-280-10

Equipment Condition

Hood raised and secured (TM 9-2320-280-10).

General Safety Instructions

Keep hands and arms away from fan blade and drivebelts while engine is running.

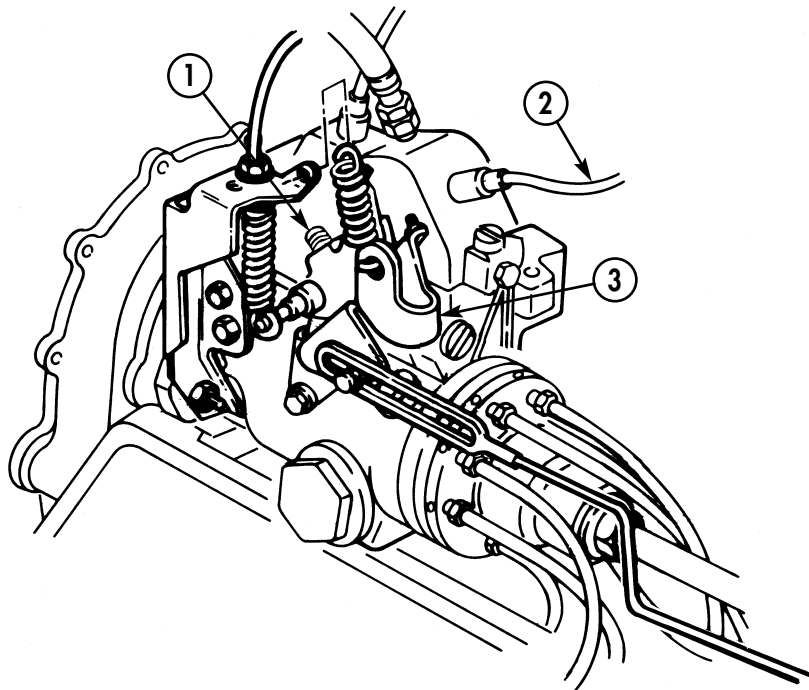
Engine Idle Speed Adjustment

1. Start engine (TM 9-2320-280-10) and bring engine to operating temperature.
2. Note idle speed and disconnect lead 569B (2) from injection pump (4). If change in idle speed is noted, refer to para. 2-22, Fuel System Tests. If no change in idle speed is noted, connect lead 569B (2) to injection pump (4) and proceed to step 3.

WARNING

Keep hands and arms away from fan blade and drivebelts while engine is running or serious injury may result.

3. Set engine idle speed to 650 rpm (± 25 rpm) for the 6.2L engine or 700 rpm (± 25 rpm) for the 6.5L engine by turning idle speed adjusting screw (1) on throttle shaft lever (3).



FOLLOW-ON TASK: Lower and secure hood (TM 9-2320-280-10).

3-45. HAND THROTTLE CONTROL CABLE AND BRACKET REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Personnel Required

One mechanic
One assistant

Materials/Parts

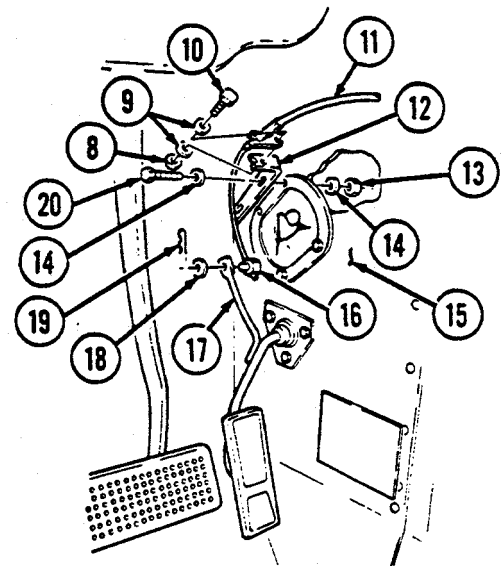
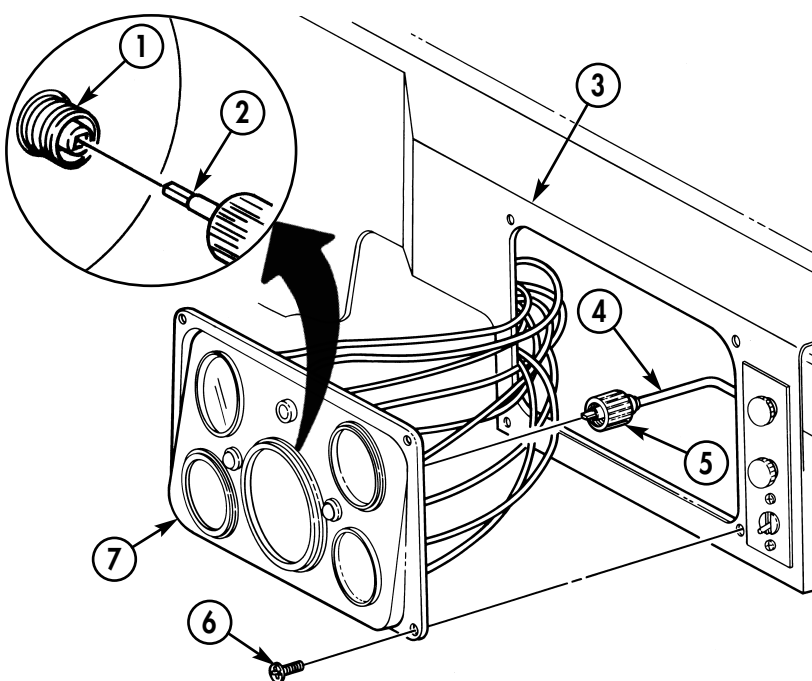
Four locknuts (Appendix G, Item 70)
O-ring (Appendix G, Item 212)

Manual References

TM 9-2320-280-24P

a. Removal

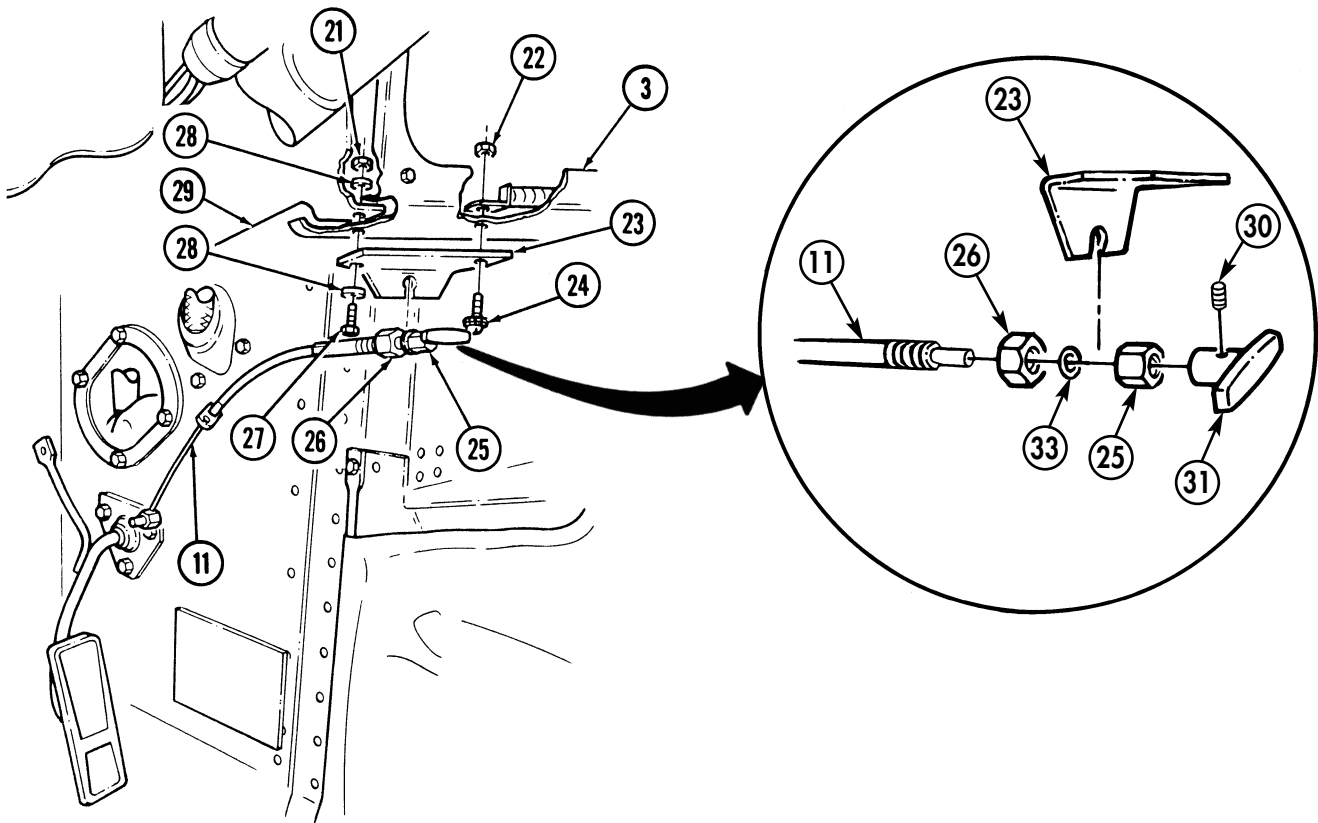
1. Remove four screws (6) and instrument cluster (7) from instrument panel (3) and pull instrument cluster (7) away to allow access to speedometer cable (4).
2. Loosen nut (5) and disconnect speedometer cable (4) from speedometer (1).
3. Remove hitch pin (19) and washer (18) and disconnect hand throttle clevis (16) from accelerator rod (17).
4. Remove locknut (8), washer (9), screw (10), washer (9), and hand throttle cable (11) from bracket (12). Discard locknut (8).
5. Remove two locknuts (13), washers (14), capscrews (20), washers (14), and bracket (12) from cowl (15). Discard locknuts (13).
6. Loosen nut (25) and hand throttle cable (11) from bracket (23).
7. Remove locknut (21), washer (28), capscrew (27), and washer (28) from bracket (23) and instrument panel (3). Discard locknut (21).
8. Remove nut (22), screw (24), and bracket (23) from instrument panel (3).
9. Remove setscrew (30) and handle (31) from hand throttle cable (11).
10. Remove nut (25), O-ring (33), and nut (26) from hand throttle cable (11). Discard O-ring (33).



3-45. HAND THROTTLE CONTROL CABLE AND BRACKET REPLACEMENT (Cont'd)

b. Installation

1. Install nut (26), O-ring (33), and nut (25) on hand throttle cable (11).
2. Install handle (31) on hand throttle cable (11) with setscrew (30).
3. Install bracket (23) on instrument panel (3) with screw (24) and nut (22). Do not tighten.
4. Align holes in bracket (23), instrument panel (3), and steering column bracket (29) with washer (28), capscrew (27), washer (28) and locknut (21).
5. Tighten screw (24) and nut (22).
6. Install hand throttle cable (11) on bracket (23) with nut (25).
7. Install bracket (12) on cowl (15) with two washers (14), capscrews (20), washers (14), and locknuts (13).
8. Install hand throttle cable (11) on bracket (12) with washer (9), screw (10), washer (9), and locknut (8).
9. Connect clevis (16) to accelerator rod (17) with washer (18) and hitch pin (19).
10. Connect speedometer cable (4) to speedometer (1), ensuring core (2) engages with square hole in speedometer (1), and tighten nut (5).
11. Install instrument cluster (7) in instrument panel (3) with four screws (6).



Section IV. EXHAUST SYSTEM MAINTENANCE

3-46. EXHAUST SYSTEM MAINTENANCE TASK SUMMARY

TASK PARA.	PROCEDURES	PAGE NO.
3-47.	Tailpipe Replacement	3-86
3-48.	Muffler and Insulator Replacement (All models except M1123 and "A2" vehicles)	3-88
3-49.	Muffler and Catalytic Converter Replacement (M1123 and "A2" vehicles only)	3-90
3-50.	Crossover Pipe Replacement	3-92
3-51.	Tailpipe Hanger Replacement	3-94
3-52.	Tailpipe Insulator Replacement	3-95
3-53.	Muffler Support Bracket Maintenance	3-96
3-54.	Right Exhaust Manifold Rear Heat Shield Replacement	3-98
3-55.	Right Exhaust Manifold Heat Shield Replacement	3-100
3-56.	Left Exhaust Manifold Replacement	3-102
3-57.	Right Exhaust Manifold Replacement	3-104
3-58.	Muffler Hanger Replacement	3-106

3-47. TAILPIPE REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Materials/Parts

Gasket (Appendix G, Item 42)
Three locknuts (Appendix G, Item 128)
Two lockwashers (Appendix G, Item 133)

General Safety Instructions

Do not touch hot exhaust system components with bare hands.

WARNING

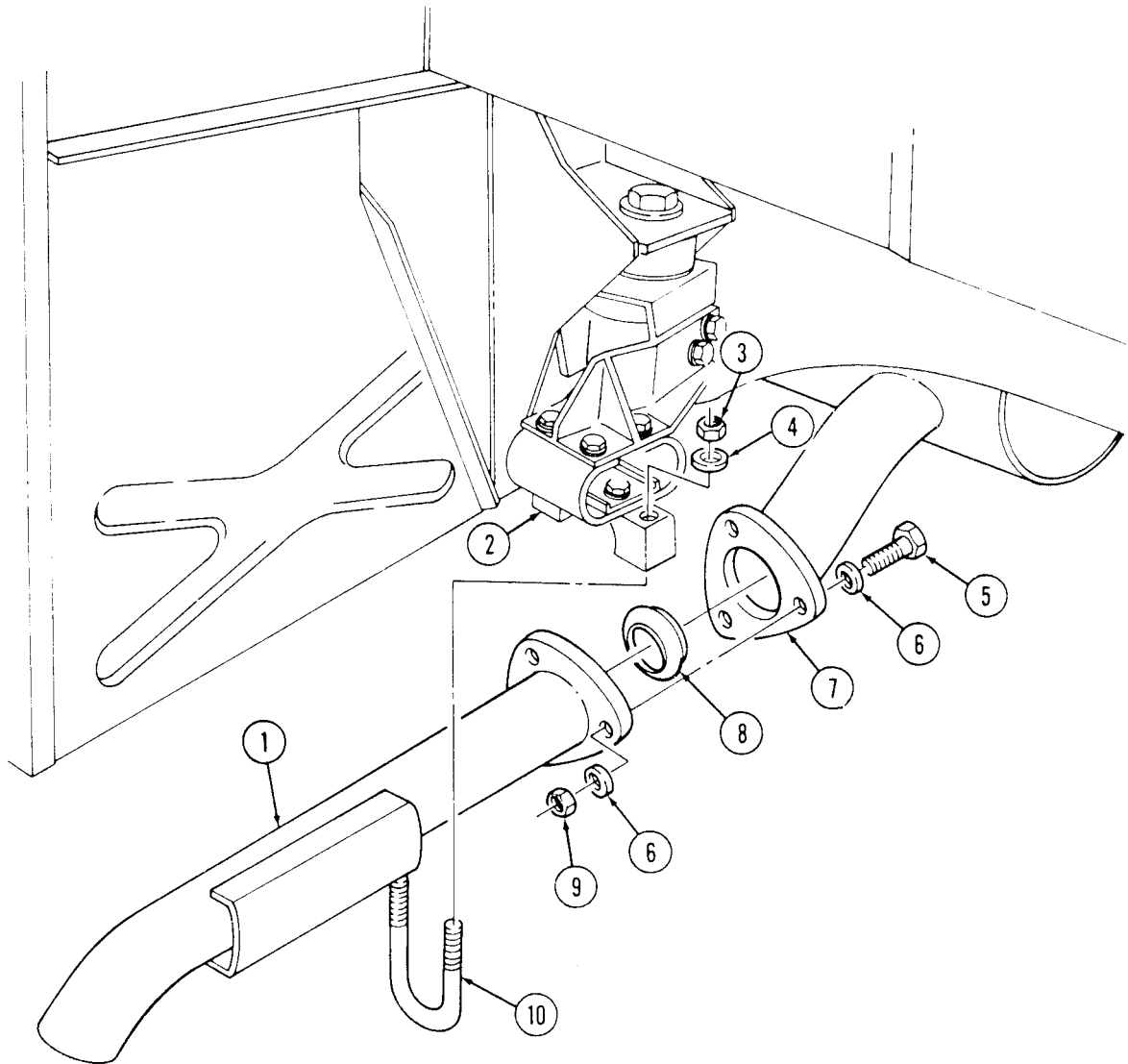
Do not touch hot exhaust system components with bare hands.
Severe injury will result.

a. Removal

1. Remove three locknuts (9), washers (6), capscrews (5), and washers (6) from tailpipe (1) and muffler (7). Discard locknuts (9).
2. Remove two nuts (3), lockwashers (4), and U-bolt (10) from tailpipe (1) and hanger (2). Discard lockwashers (4).
3. Remove tailpipe (1) and gasket (8) from muffler (7). Discard gasket (8).

3-47. TAILPIPE REPLACEMENT (Cont'd)**b. Installation**

1. Install gasket (8) and tailpipe (1) on muffler (7) with three washers (6), capscrews (5), washers (6), and locknuts (9). Tighten locknuts (9) to 26 lb-ft (35 N•m).
2. Install tailpipe (1) on hanger (2) with U-bolt (10), two washers (4), and nuts (3).



FOLLOW-ON TASK: Start engine (TM 9-2320-280-10) and check for exhaust leaks.

3-48. MUFFLER AND INSULATOR REPLACEMENT (ALL MODELS EXCEPT M1123 AND "A2" VEHICLES)

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

All except: M997A2, M1025A2, M1035A2, M1043A2, M1045A2, M1097A2, M1123

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Nine locknuts (Appendix G, Item 128)
Gasket (Appendix G, Item 42)
Two lockwashers (Appendix G, Item 133)

Manual References

TM 9-2320-280-24P

Equipment Condition

Tailpipe removed (para. 3-47).

General Safety Instructions

Do not touch hot exhaust system components with bare hands.

WARNING

Do not touch hot exhaust system components with bare hands.
Severe injury will result.

a. Removal

1. Remove three locknuts (10), washers (9), capscrews (12), and washers (9) from muffler (7) and crossover pipe (8). Discard locknuts (10).
2. Remove two nuts (16), lockwashers (15), and U-bolt (13) from muffler (7) and support bracket (14). Discard lockwashers (15).
3. Remove gasket (11) by pulling muffler (7) towards rear of vehicle. Discard gasket (11).

NOTE

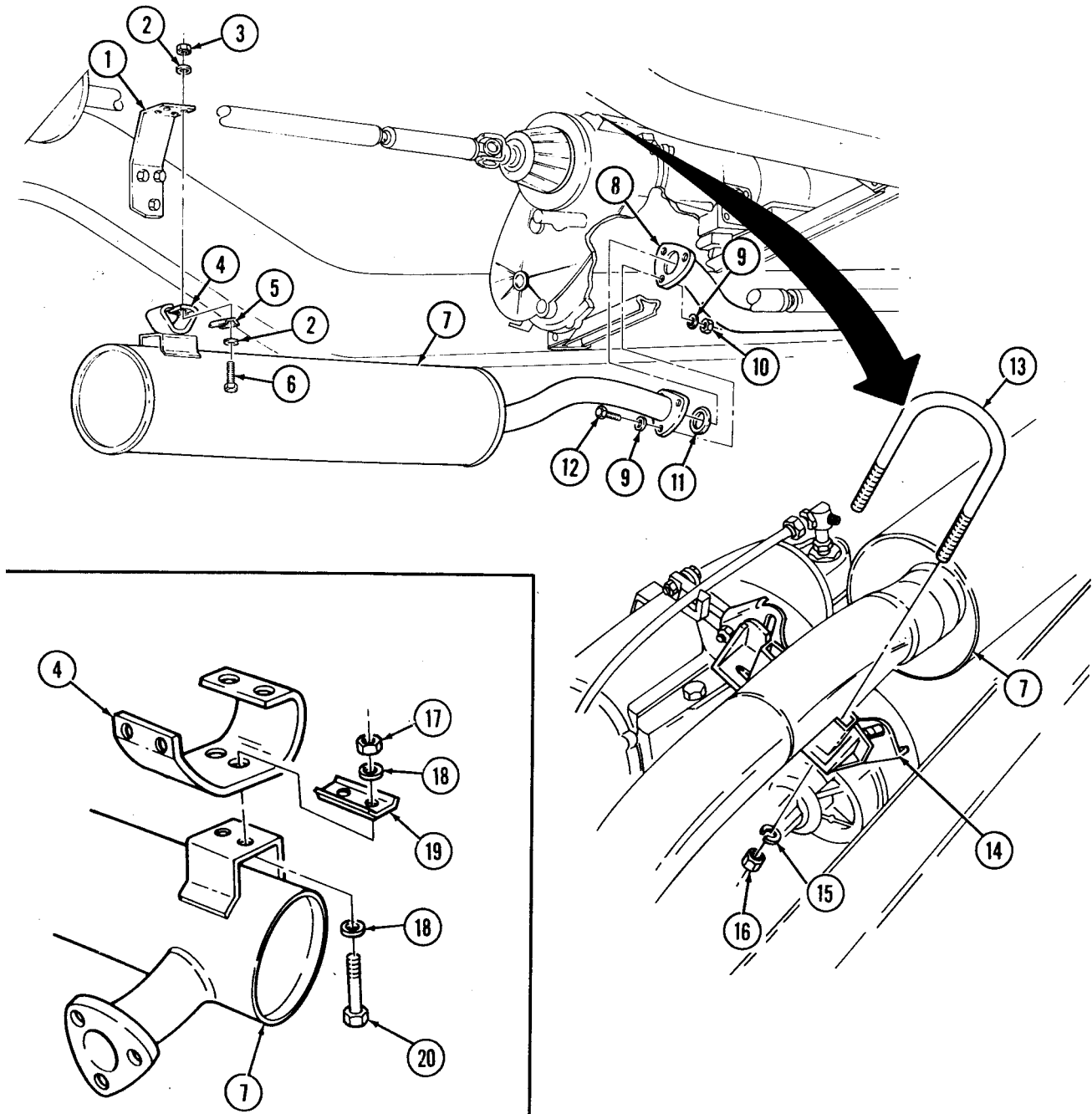
It may be necessary to lower rear propeller shaft (para. 6-5) to gain access to locknuts on muffler hanger.

4. Remove four locknuts (3), washers (2), capscrews (6), and washers (2) securing insulator (4) and retaining plates (5) to muffler hanger (1) and remove muffler (7). Discard locknuts (3).
5. Remove two locknuts (17), washers (18), capscrews (20), washers (18), insulator (4), and retaining plate (19) from muffler (7). Discard locknuts (17).

b. Installation

1. Install insulator (4) and retaining plate (19) to muffler (7) with two washers (18), capscrews (20), washers (18), and locknuts (17). Tighten locknuts (17) to 10 lb-ft (14 N•m).
2. Install muffler (7), insulator (4), and retaining plates (5) to muffler hanger (1) with four washers (2), capscrews (6), washers (2), and locknuts (3).
3. Install muffler (7) on bracket (14) with U-bolt (13), two lockwashers (15), and nuts (16).
4. Install gasket (11) and muffler (7) on crossover pipe (8) with three washers (9), capscrews (12), washers (9), and locknuts (10). Tighten locknuts (10) to 26 lb-ft (35 N•m).

3-48. MUFFLER AND INSULATOR REPLACEMENT (ALL MODELS EXCEPT M1123 AND "A2" VEHICLES)



FOLLOW-ON TASK: Install tailpipe (para. 3-47).

3-49. MUFFLER AND CATALYTIC CONVERTER REPLACEMENT (M1123 AND "A2" VEHICLES ONLY)

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M997A2, M1025A2, M1035A2, M1043A2,
M1045A2, M1097A2, M1123

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Nine locknuts (Appendix G, Item 128)
Manifold seal assembly (Appendix G, Item 197)
Two lockwashers (Appendix G, Item 167)

Manual References

TM 9-2320-280-24P

Equipment Condition

Tailpipe removed (para. 3-47).

General Safety Instructions

Do not touch hot exhaust system components with bare hands.

WARNING

Do not touch hot exhaust system components with bare hands.
Severe injury will result.

a. Removal

CAUTION

Support muffler and catalytic converter during replacement.
Failure to do so may result in damage to equipment.

1. Remove two clamps (12) and heat shield (13) from crossover pipe (14).
2. Remove four nuts (7) and U-bolt (25) from heat shield (11), support bracket (24), and muffler (26).
3. Loosen clamp (8) and remove heat shield (11) from catalytic converter (18).
4. Remove two nuts (10) and heat shield (4) from muffler (26).
5. Remove three locknuts (16), washers (15), capscrews (23), and washers (15) from catalytic converter (18) and crossover pipe (14). Discard locknuts (16).
6. Remove two nuts (21), lockwashers (20), and U-bolt (17) from catalytic converter (18) and support bracket (19). Discard lockwashers (20).
7. Remove manifold seal assembly (22) by pulling catalytic converter (18) towards rear of vehicle. Discard manifold seal assembly (22).

NOTE

It may be necessary to lower rear propeller shaft (para. 6-5) to gain access to locknuts on muffler hanger.

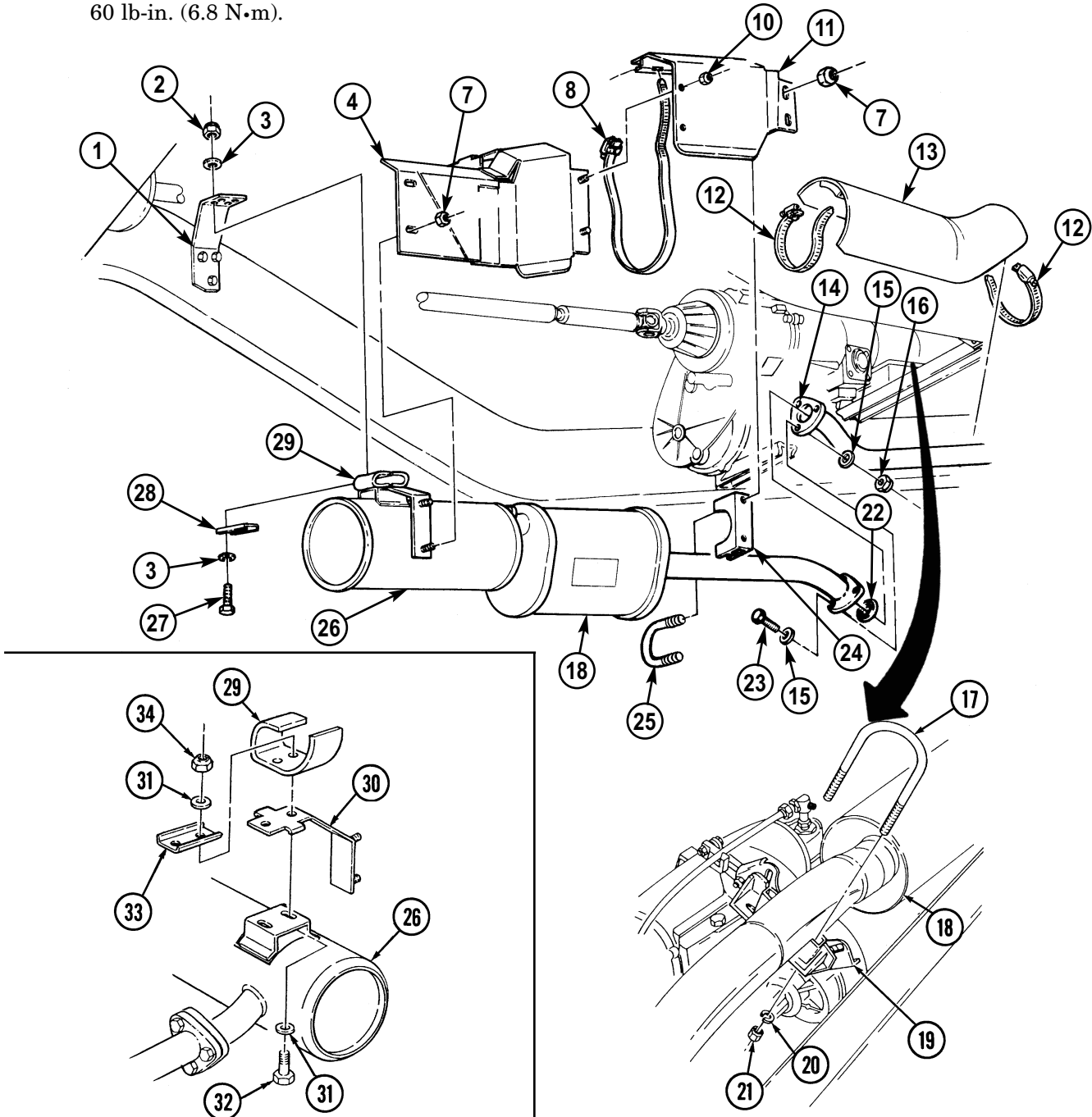
8. Remove four locknuts (2), washers (3), capscrews (27), washers (3), two retaining plates (28), and muffler (26) from muffler hanger (1). Discard locknuts (2).
9. Remove two locknuts (34), washers (31), capscrews (32), washers (31) insulator (29), retaining plate (33), and bracket (30) from muffler (26). Discard locknuts (34).

b. Installation

1. Install bracket (30), insulator (29) and retaining plate (33) on muffler (26) with two washers (31), capscrews (32), washers (31), and locknuts (34). Tighten locknuts (34) to 10 lb-ft (14 N•m).
2. Install muffler (26) and two retaining plates (28) on muffler hanger (1) with four washers (3), capscrews (27), washers (3), and locknuts (2).
3. Install catalytic converter (18) on bracket (19) with U-bolt (17), two lockwashers (20), and nuts (21).

**3-49. MUFFLER AND CATALYTIC CONVERTER REPLACEMENT
(M1123 AND "A2" VEHICLES ONLY) (Cont'd)**

4. Install manifold seal assembly (22) and catalytic converter (18) on crossover pipe (14) with three washers (15), capscrews (23), washers (15), and locknuts (16). Tighten locknuts (16) to 26 lb-ft (35 N•m).
5. Install heat shield (4) on muffler (26) with two nuts (10).
6. Install heat shield (11) on catalytic converter (18) with clamp (8).
7. Install heat shield (11) on bracket (24) and muffler (26) with U-bolt (25) and four nuts (7).
8. Install heat shield (13) on crossover pipe (14) with two clamps (12). Tighten clamps (12) to 60 lb-in. (6.8 N•m).



FOLLOW-ON TASK: Install tailpipe (para. 3-47).

3-50. CROSSOVER PIPE REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

- Engine access cover removed (para. 10-15).
- Right exhaust manifold rear heat shield removed (para. 3-54).

Materials/Parts

Nine locknuts (Appendix G, Item 128)
Two manifold seals (Appendix G, Item 197)
Gasket (Appendix G, Item 42)

General Safety Instructions

Do not touch hot exhaust system components with bare hands.

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

WARNING

Do not touch hot exhaust system components with bare hands.
Severe injury will result.

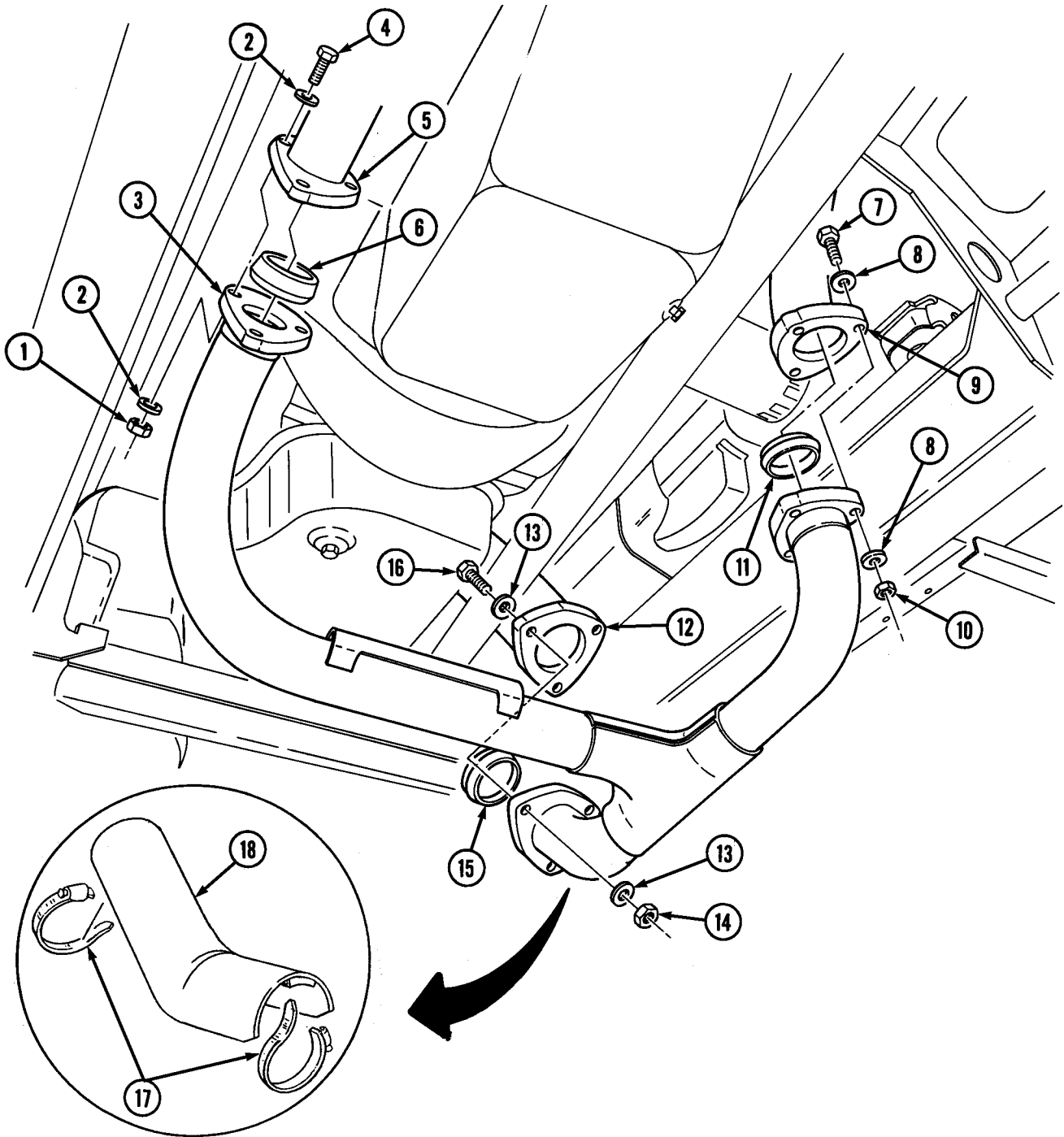
a. Removal

1. Remove two clamps (17) and heat shield (18) from crossover pipe (3).
2. Remove three locknuts (1), washers (2), capscrews (4), washers (2), and crossover pipe (3) from right exhaust manifold (5). Discard locknuts (1).
3. Remove three locknuts (14), washers (13), capscrews (16), washers (13), and crossover pipe (3) from muffler (12). Discard locknuts (14).
4. Remove three locknuts (10), washers (8), capscrews (7), washers (8), and crossover pipe (3) from left exhaust manifold (9). Discard locknuts (10).
5. Remove and discard two manifold seals (6) and (11) and gasket (15).

b. Installation

1. Install manifold seal (11) and crossover pipe (3) on left exhaust manifold (9) with three washers (8), capscrews (7), washers (8), and locknuts (10).
2. Install gasket (15) and crossover pipe (3) on muffler (12) with three washers (13), capscREW (16), washers (13), and locknuts (14).
3. Install manifold seal (6) and crossover pipe (3) on right exhaust manifold (5) with three washers (2), capscrews (4), washers (2), and locknuts (1).
4. Tighten locknuts (1), (10), and (14) to 26 lb-ft (35 N•m).
5. Install heat shield (18) on crossover pipe (3) with two clamps (17).

3-50. CROSSOVER PIPE REPLACEMENT(Cont'd)



- FOLLOW-ON TASKS:**
- Start engine (TM 9-2320-280-10) and check for exhaust leaks.
 - Install right exhaust manifold rear heat shield (para. 3-54).
 - Install engine access cover (para. 10-15).

3-51. TAILPIPE HANGER REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-24P

Materials/Parts

Six locknuts (Appendix G, Item 128)

General Safety Instructions

Do not touch hot exhaust system components with bare hands.

a. Removal

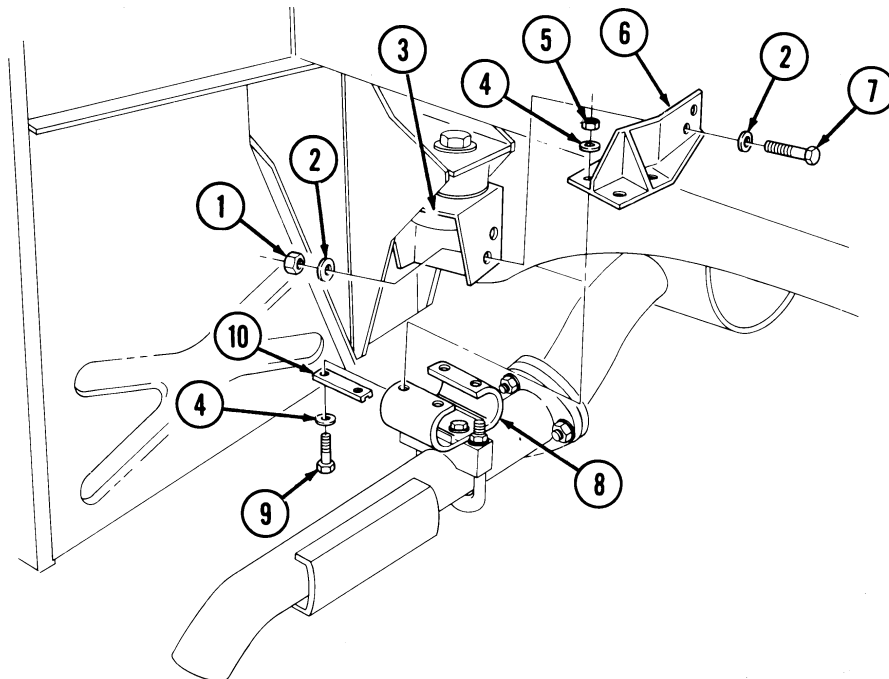
WARNING

Do not touch hot exhaust system components with bare hands.
Severe injury will result.

1. Remove four locknuts (5), washers (4), capscrews (9), washers (4) two insulator reinforcement plates (10) and insulator (8) from tailpipe hanger (6). Discard locknuts (5).
2. Remove two locknuts (1), washers (2), capscrews (7), washers (2) and tailpipe hanger (6) from frame (3). Discard locknuts (1).

b. Installation

1. Install insulator (8) and insulator reinforcement plates (10) to tailpipe hanger (6) with four washers (4), capscrews (9), washers (4), and locknuts (5).
2. Install tailpipe hanger (6) to frame (3) with two washers (2), capscrews (7), washers (2), and locknuts (1). Tighten capscrews (7) to 26 lb-ft (35 N•m).



3-52. TAILPIPE INSULATOR REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Four locknuts (Appendix G, Item 128)
Two lockwashers (Appendix G, Item 133)

Manual References

TM 9-2320-280-24P

Equipment Condition

Tailpipe removed (para. 3-47).

General Safety Instructions

Do not touch hot exhaust system components with bare hands.

WARNING

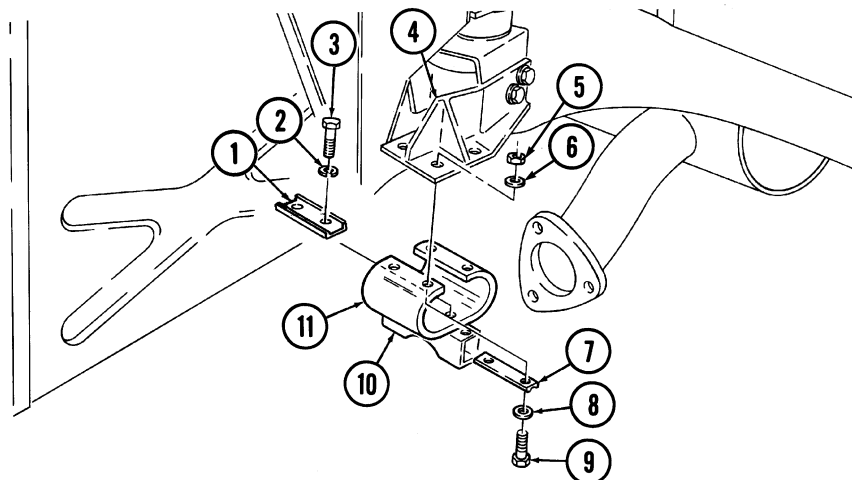
Do not touch hot exhaust system components with bare hands.
Severe injury will result.

a. Removal

1. Remove four locknuts (5), washers (6), capscrews (9), washers (8) reinforcement plates (7) and insulator (11) from tailpipe hanger (4). Discard locknuts (5).
2. Remove two capscrews (3), lockwashers (2), reinforcement plate (1) and U-bolt clamp (10) from insulator (11). Discard lockwashers (2).

b. Installation

1. Install reinforcement plate (1) and U-bolt clamp (10) to insulator (11) with two lockwashers (2) and capscrews (3). Tighten capscrews (3) to 10 lb-ft (14 N•m).
2. Install insulator (11) and reinforcement plate (7) to tailpipe hanger (4) with four washers (8), capscrews (9), washers (6), and locknuts (5). Tighten locknuts (5) to 10 lb-ft (14 N•m).



FOLLOW-ON TASK: Install tailpipe (para. 3-47).

3-53. MUFFLER SUPPORT BRACKET MAINTENANCE

This task covers:

- | | |
|---|---|
| <p>a. Removal</p> <p>b. Disassembly</p> | <p>c. Assembly</p> <p>d. Installation</p> |
|---|---|

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Four locknuts (Appendix G, Item 128)

Manual References

TM 9-2320-280-24P

Equipment Condition

- Muffler and insulator removed (all models except M1123 and "A2" series vehicles) (para. 3-48).
- Muffler and catalytic converter removed (M1123 and "A2" vehicles only) (para. 3-49).

a. Removal

NOTE

Hold bolt heads on transfer case secure to prevent changing torque or damaging transfer case seal.

Remove two locknuts (1), washers (2), and support bracket assembly (3) from transfer case (4). Discard locknuts (1).

b. Disassembly

1. Remove two locknuts (9), washers (8), capscrews (5), washers (6), mounting bracket (11), and washers (6) from support plate (10). Discard locknuts (9).
2. Remove two insulators (7) from mounting plate (11).

c. Assembly

1. Install two insulators (7) in mounting bracket (11).
2. Install two washers (6) between mounting bracket (11) and support plate (10) with two washers (6), capscrews (5), washers (8), and locknuts (9). Tighten locknuts (9) to 15 lb-ft (20 N•m).

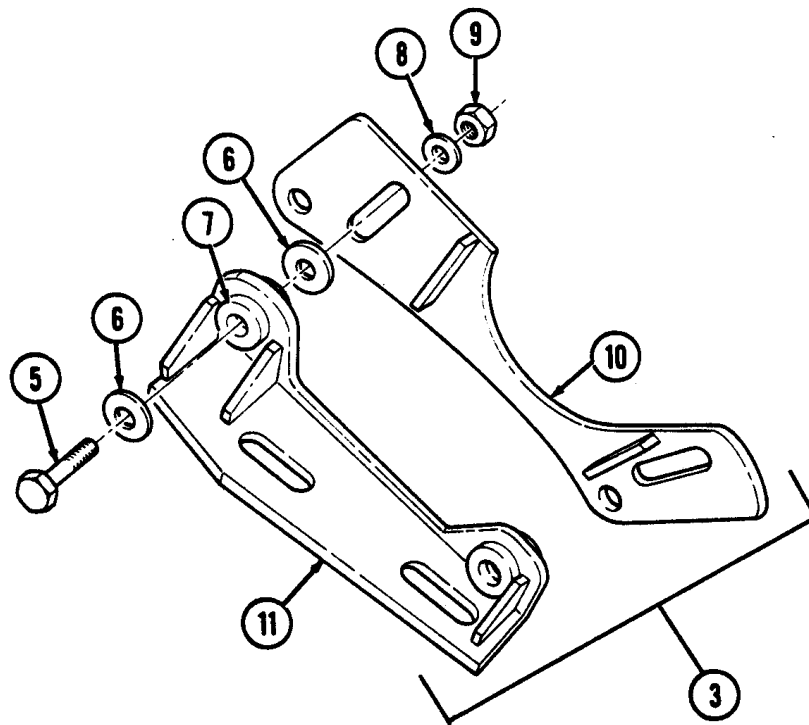
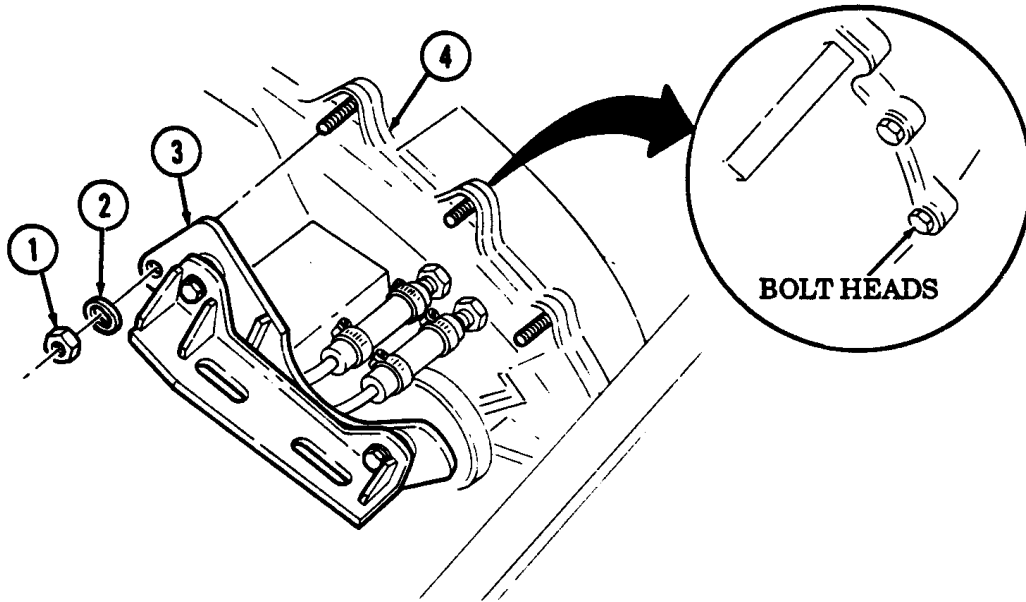
d. Installation

NOTE

Hold bolt heads on transfer case secure to prevent changing torque or damaging transfer case seal.

Install support bracket assembly (3) to transfer case (4) with two washers (2) and locknuts (1). Tighten locknuts (1) to 15 lb-ft (20 N•m).

3-53. MUFFLER SUPPORT BRACKET MAINTENANCE(Cont'd)



- FOLLOW-ON TASKS:**
- Install muffler and catalytic converter (M1123 and "A2" vehicles only) (para. 3-49).
 - Install muffler and insulator (all models except M1123 and "A2" series vehicles) (para. 3-48).

3-54. RIGHT EXHAUST MANIFOLD REAR HEAT SHIELD REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

Engine access cover removed (para. 10-15).

Materials/Parts

Locknut (Appendix G, Item 72)

General Safety Instructions

Do not touch hot exhaust system components with bare hands.

Manual References

TM 9-2320-280-24P

WARNING

Do not touch hot exhaust system components with bare hands.
Severe injury will result.

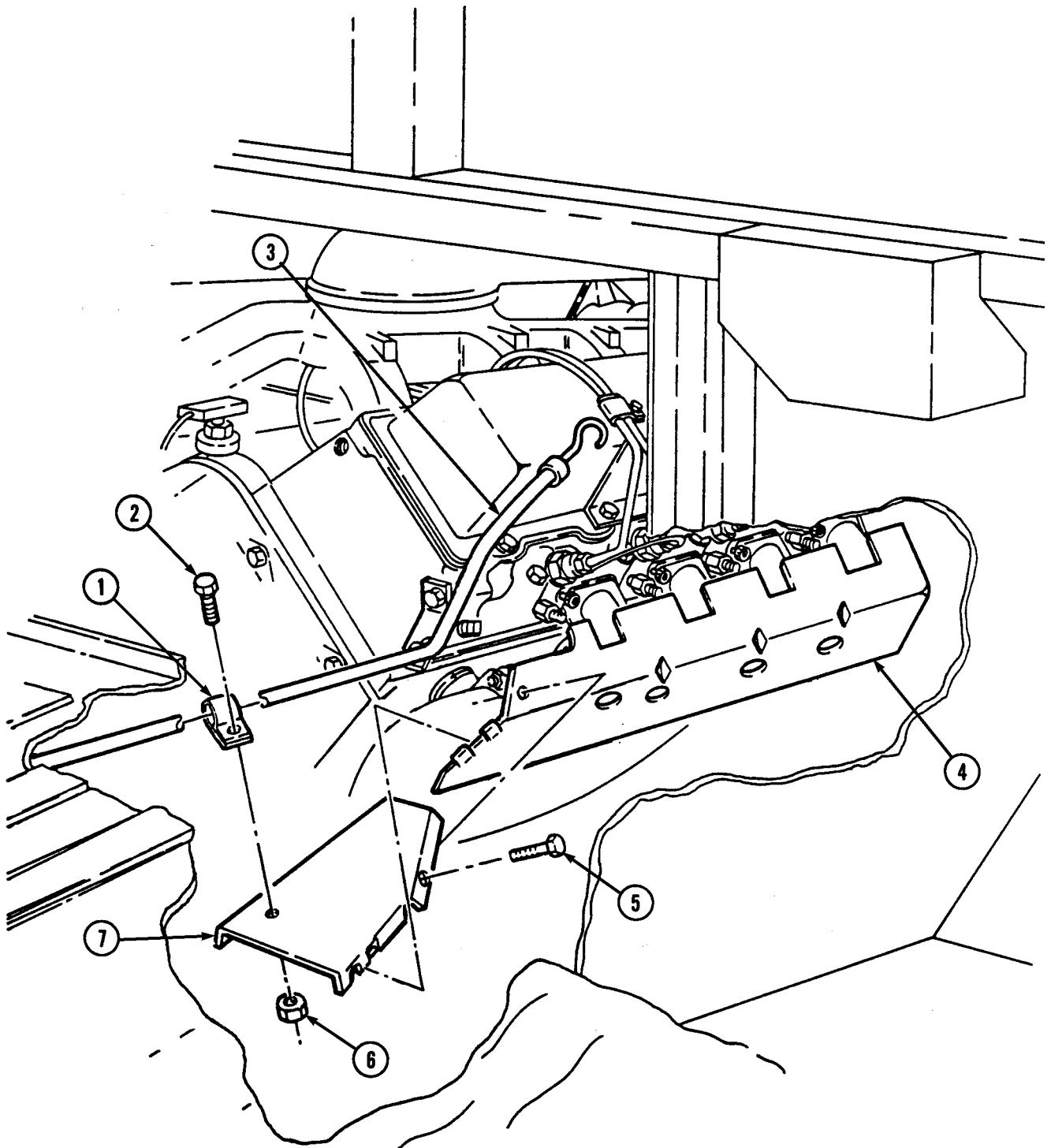
a. Removal

1. Remove locknut (6), capscrew (2), and clamp (1) from rear heat shield (7) and transmission dipstick tube (3). Discard locknut (6).
2. Remove capscrew (5) and rear heat shield (7) from heat shield (4).

b. Installation

1. Install rear heat shield (7) on heat shield (4) with capscrew (5).
2. Install clamp (1) and rear heat shield (7) on transmission dipstick tube (3) with capscrew (2) and locknut (6).

3-54. RIGHT EXHAUST MANIFOLD REAR HEAT SHIELD REPLACEMENT(Cont'd)



FOLLOW-ON TASK: Install engine access cover (para. 10-15).

3-55. RIGHT EXHAUST MANIFOLD HEAT SHIELD REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Special Tools

Hex-head driver, 8mm (Appendix B, Item 156)

Equipment Condition

- Right exhaust manifold rear heat shield removed (para. 3-54).
- Hood raised and secured (TM 9-2320-280-10).
- Engine access cover removed (para. 10-15).

Materials/Parts

Locknut (Appendix G, Item 128)

General Safety Instructions

Do not touch hot exhaust system components with bare hands.

Personnel Required

One mechanic
One assistant

WARNING

Do not touch hot exhaust system components with bare hands.
Severe injury will result.

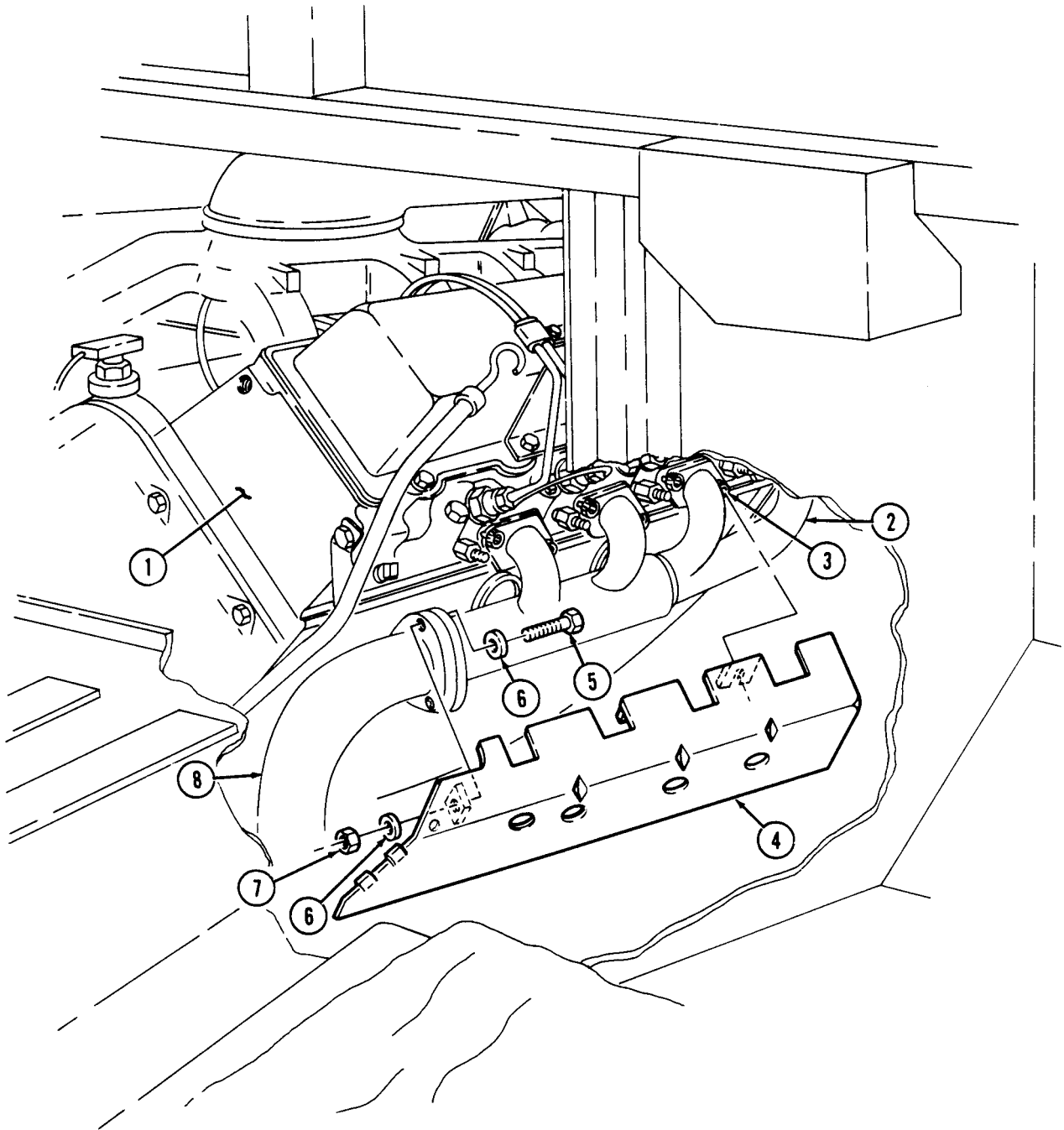
a. Removal

1. Using hex-head driver, loosen three socket head screws (3) on heat shield (4), exhaust manifold (2), and cylinder head (1).
2. Remove locknut (7), washer (6), capscrew (5), washer (6) and heat shield (4) from crossover pipe (8) and exhaust manifold (2). Discard locknut (7).

b. Installation

1. Position heat shield (4) on exhaust manifold (2) and crossover pipe (8).
2. Using hex-head driver, secure heat shield (4) and exhaust manifold (2) to cylinder head (1) with three socket-head screws (3). Tighten socket-head screws (3) to 25-33 lb-ft (34-45 N•m).
3. Install heat shield (4) on exhaust manifold (2) and crossover pipe (8) with washer (6), capscrew (5), washer (6), and locknut (7). Tighten locknut (7) to 37 lb-ft (50 N•m).

3-55. RIGHT EXHAUST MANIFOLD HEAT SHIELD REPLACEMENT (Cont'd)



- FOLOW-ON TASK:**
- Install right exhaust manifold rear heat shield (para. 3-54).
 - Install engine access cover (para. 10-15).
 - Start engine (TM 9-2320-280-10) and check for exhaust leaks.
 - Lower and secure hood (TM 9-2320-280-10).

3-56. LEFT EXHAUST MANIFOLD REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Special Tools

Hex-head driver, 8mm, (Appendix B, Item 156)

Materials/Parts

Gasket (Appendix G, Item 50)
Four locknuts (Appendix G, Item 128)
Manifold seal (Appendix G, Item 197)

Manual References

TM 9-2820-280-24P

Equipment Condition

- Engine access cover removed (para. 10-15).
- Oil dipstick tube removed (para. 3-2).
- 60 ampere alternator removed (para. 4-2).
- 100 ampere alternator removed (para. 12-23 or 12-24).
- 200 ampere alternator removed (para. 4-109 or 4-110).

General Safety Instructions

- Do not touch hot exhaust system components with bare hands.
- Place used gaskets in a plastic, leakproof, sealed bag or container.

WARNING

Do not touch hot exhaust system components with bare hands.
Severe injury will result.

a. Removal

1. Remove three locknuts (8), washers (9), capscrews (11), and washers (9) from crossover pipe (7) and exhaust manifold (4). Discard locknuts (8).

NOTE

Some vehicles may have a socket-head screw in place of stud to secure alternator support bracket and exhaust manifold to cylinder head.

2. Remove locknut (14), washer (15) and alternator support bracket (1) from exhaust manifold (4) and stud (2). Discard locknut (14).
3. Remove stud (2) and washer (3) from exhaust manifold (4) and cylinder head (6).
4. Using hex-head driver, remove seven socket-head screws (12) and washers (13) from exhaust manifold (4) and cylinder head (6).

WARNING

- Vehicles with serial numbers USBL Eff. 1 through 118767 have manifold gaskets containing asbestos fibers. When performing manifold maintenance, place used gaskets in a plastic, leakproof, sealed bag or container and contact the local health and safety department for further disposal instructions.
- Failure to observe above warning may result in an environmental hazard.

5. Remove exhaust manifold (4), gasket (5), and manifold seal (10). Discard gasket (5) and manifold seal (10).
6. Clean all gasket material from head mounting surface and manifold mating surface.

3-56. LEFT EXHAUST MANIFOLD REPLACEMENT (Cont'd)

b. Installation

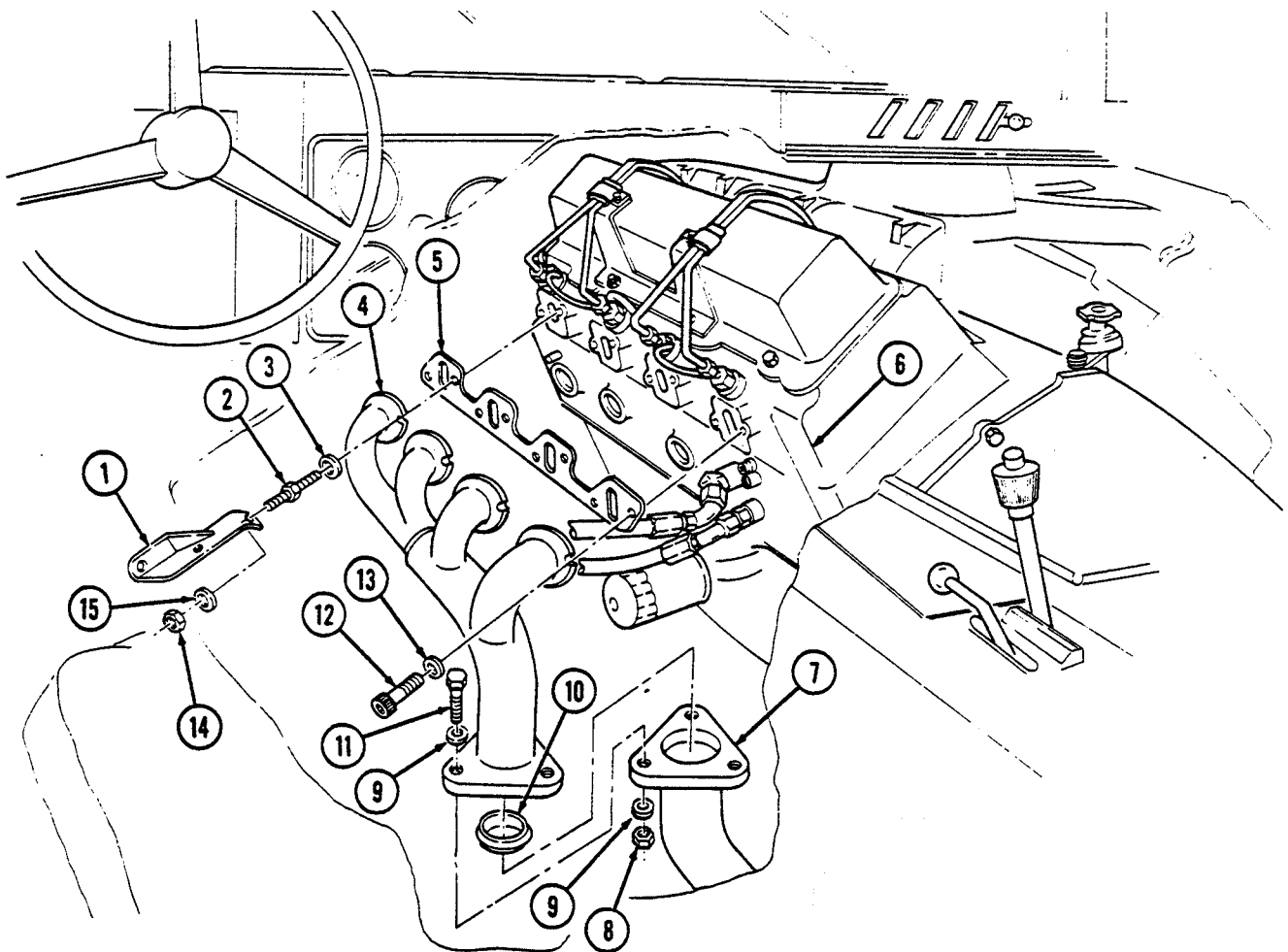
CAUTION

Alternate screw and stud tightening. Flanges often break when each screw is tightened completely before others are snugged up.

NOTE

Ensure replacement gasket has a silver, shiny surface, not a dull, dark surface, which is characteristic of a gasket containing asbestos.

1. Install gasket (5) and exhaust manifold (4) on cylinder head (6) with seven washers (13), socket-head screws (12), washer (3), and stud (2).
2. Using hex-head driver, tighten seven socket-head screws (12) and stud (2) to 25-33 lb-ft (34-45 N-m).
3. Install alternator support bracket (1) on exhaust manifold (4) and stud (2) with washer (15) and locknut (14). Tighten locknut (14) to 31-39 lb-ft (42-53 N-m).
4. Install manifold seal (10) and crossover pipe (7) on exhaust manifold (4) with three washers (9), capscrews (11), washers (9), and locknuts (8). Tighten locknuts (8) to 37 lb-ft (50 N-m).



- FOLLOW-ON TASKS:**
- Install 200 ampere alternator (para. 4-109 or 4-110).
 - Install 100 ampere alternator (para. 12-23 or 12-24).
 - Install 60 ampere alternator (para. 4-2).
 - Install oil dipstick tube (para. 3-2).
 - Install engine access cover (para. 10-15).

3-57. RIGHT EXHAUST MANIFOLD REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Special Tools

Hex head driver, 8mm, (Appendix B, Item 156)

Materials/Parts

Gasket (Appendix G, Item 50)
Three locknuts (Appendix G, Item 128)
Manifold seal (Appendix G, Item 197)

Manual References

TM 9-2820-280-24P

Equipment Condition

- Air horn and elbow removed (para. 3-14).
- Right exhaust manifold heat shield removed (para. 3-55).

General Safety Instructions

- Do not touch hot exhaust system components with bare hands.
- Place used gaskets in a plastic, leakproof, sealed bag or container.

WARNING

Do not touch hot exhaust system components with bare hands. Severe injury will result.

a. Removal

1. Remove three locknuts (10), washers (7), capscrews (6), and washers (7) from exhaust manifold (3) and crossover pipe (9). Discard locknuts (10).
2. Using hex head driver, remove eight socket-head screws (5) and washers (4) from exhaust manifold (3) and cylinder head (1).

WARNING

- Vehicles with serial numbers USBL Eff. 1 through 118767 have manifold gaskets containing asbestos fibers. When performing manifold maintenance, place used gaskets in a plastic, leakproof sealed bag or container and contact the local health and safety department for further disposal instructions.
- Failure to observe above warning may result in an environmental hazard.

3. Remove exhaust manifold (3), gasket (2), and manifold seal (8). Discard gasket (2) and manifold seal (8).
4. Clean all gasket material from head mounting surface and manifold mating surface.

b. Installation

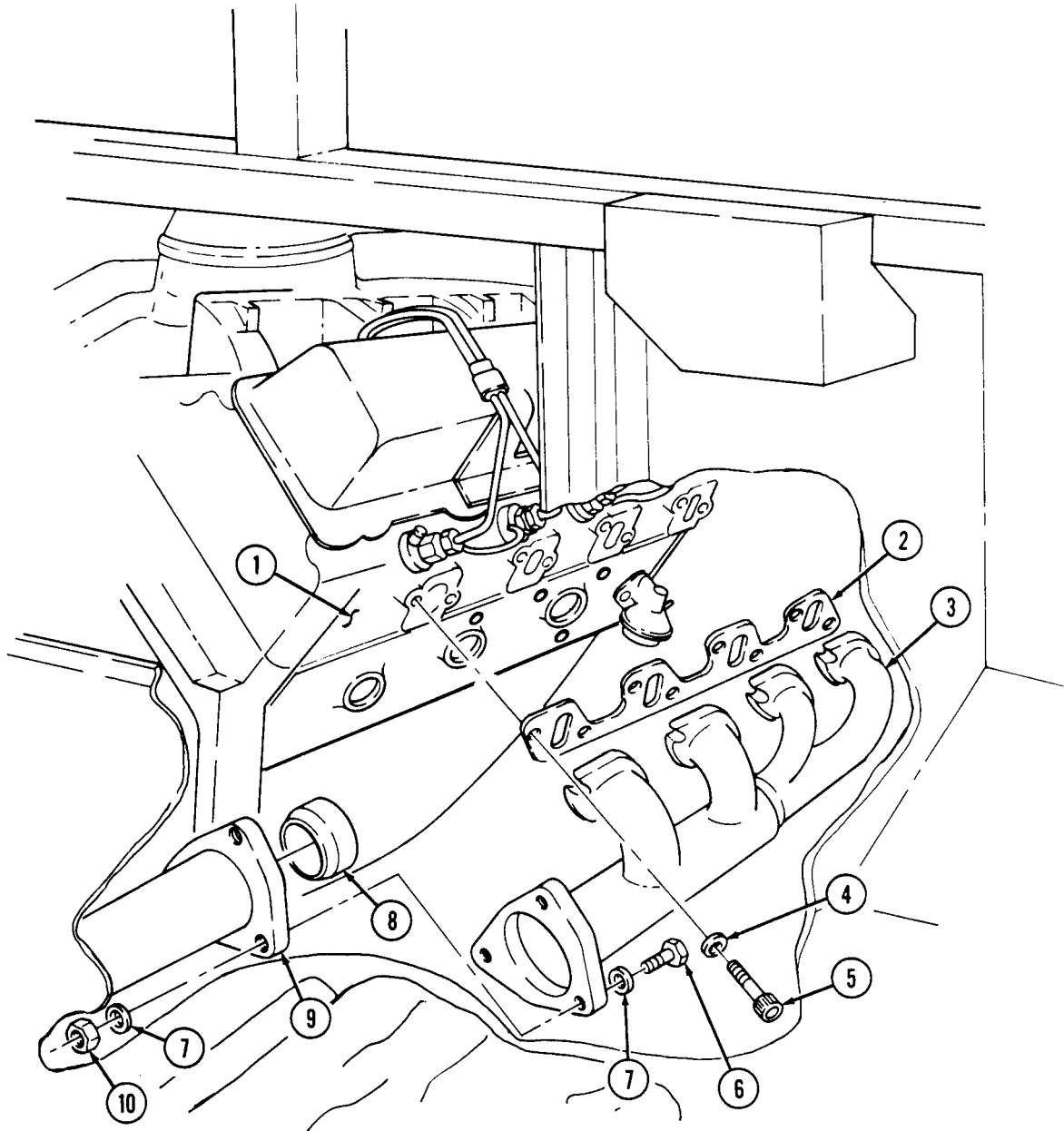
CAUTION

Alternate screw tightening. Flanges often break when each screw is tightened completely before others are snugged up.

NOTE

Ensure replacement gasket has a silver, shiny surface, not a dull, dark surface, which is characteristic of a gasket containing asbestos.

1. Install gasket (2) and exhaust manifold (3) to cylinder head (1) with eight socket-head screws (5) and washers (4). Tighten socket-head screws (5) to 25-33 lb-ft (34-45 N·m).
2. Install exhaust manifold (3) to crossover pipe (9) with manifold seal (8), three washers (7), capscrews (6), washers (7), and locknuts (10). Tighten locknuts (10) to 37 lb-ft (50 N·m).

3-57. RIGHT EXHAUST MANIFOLD REPLACEMENT (Cont'd)

FOLLOW-ON TASKS:

- Install air horn and elbow (para. 3-14).
- Install right exhaust manifold heat shield (para. 3-55).

3-58. MUFFLER HANGER REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-24P

Materials/Parts

Three locknuts (Appendix G, Item 114)

Equipment Condition

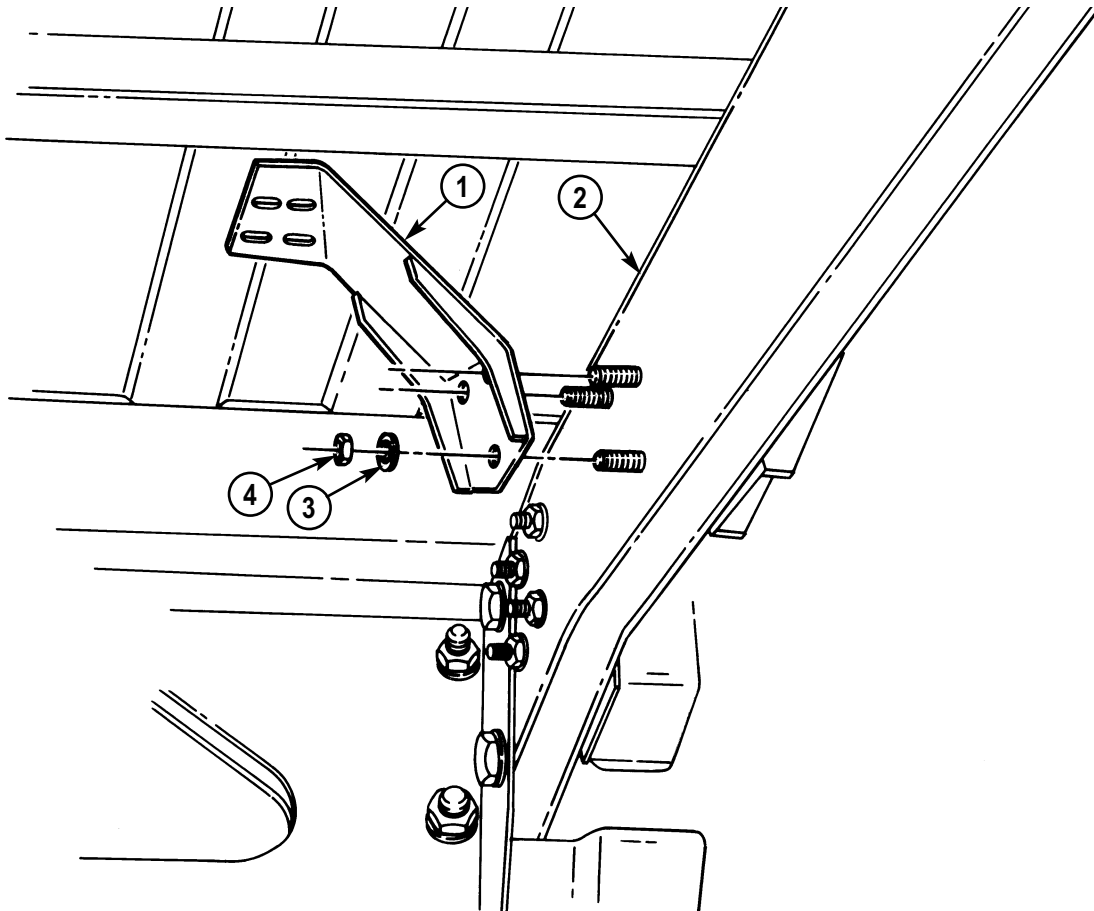
Muffler and insulator removed (para. 3-48).

a. Removal

Remove three locknuts (4), washers (3), and muffler hanger (1) from frame rail (2). Discard locknuts (4).

b. Installation

Install muffler hanger (1) to frame rail (2) with three washers (3) and locknuts (4). Tighten locknuts (4) to 75 lb-ft (102 N·m).



FOLLOW-ON TASK: Install muffler and insulator (para. 3-48).

Section V. COOLING SYSTEM MAINTENANCE

3-59. COOLING SYSTEM MAINTENANCE TASK SUMMARY

TASK PARA.	PROCEDURES	PAGE NO.
3-60.	Cooling System Servicing	3-108
3-61.	Radiator and Fan Shroud Assembly Maintenance	3-110
3-62.	Airlift to Shroud Shield Assembly Replacement	3-116
3-63.	Radiator Support Replacement	3-117
3-64.	Surge Tank Replacement	3-118
3-65.	Surge Tank-to-Radiator Vent Hose Replacement	3-119
3-66.	Surge Tank-to-Water Crossover Vent Hose Replacement	3-120
3-67.	Thermostat Bypass Hose Replacement	3-121
3-68.	Fan Drive Hose and Quick-Disconnect Replacement	3-122
3-69.	Radiator Inlet Hose Replacement	3-124
3-70.	Radiator Lower Tube Assembly Replacement	3-125
3-71.	Lower Radiator Hose Replacement	3-126
3-72.	Water Pump Inlet Hose Replacement	3-127
3-73.	Surge Tank-to-Lower Radiator Tube Hose Replacement	3-128
3-74.	Surge Tank Overflow Hose Replacement	3-129
3-75.	Thermostat Replacement	3-130
3-76.	Water Pump Pulley Replacement	3-130.1
3-76.1.	Water Pump and Adapter Plate Maintenance	3-130.2
3-77.	Water Crossover Maintenance	3-132
3-78.	Fan Drive and Fan Blade Maintenance	3-134
3-79.	Fan Drive Friction Lining Replacement	3-136
3-80.	Power Steering Drivebelt Set Replacement	3-137
3-81.	Alternator Drivebelt Set Replacement	3-138
3-82.	Drivebelts Adjustment	3-140
3-83.	Serpentine Drivebelt Maintenance	3-142
3-84.	Tensioner, Idler Pulleys, and Mounting Hardware Replacement	3-144

3-60. COOLING SYSTEM SERVICING

This task covers:

- a. Depressurizing
- b. Draining System

- c. Preventive Cleaning
- d. Filling System

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Test Equipment

Radiator tester (Appendix B, Item 66)

Materials/Parts

Antifreeze (Appendix C, Item 12)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P
TM 750-254
TB 750-651

Equipment Condition

Hood raised and secured (TM 9-2320-280-10).

General Safety Instructions

Do not remove surge tank filler cap before releasing internal pressure.

a. Depressurizing

WARNING

Do not remove surge tank filler cap before depressurizing system when engine temperature is above 190°F (88°C). Steam or hot coolant under pressure will cause severe burns.

1. If engine is hot, remove surge tank filler cap (1) by placing a thick cloth over cap (1). Press down and turn counterclockwise to its first stop to release internal pressure.
2. After pressure has escaped, press down and turn cap (1) counterclockwise again and remove.

b. Draining System

1. If engine is hot, repressurize system (see a. of this task).

NOTE

Have drainage container ready to catch coolant.

2. Open draincock (4) and allow system to drain.
3. Close draincock (4).

c. Preventive Cleaning

1. For preventive cleaning, refer to TB 750-651.
2. Test surge tank filler cap (1), refer to TM 750-254.

d. Filling System

NOTE

The cooling system for the vehicles covered in this manual has a 26 qt (25 l) capacity. Continue filling and allow air to escape. Ensure surge tank coolant level is 3/4 full before securing filler cap.

1. Ensure radiator draincock (4) is closed and heater control valve (3) is open (pull "TEMP" knob on dash to "MAX" position).
2. Fill system with proper antifreeze solution. See table 3-1 for preparation of antifreeze solutions.

3-60. COOLING SYSTEM SERVICING (Cont'd)

3. Secure filler cap (1) to surge tank (2).
4. Run engine at fast idle (approximately 1500 rpm) until engine temperature reaches 190°F (88°C), opening thermostat to circulate coolant.
5. Depressurize system (see a. of this task).
6. Fill with proper antifreeze solution until surge tank (2) is 3/4 full. See table 3-1 for preparation of antifreeze solutions.
7. Secure filler cap (1) to surge tank (2).
8. Run engine at fast idle (approximately 1500 rpm) until temperature reaches 190°F (88°C), opening thermostat, and stop engine.
9. Depressurize system (see task a. of this paragraph). Use tester to ensure proper coolant protection is provided.
10. Secure filler cap (1) to surge tank (2).

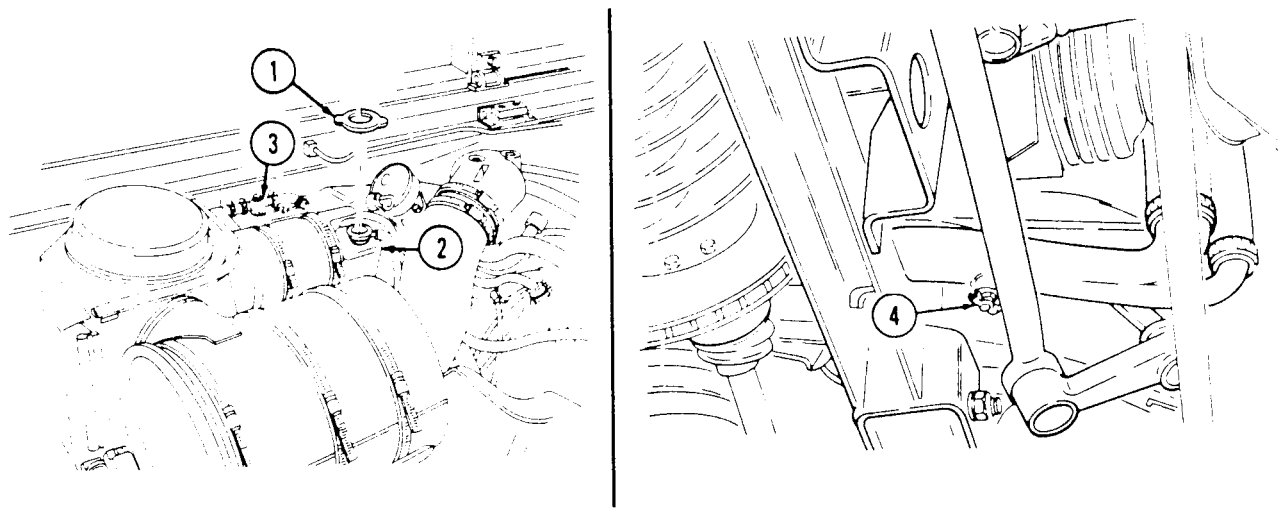


Table 3-1. Guide for Preparation of Antifreeze Solutions.

ETHYLENE-GLYCOL INHIBITED MIL-A-46153			
LOWEST EXPECTED AMBIENT TEMPERATURE		PINTS PER GAUON OF COOLANT CAPACITY	ARCTIC GRADE ANTIFREEZE -90°F (-67.7°C) MIL-A-11755
°F	°C		
+20	-6.7	1-1/2	<p>CAUTION</p> <p>Freezing point of -90°F (-67.7°C). Issued ready for use and must not be mixed with any other liquid.</p>
+10	-12.2	2	
0	-17.7	2-3/4	
-10	-23.3	3-1/4	
-20	-28.8	3-1/2	
-30	-34.4	4	
-40	-40.0	4-1/4	
-50	-45.5	4-1/2	
-55	-48.3	4-3/4	
Below -60	Below -51.1	Use arctic grade antifreeze -90°F (-67.7°C)	

- FOLLOW-ON TASKS:
- Start engine (TM 9-2320-280-10) and check cooling system for leaks.
 - Lower and secure hood (TM 9-2320-280-10).

3-61. RADIATOR AND FAN SHROUD ASSEMBLY MAINTENANCE

This task covers:

- | | |
|---|------------------------|
| <p>a. Removal</p> <p>b. Cleaning and Inspection</p> | <p>c. Installation</p> |
|---|------------------------|

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Locknut (Appendix G, Item 99)
Six locknuts (Appendix G, Item 128)
Eight lockwashers (Appendix G, Item 135)
Rivet (Appendix G, Item 254) (optional)
Repair kit (Appendix C, Item 37) (optional)

Personnel Required

One mechanic
One assistant

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

- Hood removed (para. 10-5).
- Cooling system drained (para. 3-60).
- Oil cooler removed (para. 3-8).

General Safety Instructions

Compressed air used for cleaning purposes will not exceed 30 psi (207 kPa).

CAUTION

Do not bend transmission oil cooler fins. Damaged fins reduce cooling efficiency, which may damage engine.

a. Removal

NOTE

The radiator and fan shroud are removed as a unit.

1. Loosen clamp (2) and disconnect radiator inlet hose (1) from radiator (3).
2. Loosen clamp (6) and disconnect surge tank-to-radiator vent hose (5) from adapter (7).
3. Loosen clamp (16) and disconnect control valve hose (15) from shroud bulkhead adapter (17)

NOTE

M1123 and "A2" vehicles have a quick-disconnect on fan drive hose.

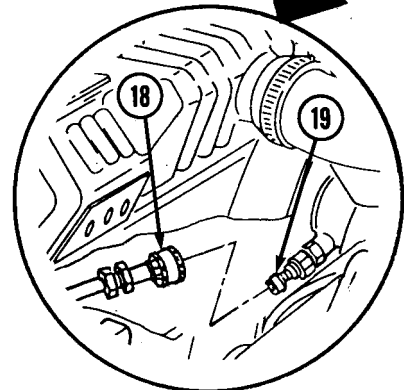
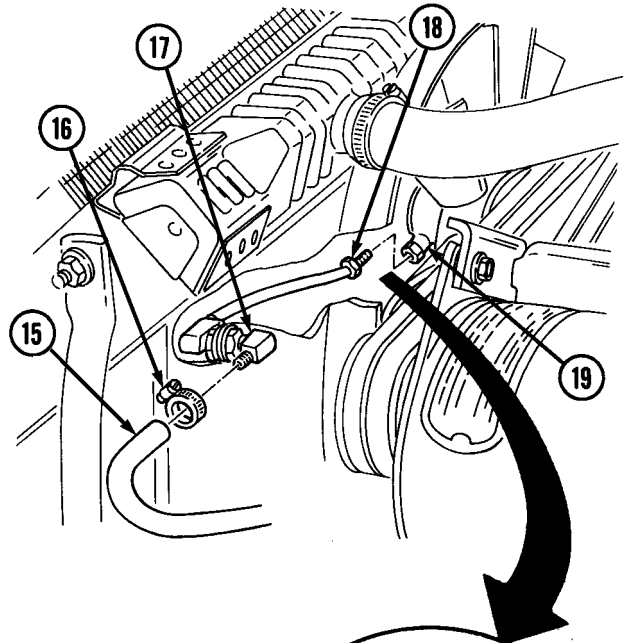
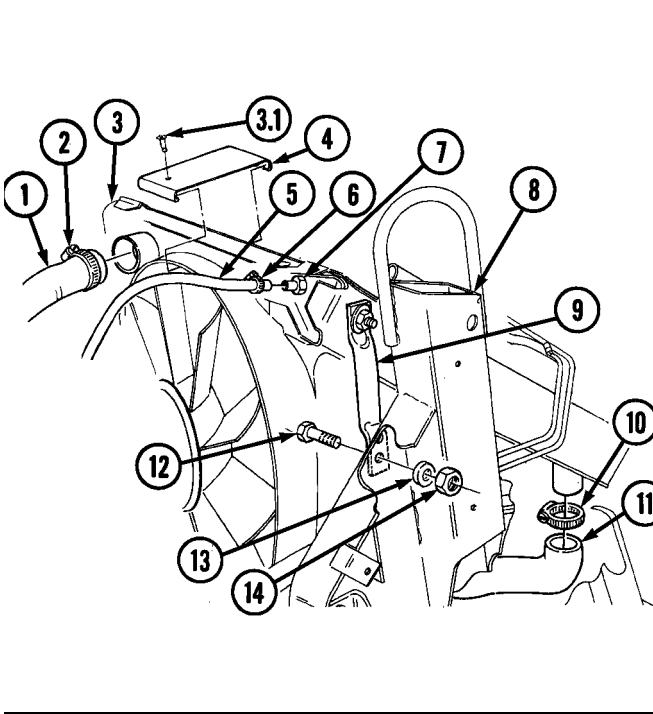
4. Disconnect fan drive hose (18) from fan drive (19).
5. Loosen clamp (10) and disconnect lower radiator front hose (11) from radiator (3).

NOTE

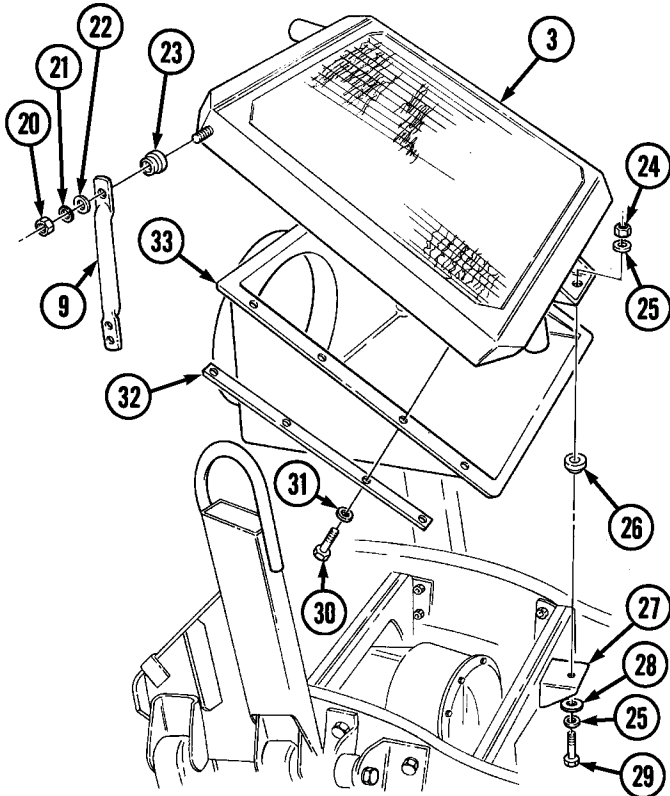
Perform step 6 only if shroud has to be removed from radiator.

6. Remove rivet (3.1) (if installed) and strap (4) securing fan shroud (33) to radiator (3).
7. Remove locknut (24), washer (25), capscrew (29), large washer (28), washer (25), and lower mount (26) from radiator (3) and frame bracket (27). Discard locknut (24).
8. Remove four locknuts (14), washers (13), and capscrews (12) from two rear support brackets (9) and airlift brackets (8). Discard locknuts (14).
9. Lift radiator (3) up and remove from vehicle.
10. Remove eight capscrews (30), lockwashers, (31), two retaining strips (32) and fan shroud (33) from radiator (3). Discard lockwashers (31).
11. Remove two locknuts (20), washers (21), large washers (22), insulators (23), and brackets (9) from radiator (3). Discard locknuts (20).

3-61. RADIATOR AND FAN SHROUD ASSEMBLY MAINTENANCE (6nt'd)



QUICK-DISCONNECT



3-61. RADIATOR AND FAN SHROUD ASSEMBLY MAINTENANCE (6nt'd)

b. Cleaning and Inspection

WARNING

Compressed air used for cleaning purposes will not exceed 30 psi (207 kPa). Use only with effective chip guarding and personal protective equipment (goggles/shield, gloves, etc).

CAUTION

Using high water pressure when cleaning engine and transmission oil cooler and radiator can cause damage. High water pressure should not be directed at cooler or radiator.

1. Remove dirt, trash, and insects embedded in radiator fins, using water and compressed air.
2. Inspect radiator adapter (19) for damage. Replace adapter (19) if damaged.
3. Inspect radiator (6) for breaks, punctures, cracks, and splits. Replace radiator (6) if broken, punctured, cracked, or split.
4. Inspect shroud bulkhead adapter (20) for damage. Replace bulkhead adapter (20) if damaged.

NOTE

For on vehicle fan shroud repair only, use repair kit listed in Appendix C.

5. Inspect fan shroud (16) for cracks, splits, and breaks. Repair fan shroud (16) if cracked, split, or broken. Replace fan shroud if damaged beyond repair.
6. Inspect fan drive hose (21) for cracks or damage. Replace if defective.

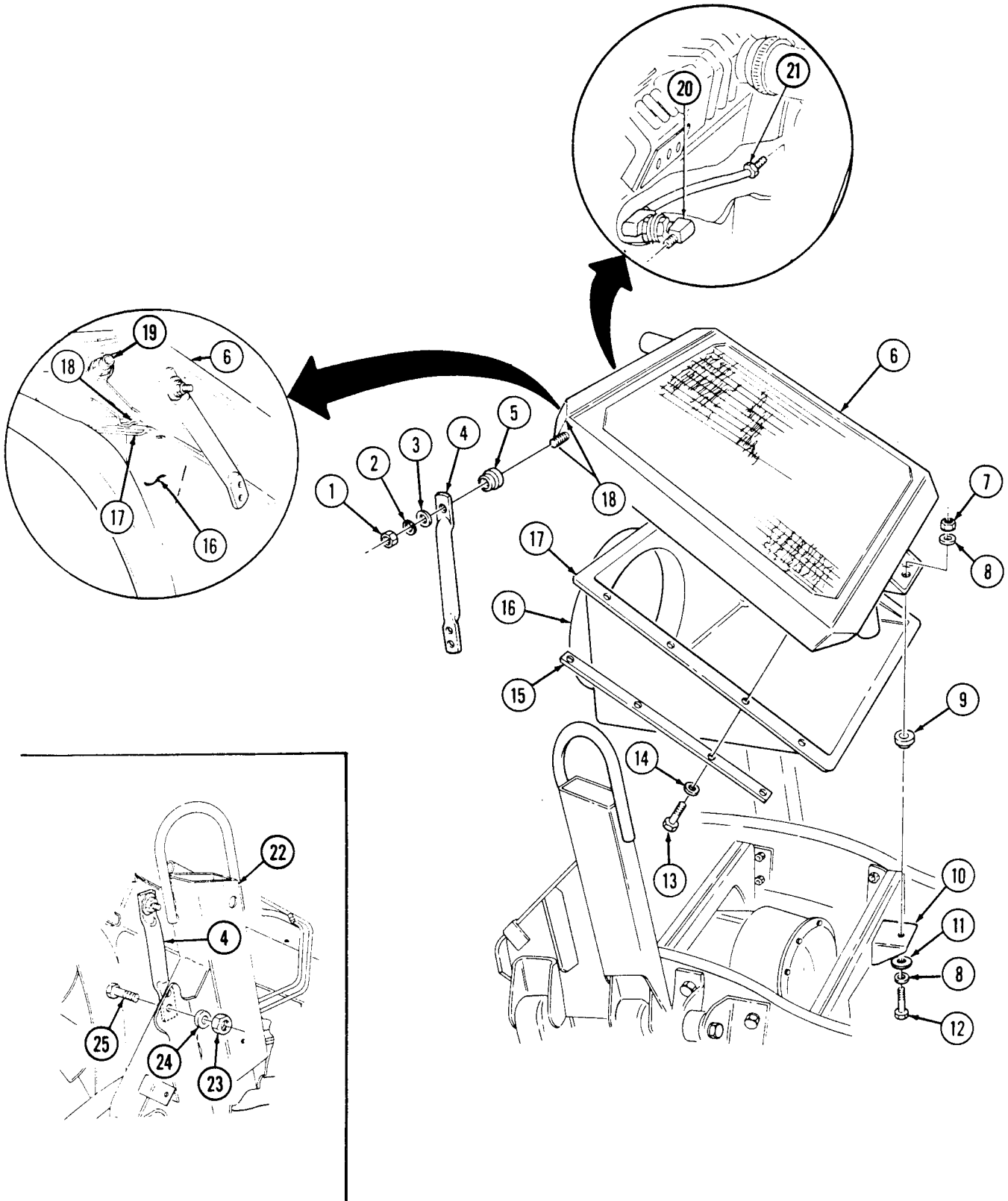
c. Installation

CAUTION

To ensure proper cooling of engine, upper edge of shroud must align with radiator top tank seam or damage to equipment may result.

1. Install fan shroud (16) to radiator (6) so fan shroud edge (17) aligns with tank seam (18) and secure with two retaining strips (15), eight washers (14), and capscrews (13). Tighten capscrews (13) to 6 lb-ft (8 N•m).
2. Install two support brackets (4) and insulators (5) to radiator (6) with two large washers (3), washers (2), and locknuts (1). Tighten locknuts (1) to 20 lb-ft (27 N•m).
3. Align radiator (6) to frame bracket (10), and align rear support brackets (4) to airlift brackets (22).
4. Install rear support brackets (4) to airlift brackets (22) with four capscrews (25), washers (24), and locknuts (23). Do not tighten locknuts (23).
5. Install radiator (6) and mount (9) on frame bracket (10) with large washer (11), washer (8), capscrew (12), washer (8), and locknut (7). Do not tighten capscrew (12).

3-61. RADIATOR AND FAN SHROUD ASSEMBLY MAINTENANCE (Cont'd)



3-61. RADIATOR AND FAN SHROUD ASSEMBLY MAINTENANCE (6nfd)

NOTE

- Fan shroud should be aligned so the following dimensions are maintained. Adjustments may be made by sliding the radiator/shroud assembly. Distance “A” from the edge of shroud ring and rear edge of fan must be $1\text{-}1/2 \pm 1/8$ in. (38.1 ± 3 mm). Measure distance “A” at the 2, 4, 8, and 10 o'clock positions.
- Fan blade to fan shroud clearance, the distance between the top of the fan blade and fan shroud, must not be less than 1/4 in. (6 mm) at any position.

6. Tighten locknuts (12) to 26 lb-ft (35 N•m). Tighten capscrew (9) to 30 lb-ft (41N•m).

NOTE

- To secure strap to shroud, use of rivet is optional.
- Perform steps 7.1 and 7.2 if retaining strap was not connected to radiator shroud with rivet.

7. Secure radiator (3) to shroud (13) with strap (5). Secure strap (5) to shroud (13) with rivet (4).

7.1. Locate, mark, and drill 0.129-in. (3 mm) diameter hole (using #30 drill bit) in strap (5) and fan shroud (13). Remove burrs and sharp edges.

7.2. Secure radiator (3) to fan shroud (13) with rivet (4).

8. Connect lower radiator front hose (11) to radiator (3) with clamp (10).

NOTE

- M1123 and “A2” vehicles have a quick-disconnect on fan drive hose.
- The fan drive hose may be modified to add the quick-disconnect. Refer to appendix D, Fig. D-94 for installation.

9. Connect fan drive hose (17) to fan drive (18).

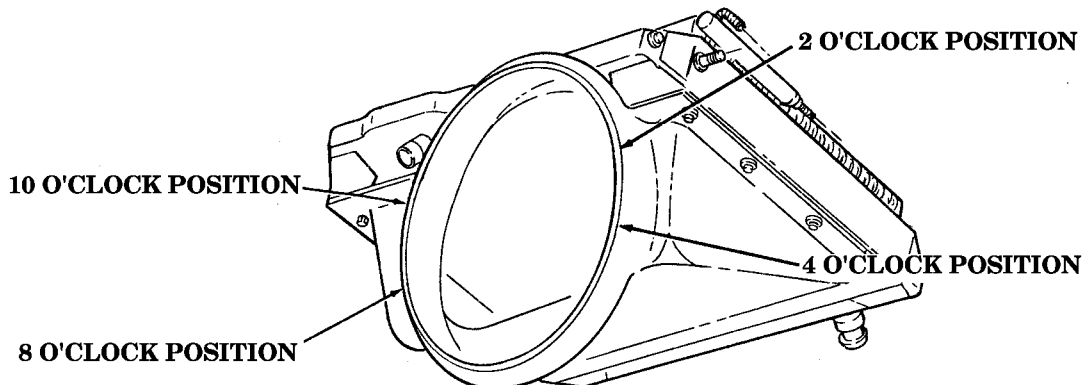
10. Connect control valve hose (14) to bulkhead adapter (16) with clamp (15).

NOTE

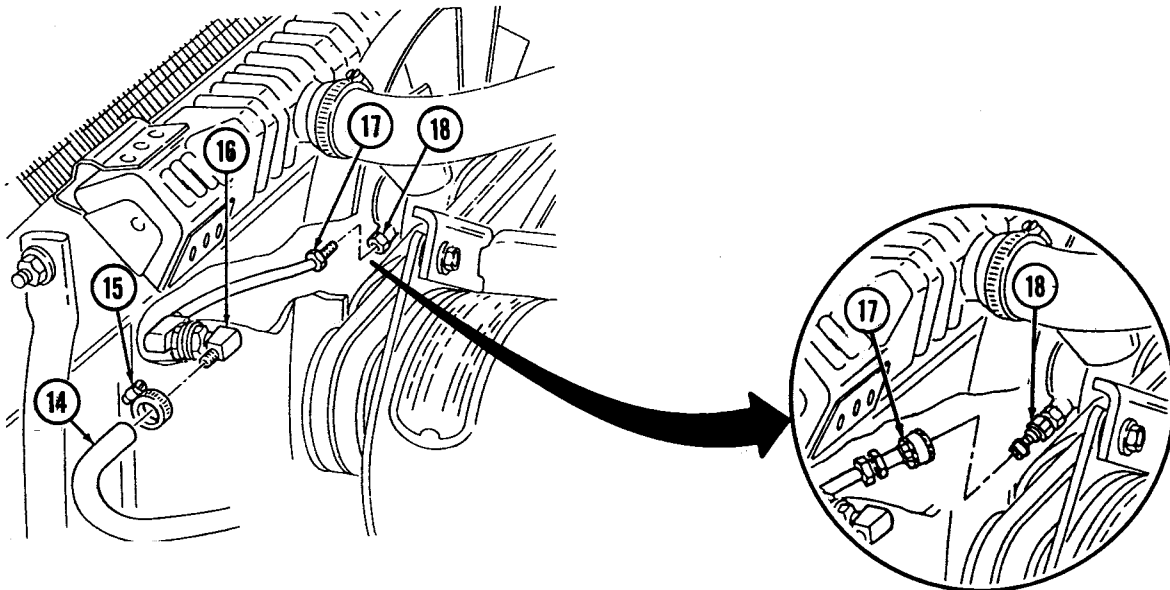
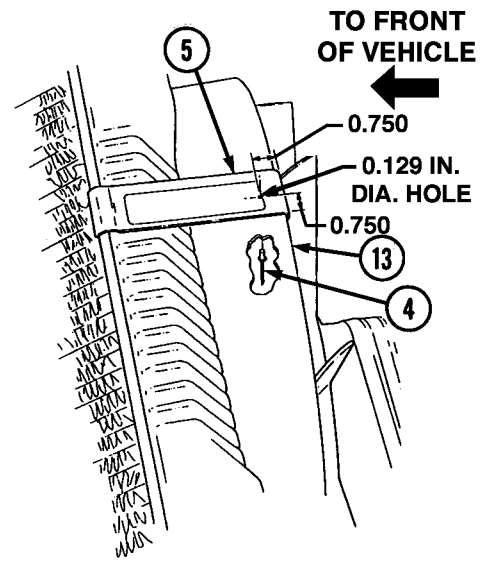
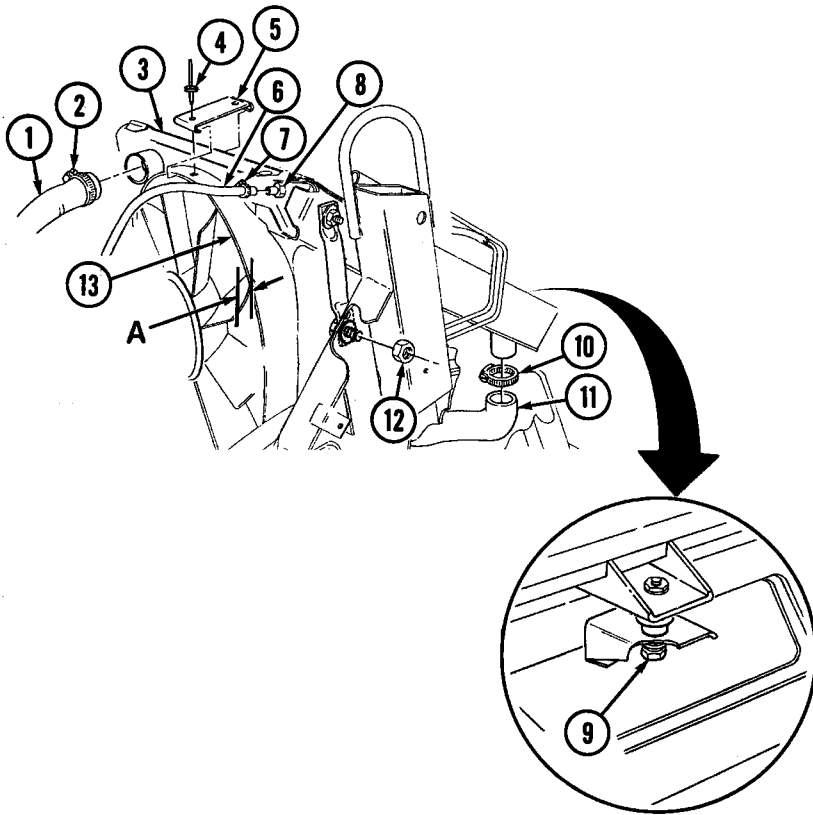
For vehicles equipped with a 200 amp alternator, it is recommended that the inlet hose be installed with the hose twisted counterclockwise, and upward until a kink in the hose starts to form.

11. Connect radiator inlet hose (1) to radiator (3) with clamp (2).

12. Connect surge tank-to-radiator vent hose (6) to adapter (8) with clamp (7).



3-61. RADIATOR AND FAN SHROUD ASSEMBLY MAINTENANCE (6n7'd)



- FOLLOW-ON TASKS:**
- Fill cooling system (para. 3-60).
 - Install oil cooler (para. 3-8).
 - Start engine (TM 9-2320-280-10) and check cooling system for leaks.
 - Install hood (para. 10-5).
 - Bleed power steering system (para. 8-29).

3-62. AIRLIFT TO SHROUD SHIELD ASSEMBLY REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-24P

Equipment Condition

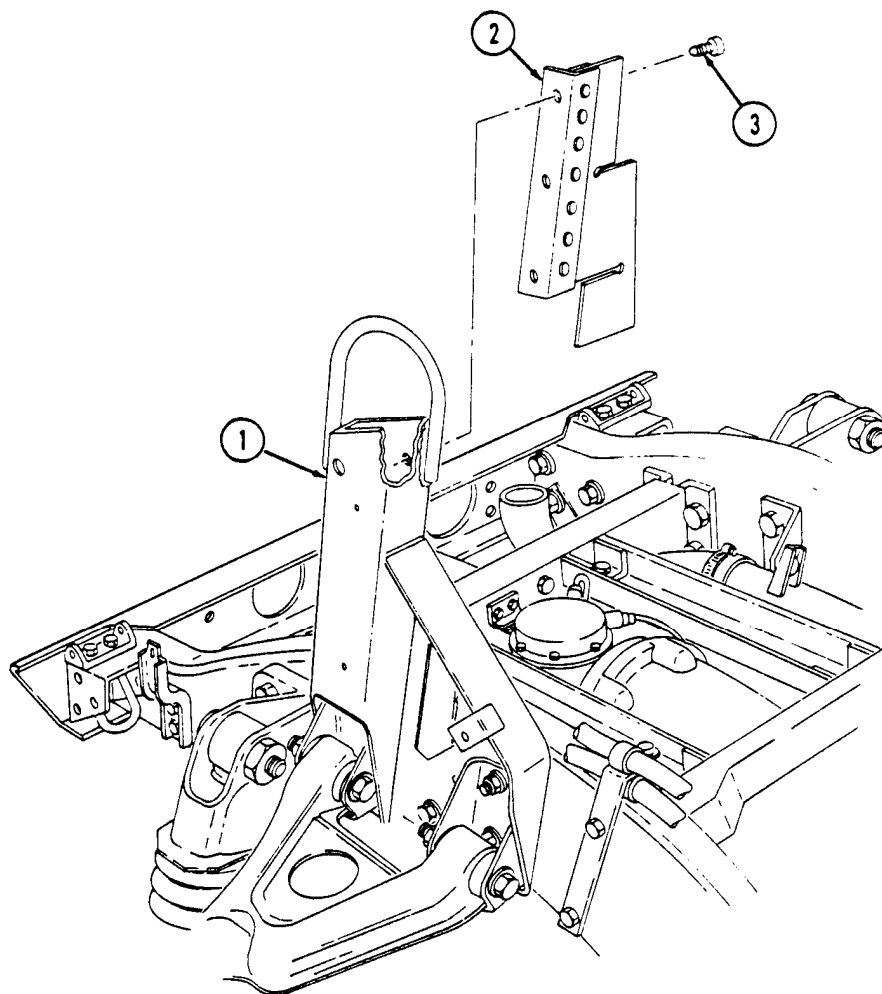
Radiator and fan shroud removed (para. 3-61).

a. Removal

Remove three screws (3) and shield assembly (2) from airlift bracket (1).

b. Installation

Install shield assembly (2) on airlift bracket (1) with three screws (3).



FOLLOW-ON TASK: Install radiator and fan shroud (para. 3-61).

3-63. RADIATOR SUPPORT REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Three locknuts (Appendix G, Item 128)

Manual References

TM 9-2320-280-24P

Equipment Condition

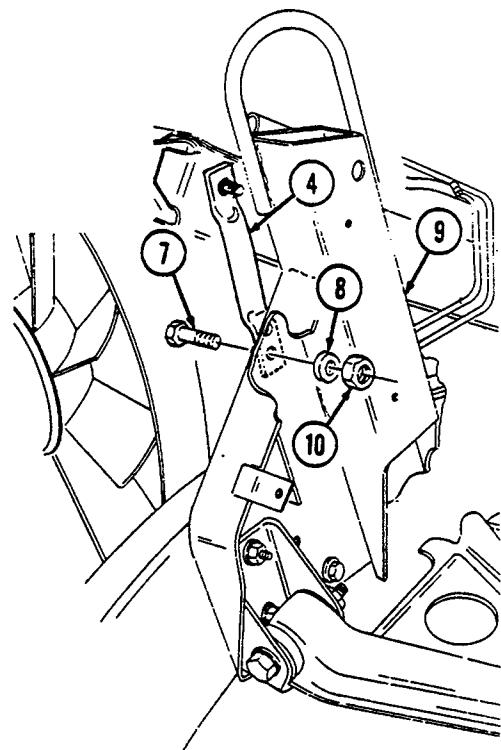
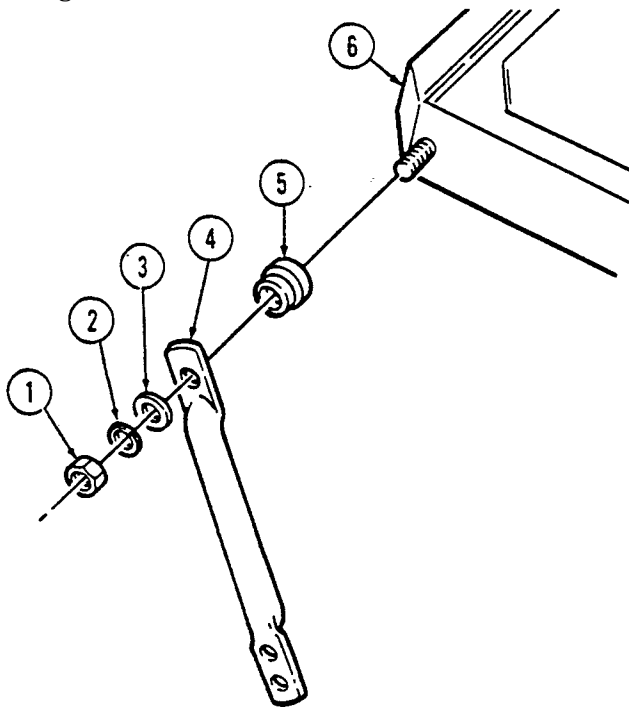
- Left splash shield removed (para. 10-17).
- Right splash shield removed (para. 10-20).

a. Removal

1. Remove locknut (1), washer (2), large washer (3), radiator support (4), and insulator (5) from radiator (6). Discard locknut (1).
2. Remove two locknuts (10), washers (8), capscrews (7), and support (4) from airlift bracket (9). Discard locknuts (10).

b. Installation

1. Install support (4) on airlift bracket (9) with two capscrews (7), washers (8), and locknuts (10).
2. Install insulator (5) and support (4) on radiator (6) with large washer (3), washer (2), and locknut (1). Tighten locknut (1) to 26 lb-ft (35 N·m).
3. Tighten locknuts (10) to 26 lb-ft (35 N·m).



- FOLLOW-ON TASKS:**
- Install left splash shield (para. 10-17).
 - Install right splash shield (para. 10-20).

3-64. SURGE TANK REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-24P

Equipment Condition

Cooling system drained as required (para. 3-60).

NOTE

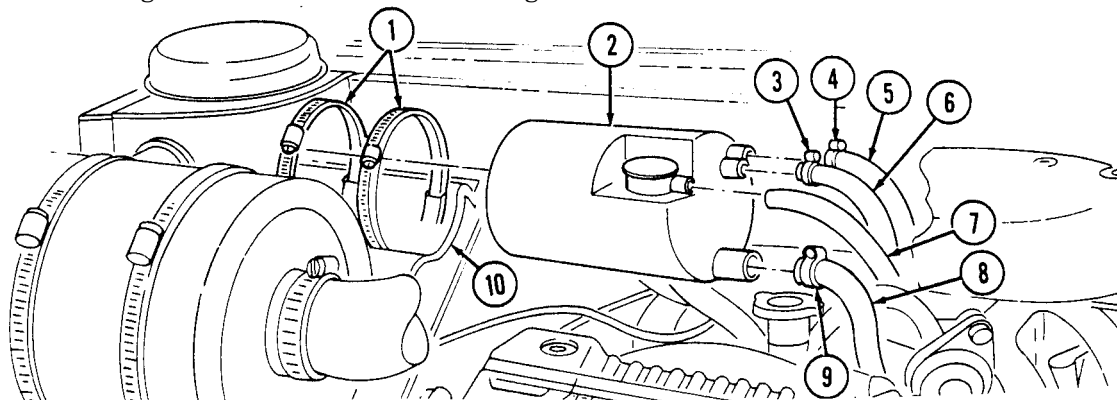
- Tag hoses prior to disconnection.
- When current stocks of the four-quart surge tank (12340062) are exhausted, the four and one-half quart surge tank (12340061) will be provided in its place. When replacing the four-quart surge tank (12340062) with the four and one-half quart surge tank (12340061), the existing surge-tank-to-lower-radiator tube hose (12339163) can be used by cutting approximately four inches from surge tank end of hose.

a. Removal

1. Loosen clamp (3) and disconnect surge tank-to-radiator vent hose (6) from surge tank (2).
2. Loosen clamp (4) and disconnect surge tank-to-water crossover vent hose (5) from surge tank (2).
3. Loosen clamp (9) and disconnect surge tank-to-lower radiator hose (8) from surge tank (2).
4. Open two clamps (1) on surge tank (2) and bracket (10).
5. Disconnect surge tank overflow hose (7) and remove surge tank (2).

b. Installation

1. Install surge tank (2) on bracket (10) with two clamps (1).
2. Connect surge tank-to-lower radiator hose (8) to surge tank (2) with clamp (9).
3. Connect surge tank-to-radiator vent hose (6) to surge tank (2) with clamp (3). Tighten clamp (3) to 10-20 lb-in. (1-2 **N•m**).
4. Connect surge tank-to-water crossover vent hose (5) to surge tank (2) with clamp (4). Tighten clamp (4) to 10-20 lb-in. (1-2 **N•m**).
5. Connect surge tank overflow hose (7) to surge tank (2).



FOLLOW-ON TASK Fill cooling system (para. 3-60).

3-65. SURGE TANK-TO-RADIATOR VENT HOSE REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

Cooling system depressurized (para. 3-60).

Manual References

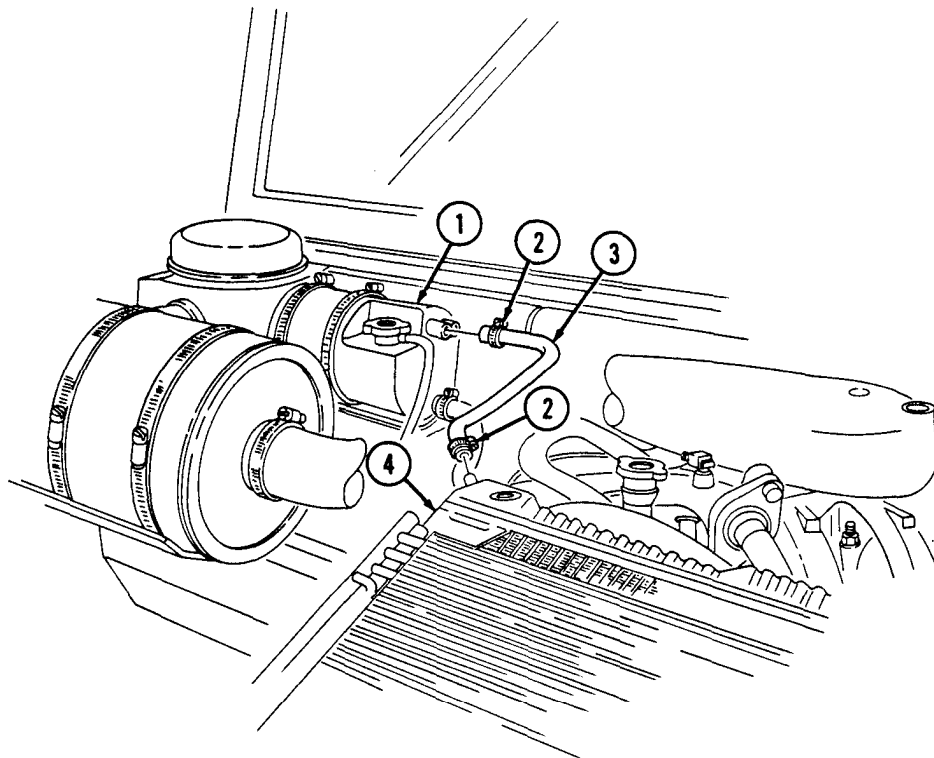
TM 9-2320-280-24P

a. Removal

1. Loosen two clamps (2) and remove vent hose (3) from radiator (4) and surge tank (1).
2. Remove two clamps (2) from vent hose (3).

b. Installation

1. Install two clamps (2) on vent hose (3).
2. Install vent hose (3) on surge tank (1) and radiator (4) with two clamps (2). Tighten clamps to 10-20 lb-in. (1-2 N•m).



FOLLOW-ON TASK: Tighten coolant filler cap (para. 3-60).

3-66. SURGE TANK-TO-WATER CROSSOVER VENT HOSE REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

Cooling system depressurized (para. 3-60).

Manual References

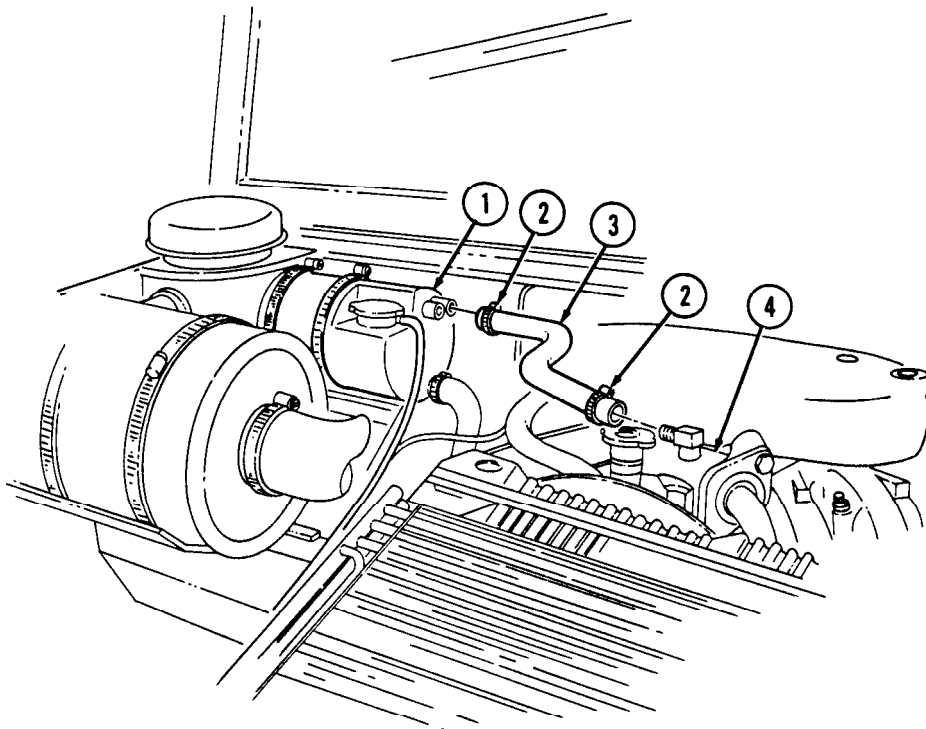
TM 9-2320-280-24P

a. Removal

1. Loosen two clamps (2) and remove vent hose (3) from water crossover (4) and surge tank (1).
2. Remove two clamps (2) from vent hose (3).

b. Installation

1. Install two clamps (2) to vent hose (3).
2. Install vent hose (3) on surge tank (1) and water crossover (4) with two clamps (2). Tighten clamps to 10-20 lb in. (1-2 N•m).



FOLLOW-ON TASK: Tighten coolant filler cap (para. 3-60).

3-67. THERMOSTAT BYPASS HOSE REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

Cooling system drained as required (para. 3-60).

Manual References

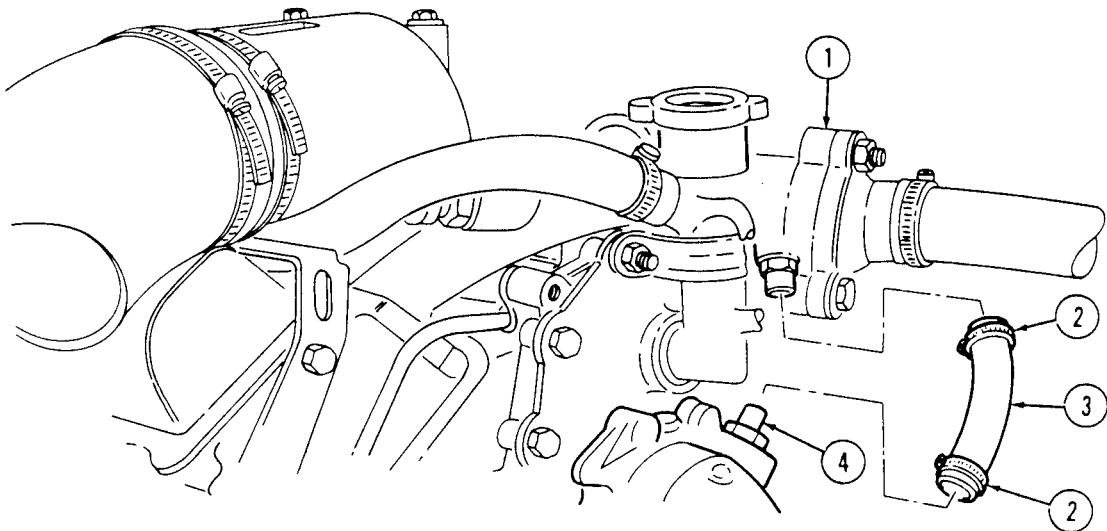
TM 9-2320-280-24P

a. Removal

1. Loosen two clamps (2) and remove hose (3) from water pump (4) and water crossover (1).
2. Remove two clamps (2) from hose (3).

b. Installation

1. Install two clamps (2) on hose (3).
2. Install hose (3) on water pump (4) and water crossover (1) with two clamps (2).



FOLLOW-ON TASK: Fill cooling system (para. 3-60).

3-68. FAN DRIVE HOSE AND QUICK-DISCONNECT REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M997A2, M1025A2, M1035A2,
M1043A2, M1045A2, M1097A2

Personnel Required

One mechanic
One assistant

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-24P

Material/Parts

Sealing compound (Appendix C, Item 44)

Equipment Condition

Hood raised and secured (TM 9-2320-280-10).

a. Removal

NOTE

Have container ready to catch fluid.

1. Loosen clamp (10) and remove control valve hose (9) from bulkhead adapter (5).
2. Remove bulkhead adapter (5) from bulkhead adapter bushing (8).
3. Remove nut (6), washer (7), bulkhead adapter bushing (8) and bulkhead adapter (11) from shroud (4).
4. Release fan drive hose quick-disconnect (2) and remove hose (1) from fan drive (3).
5. Remove bulkhead adapter bushing (8) from bulkhead adapter (11).
6. Remove bulkhead adapter (11) from fan drive hose (1).
7. Remove female end of quick-disconnect (2) from fan drive hose (1).
8. Remove male end of quick-disconnect (12) from fan drive (3).

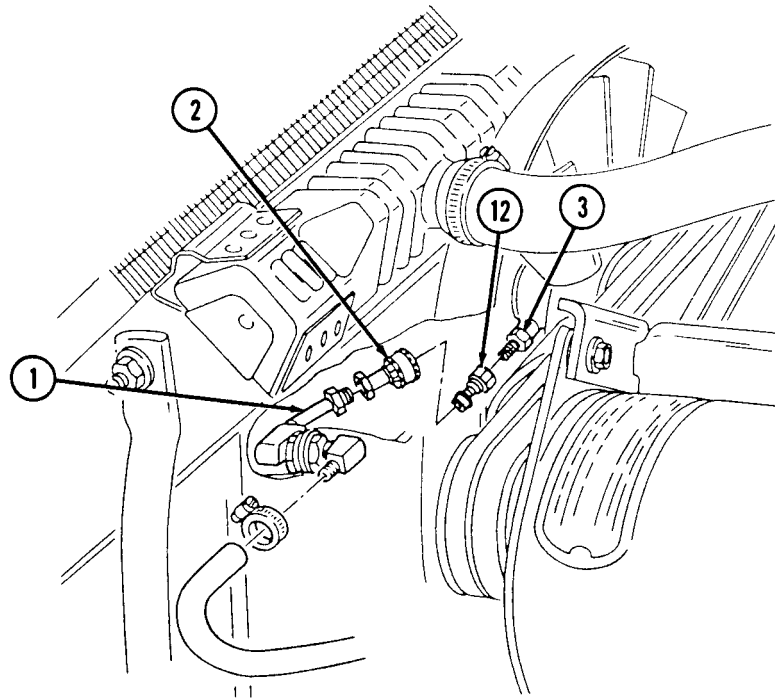
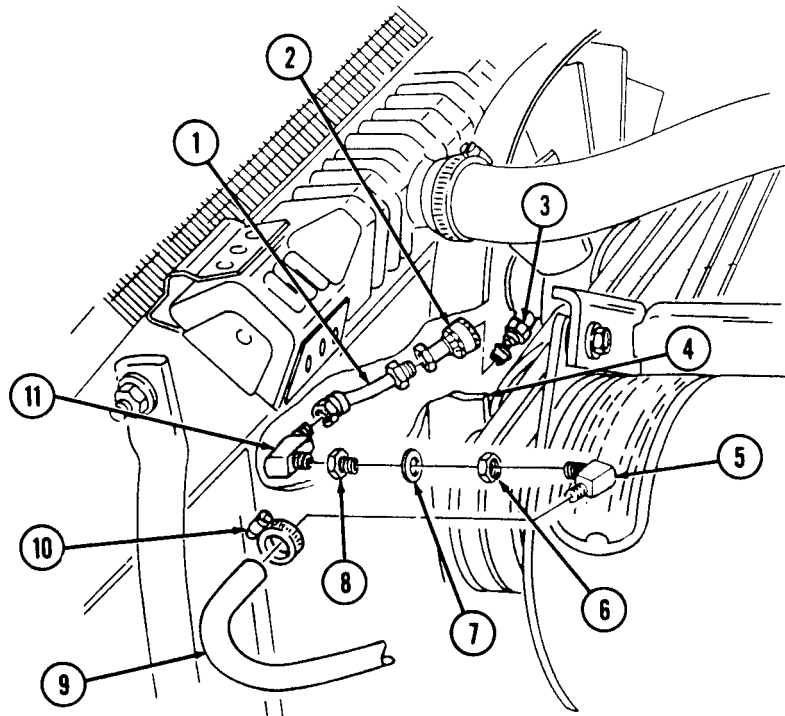
b. Installation

NOTE

Apply sealing compound to all pipe threads during installation.

1. Install male end of quick-disconnect (12) on fan drive (3).
2. Install female end of quick-disconnect (2) on fan drive hose (1).
3. Install bulkhead adapter (11) on fan drive hose (1)
4. Install bulkhead adapter bushing (8) on bulkhead adapter (11).
5. Install bulkhead adapter (11) and bulkhead adapter bushing (8) on shroud (4) with washer (7) and nut (6).
6. Install hose (1) and fan drive hose quick-disconnect (2) on fan drive (3).
7. Install bulkhead adapter (5) on bulkhead adapter bushing (8).
8. Install control valve hose (9) on bulkhead adapter (5) with clamp (10).

3-68. FAN DRIVE HOSE AND QUICK-DISCONNECT REPLACEMENT (Cont'd)



FOLLOW-ON TASK: Lower and secure hood (TM 9-2320-280-10).

3-69. RADIATOR INLET HOSE REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

Cooling system depressurized (para. 3-60).

Manual References

TM 9-2320-280-24P

a. Removal

1. Loosen two clamps (2) and remove hose (3) from radiator (1) and water crossover (4).
2. Remove two clamps (2) from hose (3).

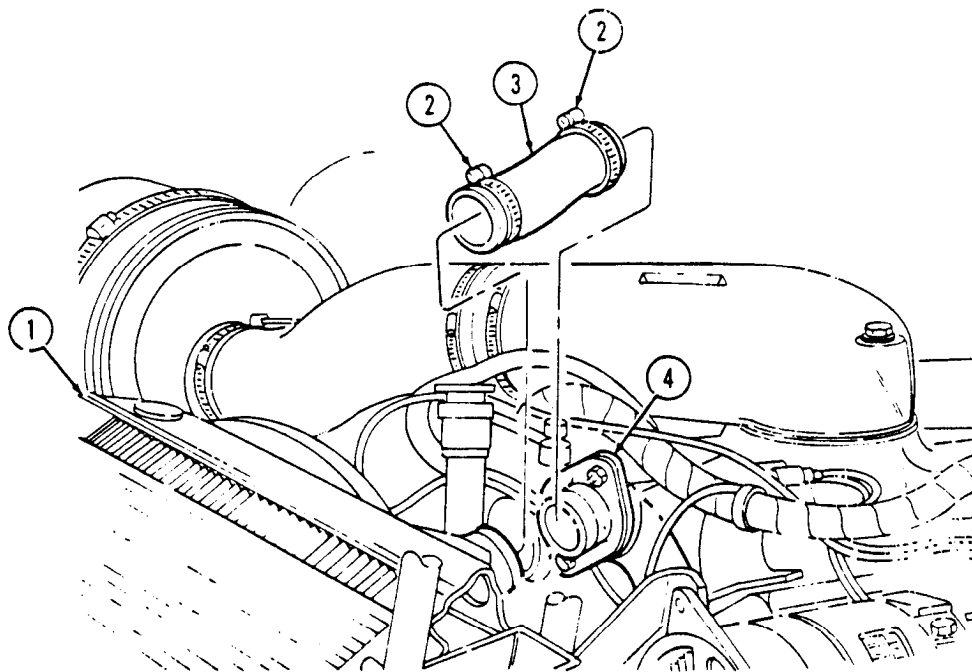
b. Installation

1. Install two clamps (2) to hose (3).

NOTE

For vehicles equipped with a 200 amp alternator, it is recommended that the inlet hose be installed with the hose twisted counterclockwise and upward until a kink in the hose starts to form.

2. Install hose (3) on water crossover (4) and radiator (1) with two clamps (2).



FOLLOW-ON TASK: Tighten coolant filler cap (para. 3-60).

3-70. RADIATOR LOWER TUBE ASSEMBLY REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Two locknuts (Appendix G, Item 72)
Tape (Appendix C, Item 50)

Manual References

TM 9-2320-280-24P

Equipment Condition

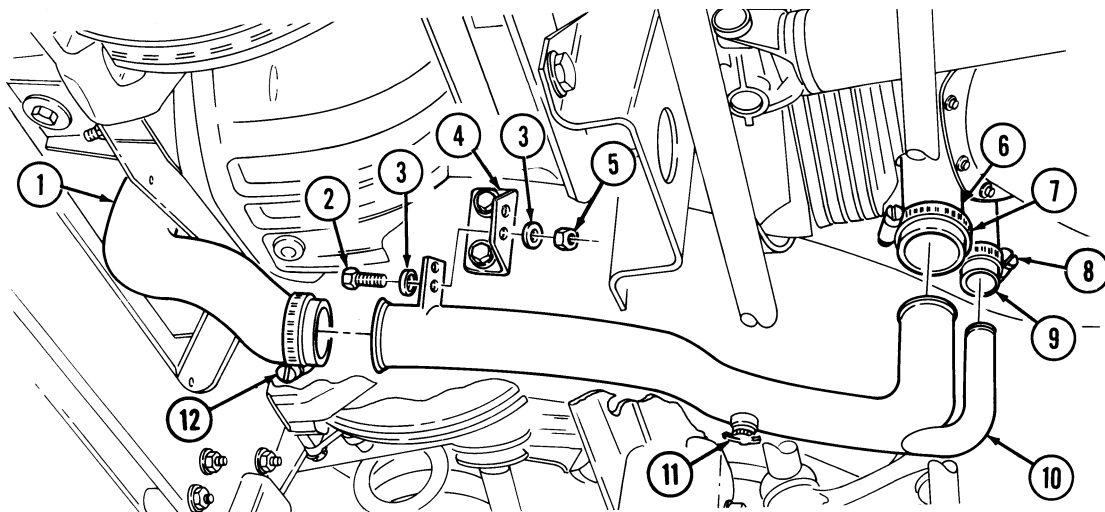
Cooling system drained (para. 3-60).

a. Removal

1. Remove draincock (11) from radiator lower tube assembly (10).
2. Remove two locknuts (5), washers (3), capscrews (2), and washers (3) from radiator lower tube assembly (10) and frame bracket (4). Discard locknuts (5).
3. Loosen clamp (7) and disconnect water pump inlet hose (6) from radiator lower tube assembly (10).
4. Loosen clamp (8) and disconnect surge tank to lower radiator hose (9) from radiator lower tube assembly (10).
5. Loosen clamp (12) and disconnect lower radiator hose (1) from radiator lower tube assembly (10).
6. Remove radiator lower tube assembly (10).

b. Installation

1. Install radiator lower tube assembly (10) on frame bracket (4) with two washers (3), capscrews (2), washers (3), and locknuts (5). Tighten locknuts (5) to 6 lb-ft (8 N•m).
2. Connect lower radiator hose (6) to radiator lower tube assembly (10) with clamp (7).
3. Connect surge tank to lower radiator hose (9) to radiator lower tube assembly (10) with clamp (8).
4. Connect water pump inlet hose (1) to radiator lower tube assembly (10) with clamp (12).
5. Apply sealant type tape to threads of draincock (11) and install draincock (11) on radiator lower tube assembly (10).



FOLLOW-ON TASK: Fill cooling system (para. 3-60).

3-71. LOWER RADIATOR HOSE REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

Cooling system drained (para. 3-60).

Manual References

TM 9-2320-280-24P

a. Removal

1. Loosen two clamps (2) and remove lower radiator hose (3) from radiator (1) and lower tube assembly (4).
2. Remove two clamps (2) from hose (3).

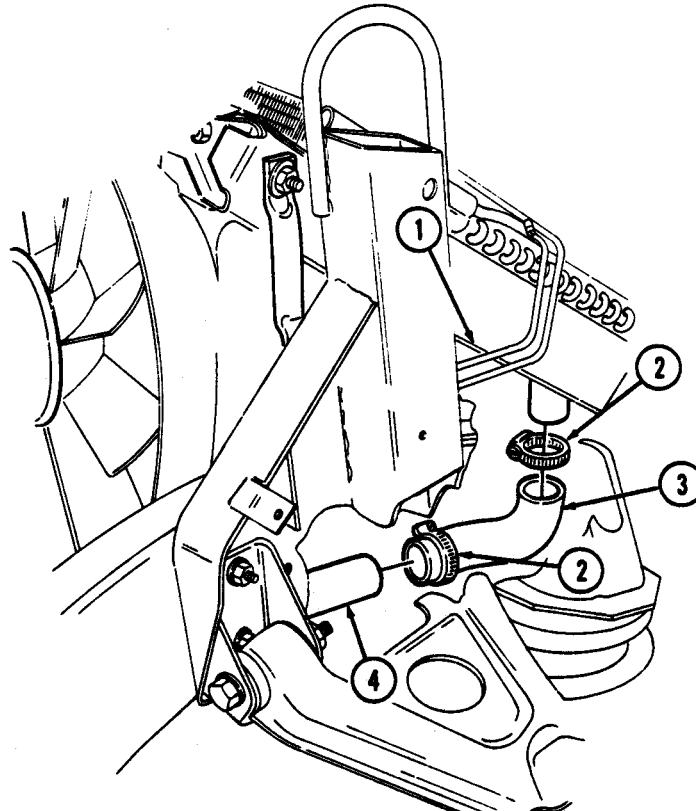
b. Installation

1. Install two clamps (2) to hose (3).
2. Install lower radiator hose (3) on lower tube assembly (4) and radiator (1) with two clamps (2).

NOTE

Vehicles may be equipped with either spring clamps and/or conventional clamps.

3. Tighten spring clamps (2) to 90 lb-in. (10 N·m). Tighten conventional clamps (2) to 40 lb-in. (5 N·m).



FOLLOW-ON TASK: Fill cooling system (para. 3-60).

3-72. WATER PUMP INLET HOSE REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

Cooling system drained (para. 3-60).

Manual References

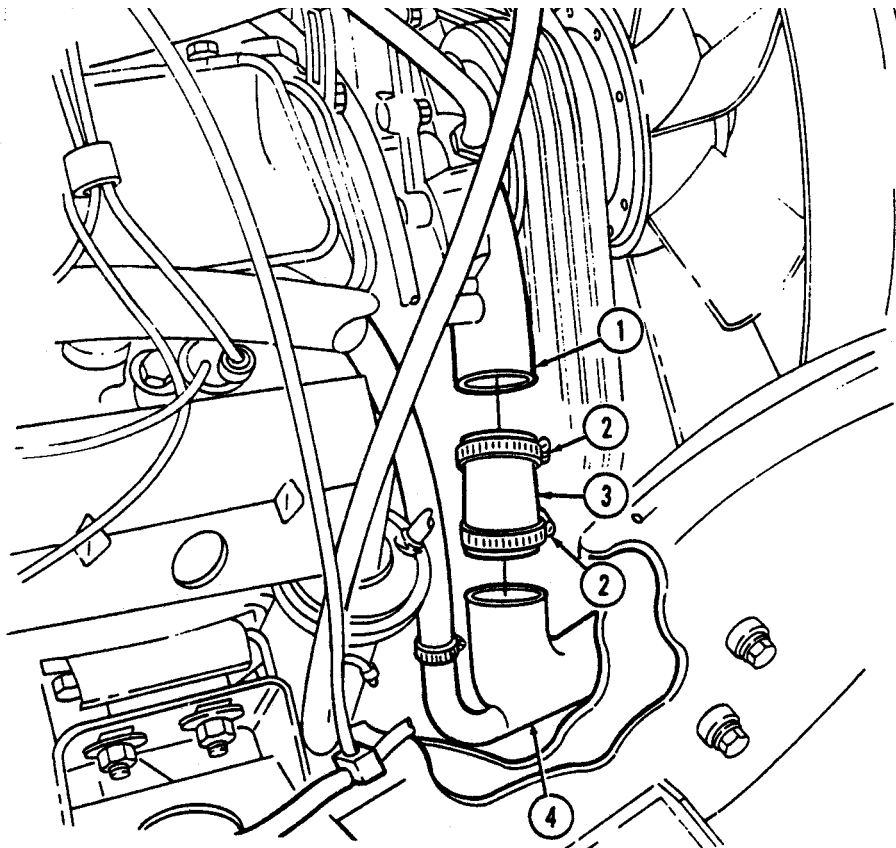
TM 9-2320-280-24P

a. Removal

1. Loosen two clamps (2) and remove water pump inlet hose (3) from water pump (1) and lower tube assembly (4).
2. Remove two clamps (2) from hose (3).

b. Installation

1. Install two clamps (2) to hose (3).
2. Install water pump inlet hose (3) on lower tube assembly (4) and water pump (1) with two clamps (2).
3. Tighten clamps (2) to 40 lb-in. (5 N·m).



FOLLOW-ON TASK: Fill cooling system (para. 3-60).

3-73. SURGE TANK-TO-LOWER RADIATOR TUBE HOSE REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

Cooling system drained (para. 3-60).

Manual References

TM 9-2320-280-24P

NOTE

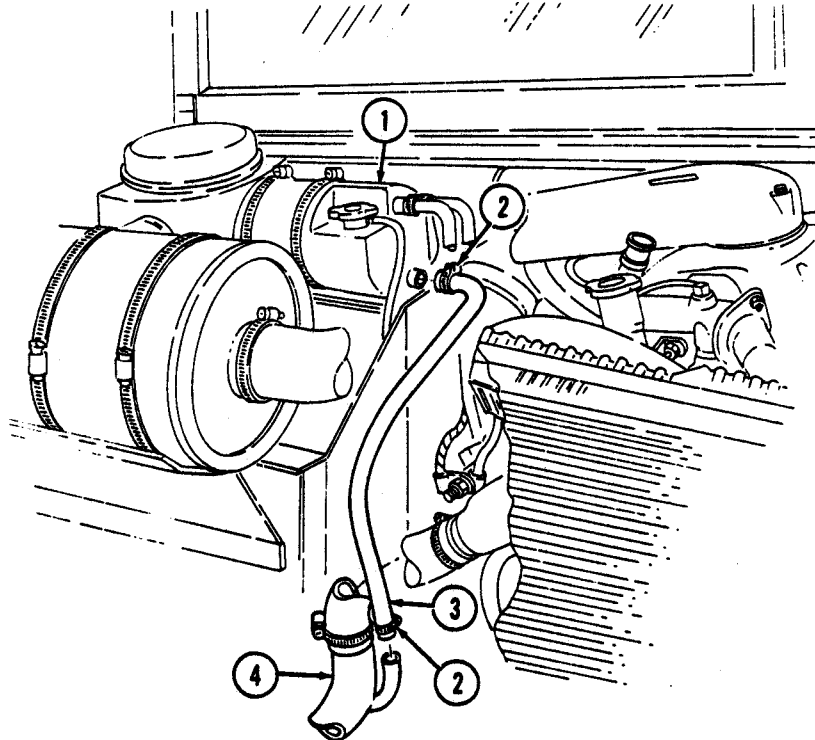
If the vehicle is equipped with surge tank (12340061) and surge tank-to-lower-radiator tube hose (12339163) is received, cut approximately four inches from surge tank end of hose prior to installation.

a. Removal

1. Loosen two clamps (2) and remove hose (3) from surge tank (1) and tube assembly (4).
2. Remove two clamps (2) from hose (3).

b. Installation

1. Install two clamps (2) on hose (3).
2. Install hose (3) on surge tank (1) and tube assembly (4) with two clamps (2).
3. Tighten clamps (2) to 40 lb-in. (5 N·m).



FOLLOW-ON TASK: Fill cooling system (para. 3-60).

3-74. SURGE TANK OVERFLOW HOSE REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

Hood raised and secured (TM 9-2320-280-10).

Manual References

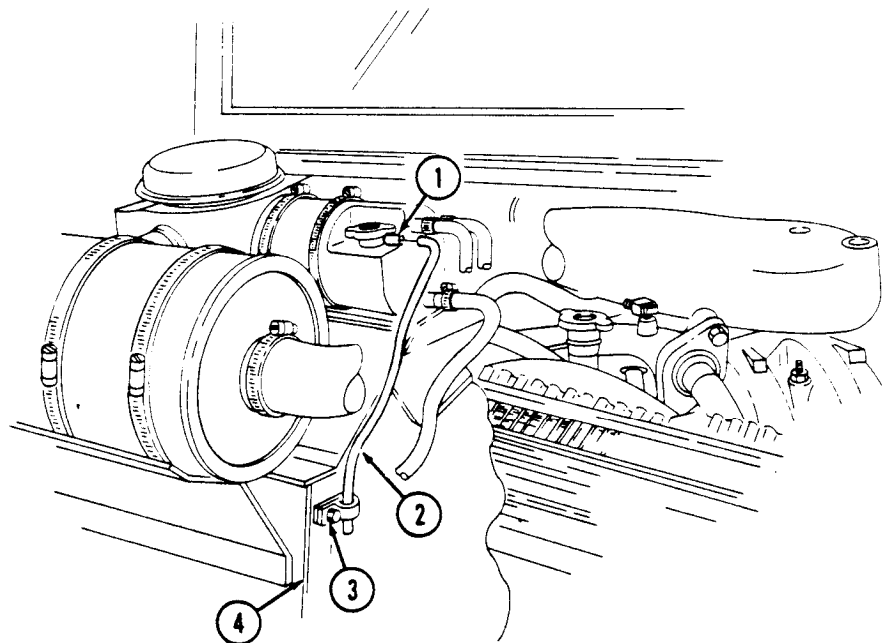
TM 9-2320-280-10
TM 9-2320-280-24P

a. Removal

1. Remove overflow hose (2) from surge tank filler neck (1).
2. Loosen clamp (3) and remove hose (2) from body (4).

b. Installation

1. Connect hose (2) to surge tank filler neck (1).
2. Install hose (2) on body (4) with clamp (3).



FOLLOW-ON TASK: Lower and secure hood (TM 9-2320-280-10).

3-75. THERMOSTAT REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-24P

Materials/Parts

Gasket (Appendix G, Item 54)
Sealing compound (Appendix C, Item 44)

Equipment Condition

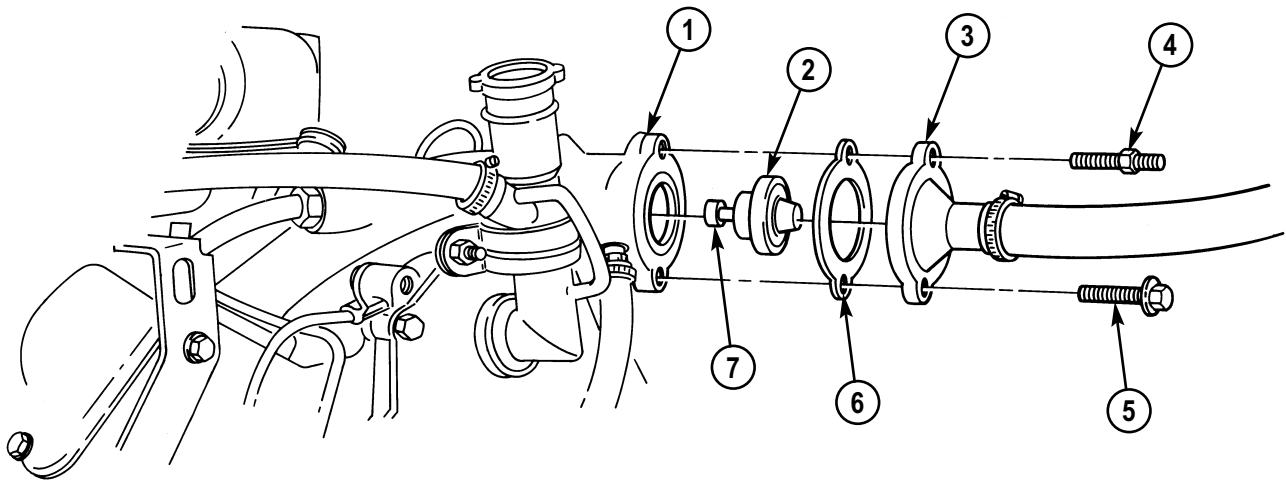
Cooling system drained as required (para. 3-60).

a. Removal

1. Remove capscrew (5), stud (4), thermostat housing (3), thermostat (2), and gasket (6) from water crossover (1). Discard gasket (6).
2. Clean gasket surface on water crossover (1) and thermostat housing (3).

b. Installation

1. Install thermostat (2) into water crossover (1) ensuring valve sensor (7) points toward crossover (1).
2. Position gasket (6) on thermostat housing (3). Apply sealing compound to fastener threads and insert capscrew (5) and stud (4) to align gasket (6).
3. Install thermostat housing (3) over thermostat (2) on water crossover (1) with capscrew (5) and stud (4). Tighten capscrew (5) and stud (4) to align gasket (6).



FOLLOW-ON TASK: Fill cooling system (para. 3-60).

3-76. WATER PUMP PULLEY REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
 automotive (Appendix B, Item 1)
 Maintenance and repair shop equipment:
 automotive (Appendix B, Item 2)

Special Tools

Hex head driver, 6 mm
 (Appendix B, Item 157)

Materials/Parts

Sealing compound (Appendix C, Item 44)

Manual References

TM 9-2320-280-24P

Equipment Condition

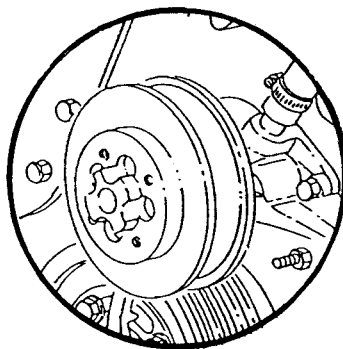
- Fan drive and fan blade removed (para. 3-78).
- Power steering drivebelt set removed (para. 3-80).
- Serpentine drivebelt removed (M1123 and "A2" vehicles) (para. 3-83).

a. Removal

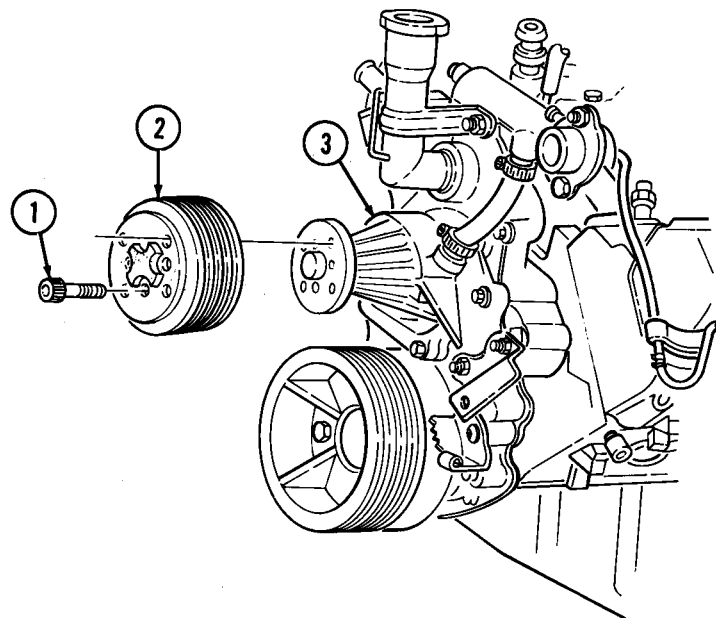
Remove four socket-head screws (1) and water pump pulley (2) from water pump (3).

b. Installation

1. Apply sealing compound to four socket-head screws (1).
2. Install water pump pulley (2) on water pump (3) with four socket-head screws (1). Tighten socket-head screws (1) to 15-20 lb-ft (20-27 N·m).



6.5L



- FOLLOW-ON TASKS:
- Install serpentine belt (M1123 and "A2" vehicles) (para. 3-83).
 - Install fan drive and fan blade (para. 3-78).
 - Install power steering drivebelt set (para. 3-80).

3-76.1. WATER PUMP AND ADAPTER PLATE MAINTENANCE

This task covers:

- | | |
|--|------------------------|
| <p>a. Removal</p> <p>b. Inspection</p> | <p>c. Installation</p> |
|--|------------------------|

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-24P

Materials/Parts

Water pump gasket (Appendix G, Item 62)
(6.2 L only)

Water pump gasket (Appendix G, Item 62.1)
(6.5 L only)

Pipe sealing compound (Appendix C, Item 44)

Sealing compound (Appendix C, Item 45)

Anaerobic gasket sealer
(Appendix C, Item 39)

Equipment Condition

- Engine oil filler tube removed (para. 3-3).
- Water pump inlet hose removed (para. 3-72).
- Water pump pulley removed (para. 3-76).
- Thermostat bypass hose removed (para. 3-67).
- Fan drive hose disconnected (para. 3-68).
- Tensioner, idler pulleys, and mounting hardware removed (para. 3-84).
- Power steering pump removed (para. 8-24).

NOTE

Water pump is different on M1123 and A2 series vehicles.

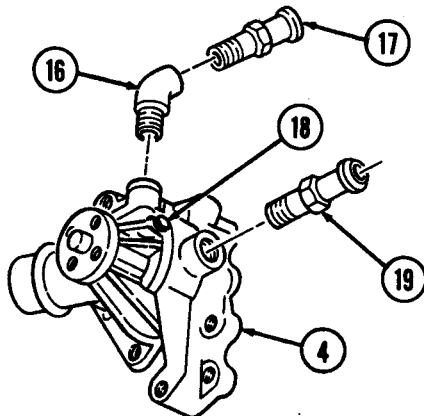
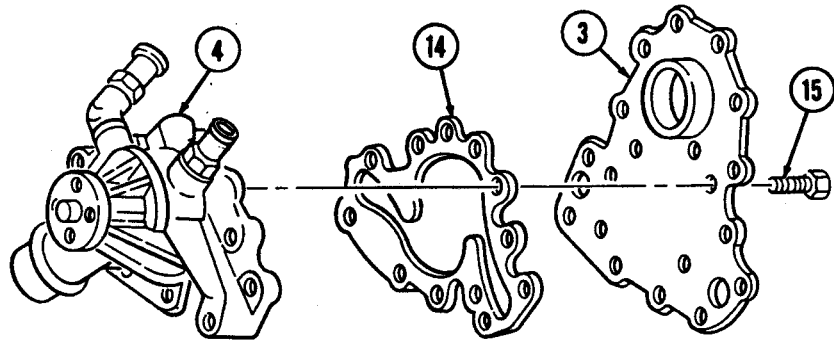
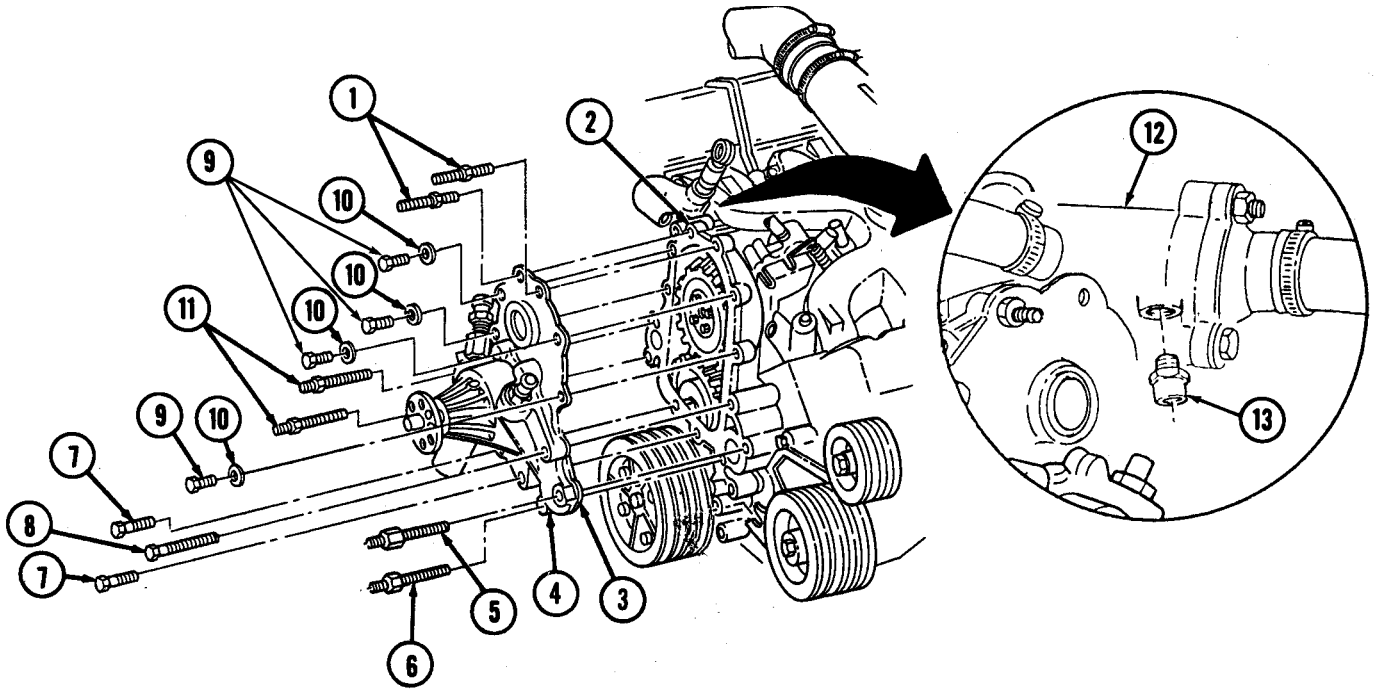
a. Removal

1. Remove bypass nipple (13) from water crossover (12).
2. Remove studs (1), (11), (6), and (5), four capscrews (9), washers (10), two capscrews (7), capscrew (8), water pump (4), and adapter plate (3) from timing gear cover (2).
3. Remove seven capscrews (15), adapter plate (3), and gasket (14) from water pump (4). Discard gasket (14).
4. Clean remaining gasket material and sealing compound from sealing surfaces of adapter plate (3), water pump (4), and timing gear cover (2).
5. Remove heater hose nipple (17), elbow (16), and bypass hose adapter (19) from water pump (4).

b. Inspection

1. Inspect water pump (4) for cracks, breaks, or loose impeller. Replace if cracked, broken, or impeller is loose.
2. Inspect adapter plate (3) for corrosion. If adapter plate (3) is excessively corroded, replace.
3. Inspect elbow (16), heater hose nipple (17), and bypass hose adapter (19) for stripped threads and breaks. If damaged, replace.
4. Inspect rivet (18) for damage or looseness. Replace if damaged or loose. Apply sealing compound to replacement rivet (18) prior to installation.

3-76.1. WATER PUMP AND ADAPTER PLATE MAINTENANCE (Cont'd)



3-76.1. WATER PUMP AND ADAPTER PLATE MAINTENANCE (Cont'd)

c. Installation

CAUTION

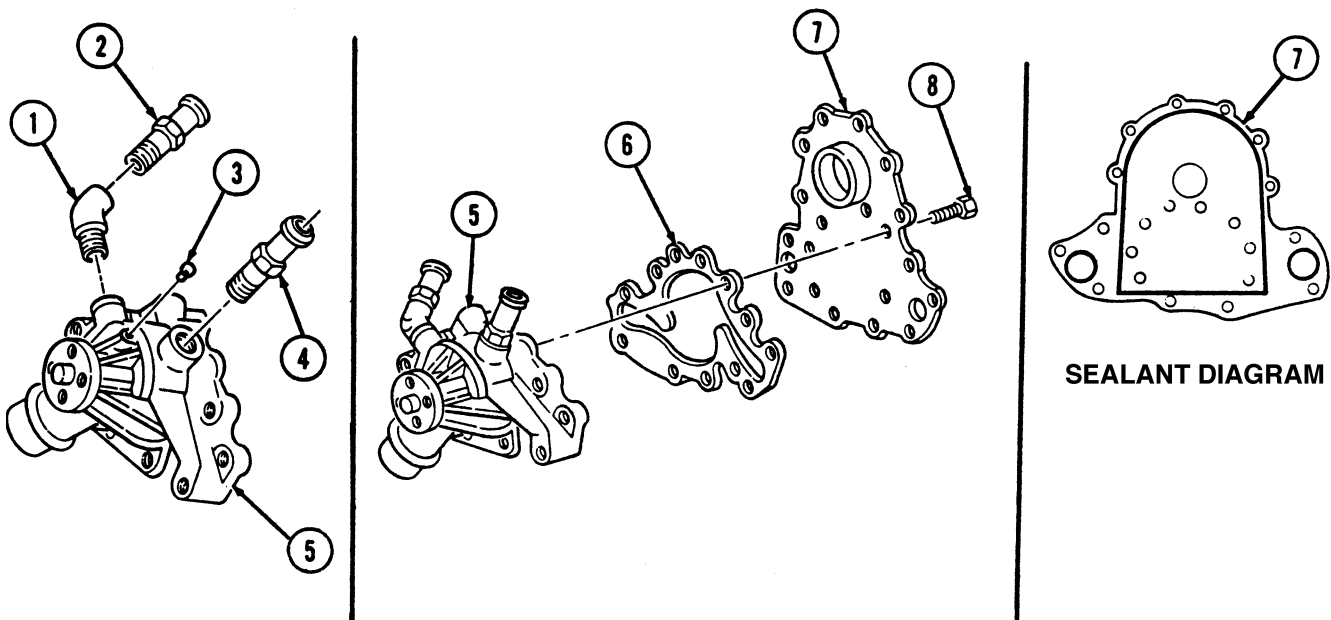
- Ensure water pump P/N 251-591 is used on 6.2L engines, or damage to equipment will result.
- Ensure water pump P/N 12534772 is used on 6.5L and 6.5L detuned engines, or damage to equipment will result.

1. Install gasket (6) and adapter plate (7) on water pump (5) with seven capscrews (8). Tighten capscrews (8) 13-20 lb-ft (18-27 N•m).

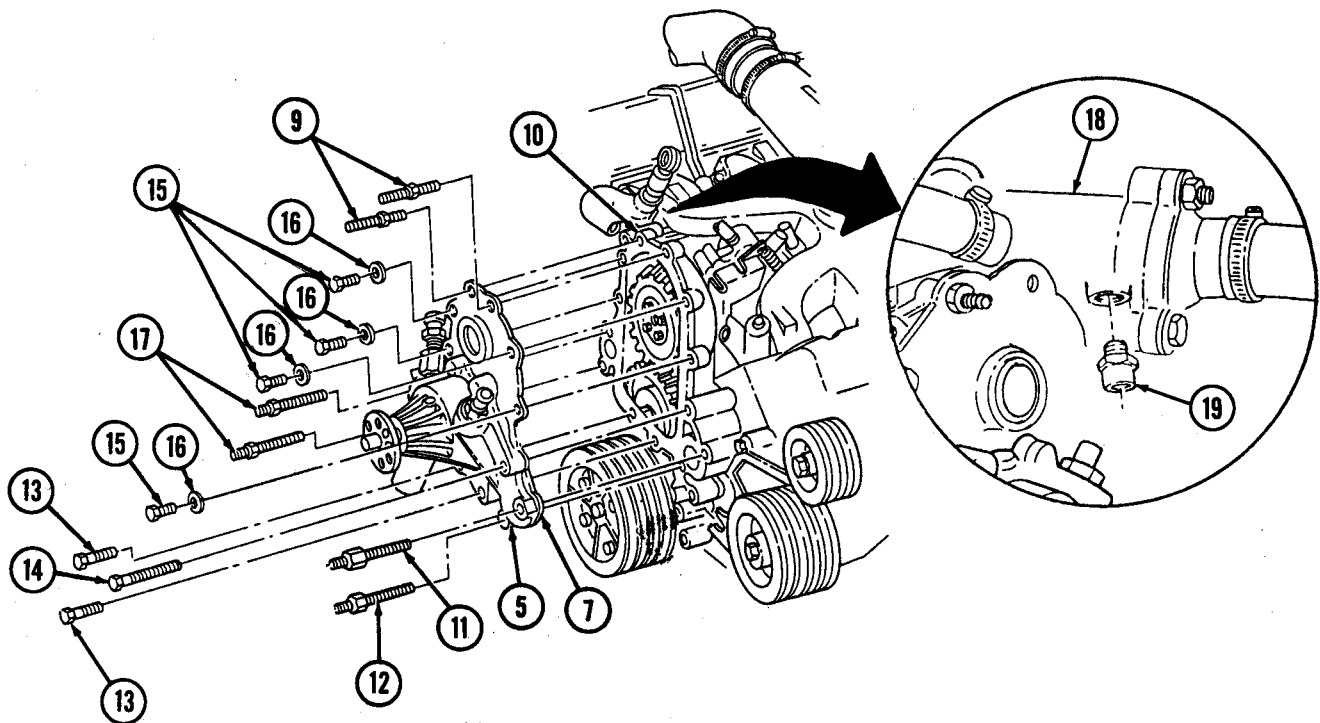
NOTE

Perform step 2 if a new water pump is being installed.

2. Apply sealing compound to rivet (3) and install in water pump (5).
3. Apply anaerobic gasket sealer to sealing surfaces on adapter plate (7), following diagram shown.
4. Apply pipe sealing compound to capscrew (14).
5. Install adapter plate (7) and water pump (5) on timing gear cover (10) with two long studs (17), stud (12), stud with thick hex (11), and capscrew (14).
6. Secure adapter plate (7) to timing gear cover (10) with two capscrews (13), studs (9), four washers (16), and capscrews (15). Tighten studs (9) and capscrews (13) and (15) to 13-20 lb-ft (18-27 N•m). Tighten studs (17), (12), and (11) to 25-37 lb-ft (34-50 N•m).
7. Apply pipe sealing compound to threads of elbow (1), heater hose nipple (2), and bypass hose adapter (4) and install in water pump (5).
8. Coat threads of bypass nipple (19) with pipe sealing compound and install in water crossover (18).



3-76.1. WATER PUMP AND ADAPTER PLATE MAINTENANCE (Cont'd)



- FOLLOW-ON TASKS:**
- Install power steering pump (para. 8-24).
 - Install tensioner, idler pulleys, and mounting hardware (para. 3-84).
 - Connect fan drive hose (para. 3-68).
 - Install water pump pulley (para. 3-76).
 - Install water pump inlet hose (para. 3-72).
 - Install engine oil filler tube (para. 3-3).
 - Install thermostat bypass hose (para. 3-67).

3-77. WATER CROSSOVER MAINTENANCE

This task covers:

- | | |
|--|------------------------|
| <p>a. Removal</p> <p>b. Inspection</p> | <p>c. Installation</p> |
|--|------------------------|

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Two gaskets (Appendix G, Item 51)

Manual References

TM 9-2320 280-24P

Equipment Condition

- Cooling system drained (para. 3-60).
- Fan temperature switch removed (para. 4-30).
- Glow plug controller removed (para. 4-29).
- Thermostat removed (para. 3-75).

General Safety Instructions

Gaskets installed on some 6.2L engines assembled prior to 1991 may contain asbestos. Gaskets should be disposed of IAW current directives.

a. Removal

1. Loosen three clamps (2) and disconnect hoses (1) from water crossover (4).
2. Remove four capscrews (6) from water crossover (4) and cylinder head (8).

WARNING

Gaskets installed on some 6.2L engines assembled prior to 1991 may contain asbestos. Gaskets should be removed with a scraper or putty knife and then be disposed of IAW current directives. Inhalation of asbestos fibers can cause respiratory ailments.

3. Remove water crossover (4) and two gaskets (7). Discard gaskets (7).
4. Clean gasket surface on water crossover (4) and cylinder head (8).

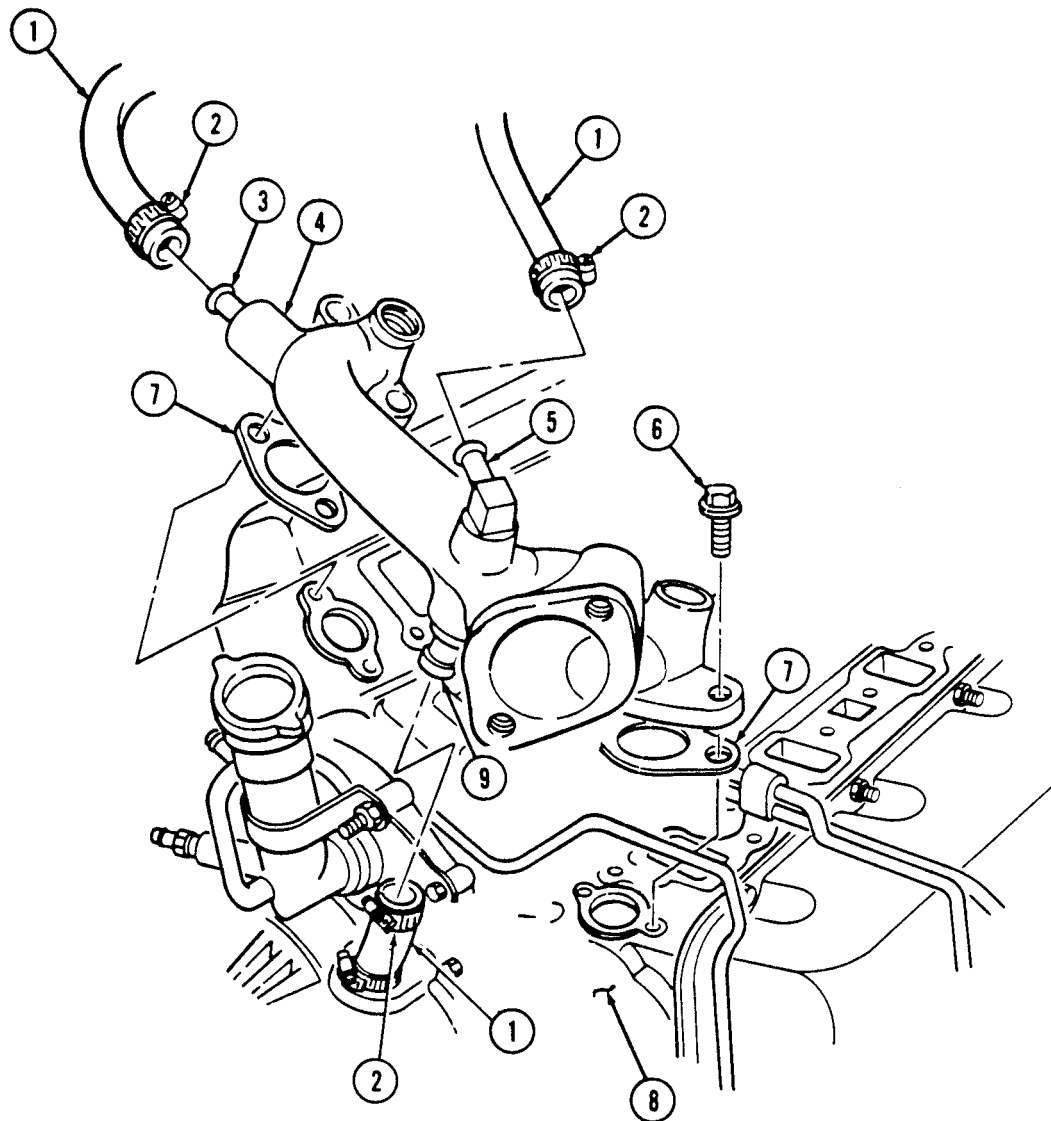
b. Inspection

Inspect thermostat by-pass nipple (3), surge tank hose nipple (5) and water pump hose adapter (9) for cracks or breaks. Replace if defective.

c. Installation

1. Install two gaskets (7) and water crossover (4) on cylinder head (8).
2. Secure water crossover (4) to cylinder head (8) with four capscrews (6). Tighten capscrews (6) to 25-35 lb-ft (34-50 N•m).
3. Connect three hoses (1) to water crossover (4) with clamps (2).

3-77. WATER CROSSOVER MAINTENANCE (Cont'd)



- FOLLOW-ON TASKS:
- Install thermostat (para. 3-75).
 - Install glow plug controller (para. 4-29).
 - Install fan temperature switch (para. 4-30).
 - Fill cooling system (para. 3-60).

3-78. FAN DRIVE AND FAN BLADE MAINTENANCE

This task covers:

- | | |
|---|---|
| <ul style="list-style-type: none"> a. Removal b. Inspection | <ul style="list-style-type: none"> c. Installation |
|---|---|

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Special Tools

Hex head driver, 8 mm
(Appendix B, Item 156)

Materials/Parts

Four lockwashers (Appendix G, Item 133)
Sealing compound (Appendix C, Item 43)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

- Hood raised and secured (TM 9-2320-280-10).
- Radiator and shroud removed (optional) (para. 3-61).

a. Removal

1. Disconnect fan drive hose (9) from fan drive (10).

NOTE

- Mark position of fan blade for installation.
 - It may be necessary to apply compressed air to clutch adapter. This disengages fan drive clutch to allow access to socket head screws.
 - The fan drive hose may be modified to add a quick-disconnect at commander's discretion. Refer to appendix D, Fig. D-94 for installation.
2. Using hex head driver, remove four socket-head screws (1) and fan drive assembly (3) from water pump pulley (2).
 3. Remove four nuts (5), lockwashers (6) and fan blade (7) from fan drive (8). Discard lockwashers (6).

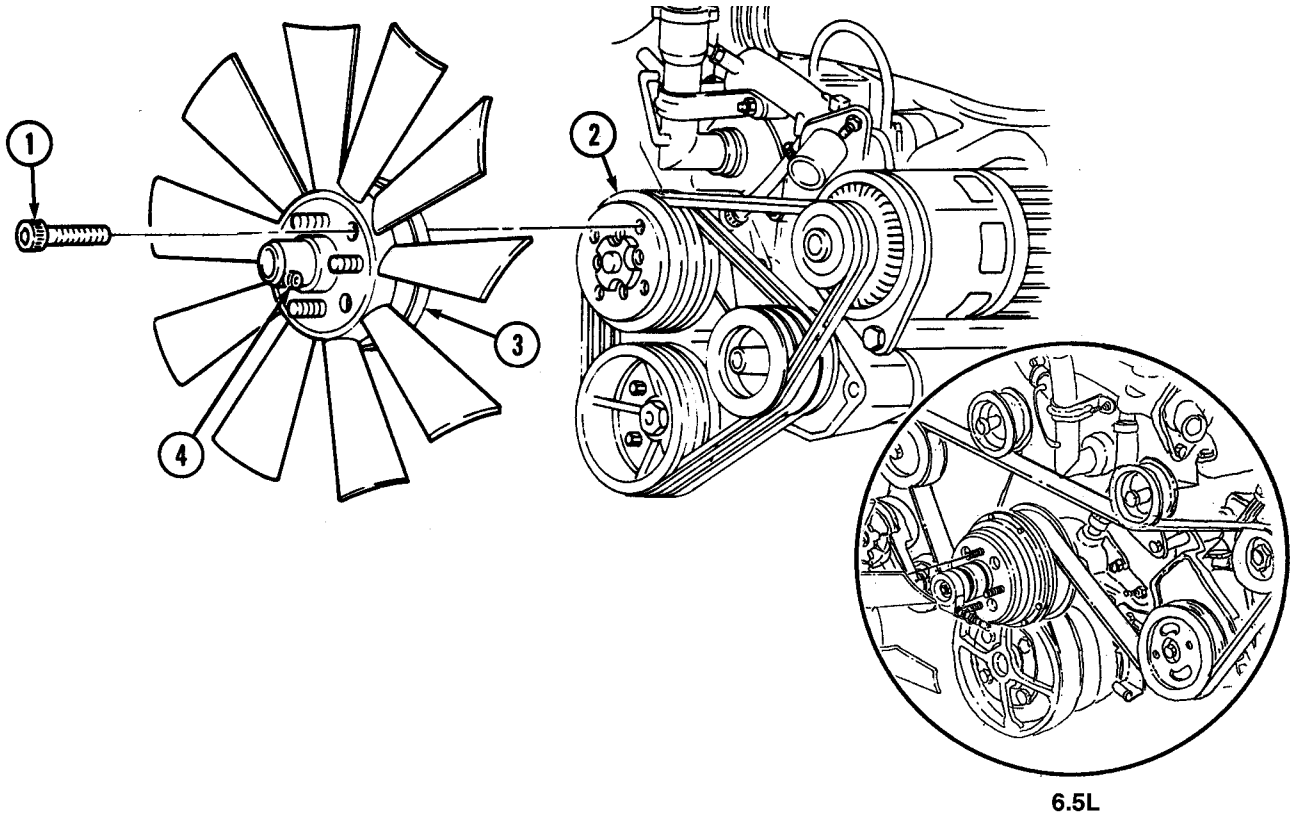
b. Inspection

Inspect clutch adapter (4) and fan blade (7) for damaged threads, cracks, bent blades, or breaks. Replace if defective.

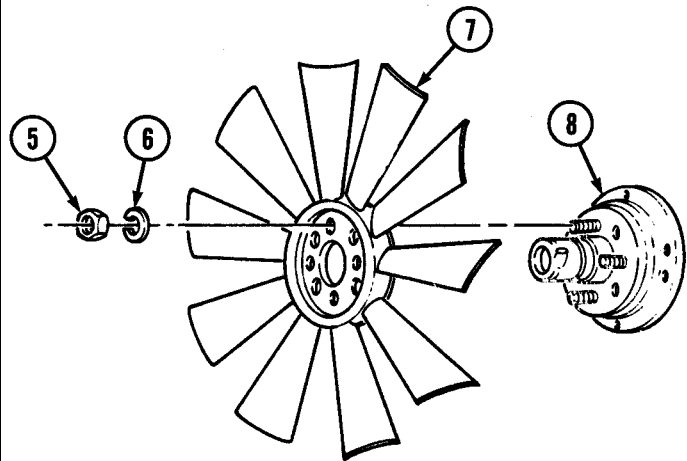
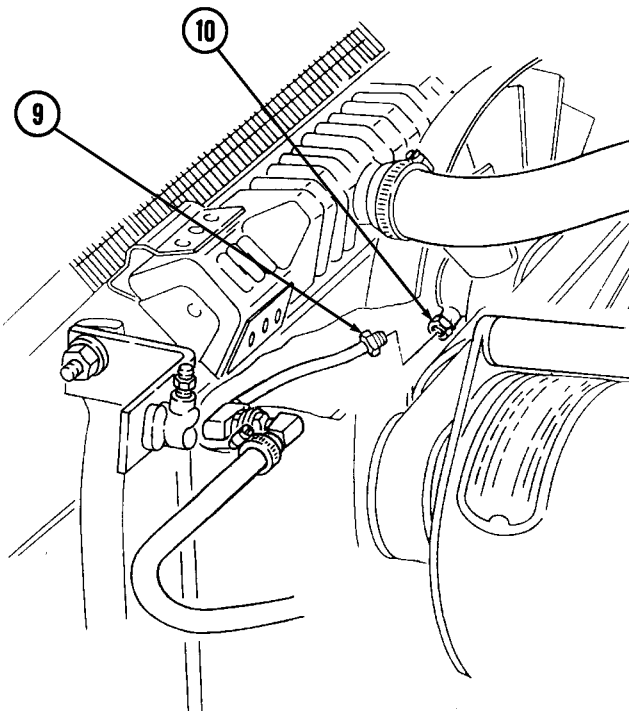
c. Installation

1. Align fan blade (7) onto fan drive (8) with four lockwashers (6) and nuts (5). Tighten nuts (5) to 26 lb-ft (35 N•m).
2. Apply sealing compound to four socket-head screws (1) and install fan drive assembly (3) to water pump (2). Tighten socket-head screws (1) to 45 lb-ft (61 N•m).
3. Connect fan drive hose (9) to fan drive (10).

3-78. FAN DRIVE AND FAN BLADE MAINTENANCE (Cont'd)



6.5L



- FOLLOW-ON TASKS:
- Install radiator and shroud (if removed) (para. 3-61).
 - Bleed power steering system (para. 8-29) (if radiator and shroud were not removed).
 - Lower and secure hood (TM 9-2320-280-10).

3-79. FAN DRIVE FRICTION LINING REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-24P

Equipment Condition

Disconnect battery ground cable (para. 4-73).

a. Removal

WARNING

Prior to loosening screws on fan drive retaining plates, disconnect fan drive hose from fan drive. Failure to do so may result in injury to personnel or damage to equipment.

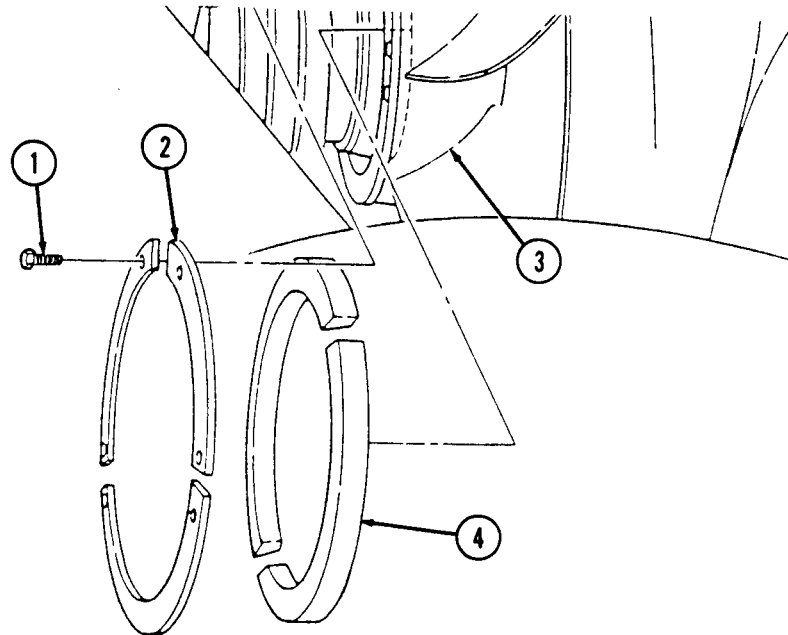
NOTE

- It maybe necessary to apply compressed air to clutch adapter. This disengages fan drive clutch to allow access to friction lining screws.
- The fan drive hose may be modified to add the quick-disconnect. Refer to Appendix D, Fig. D-94 for installation.

1. Remove six screws (1) and three retaining plates (2) from fan drive (3).
2. Remove friction lining (4) from fan drive (3).

b. Installation

1. Install friction lining (4) on fan drive (3).
2. Install three retaining plates (2) on on drive (3) with six screws (1). Tighten screws 1) to 22 lb-in. (2.5 N•m).



FOLLOW ON TASK: Connect battery ground cable (para. 4-73).

3-80. POWER STEERING DRIVEBELT SET REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

All vehicles except: M997A2, M1025A2, M1035A2, M1043A2, M1045A2, M1097A2, M1123

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-24P

Equipment Condition

Alternator drivebelts removed (para. 3-81).

NOTE

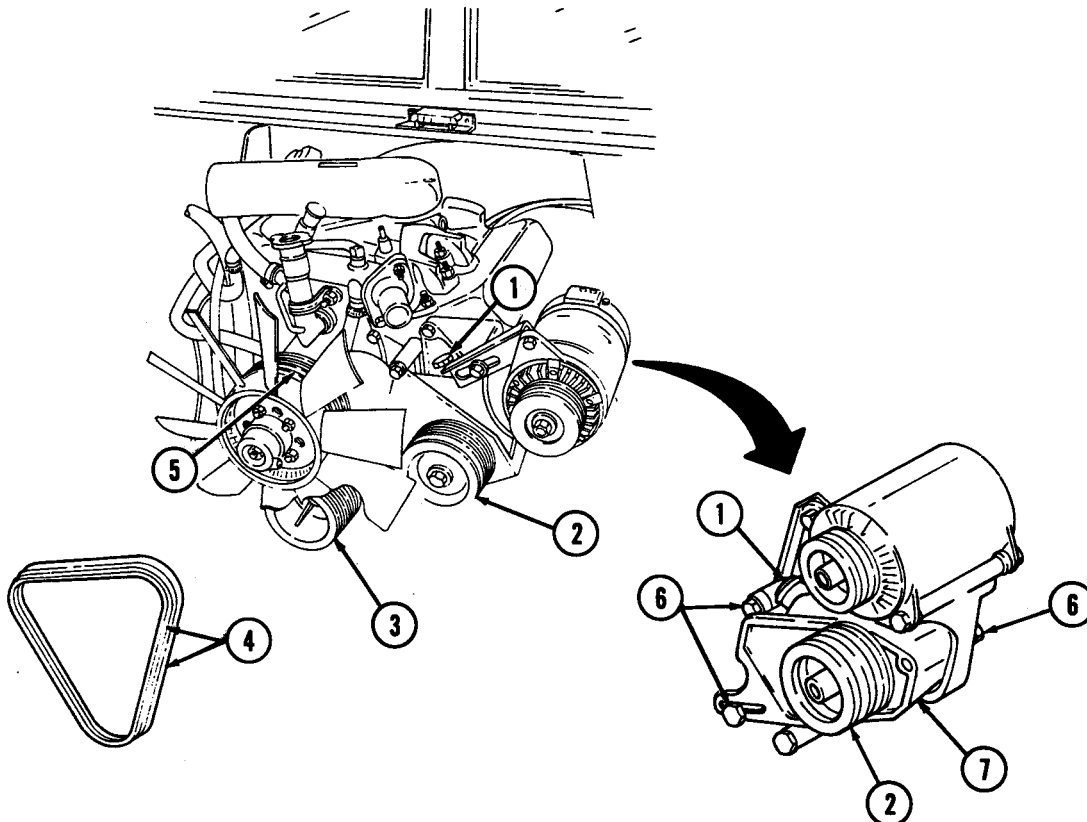
Replace power steering drivebelts in matched sets only.

a. Removal

1. Loosen three capscrews (6) from power steering pump mounting bracket (7) and support brackets.
2. Push power steering pump (1) towards engine and remove drivebelts (4) from power steering pump pulley (2), water pump pulley (5) and crankshaft pulley (3).

b. Installation

Feed belt set (4) into grooves on crankshaft pulley (3), water pump pulley (5), and power steering pump pulley (2).



FOLLOW-ON TASK: Install alternator drivebelts (para. 3-81).

3-81. ALTERNATOR DRIVEBELT SET REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

All vehicles except: M997A2, M1025A2, M1035A2, M1043A2, M1045A2, M1097A2, M1123

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

- Hood raised and secured (TM 9-2320-280-10).
- Battery ground cable disconnected (para. 4-73).

NOTE

Replace alternator drivebelts in matched sets only.

a. Removal

1. Loosen two capscrews (8) securing alternator (2) to bottom mounting bracket (9).
2. Loosen adjusting bracket capscrew (1) and push alternator (2) toward engine

NOTE

Some vehicles have a quick-disconnect on fan drive hose.

3. Disconnect fan drive hose assembly (11) from fan drive assembly (10).
4. Remove belt set (5) from power steering pump pulley (4), alternator pulley (3), water pump pulley (7), and crankshaft pulley (6).

b. Installation

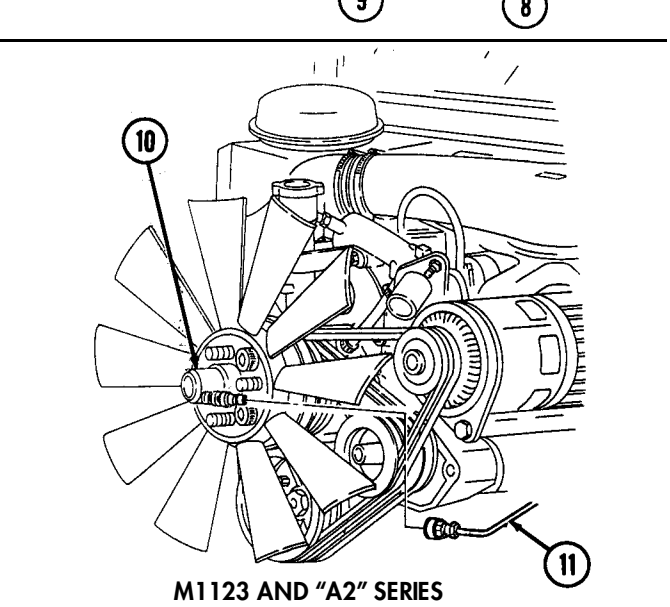
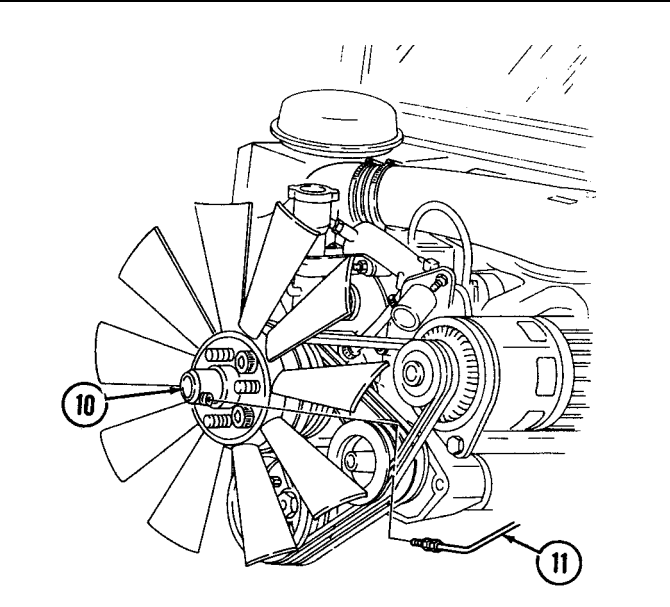
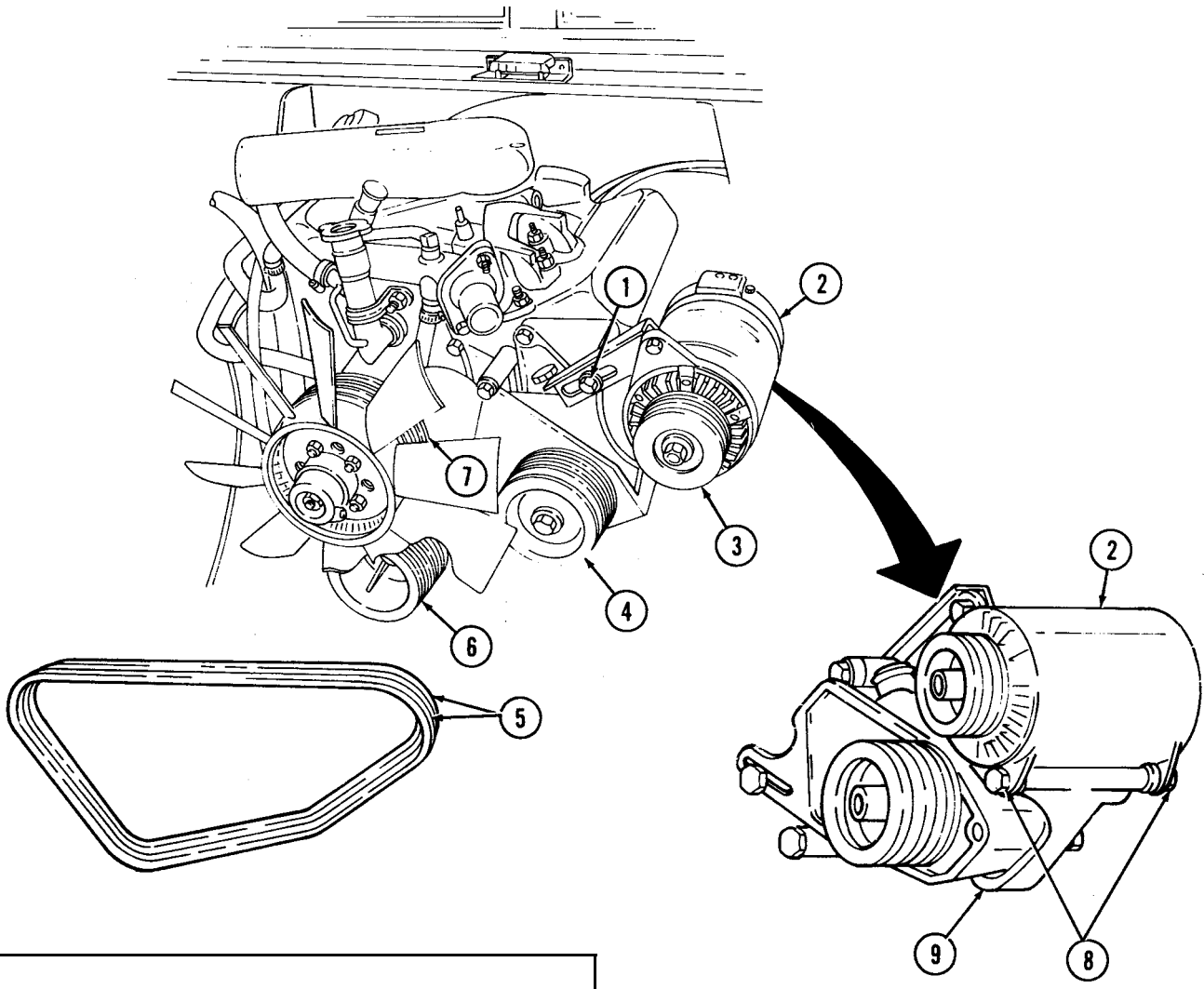
1. Feed belt set (5) into grooves on crankshaft pulley (6), water pump pulley (7), alternator pulley (3), and power steering pump pulley (4).

NOTE

Some vehicles have a quick-disconnect on fan drive hose.

2. Connect fan drive hose assembly (11) to fan drive assembly (10).

3-81. ALTERNATOR DRIVEBELT SET REPLACEMENT (Cont'd)



FOLLOW-ON TASK: Adjust drivebelts (para. 3-82).

M1123 AND "A2" SERIES

3-82. DRIVEBELTS ADJUSTMENT

This task covers:

a. Power Steering Belt Adjustment

b. Alternator Belt Adjustment

INITIAL SETUP:

Applicable Models

All vehicles except: M997A2, M1025A2, M1035A2, M1043A2, M1045A2, M1097A2, M1123

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Special Tools

Belt tension gauge (Appendix B, Item 67)

Materials/Parts

Locknut (Appendix G, Item 70)

Personnel Required

One mechanic
One assistant

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

- Hood raised and secured (TM 9-2320-280-10).
- Battery ground cable disconnected (para. 4-73).

NOTE

Prior to making any belt adjustments, check belt tension with belt tension gage. Drivebelt adjustment should only be done if belt tension is below 70 lbs (32 kg). Check alternator belts from above engine; power steering belts from under vehicle. Adjusting power steering belts can affect alternator belt tension. Always check alternator belt tension after adjusting power steering belts. To adjust air-conditioning belt, refer to para. 11-202.

a. Power Steering Belt Adjustment

1. Remove locknut (5), washer (6), capscrew (2), spacer (4), and two clamps (3) from return and control valve hoses (7) and (8) and alternator bracket (1). Discard locknut (5).
2. Loosen three capscrews (15) from power steering pump bracket (16) and support brackets.

CAUTION

Do not pry against power steering pump housing with pry bar when adjusting belt tension. Pump could be damaged.

NOTE

There are two square holes in the power steering pump bracket, one in front, accessible from above; and one in back, accessible from under the vehicle. Either can be used to adjust belt tension.

3. Adjust power steering belt set (9) using 1/2-inch breaker bar in square hole of power steering bracket (16). Apply force until belt set (9) appears tight and tighten capscrews (15).
4. Using belt tension gauge, check each belt individually for proper tension, refer to table 3-2, Belt Tension Requirements.
5. If belt set (9) tension is correct, tighten three capscrews (15) on power steering pump bracket (16) to 40 lb-ft (54 N·m). If not, repeat steps 2 through 5. If tension cannot be properly adjusted, replace belt set (9) (para. 3-80).
6. Install return and control valve hoses (7) and (8) to alternator bracket (1) with spacer (4), two clamps (3), capscrew (2), washer (6), and locknut (5). Tighten locknut (5) to 8 lb-ft (11 N·m).

b. Alternator Belt Adjustment

1. Loosen capscrew (11) and two capscrews (13.1) on alternator (13) and alternator bracket (14).

3-82. DRIVEBELTS ADJUSTMENT (Cont'd)

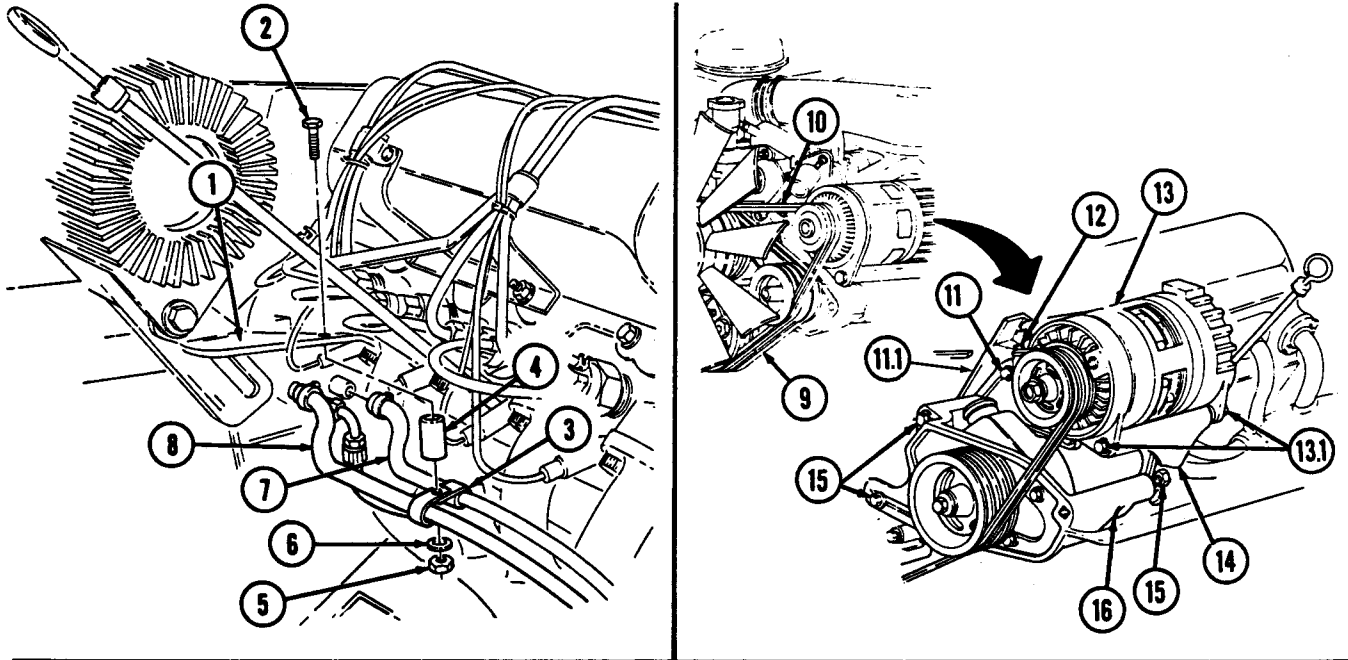
2. Adjust alternator belt set (10) by inserting 1/2-inch drive ratchet and extension in square hole (12) of alternator adjusting bracket (11.1). Turn until belt set (10) appears tight, and tighten capscrew (11) and two capscrews (13.1) securing alternator (13).
3. Using belt tension gauge, check each belt of belt set (10) individually for proper tension. Refer to table 3-2, Belt Tension Requirements.
4. If belt set (10) tension is correct, tighten alternator adjusting bracket (11.1) and capscrew (11) to 40 lb-ft (54 N.m). Tighten two capscrews (13.1) to 60 lb-ft (81 N.m). If tension is not, repeat steps 2 through 4. If tension cannot be properly adjusted, replace belt set (10) (para. 3-81).

Table 3-2. Belt Tension Requirements

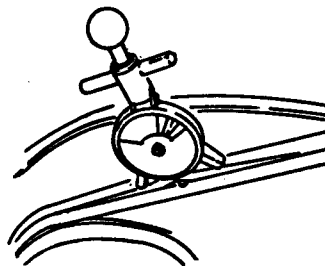
NOTE

A used belt is one that has been run at least 15 min. or 15 mi. (24 km.). Tension variance of not more than 20 lbs (90 N) between belts of the same set is acceptable.

APPLICATION	NEW BELT	USED BELT
All belts	105 ± 5 lbs (467 ± 22 N)	90 ± 5 lbs (400 ± 22 N)



BELT TENSION GAUGE



- FOLLOW-ON TASKS:**
- Connect battery ground cable (para. 4-73).
 - Lower and secure hood (TM 9-2320-280-10).

3-83. SERPENTINE DRIVEBELT MAINTENANCE

This task covers:

- | | |
|---|---|
| <ul style="list-style-type: none"> a. Removal b. Inspection | <ul style="list-style-type: none"> c. Installation d. Alignment |
|---|---|

INITIAL SETUP:

Applicable Models

M997A2, M1025A2, M1035A2, M1043A2,
M1045A2, M1097A2, M1123

Personnel Required

One mechanic
One assistant

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)
Breaker bar, 3/8 in. (Appendix B, Item 2)
Breaker bar, 1/2 in. (Appendix B, Item 2)
Pulley alignment tool
(Appendix D, Fig. D-120)

Manual References

TM 9-2320-280-10

Equipment Condition

Hood raised and secured (TM 9-2320-280-10).

a. Removal

1. Position 3/8 or 1/2 in. breaker bar as appropriate on belt tensioner (7) and move tensioner (7) clockwise to loosen belt (9).
2. Remove belt (9) from power steering pump pulley (3), alternator pulley (2), water pump pulley (4), crankshaft pulley (5), air conditioning compressor or idler pulley (8), two upper idler pulleys (1), and tensioner pulley (6). Release belt tensioner (7).

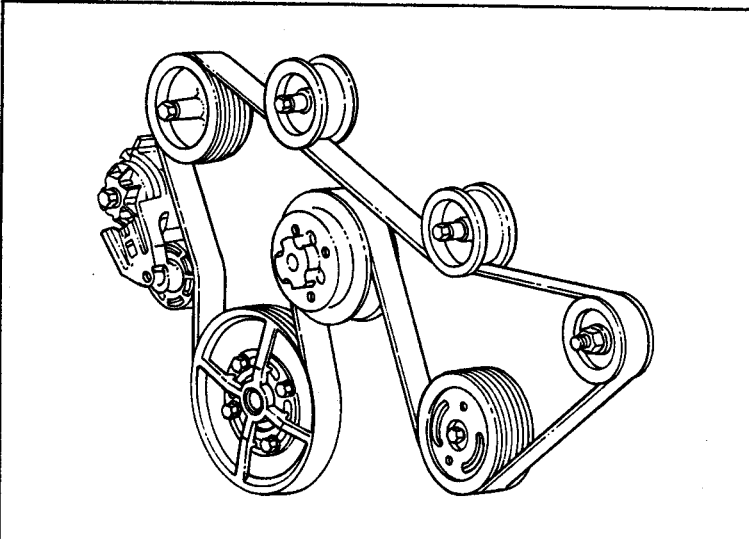
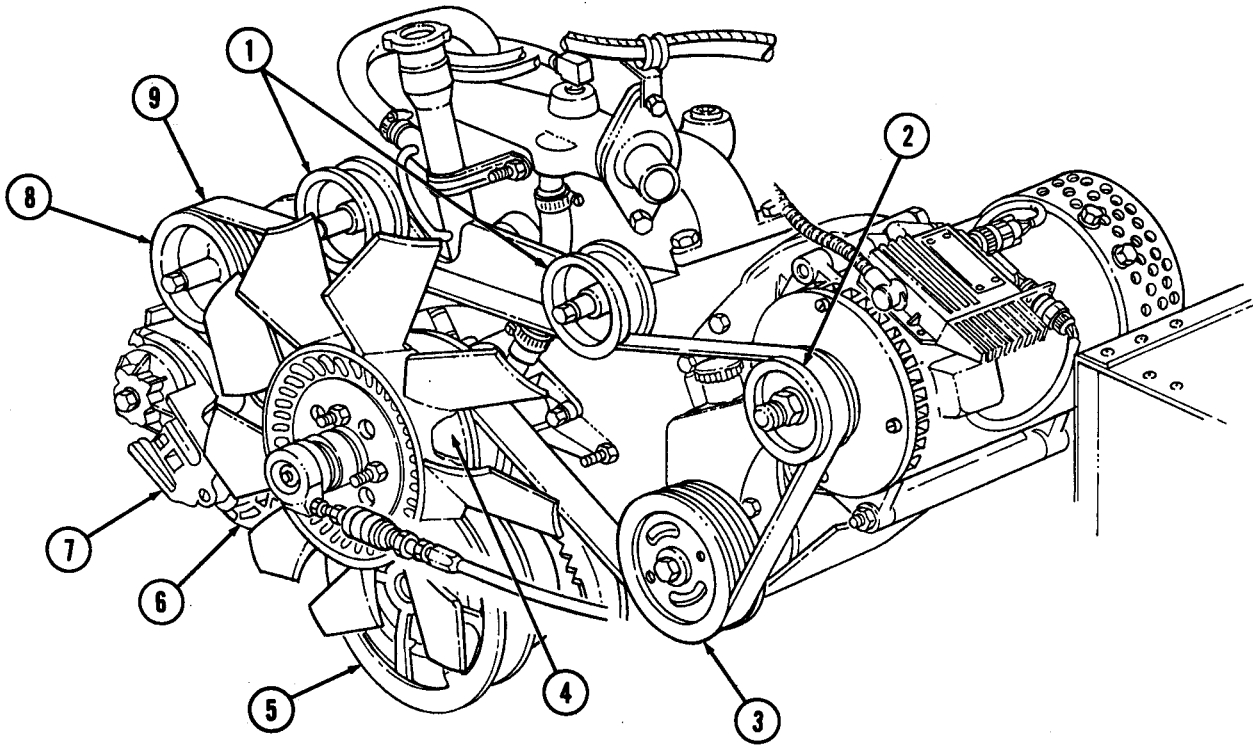
b. Inspection

Clean and check pulleys and pulley groves to ensure a smooth surface.

c. Installation

1. Position 3/8 or 1/2 in. breaker bar as appropriate on belt tensioner (7) and move tensioner (7) clockwise to allow installation of belt (9).
2. Feed belt (9) into grooves on crankshaft pulley (5), air conditioning compressor or idler pulley (8), two upper idler pulleys (1), alternator pulley (2), power steering pump pulley (3), water pump pulley (4), and tensioner pulley (6). Release belt tensioner (7).

3-83. SERPENTINE DRIVEBELT MAINTENANCE (Cont'd)



3-83. SERPENTINE DRIVEBELT MAINTENANCE (Cont'd)

d. Alignment

CAUTION

Serpentine belt failure (abnormal wear or belt dislodgement) can be caused by misalignment of pulleys, improper installation, or foreign objects introduced into belt path. Damage to equipment may result

NOTE

Ensure tab of pulley alignment tool seats flush against back side of crankshaft pulley.

1. Position tab (1) of pulley alignment tool (5) behind crankshaft pulley (6) and straight edge portion (4) of pulley alignment tool (5) across power steering pump pulley (2) and alternator pulley (3). Tab (1) on pulley alignment tool (5) should seat flush against back side of crankshaft pulley (6). Straight edge portion (4) of pulley alignment tool (5) should seat flush against power steering pump pulley (2) and alternator pulley (3). If pulley alignment is not flush, rotate engine and recheck alignment in several locations. Proceed to step 3 if pulleys are out of alignment.
2. Position straight edge portion (4) of pulley alignment tool (5) against idler pulleys (7) and check for bent mounting bracket (8). If mounting bracket (8) is bent, refer to para. 8-24 for replacement.

NOTE

If any adjustments are made while performing steps 3 through 8, start engine and check for proper tracking of belt.

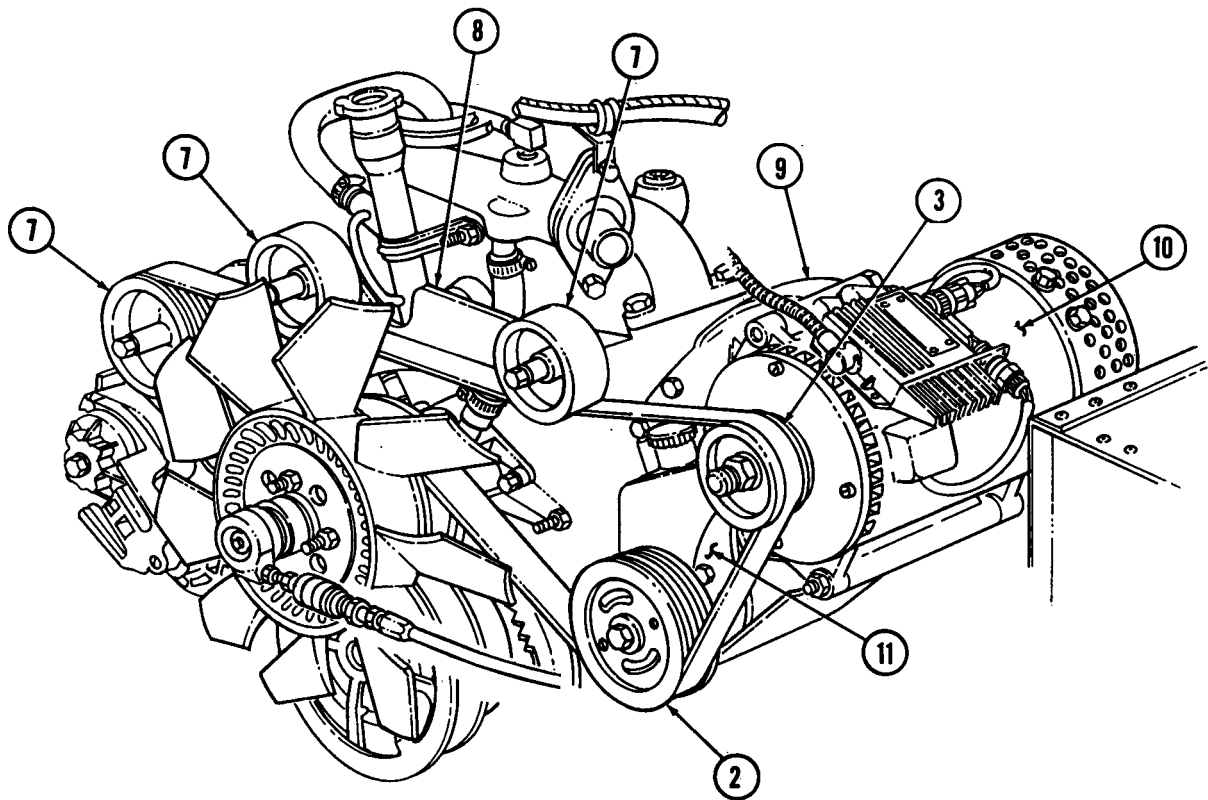
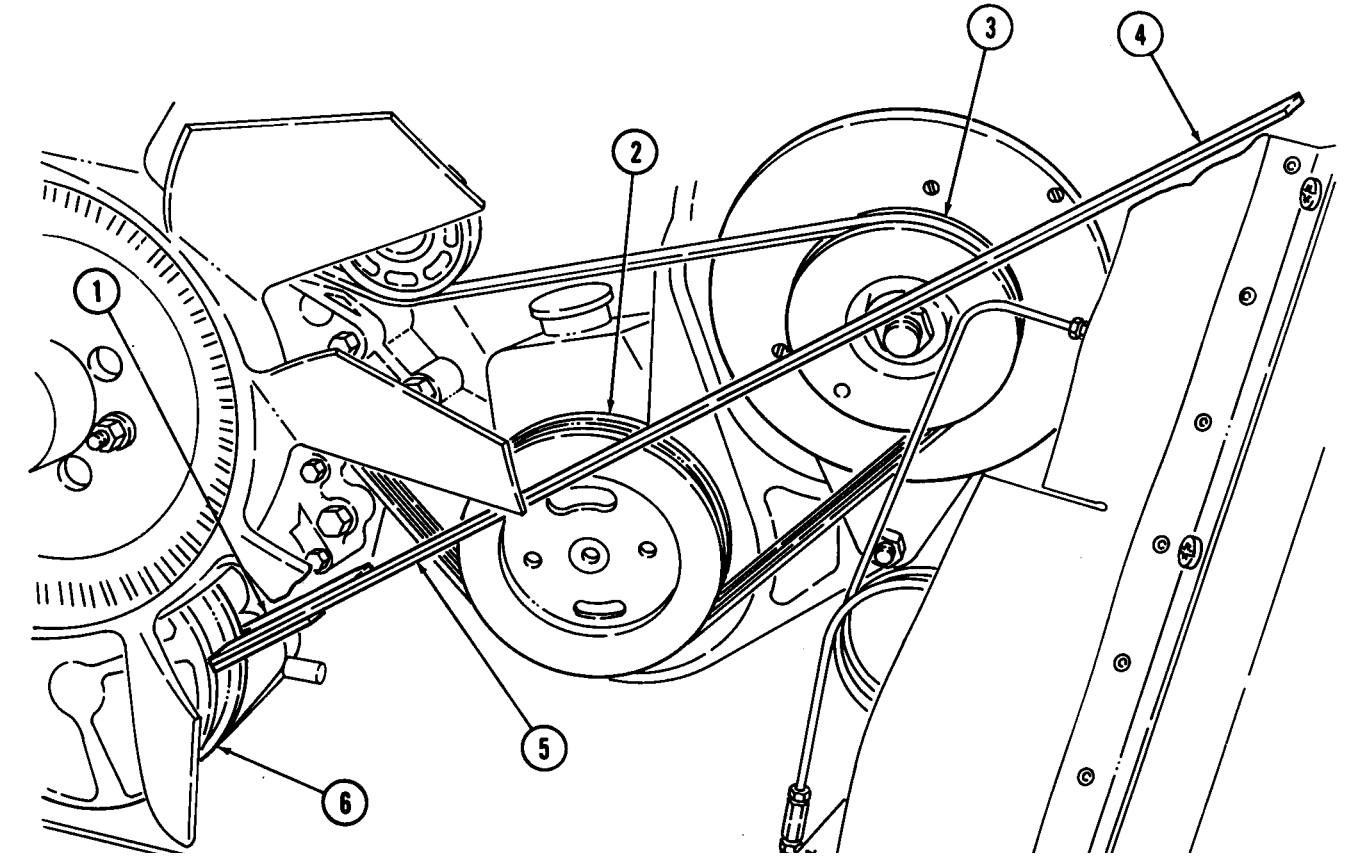
3. Check all pulleys (2), (3), (6), and (7) for mud or foreign objects lodged in grooves.

NOTE

Power steering pump pulley must be flush with end of shaft.

4. Check power steering pump pulley (2) for proper installation. Refer to para. 8-24.
5. Check power steering pump (11) and power steering/alternator mounting bracket (9) for proper installation and security of mounting hardware. Refer to para. 8-24.
6. Check alternator pulley (3) for proper installation. Refer to para. 4-3.
7. Check alternator (10) for proper installation and security of mounting hardware. Refer to para. 4-2.
8. Check idler pulleys (7) and mounting bracket (8) for proper installation and security of mounting hardware. Refer to para. 8-24.

3-83. SERPENTINE DRIVEBELT MAINTENANCE (Cont'd)



3-84. TENSIONER, IDLER PULLEYS, AND MOUNTING HARDWARE REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M997A2, M1025A2, M1035A2, M1043A2,
M1045A2, M1097A2, M1123

Materials/Parts

Two lockwashers (Appendix G, Item 191)
Three lockwashers (Appendix G, Item 190)

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

- Fan drive and fan blade removed (para. 3-78).
- Serpentine drivebelt removed (para. 3-83).

a. Removal

1. Remove capscrew (12) and tensioner (11) from mounting bracket (8).

NOTE

On M997A2 vehicles equipped with A/C, the compressor pulley is in place of the lower idler pulley.

2. Remove three nuts (6), lockwashers (5), washers (4), capscrews (1), washers (2), and idler pulleys (3) from mounting bracket (8). Discard lockwashers (5).
3. Remove two capscrews (10), lockwashers (9), and mounting bracket (8) from water pump (7). Discard lockwashers (9).

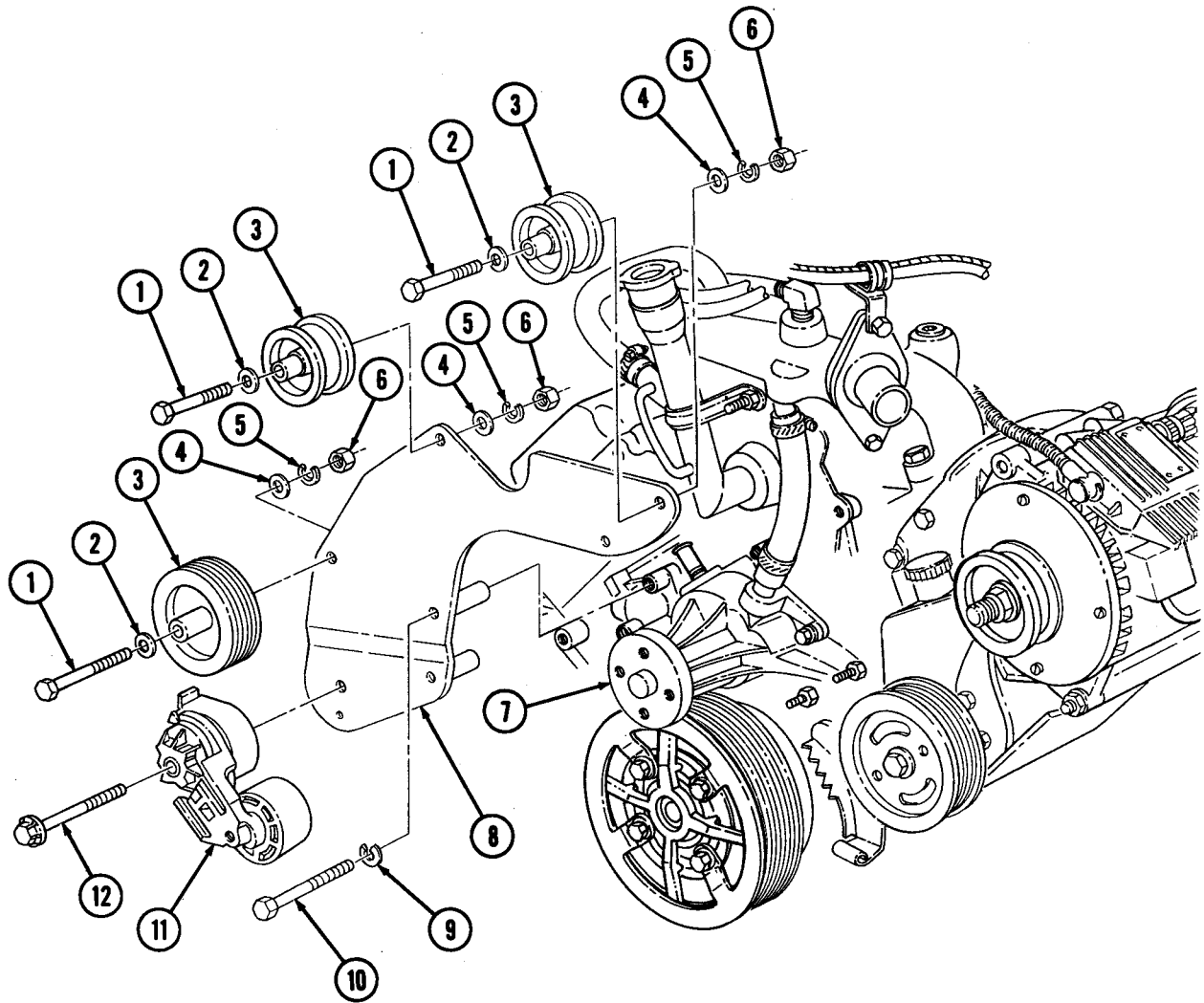
b. Installation

1. Install mounting bracket (8) on water pump (7) with two lockwashers (9) and capscrews (10).

NOTE

- On M997A2 vehicles equipped with A/C, the compressor pulley is in place of the lower idler pulley.
 - Pulley will turn if it is installed correctly. If pulley does not turn, it may be installed backwards.
2. Install three idler pulleys (3) on mounting bracket (8) with three washers (2), capscrews (1), washers (4), lockwashers (5), and nuts (6).
 3. Install tensioner (11) on mounting bracket (8) with capscrew (12).

**3-84. TENSIONER, IDLER PULLEYS, AND MOUNTING HARDWARE REPLACEMENT
(Cont'd)**



- FOLLOW-ON TASKS:
- Install serpentine drivebelt (para. 3-83).
 - Install fan drive and fan blade (para. 3-78).

CHAPTER 4 ELECTRICAL SYSTEM MAINTENANCE

Section I. GENERATING AND PROTECTIVE CONTROL BOX SYSTEM MAINTENANCE

**4-1. GENERATING AND PROTECTIVE CONTROL BOX SYSTEM MAINTENANCE
TASK SUMMARY**

TASK PARA.	PROCEDURES	PAGE NO.
4-2.	60 Ampere Alternator Maintenance	4-2
4-2.1.	60 Ampere Alternator Regulator Replacement	4-6.2
4-2.2.	100/200 Ampere Alternator Cable Replacement	4-6.4
4-3.	Alternator Pulley Replacement	4-8
4-4.	Alternator Mounting Brackets Replacement	4-10
4-4.1.	Alternator/Power Steering Mounting Bracket Replacement	4-10.2
4-5.	Protective Control Box Maintenance	4-12
4-5.1.	Distribution Box Maintenance	4-12.2

4-2. 60 AMPERE ALTERNATOR MAINTENANCE

This task covers:

- | | |
|---|---|
| <ul style="list-style-type: none"> a. Removal b. Installation | <ul style="list-style-type: none"> c. Adjustment |
|---|---|

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Special Tools

Hex-head driver, 3/16 in.
(Appendix B, Item 163)

Materials/Parts

Lockwasher (Appendix G, Item 133)
Two lockwashers (Appendix G, Item 183)
Three lockwashers (Appendix G, Item 188)
Five lockwashers (Appendix G, Item 178)
Sealing compound (Appendix C, Item 44)
Adhesive sealant (Appendix C, Item 3)

Personnel Required

One mechanic
One assistant

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

- Battery ground cable disconnected (para. 4-73).
- Hood raised and secured (TM 9-2320-280-10).

General Safety Instructions

Alternator must be supported during removal and installation.

NOTE

Prior to removal, tag leads for installation.

a. Removal

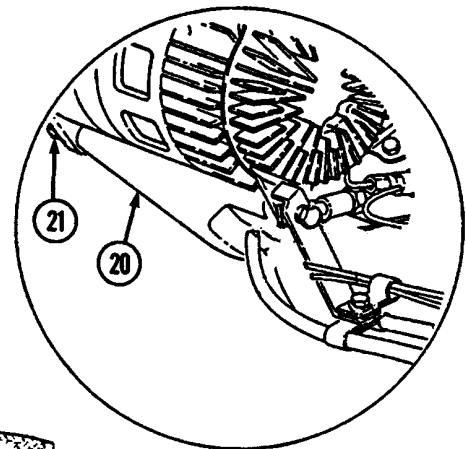
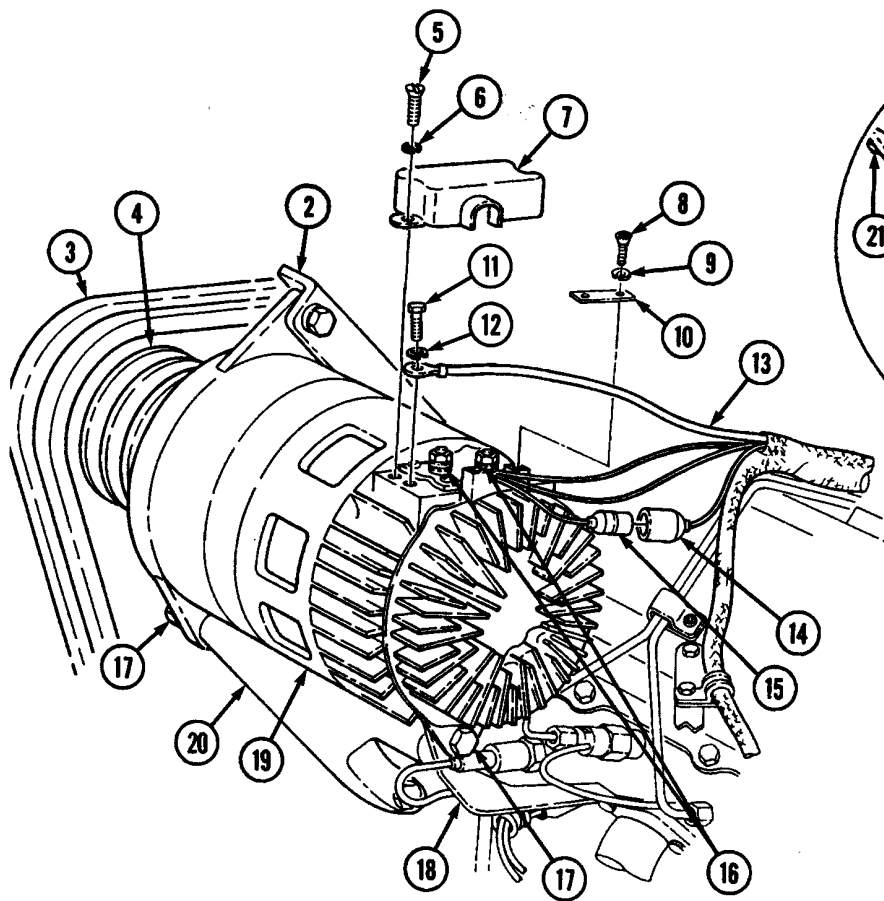
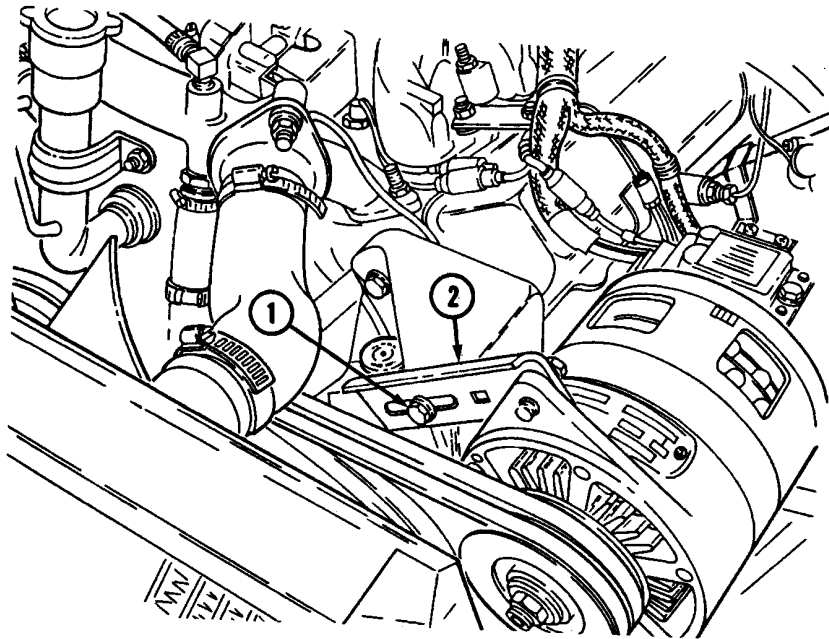
1. Loosen capscrew (1) on alternator adjusting bracket (2) and two capscrews (17) on alternator mounting bracket (20) and support bracket (18).

NOTE

Perform step 2 for vehicles with revised configurations.

2. Loosen capscrew (1) on alternator adjusting bracket (2) and nut (21) on alternator mounting bracket (20) and support bracket (18).
3. Remove two drivebelts (3) from alternator pulley (4).
4. Remove two screws (8), lockwashers (9), and wire retaining strap (10) from alternator (19). Discard lockwashers (9).
5. Remove two screws (5) and lockwashers (6) from terminal cover (7). Discard lockwashers (6).
6. Pry cover (7) away from waterproofing adhesive and remove cover (7).
7. Remove waterproofing adhesive around terminals (16).
8. Disconnect lead 568A (15) at engine wiring harness (14).
9. Remove capscrew (11) and lockwasher (12) securing ground 3B (13) to alternator (19) and disconnect ground 3B (13) from alternator (19). Discard lockwasher (12).

4-2. 60 AMPERE ALTERNATOR MAINTENANCE (Cont'd)



REVISED
NEW
CONFIGURATION

4-2. 60 AMPERE ALTERNATOR MAINTENANCE (Cont'd)

10. Remove nut (4), lockwasher (3), washer (2), and lead 5A (1) from alternator (9). Discard lockwasher (3).
11. Remove nut (5), lockwasher (6), washer (7), and lead 2A (8) from alternator (9). Discard lockwasher (6).

WARNING

Alternator must be supported during removal and installation. Failure to support alternator may cause injury to personnel or damage to equipment.

12. Remove capscrew (13), lockwasher (12), and washer (11) from adjusting bracket (10) and alternator (9). Discard lockwasher (12).

NOTE

- Perform step 14 for vehicles with new alternator support bracket configuration.
- Perform step 15 for vehicles with revised new configuration

13. Remove two capscrews (14), lockwashers (15), and washers (16) from alternator (9), support bracket (17), and mounting bracket (18). Discard lockwashers (15).
14. Remove two capscrews (14), lockwashers (15), washers (16), spacer (21), power steering lines bracket (20), and support bracket (17) from mounting bracket (18). Discard lockwashers (15).
15. Remove nut (22), lockwasher (15), washer (16), long capscrew (23), washer (16), power steering lines bracket (20), and support bracket (17) from mounting bracket (18) and alternator (9). Discard lockwasher (15).
16. Remove alternator (9).
17. Remove alternator pulley (19) (para. 4-3).

b. Installation

1. Install alternator pulley (19) (para. 4-3).

NOTE

- Perform step 3 for vehicles with new alternator support bracket configuration.
- Perform step 4 for vehicles with revised new configuration.

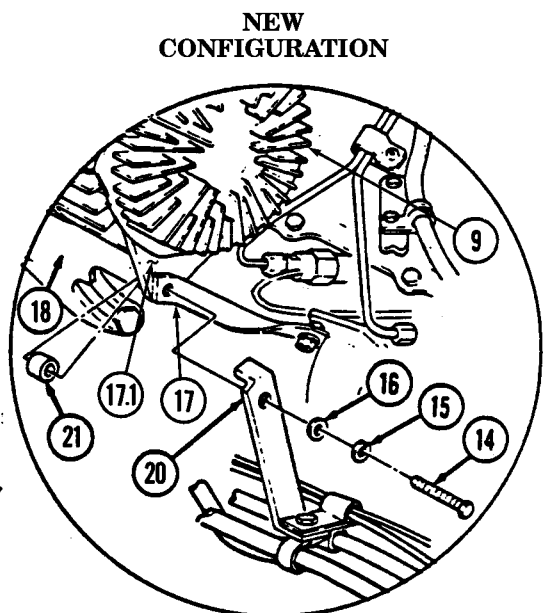
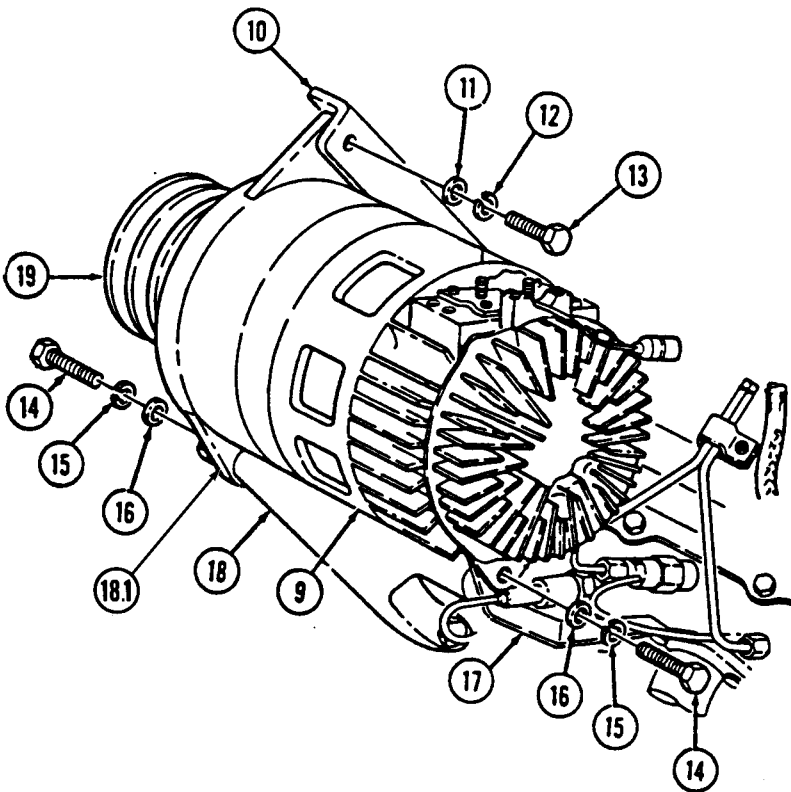
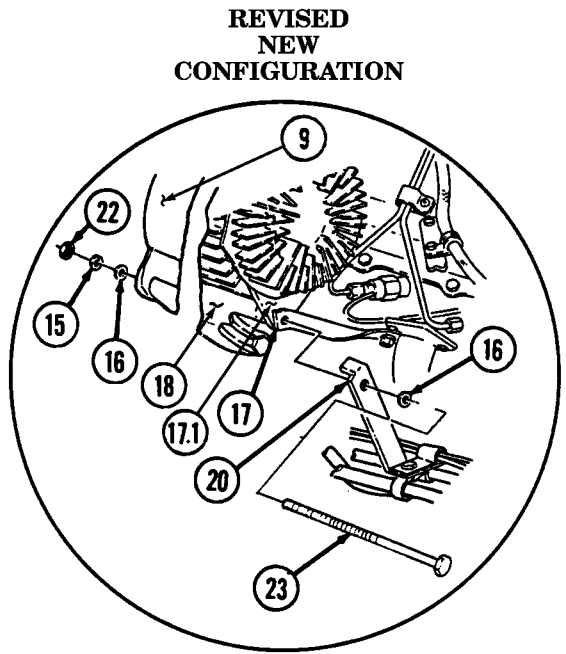
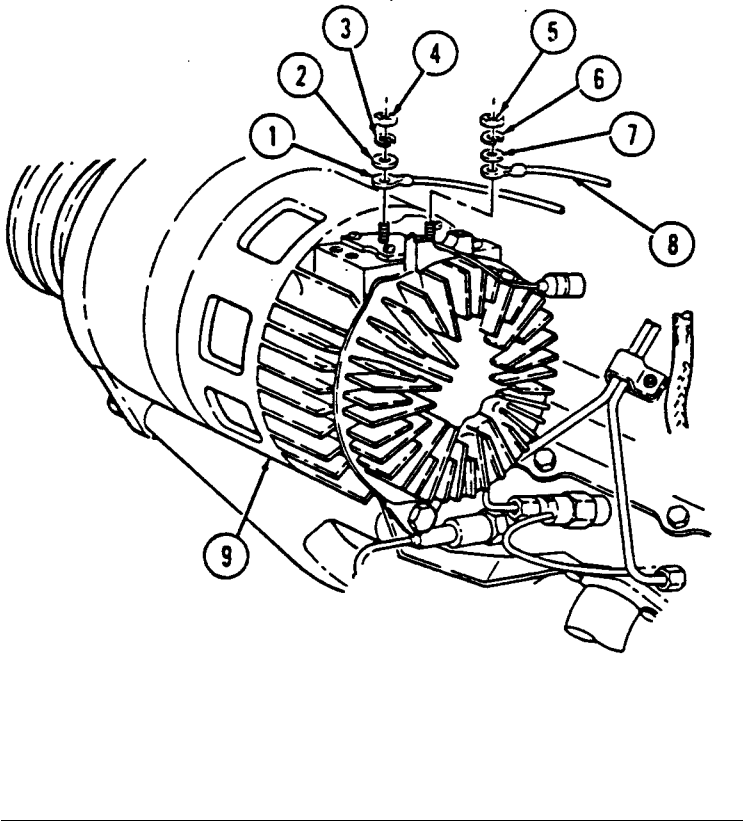
2. Position alternator (9) on mounting bracket (18) with support bracket (17) between mounting flange (18.1) and alternator (9) and install two washers (16), lockwashers (15), and capscrews (14).
3. Position alternator (9) on mounting bracket (18) with support bracket (17) and power steering lines bracket (20) on the outside of alternator mounting flange (17.1) and install spacer (21) between mounting bracket (18) and alternator mounting flange (17.1) with two lockwashers (15), washers (16), and capscrews (14).
4. Position alternator (9) on mounting bracket (18) with support bracket (17) and power steering lines bracket (20) on the outside of alternator mounting flange (17.1) and install washer (16), long capscrew (23), lockwasher (15), washer (16), and nut (22).
5. Align alternator (9) with adjusting bracket (10) and install washer (11), lockwasher (12), and capscrew (13).

NOTE

Ensure terminals are clean before connections are made.

6. Connect lead 2A (8) on alternator (9) with washer (7), lockwasher (6), and nut (5). Tighten nut (5) to 20-25 lb-in. (2-3 N•m).
7. Connect lead 5A (1) on alternator (9) with washer (2), lockwasher (3), and nut (4). Tighten nut (4) to 45-55 lb-in. (5-6 N•m).

4-2. 60 AMPERE ALTERNATOR MAINTENANCE (Cont'd)



4-2. 60 AMPERE ALTERNATOR MAINTENANCE (Cont'd)

8. Connect ground 3B (11) to alternator (15) with lockwasher (3) and capscrew (4). Tighten capscrew (4) to 82-102 lb-in. (9-12 N•m).
9. Connect lead 568A (14) to engine wiring harness (13).
10. Install wire retainer strap (10) on alternator (15) with two lockwashers (9) and screws (8). Tighten screws (8) to 30-35 lb-in. (3-4 N•m).
11. Install two drivebelts (1) on alternator pulley (2).
12. Adjust drivebelts (1) (para. 3-82).
13. Check alternator (15) for correct output voltage adjustment (para. 4-2, task c.).

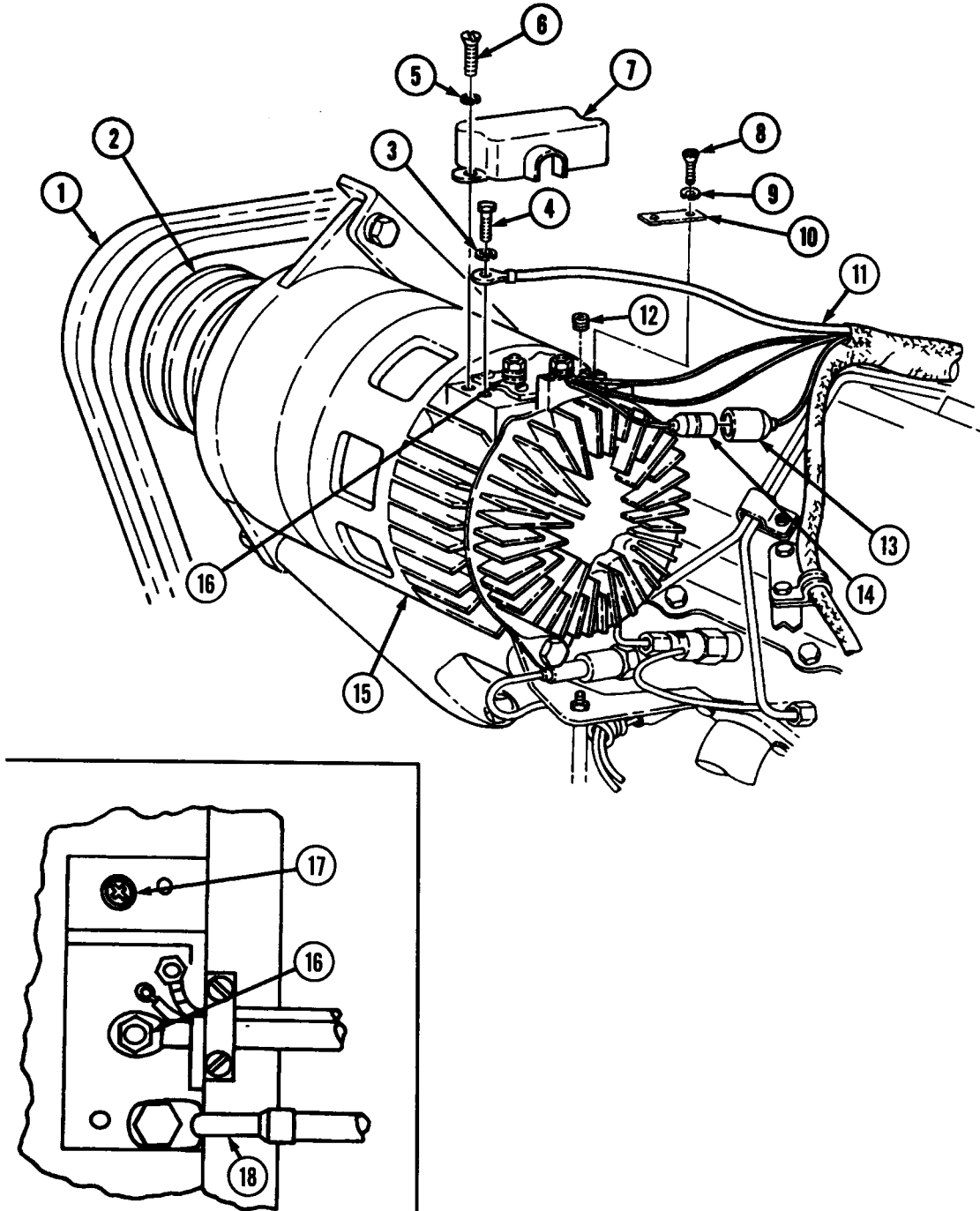
c. Adjustment

NOTE

Battery ground cable must be removed (para. 4-73).

1. Using hex-head driver, remove pipe plug (12).
2. Connect battery ground cable (para. 4-73).
3. Start engine (TM 9-2320-280-10).
4. Raise engine speed above idle.
5. Put a load on the alternator by operating driving lights (TM 9-2320-280-10).
6. Using a multimeter, check alternator (15) output voltage. Connect black test lead to ground lead 3B (18). Connect red test lead to lead 5A (16). Output voltage should be 28 volts \pm 0.5 volts. If adjustment is required, go to step 7. If no adjustment is required, go to step 11.
7. Turn adjusting screw (17) counterclockwise to increase voltage or clockwise to decrease voltage.
8. Turn off driving lights (TM 9-2320-280-10).
9. Return engine to idle.
10. Stop engine (TM 9-2320-280-10).
11. Apply sealing compound to pipe plug (12) threads. Using hex-head driver, install pipe plug (12) and tighten to 30-40 lb-in. (3-4 N•m).
12. Remove battery ground cable (para. 4-73).
13. Seal terminal connections using adhesive sealant.
14. Install terminal cover (7) on alternator (15) with two lockwashers (5) and screws (6).

4-2. 60 AMPERE ALTERNATOR MAINTENANCE (Cont'd)



- FOLLOW-ON TASKS:
- Connect battery ground cable (para. 4-73).
 - Lower and secure hood (TM 9-2320-280-10).

4-2.1. 60 AMPERE ALTERNATOR REGULATOR REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-24P

Materials/Parts

O-ring (Appendix G, Item 218)

Equipment Condition

60 ampere alternator removed (para. 4-2).

a. Removal

NOTE

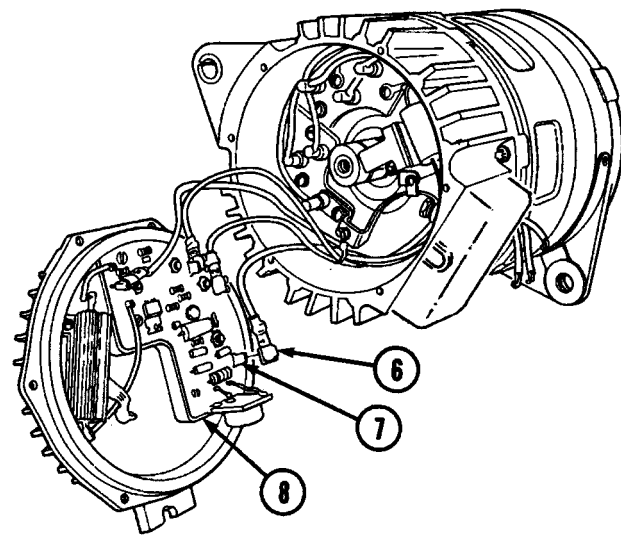
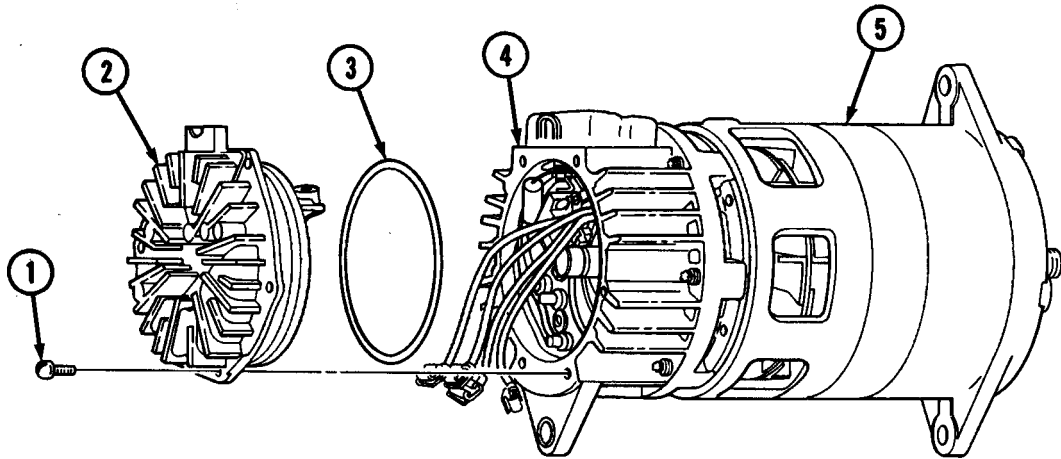
Regulator is part of end cover. Do not disassemble.

1. Remove six screws (1), end cover (2), and O-ring (3) from end housing (4). Discard O-ring (3).
2. Disconnect four leads (6) from terminals (7) on regulator (8).

b. Installation

1. Install O-ring (3) on end cover (2).
2. Connect four leads (6) to terminals (7) on regulator (8).
3. Install end cover (2) on end housing (4) with six screws (1).
4. Check alternator (5) for correct output voltage (para. 4-2, task c.).

4-2.1. 60 AMPERE ALTERNATOR REGULATOR REPLACEMENT (Cont'd)



FOLLOW-ON TASK: Install alternator (para. 4-2).

4-2.2. 100/200 AMPERE ALTERNATOR CABLE REPLACEMENT

This task covers:

- a. Removal
- b. Installation
- c. 12-Volt Regulator Cable Removal
- d. 12-Volt Regulator Cable Installation
- e. 100/200 Ampere Alternator Ground Cable Removal
- f. 100/200 Ampere Alternator Ground Cable Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)
Maintenance and repair shop equipment:
automotive (Appendix B, Item 2)

Materials/Parts

Sealant (Appendix C, Item 47.1)
Two lockwashers (Appendix G, Item 134)
Five lockwashers (Appendix G, Item 191)
Six tiedown straps (Appendix G, Item 312)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

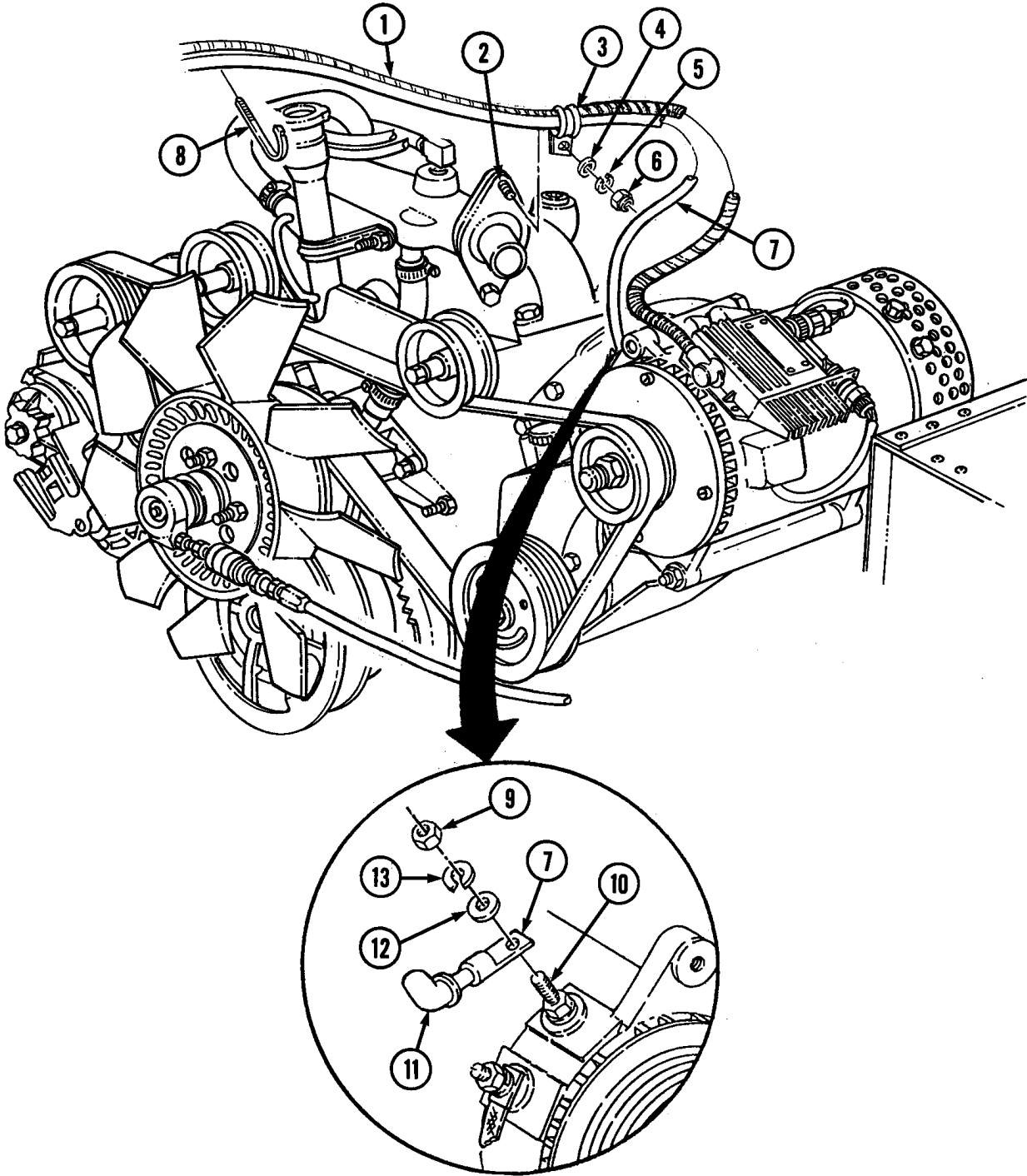
- Hood raised and secured (TM 9-2320-280-10).
- Battery ground cables disconnected (para. 4-73).
- Engine access cover removed (para. 10-15).

a. Removal

NOTE

- Prior to removal, tag leads for installation.
 - Note number of clamps and tiedown straps for installation.
1. Slide back rubber boot (11) and remove nut (9), lockwasher (13), washer (12), and cable (7) from positive stud (10). Discard lockwasher (13).
 2. Remove nut (6), lockwasher (5), washer (4), and clamp (3) from water crossover stud (2). Discard lockwasher (5).
 3. Remove two tiedown straps (8) from cables (1) and (7). Discard tiedown straps (8).

4-2.2. 100/200 AMPERE ALTERNATOR CABLE REPLACEMENT (Cont'd)



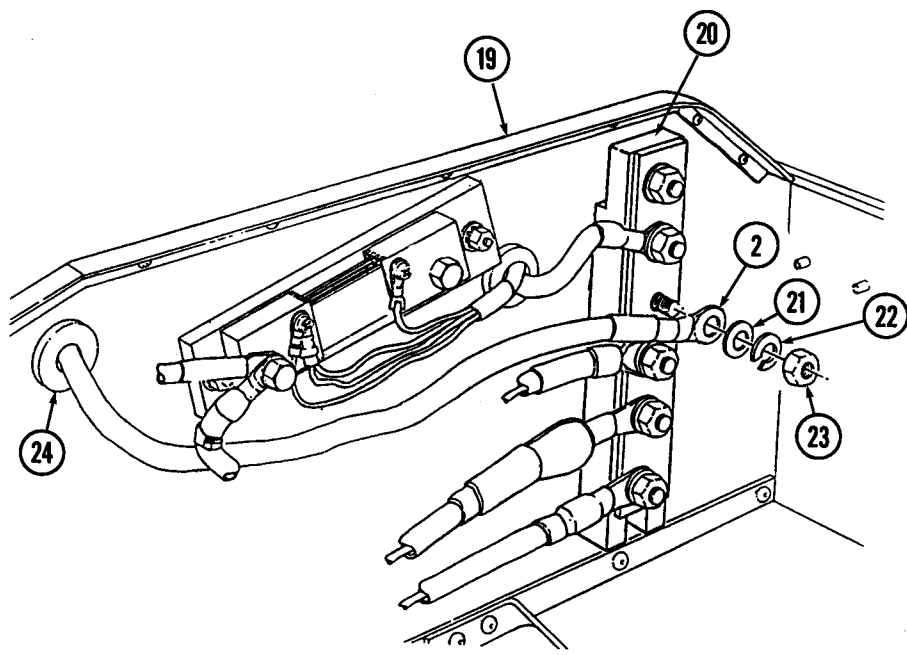
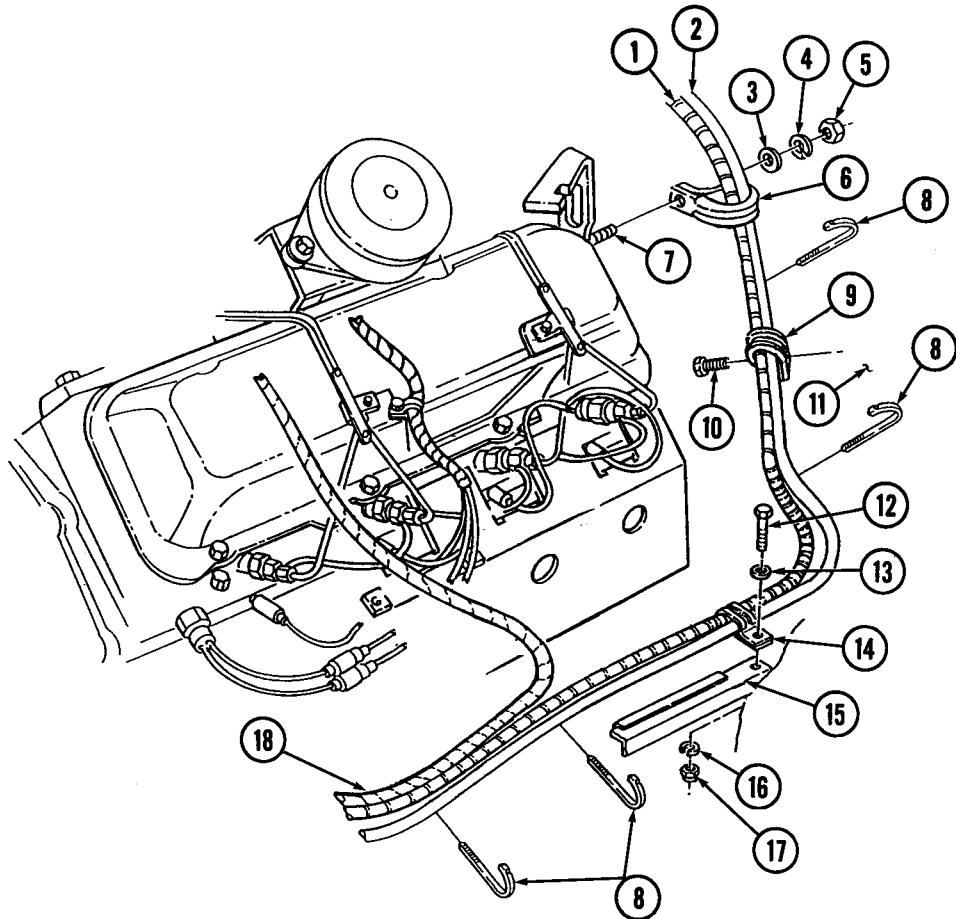
4-2.2. 100/200 AMPERE ALTERNATOR CABLE REPLACEMENT(Cont'd)

4. Remove nut (5), lockwasher (4), washer (3), clamp (6), and cables (1) and (2) from stud (7). Discard lockwasher (4).
5. Remove four tiedown straps (8) from cables (1), (2), and (18). Discard tiedown straps (8).
6. Remove screw (10), clamp (9), nut (17), lockwasher (16), screw (12), washer (13), and clamp (14) from bracket (15) and body (11). Discard lockwasher (16).
7. Remove nut (23), lockwasher (22), washer (21), and cable (2) from buss bar (20). Discard lockwasher (22).
8. Remove cable (2) through grommet (24) on battery box (19).

b. Installation

1. Insert cable (2) through grommet (24) on battery box (19) and install cable (2) on buss bar (20) with washer (21), lockwasher (22), and nut (23).
2. Install cables (1) and (2) on bracket (15) and body (11) with clamp (14), washer (13), screw (12), lockwasher (16), nut (17), clamp (9), and screw (10).
3. Install cables (1) and (2) on stud (7) with clamp (6), washer (3), lockwasher (4), and nut (5).
4. Secure cables (1), (2), and (18) together using four tiedown straps (8).

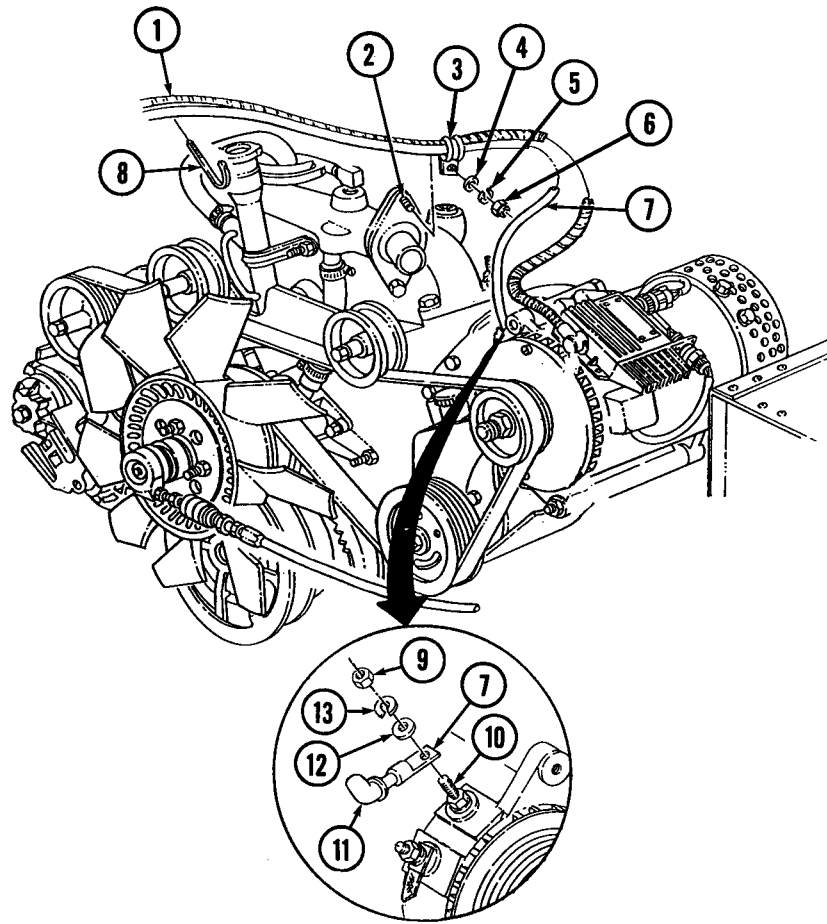
4-2.2. 100/200 AMPERE ALTERNATOR CABLE REPLACEMENT (Cont'd)



4-2.2. 100/200 AMPERE ALTERNATOR CABLE REPLACEMENT (Cont'd)

5. Install two tiedown straps (8) on cables (1) and (7).
6. Install cables (1) and (7) on water crossover stud (2) with clamp (3), washer (4), lockwasher (5), and nut (6). Tighten nut (6) to 10-15 lb-ft (14-20 N•m).
7. Apply sealant to positive stud (10) and cable (7), coating all exposed metallic surfaces.
8. Install cable (7) on positive stud (10) with washer (12), lockwasher (13), and nut (9). Tighten nut (9) to 10-15 lb-ft (14-20 N•m).
9. Slide rubber boot (11) on cable (7).

4-2.2. 100/200 AMPERE ALTERNATOR CABLE REPLACEMENT (Cont'd)



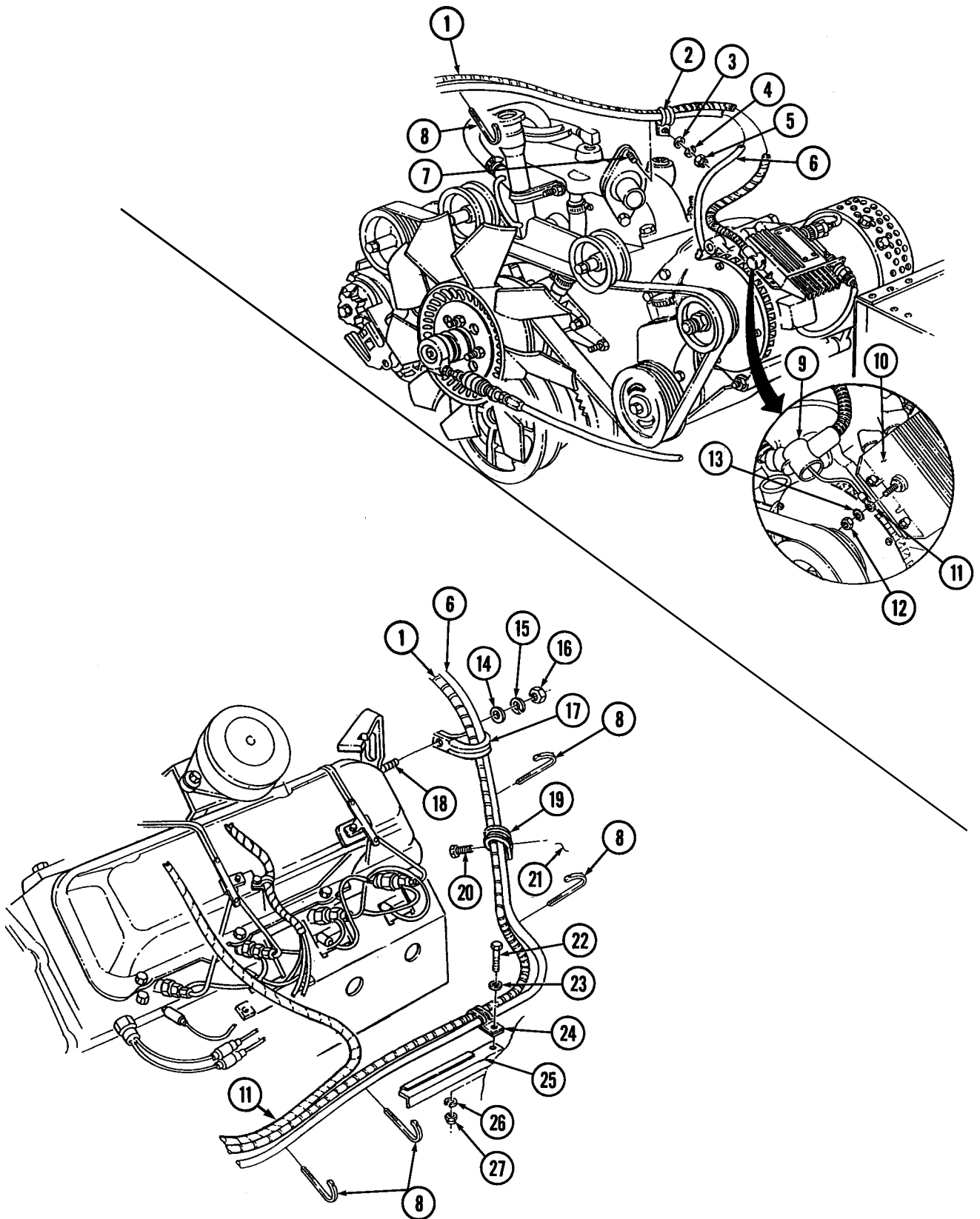
4-2.2. 100/200 AMPERE ALTERNATOR CABLE REPLACEMENT (Cont'd)

c. 12-Volt Regulator Cable Removal

NOTE

- Prior to removal, tag leads for installation.
 - Note number of clamps and tiedown straps for installation.
1. Slide back rubber boot (9) and remove nut (12), washer (13), and cable (11) from regulator (10).
 2. Remove six tiedown straps (8) from cables (1), (6), and (11). Discard tiedown straps (8).
 3. Remove nut (5), lockwasher (4), washer (3), clamp (2), and cables (1) and (6) from stud (7). Discard lockwasher (4).
 4. Remove nut (16), lockwasher (15), washer (14), clamp (17), and cables (1) and (6) from stud (18). Discard lockwasher (15).
 5. Remove screw (20), clamp (19), nut (27), lockwasher (26), screw (22), washer (23), clamp (24), and cables (1) and (6) from bracket (25) and body (21). Discard lockwasher (26).

4-2.2. 100/200 AMPERE ALTERNATOR CABLE REPLACEMENT (Cont'd)

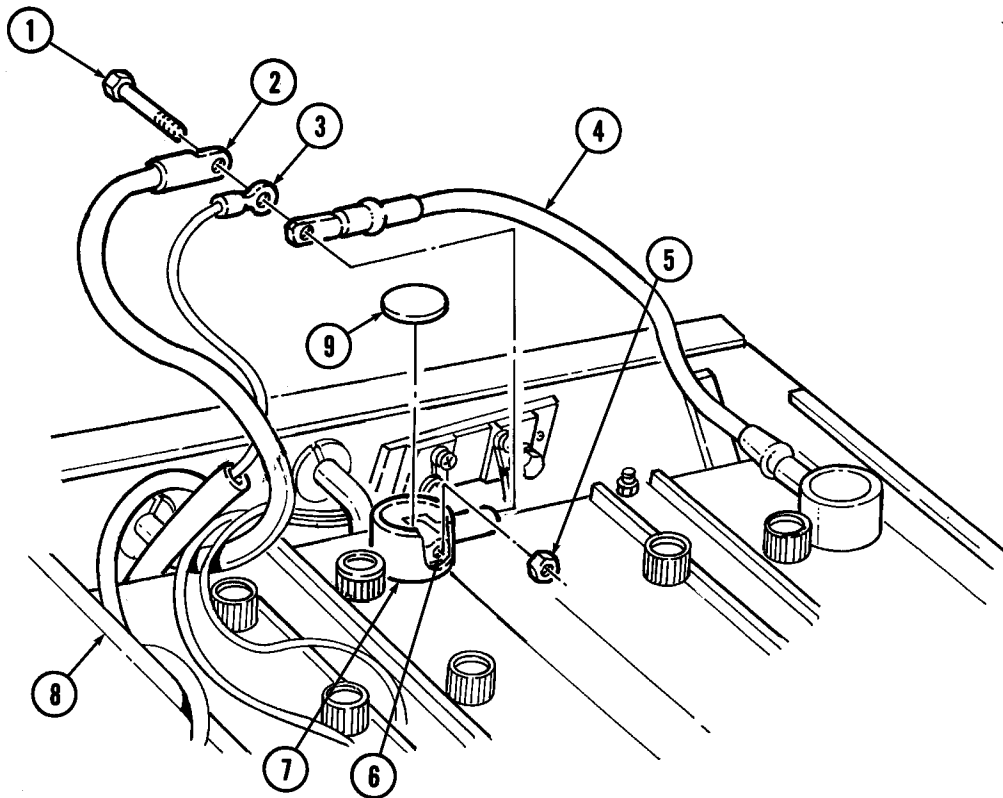


4-2.2. 100/200 AMPERE ALTERNATOR CABLE REPLACEMENT (Cont'd)

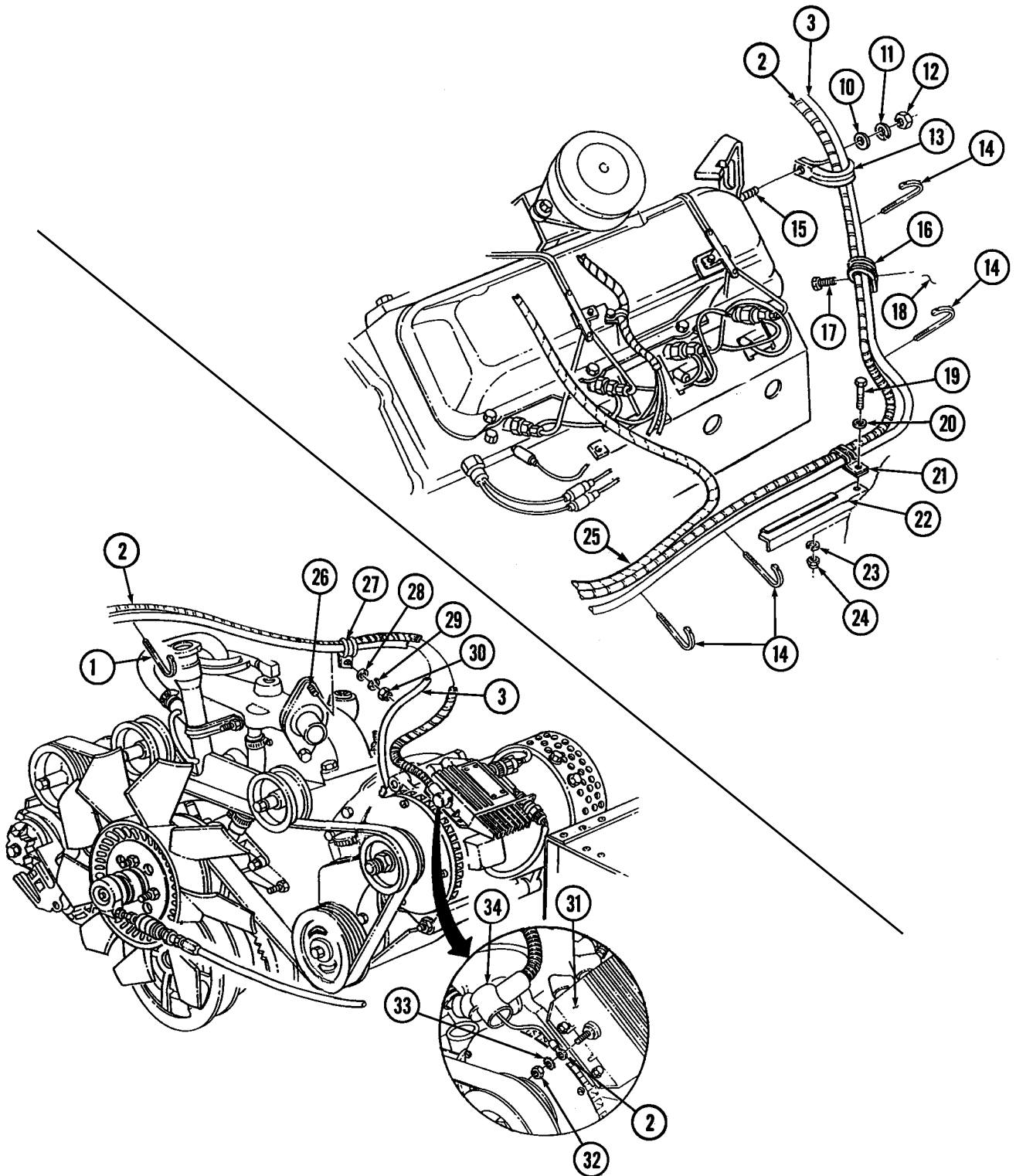
6. Remove cap (9) from battery terminal boot (7) and clean lubricating oil from battery terminal boot (7).
7. Remove nut (5), screw (1), and cables (2), (3), and (4) from terminal clamp (6) and battery box (8).

d. 12-Volt Regulator Cable Installation

1. Position cable (2) in approximate mounting location through hole in battery box (8).
2. Install cables (4), (3), and (2) on terminal clamp (6) with screw (1) and nut (5).
3. Fill battery terminal boot (7) with lubricating oil.
4. Install cap (9) on terminal boot (7).
5. Install cables (2) and (3) and clamps (16) and (21) on bracket (22) and body (18) with washer (20), screw (19), lockwasher (23), nut (24), and screw (17).
6. Install clamp (13) and cables (2) and (3) on stud (15) with washer (10), lockwasher (11), and nut (12).
7. Install six tiedown straps (14) on cables (2), (3), and (25).
8. Install cables (2) and (3) on stud (26) with clamp (27), washer (28), lockwasher (29), and nut (30).
9. Install cable (2) on regulator (31) with washer (33) and nut (32). Tighten nut (32) to 18-22 lb-in. (2.0-2.5 N·m). Slide rubber boot (34) on nut (32).



4-2.2. 100/200 AMPERE ALTERNATOR CABLE REPLACEMENT (Cont'd)



4-2.2. 100/200 AMPERE ALTERNATOR CABLE MAINTENANCE(Cont'd)

e. 100/200 Ampere Alternator Ground Cable Removal

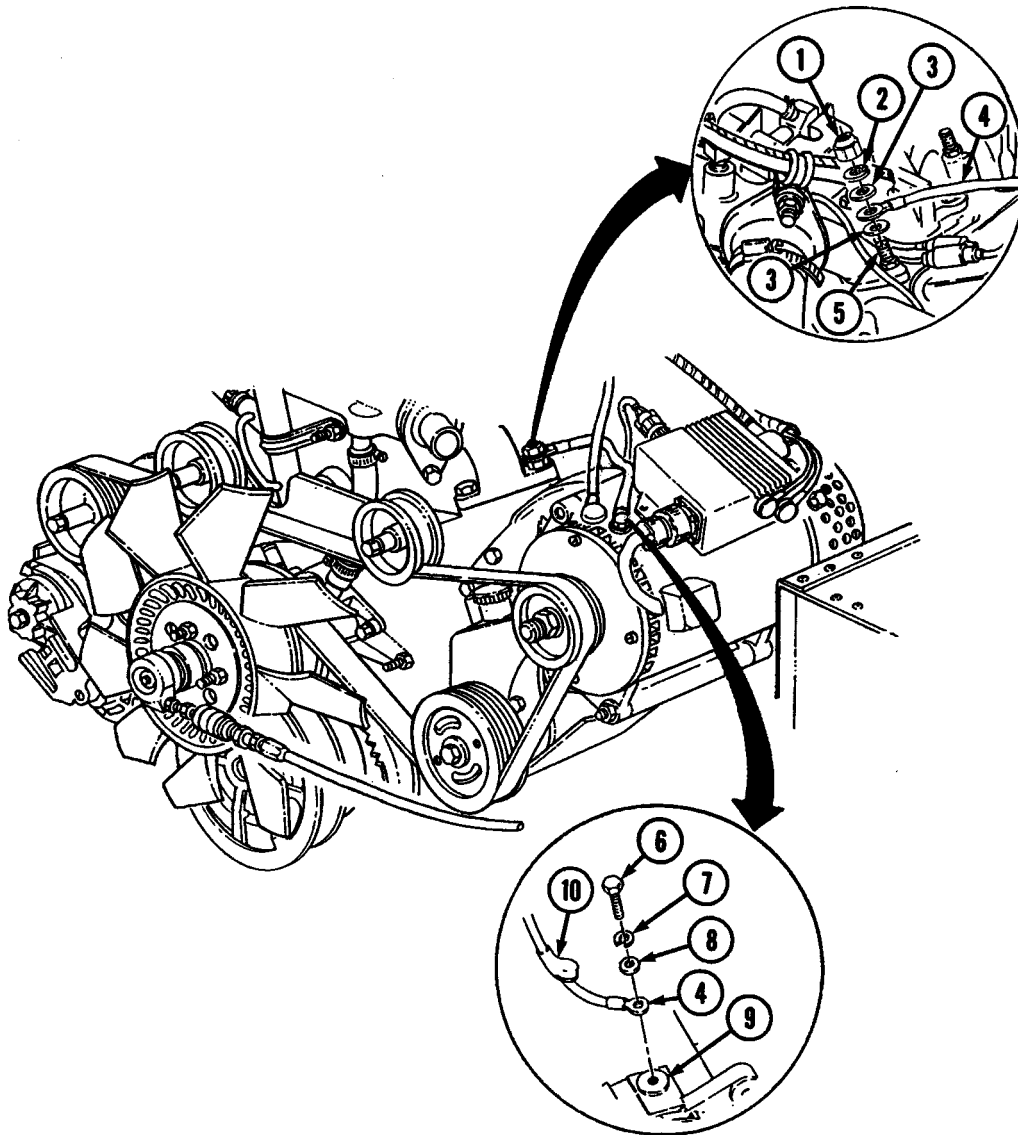
NOTE

- Routing of the 200 amp ground cable is identical to the 100 amp ground cable, with the exception of the 200 amp ground cable being installed on the alternator with a washer, lockwasher, and nut. This procedure covers the 100 amp ground cable.
 - Prior to removal, tag leads for installation.
1. Slide back rubber boot (10) and remove capscrew (6), lockwasher (7), washer (8), and ground cable (4) from alternator (9). Discard lockwasher (7).
 2. Remove nut (1), lockwasher (2), washer (3), ground cable (4), and washer (3) from water crossover stud (5). Discard lockwasher (2).

f. 100/200 Ampere Alternator Ground Cable Installation

1. Install washer (3), ground cable (4), washer (3), lockwasher (2), and nut (1) on water crossover stud (5).
2. Install ground cable (4) on alternator (9) with washer (8), lockwasher (7), and capscrew (6). Tighten capscrew (6) to 8-12 lb-ft (11-16 N•m).
3. Slide rubber boot (10) on capscrew (6).

4-2.2. 100/200 AMPERE ALTERNATOR CABLE REPLACEMENT (Cont'd)



- FOLLOW-ON TASKS:
- Connect battery ground cables (para. 4-73).
 - Install engine access cover (para. 10-15).
 - Lower and secure hood (TM 9-2320-280-10).

4-3. ALTERNATOR PULLEY REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
 automotive (Appendix B, Item 1)
 Mechanical puller (Appendix B, Item 167)
 Vise inserts (Appendix B, Item 170)

Materials/Parts

Locknut (Appendix G, Item 73)
 (60, 100 amp only)
 Woodruff key (Appendix G, Item 321)
 (60, 100 amp only)
 Locknut (Appendix G, Item 73.1)
 (200 amp - Niehoff)
 Woodruff key (Appendix G, Item 322)
 (200 amp - Niehoff)

Manual References

TM 9-2320-280-24P

Equipment Condition

- 60 amp alternator removed (para. 4-2).
- 100 amp alternator removed (para. 12-23 or 12-24).
- 200 amp alternator removed (para. 4-109 or 4-110).

NOTE

The removal and installation procedure for 60 amp, 100 amp, and 200 amp alternator pulleys are identical.

a. Removal

1. Clamp alternator pulley (2) in a soft-jawed vise.
2. Remove locknut (4) and washer (3) from alternator shaft (6). Discard locknut (4).
3. Remove alternator (1) and pulley (2) from soft-jawed vise.
4. Using a mechanical puller, remove pulley (2) and woodruff key (5) from alternator (1). Discard woodruff key (5).

b. Installation

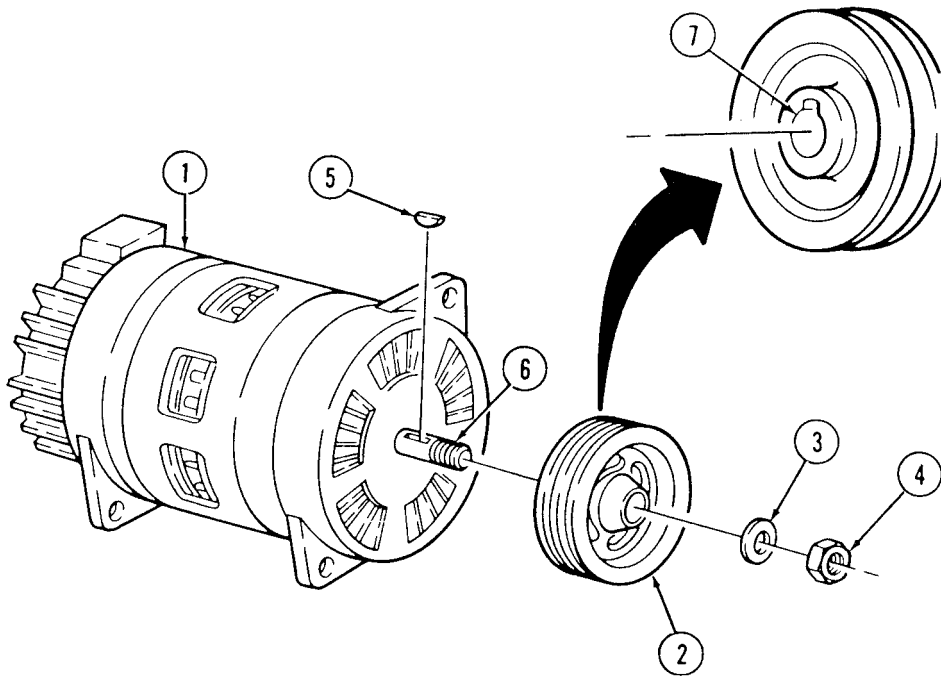
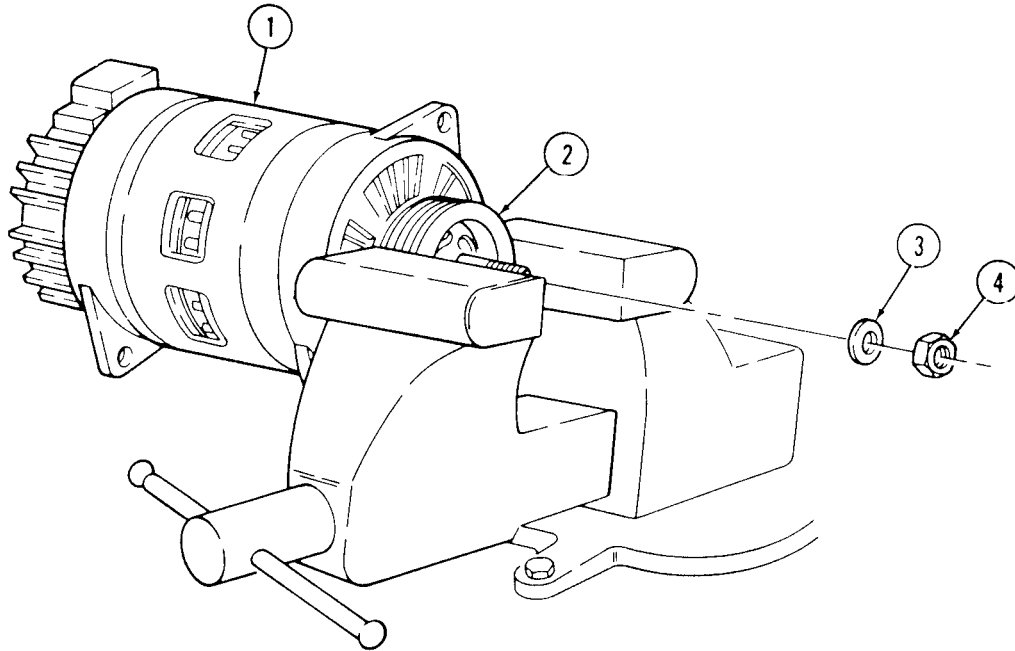
1. Position woodruff key (5) in alternator shaft (6) with flat side up.
2. Align pulley keyway (7) with woodruff key (5) in alternator shaft (6) and tap pulley (2) onto shaft (6).
3. Install washer (3) and locknut (4) on shaft (6). Tighten locknut (4) finger-tight.
4. Clamp pulley (2) in soft-jawed vise.

NOTE

For 200 amp alternators (12447109 or 12338796-1), tighten locknut to 115-125 lb-ft (156-169 N•m).

5. Tighten locknut (4) to 95 ± 5 lb-ft (129 ± 7 N•m).
6. Remove pulley (2) and alternator (1) from vise.

4-3. ALTERNATOR PULLEY REPLACEMENT (Cont'd)



- FOLLOW-ON TASKS:
- Install 60 amp alternator (para. 4-2).
 - Install 100 amp alternator (para. 12-23 or 12-24).
 - Install 200 amp alternator (para. 4-109 or 4-110).

4-4. ALTERNATOR MOUNTING BRACKETS REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Two lockwashers (Appendix G, Item 133)
Two bolts (Appendix G, Item 5)
Bolt (Appendix G, Item 4)
Lockwasher (Appendix G, Item 191)
Lockwasher (Appendix G, Item 178)

Manual References

TM 9-2320-280-24P

Equipment Condition

- 60 ampere alternator removed (para. 4-2).
- 100 ampere alternator removed (para. 12-23 or 12-24).
- 200 ampere alternator removed (para. 4-109 or 4-110).

a. Removal

NOTE

If the connection is loose between alternator bracket and alternator, tightening mounting bolts further may cause alternator bracket to fail. Notify DS maintenance to modify an older bracket.

1. Remove capscrew (4), lockwasher (5), washer (6), and alternator adjusting bracket (7) from alternator mounting bracket (9). Discard lockwasher (5).
2. Remove bolt (1) and lockwasher (2) from power steering bracket (3), alternator mounting bracket (9), and engine (21). Discard lockwasher (2) and bolt (1).
3. Remove capscrew (12), lockwasher (11), and washer (10) from alternator mounting bracket (9) and power steering bracket (3). Discard lockwasher (11).
4. Remove capscrew (25), lockwasher (24), and washer (23), and swing power steering pump (22) down. Discard lockwasher (24).
5. Remove two bolts (8) and alternator mounting bracket (9) from engine (21). Discard bolts (8).

NOTE

Perform steps 8 and 9 for vehicles with new alternator support bracket configuration.

6. Remove nut (20), washer (19), capscrew (13), spacer (17), and clamps (18) from support bracket (14).
7. Remove socket-head screw (16), washer (15), and support bracket (14) from engine (21).
8. Remove nut (20), two washers (19), capscrew (13), power steering lines bracket (27), and harness clamp (26) from clamps (18).
9. Remove nut (16), washer (15), and support bracket (14) from engine (21).

b. Installation

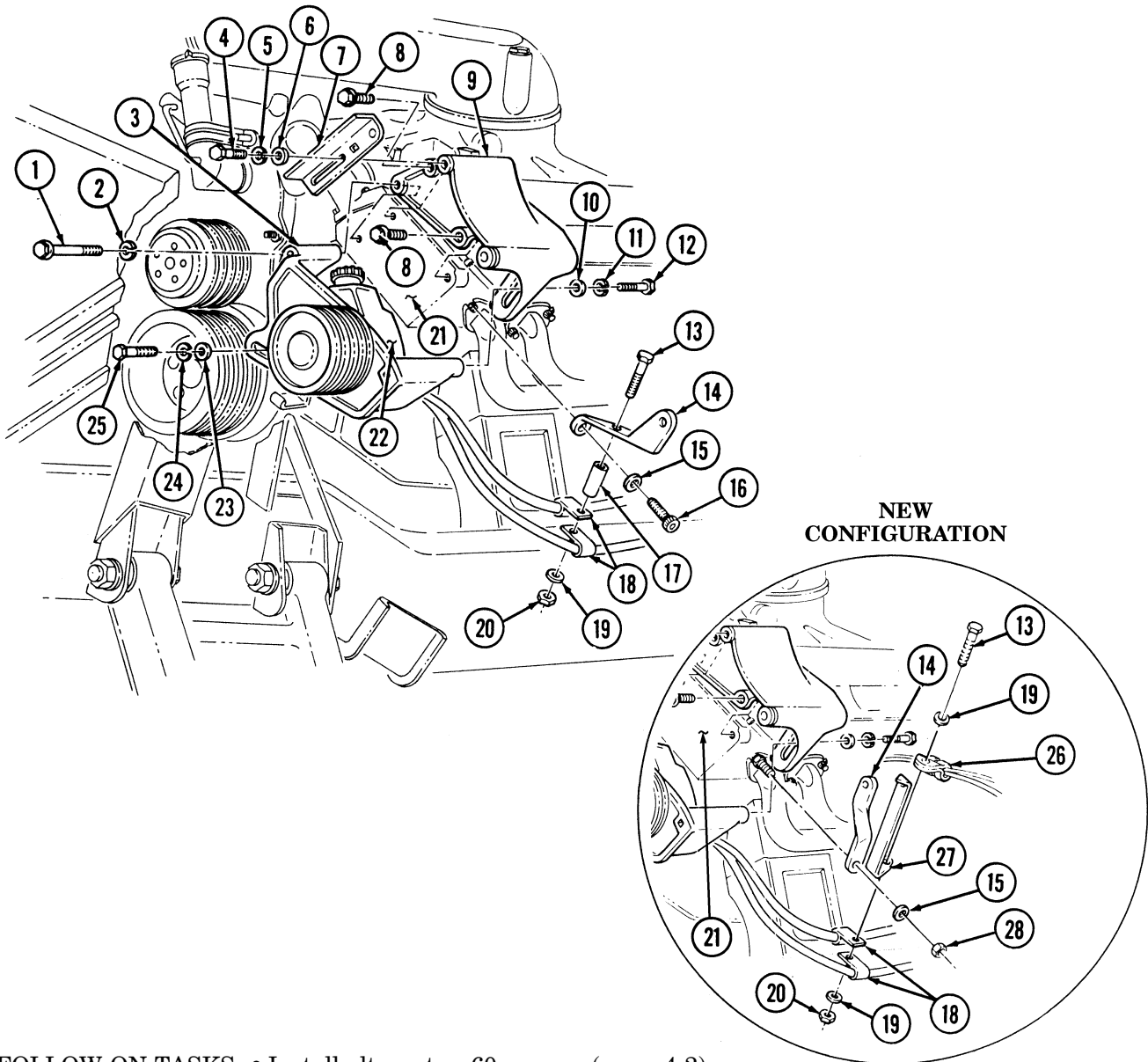
NOTE

Perform steps 3 and 4 for vehicles with new alternator support bracket configuration.

1. Install support bracket (14) on engine (21) with washer (15) and socket-head screw (16). Tighten socket-head screw (16) to 25-33 lb-ft (34-45 N•m).
2. Install spacer (17) and clamps (18) on support bracket (14) with capscrew (13), washer (19), and nut (20).
3. Install support bracket (14) on engine (21) with washer (15) and nut (28). Tighten nut (28) to 35 lb-ft (47 N•m).
4. Install power steering lines bracket (27) and harness clamp (26) on clamps (18) with washer (19), capscrew (13), washer (19), and nut (20).

4-4. ALTERNATOR MOUNTING BRACKETS REPLACEMENT (Cont'd)

5. Install alternator mounting bracket (9) on engine (21) with two bolts (8). Tighten bolts (8) to 48 lb-ft (65 N•m).
6. Install power steering bracket (3) on alternator mounting bracket (9) with washer (10), lockwasher (11), and capscrew (12). Tighten capscrew (12) finger-tight.
7. Secure power steering bracket (3) on alternator mounting bracket (9) and engine (21) with lockwasher (2) and bolt (1). Tighten bolt (1) to 48 lb-ft (65 N•m).
8. Install alternator adjusting bracket (7) on alternator mounting bracket (9) with washer (6), lockwasher (5), and capscrew (4).
9. Install washer (23), lockwasher (24), and capscrew (25) in power steering bracket (3). Tighten capscrew (25) finger-tight.



- FOLLOW-ON TASKS:**
- Install alternator, 60 ampere (para. 4-2).
 - Install alternator, 100 ampere (para. 12-23 or 12-24).
 - Install alternator, 200 ampere (para. 4-109 or 4-110).

4-4.1. ALTERNATOR/POWER STEERING MOUNTING BRACKET REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M1123 and "A2" series vehicles only

Manual References

TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)
Maintenance and repair shop equipment:
automotive (Appendix B, Item 2)

Equipment Condition

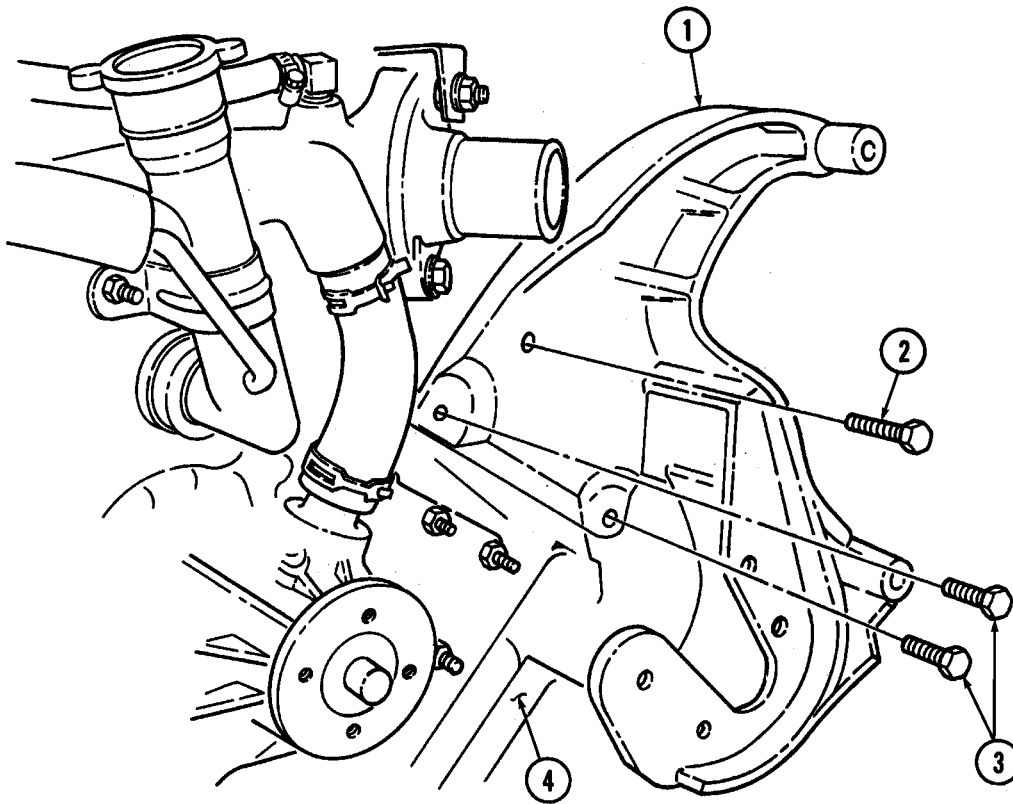
- 200 ampere alternator removed (para. 4-109 or 4-110).
- Tensioner, idler pulleys, and mounting hardware removed (para. 3-84).
- Power steering pump removed (para. 8-24).

a. Removal

Remove two short bolts (3), long bolt (2), and mounting bracket (1) from engine (4).

b. Installation

Install mounting bracket (1) on engine (4) with two short bolts (3) and long bolt (2). Tighten bolts (3) and (2) to 48 lb-ft (65 N·m).

4-4.1. ALTERNATOR/POWER STEERING MOUNTING BRACKET REPLACEMENT (Cont'd)

- FOLLOW-ON TASKS:
- Install power steering pump (para. 8-24).
 - Install tensioner, idler pulleys, and mounting hardware (para. 3-84).
 - Install 200 ampere alternator (para. 4-109 or 4-110).

4-5. PROTECTIVE CONTROL BOX MAINTENANCE

This task covers:

- | | |
|--|------------------------|
| <p>a. Removal</p> <p>b. Inspection</p> | <p>c. Installation</p> |
|--|------------------------|

INITIAL SETUP:

Tools

General mechanic's tool kit:
 automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-10
 TM 9-2320-280-24P

Materials/Parts

Silicone compound (Appendix C, Item 48)

Equipment Condition

- Battery ground cable disconnected (para. 4-73).
- Hood raised and secured (TM 9-2320-280-10).

Personnel Required

One mechanic
 One assistant

CAUTION

The control box must be supported from inside the vehicle during removal and installation or damage to protective control box/unit may result.

a. Removal

1. Working under hood, disconnect engine wiring harness cannon plug (6) from control box (5).
2. From inside the vehicle, disconnect body wiring harness cannon plug (3) from control box (5).
3. Remove four screws (1) and control box (5) from cowl (2).

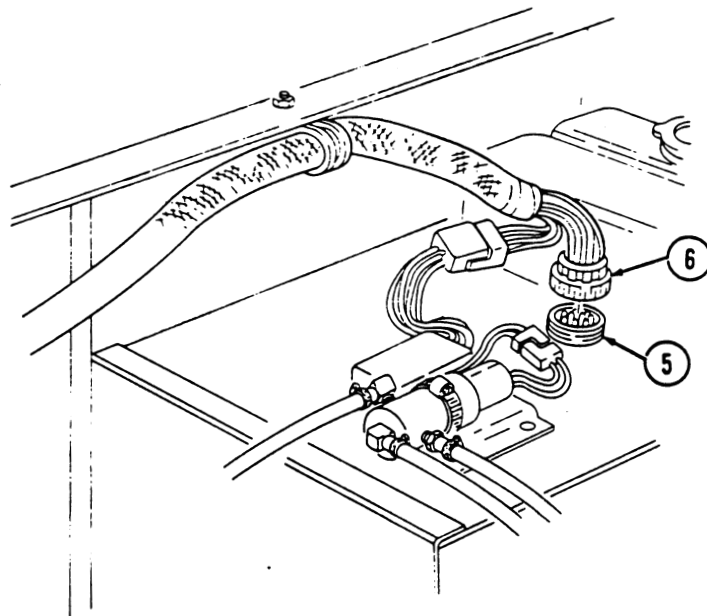
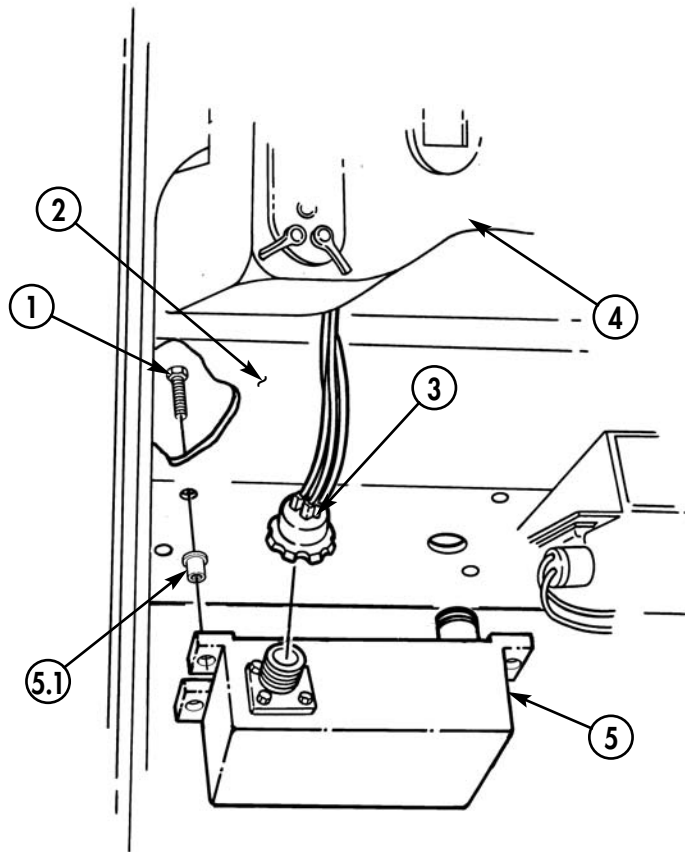
b. Inspection

Inspect rivnuts (5.1) for damage. Replace rivnuts (5.1) if damaged (para. 10-66).

c. Installation

1. Position control box (5) under instrument panel (4) against cowl (2).
2. From under hood, install control box (5) on cowl (2) with four screws (1). Tighten screws (1) to 6 lb-ft (8 N•m).
3. Fill engine wiring cannon plug (6) and control box connection (5) to capacity with silicone.
4. From inside vehicle, connect body wiring harness cannon plug (3) to control box (5).
5. Connect engine wiring harness cannon plug (6) to control box (5).

4-5. PROTECTIVE CONTROL BOX MAINTENANCE (Cont'd)



- FOLLOW-ON TASKS:**
- Lower and secure hood (TM 9-2320-280-10).
 - Connect battery ground cable (para. 4-73).

4-5.1. DISTRIBUTION BOX MAINTENANCE

This task covers:

- | | |
|---|---|
| <ul style="list-style-type: none"> a. Removal b. Inspection | <ul style="list-style-type: none"> c. Installation |
|---|---|

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Personnel Required

One mechanic
One assistant

Equipment Condition

- Battery ground cable disconnected (para. 4-73).
- Hood raised and secured (TM 9-2320-280-10).

CAUTION

The distribution box must be supported from inside the vehicle during removal and installation, or damage to distribution box may result.

a. Removal

1. From inside the vehicle, disconnect body wiring harness cannon plug (3) from distribution box (4).
2. Working under hood, disconnect engine wiring harness cannon plug (6) and glow plug wiring harness cannon plug (7) from distribution box (4).
3. Remove four screws (1) and distribution box (4) from cowl (2).

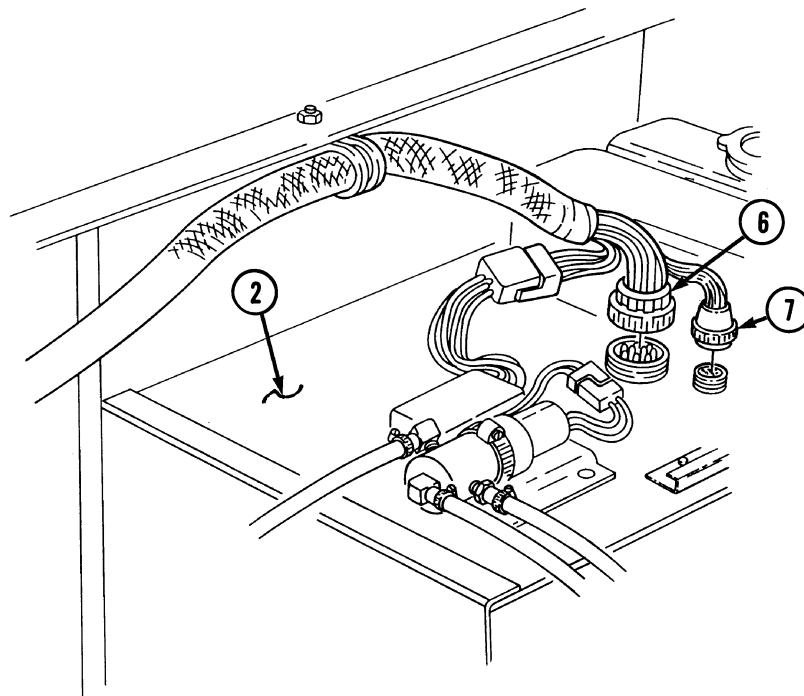
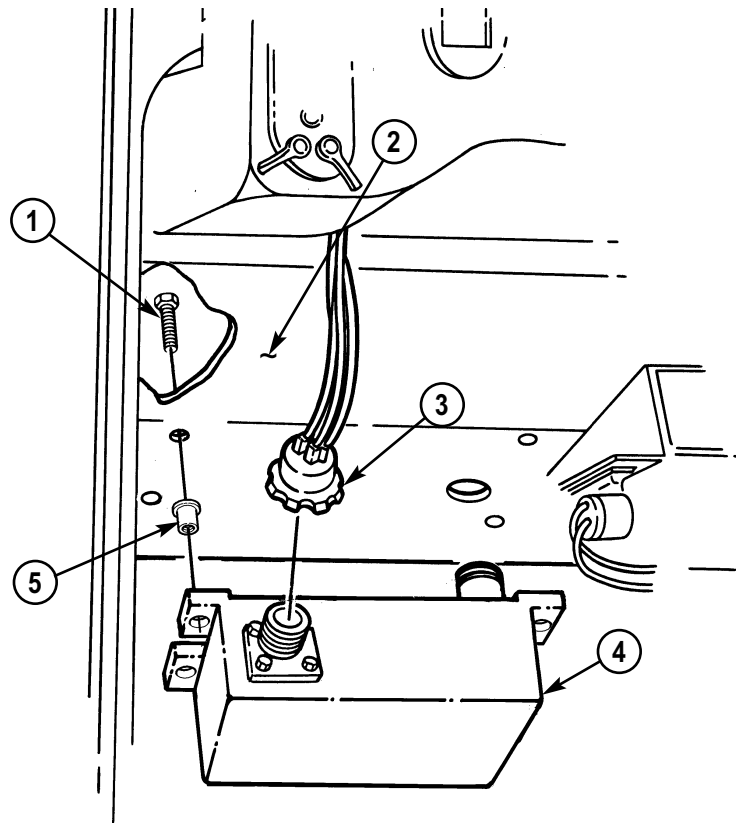
b. Inspection

Inspect rivnuts (5) for damage. Replace rivnuts (5) if damaged (para. 10-66).

c. Installation

1. From under hood, install distribution box (4) on cowl (2) with four screws (1). Tighten screws (1) to 71 lb-in. (8 N•m).
2. Connect body wiring harness cannon plug (3) to distribution box (4).
3. Connect engine wiring harness cannon plug (6) to distribution box (4).
4. Connect glow plug wiring harness cannon plug (7) to distribution box (4).

4-5.1. DISTRIBUTION BOX MAINTENANCE (Cont'd)



- FOLLOW-ON TASKS:
- Lower and secure hood (TM 9-2320-280-10).
 - Connect battery ground cable (para. 4-73).

Section I.1. DUAL VOLTAGE ALTERNATOR AND REGULATOR SYSTEM MAINTENANCE

4-5.2. DUAL VOLTAGE ALTERNATOR AND REGULATOR SYSTEM MAINTENANCE TASK SUMMARY

TASK PARA.	PROCEDURES	PAGE NO.
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NOTE

This section pertains to vehicles configured for dual voltage and electrical systems. Conversion from single voltage electrical systems to dual voltage is accomplished by application of 100-, 200-, and 400-voltage kits. Newer production vehicles incorporate these systems.

4-5.3.	100 Ampere Dual Voltage Alternator (12447110) Replacement	4-12.6
4-5.4.	100 Ampere Dual Voltage Alternator (12447110) Cable Replacement	4-12.10
4-5.5.	100 Ampere Dual Voltage Alternator (12447110) Umbilical Power Cable Replacement	4-12.12
4-5.6.	100 Ampere Dual Voltage Alternator Regulator (Part of 12447110) Replacement	4-12.16
4-5.7.	(6.5L) 200 Ampere Dual Voltage Alternator (12447109) Replacement	4-12.18
4-5.8.	(6.5L) 200 Ampere Dual Voltage Alternator (12447109) Cable Replacement	4-12.22
4-5.9.	(6.5L) 200 Ampere Dual Voltage Alternator (12447109) Umbilical Power Cable Replacement	4-12.24
4-5.10.	(6.5L) 200 Ampere Dual Voltage Regulator (Part of 12447109) Replacement	4-12.26
4-5.11.	(6.5L) 400 Ampere Dual Voltage Regulator (Part of 12446760) Replacement	4-12.28
4-5.12.	(6.5L) 400 Ampere Dual Voltage Alternator (Part of 12446760) Cable Replacement	4-12.30
4-5.13.	(6.5L) 400 Ampere Dual Voltage Alternator (12446760) Replacement	4-12.38

4-5.3. 100 AMPERE DUAL VOLTAGE ALTERNATOR (124471 10) REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic’s tool kit:
 automotive (Appendix B, Item 1)
 Maintenance and repair shop equipment:
 automotive (Appendix B, Item 2)

Materials/Parts

Lockwasher (Appendix G, Item 188)
 Two lockwashers (Appendix G, Item 172)

Personnel Required

One mechanic
 One assistant

Manual References

TM 9-2320-280-10
 TM 9-2320-280-24P

Equipment Condition

- Hood raised and secured (TM 9-2320-280-10).
- Battery ground cables disconnected (para. 4-73).
- Engine access cover removed (para. 10-15).
- Voltage regulator removed (para. 4-5.6).

General Safety Instructions

Alternator must be supported during removal and installation.

a. Removal

NOTE

Prior to removal, tag leads for installation.

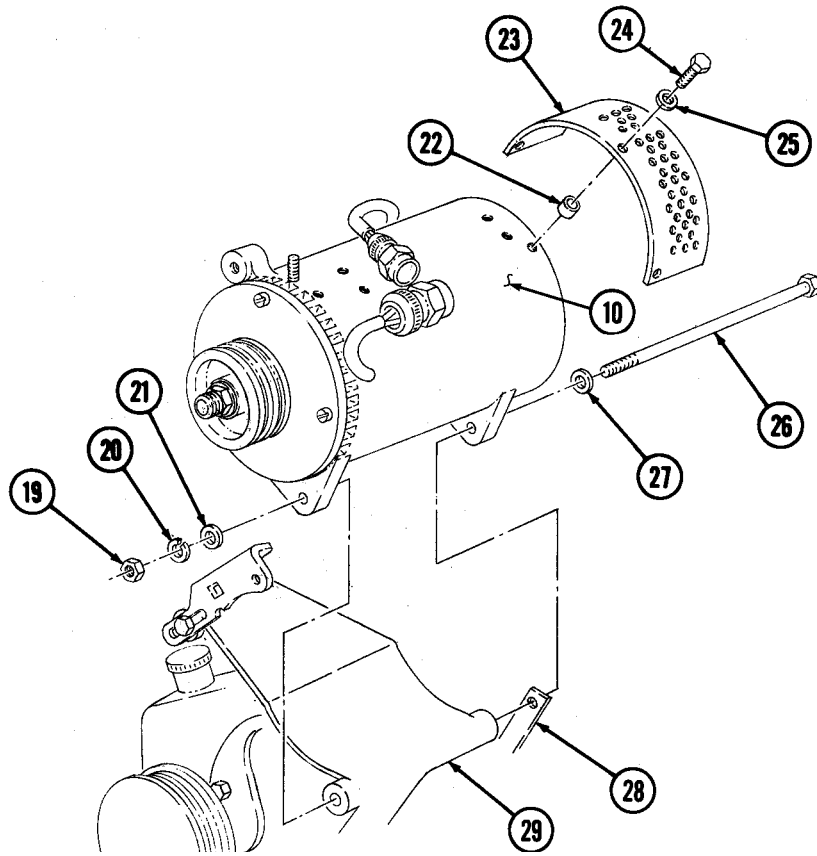
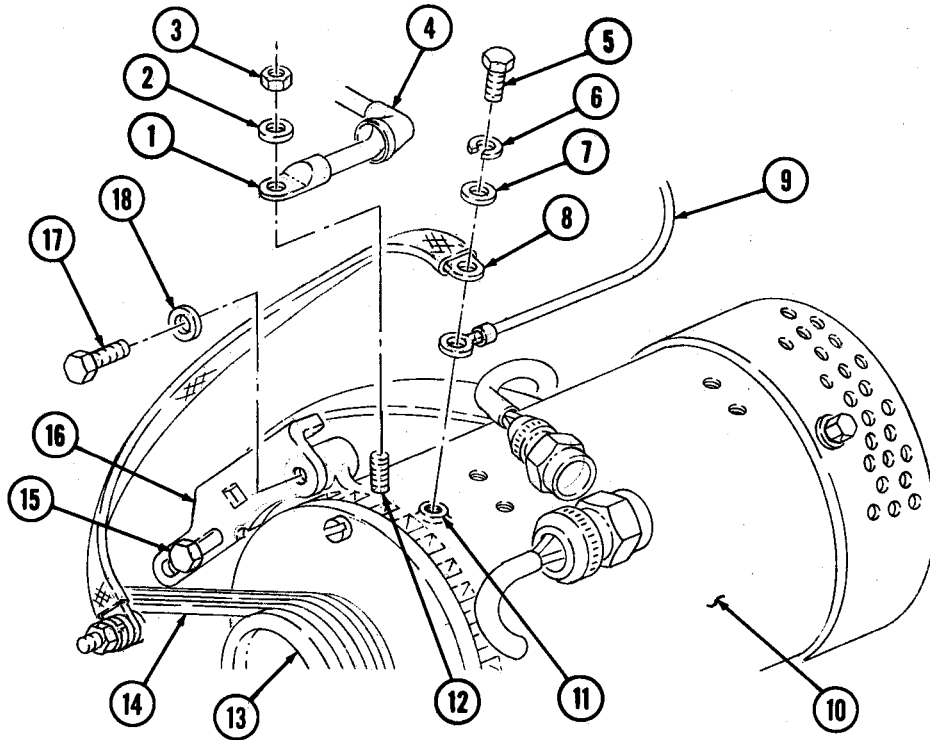
1. Remove screw (5), lockwasher (6), washer (7), ground strap (8), and lead 3B (9) from ground point (11). Discard lockwasher (6).
2. Slide back rubber boot (4) and remove nut (3), washer (2), and alternator positive cable (1) from positive stud (12).
3. Loosen screw (15) on alternator adjustment bracket (16) and remove drivebelt (14) from alternator pulley (13) on alternator (10).

WARNING

Alternator must be supported during removal. Failure to support alternator may cause injury to personnel or damage to equipment.

4. Remove screw (17) and washer (18) from alternator adjustment bracket (16).
5. Remove nut (19), lockwasher (20), washer (21), screw (26), washer (27), and alternator (10) from support bracket (28) and mounting bracket (29). Discard lockwasher (20).
6. Remove three capscrews (24), washers (25), bushings (22), and fan guard assembly (23) from alternator (10).
7. Remove alternator pulley (13) (para. 4-3).

4-5.3. 100 AMPERE DUAL VOLTAGE ALTERNATOR (12447110) REPLACEMENT(Cont'd)



4-5.3. 100 AMPERE DUAL VOLTAGE ALTERNATOR (12447110) REPLACEMENT(Cont'd)

b. Installation

1. Install alternator pulley (4) (para. 4-3).
2. Install fan guard assembly (6) on alternator (11) with three bushings (5), washers (8), and capscrews (7).

WARNING

Alternator must be supported during installation. Failure to support alternator may cause injury to personnel or damage to equipment.

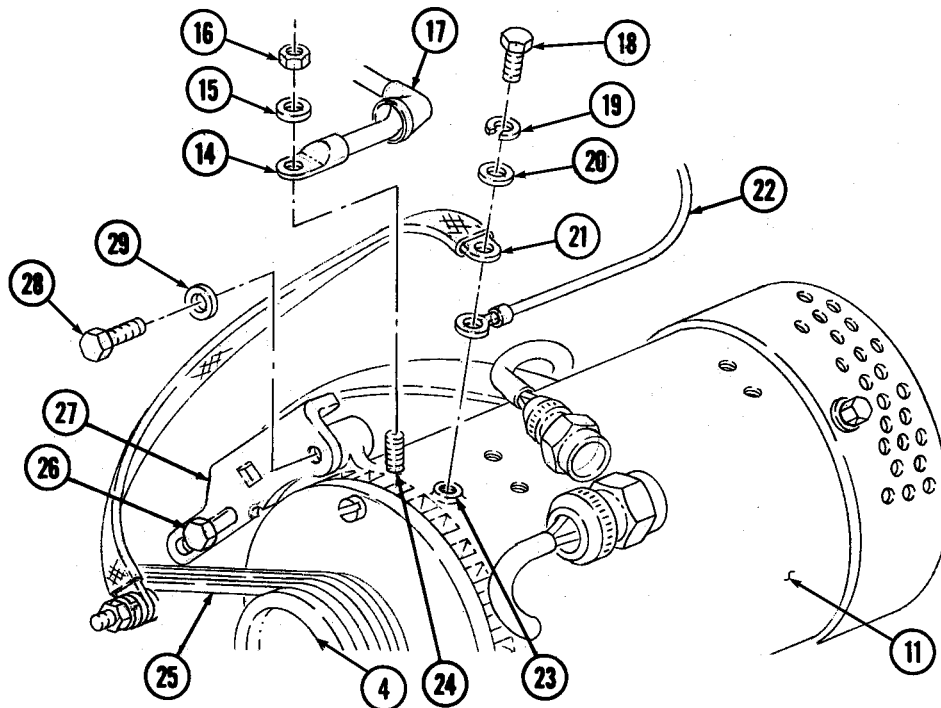
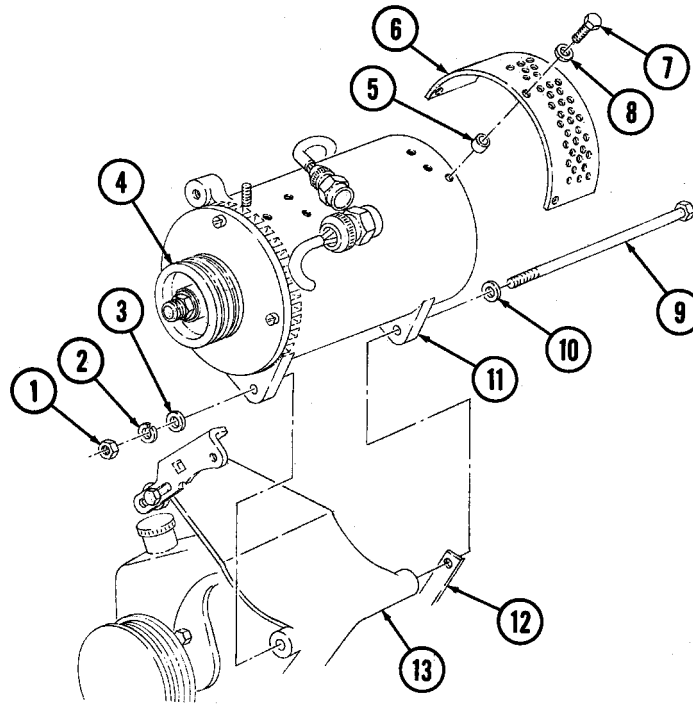
3. Position alternator (11) on mounting bracket (13), with support bracket (12) on outside of alternator (11), and install washer (10), capscrew (9), washer (3), lockwasher (2), and nut (1).

NOTE

Ensure terminals are clean before connections are made.

4. Install washer (29) and screw (28) on alternator adjustment bracket (27) and alternator (11). Do not tighten screw (28).
5. Install positive cable (14), washer (15), and nut (16) on positive stud (24). Tighten nut (16) to 10-15 lb-ft (14-20 N•m).
6. Slide rubber boot (17) over positive stud (24).
7. Install lead 3B (22) and ground strap (21) on ground point (23) with washer (20), lockwasher (19), and screw (18). Tighten screw (18) to 8-12 lb-ft (11-16 N•m).
8. Install drivebelt (25) on alternator pulley (4) and rotate alternator (11) to put tension on drivebelt (25). Tighten screws (26) and (28).

4-5.3. 100 AMPERE DUAL VOLTAGE ALTERNATOR (12447110) REPLACEMENT (Cont'd)



- FOLLOW-ON TASKS:
- Install voltage regulator (para. 4-5.6).
 - Connect battery ground cables (para. 4-73).
 - Install engine access cover (para. 10-15).
 - Lower and secure hood (TM 9-2320-280-10).
 - Start engine (TM 9-2320-280-10) and check operation of voltmeter gauge.

4-5.4. 100 AMPERE DUAL VOLTAGE ALTERNATOR (124471 10) CABLE REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
 automotive (Appendix B, Item 1)
 Maintenance and repair shop equipment:
 automotive (Appendix B, Item 2)

Materials/Parts

Two lockwashers (Appendix G, Item 191)
 Silicone compound (Appendix C, Item 48)
 Tiedown strap (Appendix G, Item 306)
 Lockwasher (Appendix G, Item 134)
 Lockwasher (Appendix G, Item 141)

Manual References

TM 9-2320-280-10
 TM 9-2320-280-24P

Equipment Condition

- Hood raised and secured (TM 9-2320-280-10).
- Battery ground cables disconnected (para. 4-73).
- Engine access cover removed (para. 10-15).

a. Removal

NOTE

Prior to removal, tag leads for installation.

1. Slide back rubber boot (8) and remove nut (6), washer (7), and positive cable (1) from positive stud (9).
2. Remove nut (5), lockwasher (4), washer (3), and clamp (2) from thermostat outlet stud (10). Discard lockwasher (4).
3. Remove nut (22), lockwasher (21), clamp (20), and cable (1) from right cylinder head stud (19) of water manifold (18). Discard lockwasher (21).
4. Remove nut (17), lockwasher (16), screw (14), washer (13), and clamp (11) from inner body flange (12). Discard lockwasher (16).
5. Inspect condition of edge trim (15) for damage and replace if damaged.
6. Remove nut (28), lockwasher (27), washer (26), and cable (1) from power stud (25). Discard lockwasher (27).
7. Remove tiedown strap (24) from cable (1).
8. Remove grommet (23) and cable (1) from battery box (29) and vehicle.

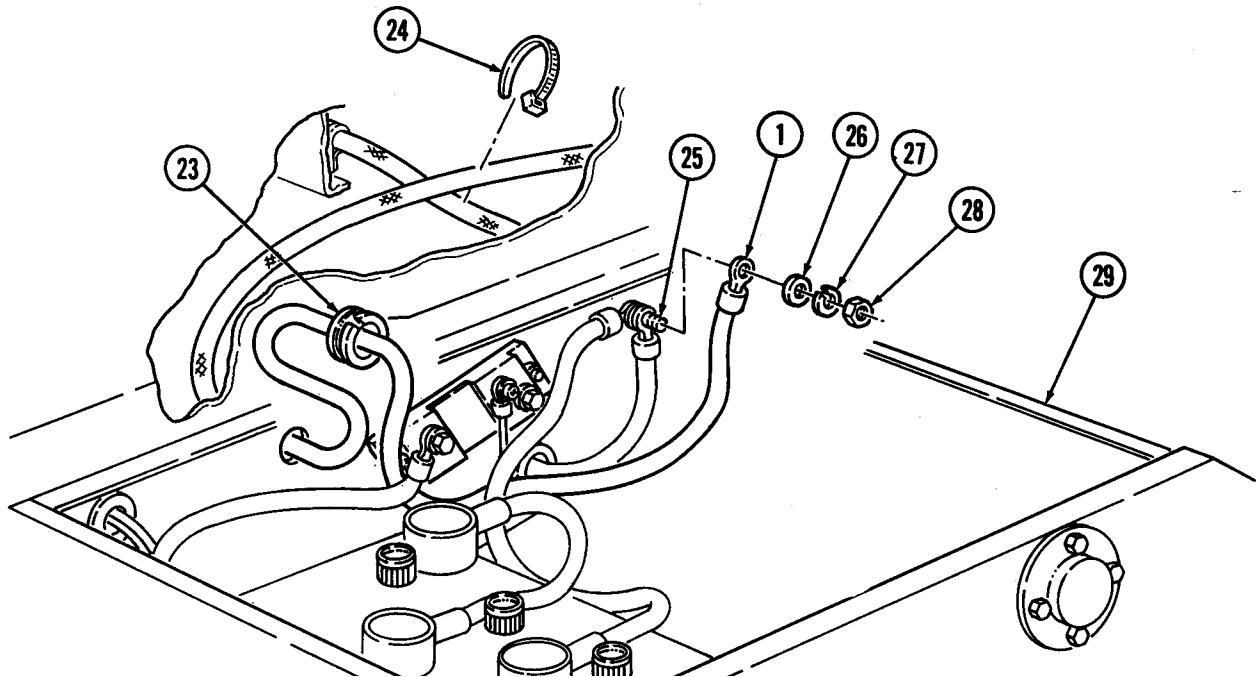
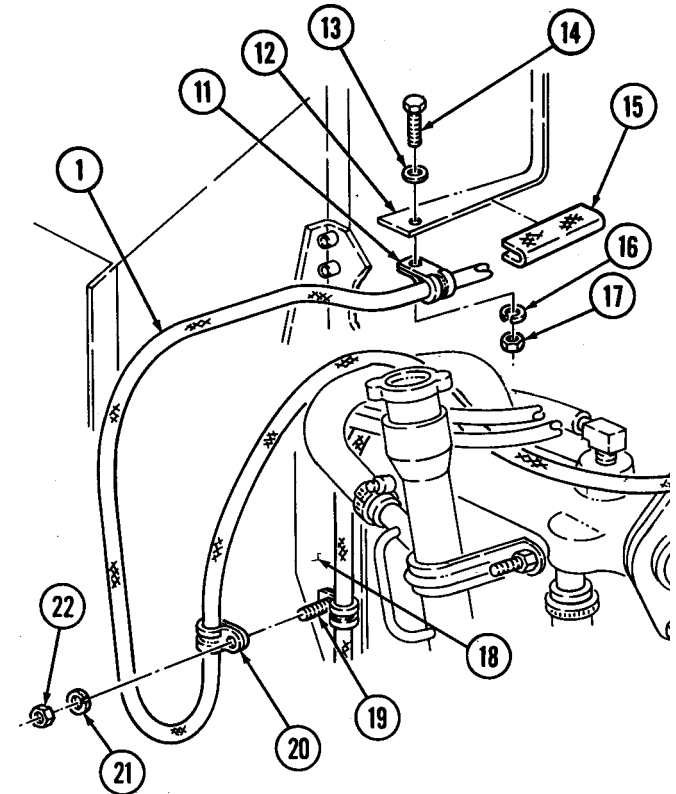
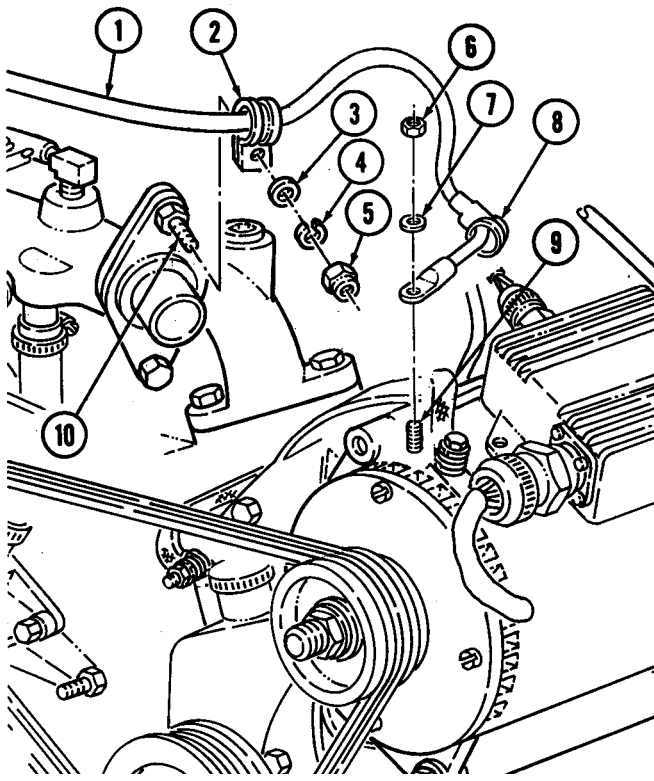
b. Installation

NOTE

Ensure studs are clean before connections are made.

1. Install grommet (23) on battery box (29).
2. Route cable (1) through grommet (23) in battery box (29) and install cable (1) on power stud (25) with washer (26), lockwasher (27), and nut (28). Apply silicone compound to power stud (25).
3. Install tiedown strap (24) on cable (1).
4. Install cable (1) on inner body flange (12) with washer (13), screw (14), clamp (11), lockwasher (16), and nut (17).
5. Install cable (1) to right cylinder head stud (19) on water manifold (18) with clamp (20), lockwasher (21), and nut (22).
6. Install cable (1) on thermostat outlet stud (10) with clamp (2), washer (3), lockwasher (4), and nut (5).
7. Install cable (1) on positive stud (9) with washer (7) and nut (6). Tighten nut (6) to 75-85 lb-ft (8-10 N•m). Slide rubber boot (8) over nut (6).

**4-5.4. 100 AMPERE DUAL VOLTAGE ALTERNATOR (12447110) CABLE REPLACEMENT
(Cont'd)**



- FOLLOW-ON TASKS:**
- Connect battery ground cables (para. 4-73).
 - Install engine access cover (para. 10-15).
 - Lower and secure hood (TM 9-2320-280-10).
 - Start engine (TM 9-2320-280-10) and check operation of voltmeter gauge.

4-5.5. 100 AMPERE DUAL VOLTAGE ALTERNATOR (124471 10) UMBILICAL POWER CABLE REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Two lockwashers (Appendix G, Item 141)
Two lockwashers (Appendix G, Item 138)
Lockwasher (Appendix G, Item 148)
Silicone compound (Appendix C, Item 47.1)

Personnel Required

One mechanic
One assistant

Manual References

TM 9-2320-280-24P

Equipment Condition

- Batteries removed (para. 4-79).
- Fixed rear door removed (para. 10-14).

a. Removal

NOTE

Prior to removal, tag leads for installation.

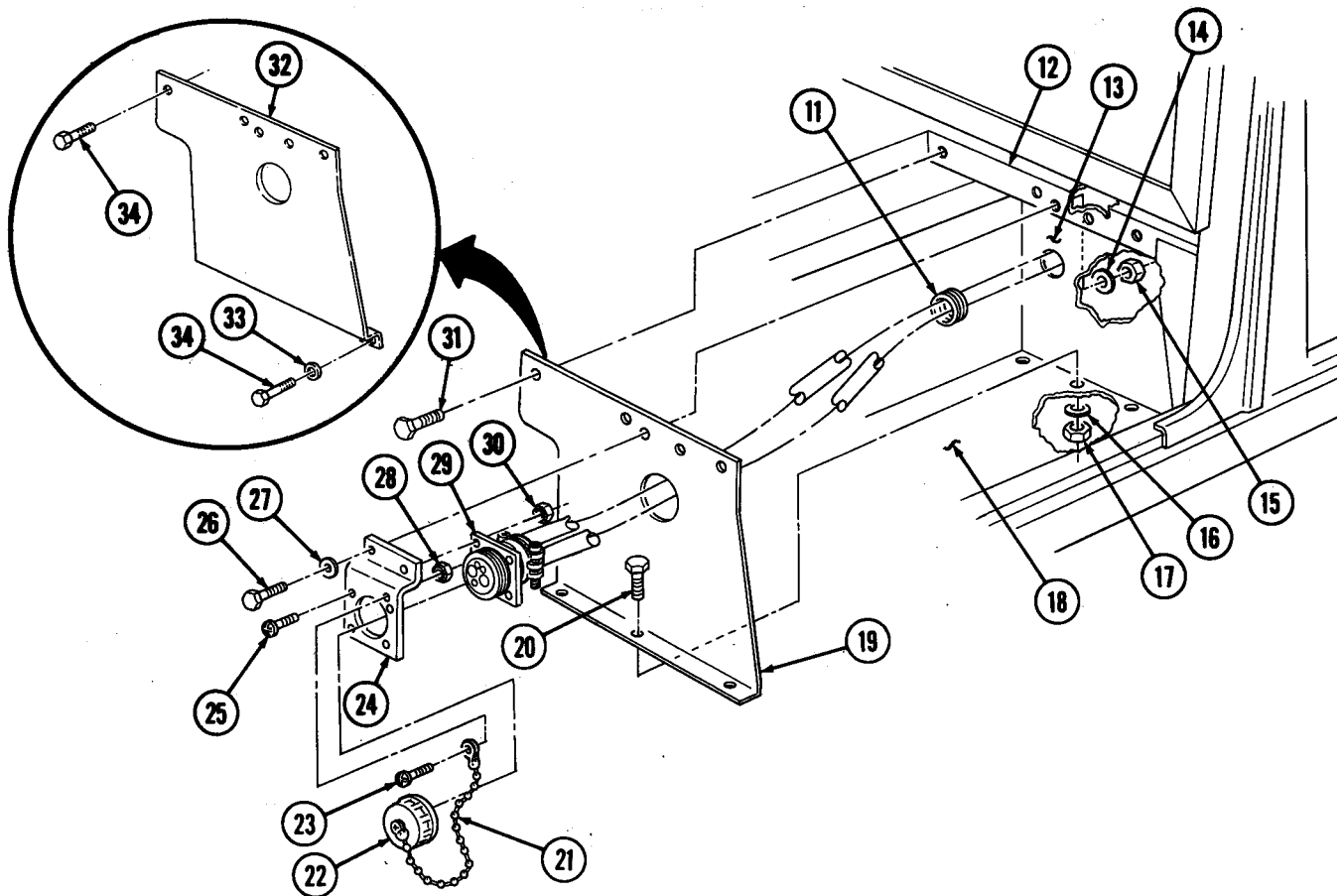
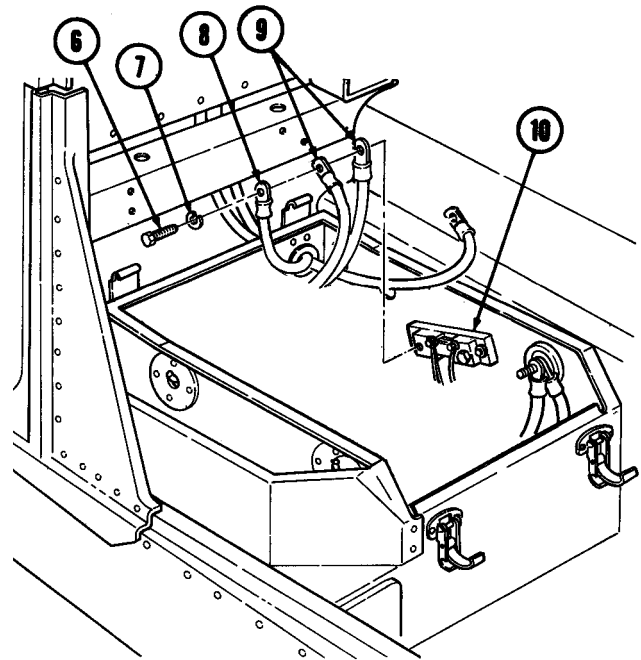
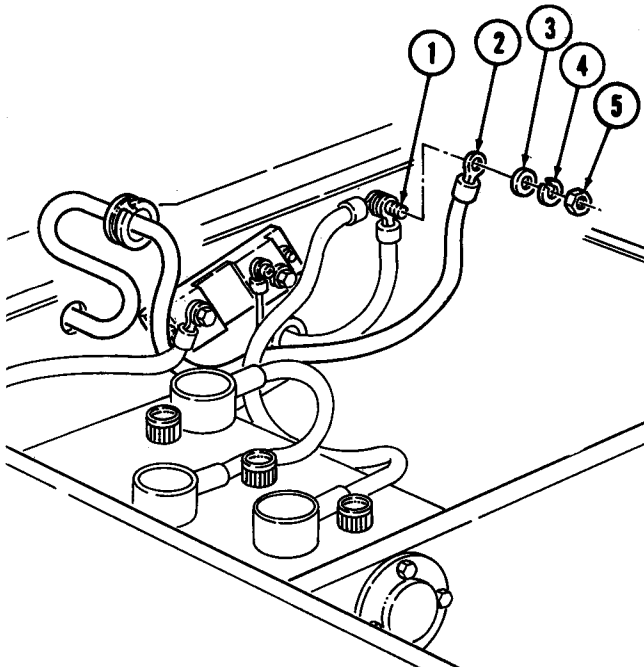
1. Remove nut (5), lockwasher (4), washer (3), and positive power cable (2) from power stud (1). Discard lockwasher (4).
2. Remove capscrew (6), lockwasher (7), negative power cable (8), and two cables (9) from shunt (10). Discard lockwasher (7).

NOTE

Perform step 4 for M1097A2 and M1123 vehicles only. Perform steps 5 and 6 for M1097 and M1097A1 vehicles only.

4. Remove five capscrews (34), two washers (33), and coverplate (32) from "B" beam (12).
5. Remove three capscrews (31) from coverplate (19) and "B" beam (12).
6. Remove three nuts (17), lockwashers (16), capscrews (20), and coverplate (19) from cargo floor (18). Discard lockwashers (16).
7. Remove two nuts (15), washers (14), capscrews (26), washers (27), and mounting bracket (24) from coverplate (19).
8. Remove nut (28), screw (23), and cover chain (21) from mounting bracket (24).
9. Remove cover (22) with cover chain (21) from umbilical power cable assembly (29).
10. Remove four nuts (30), screws (25), and mounting bracket (24) from umbilical power cable assembly (29).
11. Pull umbilical power cable assembly (29) through grommet (11) and coverplate (19) and remove from vehicle.
12. Remove grommet (11) from battery box (13).

4-5.5. 100 AMPERE DUAL VOLTAGE ALTERNATOR (12447110) UMBILICAL POWER CABLE REPLACEMENT (Cont'd)



4-5.5. 100 AMPERE DUAL VOLTAGE ALTERNATOR (12447110) UMBILICAL POWER CABLE REPLACEMENT (Cont'd)

b. Installation

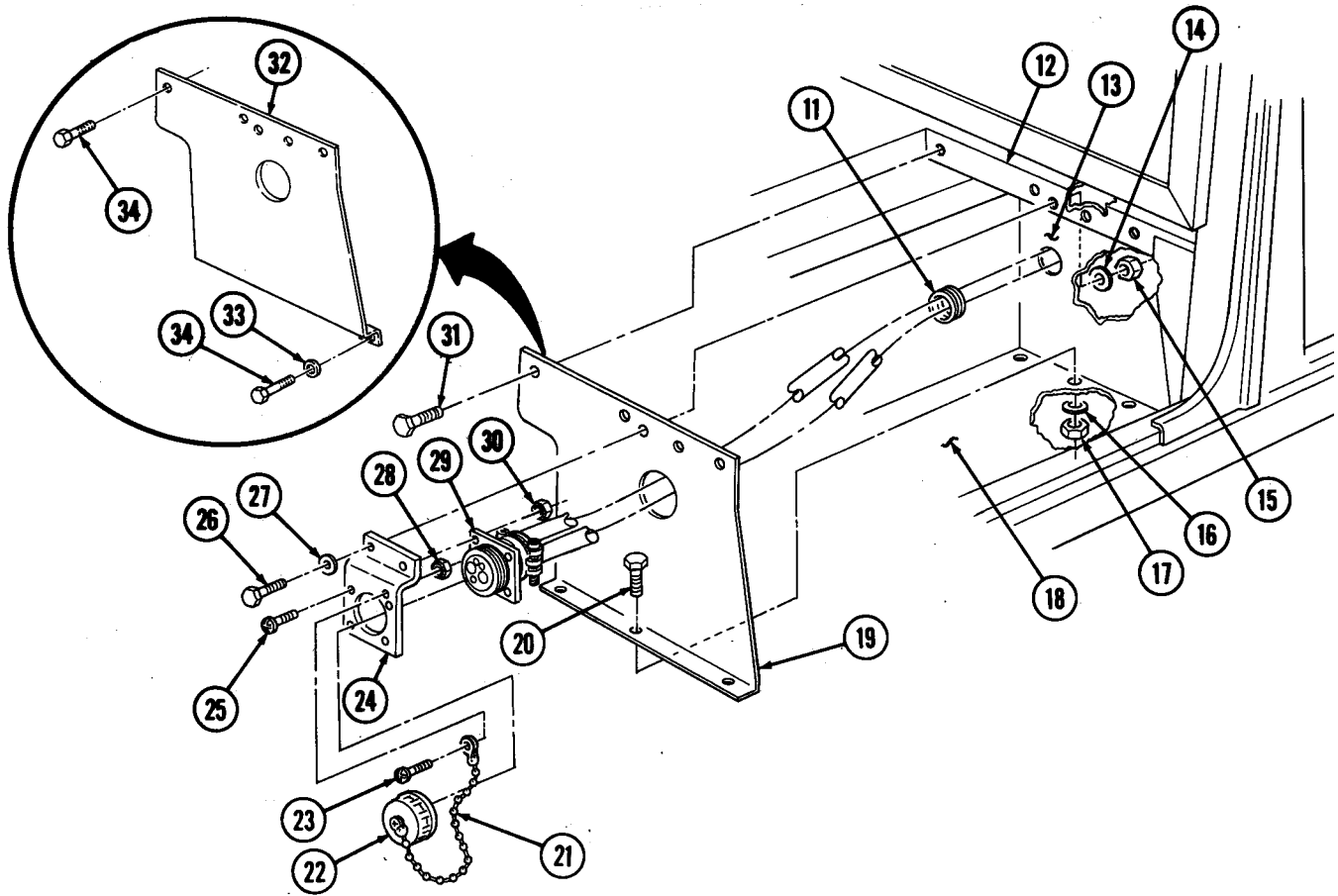
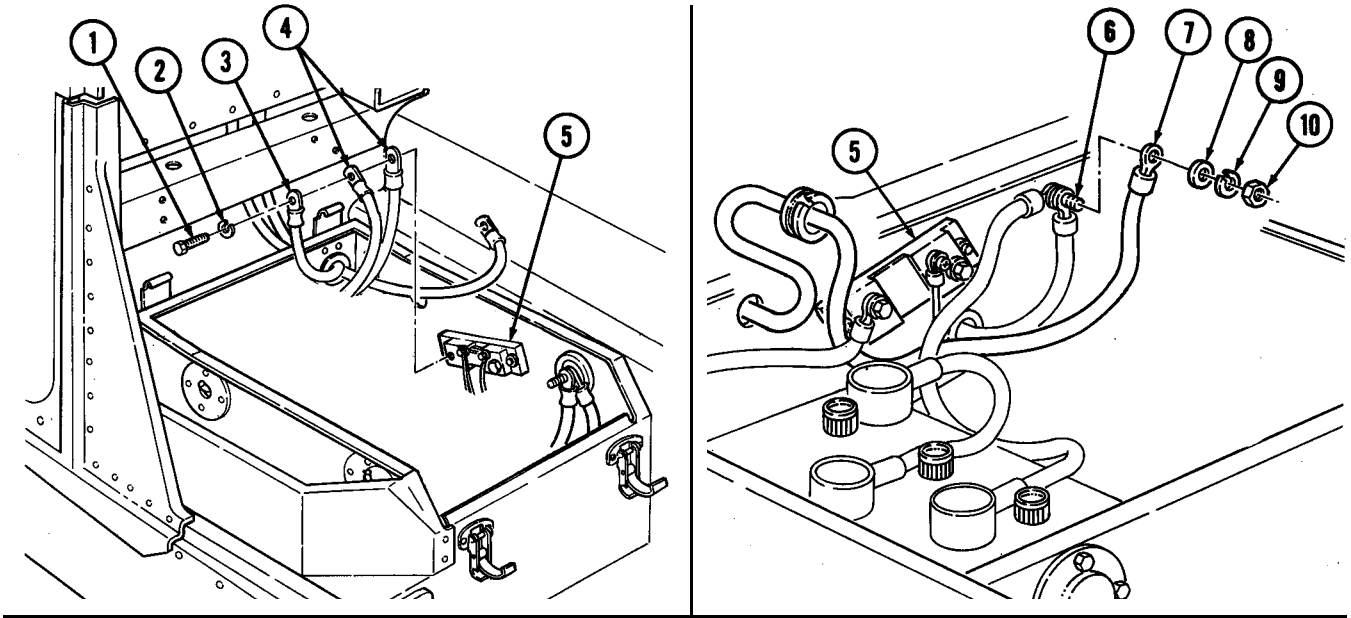
1. Install grommet (11) on battery box (13).
2. Route umbilical power cable assembly (29) through coverplate (19) and grommet (11) and position in approximate mounting location.
3. Install mounting bracket (24) on umbilical power cable assembly (29) with three screws (25) and nuts (30).
4. Install cover (22) on umbilical power cable assembly (29).
5. Install cover chain (21) on mounting bracket (24) with screw (23) and nut (28).

NOTE

Perform step 6 for M1097A2 and M1123 vehicles only. Perform steps 7 and 8 for M1097 and M1097A1 vehicles.

6. Install coverplate (32) on "B" beam (12) with two washers (33) and five capscrews (34).
7. Install mounting bracket (24) on coverplate (19) with two washers (27), capscrews (26), washers (14), and nuts (15).
8. Install coverplate (19) on "B" beam (12) with three capscrews (31).
9. Install coverplate (19) on cargo floor (18) with three capscrews (20), lockwashers (16), and nuts (17). Tighten nuts (17) to 65 lb-ft (88 N•m).
10. Install two cables (4) and negative power cable (3) on shunt (5) with lockwasher (2) and capscrew (1).
11. Install positive power cable (7) on power stud (6) with washer (8), lockwasher (9), and nut (10).
12. Apply silicone compound to cable (7), coating all exposed metallic surfaces.

4-5.5. 100 AMPERE DUAL VOLTAGE ALTERNATOR (12447110) UMBILICAL POWER CABLE REPLACEMENT (Cont'd)



- FOLLOW-ON TASKS:**
- Install fixed rear door (para. 10-14).
 - Install batteries (para. 4-79).

4-5.6. 100 AMPERE DUAL VOLTAGE ALTERNATOR REGULATOR (PART OF 12447110) REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
 automotive (Appendix B, Item 1)
 Maintenance and repair shop equipment:
 automotive (Appendix B, Item 2)

Materials/Parts

Three lockwashers (Appendix G, Item 135)
 Lockwasher (Appendix G, Item 138)
 Sealant (Appendix C, Item 44)
 Grease (Appendix C, Item 25)

Manual References

TM 9-2320-280-10
 TM 9-2320-280-24P

Equipment Condition

- Battery ground cables disconnected (para. 4-73).
- Hood raised and secured (TM 9-2320-280-10).

NOTE

Prior to removal, tag leads for installation.

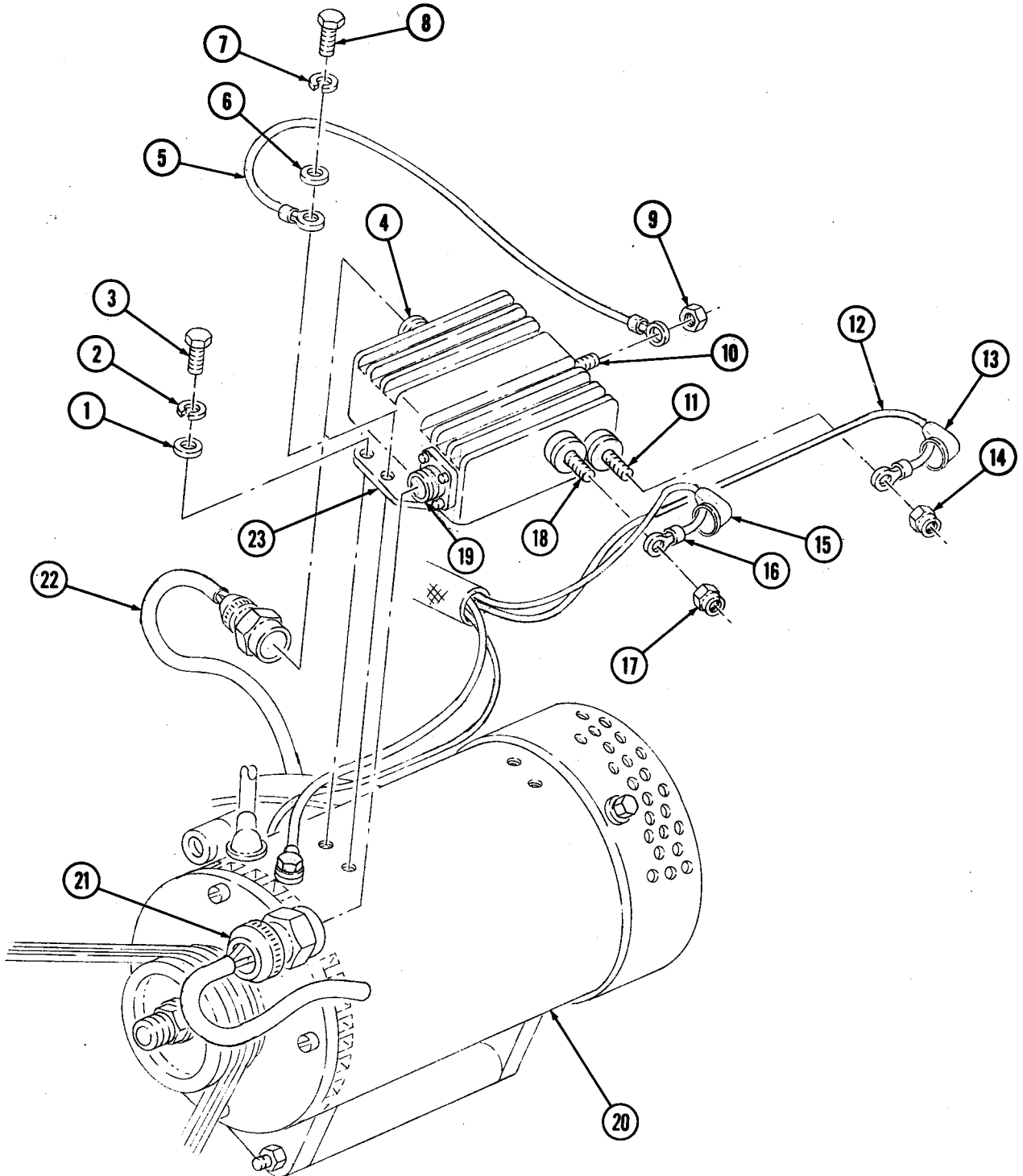
a. Removal

1. Disconnect voltage regulator plug (21) from voltage regulator connector (19).
2. Slide back rubber boot (13) and remove nut (14) and lead 568A (12) from IGN terminal (11).
3. Slide back rubber boot (15) and remove nut (17) and lead 2A (16) from AC terminal (18).
4. Remove nut (9) and ground wire (5) from 14-volt stud (10) on voltage regulator (23).
5. Disconnect alternator connector (22) from voltage regulator connector (4).
6. Remove screw (8), lockwasher (7), washer (6), and ground wire (5) from voltage regulator (23) and alternator (20). Discard lockwasher (7).
7. Remove three screws (3), lockwashers (2), washers (1), and voltage regulator (23) from alternator (20). Discard lockwashers (2).

b. Installation

1. Install voltage regulator (23) on alternator (20) with three washers (1), lockwashers (2), and screws (3). Tighten screws (3) to 30-34 lb-in. (3-4 N•m).
2. Install one end of ground wire (5) on voltage regulator (23) with washer (6), lockwasher (7), and screw (8). Tighten screw (8) to 88-94 lb-in. (10-11 N•m).
3. Install other end of ground wire (5) on 14-volt stud (10) with nut (9). Tighten nut (9) to 45-55 lb-in. (5-6 N•m) and apply sealant to nut (9) and 14-volt stud (10).
4. Connect alternator connector (22) to voltage regulator connector (4).
5. Install lead 568A (12) on IGN terminal (11) with nut (14). Tighten nut (14) to 23-27 lb-in. (2.6-3.0 N•m).
6. Apply grease to IGN terminal (11), lead 568A (12), and inside of boot (13), and slide rubber boot (13) over terminal (11).
7. Install lead 2A (16) on AC terminal (18) with nut (17). Tighten nut (17) to 18-22 lb-in. (2.0-2.5 N•m).
8. Apply grease to AC terminal (18), lead 2A (16), and inside of boot (15), and slide rubber boot (15) over terminal (18).
9. Connect voltage regulator plug (21) to voltage regulator connector (19).

**4-5.6. 100 AMPERE DUAL VOLTAGE ALTERNATOR REGULATOR (PART OF 12447110)
REPLACEMENT (Cont'd)**



- FOLLOW-ON TASKS:**
- Connect battery ground cables (para. 4-73).
 - Lower and secure hood (TM 9-2320-280-10).

4-5.7. (6.5L) 200 AMPERE DUAL VOLTAGE ALTERNATOR (12447109) REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)
Maintenance and repair shop equipment:
automotive (Appendix B, Item 2)

Materials/Parts

Lockwasher (Appendix G, Item 187)
Lockwasher (Appendix G, Item 188)
Lockwasher (Appendix G, Item 186)
Lockwasher (Appendix G, Item 133)
Grease (Appendix C, Item 25)

Personnel Required

One mechanic
One assistant

Manual References

TM 9-2320-280-24P

Equipment Condition

Voltage regulator removed (para. 4-5.10).

General Safety Instructions

Alternator must be supported during removal and installation.

a. Removal

NOTE

Prior to removal, tag leads for installation.

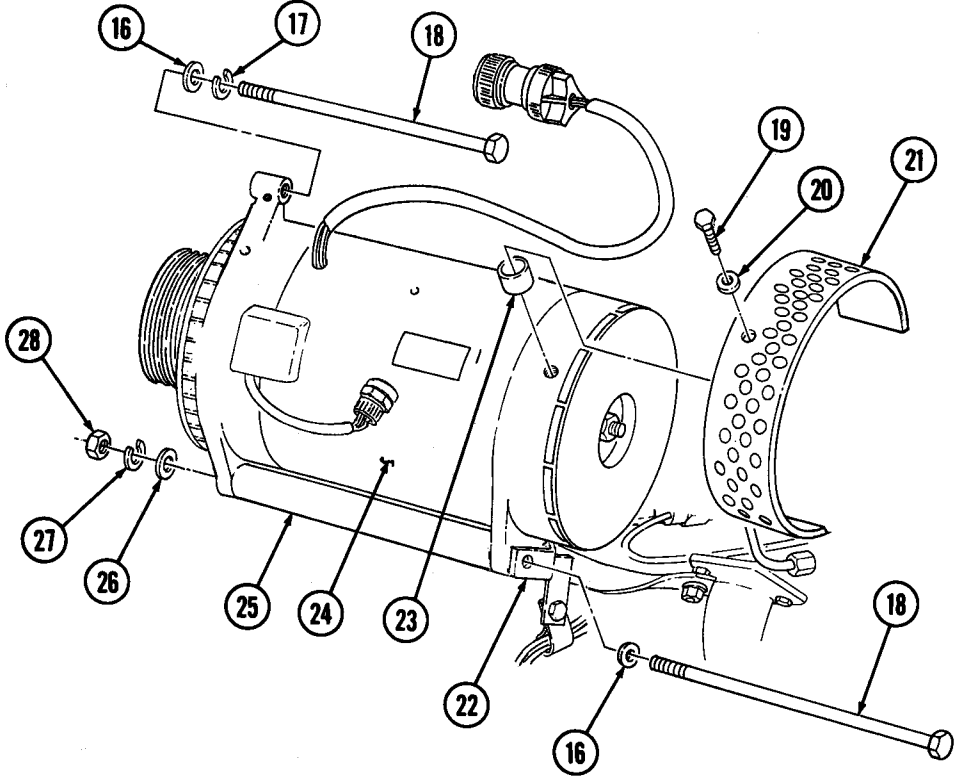
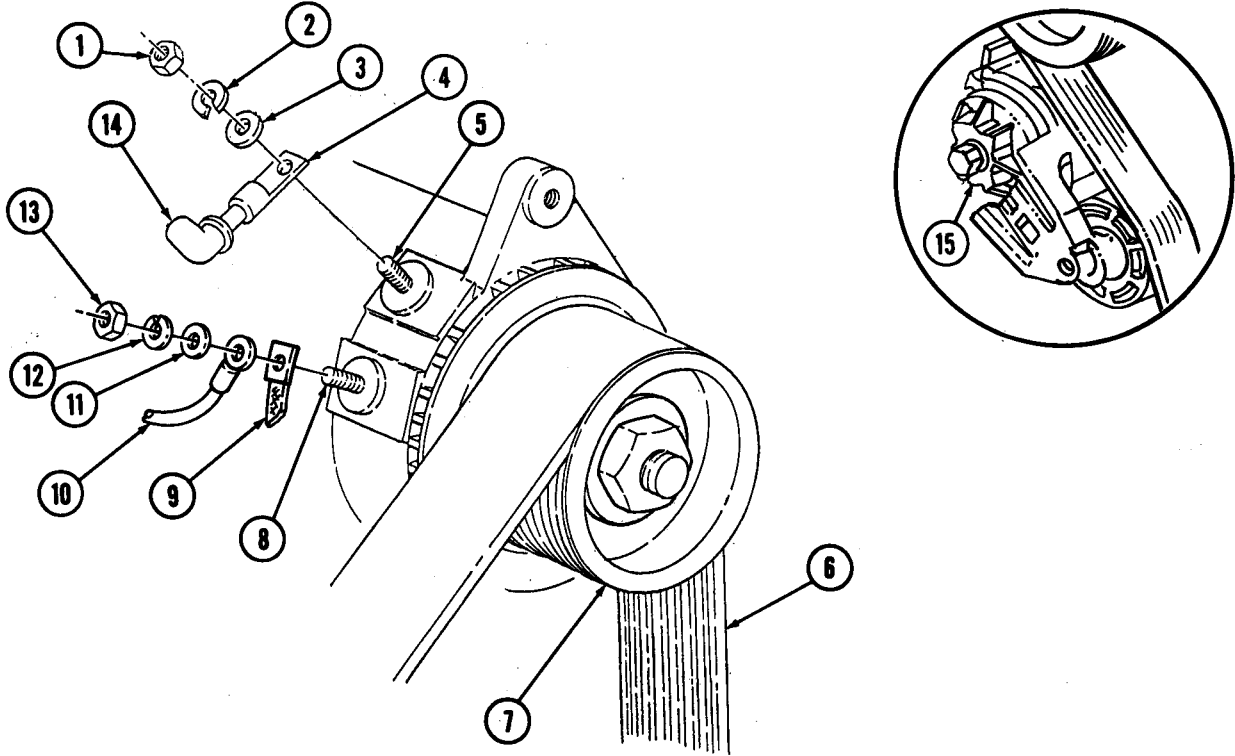
1. Remove nut (13), lockwasher (12), washer (11), lead 3B (10), and ground strap lead 3B (9) from ground stud (8). Discard lockwasher (12).
2. Slide back rubber boot (14) and remove nut (1), lockwasher (2), washer (3), and alternator positive cable lead 6 (4) from positive stud (5). Discard lockwasher (2).
3. Position 3/8-in. breaker bar on belt tensioner (15), move tensioner (15) clockwise, and remove drivebelt (6) from alternator pulley (7).

WARNING

Alternator must be supported during removal. Failure to support alternator may cause injury to personnel or damage to equipment.

4. Remove nut (28), lockwasher (27), washer (26), two screws (18), washers (16), lockwasher (17), and alternator (24) from support bracket (22) and mounting bracket (25). Discard lockwashers (27) and (17).
5. Remove three capscrews (19), washers (20), bushings (23), and fan guard assembly (21) from alternator (24).
6. Remove alternator pulley (7) (para. 4-3).

4-5.7. (6.5L) 200 AMPERE DUAL VOLTAGE ALTERNATOR (12447109) REPLACEMENT (Cont'd)



4-5.7. (6.5L) 200 AMPERE DUAL VOLTAGE ALTERNATOR (12447109) REPLACEMENT (Cont'd)**b. Installation**

1. Install alternator pulley (20) (para. 4-3).
2. Install fan guard assembly (6) on alternator (9) with three bushings (8), washers (5), and capscrews (4).

WARNING

Alternator must be supported during installation. Failure to support alternator may cause injury to personnel or damage to equipment.

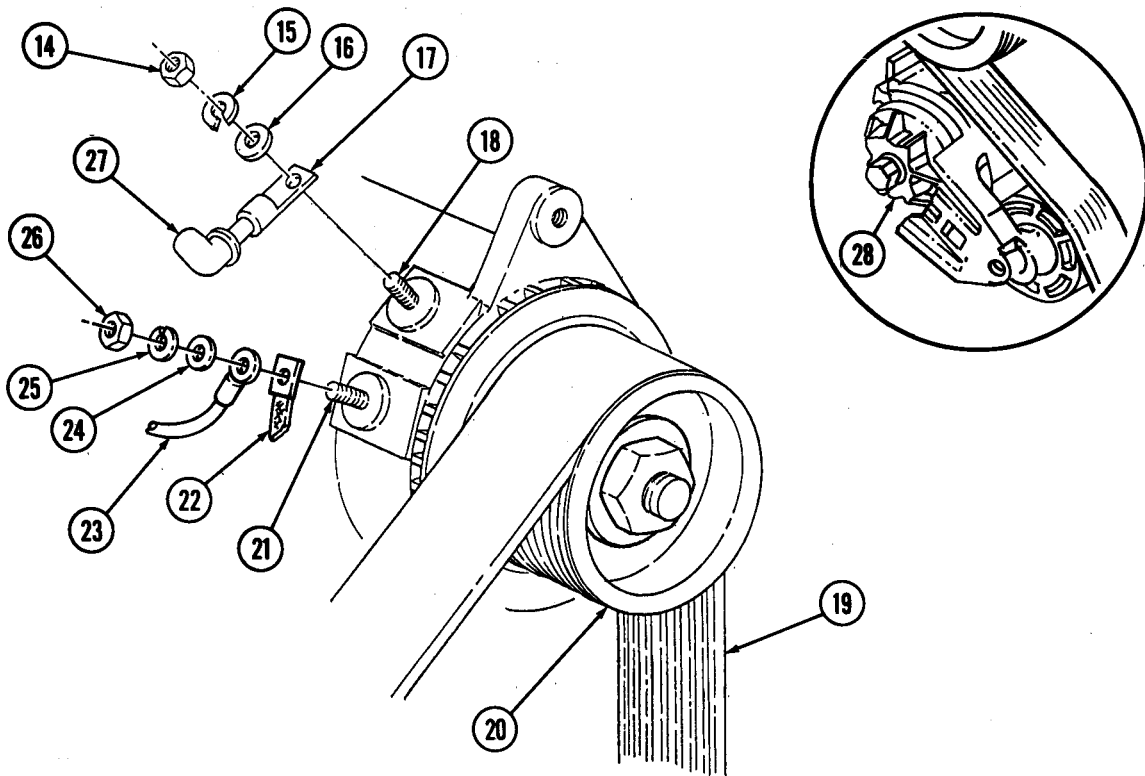
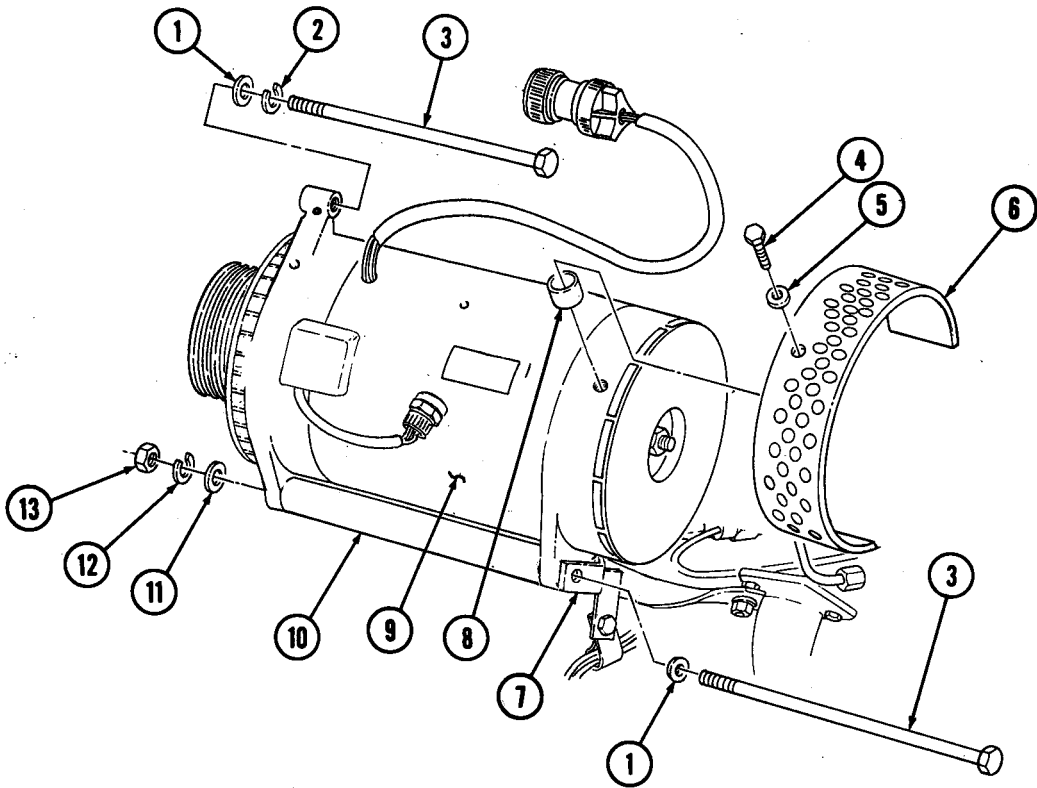
3. Position alternator (9) on mounting bracket (10).
4. Install support bracket (7) on alternator (9) and alternator mounting bracket (10) with lockwasher (2), two washers (1), capscrews (3), washer (11), lockwasher (12), and nut (13).

NOTE

Ensure terminals are clean before connections are made.

5. Install positive cable lead 6 (17) on positive stud (18) with washer (16), lockwasher (15), and nut (14). Tighten nut (14) to 10-15 lb-ft (14-20 N•m).
6. Apply grease to positive terminal (18), positive cable lead 6 (17), and inside of rubber boot (27), slide boot (27) over stud (18).
7. Install ground strap (22) and lead 3B (23) on ground stud (21) with washer (24), lockwasher (25), and nut (26). Tighten nut (26) to 8-12 lb-ft (11-16 N•m).
8. Position 3/8-in. breaker bar on belt tensioner (28), move tensioner (28) clockwise, and install belt (19) on alternator pulley (20).

4-5.7. (6.5L) 200 AMPERE DUAL VOLTAGE ALTERNATOR (12447109) REPLACEMENT (Cont'd)



FOLLOW-ON TASK: Install voltage regulator (para. 4-5.10).

4-5.8. (6.5L) 200 AMPERE DUAL VOLTAGE ALTERNATOR (12447109) CABLE REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
 automotive (Appendix B, Item 1)
 Maintenance and repair shop equipment:
 automotive (Appendix B, Item 2)

Materials/Parts

Four tiedown straps (Appendix G, Item 309)
 Lockwasher (Appendix G, Item 134)
 Lockwasher (Appendix G, Item 186)
 Lockwasher (Appendix G, Item 191)
 Lockwasher (Appendix G, Item 150)

Manual References

TM 9-2320-280-10
 TM 9-2320-280-24P

Equipment Condition

- Hood raised and secured (TM 9-2320-280-10).
- Battery ground cables disconnected (para. 4-73).
- Engine access cover removed (para. 10-15).

a. Removal

NOTE

Prior to removal, tag leads for installation.

1. Slide back rubber boot (5) and remove nut (8), lockwasher (7), washer (6), cable (4), nut (3), and washer (2) from positive stud (1). Discard lockwasher (7).
2. Remove capscrew (9) and clamp (10) from water crossover bracket (11), and separate cable (4) from cables and clamp (10).
3. Remove nut (14), lockwasher (13), and clamp (15) from stud (12) and separate cable (4) from cables and clamp (15). Discard lockwasher (13).
4. Remove and discard four tiedown straps (16).
5. Remove nut (22), lockwasher (21), screw (17), and washer (18) from bracket (20) and remove cable (4) from clamp (19). Discard lockwasher (21).
6. Remove nut (27), lockwasher (26), washer (25), and cable (4) from buss bar (24) on battery box (23). Discard lockwasher (26).
7. Remove cable (4) through grommet (28) and vehicle.

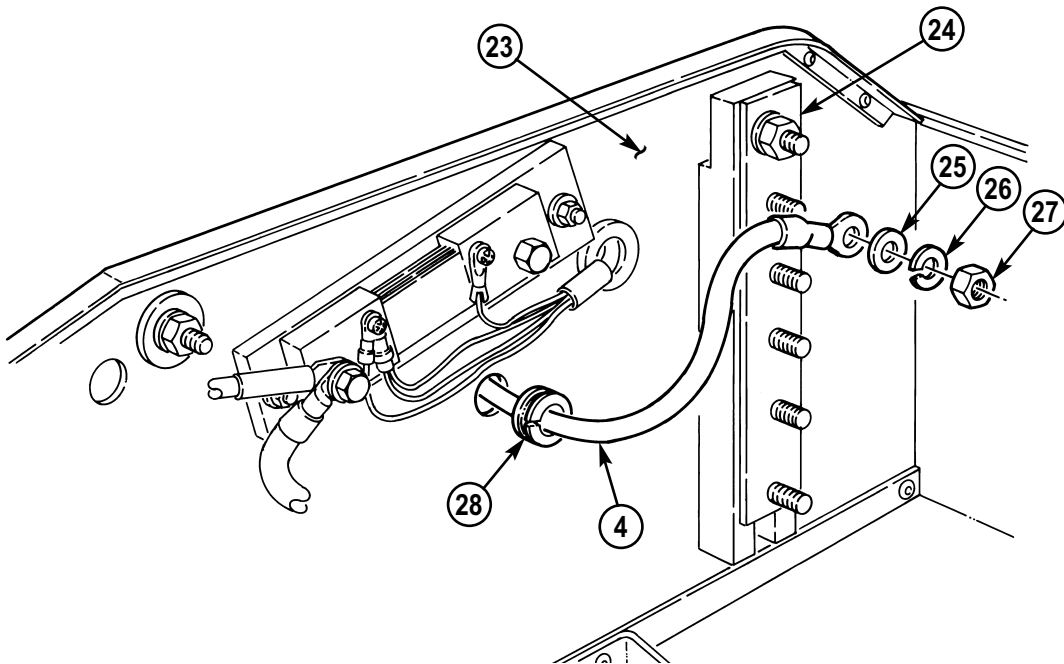
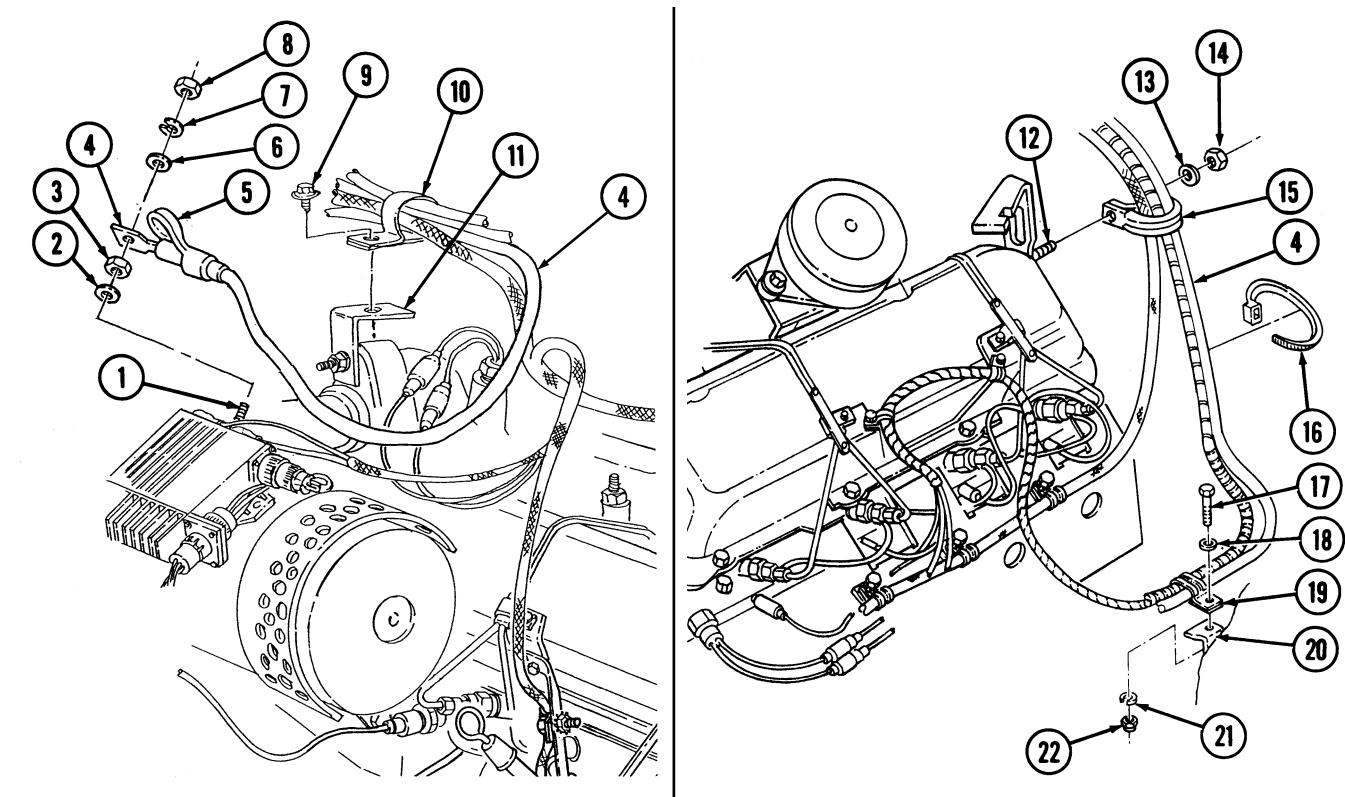
b. Installation

NOTE

Ensure terminals are clean before connections are made.

1. Install cable (4) through grommet (28) in battery box (23).
2. Install cable (4) on buss bar (24) with washer (25), lockwasher (26), and nut (27).
3. Install four tiedown straps (16) on cable (4).
4. Route cable (4) through clamp (19), and install clamp (19) to bracket (20) with washer (18), screw (17), lockwasher (21), and nut (22).
5. Route cable (4) through clamp (15), and install clamp (15) on stud (12) with lockwasher (13), and nut (14).
6. Route cable (4) through clamp (10), and install clamp (10) on water crossover bracket (11) with capscrew (9).
7. Install washer (2), nut (3), and cable (4) on positive stud (1) with washer (6), lockwasher (7), and nut (8). Tighten nut (8) to 10-15 lb-ft (14-20 N•m), and slide rubber boot (5) over nut (8).

4-5.8. (6.5L) 200 AMPERE DUAL VOLTAGE ALTERNATOR (12447109) CABLE REPLACEMENT (Cont'd)



- FOLLOW-ON TASKS:**
- Connect battery ground cables (para. 4-73).
 - Install engine access cover (para. 10-15).
 - Lower and secure hood (TM 9-2320-280-10).
 - Start engine (TM 9-2320-280-10) and check operation of voltmeter gauge.

4-5.9. (6.5L) 200 AMPERE DUAL VOLTAGE ALTERNATOR (12447109) UMBILICAL POWER CABLE REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Two lockwashers (Appendix G, Item 138)
Lockwasher (Appendix G, Item 148)
Lockwasher (Appendix G, Item 150)
Sealing compound (Appendix C, Item 47.1)

Personnel Required

One mechanic
One assistant

Manual References

TM 9-2320-280-24P

Equipment Condition

- Batteries removed (para. 4-79).
- Fixed rear door removed (para. 10-14).

a. Removal

NOTE

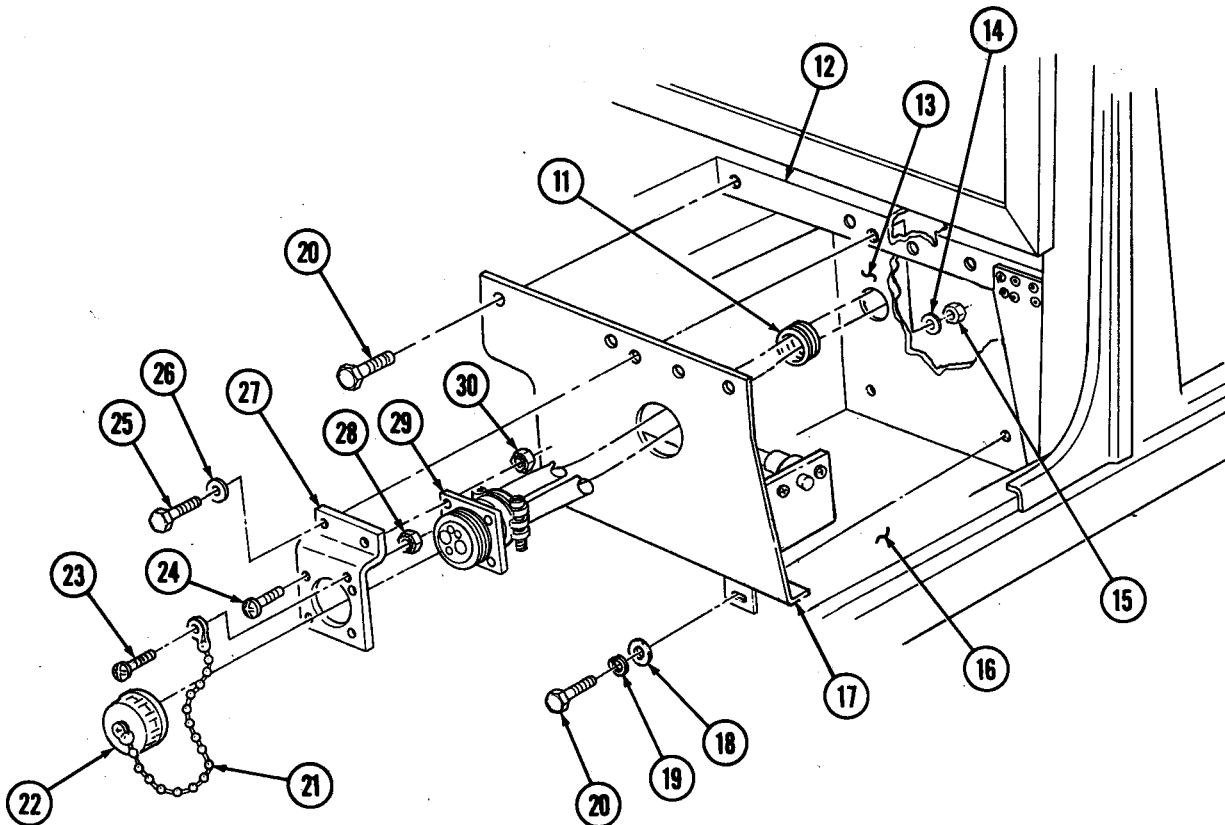
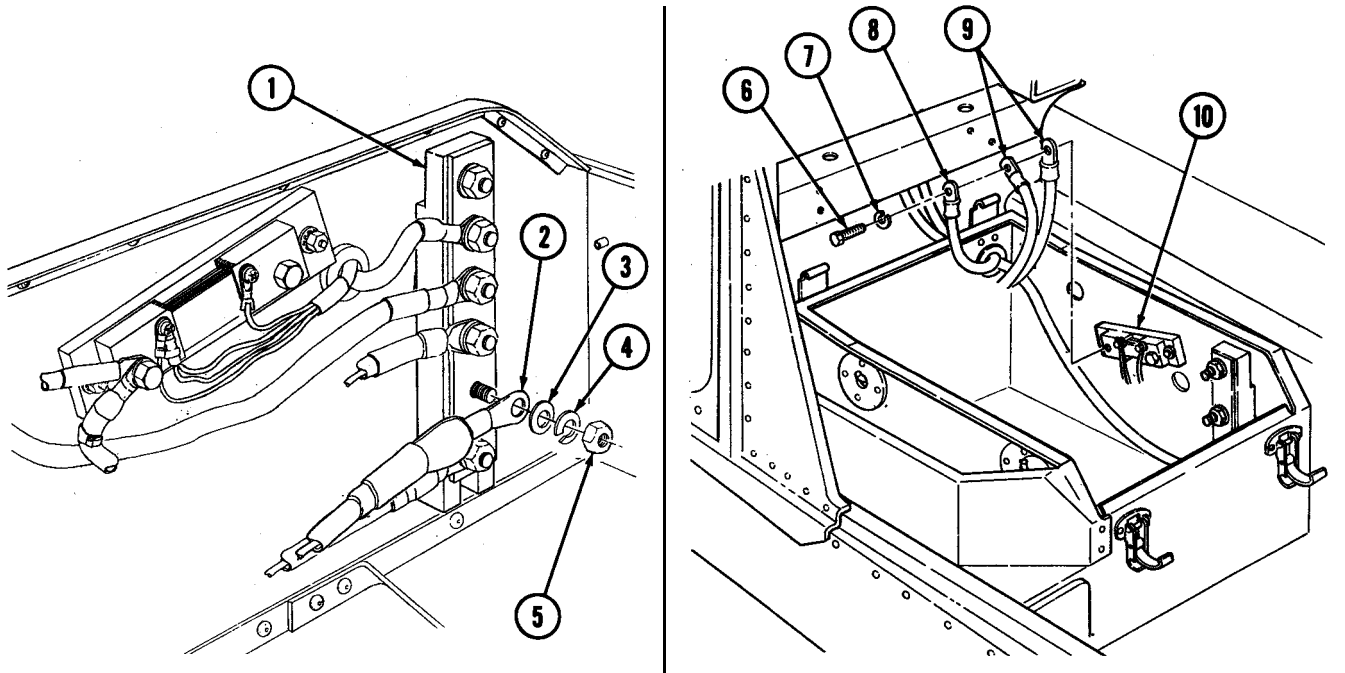
Prior to removal, tag leads for installation.

1. Remove nut (5), lockwasher (4), washer (3), and positive power cable (2) from buss bar (1). Discard lockwasher (4).
2. Remove capscrew (6), lockwasher (7), negative power cable (8), and two cables (9) from shunt (10). Discard lockwasher (7).
3. Remove five capscrews (20), two lockwashers (19), washers (18), and coverplate (17) from "B" beam (12). Discard lockwashers (19).
4. Remove two nuts (15), washers (14), capscrews (25), washers (26), and mounting bracket (27) from coverplate (17).
5. Remove nut (28), screw (23), and cover chain (21) from mounting bracket (27).
6. Remove cover (22) with cover chain (21) from umbilical power cable assembly (29).
7. Remove four nuts (30), screws (24), and mounting bracket (27) from umbilical power cable assembly (29).
8. Pull umbilical power cable assembly (29) through grommet (11) and coverplate (17), and remove from vehicle (16).
9. Remove grommet (11) from battery box (13).

b. Installation

1. Install grommet (11) on battery box (13).
2. Route umbilical power cable assembly (29) through coverplate (17) and grommet (11), and position in approximate mounting location on vehicle (16).
3. Install cover chain (21) on mounting bracket (27) with screw (23) and nut (28).
4. Install umbilical power cable assembly (29) on mounting bracket (27) with four screws (24) and nuts (30).
5. Install cover (22) on umbilical power cable assembly (29).
6. Install coverplate (17) on "B" beam (12) with two washers (18), lockwashers (19), and five capscrews (20).
7. Install mounting bracket (27) on coverplate (17) with two washers (26), capscrews (25), washers (14), and nuts (15).
8. Install two cables (9) and negative power cable (8) on shunt (10) with lockwasher (7) and capscrew (6).
9. Install positive power cable (2) on buss bar (1) with washer (3), lockwasher (4), and nut (5).
10. Apply silicone compound to cable (2), coating all exposed metallic surfaces.

4-5.9. (6.5L) 200 AMPERE DUAL VOLTAGE ALTERNATOR (12447109) UMBILICAL POWER CABLE REPLACEMENT (Cont'd)



- FOLLOW-ON TASKS:**
- Install fixed rear door (para. 10-14).
 - Install batteries (para. 4-79).

4-5.10. (6.5L) 200 AMPERE DUAL VOLTAGE REGULATOR (PART OF 12447109) REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)
Maintenance and repair shop equipment:
automotive (Appendix B, Item 2)

Materials/Parts

Two spring tension washers
(Appendix G, Item 318)
Lockwasher (Appendix G, Item 185)
Grease (Appendix C, Item 25)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

- Battery ground cables disconnected (para. 4-73).
- Hood raised and secured (TM 9-2320-280-10).

a. Removal

NOTE

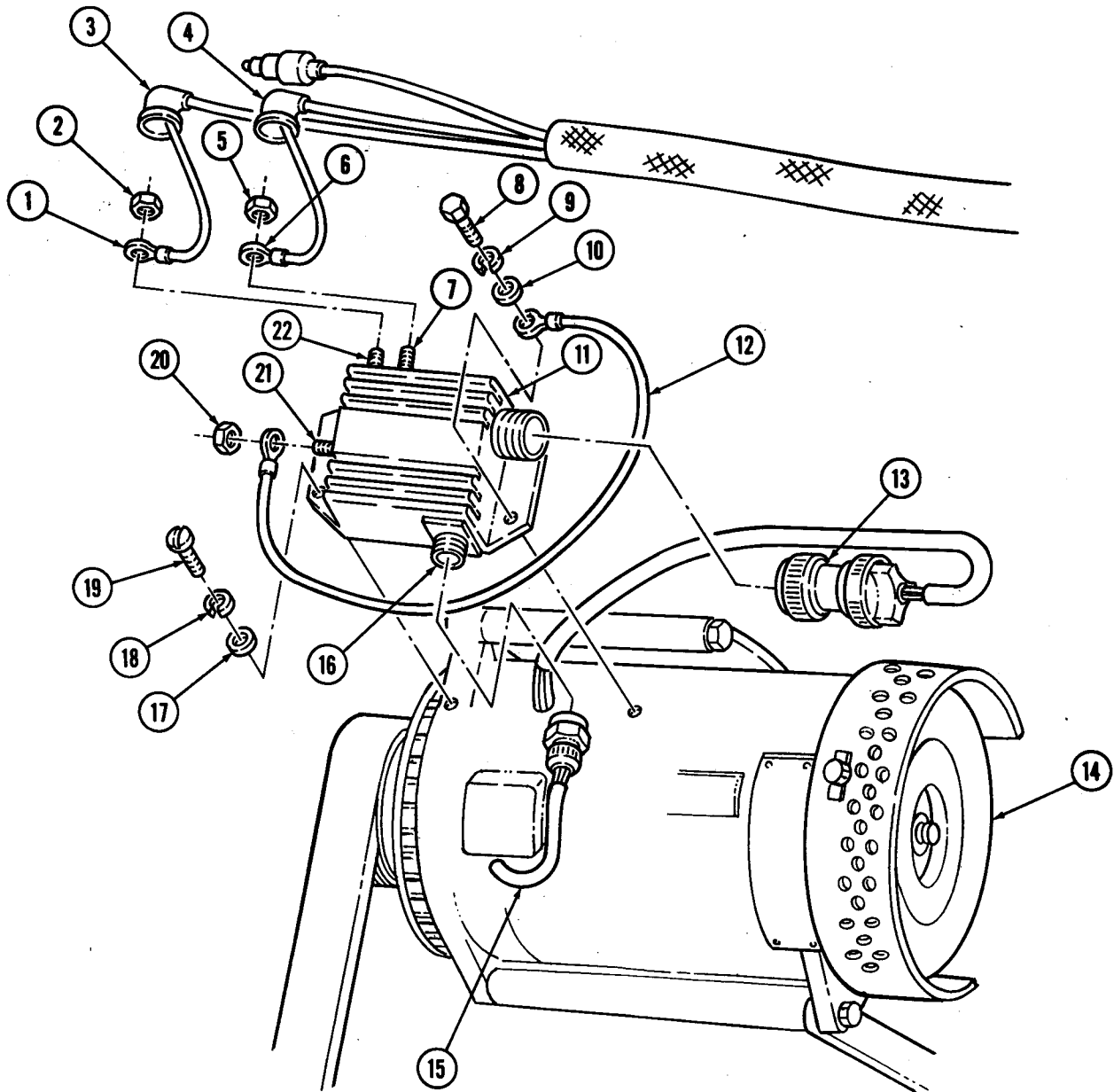
Prior to removal, tag leads for installation.

1. Disconnect regulator plug (13) from voltage regulator (11).
2. Slide back rubber boot (3) and remove nut (2) and lead 5A (1) from IGN terminal (22).
3. Slide back rubber boot (4) and remove nut (5) and lead 2A (6) from AC terminal (7).
4. Remove nut (20) and ground wire (12) from 14-volt stud (21).
5. Remove screw (8), lockwasher (9), washer (10), and ground wire (12) from voltage regulator (11). Discard lockwasher (9).
6. Disconnect alternator connector (15) from regulator connector (16).
7. Remove two screws (19), spring tension washers (18), washers (17), and voltage regulator (11) from alternator (14). Discard spring tension washers (18).

b. Installation

1. Install voltage regulator (11) on alternator (14) with two washers (17), spring tension washers (18), and screws (19). Tighten screws (19) to 30-34 lb-in. (3-4 N•m).
2. Connect alternator connector (15) to regulator connector (16).
3. Install lead 5A (1) and nut (2) on IGN terminal (22). Tighten nut (2) to 23-27 lb-in. (2.6-3.0 N•m).
4. Apply grease to IGN terminal (22), lead 5A (1), and inside of boot (3), and slide boot (3) over IGN terminal (22).
5. Install lead 2A (6) and nut (5) on AC terminal (7). Tighten nut (5) to 18-22 lb-in. (2.0-2.5 N•m).
6. Apply grease to AC terminal (7), lead 2A (6), and inside of boot (4), and slide boot (4) over AC terminal (7).
7. Connect regulator plug (13) to voltage regulator (11).
8. Install one end of ground wire (12) on 14-volt stud (21) on regulator (11) with nut (20). Tighten nut (20) to 45-55 lb-in. (5-6 N•m).
9. Install other end of ground wire (12) on regulator (11) with washer (10), lockwasher (9), and screw (8). Tighten screw (8) to 88-94 lb-in. (10-11 N•m).

**4-5.10. (6.5L) 200 AMPERE DUAL VOLTAGE REGULATOR (PART OF 12447109)
REPLACEMENT (Cont'd)**



- FOLLOW-ON TASKS:**
- Connect battery ground cables (para. 4-73).
 - Lower and secure hood (TM 9-2320-280-10).

**4-5.11. (6.5L) 400 AMPERE DUAL VOLTAGE REGULATOR (PART OF 12446760)
REPLACEMENT**

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
 automotive (Appendix B, Item 1)
 Maintenance and repair shop equipment:
 automotive (Appendix B, Item 2)

Materials/Parts

Two lockwashers (Appendix G, Item 187)
 Lockwasher (Appendix G, Item 185)
 Grease (Appendix C, Item 25)

Manual References

TM 9-2320-280-10
 TM 9-2320-280-24P

Equipment Condition

- Battery ground cables disconnected (para. 4-73).
- Hood raised and secured (TM 9-2320-280-10).

a. Removal

NOTE

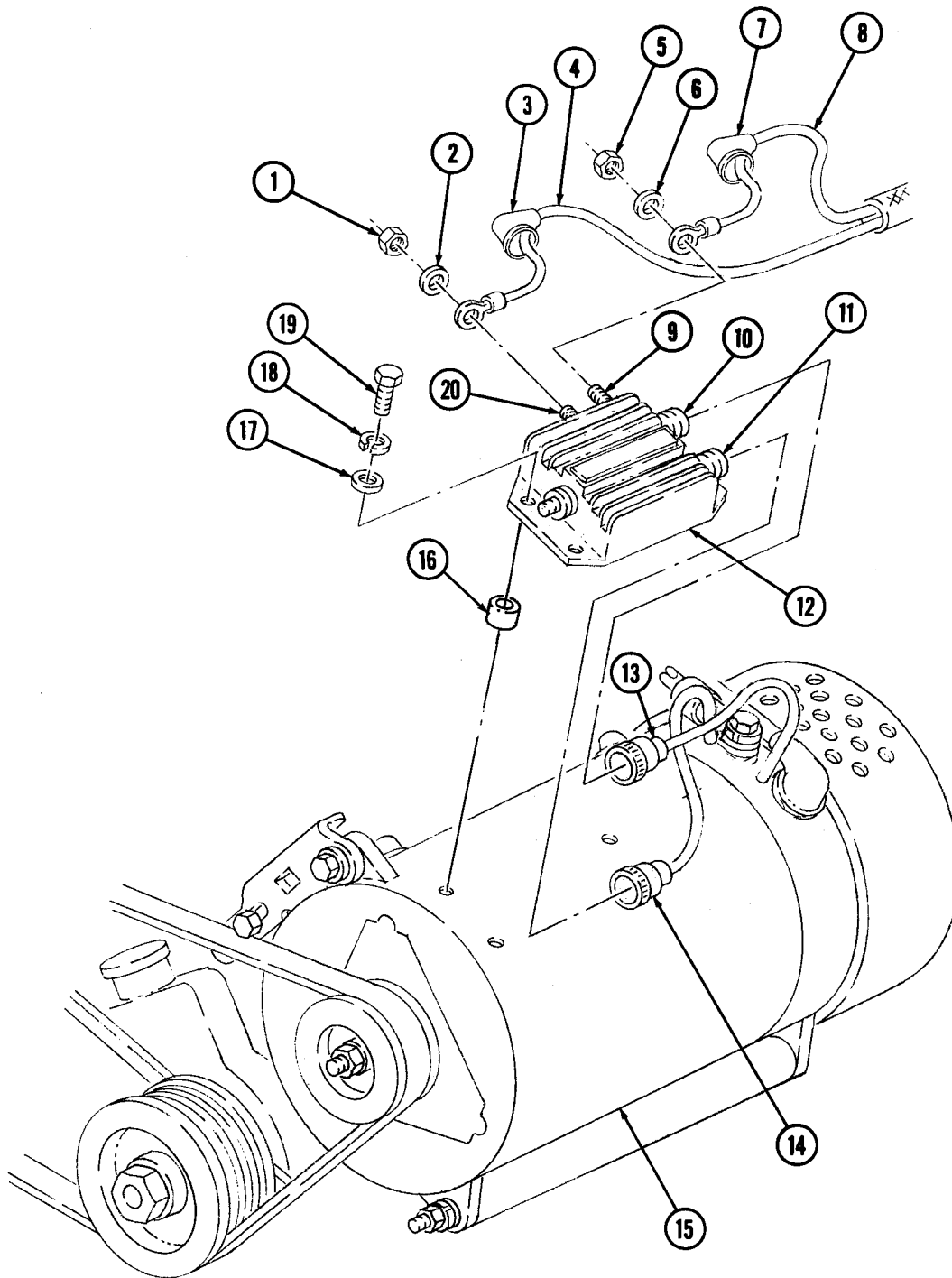
Prior to removal, tag leads for installation.

1. Disconnect regulator plugs (13) and (14) from connectors (10) and (11) on voltage regulator (12).
2. Slide back rubber boot (7) and remove nut (5), washer (6), and lead 5A (8) from red terminal (9) on voltage regulator (12).
3. Slide back rubber boot (3) and remove nut (1), washer (2), and lead 2A (4) from yellow terminal (20) on voltage regulator (12).
4. Remove three screws (19), lockwashers (18), washers (17), spacers (16), and voltage regulator (12) from alternator (15). Discard lockwashers (18).

b. Installation

1. Install voltage regulator (12) on alternator (15) with three spacers (16), washers (17), lockwashers (18), and screws (19) . Tighten screws (19) to 30-34 lb-in. (3-4 N•m).
2. Install lead 5A (8), washer (6), and nut (5) on red terminal (9) of voltage regulator (12). Tighten nut (5) to 35 lb-in. (4 N•m).
3. Apply grease to red terminal (9), lead 5A (8), and inside of boot (7), and slide boot (7) over red terminal (9).
4. Install lead 2A (4), washer (2), and nut (1) on yellow terminal (20) of voltage regulator (12). Tighten nut (1) to 20 lb-in. (2 N•m).
5. Apply grease to yellow terminal (20), lead 2A (4), and inside of boot (3), and slide boot (3) over yellow terminal (20).
6. Connect regulator plugs (13) and (14) to connectors (10) and (11) on voltage regulator (12).

**4-5.11. (6.5L) 400 AMPERE DUAL VOLTAGE REGULATOR (PART OF 12446760) REPLACEMENT
(Cont'd)**



- FOLLOW-ON TASKS:**
- Connect battery ground cables (para. 4-73).
 - Lower and secure hood (TM 9-2320-280-10).

4-5.12. (6.5L) 400 AMPERE DUAL VOLTAGE ALTERNATOR (PART OF 12446760) CABLE REPLACEMENT

This task covers:

- a. Removal b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
 automotive (Appendix B, Item 1)
 Maintenance and repair shop equipment:
 automotive (Appendix B, Item 2)

Materials/Parts

Locknut (Appendix G, Item 72)
 Three lockwashers (Appendix G, Item 191)
 Locknut (Appendix G, Item 79)
 Lockwasher (Appendix G, Item 141)
 Five lockwashers (Appendix G, Item 190)
 Three tiedown straps (Appendix G, Item 309)

Manual References

TM 9-2320-280-10
 TM 9-2320-280-24P

Equipment Condition

- Hood raised and secured (TM 9-2320-280-10).
- Battery ground cables disconnected (para. 4-73).
- Engine access cover removed (para. 10-15).

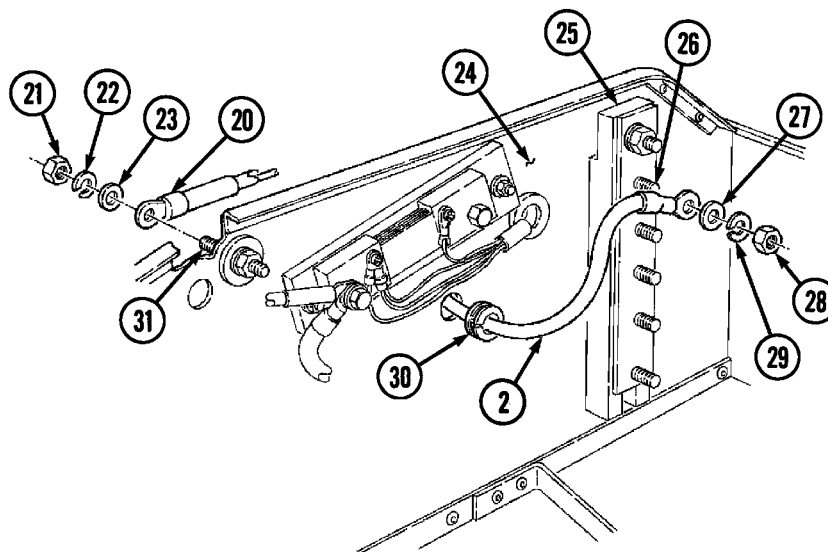
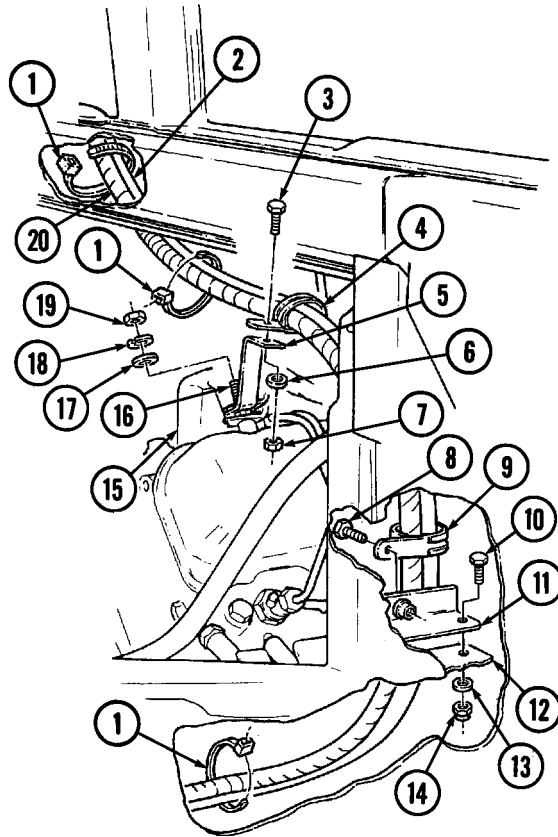
a. Removal

NOTE

Prior to removal, tag leads for installation.

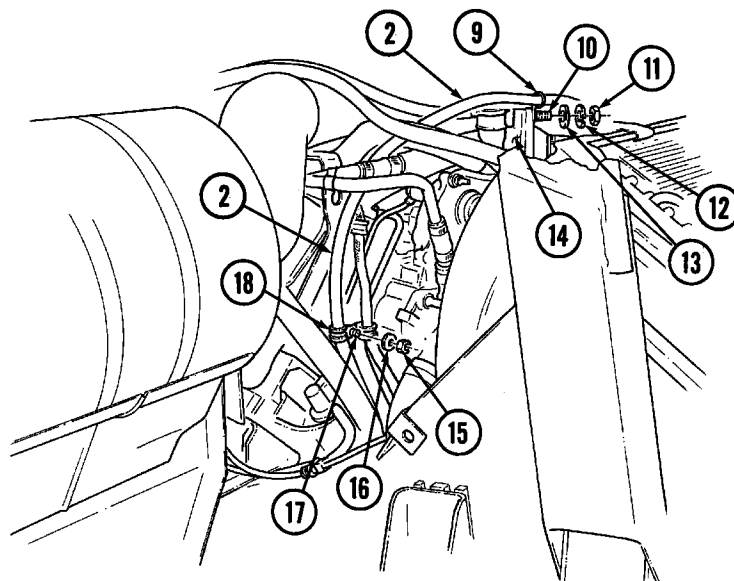
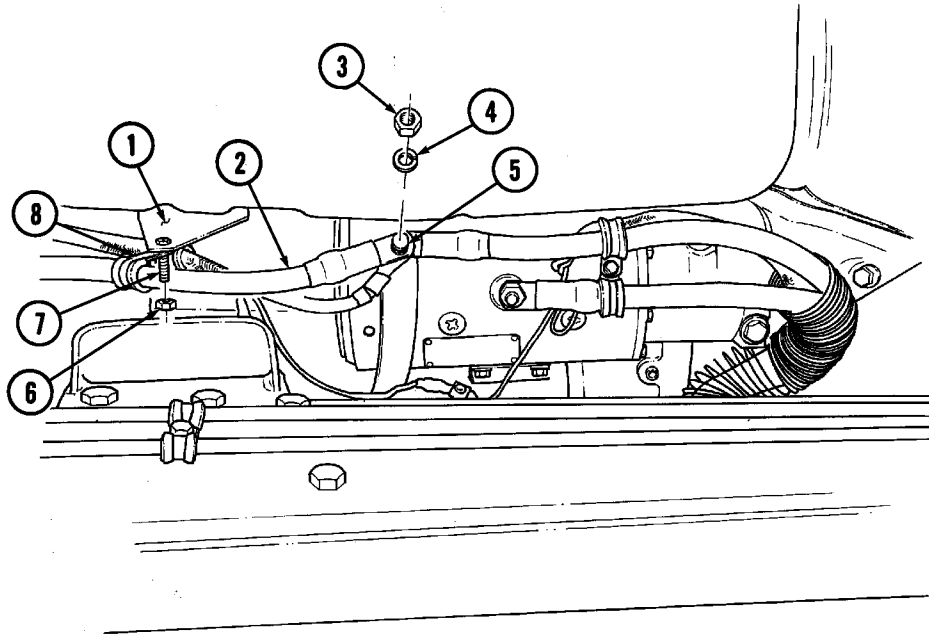
1. Remove locknut (7), washer (6), screw (3), clamp (4), and cables (2) and (20) from bracket (5). Discard locknut (7).
2. Remove nut (19), lockwasher (18), washer (17), and bracket (5) from stud (16) on right rear intake manifold (15). Discard lockwasher (18).
3. Remove screw (8), clamp (9), and cables (2) and (20) from bracket (11).
4. Remove locknut (14), washer (13), screw (10), and bracket (11) from right rear cowl (12). Discard locknut (14).
5. Remove three tiedown straps (1) from cables (2) and (20). Discard tiedown straps (1).
6. Remove nut (21), lockwasher (22), washer (23), and cable (20) from stud (31) on battery box side panel (24). Discard lockwasher (22).
7. Remove nut (28), lockwasher (29), washer (27), and cable (2) from stud (26) on buss bar (25). Discard lockwasher (29).
8. Remove grommet (30) from battery box side panel (24) and remove cable (2) through battery box side panel (24).

4-5.12. (6.5L) 400 AMPERE DUAL VOLTAGE ALTERNATOR (PART OF 12446760) CABLE REPLACEMENT (Cont'd)



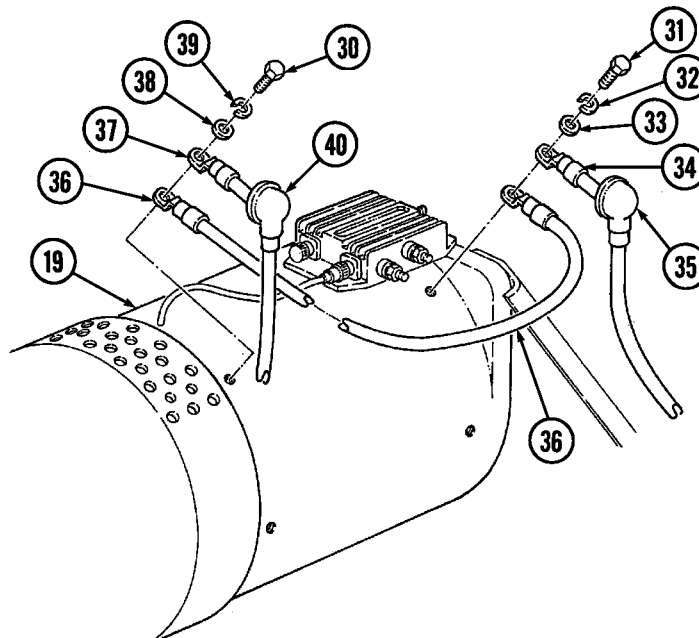
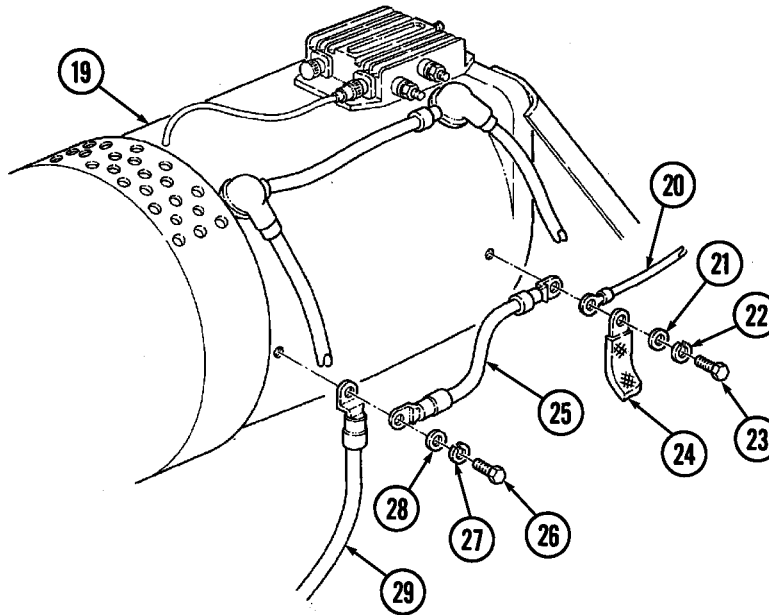
4-5.12. (6.5L) 400 AMPERE DUAL VOLTAGE ALTERNATOR (PART OF 12446760) CABLE REPLACEMENT (Con'td)

9. Remove nut (6), screw (7), cable (2), and clamp (8) from oil pan bracket (1).
10. Remove nut (3), lockwasher (4), and cable (2) from positive terminal (5). Discard lockwasher (4).
11. Remove nut (11), lockwasher (12), washer (13), clamp (9), and cable (2) from stud (10) on thermostat housing (14). Discard lockwasher (12).
12. Remove nut (15), washer (16), clamp (18), and cable (2) from stud (17).



4-5.12. (6.5L) 400 AMPERE DUAL VOLTAGE ALTERNATOR (PART OF 12446760) CABLE REPLACEMENT (Cont'd)

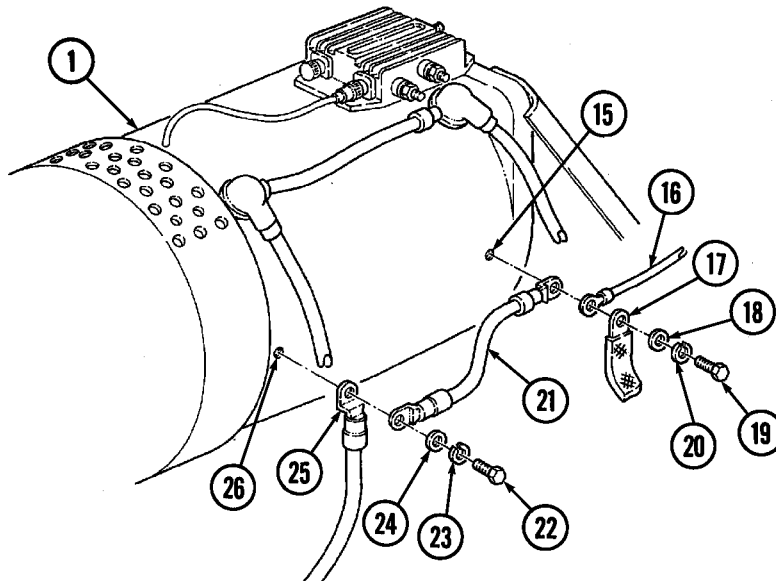
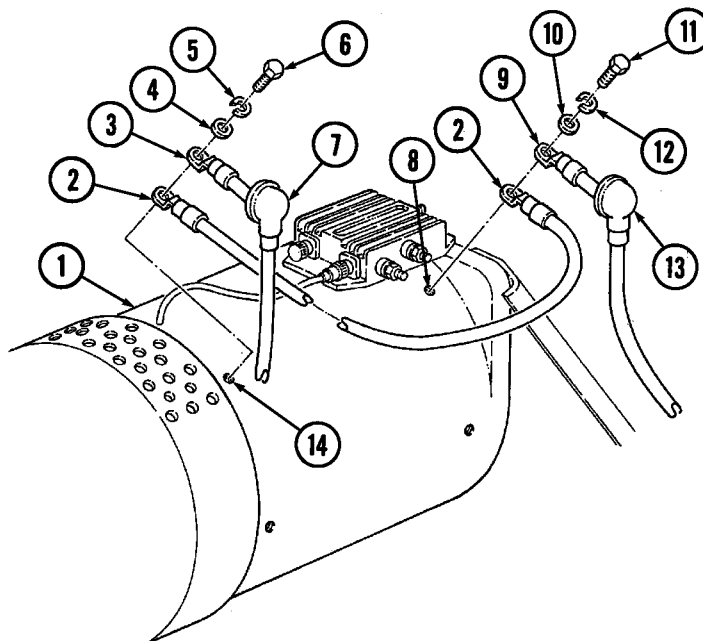
13. Remove screw (23), lockwasher (22), washer (21), ground strap (24), lead (20), and cable (25) from alternator (19). Discard lockwasher (22).
14. Remove screw (26), lockwasher (27), washer (28), cables (25) and (29) from alternator (19). Discard lockwasher (27).
15. Slide back rubber boot (35) and remove screw (31), lockwasher (32), washer (33), and cables (34) and (36) from alternator (19). Discard lockwasher (32).
16. Slide back rubber boot (40) and remove screw (30), lockwasher (39), washer (38), and cables (37) and (36) from alternator (19). Discard lockwasher (39).



4-5.12. (6.5L) 400 AMPERE DUAL VOLTAGE ALTERNATOR (PART OF 12446760) CABLE REPLACEMENT (Con't'd)

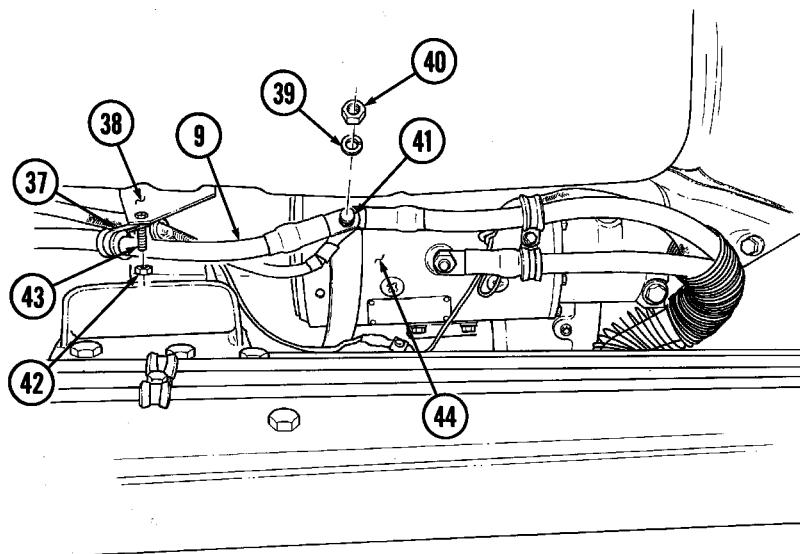
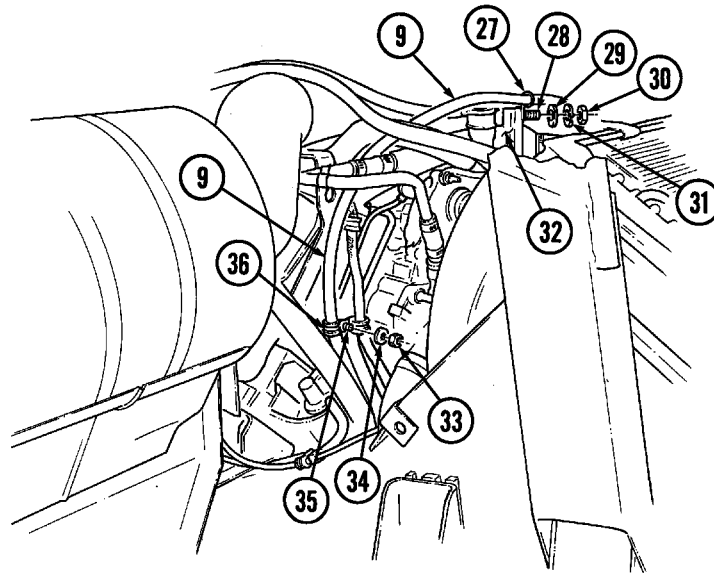
b. Installation

1. Install cables (2) and (3) to rear positive terminal (14) on alternator (1) with washer (4), lockwasher (5), and screw (6), and slide rubber boot (7) over cables (2) and (4).
2. Install cables (2) and (9) to front positive terminal (8) on alternator (1) with washer (10), lockwasher (12), and screw (11), and slide rubber boot (13) over cables (2) and (9).
3. Install ground strap (17), lead (16), and cable (21) to front negative terminal (15) on alternator (1) with washer (18), lockwasher (20), and screw (19).
4. Install cables (25) and (21) to rear negative terminal (26) on alternator (1) with washer (24), lockwasher (23), and screw (22).



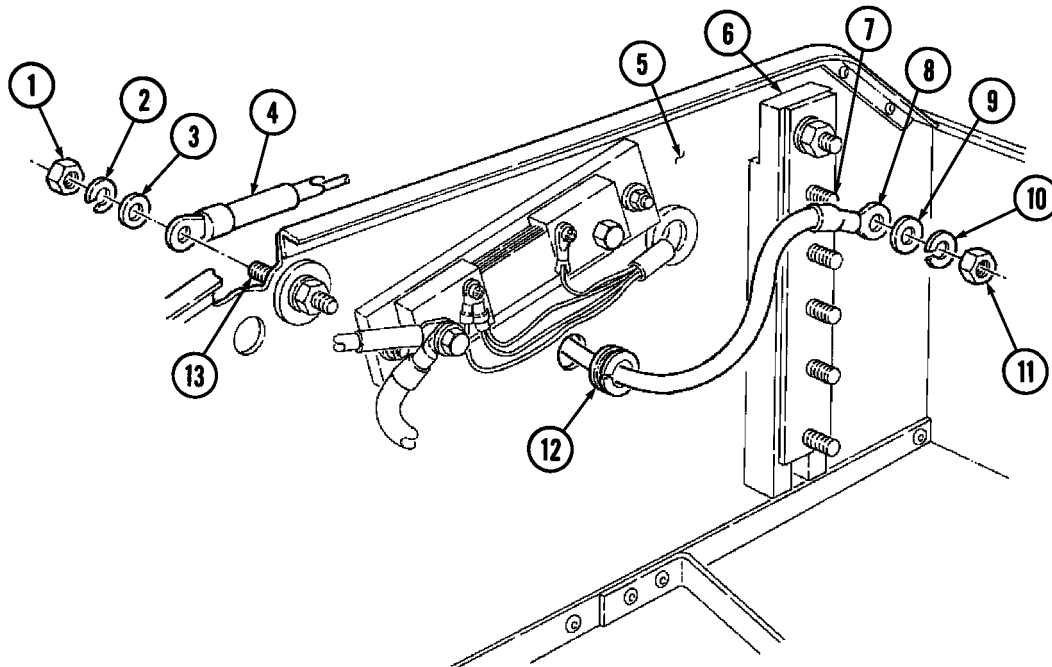
4-5.12. (6.5L) 400 AMPERE DUAL VOLTAGE ALTERNATOR (PART OF 12446760) CABLE REPLACEMENT (Cont'd)

5. Install cable (9) on stud (35) with clamp (36), washer (34), and nut (33).
6. Install cable (9) to stud (28) on thermostat housing (32) with clamp (27), washer (29), lockwasher (31), and nut (30).
7. Install cable (9) on positive terminal (41) of starter (44) with lockwasher (39) and nut (40).
8. Install cable (9) on oil pan bracket (38) with clamp (37), screw (43), and nut (42).

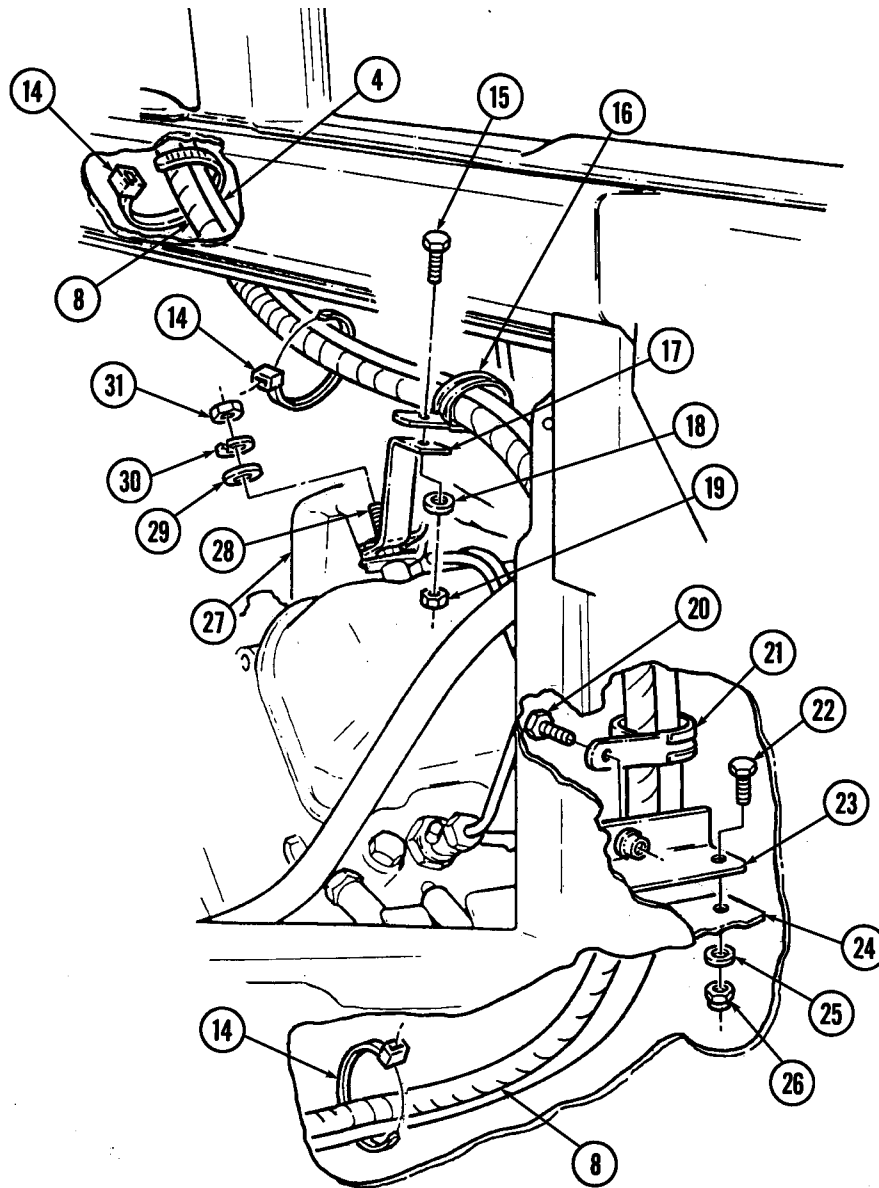


4-5.12. (6.5L) 400 AMPERE DUAL VOLTAGE ALTERNATOR (PART OF 12446760) CABLE REPLACEMENT (Cont'd)

9. Install grommet (12) on battery box side panel (5) and route cable (8) through grommet (12) and battery box side panel (5).
10. Install cable (8) to stud (7) on buss bar (6) with washer (9), lockwasher (10), and nut (11).
11. Install cable (4) to stud (13) on battery box side panel (5) with washer (3), lockwasher (2), and nut (1).
12. Install bracket (23) on right rear cowl (24) with screw (22), washer (25), and locknut (26).
13. Install cables (4) and (8) on bracket (23) with clamp (21) and screw (20).
14. Install bracket (17) to stud (28) on right rear intake manifold (27) with washer (29), lockwasher (30), and nut (31).
15. Install cables (4) and (8) on bracket (17) with clamp (16), screw (15), washer (18), and locknut (19).
16. Install three tiedown straps (14) on cables (4) and (8).



4-5.12. (6.5L) 400 AMPERE DUAL VOLTAGE ALTERNATOR (PART OF 12446760) CABLE REPLACEMENT (Cont'd)



- FOLLOW-ON TASKS:**
- Install engine access cover (para. 10-15).
 - Connect battery ground cables (para. 4-73).
 - Lower and secure hood (TM 9-2320-280-10).

4-5.13. (6.5L) 400 AMPERE DUAL VOLTAGE ALTERNATOR (12446760) REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
 automotive (Appendix B, Item 1)
 Maintenance and repair shop equipment:
 automotive (Appendix B, Item 2)

Materials/Parts

Lockwasher (Appendix G, Item 191)
 Lockwasher (Appendix G, Item 133)
 Lockwasher (Appendix G, Item 151)

Personnel Required

One mechanic
 One assistant

Manual References

TM 9-2320-280-10
 TM 9-2320-280-24P

Equipment Condition

- Hood raised and secured (TM 9-2320-280-10).
- Battery ground cables disconnected (para. 4-73).
- Engine access cover removed (para. 10-15).
- Alternator cables removed (para. 4-5.12).

General Safety Instructions

Alternator must be supported during removal and installation.

a. Removal

NOTE

Prior to removal, tag leads for installation.

1. Position 3/8-in. breaker bar on belt tensioner (4), move tensioner (4) clockwise, and remove drivebelt (1) from power steering pump pulley (3) and alternator pulley (2).
2. Remove nut (5), lockwasher (6), washer (7), ground strap (8), and washer (10) from stud (9). Discard lockwasher (6).

WARNING

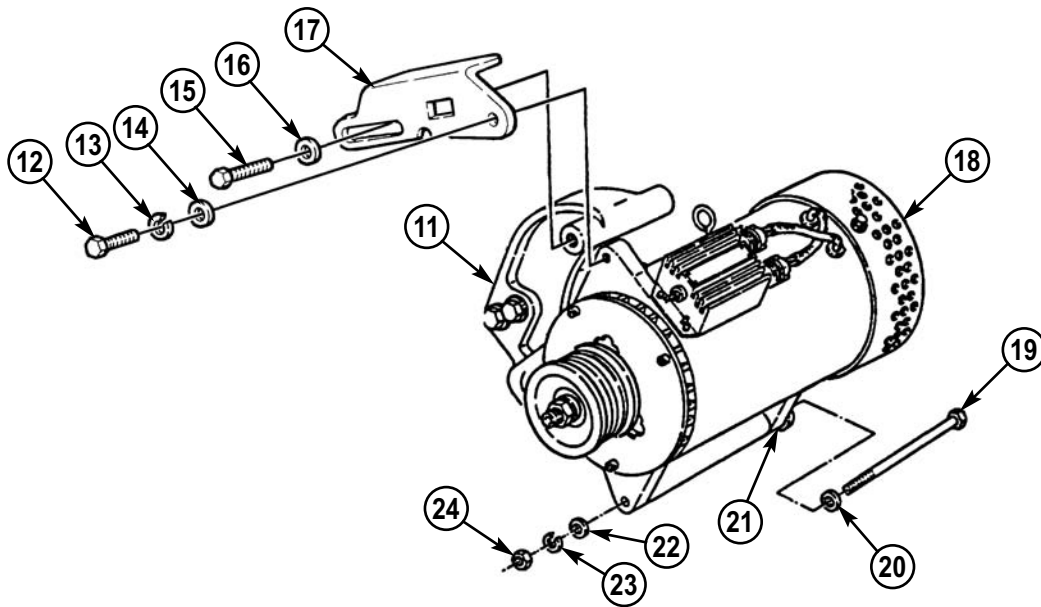
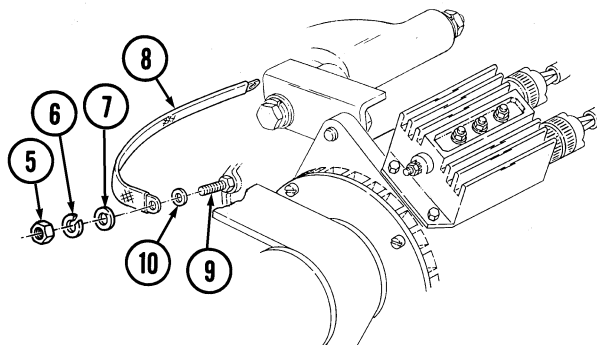
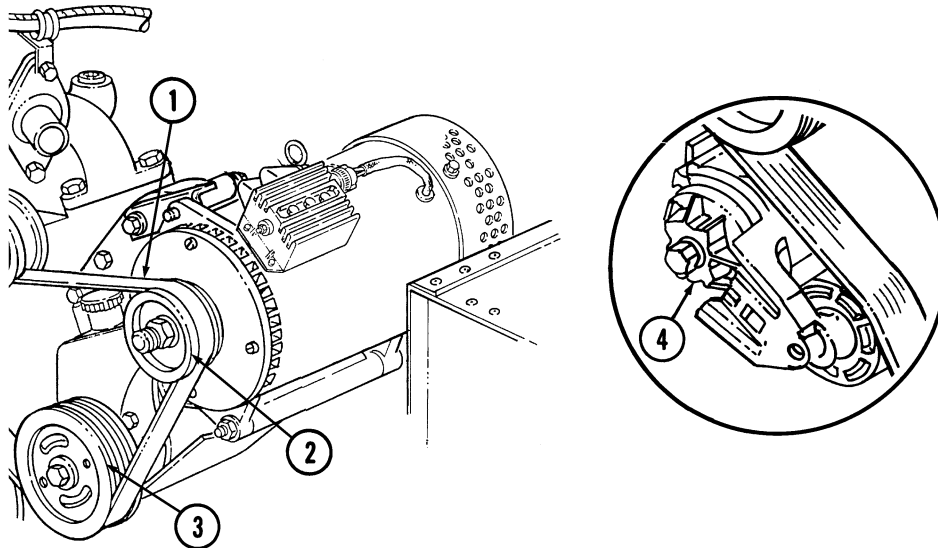
Alternator must be support during removal and installation.
 Failure to do so may cause injury to personnel or damage to equipment.

3. Remove screw (12), lockwasher (13), and washer (14) from alternator bracket (17) and alternator mounting bracket (11). Discard lockwasher (13).
4. Remove screw (15), washer (16), and bracket (17) from alternator (18) and alternator mounting bracket (11).
5. Remove nut (24), lockwasher (23), washer (22), screw (19), washer (20), and alternator (18) from alternator support bracket (21) and alternator mounting bracket (11). Discard lockwasher (23).
6. Remove alternator pulley (2) (para. 4-3).

b. Installation

1. Install alternator pulley (2) (para. 4-3).
2. Position alternator (18) on alternator mounting bracket (11).
3. Install alternator (18) on alternator mounting bracket (11) and alternator support bracket (21) with washer (20), screw (19), washer (22), lockwasher (23), and nut (24). Do not tighten nut (24).
4. Install alternator bracket (17) on alternator mounting bracket (11) and alternator (18) with washer (16) and screw (15). Do not tighten screw (15).
5. Install washer (14), lockwasher (13), and screw (12) on alternator mounting bracket (11) and alternator bracket (17).
6. Tighten screw (15) to 40 lb-ft (54 N•m).
7. Tighten nut (24) to 155 lb-ft (210 N•m).
8. Install ground strap (8) on stud (9) with washers (10) and (7), lockwasher (6), and nut (5).
9. Position 3/8-in. breaker bar on belt tensioner (4) and move tensioner (4) clockwise and install drivebelt (1) on power steering pump pulley (3) and alternator pulley (2).

**4-5.13. (6.5L) 400 AMPERE DUAL VOLTAGE ALTERNATOR (12446760) REPLACEMENT
(Cont'd)**



- FOLLOW-ON TASKS:**
- Install alternator cables (para. 4-5.12).
 - Install engine access cover (para. 10-15).
 - Connect battery ground cables (para. 4-73).
 - Lower and secure hood (TM 9-2320-280-10).

Section II. STARTER AND STARTING CONTROL SYSTEM MAINTENANCE

4-6. STARTER AND STARTING CONTROL SYSTEM MAINTENANCE TASK SUMMARY

TASK PARA.	PROCEDURES	PAGE NO.
4-7.	Rotary Switch Replacement	4-14
4-8.	Starter Replacement	4-16
4-9.	Circuit Breaker Replacement	4-20

4-7. ROTARY SWITCH REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Materials/Parts

Lockwasher (Appendix G, Item 136)
Lockwasher (Appendix G, Item 162)

Equipment Condition

Battery ground cable disconnected
(para. 4-73).

NOTE

Prior to removal, tag leads and note position of lever for installation.

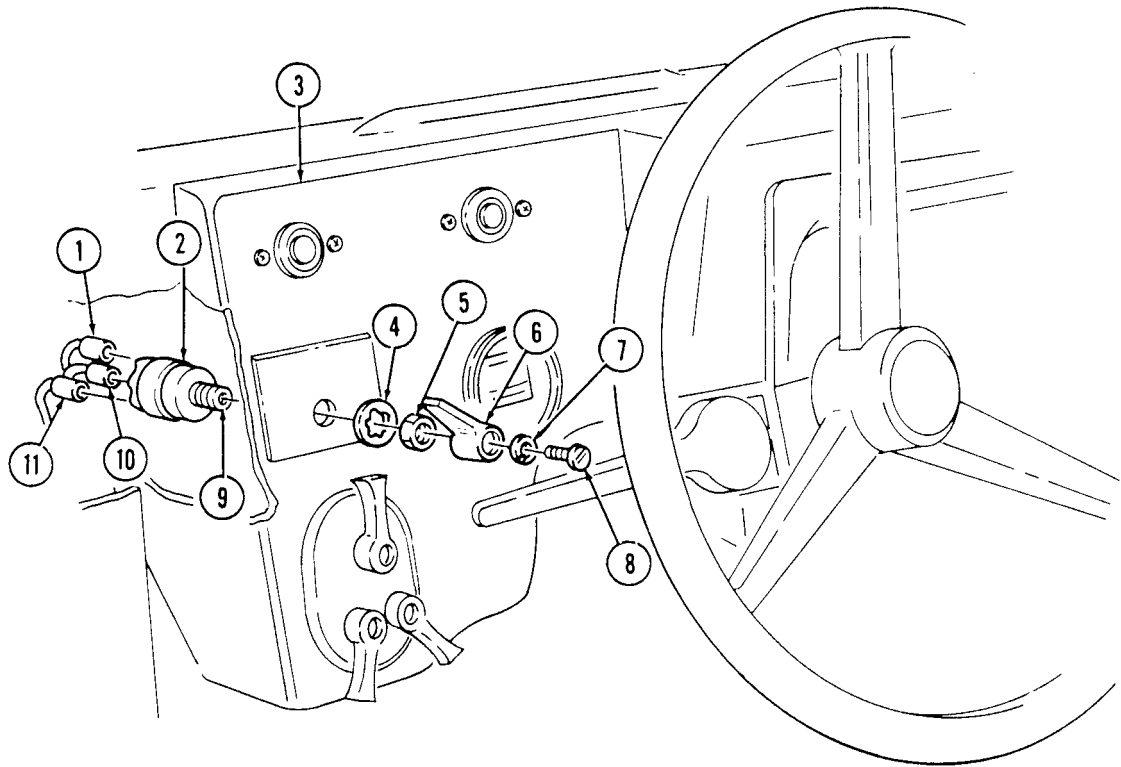
a. Removal

1. Remove screw (8), lockwasher (7), and switch lever (6) from switch shaft (9). Discard lockwasher (7).
2. Remove nut (5) and lockwasher (4) from switch (2) and instrument panel (3). Discard lockwasher (4).
3. Push switch (2) out of hole in panel (3).
4. Disconnect three electrical leads 11A (1), 14A (10), and 29A (11) from switch (2) and remove switch (2).

b. Installation

1. Connect three electrical leads 11A (1), 14A (10), and 29A (11) on switch (2).
2. Install switch (2) into hole in panel (3).
3. Install lockwasher (4) and nut (5) on switch (2).
4. Place switch lever (6) on switch shaft (9) to indicate ENGINE STOP position.
5. Secure lever (6) on switch shaft (9) with lockwasher (7) and screw (8).

4-7. ROTARY SWITCH REPLACEMENT (Cont'd)



- FOLLOW-ON TASKS:
- Connect battery ground cable (para. 4-73).
 - Check rotary switch operation (TM 9-2320-280-10).

4-8. STARTER REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Special Tools

Crowfoot, 9/16 in. (Appendix B, Item 150)
Torque adapter, 3/4 in. (Appendix B, Item 145)
Socket adapter, 3/8 - 1/2 in. drive (Appendix B, Item 146)

Materials/Parts

Lockwasher (Appendix G, Item 133)
Lockwasher (Appendix G, Item 137)
Plain-assembled nut (Appendix G, Item 203)
Adhesive sealant (Appendix C, Item 10)
Sealing compound (Appendix C, Item 45)

Personnel Required

One mechanic
One assistant

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

- Battery ground cable disconnected (para. 4-73).
- Arctic heater oil pan shroud removed (para. 12-48.2).
- Converter housing cover removed (para. 5-19).
- Sealed upper converter housing cover removed (para. 5-18).

General Safety Instructions

Starter must be supported during removal and installation.

WARNING

Starter must be supported during removal and installation. Failure to support starter may cause injury to personnel or damage to equipment.

NOTE

- Illustration shown is a cutaway of the right side of vehicle.
- Prior to removal, tag leads for installation.

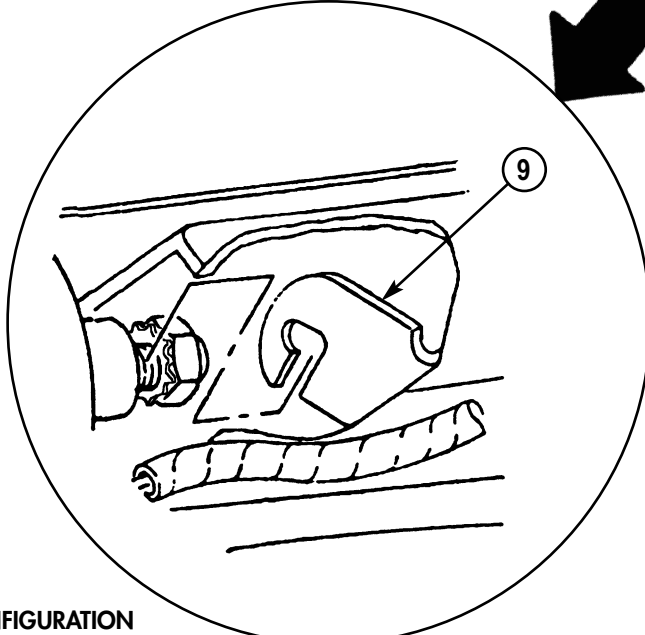
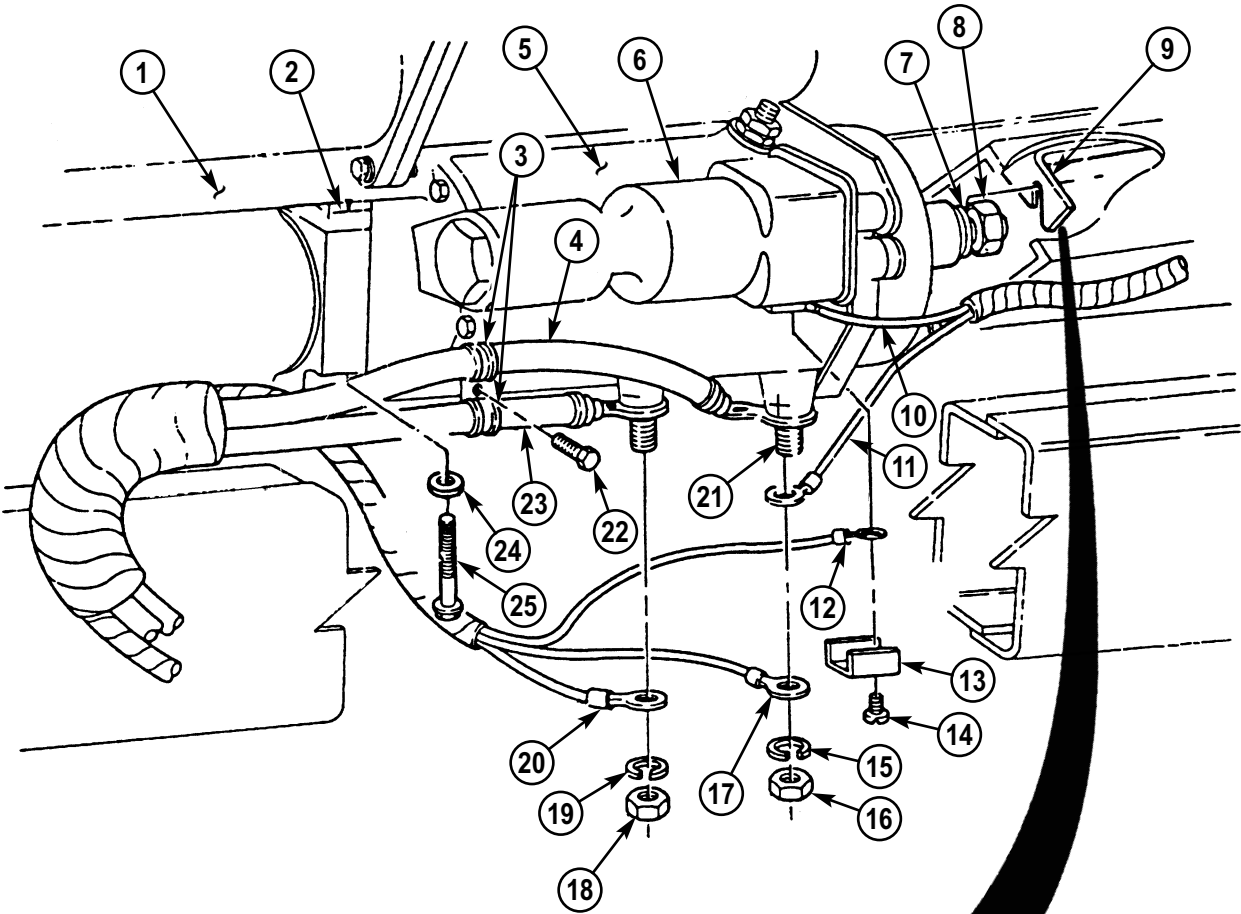
a. Removal

1. Remove nut (18), lockwasher (19), lead 3D (20), and negative cable 7A (23) from starter (5). Discard lockwasher (19).
2. Remove adhesive sealant from positive terminal (21) on starter (5).

NOTE

- Perform step 3 for all vehicles except M1123 and "A2" series vehicles.
 - Perform step 4 for M1123 and "A2" series vehicles only.
3. Remove nut (16), lockwasher (15), leads 81A (11) and 81B (17), and positive cable 6A (4) from starter (5). Discard lockwasher (15) and tiedown strap (9.1).
 4. Remove nut (16), lockwasher (15), and lead 81B (17) from starter (5). Discard lockwasher (15).
 5. Remove screw (14), clip (13), and leads 74B (12) and 74A (10) from solenoid (6).
 6. Remove screw (22), two clamps (3), negative cable 7A (23), and positive cable 6A (4) from starter (5).
 7. Loosen plain-assembled nut (8) and washer (7) (if installed) on stud connecting starter (5) to bracket (9). Discard plain-assembled nut (8).
 8. While supporting starter (5) from under vehicle, remove two capscrews (25) and washers (24) from starter (5) and engine (1).
 9. Remove starter (5) and shim (2) from engine (1).

4-8. STARTER REPLACEMENT (Cont'd)



NEW CONFIGURATION

4-8. STARTER REPLACEMENT (Cont'd)

b. Installation

1. Install an 0.08 in. (2 mm) shim (2) on starter (5).
2. Position shim (2) and starter (5) to flywheel housing with solenoid (6) facing outward.
3. Slide front stud on starter (5) in bracket (9).

NOTE

Some capscrews have sealing compound pre-applied. Additional sealing compound is not required.

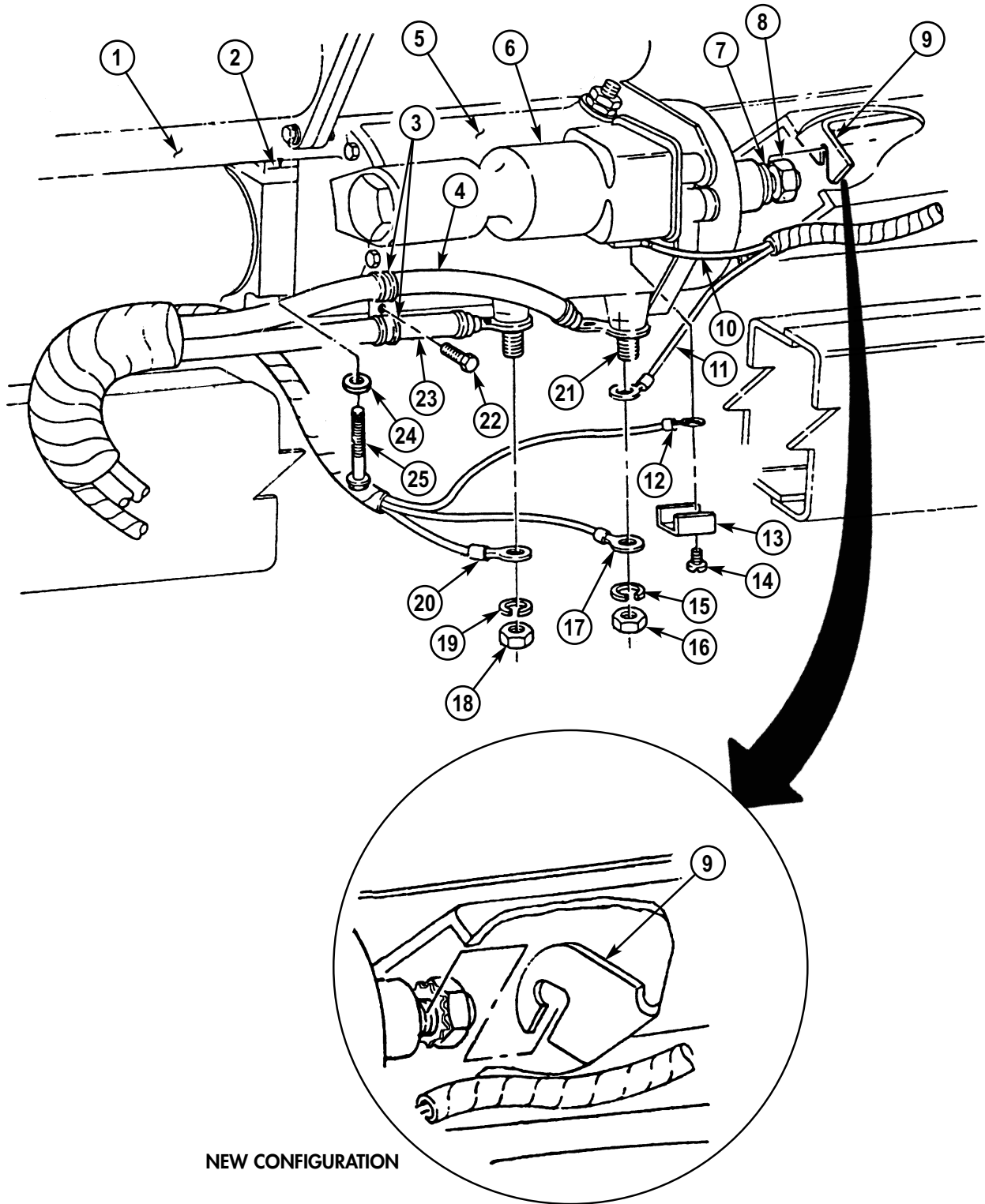
4. Apply sealing compound to capscrews (25). Install two washers (24) and capscrews (25) on starter (5) and engine (1). Tighten capscrews (25) to 30-40 lb-ft (41-54 N•m).
5. Secure starter (5) on bracket (9) with plain-assembled nut (8). Using crowfoot, tighten plain-assembled nut (8) to 15-19 lb-ft (20-26 N•m).
6. Install two clamps (3), and negative cable 7A (23) and positive cable 6A (4), on starter (5) with screw (22).
7. Connect leads 74A (10) and 74B (12) to solenoid (6) with clip (13) and screw (14). Tighten screw (14) to 20 lb-in. (2 N•m).

NOTE

Perform step 8 for all vehicles except M1123 and "A2" series vehicles. Perform step 9 for M1123 and "A2" series vehicles only.

8. Connect positive cable 6A (4) and leads 81A (11) and 81B (17) to starter (5) with lockwasher (15) and nut (16). Using torque adapter, tighten nut (16) to 25-30 lb-ft (34-41 N•m).
- 8.1. Deleted.
9. Connect lead 81B (17) to starter (5) with lockwasher (15) and nut (16). Tighten nut (16) to 25-30 lb-ft (34-41 N•m).
10. Seal positive terminal (21), leads 81B (17) and 81A (11), and positive cable 6A (4) with adhesive sealant. Apply sealant at least 1.8 in. (3.175 mm) thick, covering all exposed metal attached to the positive terminal (21).
11. Connect negative cable 7A (23) and lead 3D (20) to starter (5) with lockwasher (19) and nut (18). Using torque adapter, tighten nut (18) to 15-20 lb-ft (20-27 N•m).

4-8. STARTER REPLACEMENT (Cont'd)



NEW CONFIGURATION

- FOLLOW-ON TASKS:**
- Install converter housing cover (para. 5-19).
 - Install sealed upper converter housing cover (para. 5-18).
 - Connect battery ground cable (para. 4-73).
 - Install arctic heater oil pan shroud (para. 12-48.2).
 - Start engine (TM 9-2320-280-10) and check for smooth starter engagement.

4-9. CIRCUIT BREAKER REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Materials/Parts

Two lockwashers (Appendix G, Item 136)

Equipment Condition

Battery ground cable disconnected (para. 4-73).

NOTE

- All circuit breakers are removed and installed basically the same.
- This procedure covers the instrument gauge circuit breaker.
- Prior to removal, tag leads for installation.

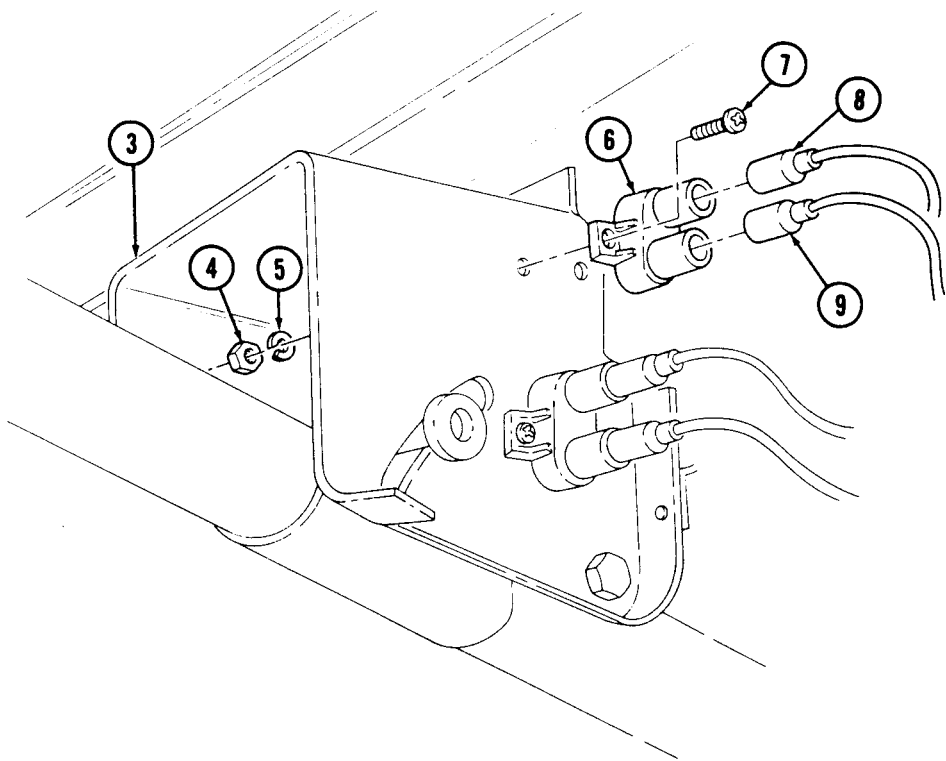
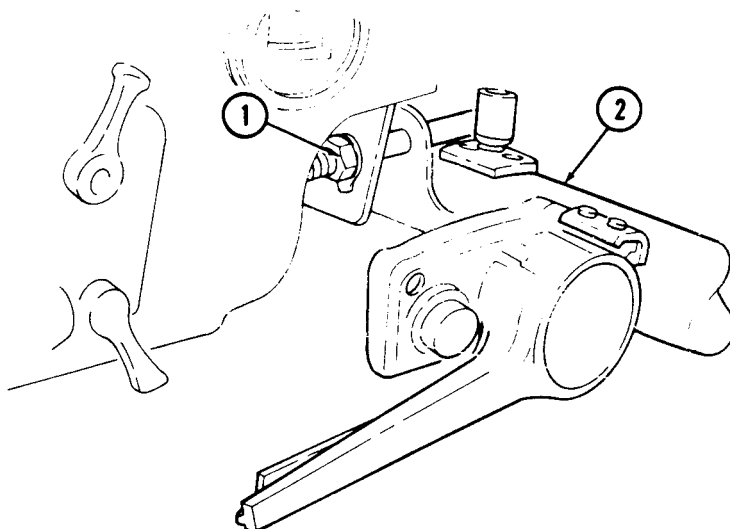
a. Removal

1. Loosen nut (1) and lower steering column (2).
2. Disconnect lead 29B (8) and 29D (9) from circuit breaker (6).
3. Remove two nuts (4), lockwashers (5), screws (7), and circuit breaker (6) from column bracket (3). Discard lockwasher (5).

b. Installation

1. Install circuit breaker (6) on column bracket (3) with two screws (7), lockwashers (5) and nuts (4).
2. Connect leads 29B (8) and 29D (9) to circuit breaker (6).
3. Raise steering column (2) and tighten nut (1) to 31 lb-ft (42 N•m).

4-9. CIRCUIT BREAKER REPLACEMENT (Cont'd)



- FOLLOW-ON TASKS:
- Connect battery ground cable (para. 4-73).
 - Check operation of circuit breaker (TM 9-2320-280-10).

Section III. INSTRUMENTS, SENDING UNITS, SWITCHES, AND HORN MAINTENANCE

4-10. INSTRUMENTS, SENDING UNITS, SWITCHES, AND HORN MAINTENANCE TASK SUMMARY

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4-14.	Speedometer/Odometer Replacement	4-30
4-15.	Speedometer Cable and Core (12338428) Replacement	4-32
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4-16.	Instrument Cluster Light Replacement	4-34
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4-11. INSTRUMENT CLUSTER REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Materials/Parts

Five lockwashers (Appendix G, Item 169)
Antiseize compound (Appendix C, Item 13)

Equipment Condition

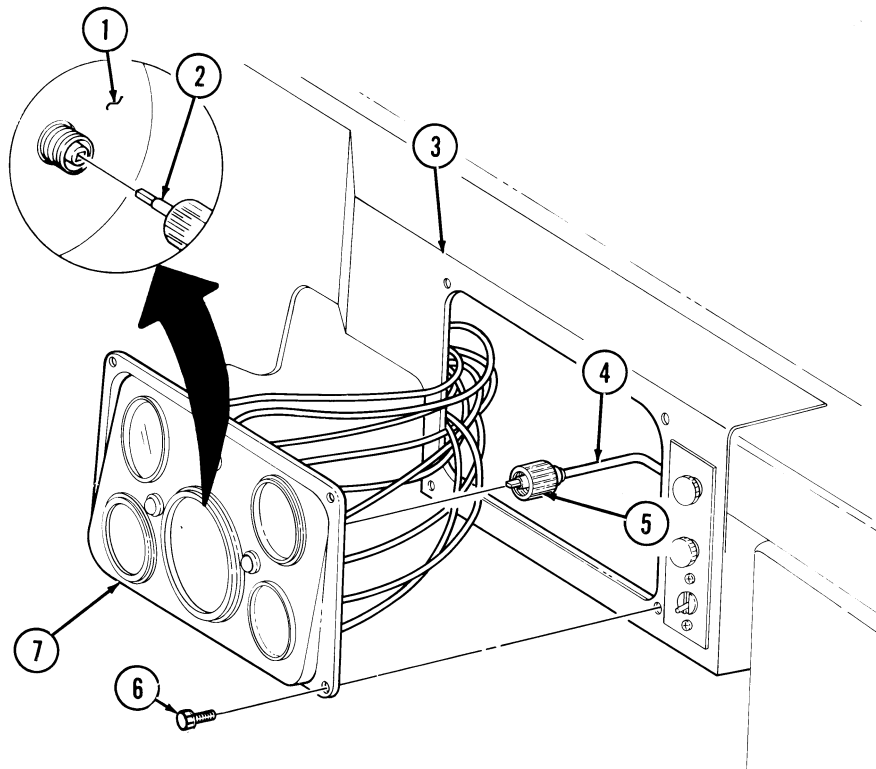
Battery ground cable disconnected (para. 4-73).

NOTE

Prior to removal, tag leads for installation.

a. Removal

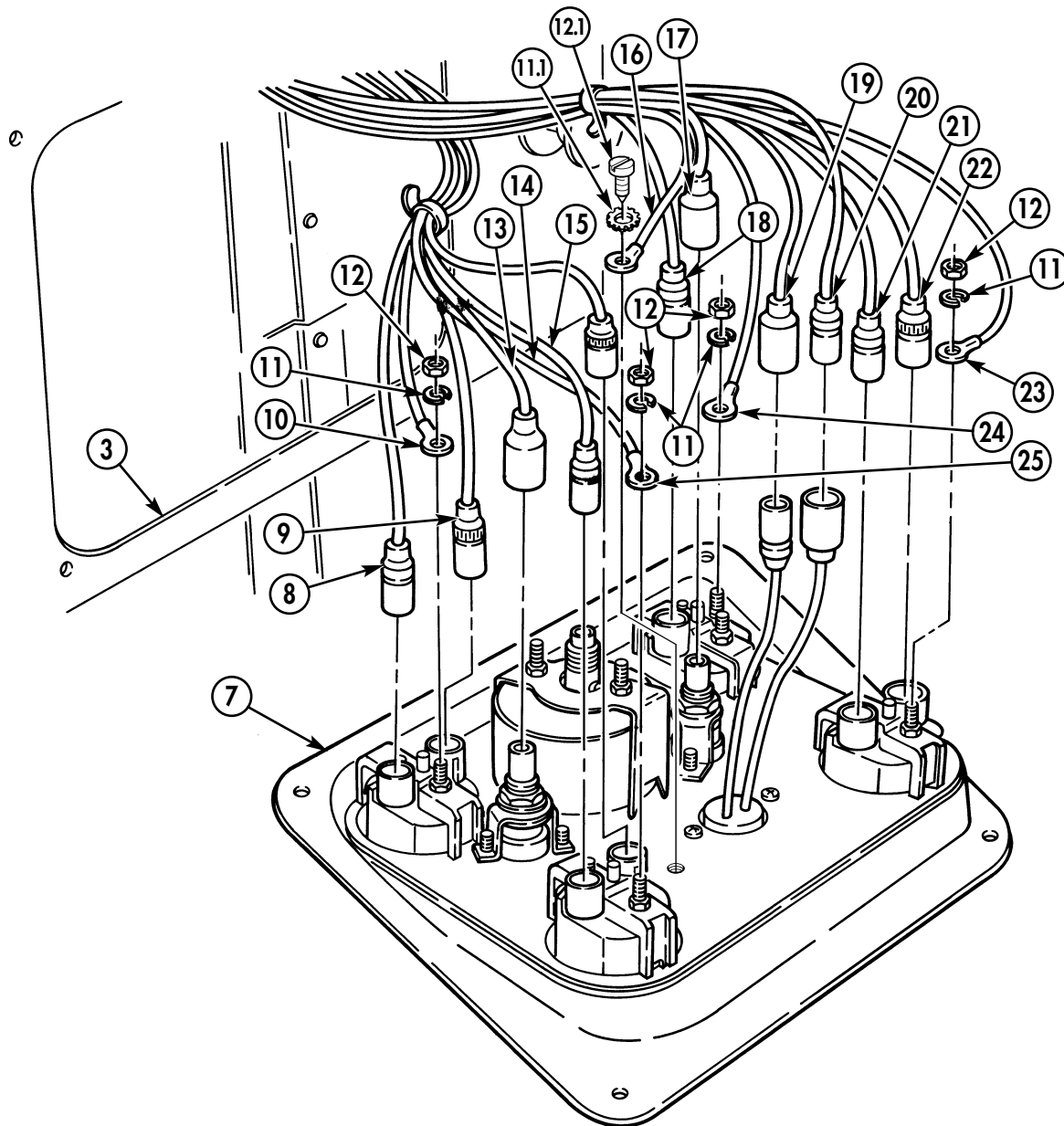
1. Remove four capscrews (6) from instrument cluster (7) and instrument panel (3). Pull instrument cluster (7) away from instrument panel (3) to allow access to speedometer cable (4).
2. Loosen nut (5) and disconnect speedometer cable (4) from speedometer (1).
3. Disconnect harness lead 27J (8), 28A (9), 40B (13), 27H (14), 36A (15), 57L (19), 17B (20), 27G (21), 33A (22), 40C (17), and 567A (18) from instrument cluster (7).
4. Remove four nuts (12), lockwashers (11), and harness ground leads 58H (10), 58G (25), 58E (23), and 58F (24) from instrument cluster (7). Discard lockwashers (11).
5. Remove screw (12.1), lockwasher (11.1), and ground lead 57G (16) from instrument cluster (7) and remove instrument cluster (7).



4-11. INSTRUMENT CLUSTER REPLACEMENT (Cont'd)

b. Installation

1. Apply antiseize compound to harness ground leads 58H (10), 58G (25), 58E (23), and 58F (24) and install on instrument cluster (7) with five lockwashers (11) and nuts (12).
2. Apply antiseize compound to harness ground lead 57G (16) and install on instrument cluster (7) with lockwasher (11.1) and screw (12.1).
3. Connect harness leads 27J (8), 28A (9), 40B (13), 27H (14), 36A (15) 57L (19), 17B (20), 27G (21), 33A (22), 40C (17), and 567A (18) to instrument cluster (7).
4. Connect speedometer cable (4) to speedometer (1) ensuring core (2) engages with square hole in speedometer (1) and secure with nut (5).
5. Install instrument cluster (7) in panel (3) with four capscrews (6).



FOLLOW-ON TASKS: • Connect battery ground cable (para. 4-73).
 • Check operation of instrument cluster components (TM 9-2320-280-10).

4-12. INSTRUMENT PANEL REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

- Instrument cluster removed (para. 4-11).
- Heater control cables remove (para. 10-89).

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

NOTE

Prior to removal, tag leads for installation.

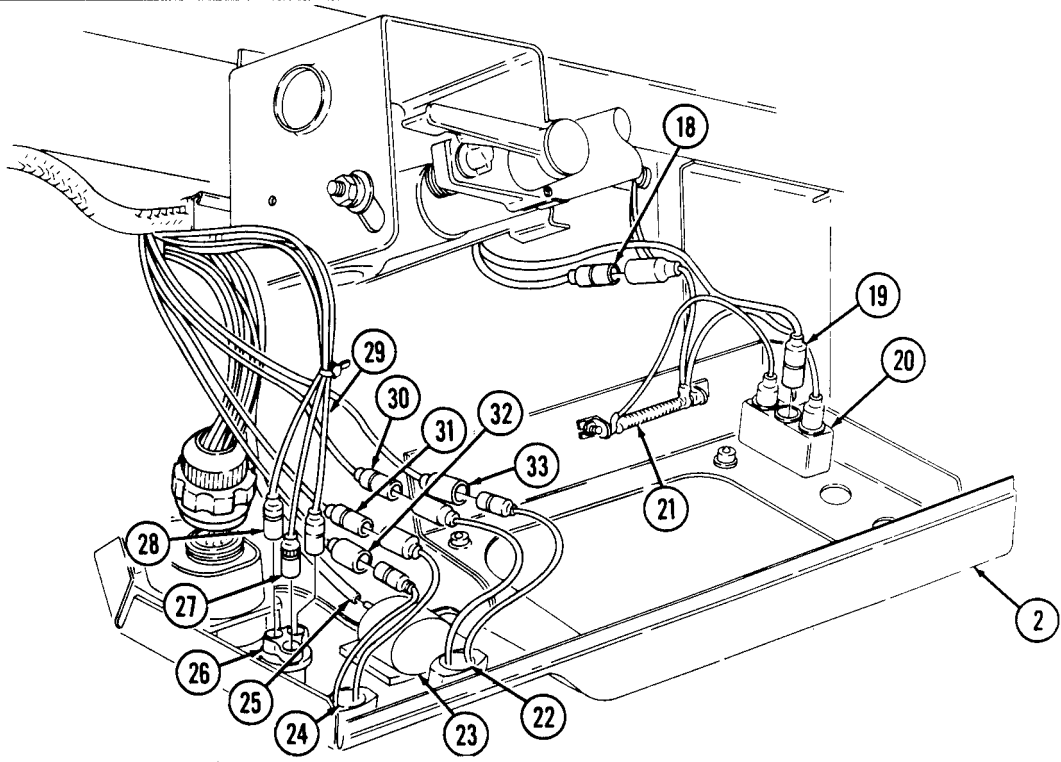
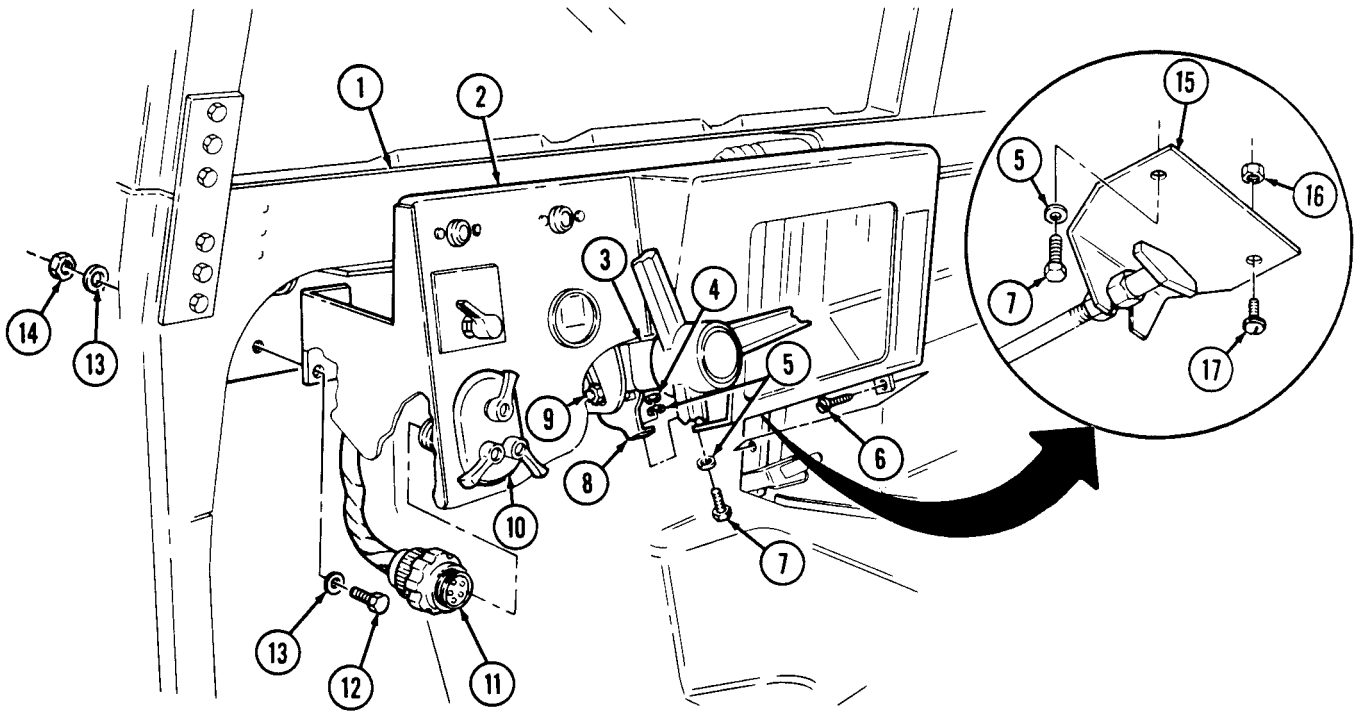
a. Removal

1. Loosen nut (9) and lower steering column (3).
2. Remove cannon plug (11) from main light switch (10).
3. Remove two capscrews (12), washers (13), nuts (14), and washers (13) from instrument panel (2) and body (1).
4. Remove nut (16) and screw (17) from hand throttle bracket (15) and instrument panel (2).
5. Remove nut (4), washer (5), capscrew (7), washer (5) and hand throttle bracket (15) from steering column bracket (8) and instrument panel (2).
6. Remove screw (6) from instrument panel (2) and body (1).
7. Pull instrument panel (2) away from body (1).
8. Disconnect two harness leads 11A (28), 14A (29), and 27A (27) from rotary switch (26).
9. Disconnect two harness leads 27F (32) and 571A (31) at wait-to-start indicator light (24).
10. Disconnect two harness leads 27L (30) and 67D (33) at brake warning indicator light (22).
11. Disconnect harness lead 400 D (18) from resistor (21).
12. Disconnect harness lead 27E (19) from blower switch (20) and remove instrument panel (2).
13. Disconnect hose (25) from air restriction gage (23).

b. Installation

1. Connect hose (25) to air restriction gage (23).
2. Connect harness lead 27E (19) to blower switch (20).
3. Connect harness lead 400D (18) to resistor (21).
4. Connect two harness leads 27L (30) and 67D (33) to brake warning indicator light (22).
5. Connect two harness leads 27F (32) and 571A (31) to wait-to -start indicator light (24).
6. Connect three harness leads 11A (28), 14A (29), and 27A (27) to rotary switch (26).
7. Install instrument panel (2) on body (1) with screw (6).
8. Install instrument panel (2) and hand throttle bracket (15) to steering column bracket (8) with washer (5), capscrew (7), washer (5), and nut (4).
9. Install hand throttle bracket (15) to instrument panel (2) with screw (17) and nut (16).
10. Install instrument panel (2) to body (1) with two washers (13), capscrews (12), and washers (13), and nuts (14).
11. Install cannon plug (11) to main light switch (10).
12. Raise steering column (3) and tighten nut (9) to 31 lb-ft (42 **N•m**).

4-12. INSTRUMENT PANEL REPLACEMENT (Cont'd)



- FOLLOW-ON TASKS:
- Install heater cables (para. 10-89).
 - Install instrument cluster (para. 4-11).
 - Check operation of instrument panel components (TM 9-2320-280-10).

4-13. ELECTRICAL GAUGE REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Materials/Parts

Two lockwashers (Appendix G, Item 169)

Equipment Condition

Battery ground cable disconnected (para. 4-73).

NOTE

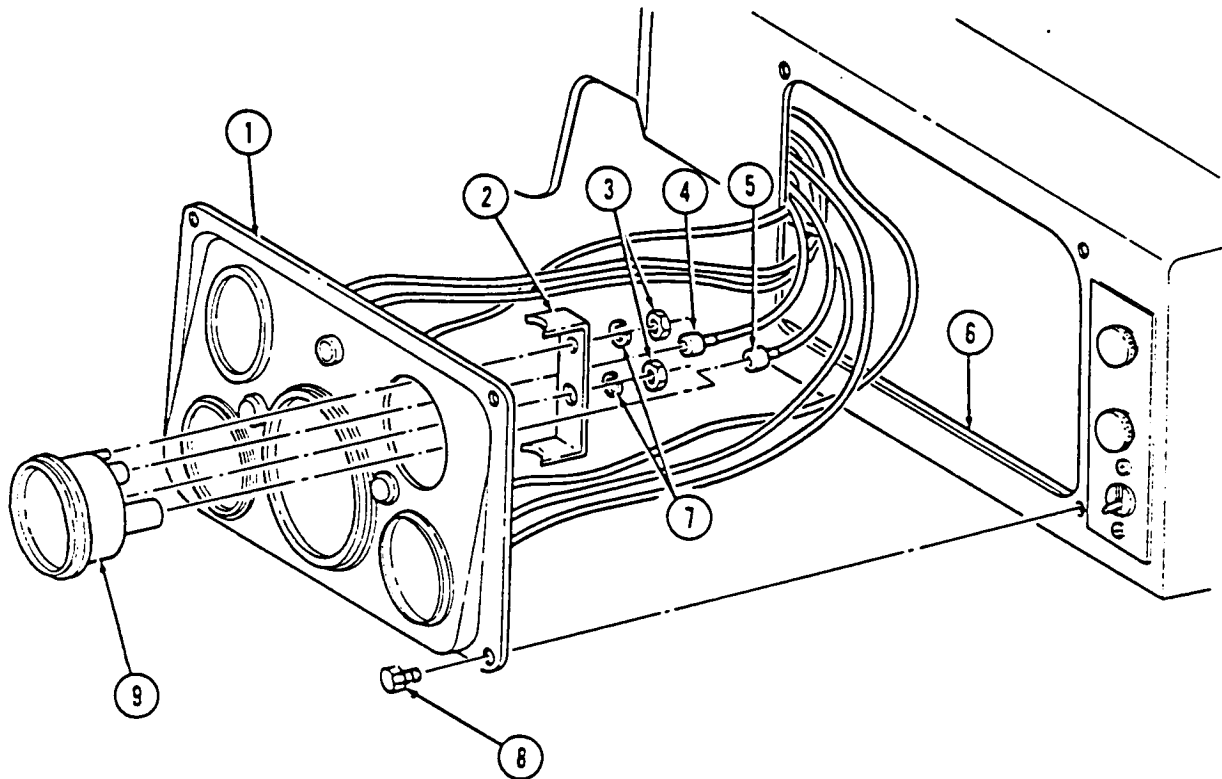
- All electrical gauges are removed and installed basically the same. This procedure covers the temperature gauge.
- Prior to removal, tag all leads for installation.

a. Removal

1. Remove four capscrews (8) from instrument cluster (1) and instrument panel (6).
2. Pull instrument cluster (1) away from panel (6).
3. Disconnect leads (4) and (5) from gauge (9).
4. Remove two nuts (3), lockwashers (7), gauge retaining bracket (2), and gauge (9) from instrument cluster (1). Discard lockwashers (7).

b. Installation

1. Install gauge (9) and retaining bracket (2) on instrument cluster (1) with two new lockwashers (7) and nuts (3). Tighten nuts (3) to 8 lb-in. (1 N•m).
2. Connect leads (4) and (5) to gauge (9).
3. Install instrument cluster (1) to panel (6) with four capscrews (8).

4-13. ELECTRICAL GAUGE REPLACEMENT (Cont'd)

- FOLLOW-ON TASKS:
- Connect battery ground cable (para. 4-73).
 - Start engine and check operation of gauge (TM 9-2320-280-10).

4-13.1. TACHOMETER REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M1123

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Material/Parts

Gasket (Appendix G, Item 55)
Seven lockwashers (Appendix G, Item 156)
Lockwasher (Appendix G, Item 155)
Two locknuts (Appendix G, Item 72)
Seal (Appendix G, Item 285)
Two lockwashers (Appendix G, Item 138)
Lockwasher (Appendix G, Item 168)

Manual References

TM 9-2320-280-24P

Equipment Condition

- Battery ground cable disconnected (para. 4-73).
- Radio rack removed (para. 12-132).
- Radio rack mounting brackets removed (para. 12-130).
- Engine access cover removed (para. 10-15).

a. Removal

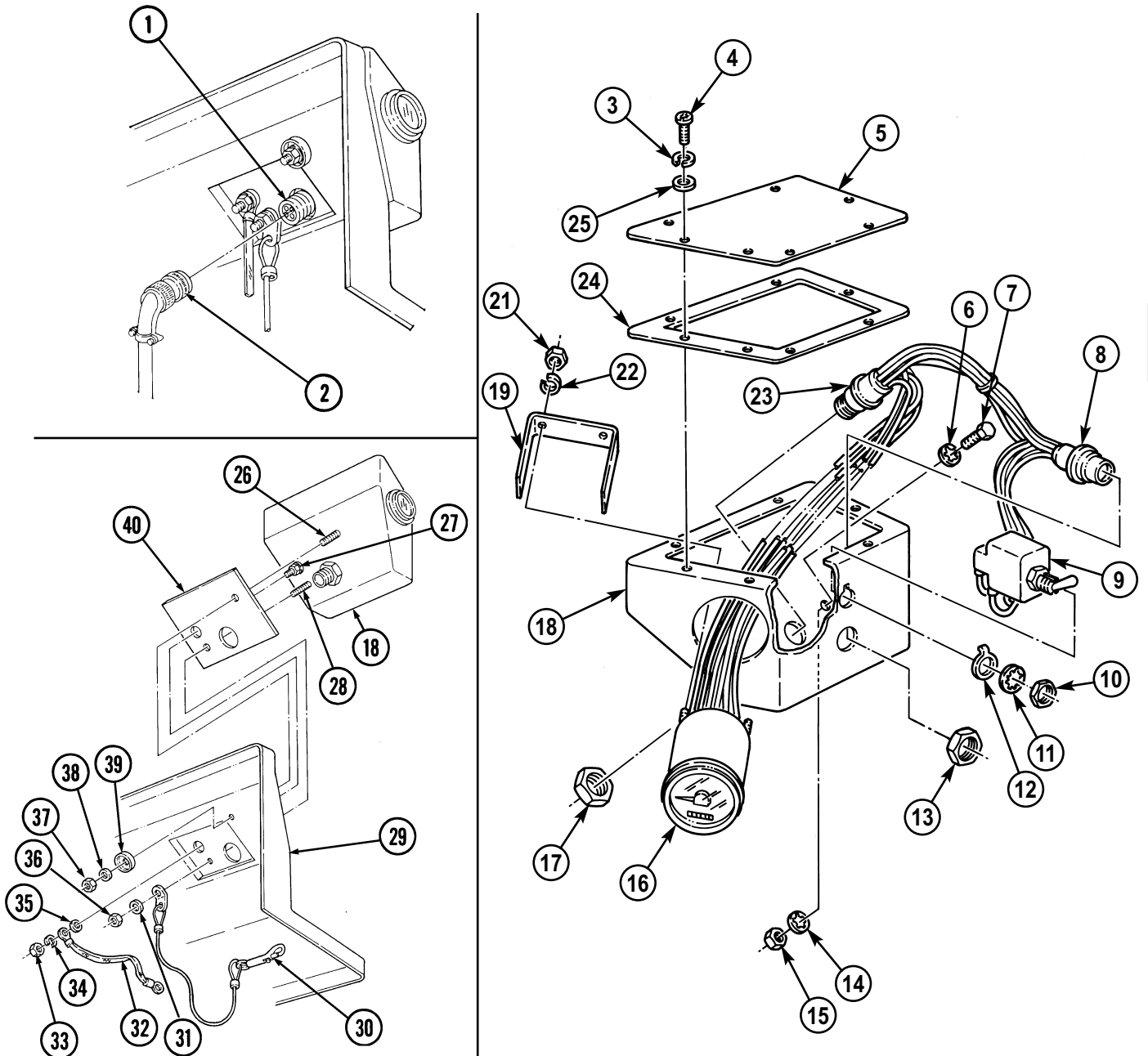
1. Remove engine harness connector (2) from tachometer connector (1).
2. Remove seven screws (4), lockwashers (3), washers (25), cover (5), and gasket (24) from tach/hourmeter box (18). Discard lockwashers (3) and gasket (24).
3. Remove nut (33), lockwasher (34), ground cable (32), and washer (35) from stud (27). Discard lockwasher (34).
4. Remove locknut (36), washer (31), and safety lanyard (30) from stud (28). Discard locknut (36).
5. Remove locknut (37), washer (38), and washer (39) from stud (26) and remove tach/hourmeter box (18) from engine access cover (29). Discard locknut (37).
6. Remove seal (40) from tach/hourmeter box (18). Discard seal (40).
7. Remove nut (15), washer (14), washer (6), and screw (7) from tach/hourmeter box (18).
8. Remove two nuts (21), lockwashers (22), and bracket (19) from tach/hourmeter box (18). Discard lockwashers (22).
9. Remove nuts (13) and (17) from cable connectors (8) and (23).
10. Remove nut (10), lockwasher (11), washer (12), toggle switch (9), cable connectors (8) and (23), and tachometer (16) from tach/hourmeter box (18). Discard lockwasher (11).

b. Installation

1. Install cable connectors (8) and (23) to tach/hourmeter box (18) with nuts (13) and (17).
2. Install toggle switch (9) in tach/hourmeter box (18) with washer (12), lockwasher (11), and nut (10).
3. Install tachometer (16) to tach/hourmeter box (18) with bracket (19), two lockwashers (22), and nuts (21).
4. Install screw (7), washer (6), washer (14), and nut (15) on tach/hourmeter box (18).
5. Install seal (40) on tach/hourmeter box (18).
6. Install tach/hourmeter box (18) on engine access cover (29) with washer (39), washer (38), and locknut (37).
7. Install safety lanyard (30) to stud (28) with washer (31) and locknut (36).

4-13.1. TACHOMETER REPLACEMENT (Cont'd)

8. Install ground cable (32) to stud (27) with washer (35), lockwasher (34), and nut (33).
9. Install cover (5) and gasket (24) to tach/hourmeter box (18) with seven washers (25), lockwashers (3), and screws (4).
10. Install engine harness plug (2) to tachometer connector (1).



- FOLLOW-ON TASKS:**
- Install engine access cover (para. 10-15).
 - Install radio rack (para. 12-132).
 - Install radio rack mounting brackets (para. 12-130).
 - Connect battery ground cables (para. 4-73).

4-13.2. TACHOMETER CABLE CONNECTOR ASSEMBLY REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M1123

Material/Parts

Sealant (Appendix C, Item 10)

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

Tachometer removed (para. 4-13.1).

a. Removal

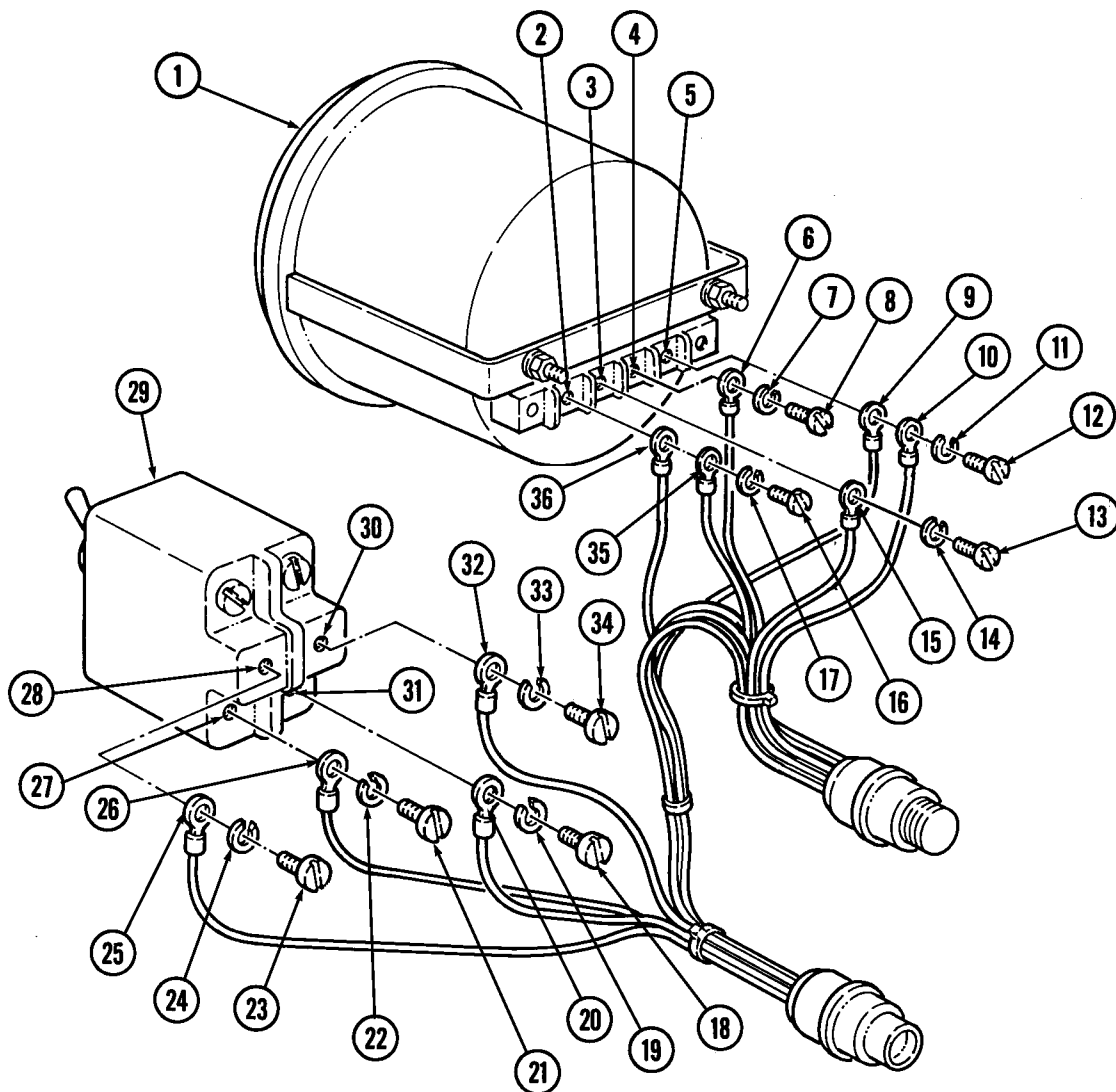
1. Remove screw (13), washer (14), and cable connector wire lead 12 (15) from terminal post SIG (3) on tachometer (1).
2. Remove screw (8), washer (7), and cable connector wire lead 13 (6) from terminal post SIG (4) on tachometer (1).
3. Remove screw (12), washer (11), and cable connector leads 58A (9) and 58B (10) from terminal post NEG (5) on tachometer (1).
4. Remove screw (16), washer (17), and cable connector wire leads 458A (35) and 458B (36) from terminal post POS (2) on tachometer (1).
5. Remove screw (23), washer (24), and cable connector wire lead 11 (25) from terminal post 5 (28) on toggle switch (29).
6. Remove screw (34), washer (33), and cable connector wire lead 10 (32) from terminal post 2 (30) on toggle switch (29).
7. Remove screw (21), washer (22), and cable connector wire lead 97A (26) from terminal post 4 (27) on toggle switch (29).
8. Remove screw (18), washer (19), and cable connector lead 97B (20) from terminal post 1 (31) on toggle switch (29).

b. Installation

1. Apply approximately 0.125 in. (3.175 mm) adhesive sealant to wire leads 97A (26), 97B (20), 10 (32), 11 (25) and terminal posts 1 (31), 2 (30), 4 (27), and 5 (28).
2. Install cable connector wire lead 97B (20) to terminal post 1 (31) on toggle switch (29) with washer (19) and screw (18).
3. Install cable connector wire lead 97A (26) to terminal post 4 (27) on toggle switch (29) with washer (22) and screw (21).
4. Install cable connector wire lead 10 (32) to terminal post 2 (30) on toggle switch (29) with washer (33) and screw (34).
5. Install cable connector wire lead 11 (25) to terminal post 5 (28) on toggle switch (29) with washer (24) and screw (23).
6. Apply approximately 0.125-in. of adhesive sealant to wire leads 13 (6), 58A (9), 58B (10), 12 (15), 458A (35), 458B (36) and terminal posts POS (2), SIG (3), SIG (4), and NEG (5).
7. Install cable connector wire leads 458A (35) and 458B (36) to terminal post POS (2) on tachometer (1) with washer (17) and screw (16).

4-13.2. TACHOMETER CABLE CONNECTOR ASSEMBLY REPLACEMENT (Gr'd)

8. Install cable connector wire leads 58A (9) and 58B (10) to terminal post NEG (5) on tachometer (1) with washer (11) and screw (12).
9. Install cable connector wire lead 13 (6) to terminal post SIG (4) on tachometer (1) with washer (7) and screw (8).
10. Install cable connector wire lead 12 (15) to terminal post SIG (3) on tachometer (1) with washer (14) and screw (13).



FOLLOW-ON TASK: Install tachometer (para. 4-13.1).

4-14. SPEEDOMETER/ODOMETER REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

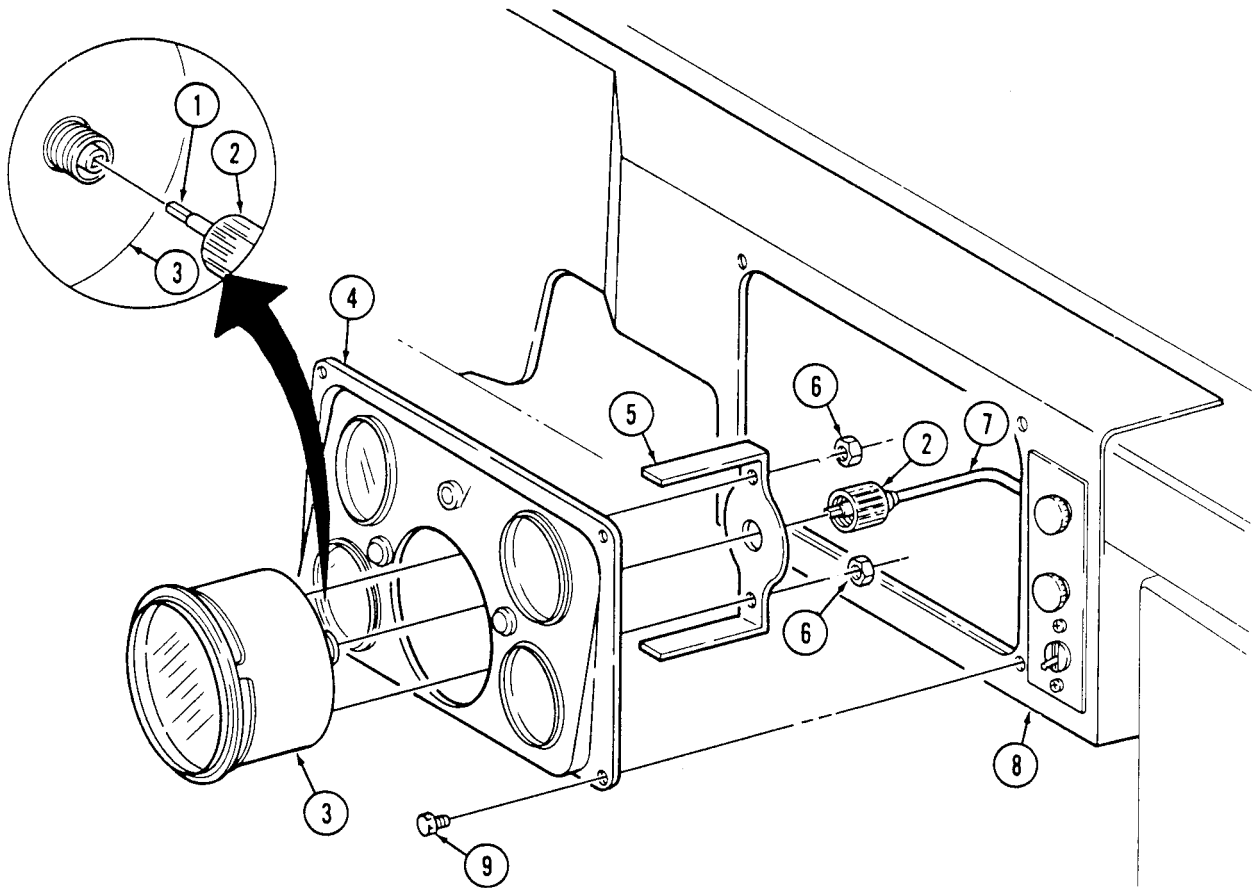
a. Removal

1. Remove four capscrews (9) from instrument cluster (4) and instrument panel (8).
2. Pull instrument cluster (4) away from panel (8).
3. Loosen large nut (2) on speedometer cable (7) and pull cable end out of speedometer (3).
4. Remove two nuts (6), speedometer retaining bracket (5), and speedometer (3) from instrument cluster (4).

b. Installation

1. Install speedometer (3) and speedometer retaining bracket (5) on instrument cluster (4) with two nuts (6). Tighten nuts (6) to 8 lb-in. (1 N•m).
2. Install speedometer cable (7) into back of speedometer (3), ensuring core (1) engages in square hole in speedometer (3), and tighten cable nut (2).
3. Install instrument cluster (4) to panel (8) with four capscrews (9).

4-14. SPEEDOMETER/ODOMETER REPLACEMENT (Cont'd)



FOLLOW-ON TASK: Check operation of speedometer (TM9-2320-280-10).

4-15. SPEEDOMETER CABLE AND CORE (12338428) REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Materials/Parts

Plain-assembled nut (Appendix G, Item 201)

Equipment Condition

- Hood raised and secured (TM 9-2320-280-10).
- Engine access cover removed (para. 10-15).

a. Removal

NOTE

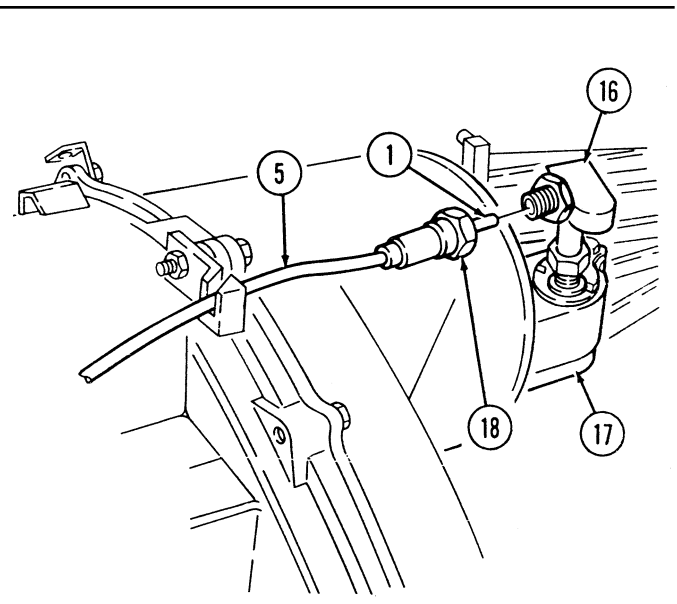
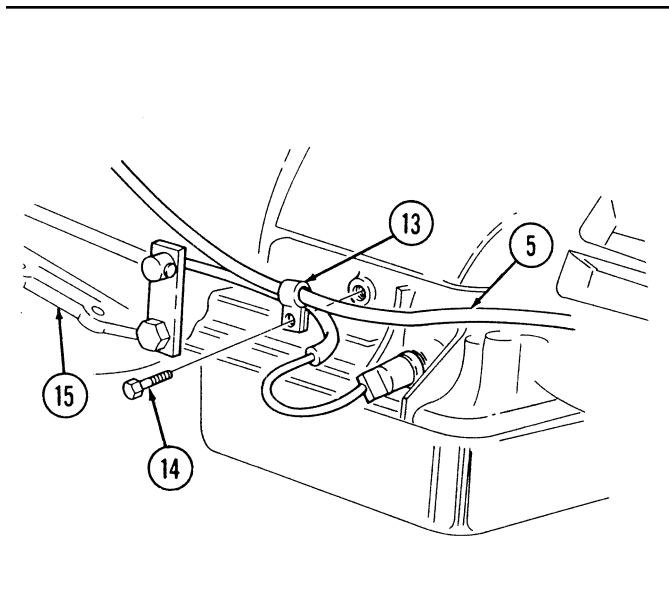
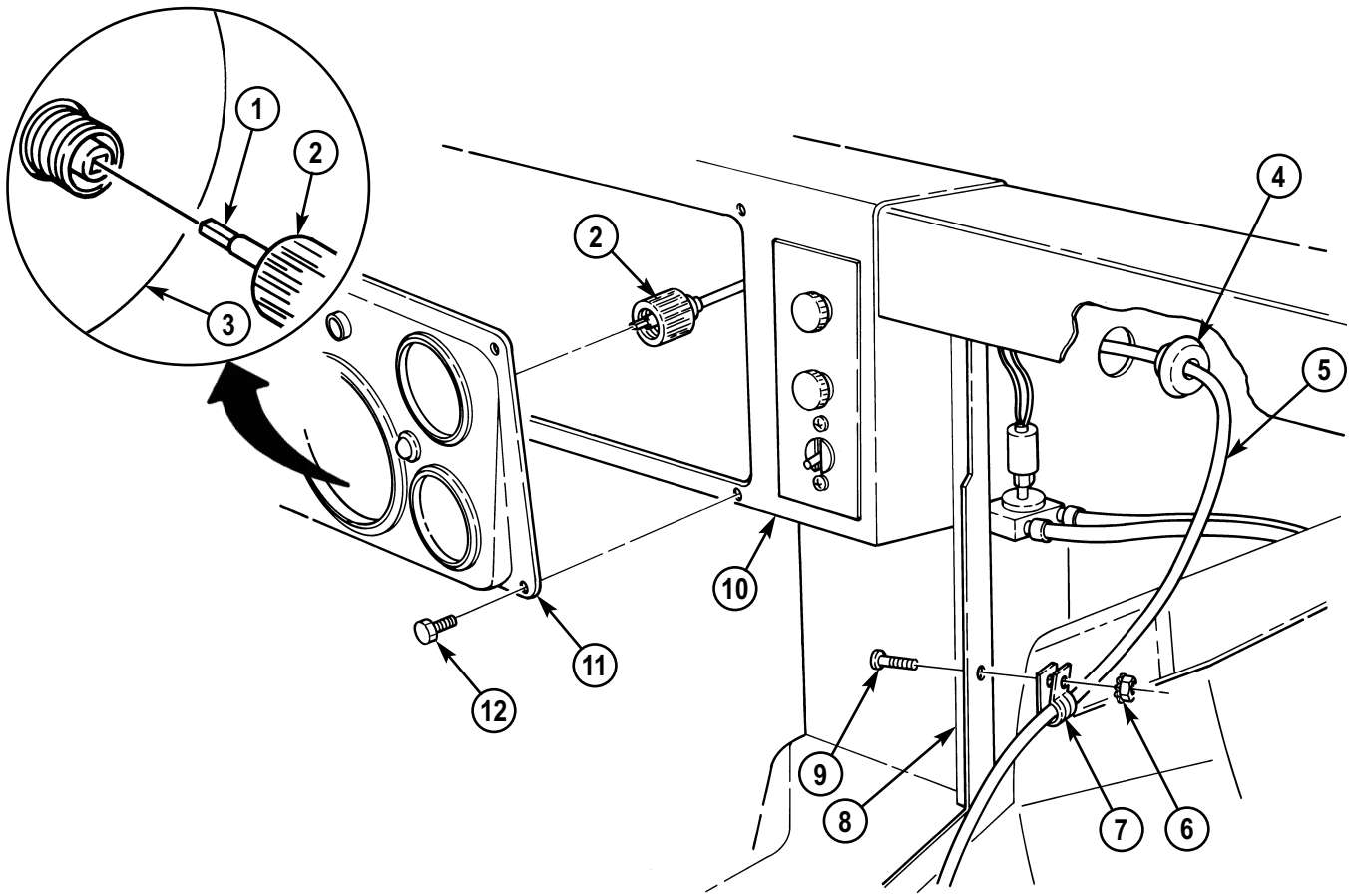
If vehicle is equipped with speedometer cable (12338428-2), refer to para. 4-15.1.

1. Remove four capscrews (12) from instrument cluster (11) and instrument panel (10) and pull instrument cluster (11) away to gain access to back of speedometer (3).
2. Remove speedometer driveshaft nut (2) from speedometer (3).
3. Push speedometer cable (5) and rubber grommet (4) through body (8).
4. Remove screw (9) and plain-assembled nut (6) from clamp (7) on body (8). Remove clamp (7) from speedometer cable (5). Discard plain-assembled nut (6).
5. Working under vehicle, remove screw (14) and clamp (13) from side of transmission (15). Remove clamp (13) from speedometer cable (5).
6. Remove speedometer driveshaft nut (18) and speedometer cable (5) from adapter (16) on transfer case (17) and remove speedometer cable (5).

b. Installation

1. Install speedometer cable (5) into adapter (16), ensuring core (1) engages in square hole in adapter (16), and tighten speedometer cable nut (18).
2. Install speedometer cable (5) and clamp (13) on side of transmission (15) with screw (14).
3. Secure speedometer cable (5) and clamp (7) on body (8) with screw (9) and plain-assembled nut (6).
4. Install speedometer cable (5) and grommet (4) on body (8).
5. Install speedometer cable (5) into back of speedometer (3), ensuring core (1) engages in square hole in speedometer (3) and tighten speedometer cable nut (2).
6. Install instrument cluster (11) on panel (10) with four capscrews (12).

4-15. SPEEDOMETER CABLE AND CORE (12338428) REPLACEMENT (Cont'd)



- FOLLOW-ON TASKS:**
- Lower and secure hood (TM 9-2320-280-10).
 - Install engine access cover (para. 10-15).

4-15.1. SPEEDOMETER CABLE AND CORE (12338428-2) REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

All models except M1123 and "A2" series vehicles

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

- Hood raised and secured (TM 9-2320-280-10).
- Engine access cover removed (para. 10-15).
- Battery ground cable disconnected (para. 4-73).
- Fuel filter drain hose removed (para. 3-34).
- Left splash shield removed (para. 10-17).

Materials/Parts

Plain-assembled nut (Appendix G, Item 201)
Tiedown strap (Appendix G, Item 315)

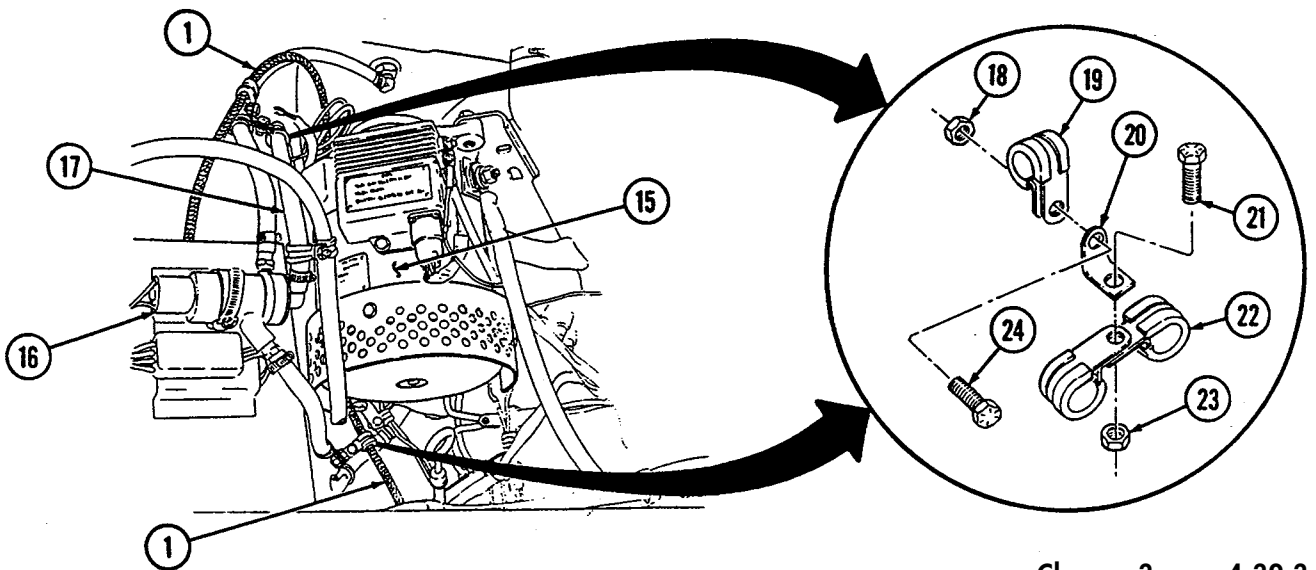
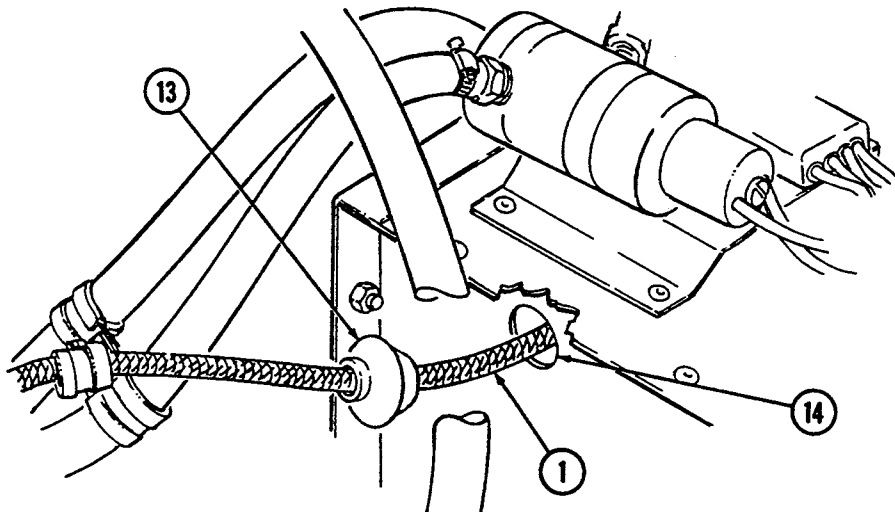
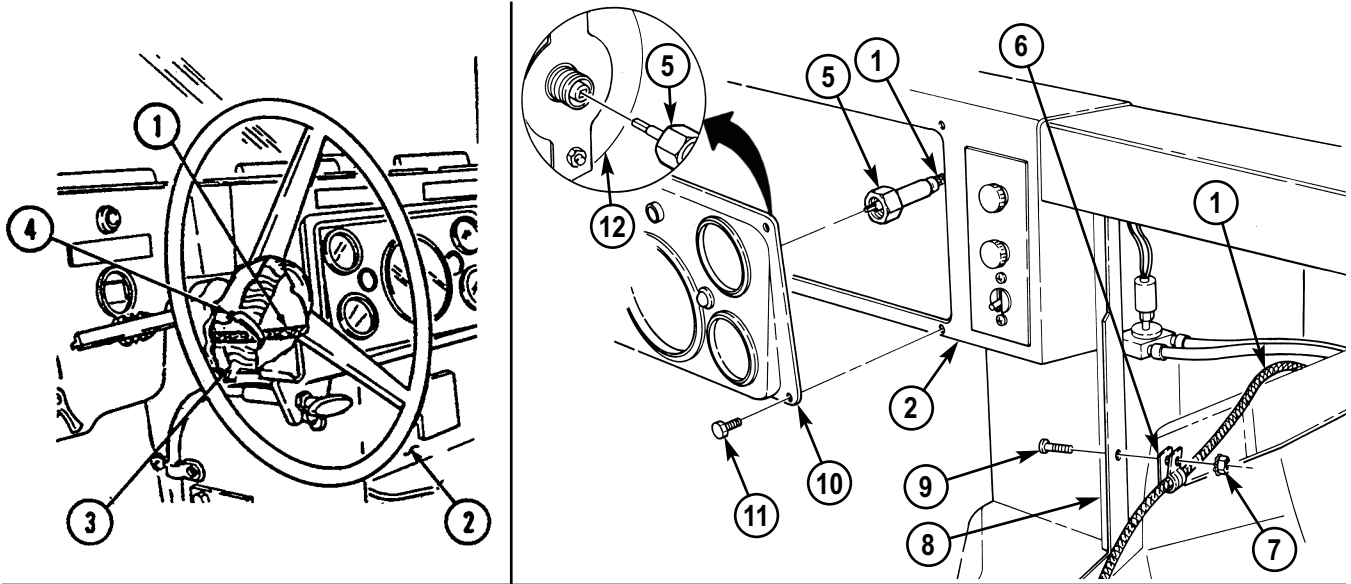
NOTE

If vehicle is equipped with speedometer cable (12338428), refer to para. 4-15.

a. Removal

1. Remove tiedown strap (4) from speedometer cable (1) and wiring harness (3) behind instrument panel (2). Discard tiedown strap (4).
2. Remove four capscrews (11) and pull instrument cluster (10) away to gain access to back of speedometer (12).
3. Loosen nut (5) and remove speedometer cable (1) from speedometer (12).
4. Remove plain-assembled nut (7), clamp (6), screw (9), and speedometer cable (1) from body (8). Discard plain-assembled nut (7).
5. Push speedometer cable (1) and grommet (13) through cowl (14).
6. Remove two nuts (18), screws (24), clamps (19), and speedometer cable (1) from two speedometer cable support braces (20) located in front of solenoid control valve (16) and behind alternator (15).
7. Remove nut (23), screw (21), and speedometer cable support brace (20) from two clamps (22) on hydraulic hoses (17) located in front of solenoid control valve (16).
8. Remove nut (23), screw (21), and speedometer cable support brace (20) from two clamps (22) on hydraulic hoses (17) located behind alternator (15).
9. Remove speedometer cable (1) from under alternator (15).

4-15.1. SPEEDOMETER CABLE AND CORE (12338428-2) REPLACEMENT (Cont'd)

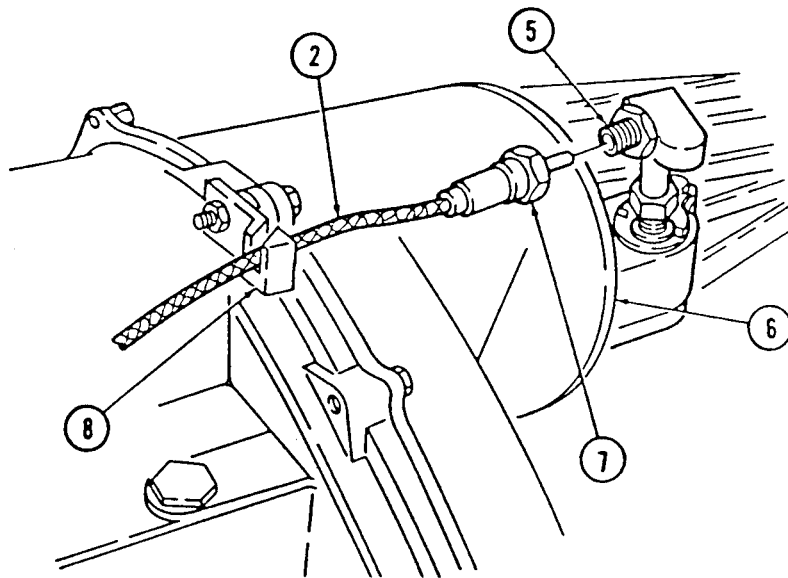
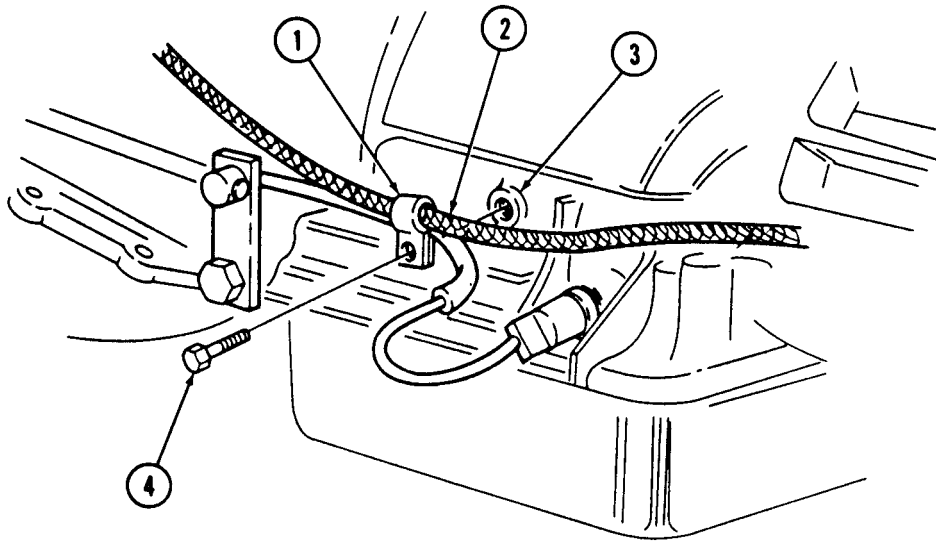


4-15.1. SPEEDOMETER CABLE AND CORE (12338428-2) REPLACEMENT (Cont'd)

10. Remove screw (4), clamp (1), and speedometer cable (2) from transmission (3).
11. Remove speedometer cable (2) from standoff bracket (8) on transfer case (6).
12. Loosen nut (7) and remove speedometer cable (2) from adapter (5) on transfer case (6).

b. Installation

1. Install speedometer cable (2) into adapter (5) on transfer case (6) and tighten nut (7) to 90-110 lb-in (10-12 N•m).
2. Install speedometer cable (2) through standoff bracket (8) on transfer case (6).
3. Install speedometer cable (2) on transmission (3) with clamp (1) and screw (4).

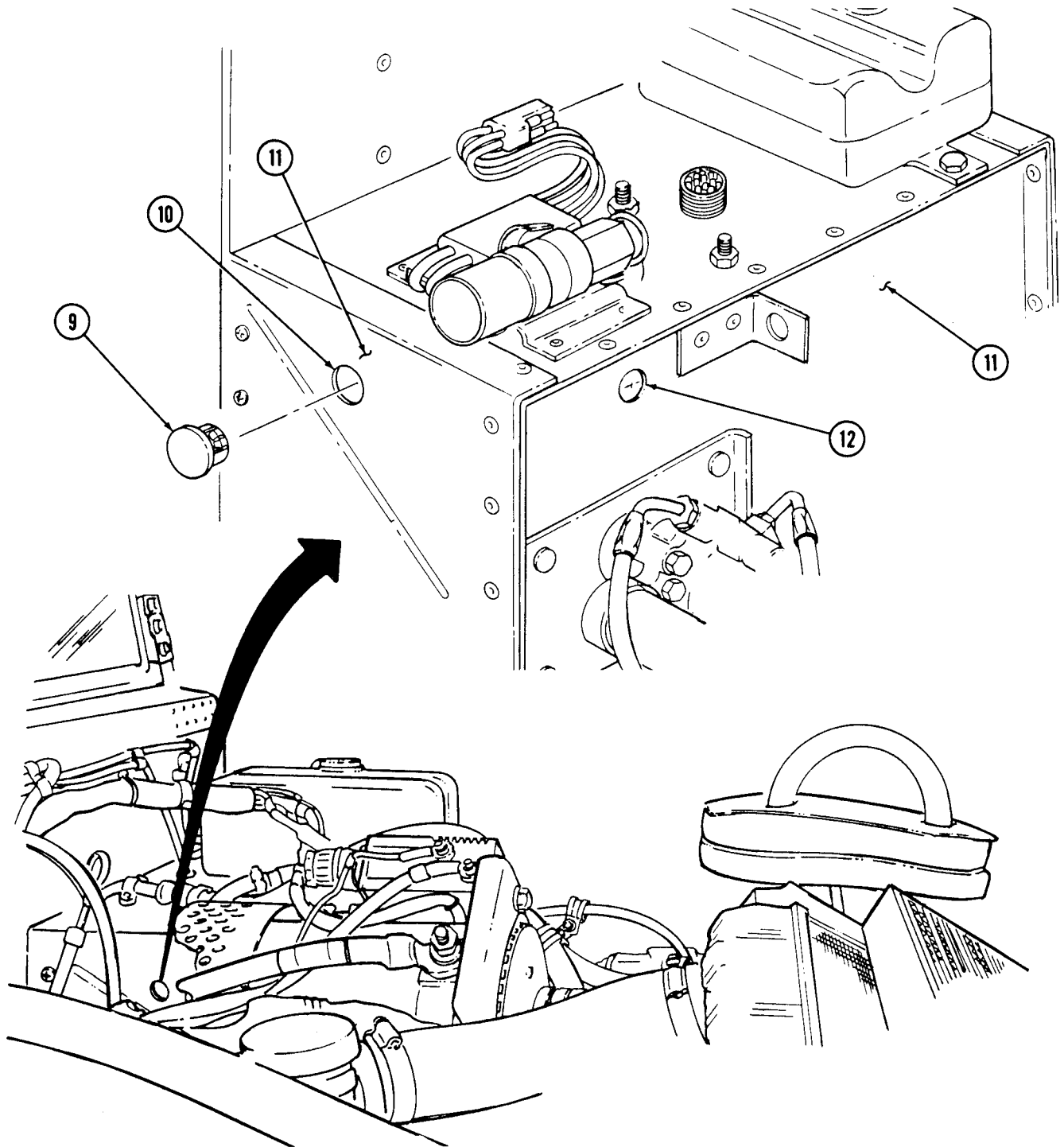


4-15.1. SPEEDOMETER CABLE AND CORE (12338428-2) REPLACEMENT (Cont'd)

NOTE

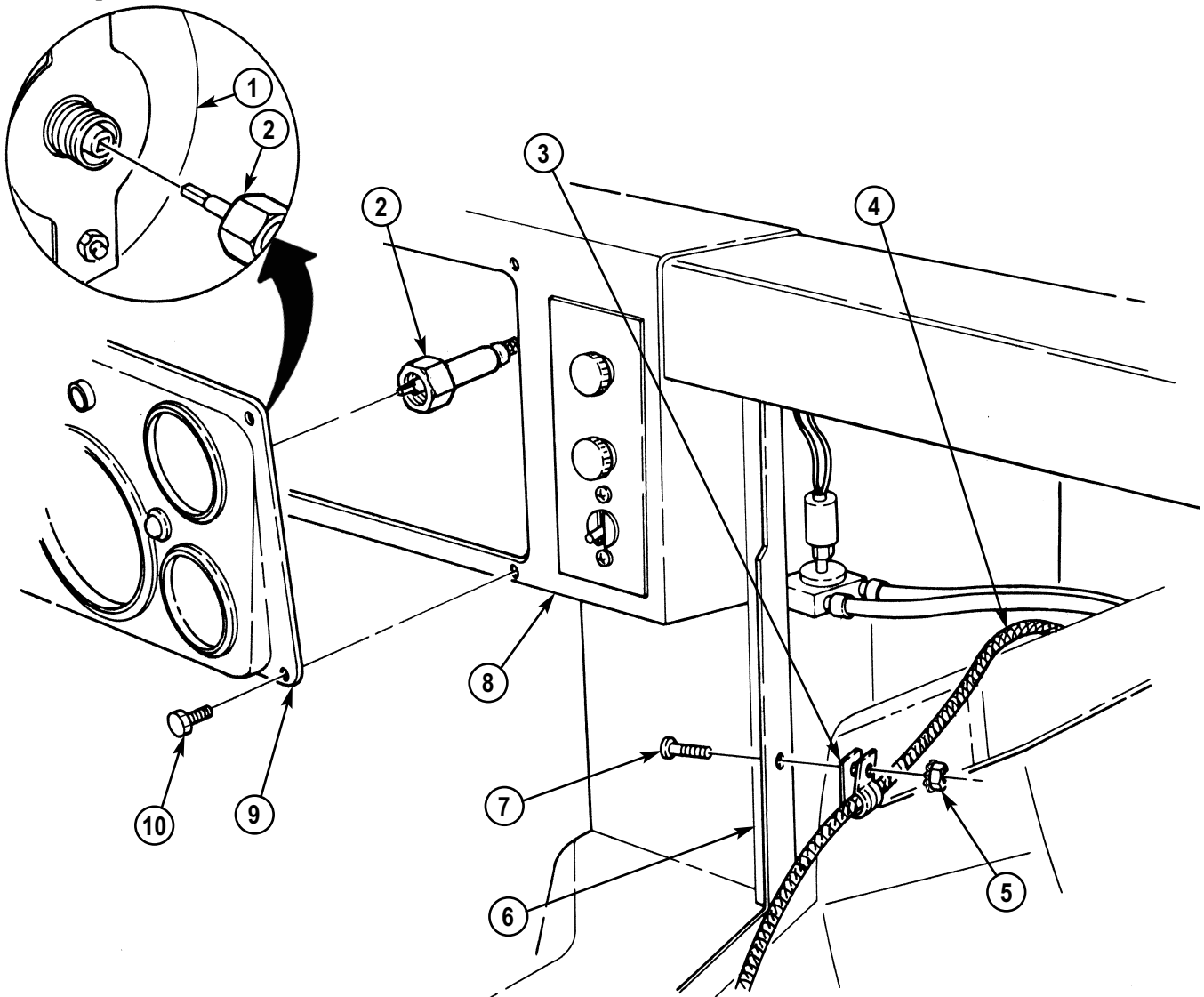
If installing speedometer cable (12338428-2) for the first time, perform steps 4 and 5. If not go to step 6.

4. Install plug (9) in existing hole (10) located in left inner cowl (11).
5. Locate, mark, and drill 1.00-in. (25.4 mm) diameter hole (12) in front of cowl (11).

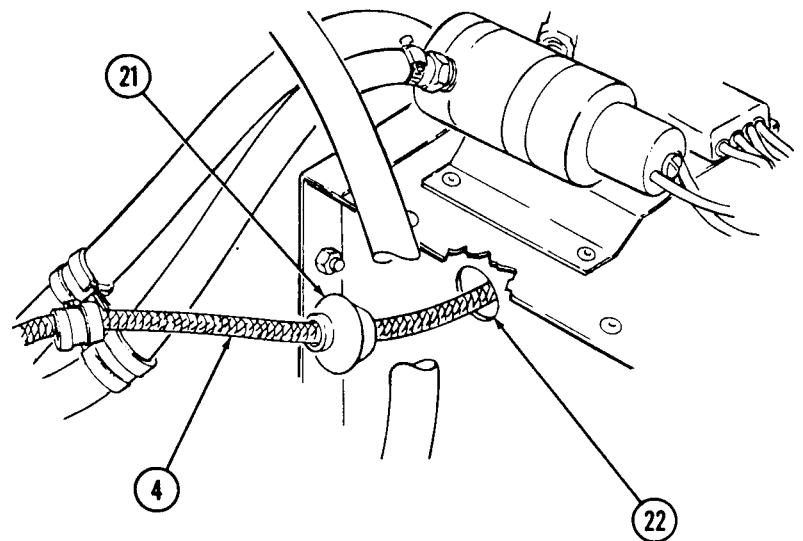
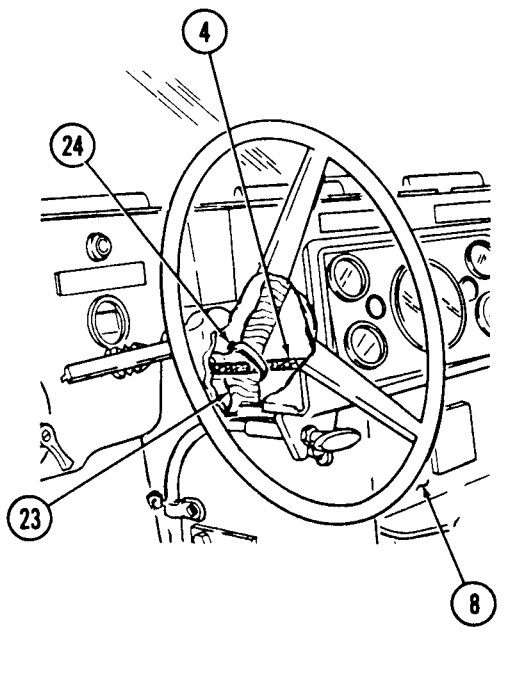
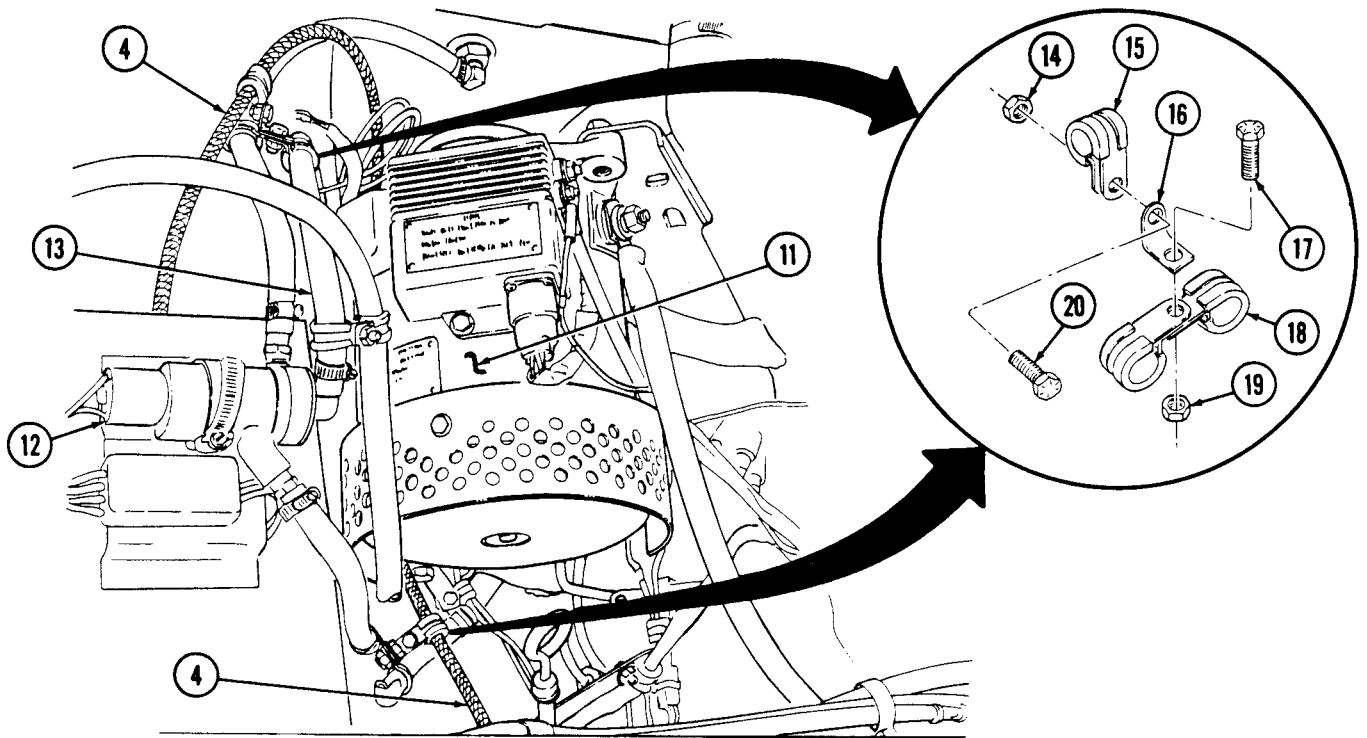


4-15.1. SPEEDOMETER CABLE AND CORE (12338428-2) REPLACEMENT (Cont'd)

6. Install speedometer cable (4) on body (6) with clamp (3), screw (7), and plain-assembled nut (5).
7. Route speedometer cable (4) under alternator (11) next to hydraulic hoses (13).
8. Install speedometer cable support brace (16) on two clamps (18) and hydraulic hoses (13) located behind alternator (11) with screw (17) and nut (19).
9. Install speedometer cable (4) and clamp (15) on speedometer cable support brace (16) with screw (20) and nut (14).
10. Install speedometer cable support brace (16) on two clamps (18) and hydraulic hoses (13) located in front of solenoid control valve (12) with screw (17) and nut (19).
11. Install speedometer cable (4) and clamp (15) on speedometer cable support brace (16) with screw (20) and nut (14).
12. Install speedometer cable (4) and grommet (21) into cowl (22).
13. Install speedometer cable (4) on speedometer (1).
14. Install instrument cluster (9) on instrument panel (8) with four capscrews (10).
15. Install tiedown strap (24) on speedometer cable (4) and wiring harness (23) behind instrument panel (8).



4-15.1. SPEEDOMETER CABLE AND CORE (12338428-2) REPLACEMENT (Cont'd)



- FOLLOW-ON-TASK:
- Install left splash shield (para. 10-17).
 - Connect battery ground cable (para. 4-73).
 - Install fuel filler drain hose (para 3-34).
 - Install engine access cover (para. 10-15).
 - Lower and secure hood (TM 9-2320-280-10).

4-16. INSTRUMENT CLUSTER LIGHT REPLACEMENT

This task covers:

- a. Lamp Removal
- b. Lamp Installation

- c. Light Assembly Removal
- d. Light Assembly Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

Battery ground cable disconnected (para. 4-73).

Manual References

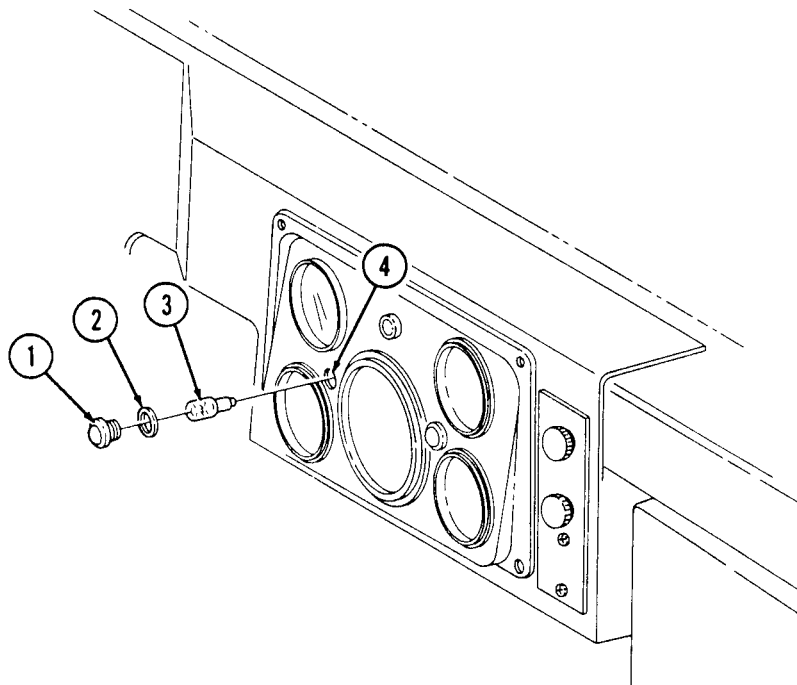
- TM 9-2320-280-10
- TM 9-2320-280-24P

a. Lamp Removal

1. Remove light lens (1) and gasket (2) from light assembly (4).
2. Remove lamp (3) from light assembly (4).

b. Lamp Installation

1. Install lamp (3) into light assembly (4).
2. Install gasket (2) and lens (1) to light assembly (4).



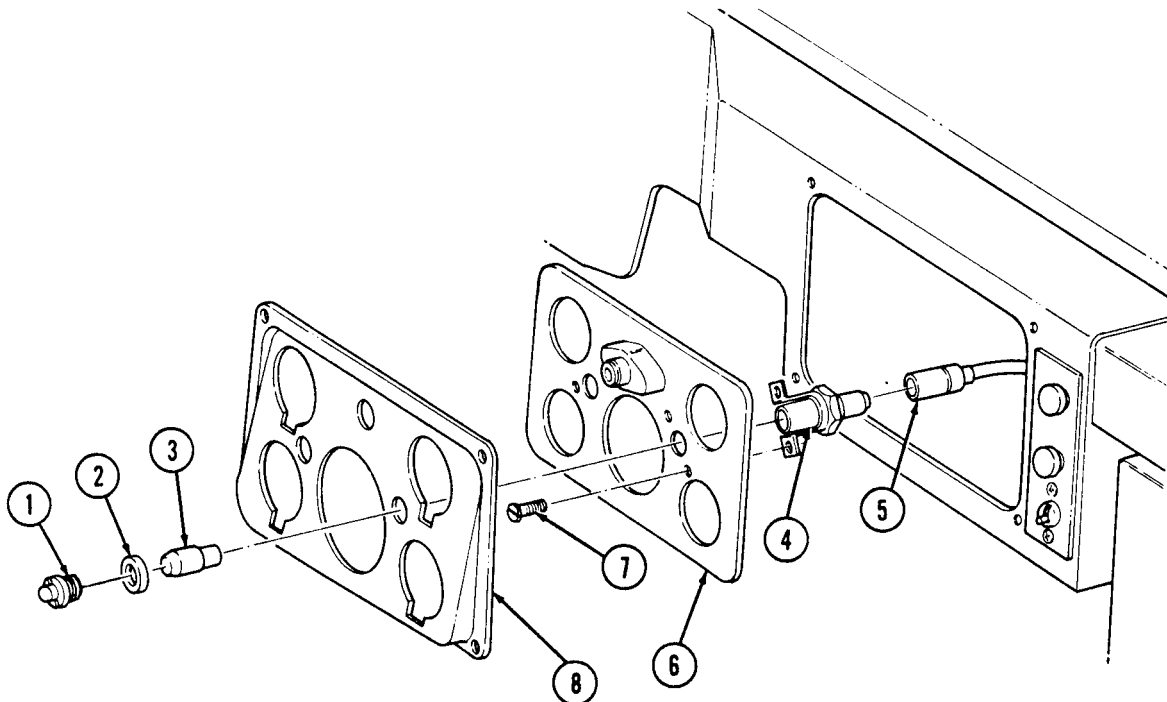
4-16. INSTRUMENT CLUSTER LIGHT REPLACEMENT (Cont'd)

c. Light Assembly Removal

1. Remove two light lenses (1) and gaskets (2) from light assemblies (4).
2. Remove lamp (3) from light assembly (4) being replaced.
3. Remove all electrical gauges (para. 4-13) and speedometer/odometer (para. 4-14).
4. Separate instrument cluster (8) from backing panel (6).
5. Disconnect harness lead 40B (5) from light assembly (4).
6. Remove two screws (7) and light assembly (4) from backing panel (6).

d. Light Assembly Installation

1. Install light assembly (4) to backing panel (6) with two screws (7).
2. Install backing panel (6) to instrument cluster (8).
3. Install all electrical gauges (para. 4-13) and speedometer/odometer (para. 4-14).
4. Connect harness lead 40B (5) to light assembly (4).
5. Install lamp (3) into light assembly (4).
6. Install two gaskets (2) and light lenses (1) on light assemblies (4).



FOLLOW-ON TASK: Connect battery ground cable (para. 4-73).

4-17. WAIT-TO-START LAMP REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
 automotive (Appendix B, Item 1)
 Maintenance and repair shop equipment:
 automotive (Appendix B, Item 2)

Equipment Condition

- Battery ground cable disconnected (para. 4-73).
- Instrument cluster removed (para. 4-11).

Manual References

TM 9-2320-280-10
 TM 9-2320-280-24P

NOTE

Prior to removal, tag leads and note position for installation.

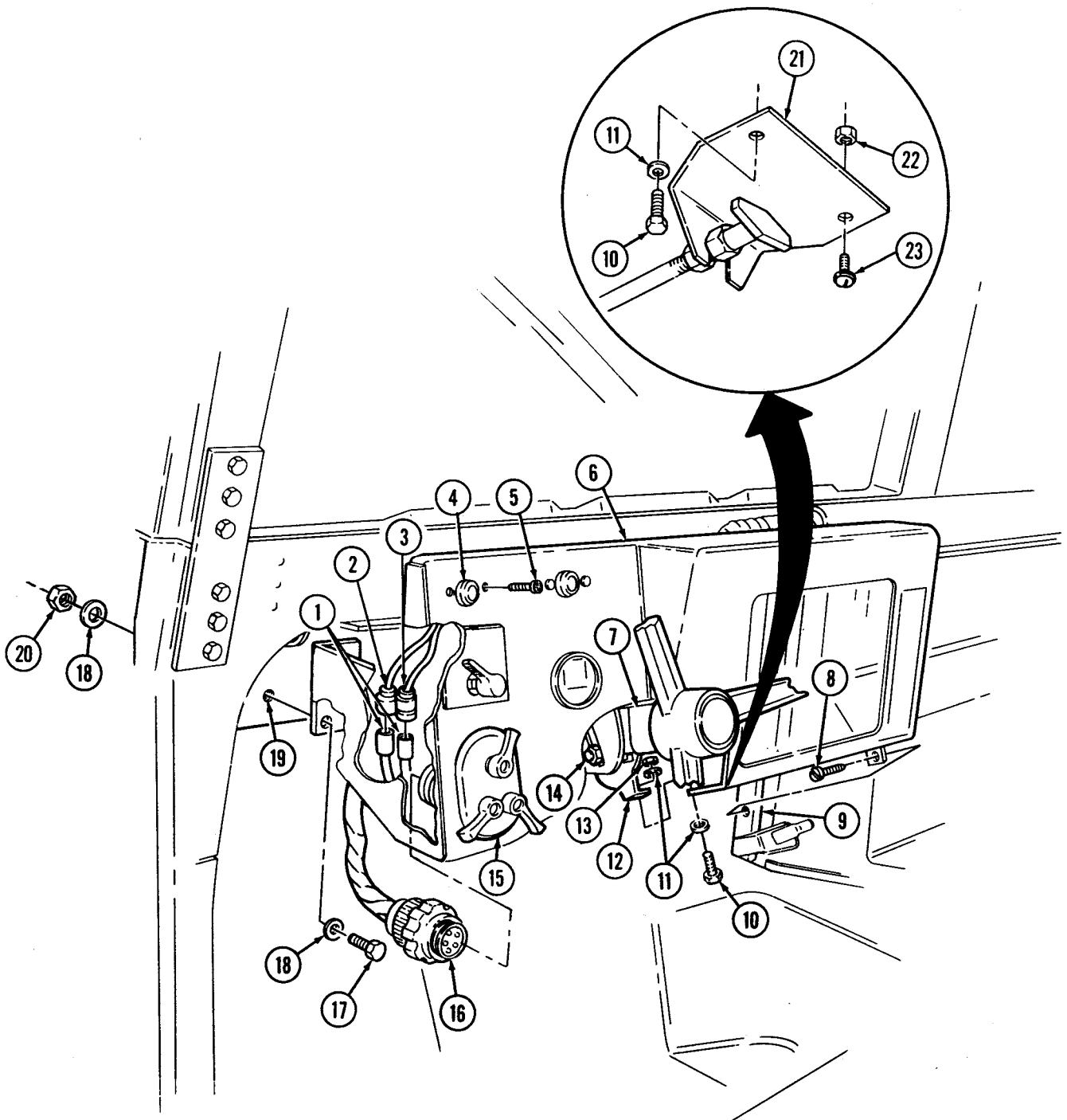
a. Removal

1. Loosen nut (14) and lower steering column (7).
2. Remove cannon plug (16) from main light switch (15).
3. Remove two capscrews (17), washers (18), nuts (20), and washers (18) from instrument panel (6) and body (19).
4. Remove nut (22) and screw (23) from hand throttle bracket (21) and instrument panel (6).
5. Remove nut (13), washer (11), capscrew (10), and washer (11) from instrument panel (6), hand throttle bracket (21), and steering column bracket (12).
6. Remove screw (8) from instrument panel (6) and cowl (9).
7. Pull instrument panel (6) away from body (19).
8. Remove two screws (5) from wait-to-start lamp (4) and instrument panel (6).
9. Disconnect lead 571 (2) and 27 (3) from wiring harness (1).
10. Remove wait-to-start lamp (4).

b. Installation

1. Connect lead 571 (2) and 27 (3) to wiring harness (1).
2. Install wait-to-start lamp (4) on instrument panel (6) with two screws (5).
3. Install instrument panel (6) on cowl (9) with screw (8).
4. Install instrument panel (6) and hand throttle bracket (21) on steering column bracket (12) with capscrew (10), washer (11), nut (13), and washer (11).
5. Install hand throttle bracket (21) to instrument panel (6) with screw (23) and nut (22).
6. Install instrument panel (6) to body (19) with two capscrews (17), washers (18), nuts (20), and washers (18).
7. Install cannon plug (16) on main light switch (15).
8. Raise steering column (7) and tighten nut (14) to 31 lb-ft (42 N•m).

4-17. WAIT-TO-START LAMP REPLACEMENT (Cont'd)



- FOLLOW-ON TASKS:**
- Install instrument cluster (para. 4-11).
 - Connect battery ground cable (para. 4-73).
 - Start engine (TM 9-2320-280-10) and check wait-to-start lamp assembly for operation.

4-17.1. BRAKE WARNING LAMP REPLACEMENT

This task covers:

- a. Removal b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Materials/Parts

Tape (Appendix C, Item 50)

Equipment Condition

- Battery ground cables disconnected (para. 4-73).
- Air restriction gauge removed (para. 3-17).

NOTE

Prior to removal, tag leads for installation.

a. Removal

1. Remove two screws (2) from brake warning lamp (1) and instrument panel (5).
2. Disconnect leads 67 (7) and 27 (3) from wiring harness leads (6).
3. Slide brake warning lamp (1) down toward steering column (4) and remove brake warning lamp (1).

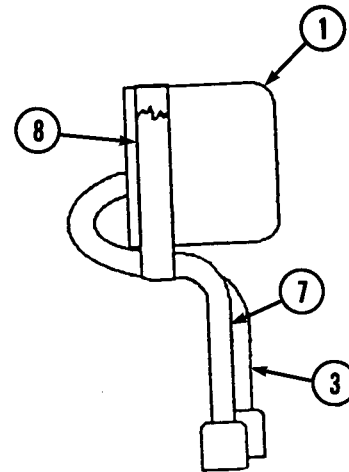
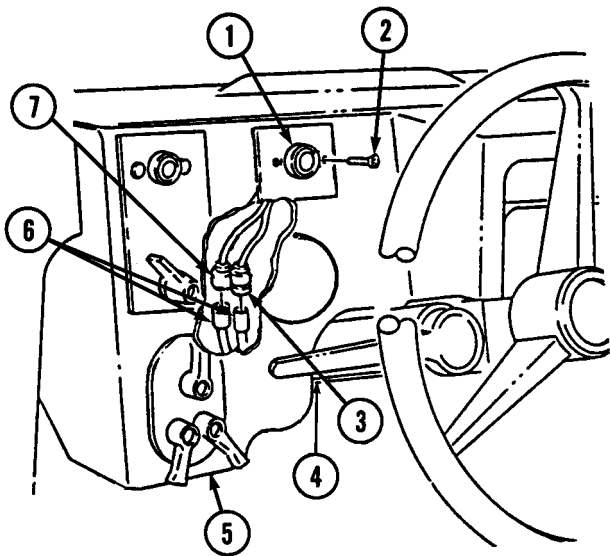
b. Installation

NOTE

Place tape around lead wires to keep lamp in proper position during installation.

1. Install tape (8) around lamp (1) and lead wires (7) and (3).
2. Slide brake warning lamp (1) up along steering column (4) and install brake warning lamp (1) on instrument panel (5) with two screws (2).
3. Connect leads 67 (7) and 27 (3) to wiring harness leads (6).

4-17.1. BRAKE WARNING LAMP REPLACEMENT (Cn't'd)



- FOLLOW-ON TASKS:**
- Install air restriction gauge (para. 3-17).
 - Connect battery ground cables (para. 4-73).
 - Start engine (TM 9-2320-280-10) and check brake warning lamp for operation.

4-18. HIGH BEAM LAMP REPLACEMENT

This Task Covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item

Equipment Condition

- Electrical gauges removed (para. 4-13).
- Speedometer/odometer removed (para. 4-14).

Manual References

TM 9-2320-280-24P

NOTE

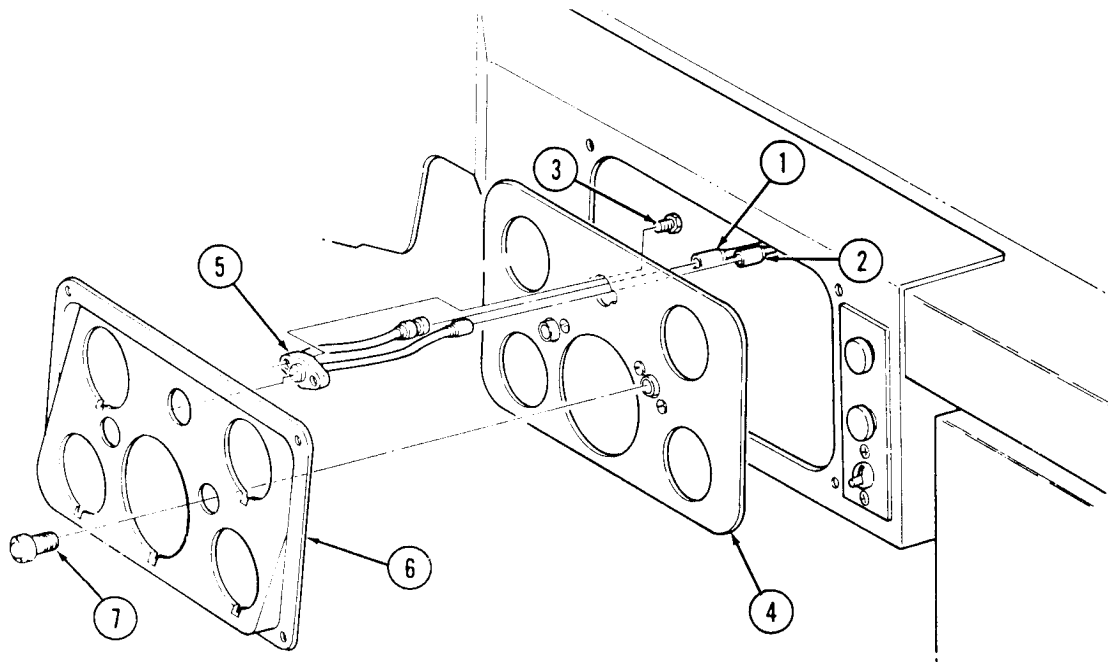
Prior to removal, tag leads for installation.

a. Removal

1. Remove two light lenses (7) from instrument cluster back panel (4).
2. Remove instrument cluster (6) from instrument cluster back panel (4).
3. Disconnect harness lead 57L (1) and lead 17B (2) from high beam lamp (5).
4. Remove two screws (3) and high beam lamp (5) from instrument cluster back panel (4).

b. Installation

1. Install high beam lamp (5) on instrument cluster back panel (4) with two screws (3).
2. Connect harness lead 57L (1) and lead 178 (2) to high beam lamp (5).
3. Install instrument cluster (6) on instrument cluster back panel (4).
4. Install two light lenses (7) on instrument cluster back panel (4).



FOLLOW-ON TASKS: • Install speedometer/odometer (para. 4-14).
• Install electrical gauges (para. 4-13).

4-19. PARKING BRAKE SWITCH REPLACEMENT

This Task Covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

Battery ground cable disconnected (para. 4-73).

Manual References

TM 9-2320-280-24P

NOTE

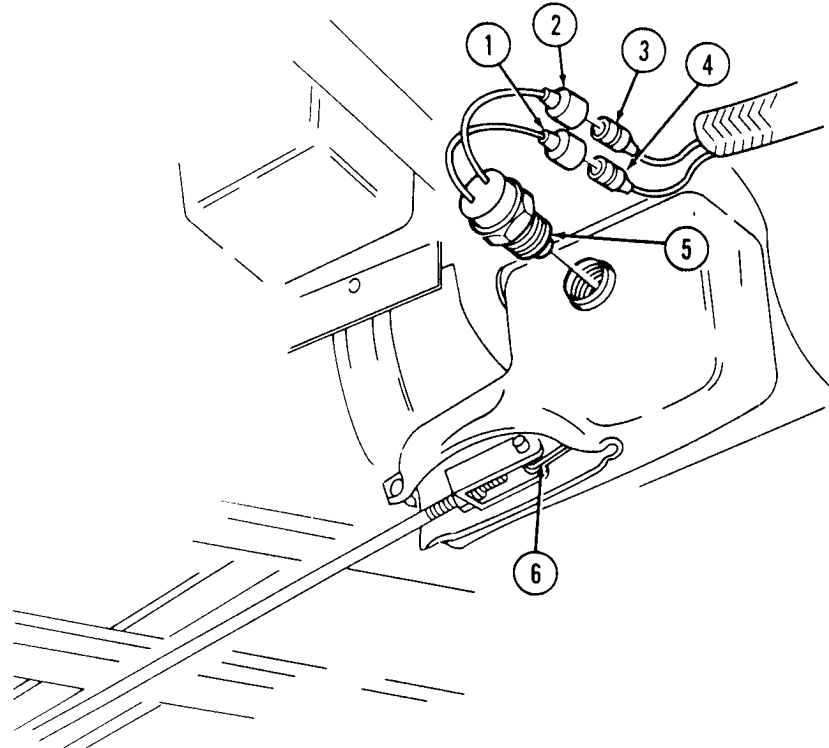
Prior to removal, tag leads for installation.

a. Removal

1. Disconnect parking brake switch lead 67C (1) and 67 (2) from wiring harness leads 67B (3) and 67E (4).
2. Remove parking brake switch (5) from parking brake lever (6).

b. Installation

1. Install parking brake switch (5) to parking brake lever (6).
2. Connect lead 67C (1) and 67 (2) to wiring harness leads 67B (3) and 67E (4).



- FOLLOW-ON TASKS:
- Connect battery ground cable (para. 4-73).
 - Check parking brake switch operation (TM 9-2320-280-10).

4-20. HORN SWITCH REPLACEMENT

This Task Covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Materials/Parts

Sealing compound (Appendix C, Item 46)

Equipment Condition

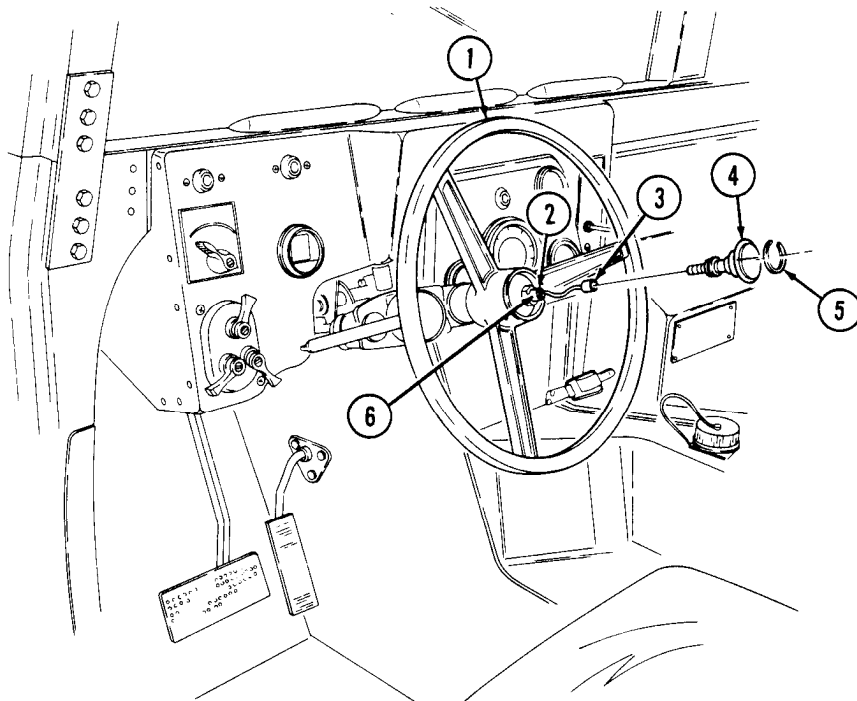
Battery ground cable disconnected (para. 4-73).

a. Removal

1. Remove snapping (5) from horn switch (4) and steering wheel (1).
2. Pull horn switch (4) out and disconnect from lead 25A (3) in steering shaft (2).

b. Installation

1. Apply sealing compound to bushing (6).
2. Connect lead 25A (3) to horn switch (4) and push into steering shaft (2).
3. Install snapping (5) on horn switch (4) and steering wheel (1).



- FOLLOW-ON TASKS:
- Connect battery ground cable (para. 4-73).
 - Test horn for operation (TM 9-2320-280-10).

4-21. HORN CONTROL BRUSH REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Materials/Parts

Sealant (Appendix C, Item 38)

Equipment Condition

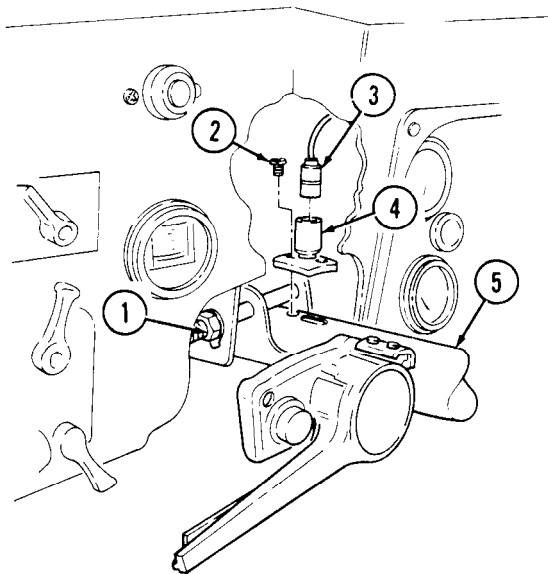
Battery ground cable disconnected (para. 4-73).

a. Lamp Removal

1. Loosen nut (1) and lower steering column (5).
2. Disconnect lead 25A (3) from horn control brush (4).
3. Remove two screws (2) from horn control brush (4) and steering column (5).
4. Pry horn control brush (4) out of steering column (5).
5. Clean sealant from steering column (5).

b. Installation

1. Apply sealing to bottom of horn control brush (4).
2. Install horn control brush (4) into steering column (5) with two screws (2).
3. Connect lead 25A (3) to horn control brush (4).
4. Raise steering column (5) and tighten nut (1) to 31 lb-ft (42 N•m).



- FOLLOW-ON TASKS:
- Connect battery ground cable (para. 4-73).
 - Check horn for proper operation (TM 9-2320-280-10).

4-22. HORN REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Materials/Parts

Two lockwashers (Appendix G, Item 175)

Equipment Condition

- Battery ground cable disconnected (para. 4-73).
- Hood raised and secured (TM 9-2320-280-10).

NOTE

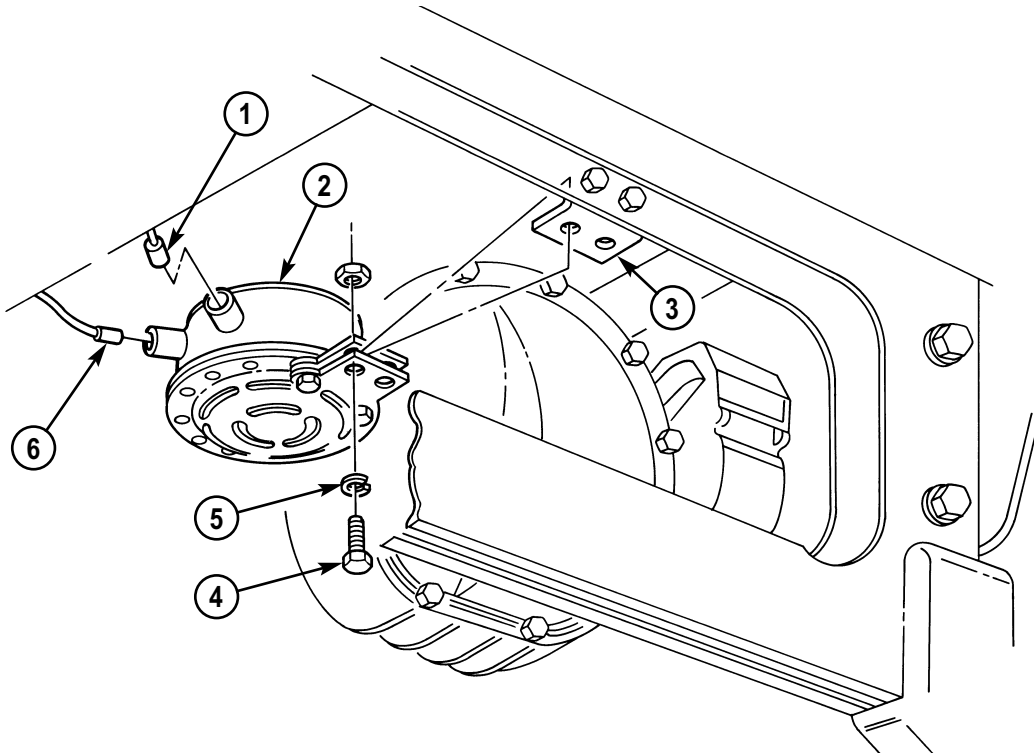
Prior to removal, tag leads for installation.

a. Removal

1. Remove two capscrews (4), lockwashers (5) and horn (2) from bracket (3). Discard lockwashers (5).
2. Disconnect lead 25A (1) and 26A (6) from horn (2).

b. Installation

1. Connect leads 25A (1) and 26A (6) to horn (2).
2. Install horn (2) on bracket (3) with two lockwashers (5) and capscrews (4).



- FOLLOW-ON TASKS:**
- Connect battery ground cable (para. 4-73).
 - Lower and secure hood (TM 9-2320-280-10).
 - Check horn for proper operation (TM 9-2320-280-10).

4-23. HORN MOUNTING BRACKET REPLACEMENT

This Task Covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-24P

Materials/Parts

Two lockwashers (Appendix G, Item 133)

Equipment Condition

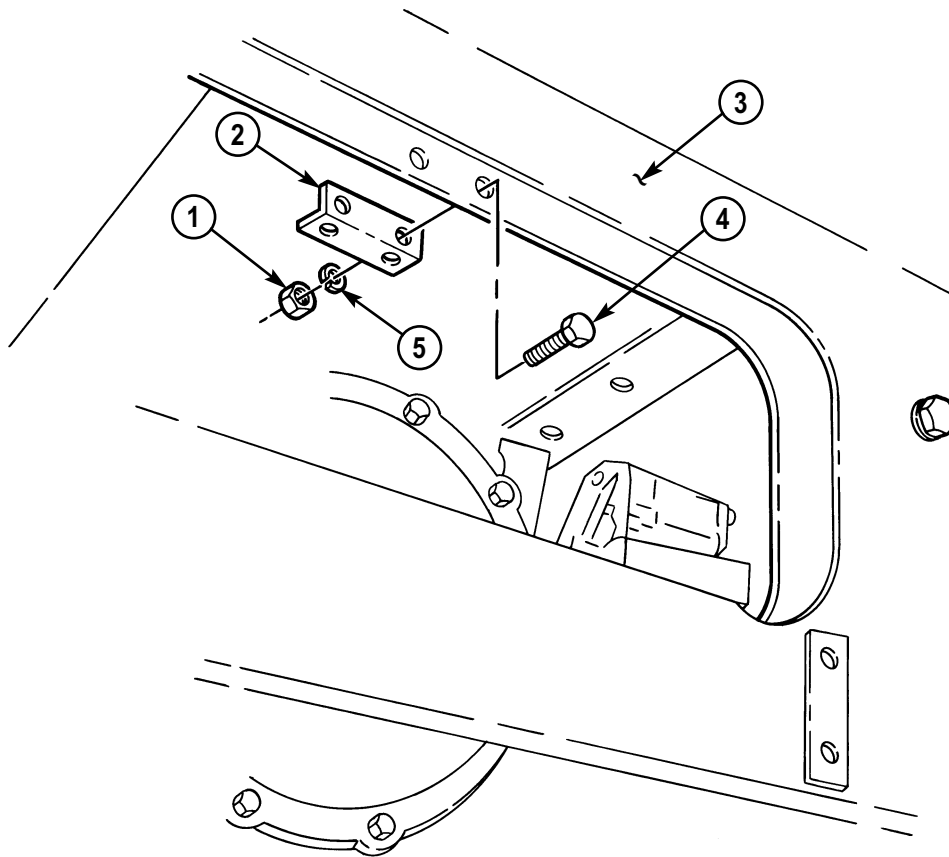
Horn removed (para. 4-22).

a. Removal

Remove two nuts (1), lockwashers (5), capscrews (4) and horn mounting bracket (2) from front crossmember (3). Discard lockwashers (5).

b. Installation

Install horn mounting bracket (2) on front crossmember (3) with two capscrews (4), lockwashers (5), and nuts (1). Tighten nuts (1) to 10 lb-ft (14 N•m).



FOLLOW-ON TASK: Install horn (para. 4-22).

4-24. ENGINE TEMPERATURE SENDING UNIT REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-24P
TM 9-2320-280-24P

Materials/Parts

Sealing compound (Appendix C, Item 44)

Equipment Condition

- Battery ground cable disconnected (para. 4-73).
- Hood raised and secured (TM 9-2320-280-10).

NOTE

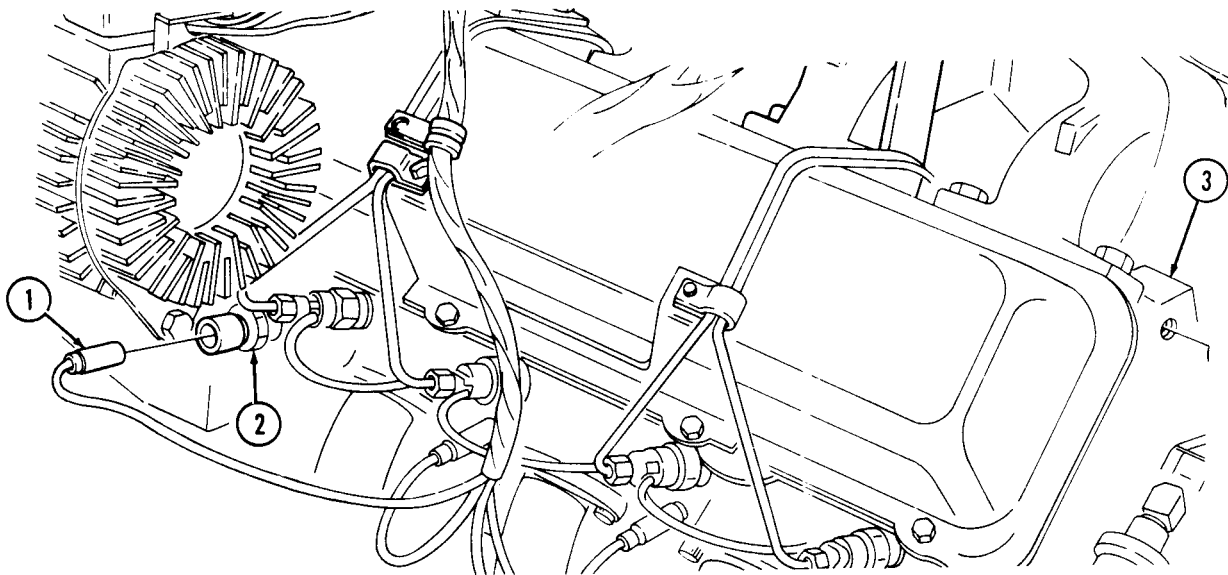
The engine temperature sending unit is located left front of engine.

a. Removal

1. Disconnect lead 33B (1) from engine temperature sending unit (2).
2. Remove engine temperature sending unit (2) from engine (3).

b. Installation

1. Apply sealing compound to threads of engine temperature sending unit (2).
2. Install engine temperature sending unit (2) to engine (3).
3. Connect lead 33B (1) to engine temperature sending unit (2).



- FOLLOW-ON TASKS:
- Connect battery ground cable (para. 4-73).
 - Start engine and check sending unit for leaks (TM 9-2320-280-10).
 - Lower and secure hood (TM 9-230-280-10).

4-25. OIL PRESSURE SENDING UNIT REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Materials/Parts

Sealing compound (Appendix C, Item 44)

Equipment Condition

- Battery ground cable disconnected (para. 4-73).
- Engine access cover removed (para. 10-15).

NOTE

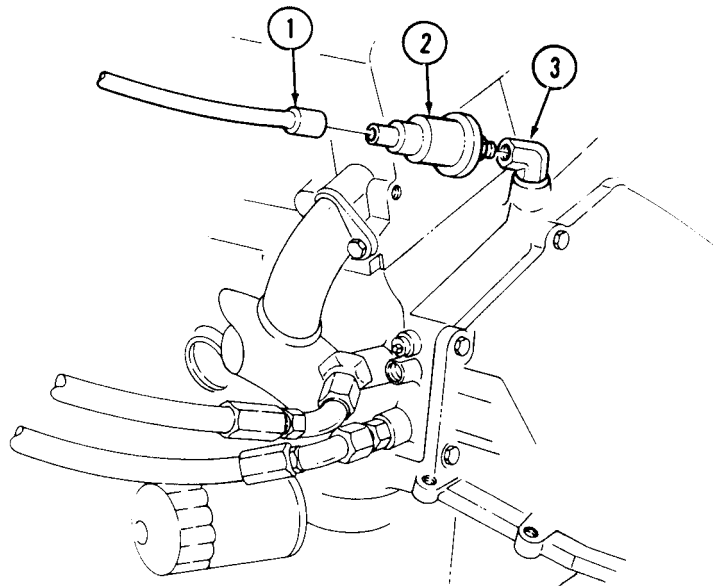
The oil pressure sending unit is located left rear of engine.

a. Removal

1. Disconnect lead 36 A (1) from oil pressure sending unit (2).
2. Remove oil pressure sending unit (2) from elbow (3).
3. Inspect elbow (3) for damage. Replace if damaged. Apply sealing compound to threads of elbow (3) before installing on engine.

b. Installation

1. Apply sealing compound to threads of oil pressure sending unit (2).
2. Install oil pressure sending unit (2) to elbow (3).
3. Connect lead 36A (1) to oil pressure sending unit (2).



- FOLLOW-ON TASKS:
- Connect battery ground cable (para. 4-73).
 - Start engine (TM 9-2320-280-10) and check sending unit for leaks.
 - Install engine access cover (para. 10-15).

4-26. FUEL PRESSURE TRANSDUCER REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Materials/Parts

Sealing compound (Appendix C, Item 44)

Equipment Condition

- Battery ground cable disconnected (para. 4-73).
- Hood raised and secured (TM 9-2320-280-10).

NOTE

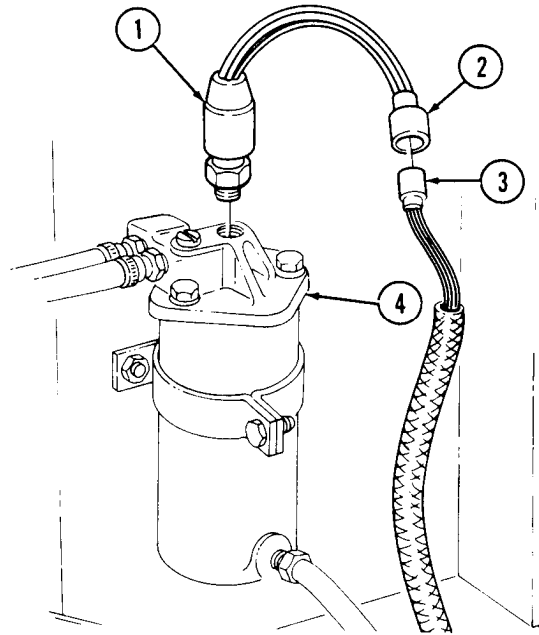
The fuel pressure transducer is a sensor unit for diagnostic testing. It is mounted on top of the fuel filter on the firewall of the vehicle.

a. Removal

1. Disconnect multiple connector (2) from STE/ICE-R wiring harness (3).
2. Remove fuel pressure transducer (1) from fuel filter (4).

b. Installation

1. Apply sealing compound to threads of fuel pressure transducer (1).
2. Install fuel pressure transducer (1) to fuel filter (4).
3. Connect multiple connector (2) to STE/ICE-R wiring harness (3).



- FOLLOW-ON TASKS:
- Connect battery ground cable (para. 4-73).
 - Start engine (TM 9-2320-280-10) and check fuel pressure transducer for leaks.
 - Lower and secure hood (TM 9-2320-280-10).

4-27. COLD ADVANCE SWITCH REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-24P

Materials/Parts

Sealing compound (Appendix C, Item 44)

Equipment Condition

- Battery ground cable disconnected (para. 4-73).
- Engine coolant drained as necessary (para. 3-60).
- Engine access cover removed (para. 10-15).

NOTE

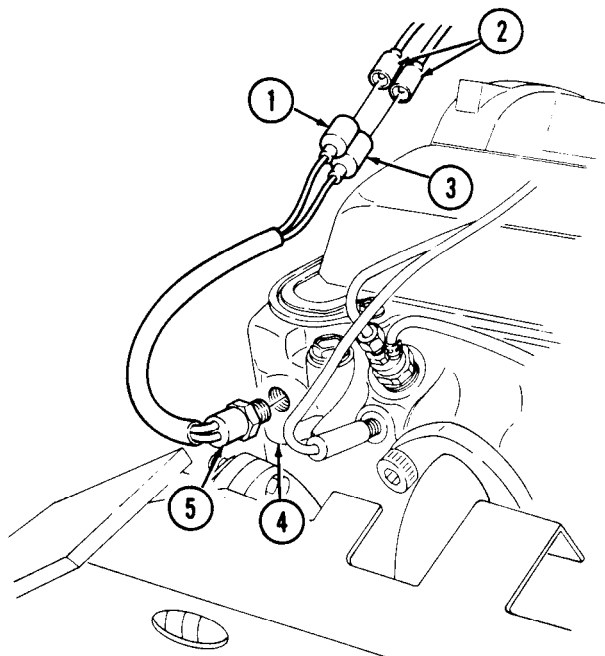
- The cold advance switch is located in the right cylinder head water jacket at the rear of the cylinder head just above the exhaust manifold.
- Prior to removal, tag leads for installation.

a. Removal

1. Disconnect leads 569G (1) and 569B (3) from engine harness (2).
2. Remove cold advance switch (5) from engine (4).

b. Installation

1. Apply sealing compound to threads of cold advance switch (5). Install cold advance switch (5) in engine (4).
2. Connect leads 569G (1) and 569B (3) to engine harness (2).



- FOLLOW-ON TASKS:
- Connect battery ground cable (para. 4-73).
 - Fill cooling system (para. 3-60).
 - Install engine access cover (para. 10-15).

4-28. FUEL LEVEL SENDING UNIT REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

Fuel tank removed (para. 3-24).

Materials/Parts

Five lockwashers (Appendix G, Item 139)
Gasket (Appendix G, Item 45)

General Safety Instructions

Do not perform this procedure near fire, flames, or sparks.

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

WARNING

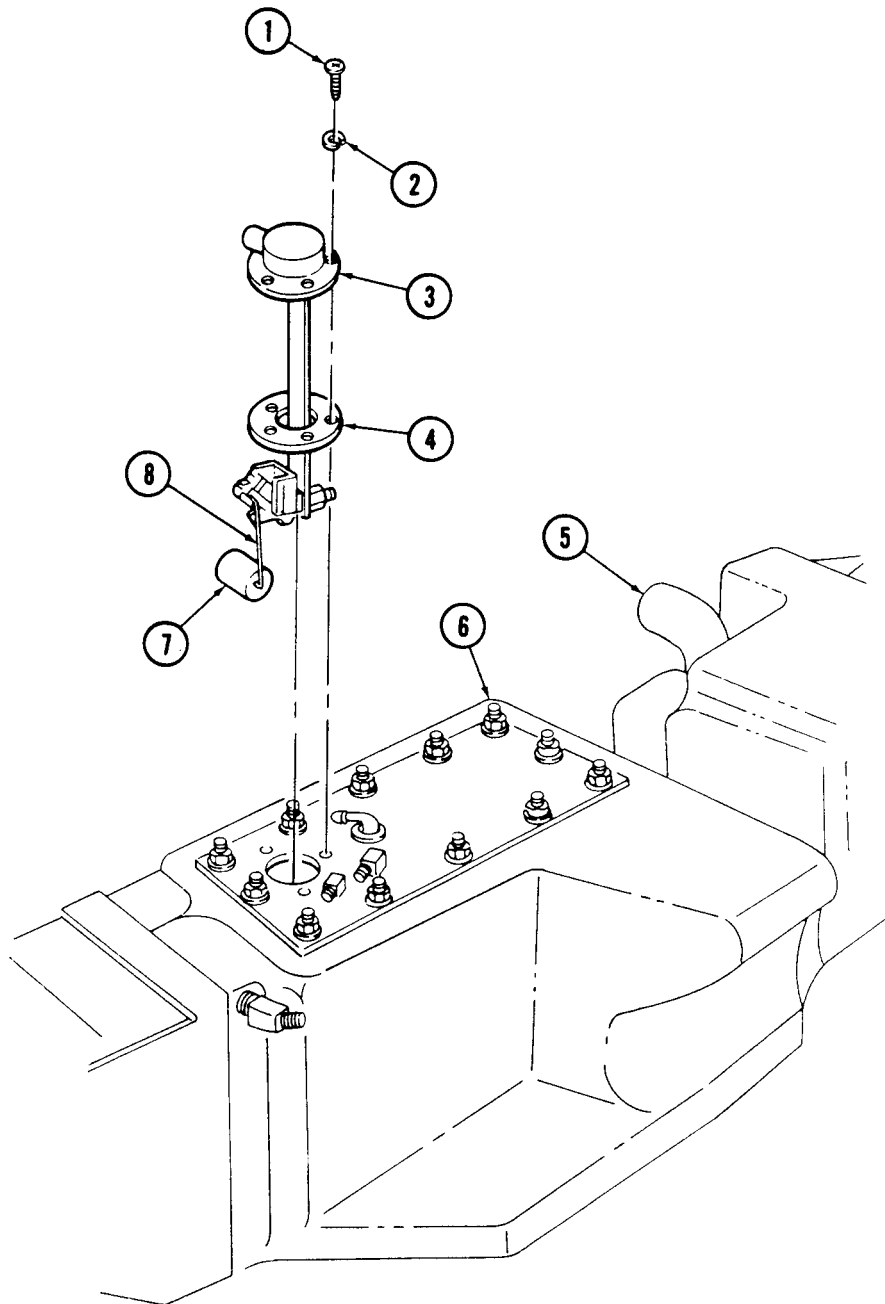
Diesel fuel is highly flammable. Do not perform this procedure near fire, flame, or sparks. Severe injury or death will result.

a. Removal

1. Remove five screws (1) and lockwashers (2) from fuel level sending unit (3) and fuel tank (6). Discard lockwashers (2).
2. Remove fuel level sending unit (3) from inside of fuel tank (6).
3. Remove and discard gasket (4).

b. Installation

1. Place gasket (4) on fuel level sending unit (3).
2. Install fuel level sending unit (3) into fuel tank (6) ensuring not to bend float arm (8).
3. Align holes of fuel level sending unit (3) to tank (6) so float (7) is pointed in same direction that tank filler neck (5) points.
4. Secure fuel level sending unit (3) with five lockwashers (2) and screws (1). Tighten screws (1) to 32 lb-in. (4 N•m).

4-28. FUEL LEVEL SENDING UNIT REPLACEMENT (Cont'd)

- FOLLOW-ON TASKS:
- Install fuel tank (para. 3-24).
 - Check fuel gauge for proper operation (TM 9-2320-280-10).

4-29. GLOW PLUG CONTROLLER/TEMPERATURE SENSOR REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Materials/Parts

Grease (Appendix C, Item 25)
Sealing compound (Appendix C, Item 44)

Equipment Condition

- Battery ground cable disconnected (para. 4-73).
- Hood raised and secured (TM 9-2320-280-10).

NOTE

- It may be necessary to clamp surge tank-to-lower radiator tube to prevent loss of coolant.
- Two different systems are used. One uses glow plug controller and the other uses a temperature sensor. The temperature sensor is indicated by a yellow band.

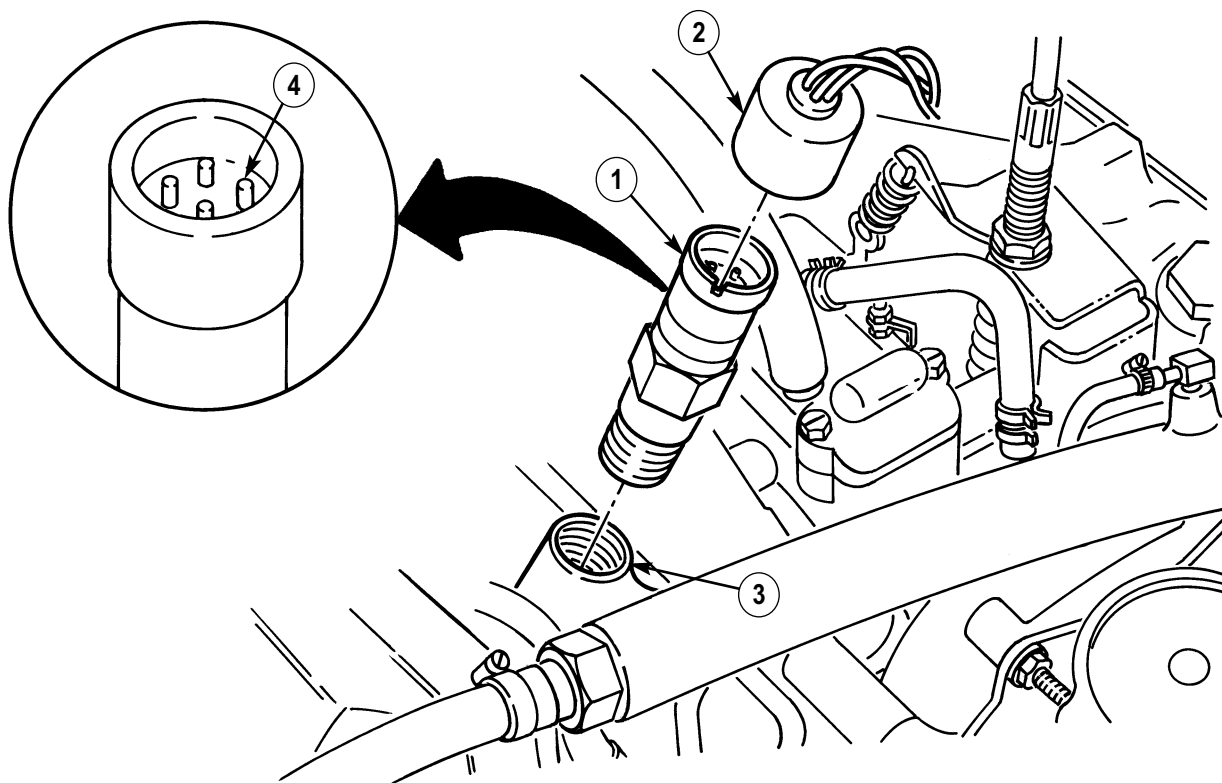
a. Removal

1. Disconnect multiple connector (2) from glow plug controller or temperature sensor (1).
2. Remove glow plug controller or temperature sensor (1) from water crossover (3).

b. Installation

CAUTION

- Do not attempt to start engine unless controller/sensor is mounted in engine for a minimum of 10 minutes or if all glow plugs are disconnected. Damage to glow plugs may result.
 - Do not overtighten controller/sensor. Damage to crossover will result.
1. Apply sealing compound to threads of glow plug controller or temperature sensor (1). Install glow plug controller or temperature sensor (1) on water crossover (3). Tighten controller or sensor (1) to 14-20 lb-ft (19-27 N•m).
 2. Apply grease to pins (4) of glow plug controller or temperature sensor (1).
 3. Connect multiple connector (2) to glow plug controller or temperature sensor (1).

4-29. GLOW PLUG CONTROLLER/TEMPERATURE SENSOR REPLACEMENT (Cont'd)

- FOLLOW-ON TASKS:
- Connect battery ground cable (para. 4-73).
 - Lower and secure hood (TM 9-2320-280-10).

4-30. FAN TEMPERATURE SWITCH REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Materials/Parts

Sealing compound (Appendix C, Item 44)

Equipment Condition

- Battery ground cable disconnected (para. 4-73).
- Hood raised and secured (TM 9-2320-280-10).

NOTE

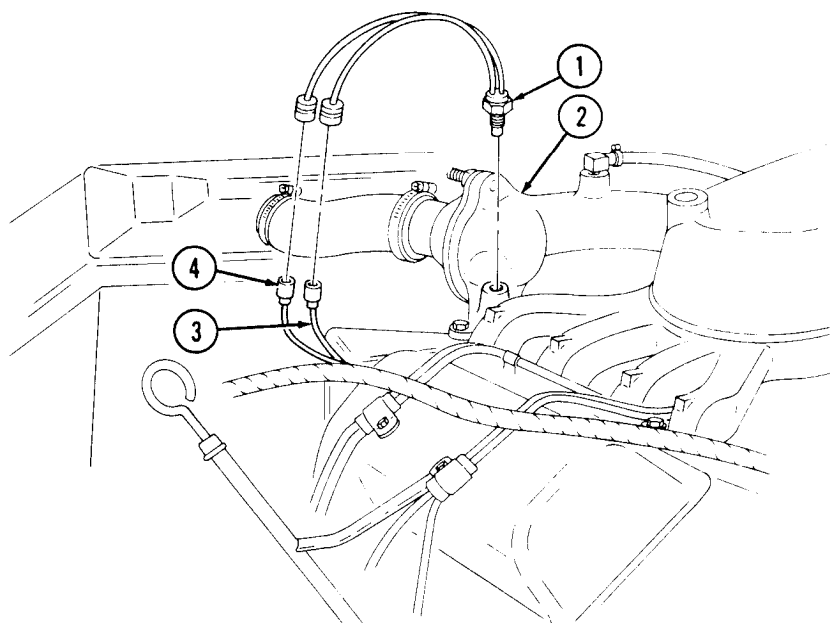
- The engine temperature switch is located on the top front side of the engine in the water crossover.
- Prior to removal, tag leads for installation.

a. Removal

1. Disconnect engine harness leads 458A (4) and 458B (3) from fan temperature switch (1).
2. Remove fan temperature switch (1) from water crossover (2).

b. Installation

1. Apply sealing compound to threads of fan temperature switch (1). Install fan temperature switch (1) to water crossover (2).
2. Connect engine harness leads 458A (4) and 458B (3) to fan temperature switch (1).



- FOLLOW-ON TASKS: • Connect battery ground cable (para. 4-73).
• Lower and secure hood (TM 9-2320-280-10).

4-31. TIME DELAY MODULE REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

- Battery ground cable disconnected (para. 4-73).
- Hood raised and secured (TM 9-2320-280-10).

Manual References

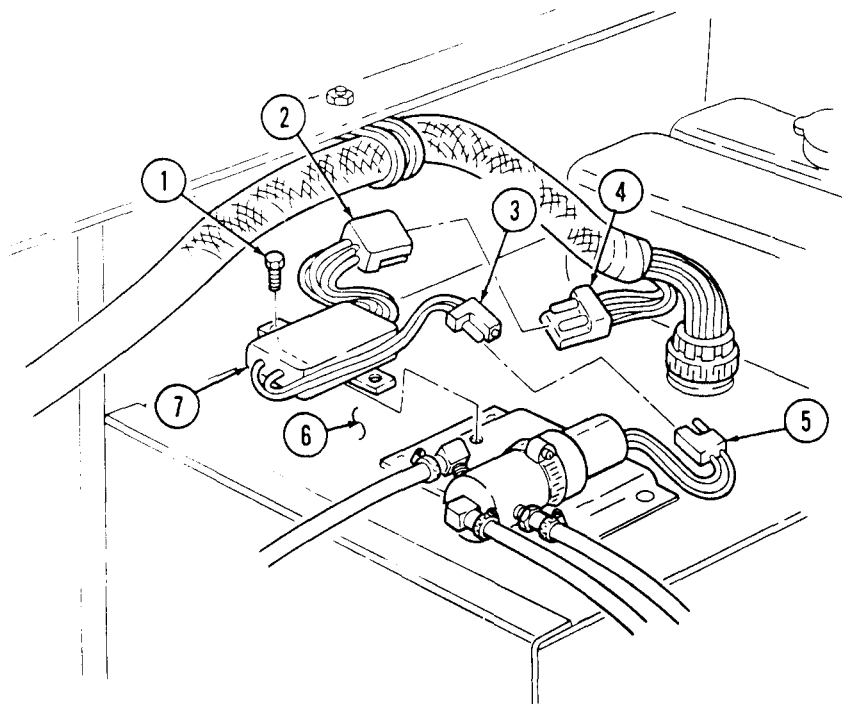
TM 9-2320-280-10
TM 9-2320-280-24P

a. Removal

1. Disconnect connector plug (3) from control valve connector (5).
2. Disconnect connector plug (2) from engine harness (4).
3. Remove two screws (1) and time delay module (7) from cowl (6).

b. Installation

1. Install time delay module (7) on cowl (6) with two screws (1).
2. Connect connector plug (2) to engine harness (4).
3. Connect connector plug (3) to control valve connector (5).



- FOLLOW-ON TASKS:
- Connect battery ground cable (para. 4-73).
 - Lower and secure hood (TM 9-2320-280-10).

4-32. RPM SENSOR REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

All vehicles except: M997A2, M1025A2, M1035A2, M1043A2, M1045A2, M1097A2

Manual References

TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

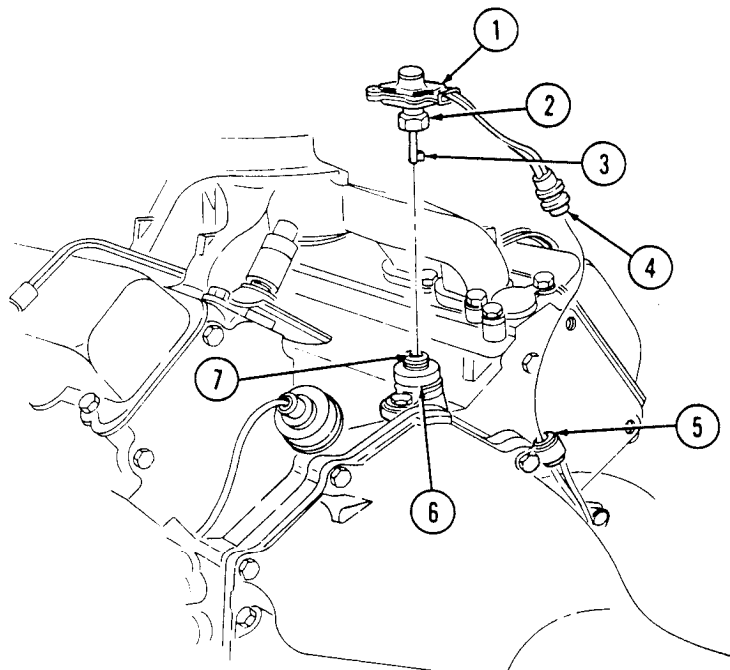
Engine access cover removed (para. 10-15).

a. Removal

1. Disconnect harness connector (5) from RPM sensor connector (4).
2. Loosen nut (2) and remove RPM sensor (1) from oil pump drive (6).

b. Installation

1. Align tab (3) on RPM sensor (1) with slot (7) in oil pump drive (6). Install RPM sensor (1) on oil pump drive (6) with nut (2).
2. Connect RPM sensor connector (4) to harness connector (5).



FOLLOW-ON TASK: Install engine access cover (para. 10-15).

4-33. ENGINE RPM SENSOR REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M997A2, M1025A2, M1035A2, M1043A2,
M1045A2, M1097A2

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

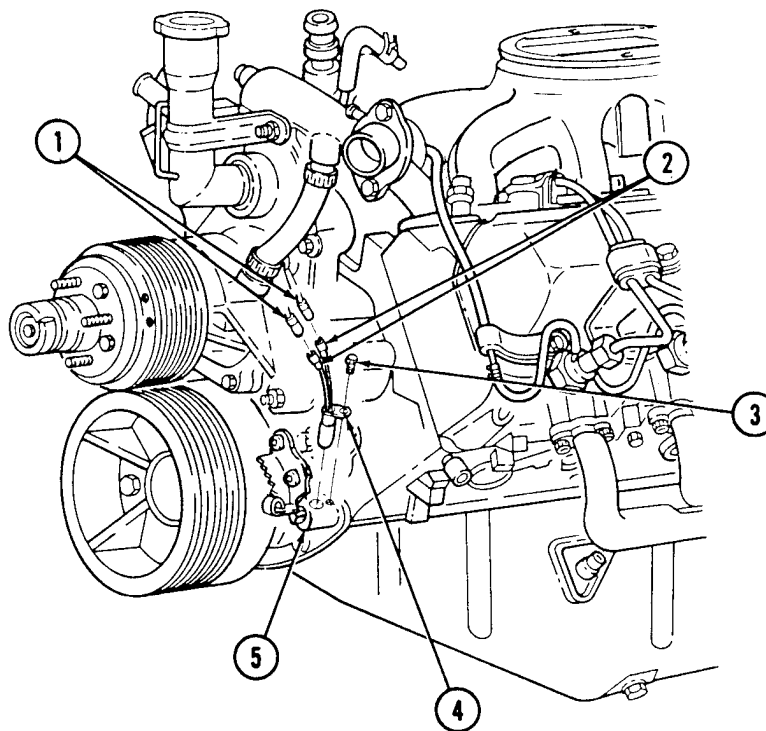
- Battery ground cable disconnected (para. 4-73).
- Hood raised and secured (TM 9-2320-280-10).

a. Removal

1. Disconnect engine harness leads (1) from RPM sensor leads (2).
2. Remove capscrew (3) and RPM sensor (4) from front cover (5).

b. Installation

1. Install RPM sensor (4) in front cover (5) with capscrew (3).
2. Connector RPM sensor leads (2) to engine harness leads (1).



- FOLLOW-ON TASKS:
- Connect battery ground cable (para. 4-73)
 - Lower and secure hood (TM 9-2320-280-10)

4-34. BACKUP LIGHT SWITCH REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M996, M996A1, M997, M997A1, M997A2,
M1035, M1035A1, M1035A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Material/Parts

Sealing compound (Appendix C, Item 44)

Manual References

TM 9-2320-280-24P

Equipment Condition

Shift controls housing removed (para. 5-7 or 5-11).

a. Removal

1. Remove boot (4) from shift control housing assembly (1).

NOTE

Perform step 2 for M996, M996A1, M997, M997A1, M1035, and M1035A1 vehicles. Perform steps 3 and 4 for M997A2 and M1035A2 vehicles.

2. Remove backup light switch (3) from shift control housing assembly (1).
3. Remove two screws (6) and lockwashers (7) from backup light switch (8) and housing (1). Discard lockwashers (7).
4. Remove tiedown strap (10) and backup light switch (8) from neutral start switch (9).

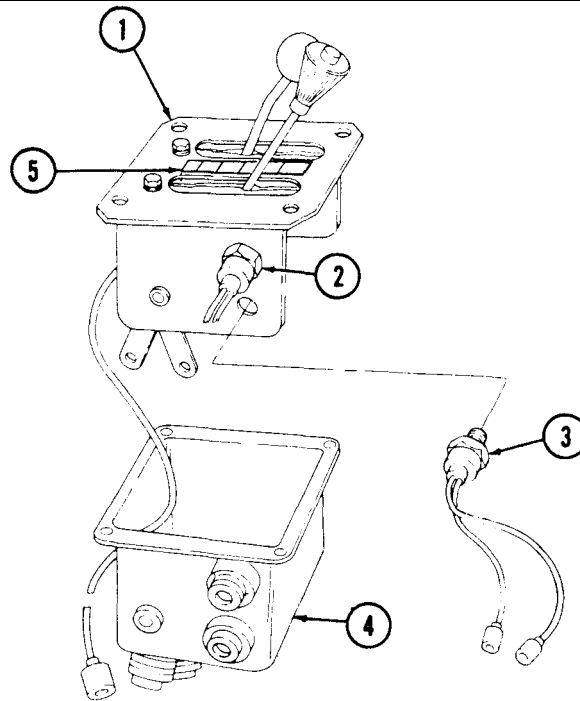
b. Installation

NOTE

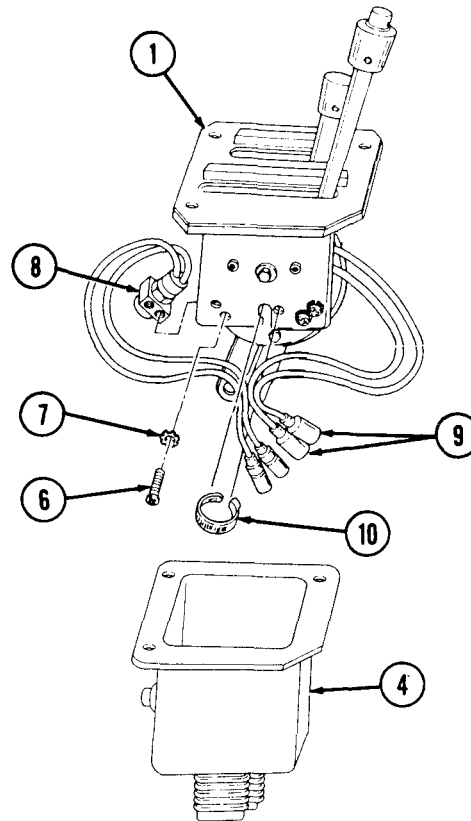
Perform steps 1 through 3 for M997A2 and M1035A2 vehicles. Perform steps 4 and 5 for M996, M996A1, M997, M997A1, M1035, and M1035A1 vehicles.

1. Install backup light switch (8) on shift controls housing (1) with two lockwashers (7) and screws (6).
2. Install tiedown strap (10) on leads from backup light switch (8) and neutral start switch (9).
3. Position neutral start switch (9) leads and backup light switch (8) leads through boot (4) and install boot (4) on housing (1).
4. Apply sealing compound to threads of backup light switch (3), and install backup light switch on shift control assembly (1).
5. Position leads from neutral start switch (2), backup light switch (3), and shift selector indicator (5) through boot (4) and install boot (4) on shift control housing assembly (1).

4-34. BACKUP LIGHT SWITCH REPLACEMENT (Cont'd)



M996, M996A1, M997, M997A1, M1035, and M1035A1 vehicles only



M997A2 and M1034A2 vehicles only

FOLLOW-ON TASK: Install shift controls housing (para. 5-7 or 5-11).

Section IV. TRANSFER CASE AND TRANSMISSION ELECTRICAL MAINTENANCE

4-35. TRANSFER CASE AND TRANSMISSION ELECTRICAL MAINTENANCE TASK SUMMARY

TASK PARA.	PROCEDURES	PAGE NO.
4-36.	Transfer Case Indicator Switch Replacement	4-59
4-37.	Transfer Case Indicator Lamp Cable Assembly Replacement	4-60
4-38.	Transfer Case Indicator Lamp Assembly Replacement	4-62
4-39.	Transmission Indicator Lamp Assembly Replacement (4L80-E)	4-63
4-40.	Transmission Circuit Breakers and Jumper Leads Replacement (4L80-E)	4-64
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4-42.	Transmission Control Module (TCM) Replacement (4L80-E)	4-66.1
4-42.1.	E-PROM Replacement	4-66.2
4-43.	Kick-Down Switch Maintenance (3L80)	4-68
4-44.	Fan Cut-Off Switch Replacement (4L80-E)	4-70
4-45.	Throttle Position (TP) Sensor Maintenance (4L80-E)	4-72
4-46.	Transmission Input Speed Sensor (TISS) and Output Speed Sensor (TOSS) Maintenance (4L80-E)	4-74

4-36. TRANSFER CASE INDICATOR SWITCH REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M1097, "A1" and "A2" series

Equipment Condition

Battery ground cable disconnected (para. 4-73).

Tools

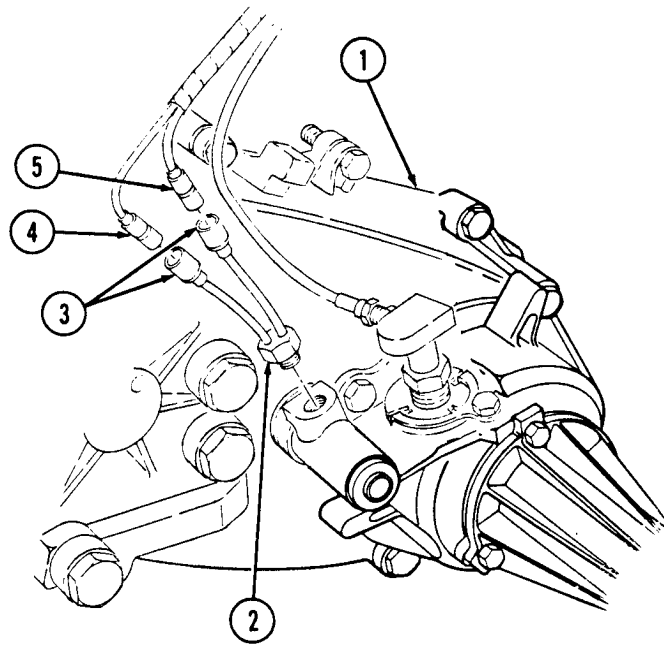
General mechanic's tool kit:
automotive (Appendix B, Item 1)

a. Removal

1. Disconnect leads 511A (4) and 511B (5) from indicator switch leads (3) on transfer case (1).
2. Remove indicator switch (2) from transfer case (1).

b. Installation

1. Install indicator switch (2) on transfer case (1).
2. Connect leads 511A (4) and 511B (5) to indicator switch leads (3).



FOLLOW-ON TASK: Connect battery ground cable (para. 4-73).

4-37. TRANSFER CASE INDICATOR LAMP CABLE ASSEMBLY REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M1097, "A1" and "A2" series

Manual References

TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

- Battery ground cable disconnected (para. 4-73).
- Engine access cover removed (para. 10-15).

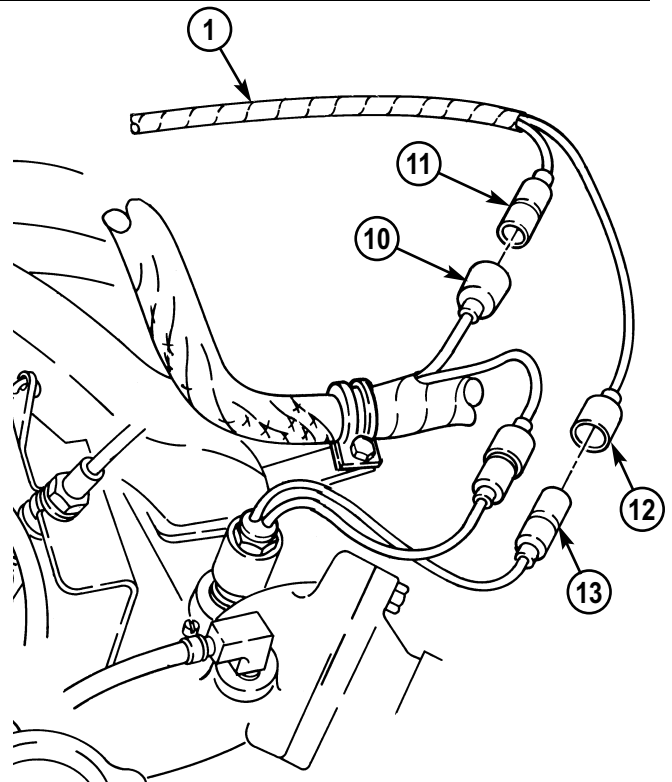
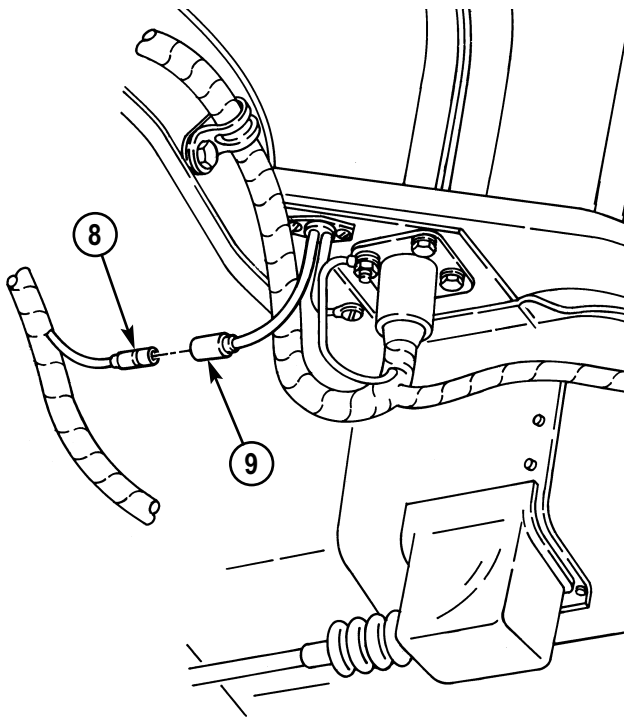
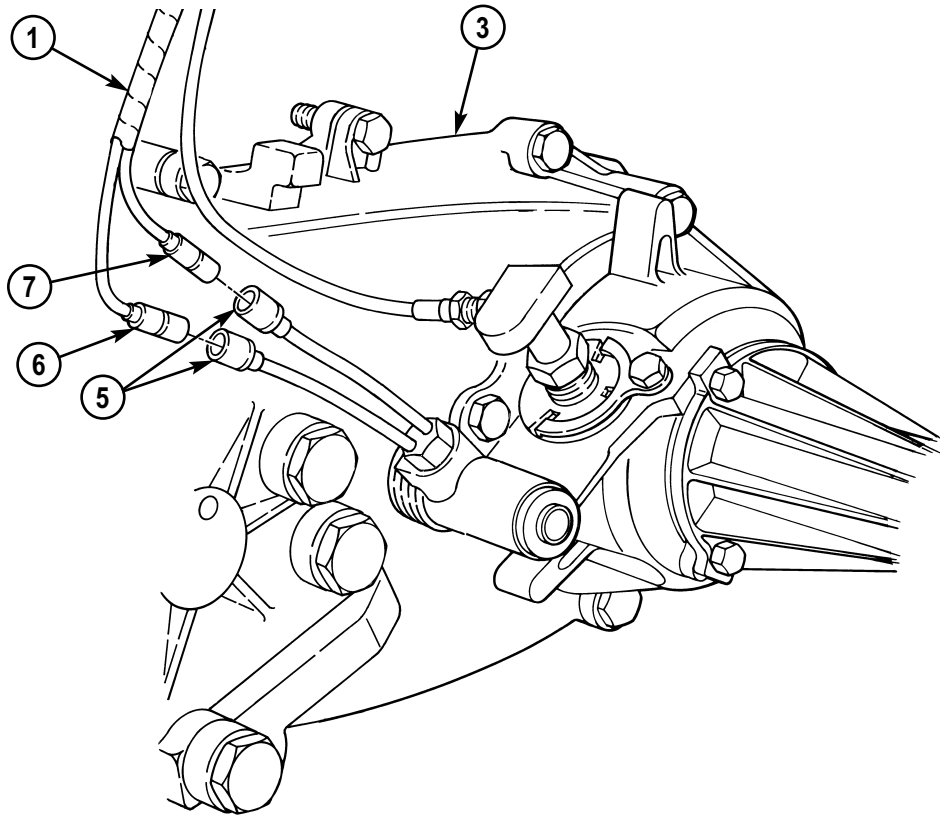
a. Removal

1. Disconnect leads 511A (6) and 511B (7) from indicator switch leads (5) on transfer case (3).
2. Deleted.
3. Disconnect lead 511A (8) from lamp assembly lead (9).
4. Disconnect leads 458B (12) and 458C (11) from fan temperature switch lead (13) and engine wiring harness lead 458A (10) and remove cable assembly (1) from vehicle.

b. Installation

1. Position cable assembly (1) in approximate mounting location on vehicle.
2. Connect leads 458B (12) and 458C (11) to fan temperature switch lead (13) and engine wiring harness lead 458A (10).
3. Connect lead 511A (8) to lamp assembly lead (9).
4. Connect leads 511B (7) and 511A (6) to indicator switch leads (5) on transfer case (3).
5. Deleted.

4-37. TRANSFER CASE INDICATOR LAMP CABLE ASSEMBLY REPLACEMENT (Cont'd)



- FOLLOW-ON TASKS:**
- Install engine access cover (para. 10-15).
 - Connect battery ground cable (para. 4-73).

4-38. TRANSFER CASE INDICATOR LAMP ASSEMBLY REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M1097, "A1" and "A2" series

Manual References

TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

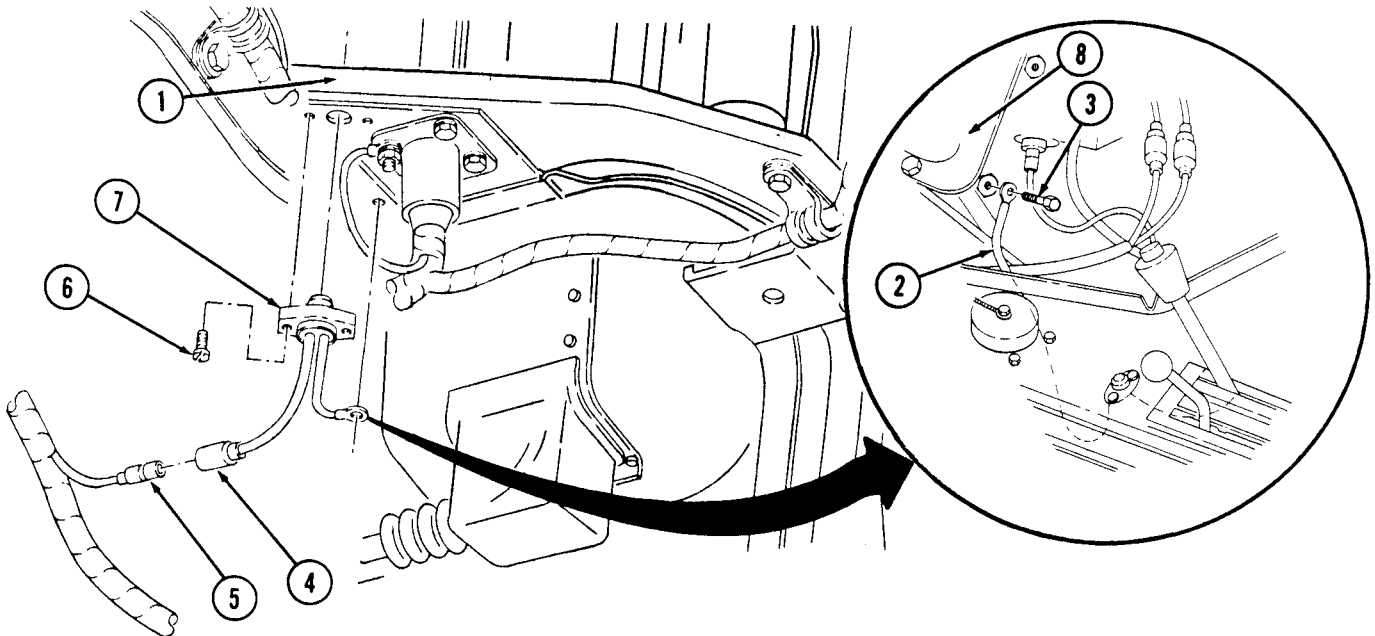
- Battery ground cable disconnected (para. 4-73).
- Engine access cover removed (para. 10-15).

a. Removal

1. Disconnect lead 511A (5) from lamp assembly lead (4).
2. Remove screw (3) and ground lead (2) from engine (8).
3. Remove two screws (6) and lamp assembly (7) from body (1).

b. Installation

1. Install lamp assembly (7) to body (1) with two screws (6).
2. Install ground lead (2) to engine (8) with screw (3).
3. Connect lead 511A (5) to lamp assembly lead (4).



- FOLLOW-ON TASKS:**
- Install engine access cover (para. 10-15).
 - Connect battery ground cable (para. 4-73).

4-39. TRANSMISSION INDICATOR LAMP ASSEMBLY REPLACEMENT (4L80-E)

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M997A2, M1025A2, M1035A2,
M1043A2, M1045A2, M1097A2

Manual References

TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

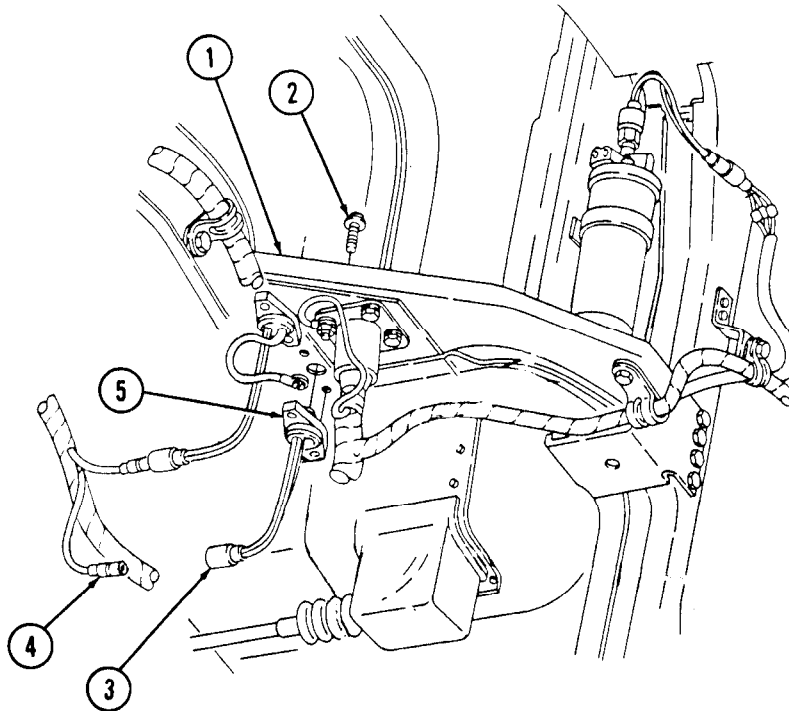
- Battery ground cable disconnected (para. 4-73).
- Engine access cover removed (para. 10-15).

a. Removal

1. Disconnect lead 657 (4) from lamp assembly lead (3).
2. Remove two screws (2) and lamp assembly (5) from body (1).

b. Installation

1. Install lamp assembly (5) to body (1) with two screws (2).
2. Connect lead 657 (4) to lamp assembly lead (3).



- FOLLOW-ON TASKS:
- Install engine access cover (para. 10-15).
 - Connect battery ground cables (para. 4-73).

4-40. TRANSMISSION CIRCUIT BREAKERS AND JUMPER LEADS REPLACEMENT (4L80-E)

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M997A2, M1025A2, M1035A2,
M1043A.2, M1045A2, M1097A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-24P

Equipment Condition

Battery ground cables disconnected (para. 4-73).

NOTE

Prior to removal, tag leads for installation.

a. Removal

1. Remove nut (6), capscrew (1), cable (2), three circuit breaker-to-battery leads (3) and cable (4) from terminal clamp (5).

NOTE

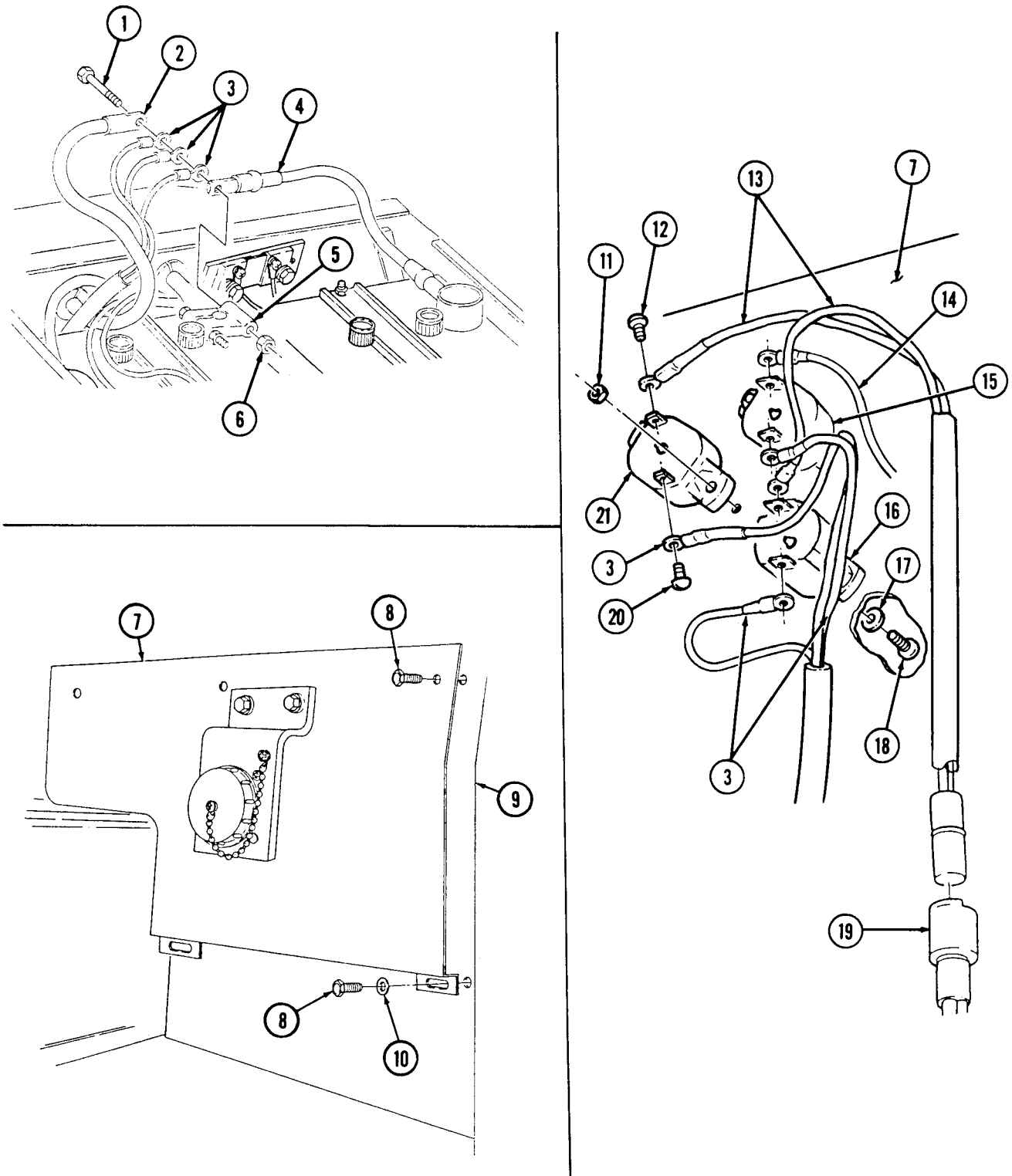
The coverplate on M1025A2 and M1043A2 vehicles has four capscrews and washers.

2. Remove five capscrews (8), two washers (10), and coverplate (7) from "B" pillar (9).
3. Remove three screws (20) and circuit breaker-tubattery leads (3) from circuit breakers (21), (16), and (15).
4. Remove two screws (12) and circuit breaker-to-relay leads (13) from circuit breakers (16) and (21).
5. Disconnect leads (13) from relay lead (19) and remove leads (13).
6. Remove screw (12) and circuit breaker-to-harness lead (14) from circuit breaker (15).
7. Remove two nuts (11), capscrews (18), washers (17) and circuit breaker (21) from coverplate (7). Repeat step 7 for circuit breakers (15) and (16).

b. Installation

1. Install circuit breaker (21) on coverplate (7) with two washers (17), capscrews (18), and nuts (11). Repeat step 1 for circuit breakers (15) and (16).
2. Install circuit breaker-to-harness lead (14) on circuit breaker (15) with screw (12).
3. Connect leads (13) to relay lead (19).
4. Install two circuit breaker-to-relay leads (13) to circuit breakers (16) and (21) with screws (12).
5. Install three circuit breaker-to-battery leads (3) on circuit breakers (15) (16), and (21) with screws (20).
6. Install coverplate (7) to "B" pillar (9) with two washers (10) and five capscrews (8).
7. Install cable (4), three circuit breaker-to-battery leads (3) and cable (2) to terminal clamp (5) with capscrew (1) and nut (6).

4-40. TRANSMISSION CIRCUIT BREAKERS AND JUMPER LEADS REPLACEMENT (4L80-E) (Cont'd)



FOLLOW-ON TASK: Connect battery ground cables (para. 4-73).

4-41. TRANSMISSION RELAY REPLACEMENT (4L80-E)

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M997A2, M1025A2, M1035A2,
M1043A2, M1045A2, M1097A2

Manual References

TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

Battery ground cables disconnected (para. 4-73).

NOTE

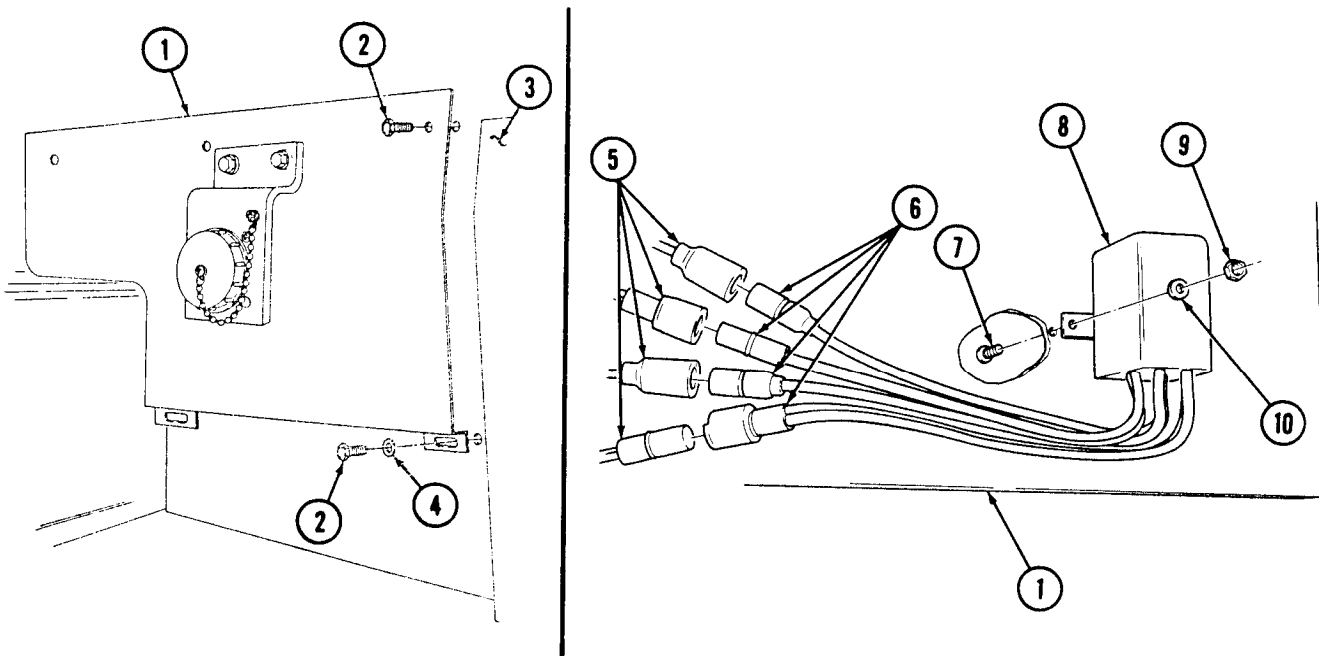
Prior to removal, tag leads for installation.
M1025A2 and M1043A2 vehicles have four capscrews and washers on coverplate.

a. Removal

1. Remove five capscrews (2), two washers (4) and coverplate (1) from "B" beam (3).
2. Disconnect four leads (5) from relay leads (6).
3. Remove two nuts (9), washers (10), capscrews (7), and relay (8) from coverplate (1).

b. Installation

1. Install relay (8) on coverplate (1) with two capscrews (7), washers (10), and nuts (9).
2. Connect four relay leads (6) to leads (5).
3. Install coverplate (1) to "B" beam (3) with two washers (4) and five capscrews (2).



FOLLOW-ON TASK: Connect battery ground cables (para. 4-73).

4-42. TRANSMISSION CONTROL MODULE (TCM) REPLACEMENT (4L80-E)

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M997A2, M1025A2, M1035A2,
M1043A2, M1045A2, M1097A2, M1123

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Personnel Required

One mechanic
One assistant

Manual References

TM 9-2320-280-24P

Equipment Condition

- Battery ground cables disconnected (para. 4-73).
- Left rear seat compartment cover removed (para. 10-43).

a. Removal

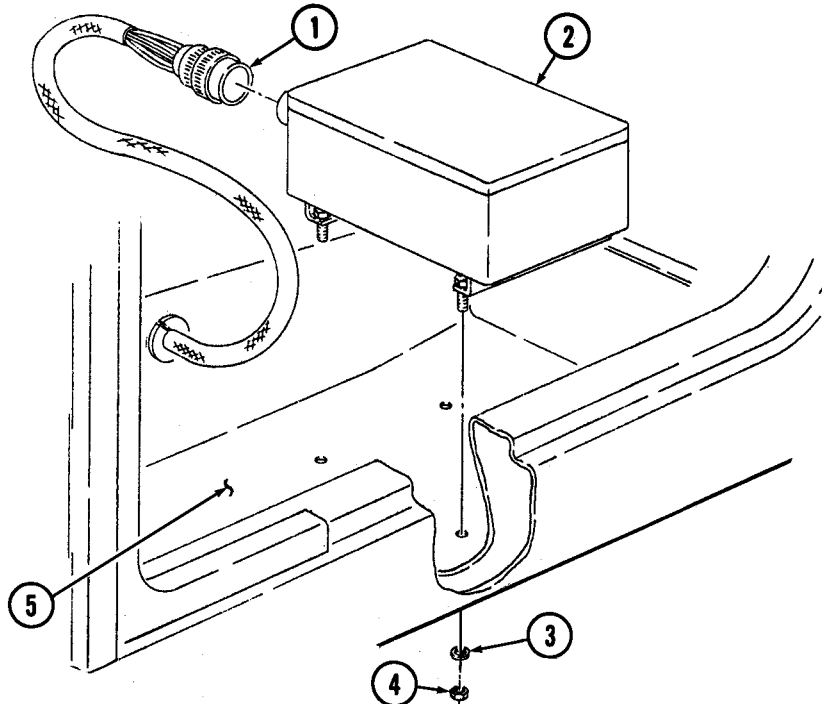
CAUTION

Ensure that ignition switch is OFF before disconnecting or reconnecting the Transmission Control Module (TCM). Failure to do this may cause internal damage to TCM.

1. Disconnect harness connector (1) from TCM (2).
2. Remove four nuts (4), washers (3), and TCM (2) from body (5).

b. Installation

1. Install TCM (2) on body (5) with four washers (3) and nuts (4).
2. Connect harness connector (1) to TCM (2).



- FOLLOW-ON TASKS:
- Connect battery ground cables (para. 4-73).
 - Install left rear seat compartment cover (para. 10-43).

4-42.1. E-PROM REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M997A2, M1025A2, M1035A2,
M1043A2, M1045A2, M1097A2, M1123

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

RTV sealant (Appendix C, Item 38)

Manual References

TM 9-2320-280-24P

Equipment Condition

- Battery ground cables disconnected (para. 4-73).
- Left rear seat compartment cover removed (para. 10-43).

a. Removal

CAUTION

Ensure that ignition switch is OFF before replacing E-PROM or disconnecting or reconnecting the Transmission Control Module (TCM). Failure to do this may cause internal damage to TCM.

NOTE

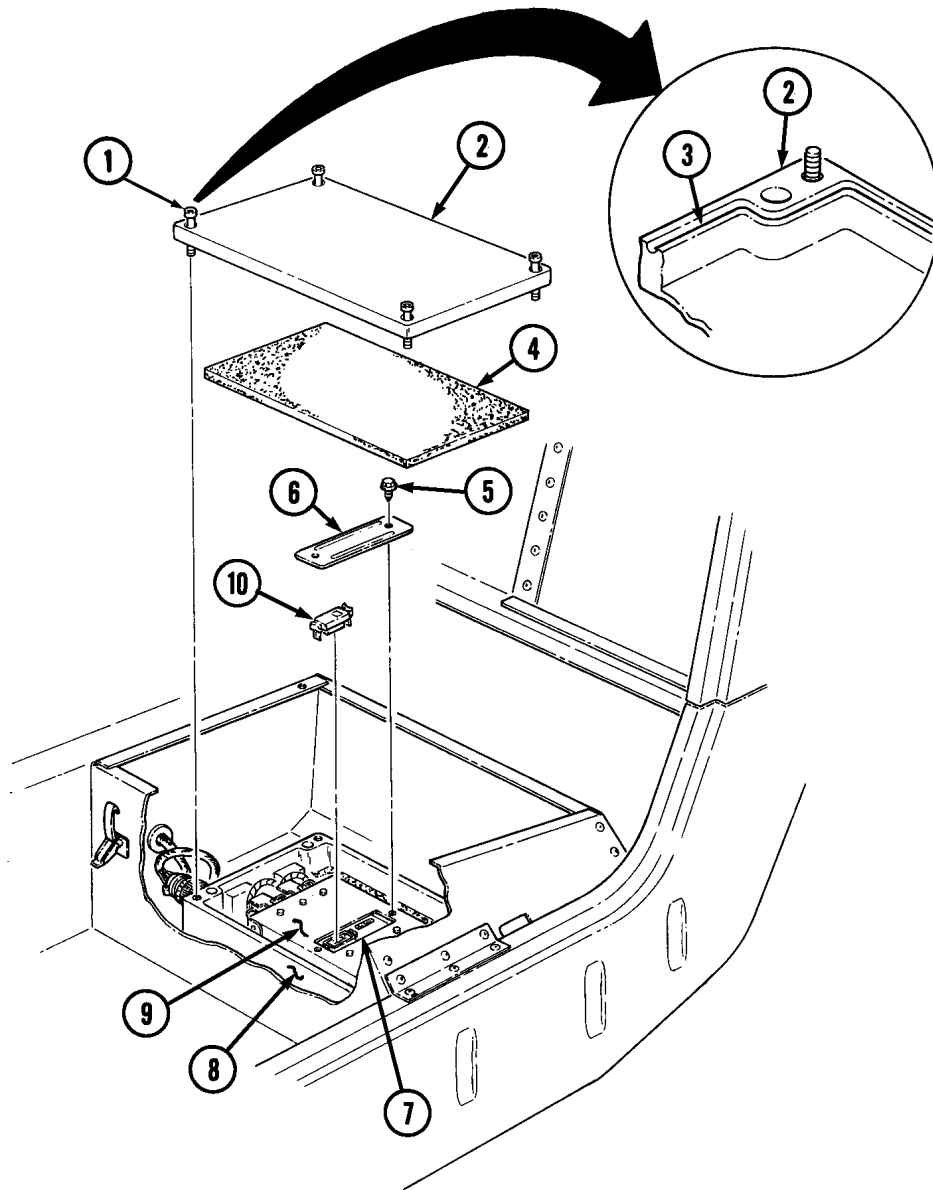
For proper calibration of E-PROM to transmission, ensure E-PROM is the same production year as the transmission installed in the vehicle.

1. Loosen four screws (1) and remove cover (2) and foam insulation (4) from TCM box (8).
2. Remove two screws (5) and access panel (6) from terminal box (9).
3. Remove E-PROM (10) from circuit board (7).

b. Installation

1. Install E-PROM (10) on circuit board (7) by pushing it down firmly to ensure it is well seated.
2. Install access panel (6) on terminal box (9) with two screws (5).
3. Clean sealant from TCM box (8) and cover (2).
4. Apply 0.125 in. (3.175 mm) bead of RTV adhesive sealant in groove (3) on cover (2).
5. Install foam insulation (4) and cover (2) on TCM box (8) and tighten four screws (1) to 30 lb-in. (3 N•m).

4-42.1. E-PROM REPLACEMENT (Contd)



- FOLLOW-ON TASKS:
- Connect negative battery cables (para. 4-73).
 - Install left rear seat compartment cover (para. 10-43).

4-43. KICK-DOWN SWITCH MAINTENANCE (3L80)

This task covers:

- | | |
|--|----------------------|
| <p>a. Removal</p> <p>b. Installation</p> | <p>c. Adjustment</p> |
|--|----------------------|

INITIAL SETUP:

Applicable Models

All vehicles except: M997A2, M1025A2, M1035A2, M1043A2, M1045A2, M1097A2, M1123

Tools

General mechanic's tool kit: automotive (Appendix B, Item 1)

Test Equipment

Multimeter (Appendix B, Item 166)

Manual References

TM 9-2320-280-10
 TM 9-2320-280-24P

Equipment Condition

- Battery ground cable disconnected (para. 4-73).
- Hood raised and secured (TM 9-2320-280-10).

a. Removal

1. Disconnect engine harness leads 315A (5) and 315B (4) from kick-down switch (3).
2. Remove two capscrews (1) and switch (3) from fuel injection pump (2).

b. Installation

1. Install kick-down switch (3) on injection pump (2) with two capscrews (1).
2. Connect leads 315A (5) and 315 B (4) to kick-down switch (3).

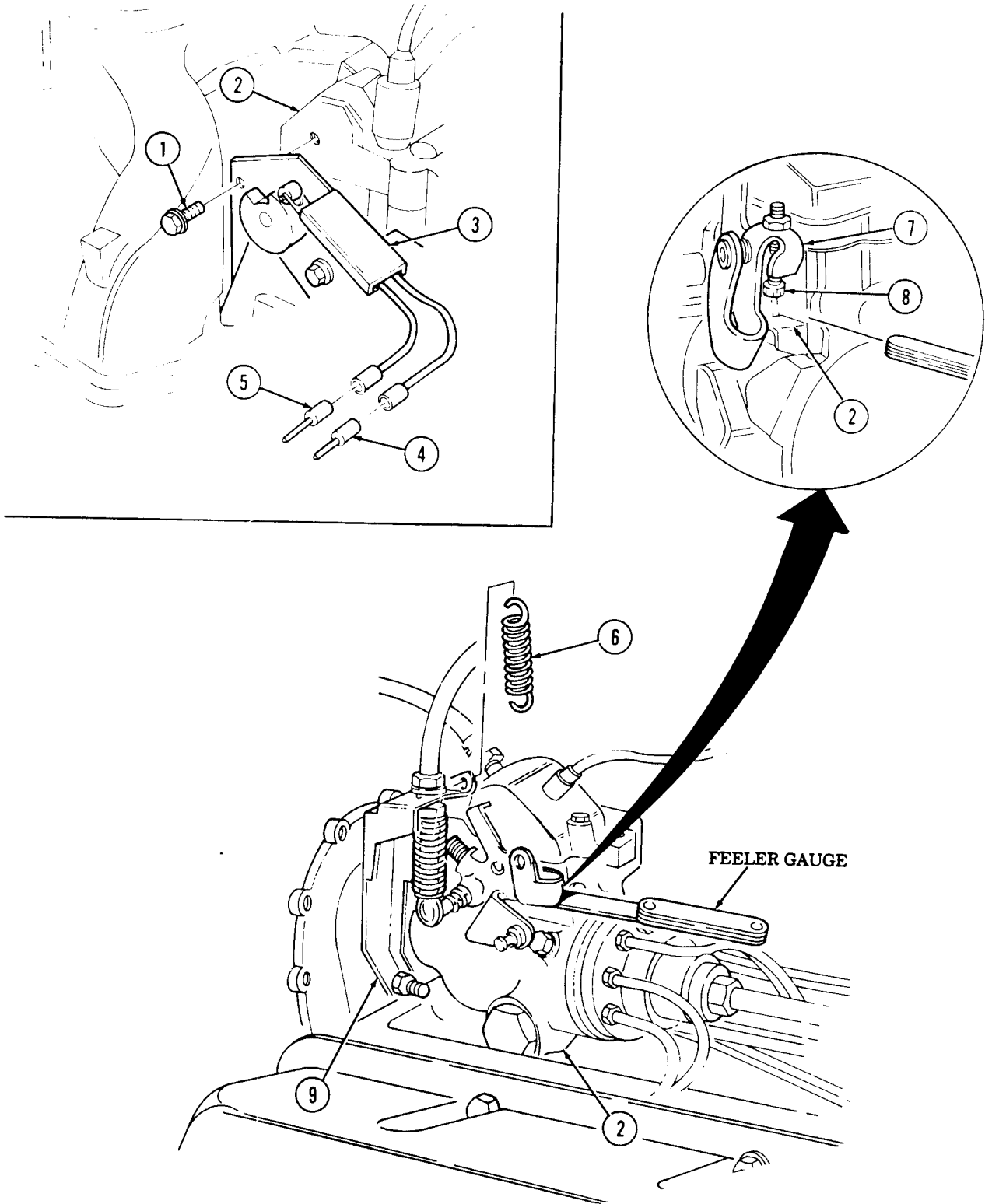
c. Adjustment

NOTE

Kick-down switch must be adjusted whenever it is replaced or when injection pump is replaced.

1. Disconnect throttle return spring (6) from throttle shaft lever (7) and accelerator cable bracket (9).
2. Disconnect engine harness leads 315A (5) and 315 B (4) from kick-down switch (3).
3. Connect multimeter to leads on kick-down switch (3) to read continuity.
4. Loosen two capscrews (1) to allow movement of kick-down switch (3).
5. Position feeler gauge set at 0.295 in. (7.493 mm) between throttle shaft lever (7) and injection pump (2) ensuring feeler gauge does not touch screw (8).
6. Move throttle shaft lever (7) to wide open position so throttle shaft lever (7) rests on feeler gauge.
7. Rotate kick-down switch (3) slowly until multimeter reads continuity through kick-down switch (3) and tighten capscrews (1).
8. Position feeler gauge set at 0.310 in. (7.874 mm) between throttle shaft lever (7) and injection pump (2) ensuring feeler gauge does not touch screw (8).
9. Move throttle shaft lever (7) to wide open position so throttle shaft lever (7) rests on feeler gauge. Note multimeter, no continuity should be present. If continuity is present, repeat steps 3 through 8.
10. Connect leads 315A (5) and 315 B (4) to kick-down switch (3).
11. Connect throttle return spring (6) to accelerator cable bracket (9) and throttle shaft lever (7).

4-43. KICK-DOWN SWITCH MAINTENANCE (3L80) (Cont'd)



- FOLLOW-ON TASKS:
- Connect battery ground cable (para. 4-73).
 - Lower and secure hood (TM 9-2320-0280-10).

4-44. FAN CUT-OFF SWITCH REPLACEMENT (4L80-E)

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M997A2, M1025A2, M1035A2, M1043A2,
M1045A2, M1097A2

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

- Engine access cover removed (para. 10-15).
- Battery ground cable disconnected (para. 4-73).
- Hood raised and secured (TM 9-2320-280-10).

Materials/Parts

Two lockwashers (Appendix G, Item 135)

a. Removal

NOTE

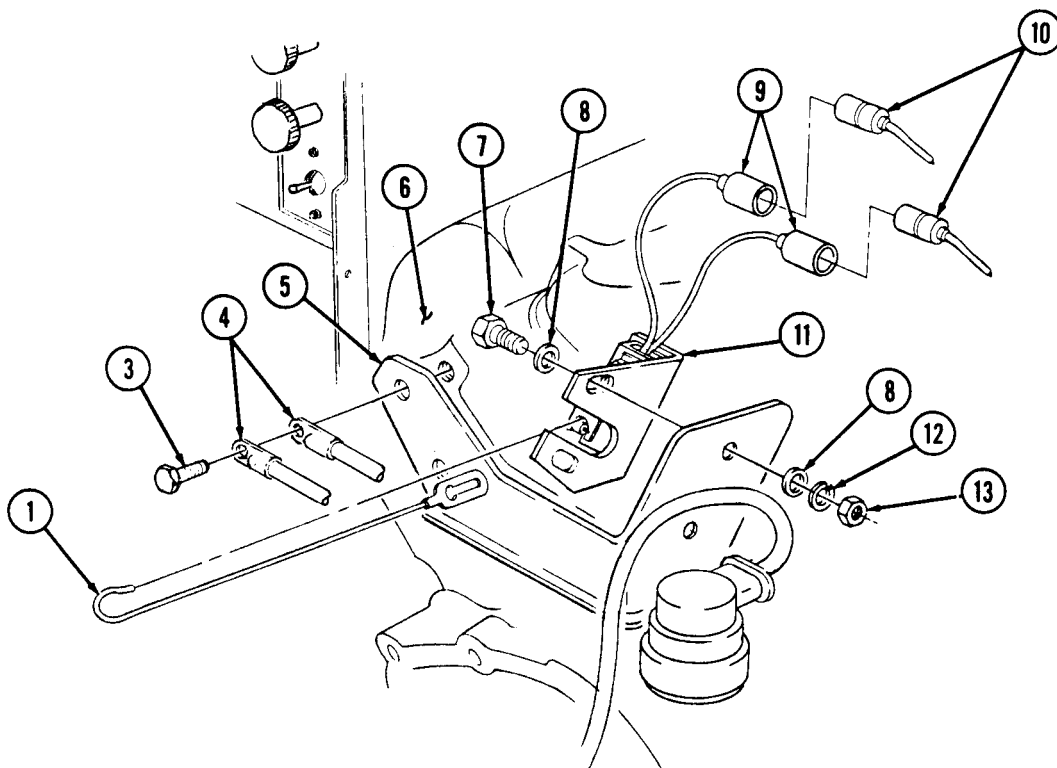
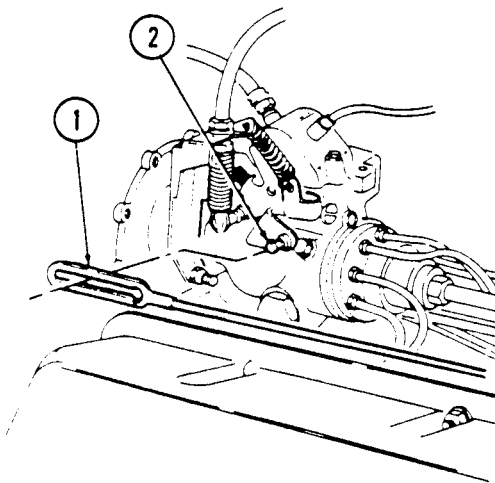
Prior to removal, tag leads for installation.

1. Slide rod (1) forward and disconnect from fuel injection pump (2).
2. Remove rod (1) from switch (11).
3. Disconnect harness leads 315A/315B (10) from leads 315 (9).
4. Remove two nuts (13), lockwashers (12), washers (8), capscrews (7), washers (8), and switch (11) from bracket (5). Discard lockwashers (12).
5. Remove two capscrews (3), leads (4), and bracket (5) from engine (6).

b. Installation

1. Install switch (11) on bracket (5) with two washers (8), capscrews (7), washers (8), lockwashers (12), and nuts (13). Do not tighten nuts (13).
2. Slide rod (1) forward and connect to fuel injection pump (2).
3. Install rod (1) on switch (11).
4. Install bracket (5) and two leads (4) on engine (6) with capscrews (3).
5. Position rod (1) at wide open throttle and position switch (11) to close. Tighten nuts (13).
6. Connect harness leads 315A/315B (10) to leads 315 (9).

4-44. FAN CUT-OFF SWITCH REPLACEMENT (4L80-E) (Cont'd)



- FOLLOW-ON TASKS:
- Install engine access cover (para. 10-15).
 - Connect battery ground cable (para. 4-73).
 - Lower and secure hood (TM 9-2320-280-10).

4-45. THROTTLE POSITION (TP) SENSOR MAINTENANCE (4L80-E)

This task covers:

- | | |
|--|----------------------|
| <p>a. Removal</p> <p>b. Installation</p> | <p>c. Adjustment</p> |
|--|----------------------|

INITIAL SETUP:

Applicable Models

M997A2, M1025A2, M1035A2, M1043A2,
M1045A2, M1097A2, M1123

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

- Hood raised and secured (TM 9-2320-280-10).
- Battery ground cables disconnected (para. 4-73).

Test Equipment

Multimeter (Appendix B, Item 166)
Jumper wire (Appendix B, Item 93.1)
Gauge block (Appendix B, Item 63)

a. Removal

CAUTION

The Throttle Position (TP) sensor is an electrical component and must not be soaked in any liquid cleaner or solvent or damage may result.

1. Disconnect body wiring harness connector (3) from TP sensor connector (4).
2. Remove two screws (7), washers (6), and TP sensor (5) from fuel injection pump (1).

b. Installation

1. Ensuring throttle is closed, place TP sensor (5) on throttle shaft (2) of fuel injection pump (1).
2. Rotate TP sensor (5) counterclockwise to align screw holes in sensor (5) with holes in injection pump (1).
3. Install TP sensor (5) on injection pump (1) with two washers (6) and screws (7). Do not tighten screws (7).
4. Adjust TP sensor (5) (para. 4-45c).

c. Adjustment

1. Disconnect engine harness connector (12) and body harness connector (11).
2. Install jumper wires between TP sensor connector (4) and body wiring harness connector (11).
3. Rotate ignition switch to RUN position (TM 9-2320-280-10).
4. Using a digital multimeter, measure voltage between terminals A and C of TP sensor connector (4). This voltage should be between 4.5 - 5.8 volts. Multiply by 0.33 to obtain the desired TP sensor voltage, and use this figure to adjust TP sensor.

NOTE

For example, 5.00 volts x 0.33 = 1.65 volts (±1% or 0.02 volt tolerance).

5. Install 0.646 side of gauge block between injection pump throttle lever stopscrew (8) and housing boss (9) on injection pump (1).

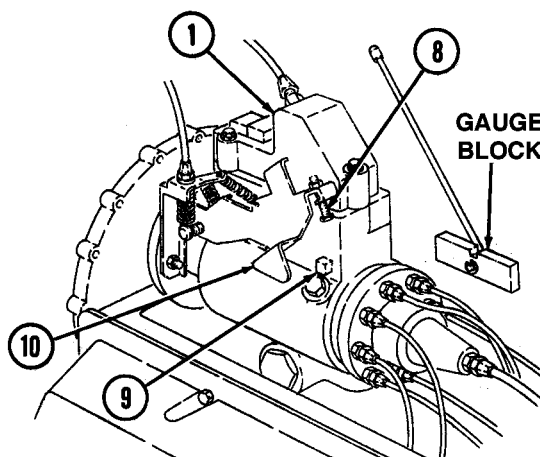
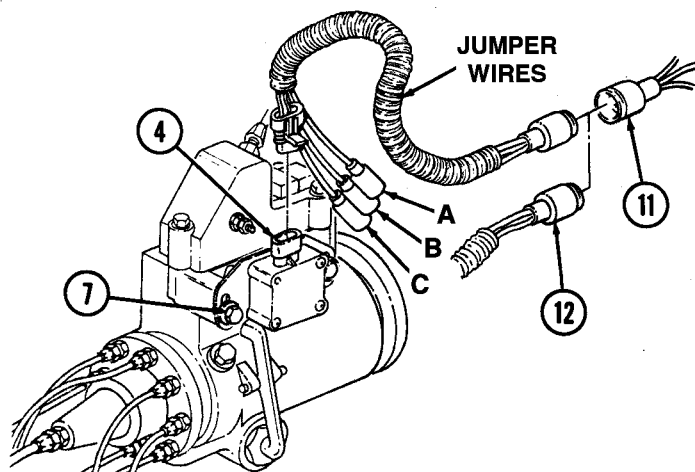
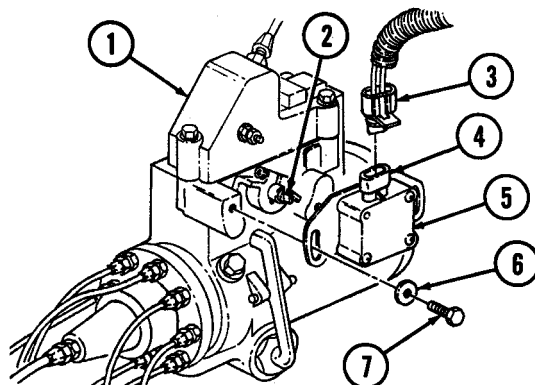
4-45. THROTTLE POSITION (TP) SENSOR MAINTENANCE (4L80-E) (Cont'd)

6. Rotate injection pump throttle lever (10) so that stopscrew (8) holds gauge block against housing boss (9).

NOTE

Keep throttle lever in this position during remainder of adjustment steps.

7. Measure voltage between terminals B and C of TP sensor connector (4).
 - a. If measured voltage is within calculated specification, as indicated in step 4, remove jumper wire and connect body harness connector (3) to TP sensor connector (4).
 - b. If voltage is not within calculated specification, go to next step.
8. Loosen TP sensor mounting screws (7) and rotate TP sensor (5) toward rear of vehicle (counter-clockwise direction).
9. With voltmeter connected to terminals B and C of TP sensor connector (4), rotate TP sensor (5) slowly toward front of vehicle (clockwise direction) until voltmeter indicates voltage as determined in step 4.
10. Tighten TP sensor mounting screws (7) and confirm that adjustment did not change.
11. Remove jumper wire.
12. Remove gauge block.
13. Connect body wiring harness connector (3) to TP sensor connector (4).
14. Connect body harness connector (11) and engine harness connector (12).



- FOLLOW-ON TASKS:
- Lower and secure hood (TM 9-2320-280-10).
 - Connect battery ground cables (para. 4-73).

4-46. TRANSMISSION INPUT SPEED SENSOR (TISS) AND OUTPUT SPEED SENSOR (TOSS) MAINTENANCE (4L80-E)

This task covers:

- a. Removal
- b. Inspection
- c. Installation

INITIAL SETUP:

Applicable Models

M997A2, M1025A2, M1035A2, M1043A2,
M1045A2, M1097A2, M1123

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Conditions

Battery ground cable disconnected (para. 4-73).

Materials/Parts

Packing retainer (Appendix G, Item 230)
Hydraulic fluid (Appendix C, Item 27)

a. Removal

NOTE

Both the input and output speed sensors are replaced basically the same.

1. Disconnect speed sensor harness connector (3) from sensor (5).
2. Remove capscrew (7) from sensor (5) and transmission (1). Slide bracket (6) off sensor (5).
3. Remove harness clip (2) from sensor bracket (6).
4. Using a twisting motion, remove sensor (5) from transmission (1).

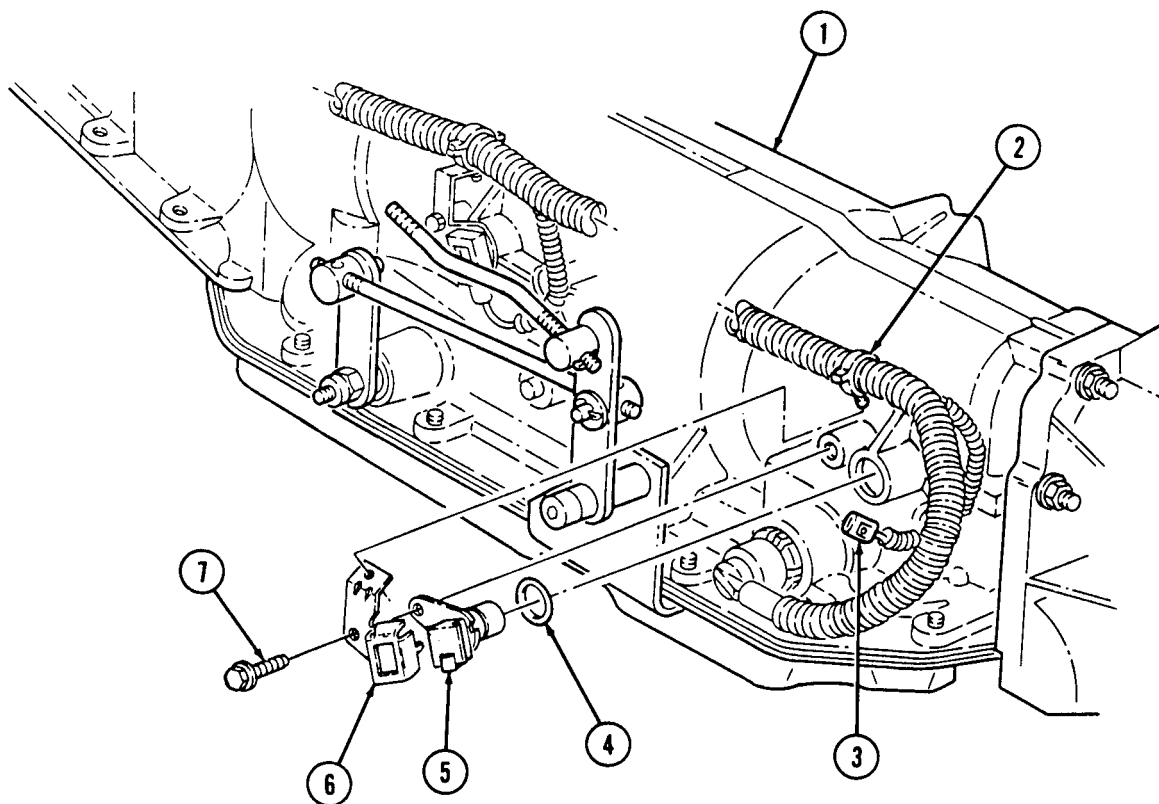
b. Inspection

Inspect packing retainer (4), and replace if damaged.

c. Installation

1. Lubricate packing retainer (4) with hydraulic fluid and install on sensor (5) if removed.
2. Install harness clip (2) on sensor bracket (6).
3. Using a twisting motion, install sensor (5) in transmission (1).
4. Slide bracket (6) over sensor (5) and install capscrew (7).
5. Install connector (3) on sensor (5).

4-46. TRANSMISSION INPUT SPEED SENSOR (TISS) AND OUTPUT SPEED SENSOR (TOSS) MAINTENANCE (4L80-E) (Cont'd)



- FOLLOW-ON TASK:
- Connect battery ground cable (para. 4-73).
 - Start engine (TM 9-2320-280-10) and check operation of transmission.

Section V. LIGHTING SYSTEM MAINTENANCE

4-47. LIGHTING SYSTEM MAINTENANCE TASK SUMMARY

TASK PARA.	PROCEDURES	PAGE NO.
4-48.	Service Headlight Lamp Maintenance	4-78
4-49.	Service Headlight Assembly Replacement	4-80
4-50.	Blackout Drive Light Assembly Replacement	4-82
4-51.	Blackout Drive Light Lamp Replacement	4-84
4-52.	Front Composite Light Assembly Replacement	4-86
4-53.	Front Composite Light Lamp Replacement	4-88
4-54.	Side Marker Light Lens and Lamp Replacement	4-89
4-55.	Side Marker Light Assembly Replacement	4-90
4-56.	Rear Composite Light Assembly Replacement	4-92
4-57.	Rear Composite Light Lamp Replacement	4-94
4-58.	Headlight Beam Selector Switch and Bracket Replacement	4-95
4-59.	Main Light Switch Replacement	4-96
4-60.	Stoplight Switch (11663279) Maintenance	4-98
4-61.	Stoplight Switch (RCSK 17810) Maintenance	4-100
4-62.	Directional Signal Flasher Replacement	4-102
4-63.	Directional Signal Control Indicator Lamp Replacement	4-103
4-64.	Directional Signal Control (12339312-1) Maintenance	4-104
4-65.	Directional Signal Control Replacement	4-106
4-66.	Directional Signal Control Cancelling Ring Replacement	4-107
4-67.	Service Headlight and Blackout Drive Light Electrical Connector and Grommet Replacement	4-108
4-68.	Backup Light Lamp Replacement	4-109
4-69.	Backup Light Assembly Replacement	4-110
4-70.	Backup Light Bracket Replacement	4-112

4-48. SERVICE HEADLIGHT LAMP MAINTENANCE

This task covers:

- a. Removal
- b. Installation
- c. Adjustment

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Personnel Required

One mechanic
One assistant

Materials/Parts

Chalk (Appendix C, Item 15)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P
TM 43-0139

Equipment Condition

Battery ground cable disconnected (para. 4-73).

NOTE

Prior to removal, tag leads for installation.

a. Removal

1. Loosen three retaining right screws (1).
2. Remove retaining ring (2).

NOTE

If retaining ring shows signs of corrosion, perform steps 3 through 5 to allow accumulated water/condensation to drain out.

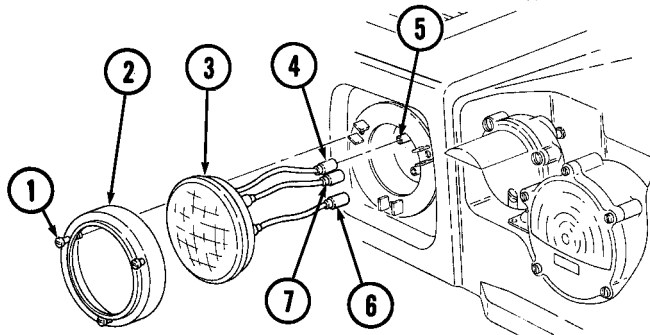
3. Clean and remove dirt/rust conditions from surface of retaining ring (2).
4. Drill a 9/16-in. (14 mm) hole in bottom of retaining ring (2), 3/4 in. (19 mm) from inside edge of retaining ring (2).
5. Paint all unprotected areas (TM 43-0139).
6. Disconnect leads 17 (4), 18 (6), and 91 (7) from headlight housing (5) and remove lamp (3).

b. Installation

NOTE

Circuit numbers are marked on housing.

1. Connect leads 17 (4), 18 (6), and 91 (7) to headlight housing (5).
2. Install lamp (3) to housing (5) and secure with retaining ring (2) and three screws (1).
3. Connect battery ground cable (para. 4-73).

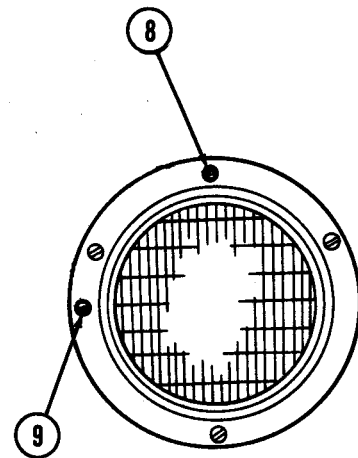
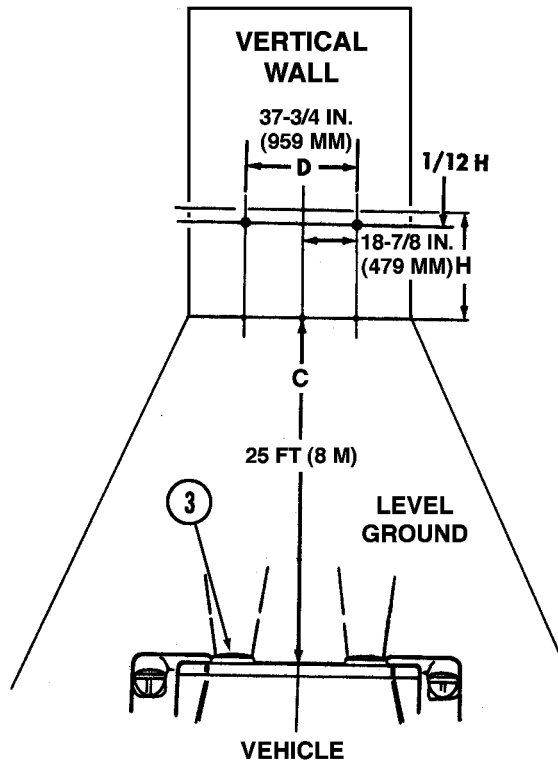


4-48. SERVICE HEADLIGHT LAMP MAINTENANCE (Cont'd)

c. Adjustment

NOTE

- Headlamp alignment is the same for both headlamps.
 - Inflate tires on vehicle before starting procedure (TM 9-2320-280-10).
 - Measured height (H) varies depending on model of vehicle and load configuration.
1. Position vehicle on level ground 25 ft (8 M) from and facing a vertical wall.
 2. Measure height (H) from ground up to center of lamp (3).
 3. Using chalk, draw a horizontal line across vertical wall at center height (H) of lamp (3).
 4. Draw a vertical line through horizontal line for center position (C) of vehicle.
 5. Measure distance from center to center of lamp (3) and divide measurement in half.
 6. Draw two vertical lines (D) at equal distance from center position line (C).
 7. Measure down 1/12 from horizontal line (H) and mark horizontal lines through lamp vertical lines (D).
 8. Turn headlamps on low beam and block out one lamp (3).
 9. Adjust lamp (3) using vertical adjusting screw (8) and/or horizontal adjusting screw (9) until center of lamp beam is aligned with lower horizontal and vertical lines.
 10. Repeat steps 8 and 9 for other lamp (3).



FOLLOW-ON TASK: Check headlight lamp for proper operation (TM 9-2320-280-10).

4-49. SERVICE HEADLIGHT ASSEMBLY REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

- Battery ground cable disconnected (para. 4-73).
- Hood raised and secured (TM 9-2320-280-10).

NOTE

- Prior to removal, tag leads for installation.
- Note position of circuit 91 for installation.

a. Removal

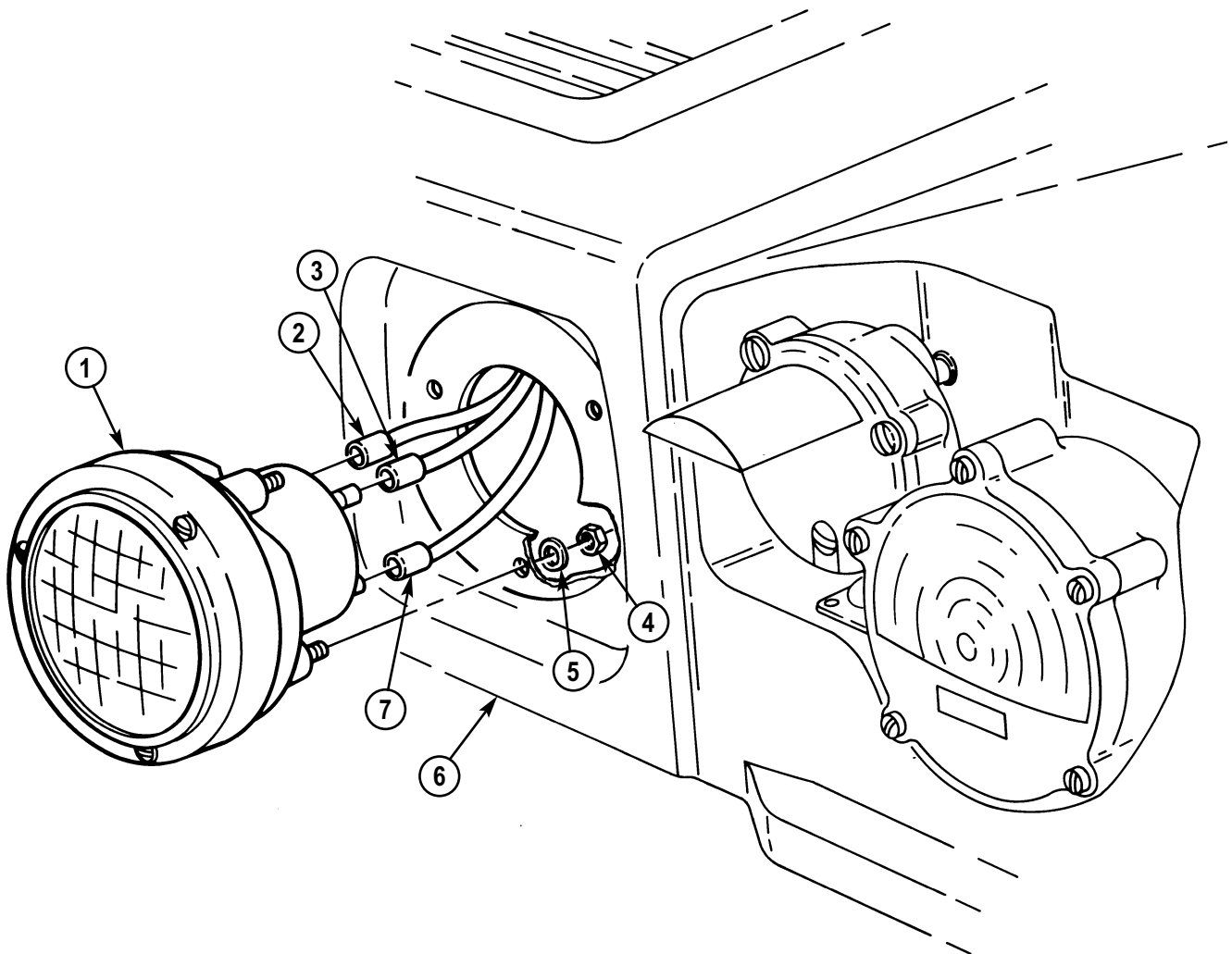
1. Remove three nuts (4) and washers (5) from headlight assembly (1) and hood (6).
2. Remove leads 17 (2), 18 (3), and 91 (7) from headlight assembly (1).
3. Remove headlight assembly (1) from hood (6).

b. Installation

NOTE

Circuit numbers are marked on headlight next to respective connector.

1. Connect leads 17 (2), 18 (3), and 91 (7) to headlight assembly (1).
2. Install headlight assembly (1) to hood (6) with three washers (5) and nuts (4).

4-49. SERVICE HEADLIGHT ASSEMBLY REPLACEMENT (Cont'd)

- FOLLOW-ON TASKS:**
- Connect battery ground cable (para. 4-73).
 - Lower and secure hood (TM 9-2320-280-10).
 - Check adjustment of headlight lamp (para. 4-48).

4-50. BLACKOUT DRIVE LIGHT ASSEMBLY REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Materials/Parts

Lockwasher (Appendix G, Item 133)
Four plain-assembled nuts
(Appendix G, Item 204)
Antiseize compound (Appendix C, Item 13)

Equipment Condition

- Battery ground cable disconnected (para. 4-73).
- Hood raised and secured (TM 9-2320-280-10).

a. Removal

1. Remove nut (5), lockwasher (6), and special washer (7) from blackout drive light (1) and hood (9). Discard lockwasher (6).
2. Disconnect lead 198 (4) from blackout drive light (1).
3. Remove blackout drive light (1) and coned mounting washer (2) from swivel bracket (11).
4. Disconnect lead 92C (3) from blackout drive light (1).

NOTE

Some vehicles may have screws in place of studs securing bracket and plate to hood.

5. Remove four plain-assembled nuts (8), swivel bracket (11), and plate (10) from hood (9). Discard plain-assembled nuts (8).

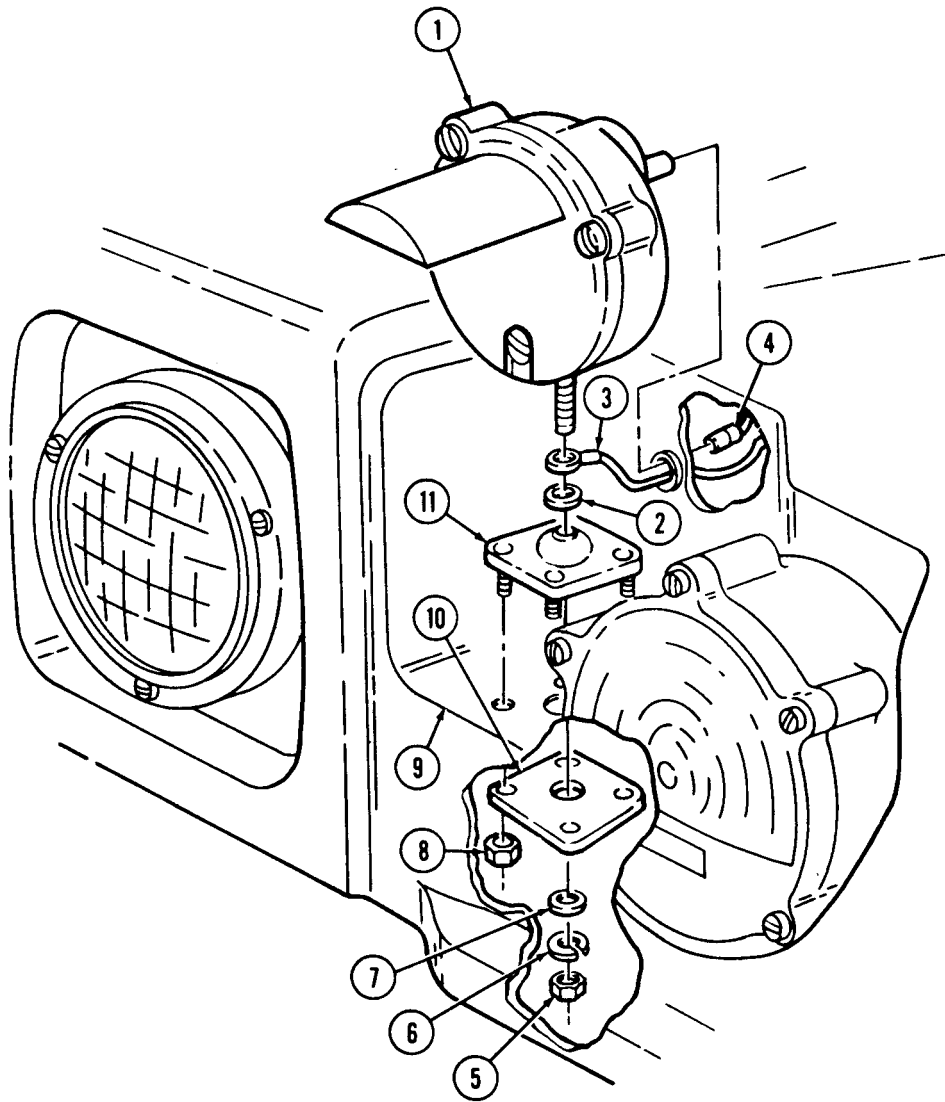
b. Installation

NOTE

Some vehicles may have screws in place of studs securing bracket and plate to hood.

1. Install swivel bracket (11) to outside of hood (9), and plate (10) to inside of hood (9) with four plain-assembled nuts (8). Tighten plain-assembled nuts (8) 16-30 lb-in. (1-3 N•m).
2. Connect lead 92C (3) to blackout drive light (1).
3. Place blackout drive light (1) and coned mounting washer (2) through hole in swivel bracket (11).
4. Connect lead 198 (4) to blackout drive light (1).
5. Install blackout drive light (1) on hood (9) with special washer (7), lockwasher (6), and nut (5).

4-50. BLACKOUT DRIVE LIGHT ASSEMBLY REPLACEMENT (Cont'd)



- FOLLOW-ON TASKS:
- Connect battery ground cable (para. 4-73).
 - Lower and secure hood (TM 9-2320-280-10).
 - Check blackout drive light for proper operation (TM 9-2320-280-10).

4-51. BLACKOUT DRIVE LIGHT LAMP REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Materials/Parts

Three gaskets (Appendix G, Item 46)
Gasket (Appendix G, Item 56)
Adhesive sealant (Appendix C, Item 10)

Equipment Condition

Battery ground cable disconnected
(para. 4-73).

a. Removal

1. Loosen three retaining screws (2) from light door (6).
2. Remove light door (6), three gaskets (5.1), and gasket (3) from light body (5). Discard gasket (3) and gaskets (5.1).
3. Remove lamp (4).
4. Clean mating surface on light door (6) and light body (5). Remove sealant.

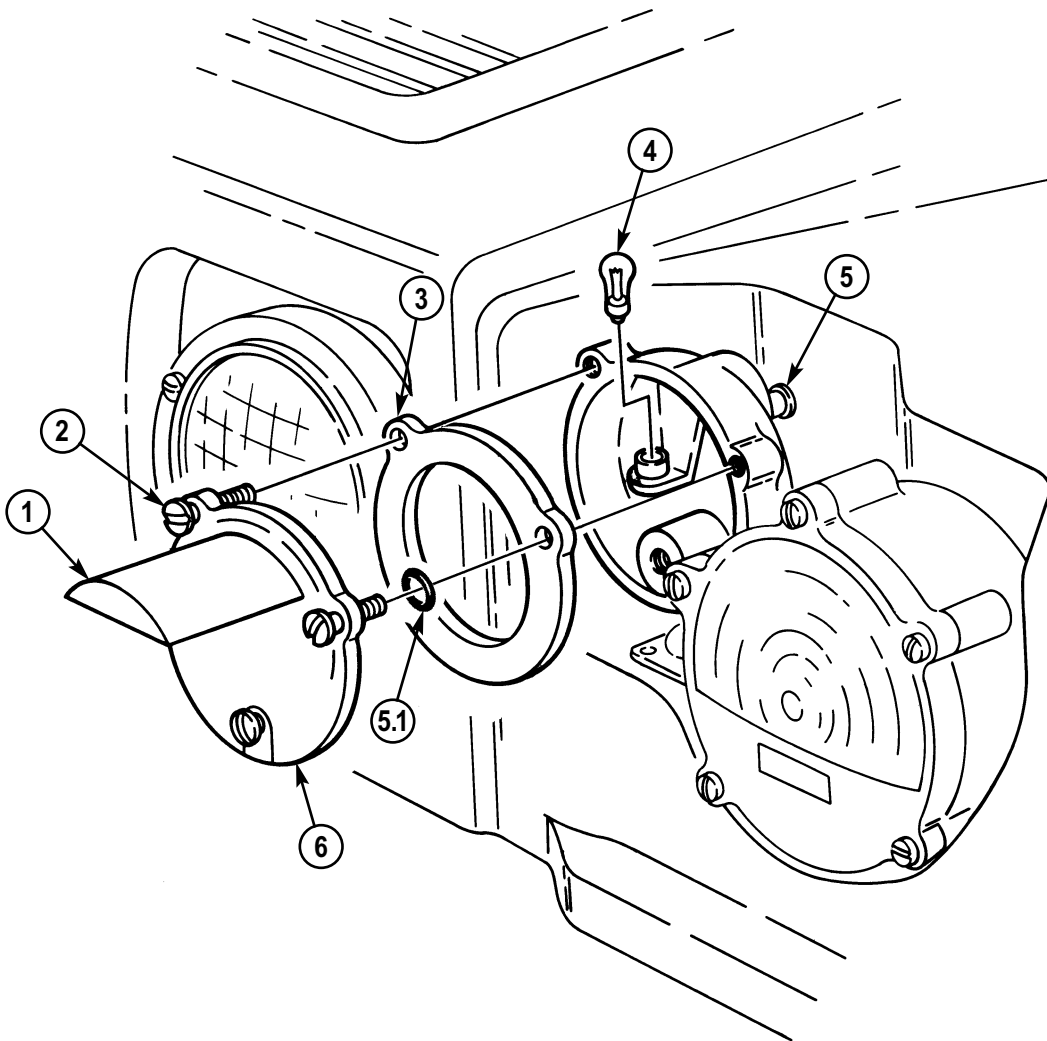
b. Installation

1. Install lamp (4).
2. Install three gaskets (5.1), gasket (3), and light door (6) to light body (5) with lens hood (1) at top.

NOTE

To prevent moisture from entering light assembly, tighten all screws evenly.

3. Secure light door (6) by tightening three screws (2).
4. Apply thin coat of sealant to seam between light body (5) and light door (6).

4-51. BLACKOUT DRIVE LIGHT LAMP REPLACEMENT (Cont'd)

- FOLLOW-ON TASKS:
- Connect battery ground cable (para. 4-73).
 - Check blackout drive light for proper operation (TM 9-2320-280-10).

4-52. FRONT COMPOSITE LIGHT ASSEMBLY REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Materials/Parts

Adhesive sealant (Appendix C, Item 10)

Equipment Condition

Battery ground cable disconnected (para. 4-73).

NOTE

- The procedure to remove and install right and left composite light assemblies is basically the same except left side has four screws securing close-off cover and right side has three screws. This procedure covers the left composite light.
- Prior to removal, tag leads for installation.

a. Removal

1. Remove four screws (1), washers (2), and close-off cover (3) from hood (4).
2. Disconnect leads 20 (5), 461 (12), and 491 (11) from hood wiring harness (6).
3. Remove two capscrews (9), washers (8), ground 92 (7), buss bar (10), and composite light (13) from hood (4).

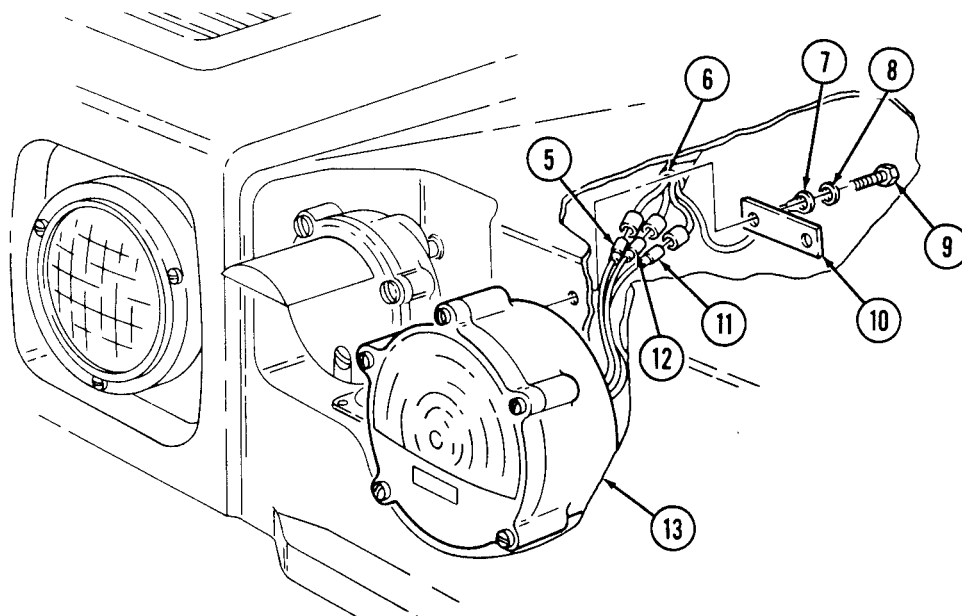
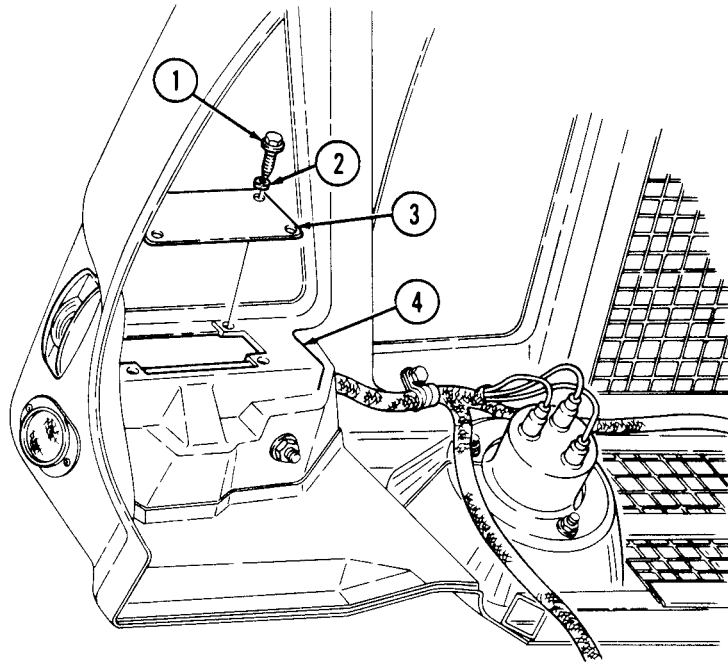
b. Installation

NOTE

To prevent water from accumulating between the composite light access cover and the hood, general purpose RTV adhesive sealant should be applied to the inside of the cover. Clean and reapply RTV when removing and reinstalling the cover.

1. Install composite light (13), buss bar (10), and ground 92 (7) on hood (4) with two washers (8) and capscrews (9).
2. Connect lead 20 (5), 461 (12), and 491 (11) to hood wiring harness (6).
3. Install close-off cover (3) to hood (4) with four washers (2) and screws (1).

4-52. FRONT COMPOSITE LIGHT ASSEMBLY REPLACEMENT (Cont'd)



- FOLLOW-ON TASKS:**
- Connect battery ground cable (para. 4-73).
 - Lower and secure hood (TM 9-2320-280-10).
 - Check front composite light for proper operation (TM 9-2320-280-10).

4-53. FRONT COMPOSITE LIGHT LAMP REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Materials/Parts

O-ring (Appendix G, Item 220)
Adhesive sealant (Appendix C, Item 10)

Equipment Condition

Battery ground cable disconnect (para. 4-73).

a. Removal

1. Loosen five retaining screws (1) and remove light door (2) and O-ring (5) from light body (3). Discard O-ring (5).
2. Remove lamp (4).
3. Clean mating surface on light door (2) and light body (3). Remove sealant.

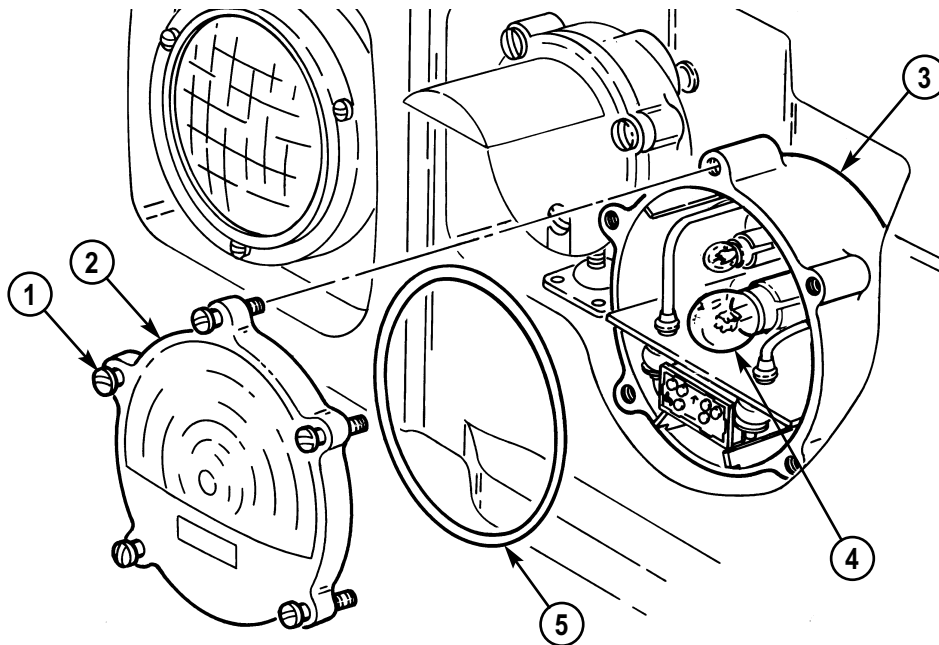
b. Installation

1. Install lamp (4).

NOTE

To prevent moisture from entering light assembly, tighten all screws evenly.

2. Install O-ring (5) and light door (2) on light body (3) with five retaining screws (1).
3. Apply thin coat of sealant to seam between light body (3) and light door (2).



- FOLLOW-ON TASKS:**
- Connect battery ground cable (para. 4-73).
 - Check front composite light for proper operation (TM 9-2320-280-10).

4-54. SIDE MARKER LIGHT LENS AND LAMP REPLACEMENT

This task covers:

a. Lens and Lamp Removal

b. Lens and Lamp Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

Battery ground cable disconnect (para. 4-73).

Manual References

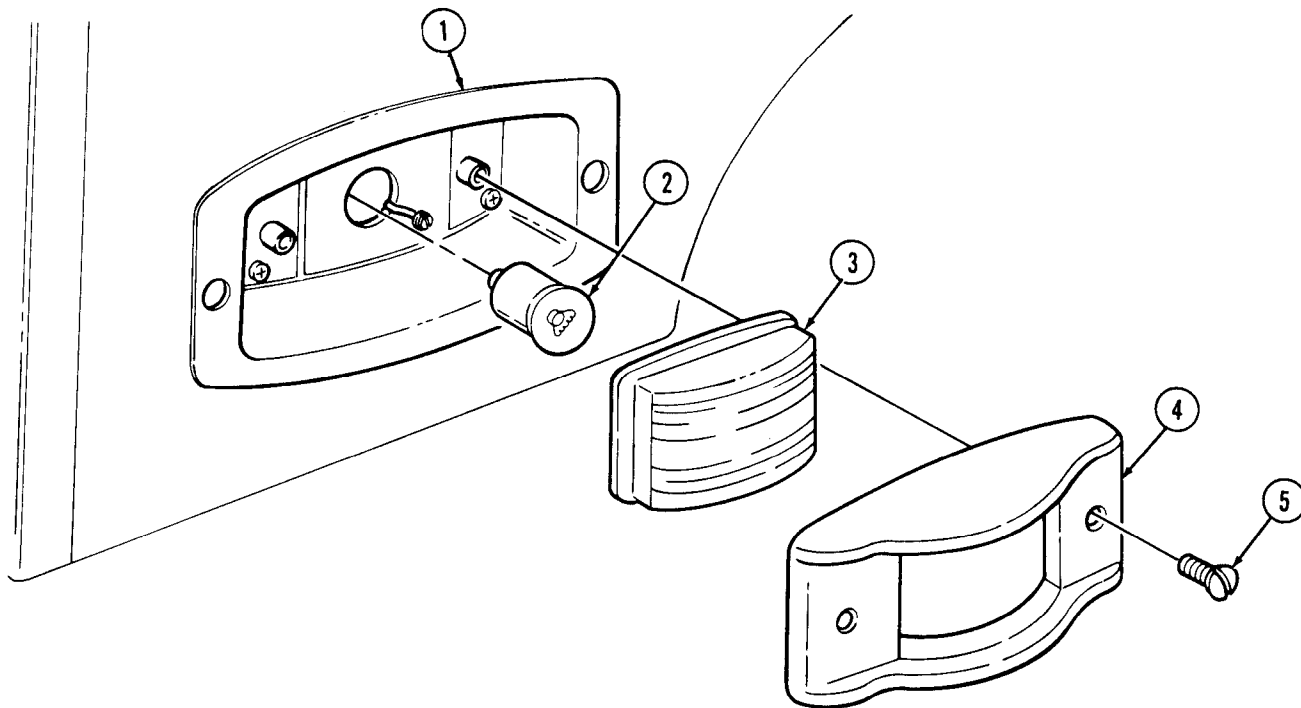
TM 9-2320-280-10
TM 9-2320-280-24P

a. Lens and Lamp Removal

1. Remove two screws (5), door (4) and lens (3) from light body (1).
2. Remove lamp (2).

b. Lens and Lamp Installation

1. Install lamp (4).
2. Install lens (3) and door (4) on light body (1) with two screws (5).



- FOLLOW-ON TASKS:
- Connect battery ground cable (para. 4-73).
 - Check side marker light for proper operation (TM 9-2320-280-10).

4-55. SIDE MARKER LIGHT ASSEMBLY REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Materials/Parts

Four locknuts (Appendix G, Item 74)
(front only)

Equipment Condition

- Battery ground cable disconnect (para. 4-73).
- Hood raised and secured (front side marker only) (TM 9-2320-280-10).

NOTE

Procedures to remove and install the front and rear side marker light assemblies are basically the same for all models. Front marker lights have locknuts, rear marker lights have plain nuts. This procedure is for the left front side marker for basic and A1 models.

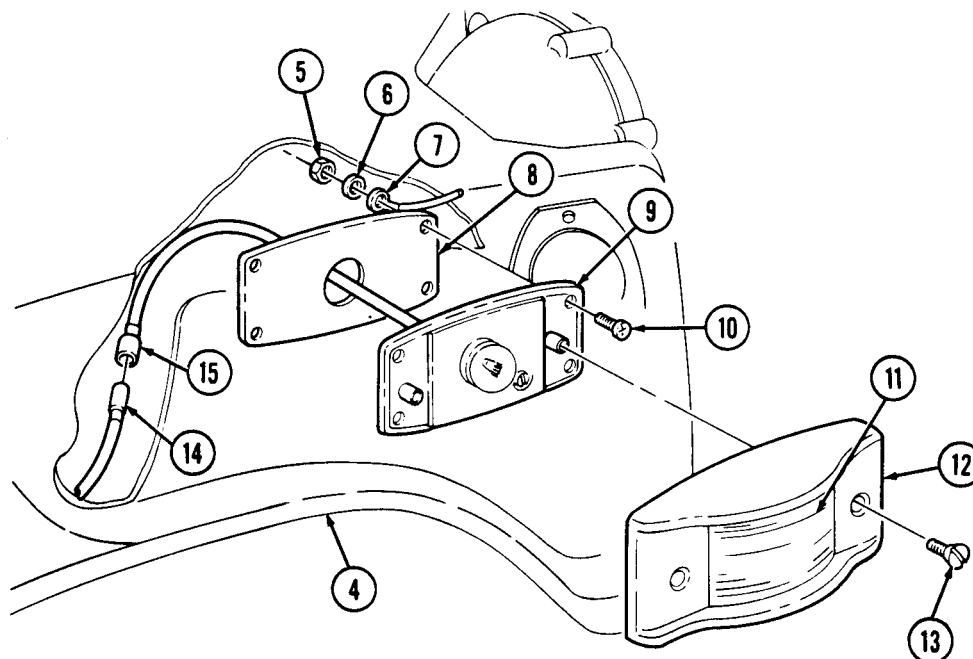
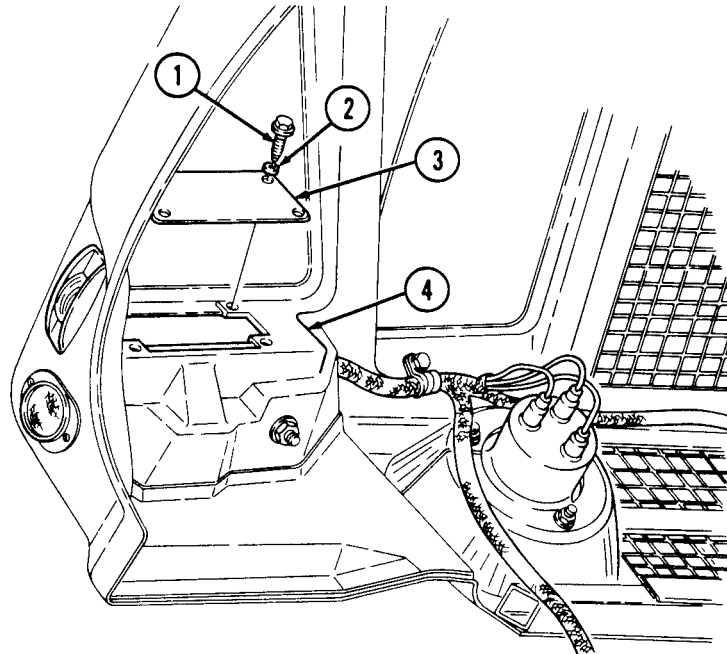
a. Removal

1. Remove four screws (1), washers (2), and close-off cover (3) from hood (4).
2. Disconnect lead 489 (14) from hood wiring harness (15).
3. Remove two screws (13), lens (11), and door (12) from side marker light (9)
4. Remove four screws (10), washers (6), locknuts (5), ground 92 (7), gasket (8), and side marker light (9) from hood (4). Discard locknuts (5).

b. Installation

1. Install gasket (8), side marker light (9), and ground 92 (7) on hood (4) with four screws (10), washers (6), and locknuts (5) ensuring ground 92 (7) is under washers (6).
2. Install lens (11) and door (12) on side marker light (9) with two screws (13).
3. Connect lead 489 (14) to hood wiring harness (15).
4. Install close-off cover (3) to hood (4) with four washers (2) and screws (1).

4-55. SIDE MARKER LIGHT ASSEMBLY REPLACEMENT (Cont'd)



- FOLLOW-ON TASKS:
- Connect battery ground cable (para. 4-73).
 - Lower and secure hood (front side marker only) (TM 9-2320-280-10).
 - Check side marker light for proper operation (TM 9-2320-280-10).

4-56. REAR COMPOSITE LIGHT ASSEMBLY REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Materials/Parts

Two lockwashers (Appendix G, Item 135)

Equipment Condition

Battery ground cable disconnect (para. 4-73).

NOTE

Prior to removal, tag leads for installation.

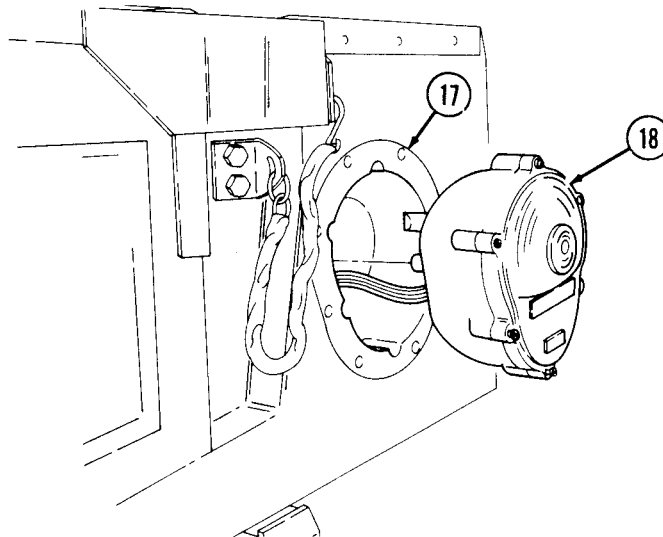
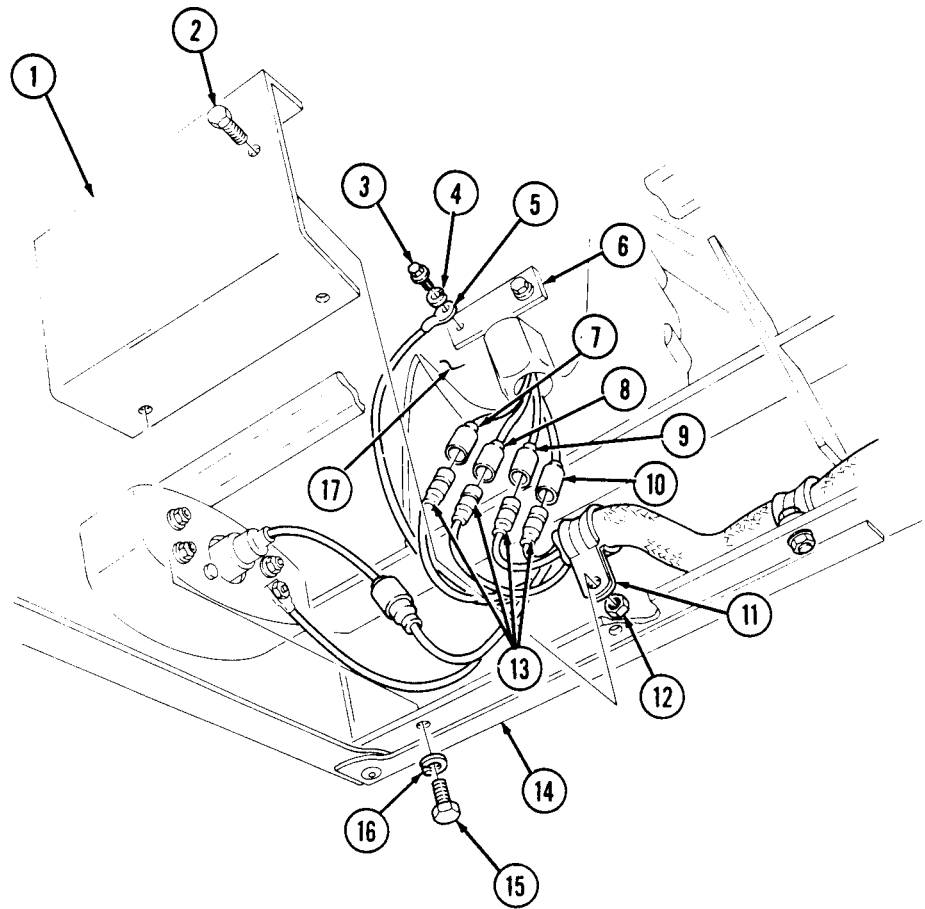
a. Removal

1. Remove two capscrews (3), washers (4), ground 95B (5), and ground strap (6) from housing (17).
2. Remove two capscrews (15), lockwashers (16), and pull shield (1) away from "D" beam (14). Discard lockwashers (16).
3. Remove screw (2), nut (12) and clamp (11) from shield (1).
4. Disconnect leads 21 (7), 23 (8), 24 (9), and 22-461 (10) from body harness (13).
5. Remove composite light (18) from housing (17).

b. Installation

1. Install composite light (18) on housing (17).
2. Connect leads 21 (7), 23 (8), 24 (9), and 22-461 (10) to body harness (13).
3. Install clamp (11) on shield (1) with screw (2) and nut (12).
4. Install shield (1) on "D" beam (14) with two capscrews (15) and lockwashers (16).
5. Install ground strap (6) and ground 95B (5) on housing (17) with two washers (4) and capscrews (3).

4-56. REAR COMPOSITE LIGHT ASSEMBLY REPLACEMENT (Cont'd)



- FOLLOW-ON TASKS:
- Connect battery ground cable (para. 4-73).
 - Check rear composite light for proper operation (TM 9-2320-280-10).

4-57. REAR COMPOSITE LIGHT LAMP REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Materials/Parts

O-ring (Appendix G, Item 221)
Adhesive sealant (Appendix C, Item 10)

Equipment Condition

Battery ground cable disconnect (para. 4-73).

a. Removal

1. Loosen six retaining screws (3) and remove composite light door (4) and O-ring (5) from composite light (1). Discard O-ring (5).
2. Remove lamp (2).
3. Clean mating surface on light door (4) and composite light (1). Remove sealant.

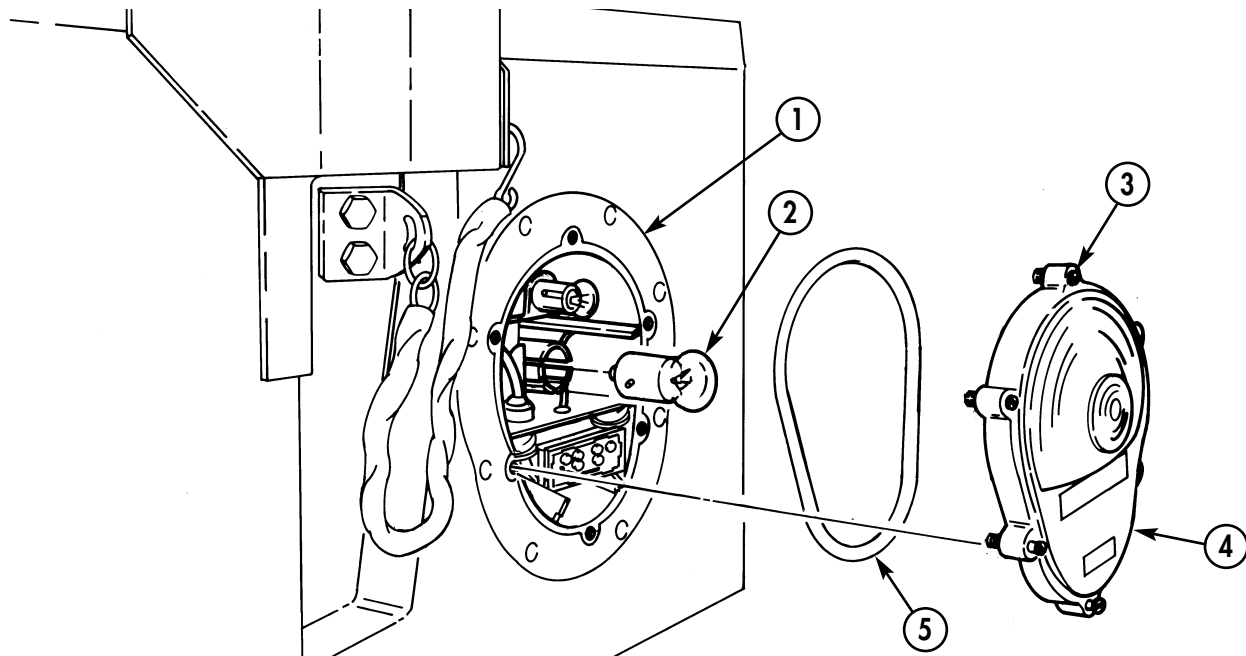
b. Installation

1. Install lamp (2).

NOTE

To prevent moisture from entering light assembly, tighten all screws evenly.

2. Install O-ring (5) and composite light door (4) on composite light (1) with six screws (3).
3. Apply a thin coat of sealant to seam between composite light (1) and composite light door (4).



- FOLLOW-ON TASKS:**
- Connect battery ground cable (para. 4-73).
 - Check front composite light for proper operation (TM 9-2320-280-10).

4-58. HEADLIGHT BEAM SELECTOR SWITCH AND BRACKET REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
 automotive (Appendix B, Item 1)
 Riveter tool kit (Appendix B, Item 139)

Manual References

TM 9-2320-280-10
 TM 9-2320-280-24P

Materials/Parts

Three assembled washer screws
 (Appendix G, Item 281)

Equipment Condition

Battery ground cables disconnected (para. 4-73).

a. Removal

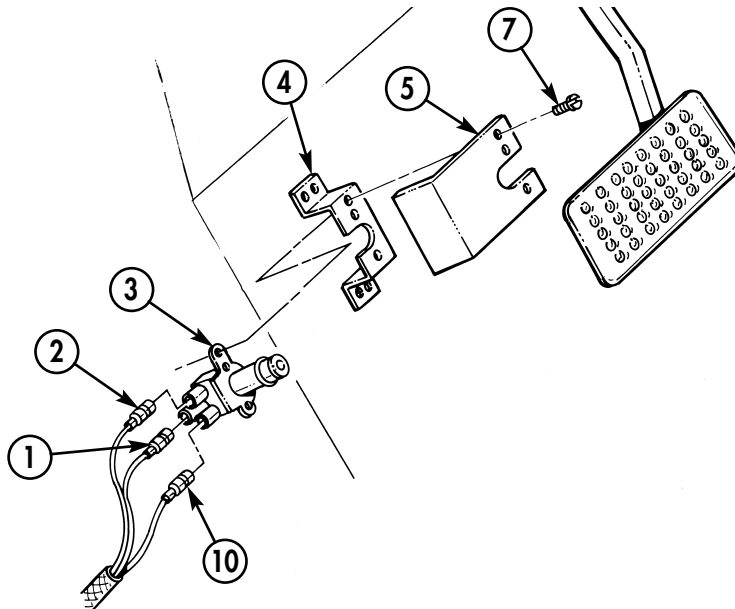
NOTE

- Prior to removal, tag leads for installation.
- Pull back floor insulation for access to beam selector switch and bracket.

1. Remove three assembled washer screws (7), switch (3), and shield (5) from bracket (4). Discard assembled washer screws (7).
2. Disconnect leads 16A (2), 17A (1), and 18A (10) from switch (3).
3. Deleted.

b. Installation

1. Deleted.
2. Connect leads 16A (2), 17A (1), and 18A (10) to switch (3).
3. Install switch (3) and shield (5) on bracket (4) with three assembled washer screws (7).



- FOLLOW-ON TASKS:**
- Connect battery ground cables (para. 4-73).
 - Check headlight beam selection switch for proper operation (TM 9-2320-280-10).

4-59. MAIN LIGHT SWITCH REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Materials/Parts

Lockwasher (Appendix G, Item 136)

Equipment Condition

Battery ground cable disconnect (para. 4-73).

a. Removal

1. Remove cannon plug (1) from main light switch (8).
2. Remove screw (6), lockwasher (5), top single position lever (4), and washer (7) from switch (8). Discard lockwasher (5).

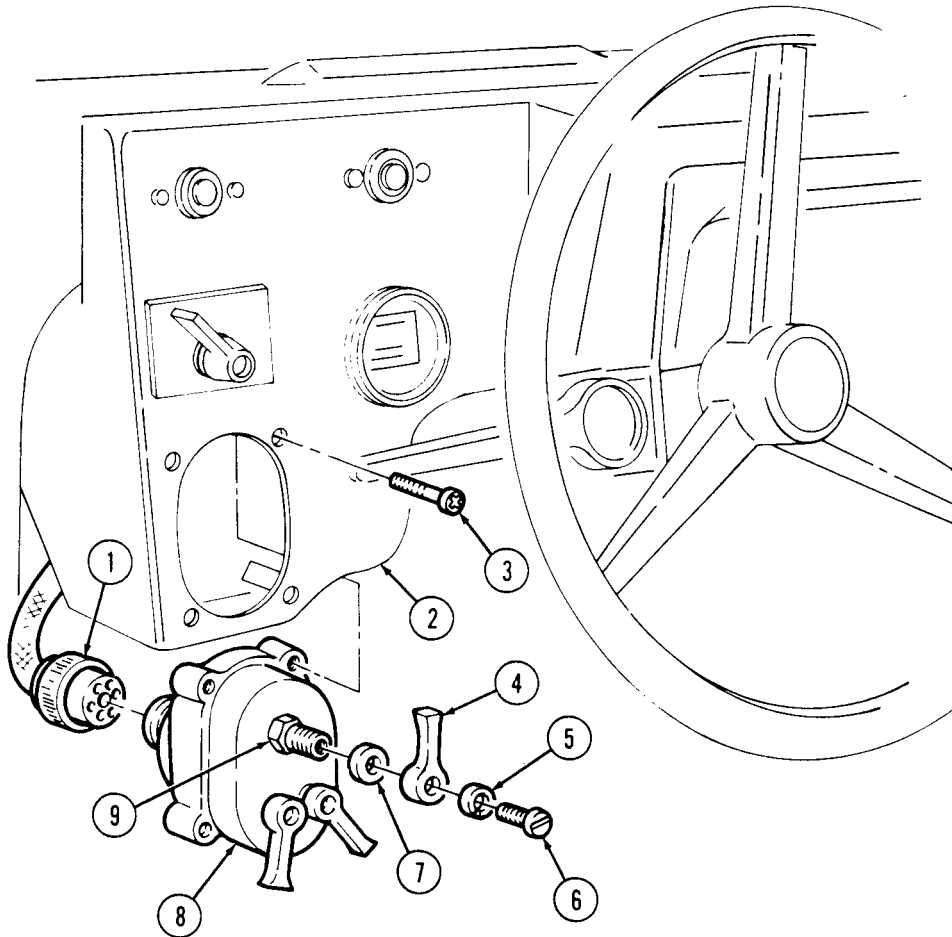
NOTE

Lower right lever must be raised to remove screw.

3. Remove four screws (3) from switch (8) and instrument panel (2).
4. Remove switch (8) from behind instrument panel (2).

b. Installation

1. With single position lever shaft (9) at top of switch (8), install switch (8) into hole in instrument panel (2) with four screws (3).
2. Install washer (7) and top single position lever (4) to switch (8) with lockwasher (5) and screw (6).
3. Install cannon plug (1) to rear of switch (8).

4-59. MAIN LIGHT SWITCH REPLACEMENT (Cont'd)

- FOLLOW ON TASKS:
- Connect battery ground cable (para. 4-73).
 - Check main light switch for proper operation (TM 9-2320-280-10).

4-60. STOPLIGHT SWITCH (11663279) MAINTENANCE

This task covers:

- | | |
|---|---|
| <ul style="list-style-type: none"> a. Removal b. Installation | <ul style="list-style-type: none"> c. Adjustment |
|---|---|

INITIAL SETUP:

Applicable Models

All vehicles except: M997A2, M1025A2, M1035A2, M1043A2, M1045A2, M1097A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Test Equipment

Multimeter (Appendix B, Item 166)

Materials/Parts

Push on nut (Appendix G, Item 226)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

Battery ground cable disconnected (para. 4-73).

NOTE

Prior to removal, tag leads for installation.

a. Removal

1. Remove push on nut (10) from rod connecting switch arm (5) and brake pedal arm (9). Discard push on nut (10).
2. Remove two nuts (6), washers (1), capscrews (2), washers (1), and stoplight switch (3) from support (4).
3. Disconnect leads 75A (7) and 75B (8) from stoplight switch (3).

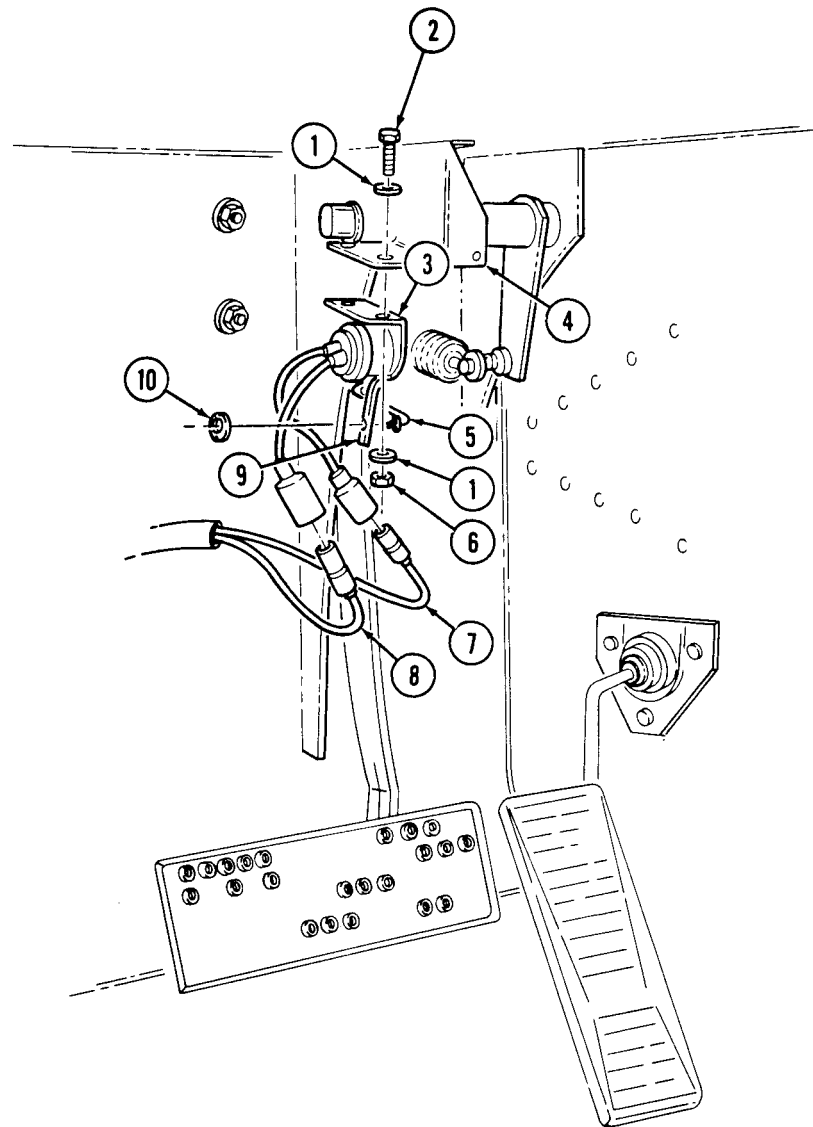
b. Installation

1. Install stoplight switch (3) on support (4) with two washers (1), capscrews (2), washers (1), and nuts (6).
2. Install switch arm (5) into brake pedal arm (9) with push on nut (10).
3. Connect leads 75B (8) and 75A (7) to stoplight switch (3).
4. Adjust stoplight switch (3) (para. 4-60c).

c. Adjustment

1. Disconnect leads 75A (7) and 75B (8) from stoplight switch (3) and connect multimeter to leads on stoplight switch (3) to check continuity. Multimeter should indicate open. Depress brake pedal, multimeter should indicate continuity within approximately 1/2 in. (12 mm) of pedal travel. If not, go to step 2.
2. Loosen two capscrews (2) to allow movement of stoplight switch (3).
3. Position stoplight switch (3) so that continuity is present when installed. Slide stoplight switch forward until no continuity (open) is indicated (approximately 1/8 to 1/4 in. (3 to 6 mm)).
4. Tighten two capscrews (2).
5. Connect leads 75A (7) and 75B (8) to stoplight switch (3).
6. Connect battery ground cable (para. 4-73).
7. Turn selector lever to service drive; stoplights should not illuminate. Depress brake pedal; stoplights should illuminate within 1/2 in. (12 mm) of pedal travel.

4-60. STOPLIGHT SWITCH (11663279) MAINTENANCE (Cont'd)



4-61. STOPLIGHT SWITCH (RCSK 17810) MAINTENANCE

This task covers:

- | | |
|---|---|
| <ul style="list-style-type: none"> a. Removal b. Installation | <ul style="list-style-type: none"> c. Adjustment |
|---|---|

INITIAL SETUP:

Applicable Models

M997A2, M1025A2, M1035A2, M1043A2,
M1045A2, M1097A2, M1123

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Test Equipment

Multimeter (Appendix B, Item 166)

Materials/Parts

Two push on nuts (Appendix G, Item 226)
Two assembled locknuts (Appendix G, Item 130)
Sealing compound (Appendix C, Item 45)

Equipment Condition

Battery ground cables disconnected (para. 4-73).

a. Removal

NOTE

Prior to removal, tag leads for installation.

1. Disconnect leads 75A (1), 75B (16), and connector 810A/810B (15) from stoplight switch leads (2).
2. Remove push on nut (14), stoplight switch arm (13), and washer (12) from actuating rod (10). Discard push on nut (14).
3. Remove two assembled locknuts (6), washers (4), capscrews (5), washers (4), and stoplight switch (3) from mounting bracket (7). Discard assembled locknuts (6).
4. Remove push on nut (9), actuating rod (10), and washer (11) from brake pedal (8). Discard push on nut (9).

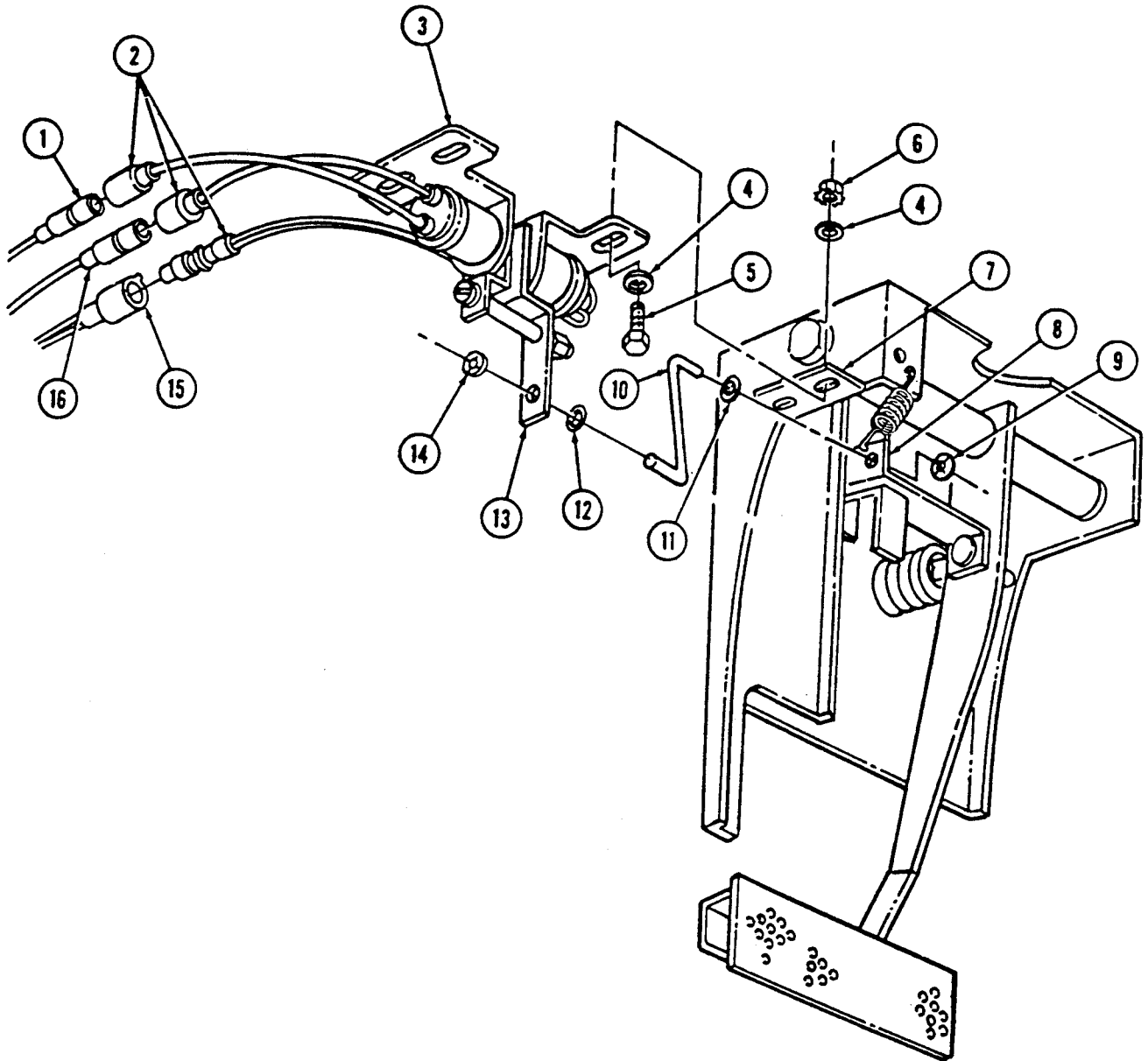
b. Installation

1. Install washer (11) and actuating rod (10) on brake pedal (8) with push on nut (9).
2. Install washer (12) and stoplight switch arm (13) on actuating rod (10) with push on nut (14).
3. Install stoplight switch (3) on mounting bracket (7) with two washers (4), capscrews (5), washers (4), and assembled locknuts (6).
4. Connect leads 75A (1), 75B (16), and connector 810A/810B (15) to stoplight switch leads (2).

c. Adjustment

1. Disconnect leads 75A (1), 75B (16), and connector 810A/810B (15) from stoplight switch leads (2) and connect multimeter to leads on stoplight switch (3) to check continuity. Multimeter should indicate open. Depress brake pedal; multimeter should indicate continuity within approximately 1/4 in. (6 mm) of pedal travel. If not, go to step 2.
2. Loosen two capscrews (5) to allow movement of stoplight switch (3).
3. Position stoplight switch (3) so that continuity is present when installed. Slide stoplight switch forward until no continuity (open) is indicated (approximately 1/4 in. (6 mm)).
4. Tighten two capscrews (5).
5. Connect leads 75B (1), 75A (16), and connector 810A/810B (15) to stoplight switch leads (2).
6. Connect battery ground cables (para. 4-73).
7. Turn selector lever to service drive; stoplights should not illuminate. Depress brake pedal; stoplights should illuminate within 1/4 in. (6 mm) of pedal travel.

4-61. STOPLIGHT SWITCH (RCSK 17810) MAINTENANCE (Cont'd)



4-62. DIRECTIONAL SIGNAL FLASHER REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Materials/Parts

Silicone compound (Appendix C, Item 48)

Equipment Condition

Battery ground cable disconnected (para. 4-73).

NOTE

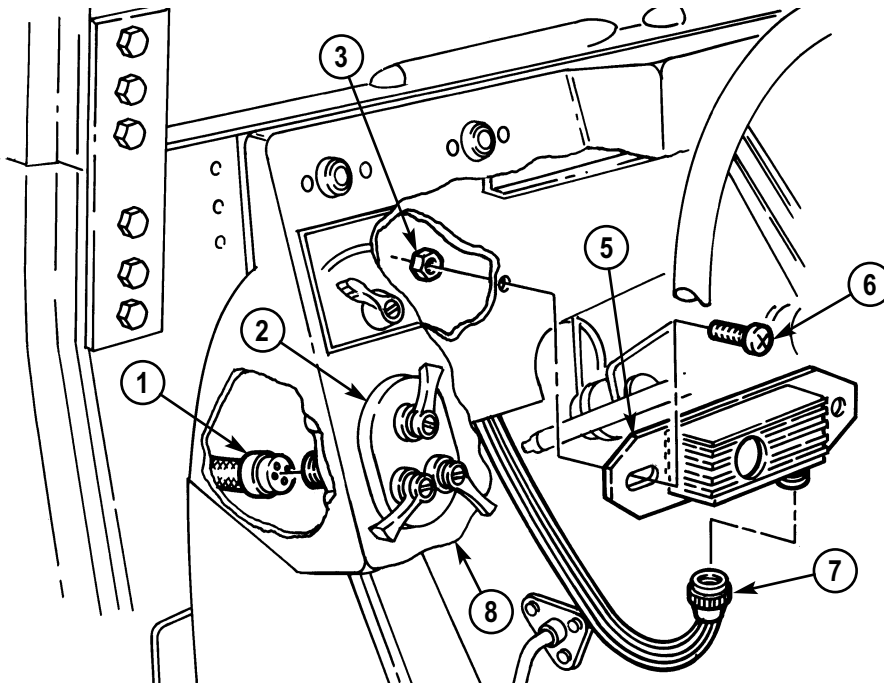
The flasher is located under the instrument panel to the left of the steering column.

a. Removal

1. Remove cannon plug (1) from main light switch (2).
2. Remove connector plug (7) from flasher (5).
3. Remove two nuts (3), screws (6), and flasher (5) from instrument panel (8).

b. Installation

1. Install flasher (5) on instrument panel (8) with two screws (6) and nuts (3).
2. Apply silicone compound to threads of connector plug (7). Install connector plug (7) on flasher (5).
3. Connect cannon plug (1) to main light switch (2).



- FOLLOW-ON TASKS:
- Connect battery ground cable (para. 4-73).
 - Check directional signal flasher for proper operation (TM 9-2320-280-10).

4-63. DIRECTIONAL SIGNAL CONTROL INDICATOR LAMP REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

Battery ground cable disconnected (para. 4-73).

Manual References

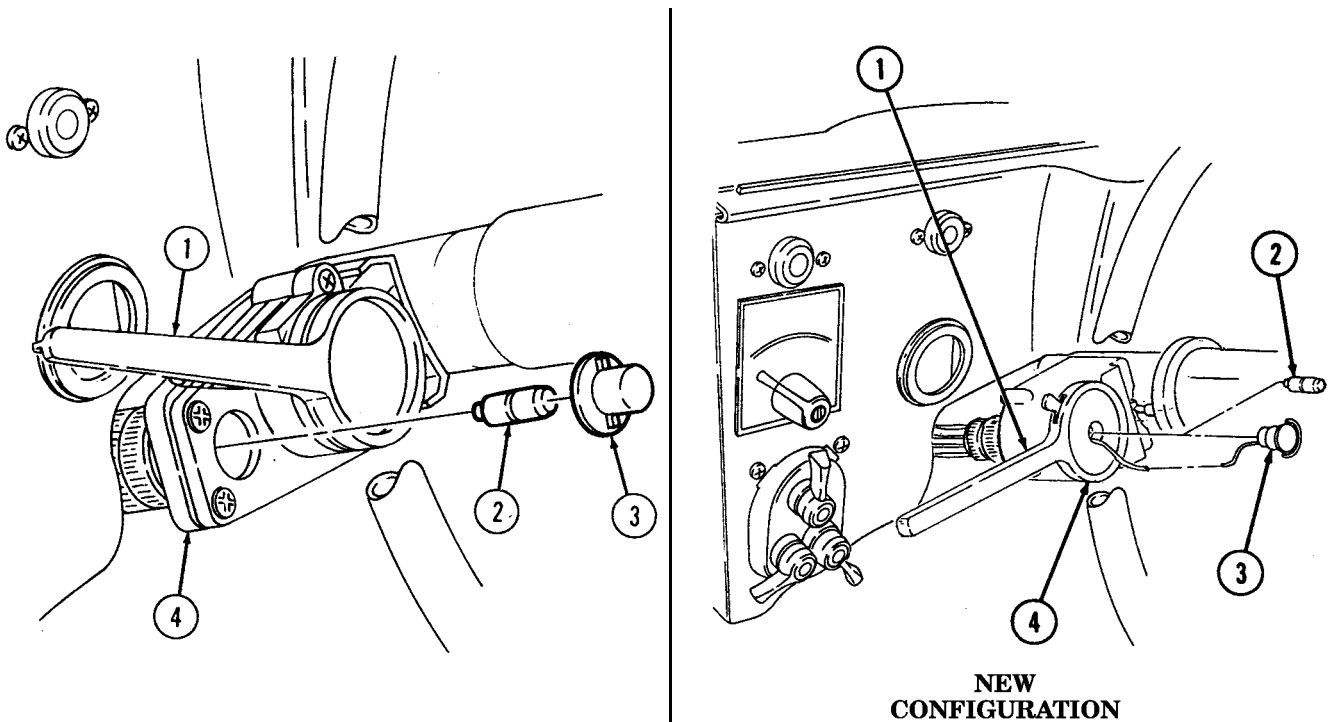
TM 9-2320-280-10
TM 9-2320-280-24P

a. Removal

1. Push turn signal indicator lever (1) in the four-way flasher position (TM 9-2320-280-10).
2. Remove light lens (3) from directional control unit (4).
3. Remove lamp (2) from directional control unit (4).

b. Installation

1. Install lamp (2) into directional control unit (4).
2. Install light lens (3) into directional control unit (4).



- FOLLOW-ON TASKS:**
- Connect battery ground cable (para. 4-73).
 - Check directional signal control lamp for proper operation (TM 9-2320-280-10).

4-64. DIRECTIONAL SIGNAL CONTROL (12339312-1) MAINTENANCE

This task covers:

- a. Removal
- b. Cleaning
- c. Installation

INITIAL SETUP:

Applicable Models

All vehicles except: M997A2, M1025A2, M1035A2, M1043A2, M1045A2, M1097A2, M1123

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

Battery ground cable disconnected (para. 4-73).

Materials/Parts

Cleaning and lubricating compound
(Appendix C, Item 16)

NOTE

The directional signal control for this application is no longer available. For replacement of a defective directional signal control, the procedures and part number for the A2 application should be used (para. 4-65).

a. Removal

1. Loosen connector nut (4) and remove connector plug (5) from directional signal control (3).
2. Remove four screws (2) and directional signal control (3) from clamp (1).

b. Cleaning

NOTE

Clean the signal control before replacing it. After cleaning, install and try again before replacing.

1. Remove four screws (7) and signal arm plate (6) from signal control (3).

CAUTION

Do not sand contacts with sandpaper or an emery board which removes the protective coating that fights corrosion. Damage to the switch will result.

NOTE

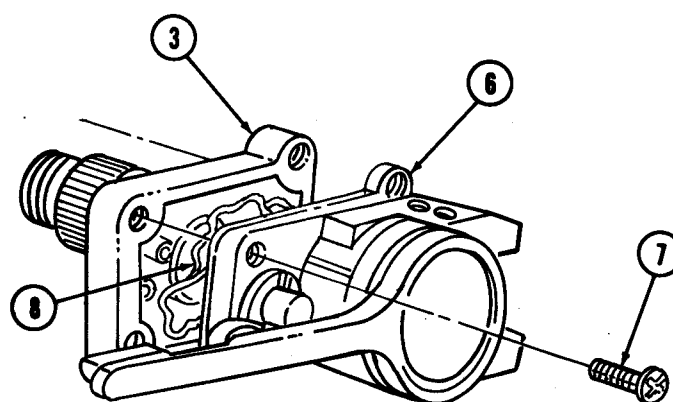
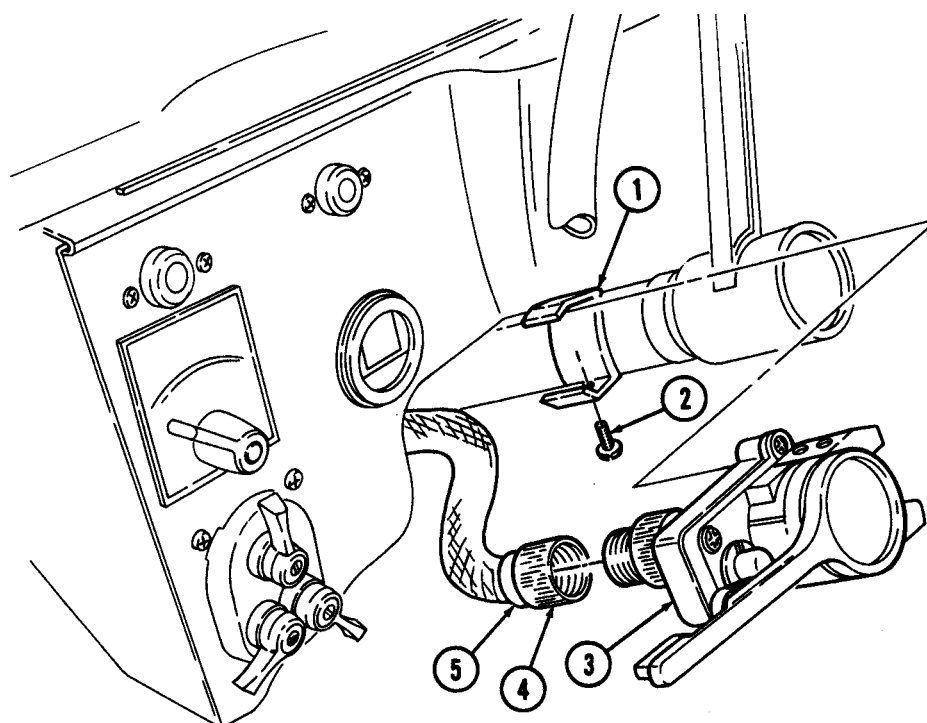
The cleaner has an alcohol base that dries quickly.

2. Spray signal control contacts (8) with cleaning compound.
3. Install signal arm plate (6) on signal control (3) with four screws (7).

c. Installation

1. Install directional signal control (3) on clamp (1) with four screws (2).
2. Install connector plug (5) on directional signal control (3) and tighten connector nut (4).

4-64. DIRECTIONAL SIGNAL CONTROL (12339312-1) MAINTENANCE (Cont'd)



- FOLLOW-ON TASKS:**
- Connect battery ground cable (para. 4-73).
 - Check directional signal control for proper operation (TM 9-2320-280-10).

4-65. DIRECTIONAL SIGNAL CONTROL REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M997A2, M1025A2, M1035A2, M1043A2,
M1045A2, M1097A2, M1123

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

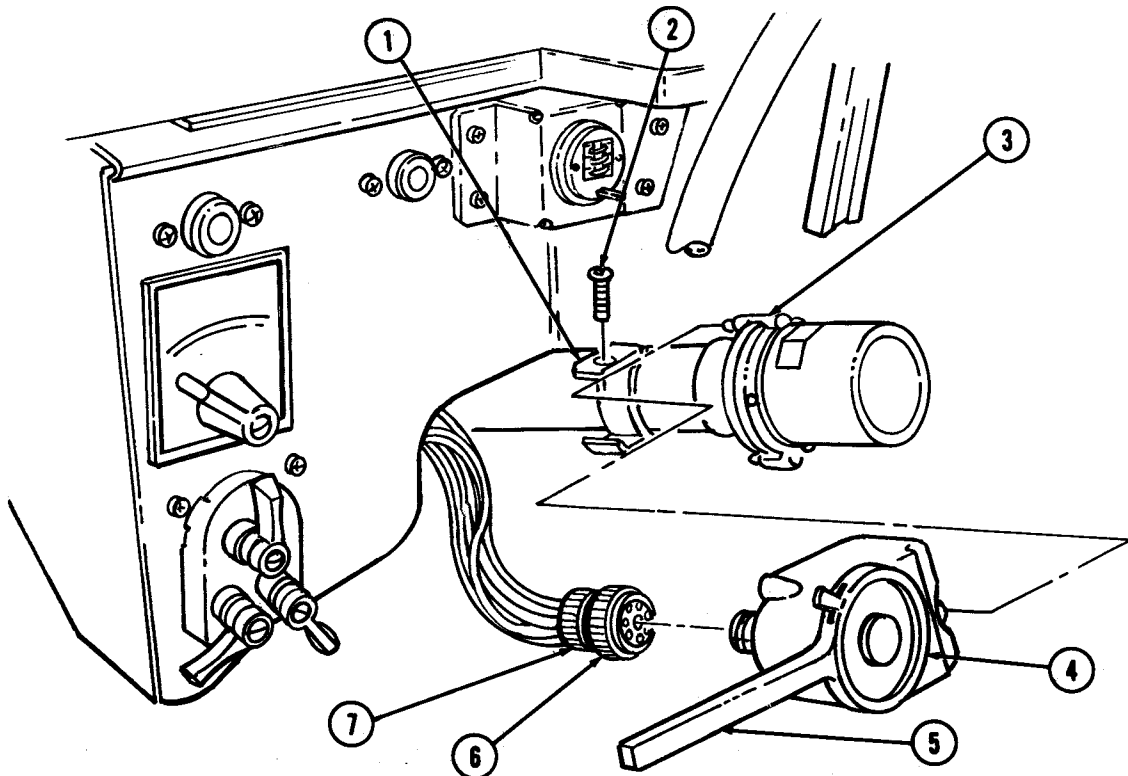
Battery ground cables disconnected (para. 4-73).

a. Removal

1. Loosen connector nut (6) and remove connector plug (7) from directional signal control (4).
2. Remove four screws (2) and directional signal control (4) from bracket (1).

b. Installation

1. Place lever (5) in HAZARD position.
2. Install directional signal control (4) on bracket (1) with four screws (2). Do not tighten screws (2).
3. Rotate steering wheel ensuring pin (3) mates with directional signal control (4) and tighten screws (2) to 22-26 lb-in. (2.5-2.9 N·m).
4. Install connector plug (7) on directional signal control (4) and tighten connector nut (6).



- FOLLOW-ON TASKS:
- Connect battery ground cables (para. 4-73).
 - Check directional signal control lamp for proper operation (TM 9-2320-280-10).

4-66. DIRECTIONAL SIGNAL CONTROL CANCELLING RING REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M997A2, M1025A2, M1035A2, M1043A2,
M1045A2, M1097A2, M1123

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

General Safety Instructions

Failure to position cancelling ring pin in proper position may cause injury to personnel or damage to equipment.

a. Removal

Remove three screws (5) and cancelling ring (4) from steering wheel (6).

b. Installation

WARNING

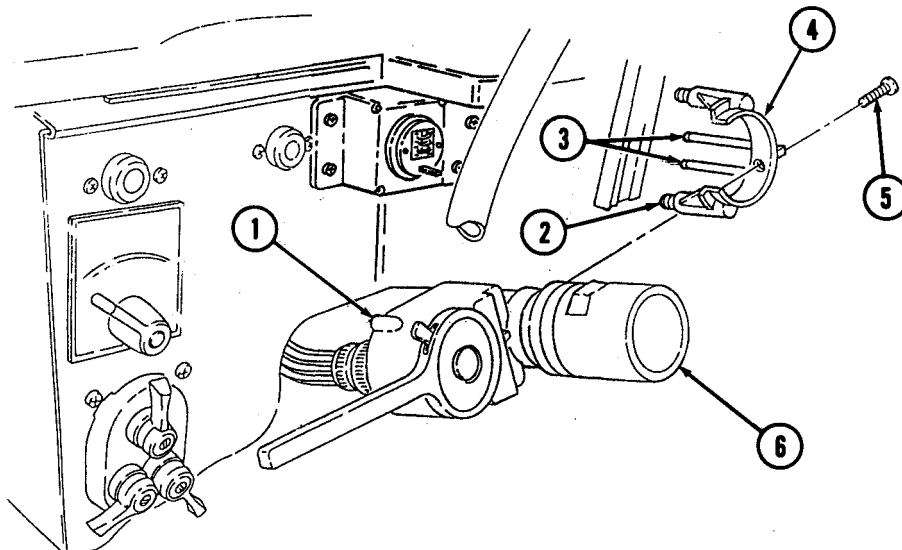
Cancelling ring pin must be positioned $90^\circ \pm 5^\circ$ from directional signal control. Ensure front wheels of vehicle point straight ahead. Failure to position pin properly could cause loss of steering, with injury to personnel or damage to equipment.

1. Install cancelling ring (4) on steering wheel (6) with pin (2) $90^\circ \pm 5^\circ$ from directional signal control (1).
2. Rotate steering wheel (6), ensuring pin (2) mates with directional signal control (1) and secure cancelling ring (4) on steering wheel (6) with three screws (5).

NOTE

Gauge posts found on new cancelling rings are there to ensure proper installation only. Gauge posts must be removed after installation of cancelling ring to permit proper operation of directional signal control.

3. Cut gauge posts (3) off within 1/4 in. (6 mm) of base.



FOLLOW-ON TASK: Check directional signal control for proper operation (TM 9-2320-280-10).

4-67. SERVICE HEADLIGHT AND BLACKOUT DRIVE LIGHT ELECTRICAL CONNECTOR AND GROMMET REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

Service headlight lamp removed (para. 4-48).

Manual References

TM 9-2320-280-24P

NOTE

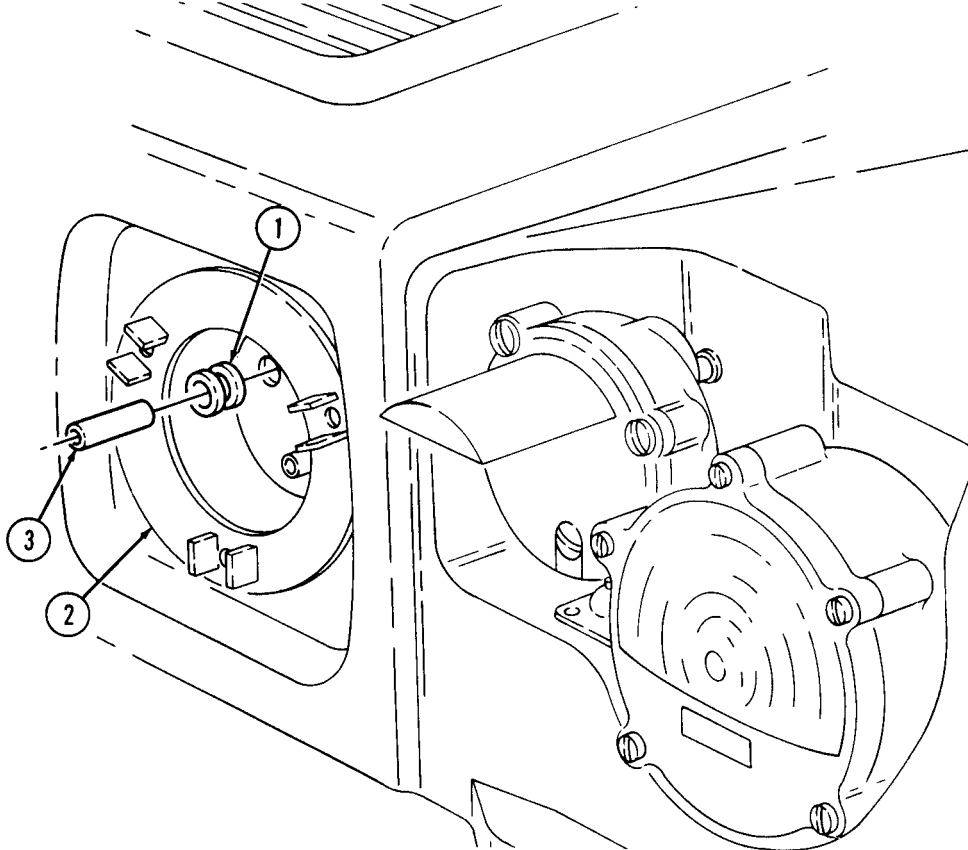
The procedure to remove and install the connector and grommet from service headlight and blackout drive light is basically the same. The following procedure is for the service headlight.

a. Removal

Remove connector (3) from grommet (1) and remove grommet (1) from headlight housing (2).

b. Installation

Install grommet (1) to headlight housing (2) and install connector (3) to grommet (1).



FOLLOW-ON TASK: Install service headlight lamp (para. 4-48).

4-68. BACKUP LIGHT LAMP REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M1035, M1035A1, M1035A2

Manual References

TM 9-2320-280-10

TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

Battery ground cable disconnected (para. 4-73).

Materials Parts

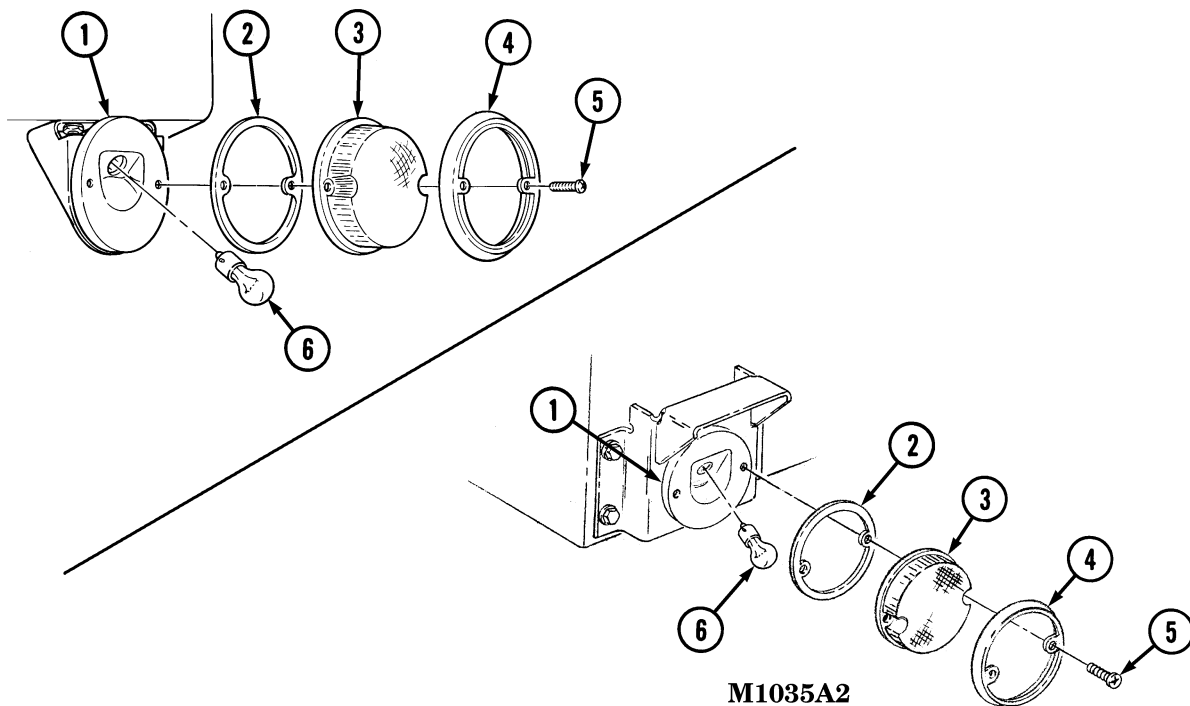
Gasket (Appendix G, Item 47)

a. Removal

1. Remove two screws (5), bezel (4), lens (3), and gasket (2) from housing (1). Discard gasket (2).
2. Remove lamp (6) from housing (1).

b. Installation

1. Install lamp (6) in housing (1).
2. Install gasket (2), lens (3), and bezel (4) on housing (1) with two screws (5).



- FOLLOW-ON TASKS:
- Connect battery ground cable (para. 4-73).
 - Check backup light for proper operation (TM 9-2320-280-10).

4-69. BACKUP LIGHT ASSEMBLY REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M1035, M1035A1, M1035A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials Parts

Two lockwashers (Appendix G, Item 139)
Tiedown strap (Appendix G, Item 310)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

Battery ground cable disconnected (para. 4-73).

a. Removal

NOTE

- Perform steps 1 and 2 for M1035 and M1035A1 vehicles.
- Perform steps 3 through 5 for M1035A2 vehicle.

1. Disconnect lead 467F (1) from lamp assembly (3).
2. Remove two nuts (6), lockwashers (5), lead 95H (4), and lamp assembly (3) from bracket (2). Discard lockwashers (5).
3. Remove tiedown strap (11) and disconnect leads 467F (1) and 95H (4) from body harness leads (10). Discard tiedown strap (11).
4. Remove capscrew (8) and clamp (9) from body (12).
5. Remove two nuts (6), lockwashers (5), lead 95H (4), and lamp assembly (3) from bracket (7). Discard lockwashers (5).

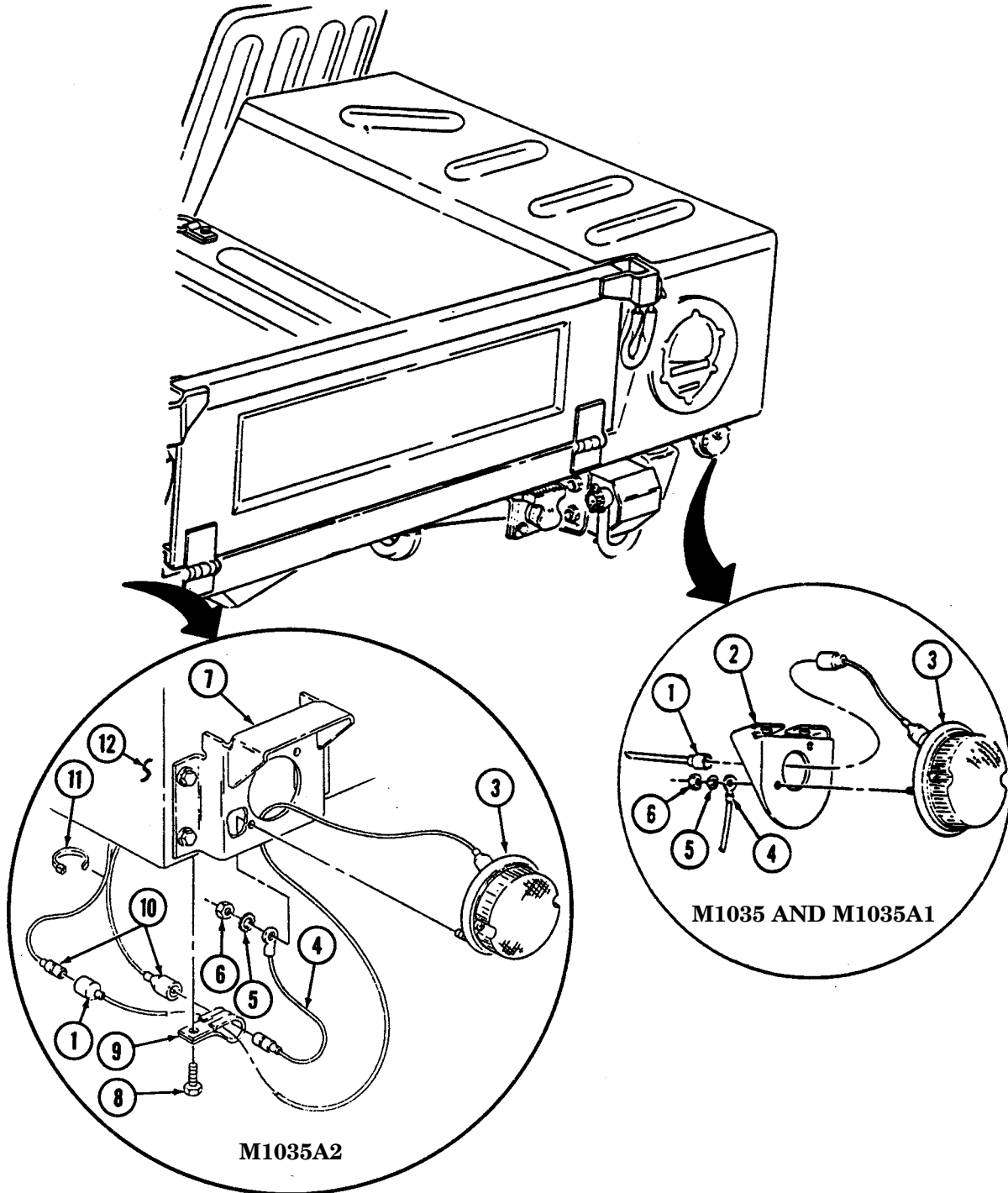
b. Installation

NOTE

- Perform steps 1 through 3 for M1035A2 vehicle.
- Perform steps 4 and 5 for M1035 and M1035A1 vehicles.

1. Install lamp assembly (3) and lead 95H (4) on bracket (7) with two lockwashers (5) and nuts (6).
2. Connect leads 467F (1) and 95H (4) to body harness leads (10) and install tiedown strap (11).
3. Install clamp (9) on body (12) with capscrew (8).
4. Install lamp assembly (3) and lead 95H (4) on bracket (2) with two lockwashers (5) and nuts (6).
5. Connect lead 467F (1) to lamp assembly (3).

4-69. BACKUP LIGHT ASSEMBLY REPLACEMENT (Cont'd)



- FOLLOW-ON TASKS:**
- Connect battery ground cable (para. 4-73).
 - Check backup light for proper operation (TM 9-2320-280-10).

4-70. BACKUP LIGHT BRACKET REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M1035, M1035A1, M1035A2

Manual References

TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

Backup light assembly removed (para. 4-69).

Materials Parts

Two lockwashers (Appendix G, Item 133)

NOTE

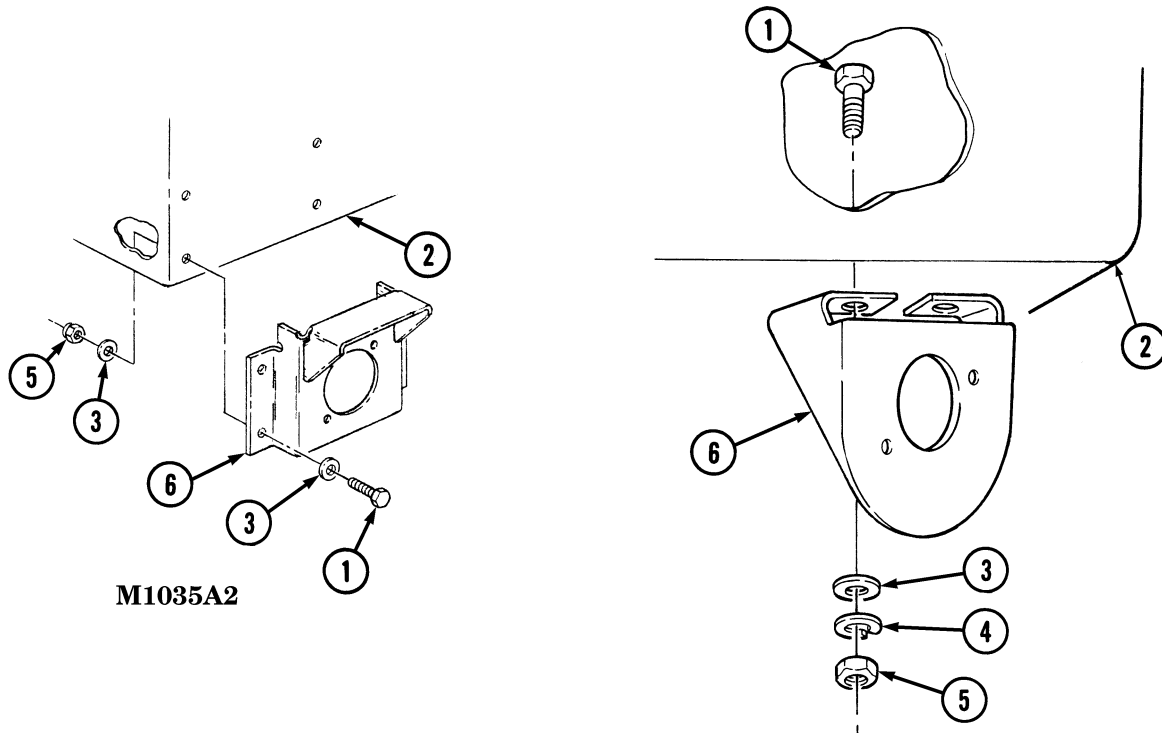
M1035A2 vehicles are equipped with four nuts, eight washers, and four capscrews.

a. Removal

Remove two nuts (5), lockwashers (4), washers (3), capscrews (1) and bracket (6) from "D" beam (2). Discard lockwashers (4).

b. Installation

Install bracket (6) on "D" beam (2) with two capscrews (1), washers (3), lockwashers (4), and nuts (5).



FOLLOW-ON TASK: Install backup light assembly (para. 4-69).

Section VI. BATTERY SYSTEM MAINTENANCE

4-71. BATTERY SYSTEM MAINTENANCE TASK SUMMARY

TASK PARA.	PROCEDURES	PAGE NO.
4-72.	Battery Cable Terminal Clamp Replacement	4-114
4-73.	Battery Cable Maintenance	4-116
4-74.	Power Feed Through Stud Replacement	4-122
4-75.	12 Volt Alternator Cable Replacement	4-124
4-76.	Buss Bar Replacement	4-127
4-77.	Starter Power Cables Replacement	4-128
4-78.	Battery Holddown Replacement	4-132
4-79.	Battery Replacement and Servicing	4-134
4-80.	Battery Tray Maintenance	4-136
4-81.	Slave Receptacle and Cable Maintenance	4-138
4-82.	Winch Power Cable Replacement	4-142
4-83.	Shunt Replacement	4-144
4-84.	Hood Wiring Harness Replacement	4-146
4-85.	Wiring Harness Connector Repair	4-154

4-72. BATTERY CABLE TERMINAL CLAMP REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Lubricating oil (Appendix C, Item 33)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

Battery box cover removed (para. 10-35).

General Safety Instructions

- Wear safety goggles and rubber gloves and do not smoke when performing battery maintenance.
- Remove all jewelry.
- When removing battery cable clamps, disconnect ground cable first.

WARNING

- Battery acid (electrolyte) is extremely harmful. Always wear safety goggles and rubber gloves, and do not smoke when performing battery maintenance. Severe injury will result if acid contacts eyes or skin.
- Remove all jewelry such as rings, dogtags, bracelets, etc. If jewelry or disconnected battery ground cable contacts battery terminal, a direct short can result, causing instant heating of tools, severe injury to personnel, or damage to equipment.
- When removing battery cable clamps, disconnect ground cable first. Do not allow tools to come in contact with vehicle when disconnecting cable clamps. A direct short can result, causing instant heating of tools, tool damage, battery damage, or battery explosion.

a. Removal

NOTE

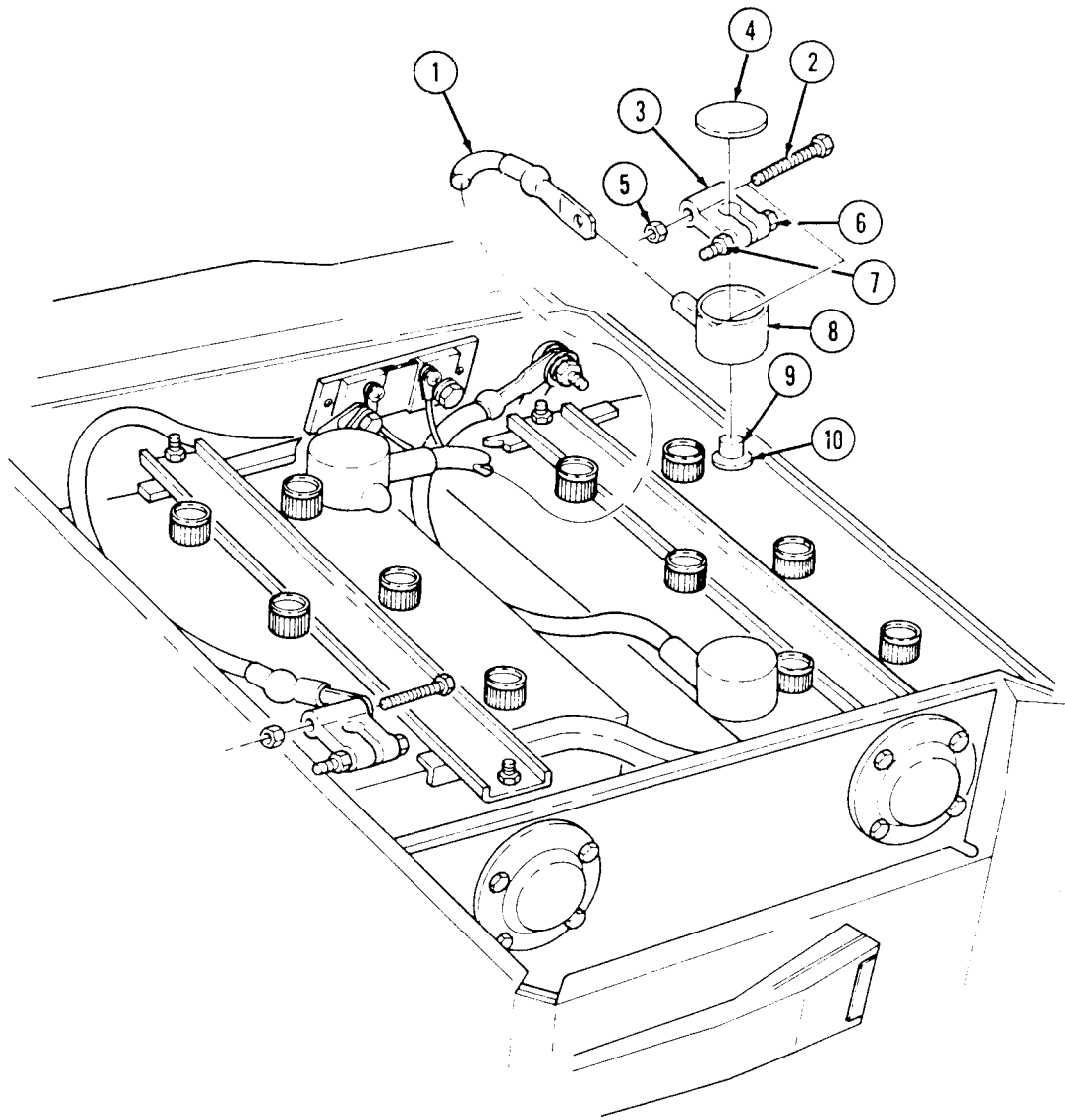
The procedure for removing and installing all four battery cable terminal clamps are basically the same. This procedure covers one battery cable terminal clamp.

1. Remove cap (4) from battery terminal boot (8).
2. Clean lubricating oil from battery terminal boot (8).
3. Loosen screw (6), nut (7), and remove terminal clamp (3) from terminal post (9).
4. Remove screw (2) and nut (5) from cable (1) and terminal clamp (3).
5. Remove cable (1) from terminal clamp (3) and battery terminal boot (8).
6. Remove terminal clamp (3) from battery terminal boot (8).

b. Installation

1. Push battery terminal boot (8) onto cable (1).
2. Place terminal clamp (3) into battery terminal boot (8) and install cable (1) on terminal clamp (3) with screw (2) and nut (5).
3. Apply lubricating oil to battery post pad (10). Do not allow lubricating oil to coat terminal post (9).
4. Secure terminal clamp (3) to terminal post (9) by tightening screw (6) and nut (7).
5. Apply lubricating oil to terminal clamp (3).
6. Install cap (4) to battery terminal boot (8).

4-72. BATTERY CABLE TERMINAL CLAMP REPLACEMENT (Cont'd)



FOLLOW-ON TASK: Install battery box cover (para. 10-35).

4-73. BATTERY CABLE MAINTENANCE

This task covers:

- | | |
|--|--|
| <ul style="list-style-type: none"> a. Cleaning and Inspection b. Ground Cables Disconnection c. Ground Cables Reconnection d. Ground Cable Removal e. Ground Cable Installation | <ul style="list-style-type: none"> f. Interconnecting Cable Removal g. Interconnecting Cable Installation h. Positive Cable Removal i. Positive Cable Installation |
|--|--|

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Lockwasher (Appendix G, Item 141)
Lockwasher (Appendix G, Item 148)
Lockwasher (Appendix G, Item 150)
Sodium bicarbonate (Appendix C, Item 49)
Lubricating oil (Appendix C, Item 33)
Silicone compound (Appendix C, Item 48)

Manual References

TM 9-2320-280-24P

Equipment Condition

Battery box cover removed (para. 10-35).

General Safety Instructions

- Wear safety goggles and rubber gloves and do not smoke when performing battery maintenance.
- Remove all jewelry.
- When removing battery cables, disconnect ground cable first. Ensure all switches are in OFF position before disconnecting.

WARNING

- Battery acid (electrolyte) is extremely harmful. Always wear safety goggles and rubber gloves, and do not smoke when performing battery maintenance. Severe injury will result if acid contacts eyes or skin.
- Remove all jewelry such as rings, dogtags, bracelets, etc. If jewelry or disconnected battery ground cable contacts battery terminal, a direct short can result, causing instant heating of tools, severe injury to personnel, or damage to equipment.
- Always disconnect both ground cables when performing battery maintenance on the "A2" series vehicles. The "A2" series vehicles have a 12 volt cable connected to the positive terminal, which keeps the electrical system charged when only one ground cable is disconnected. Failure to do this may cause injury to personnel, or damage to equipment.
- When removing battery cable clamps, disconnect both ground cables first. Ensure all switches are in OFF position before disconnecting. Do not allow tools to come in contact with vehicle when disconnecting cable clamps. A direct short can result, causing instant heating of tools, tool damage, battery damage, or battery explosion.

NOTE

- Secure all cables to head side of mounting capscrews.
- Use this procedure for disconnecting all battery cables.
- The following procedure covers disconnection and connection of the ground cable.

a. Cleaning and Inspection

1. Inspect cables (1), (2), and (11) for corrosion and cracks.
2. Remove defective cables (1), (2), and (11), or clean with wire brush and baking soda solution.

4-73. BATTERY CABLE MAINTENANCE (Cont'd)

b. Ground Cables Disconnection

NOTE

Perform steps 1 through 6 for M997A2, M1025A2, M1035A2, M1043A2, M1045A2, and M1097A2 vehicles only. Perform step 7 for all other vehicles.

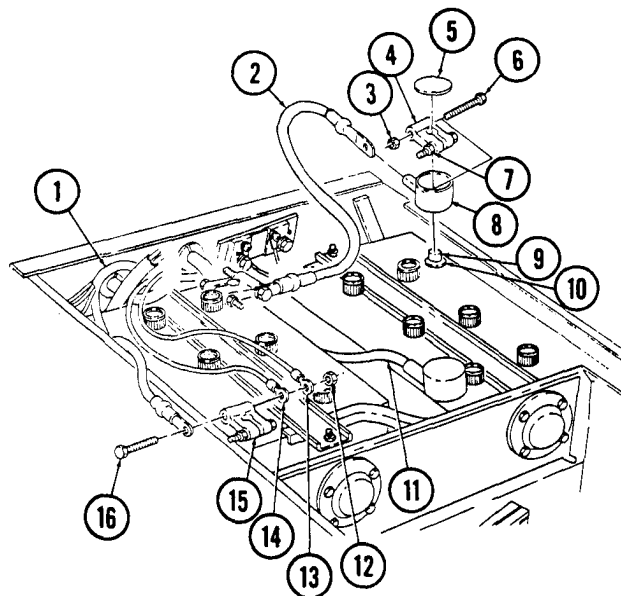
1. Remove nut (12), leads (13) and (14), screw (16), and ground cable (1) from terminal clamp (15).
2. Remove cap (5) from battery terminal boot (8).
3. Clean lubricating oil from battery terminal boot (8).
4. Loosen nut (7) and remove terminal clamp (4) from terminal (9).
5. Remove nut (3) and screw (6) from cable (2) and terminal clamp (4).
6. Remove cable (2) from terminal clamp (4) and battery terminal boot (8).
7. Remove nut (12), screw (16), and ground cable (1) from terminal clamp (15).

c. Ground Cables Reconnection

NOTE

Perform steps 1 through 6 for M997A2, M1025A2, M1035A2, M1043A2, M1045A2, and M1097A2 vehicles only. Perform step 7 for all other vehicles.

1. Push battery terminal boot (8) onto cable (2) and secure cable (2) to terminal clamp (4) with screw (6) and nut (3).
2. Apply a 1/16 in. (1.6mm) bead of lubricating oil to battery post pad (10). Do not allow oil to coat terminal post (9).
3. Install terminal clamp (4) to terminal (9) and tighten nut (7).
4. Fill battery terminal boot (8) with lubricating oil.
5. Install cap (5) to battery terminal boot (8).
6. Install ground cable (1) and leads (14) and (13) on terminal clamp (15) with screw (16) and nut (12).
7. Install ground cable (1) on terminal clamp (15) with screw (16) and nut (12).



4-73. BATTERY CABLE MAINTENANCE (Cont'd)

d. Ground Cable Removal

NOTE

Perform step 1 for M997A2, M1025A22, M1035A2, M1043A2, M1045A2, and M1097A2 vehicles only. Perform step 2 for all other vehicles.

1. Remove nut (5), leads (6) and (7), screw (9), and ground cable (4) from terminal clamp (8).
2. Remove nut (5), screw (9), and ground cable (4) from terminal clamp.
3. Remove capscrew (3), lockwasher (2), and ground cable (4) from shunt (1).

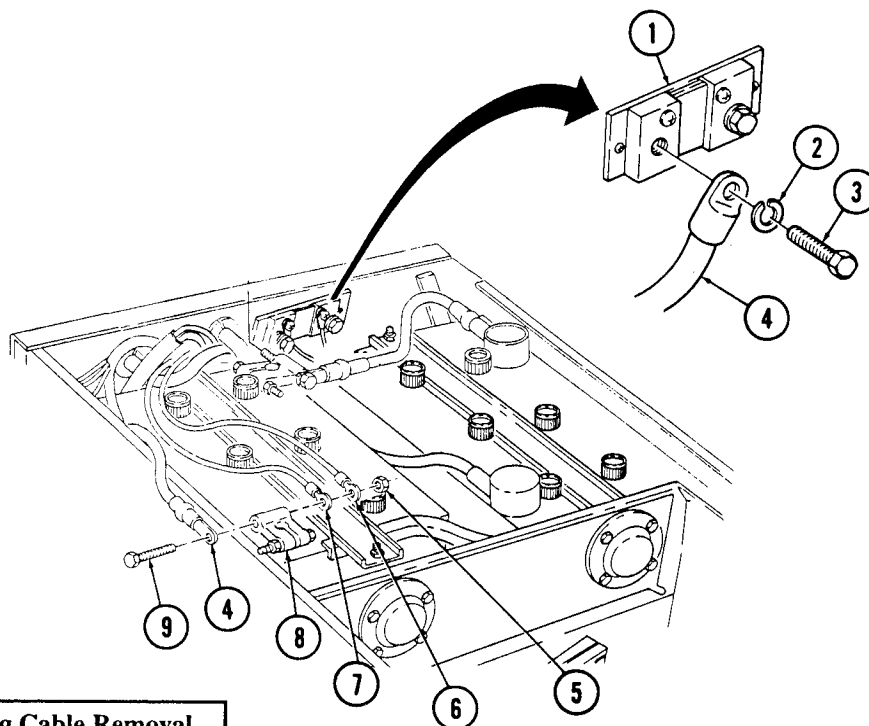
e. Ground Cable Installation

1. Position ground cable (4) in approximate mounting location and install ground cable (4) to shunt (1) with lockwasher (2) and capscrew (3).

NOTE

Perform step 2 for M997A2, M1025A2, M1035A2, M1043A2, M1045A2, and M1097A2 vehicles only. Perform step 3 for all other vehicles.

2. Install ground cable (4) on terminal clamp (8) with screw (9), leads (7) and (6), and nut (5).
3. Install ground cable (4) on terminal clamp (8) with screw (9) and nut (5).



f. Interconnecting Cable Removal

NOTE

All vehicles except M997A2, M1025A2, M1035A2, M1043A2, M1045A2, and M1097A2 vehicles have two caps and boots.

1. Remove cap (19) from battery terminal boot (20).
2. Clean lubricating oil from battery terminal boot (20).

4-73. BATTERY CABLE MAINTENANCE (Cont'd)

NOTE

Perform steps 3 through 5 for M997A2, M1025A2, M1035A2, M1043A2, M1045A2, and M1097A2 vehicles only. Perform steps 6 and 7 for all other vehicles.

3. Loosen two nuts (12) and remove terminal clamps (17) from terminals (11).
4. Remove nut (18), capscrew (14), cable (13), leads (15) and cable (16) from terminal clamp (17).
5. Remove nut (18) and screw (14) from cable (16) and terminal clamps (17).
6. Loosen two nuts (12) and remove terminal clamps (17) from terminals (11).
7. Remove two screws (14), nuts (18), and cable (16) from terminal clamps (17).
8. Remove cable (16) from terminal clamps (17) and battery terminal boot (20).

g. Interconnecting Cable Installation

NOTE

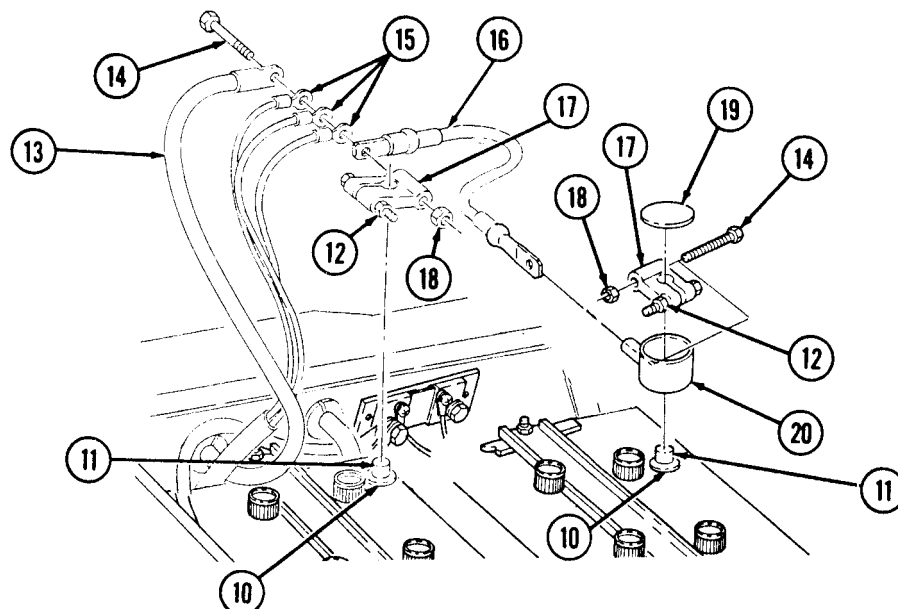
All vehicles except M997A2, M1025A2, M1035A2, M1043A2, M1045A2, and M1097A2 vehicles have two caps and boots.

1. Push battery terminal boot (20) onto cable (16) and install cable (16) on terminal clamp (17) with screw (14) and nut (18).
2. Apply a 1/16 in. (1.6mm) bead of lubricating oil to battery post pads (10). Do not allow oil to coat terminal posts (11).

NOTE

Perform steps 3 and 4 for M997A2, M1025A2, M1035A2, M1043A2, M1045A2, and M1097A2 vehicles only. Perform steps 5 and 6 for all other vehicles.

3. Install cable (16), leads (15), and cable (13) to terminal clamp (17) with screw (14) and nut (18).
4. Install two terminal clamps (17) on terminals (11) and tighten nuts (12).
5. Install cable (16) on terminal clamp (17) with capscrew (14) and nut (18).
6. Install two terminal clamps (17) on terminal posts (11) and tighten nuts (12).
7. Fill battery terminal boot (20) with lubricating oil.
8. Install cap (19) to battery terminal boot (20).



4-73. BATTERY CABLE MAINTENANCE (Cont'd)

h. Positive Cable Removal

1. Disconnect ground cable (para. 4-73.b).
2. Remove cap (8) from battery terminal boot (12).
3. Clean lubricating oil from battery terminal boot (12).
4. Loosen nut (11) and remove terminal clamp (7) from terminal (14).
5. Remove screw (6), nut (9), and cable (2) from terminal clamp (7) and battery terminal boot (12).

NOTE

Perform step 6 for M997A2, M1025A2, M1035A2, M1043A2, M1045A2, and M1097A2 vehicles only. Perform step 7 for all other vehicles.

6. Remove nut (5), lockwasher (4), washer (3), and battery positive cable (2) from buss bar (1). Discard lockwasher (4).
7. Remove nut (5), lockwasher (4), washer (3), slave receptacle positive cable (15), and battery positive cable (2) from power stud (16). Discard lockwasher (4).

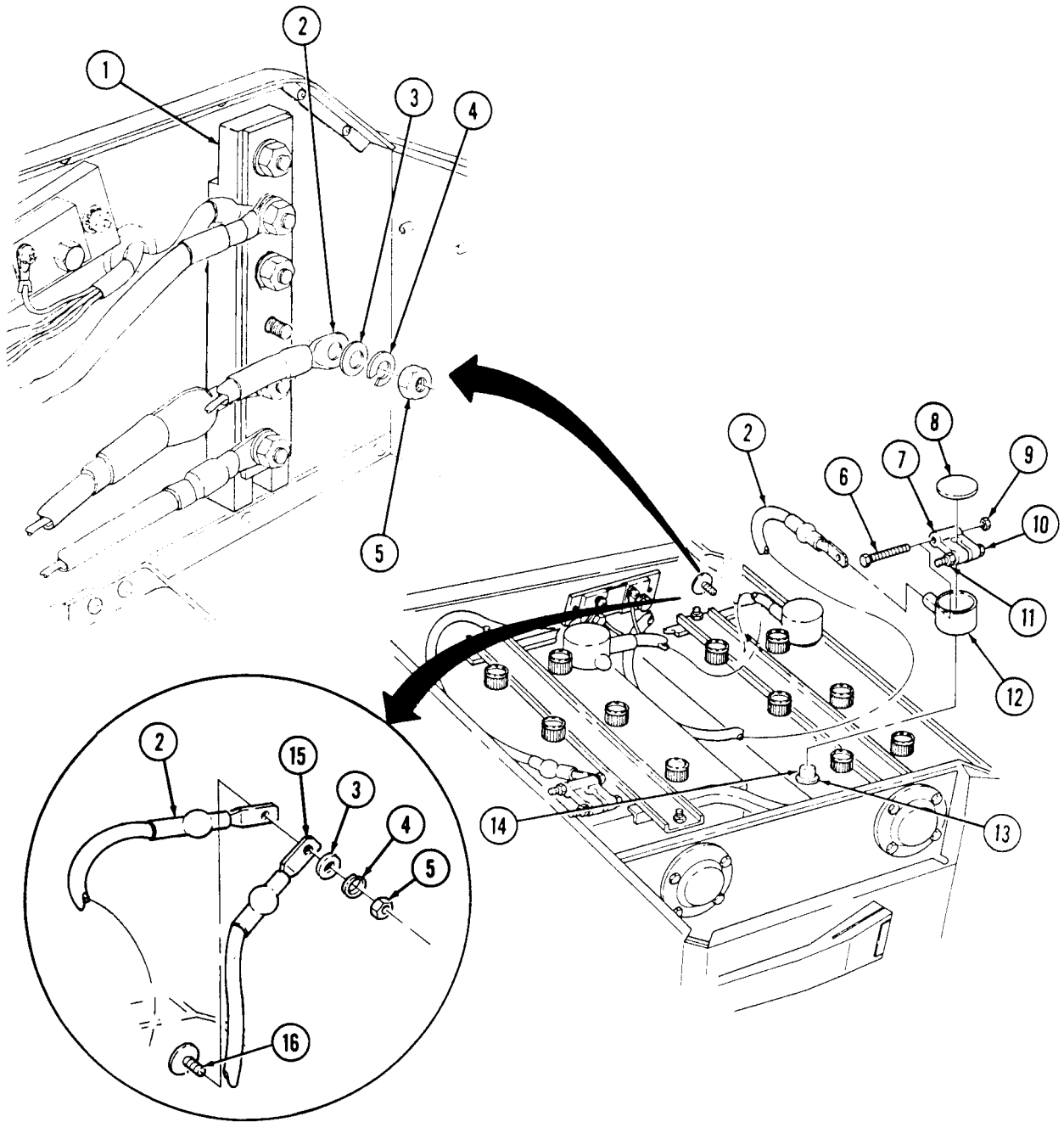
i. Positive Cable Installation

NOTE

Perform step 1 for M997A2, M1025A2, M1035A2, M1043A2, M1045A2, and M1097A2 vehicles only. Perform step 2 for all other vehicles.

1. Install positive battery cable (2) on buss bar (1) with washer (3), lockwasher (4), and nut (5). Apply silicone compound on cable (15) so that all exposed metallic surfaces are coated.
2. Install positive battery cable (2) and slave receptacle positive cable (15) on power stud (16) with washer (3), lockwasher (4), and nut (5). Tighten nut (5) to 26 lb-ft (35 **N•m**).
3. Push battery terminal boot (12) onto cable (2) and install cable (2) on terminal clamp (7) with screw (6) and nut (9).
4. Apply a 1/16 in. (1.6mm) bead of lubricating oil to battery post pad (13). Do not allow oil to coat terminal post (14).
5. Secure terminal clamp (7) to terminal post (14) and tighten nut (11).
6. Fill battery terminal boot (12) with lubricating oil.
7. Install cap (8) on battery terminal boot (12).
8. Connect battery ground cable (para. 4-73.c).

4-73. BATTERY CABLE MAINTENANCE (Cont'd)



FOLLOW-ON TASK: Install battery box cover (para. 10-35).

4-74. POWER FEED THROUGH STUD REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-24P

Materials/Parts

Two lockwashers (Appendix G, Item 141)
Locknut (Appendix G, Item 75)
Silicone compound (Appendix C, Item 48)

Equipment Condition

- Battery ground cable disconnected (para. 4-73).
- Buss bar removed (para. 4-76).
M997A2, M1025A2, M1035A2, M1043A2,
M1045A2, and M1097A2 only.

a. Removal

1. Remove nut (1), lockwasher (2), washer (3), leads 6B/6C (4), and starter cable (5), from stud (8). Discard lockwasher (2).

NOTE

Step 2 applies to all vehicles except M997A2, M1025A2, M1035A2, M1043A2, M1045A2, and M1097A2.

2. Remove nut (12), lockwasher (11), washer (10), and battery cables (9) from stud (8). Discard lockwasher (11).
3. Remove locknut (6) and stud (8) from battery box (7).

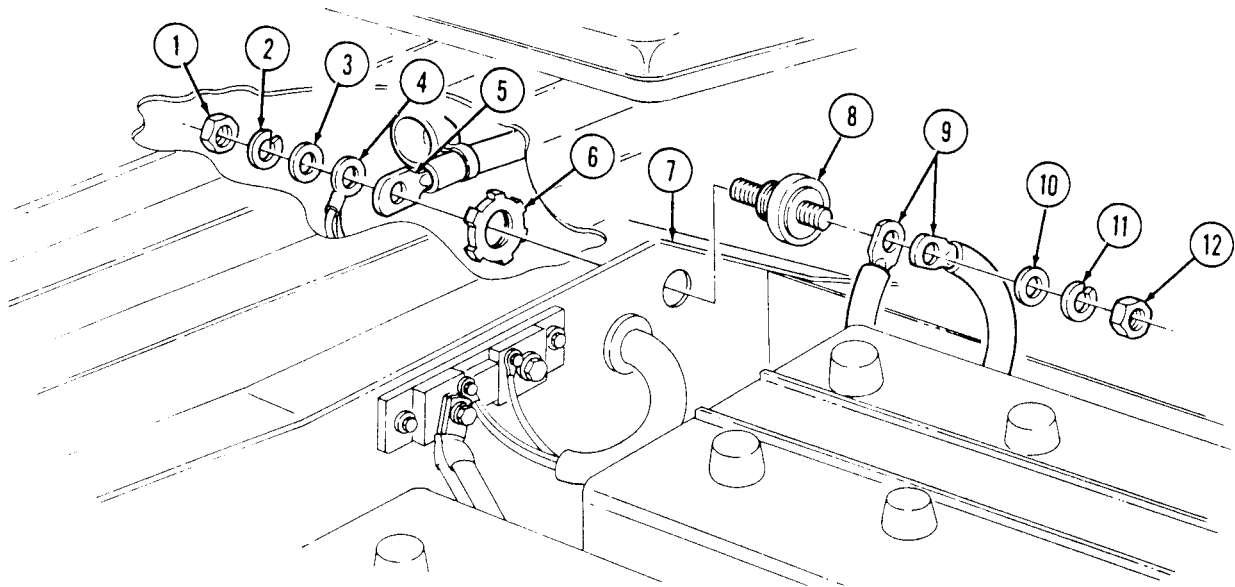
b. Installation

1. Install stud (8) on battery box (7) with locknut (6).

NOTE

Step 2 applies to all vehicles except M997A2, M1025A2, M1035A2, M1043A2, M1045A2, and M1097A2 vehicles.

2. Connect battery cables (9) to stud (8) with washer (10), lockwasher (11), and nut (12). Tighten nut (12) to 26 lb-ft (35 N•m).
3. Install starter cable (5) and leads 6B/6C (4) to stud (8) with washer (3), lockwasher (2), and nut (1). Tighten nut (1) to 18-22 lb-ft (24-30 N•m).
4. Apply silicone compound to stud (8), cables (9) and (5), and leads (4), so that all exposed metallic surfaces are coated.

4-74. POWER FEED THROUGH STUD REPLACEMENT

- FOLLOW-ON TASK:**
- Install buss bar (para. 4-76).
M997A2, M1025A2, M1035A2, M1043A2, M1045A2, and M1097A2.
 - Connect battery ground cables (para. 4-73).

4-75. 12 VOLT ALTERNATOR CABLE REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M997A2, M1025A2, M1035A2,
M1043A2, M1045A2, M1097A2

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

- Battery ground cables disconnected (para. 4-73).
- Hood raised and secured (TM 9-2320-280-10).
- Engine access cover removed (para. 10-15).

Material/Parts

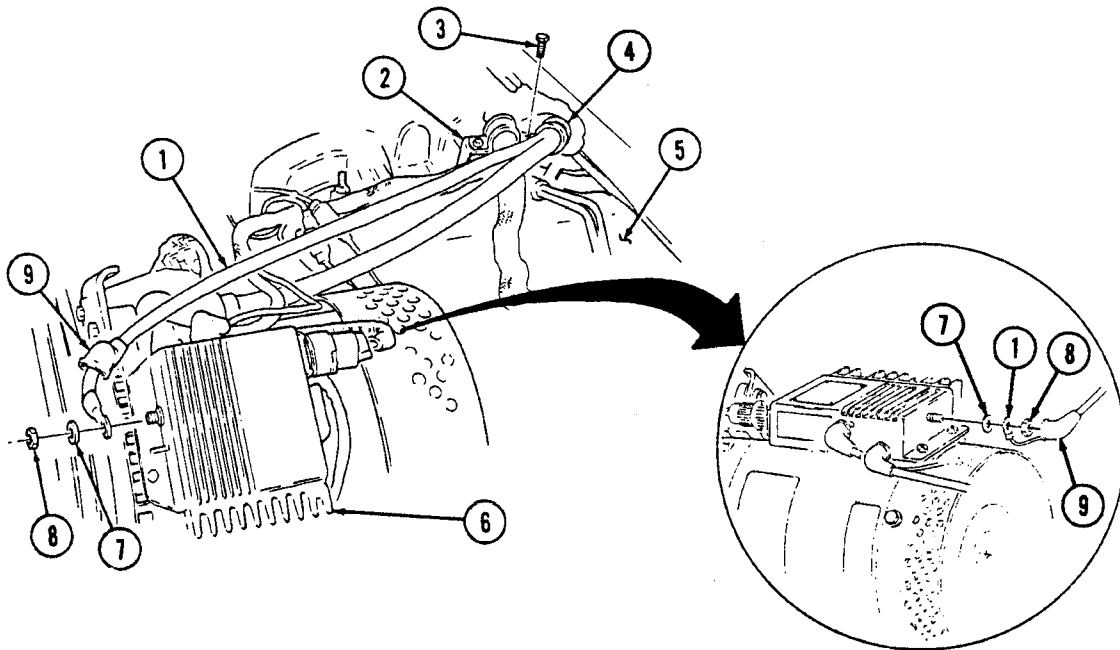
Two tiedown straps (Appendix G, Item 312)

NOTE

Prior to removal, tag leads for installation.

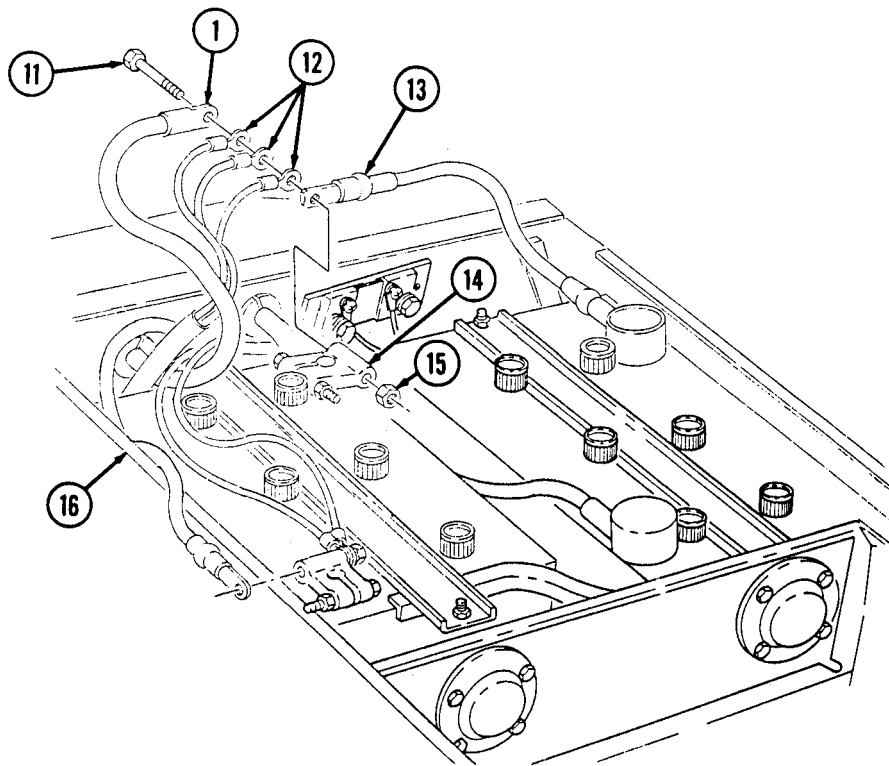
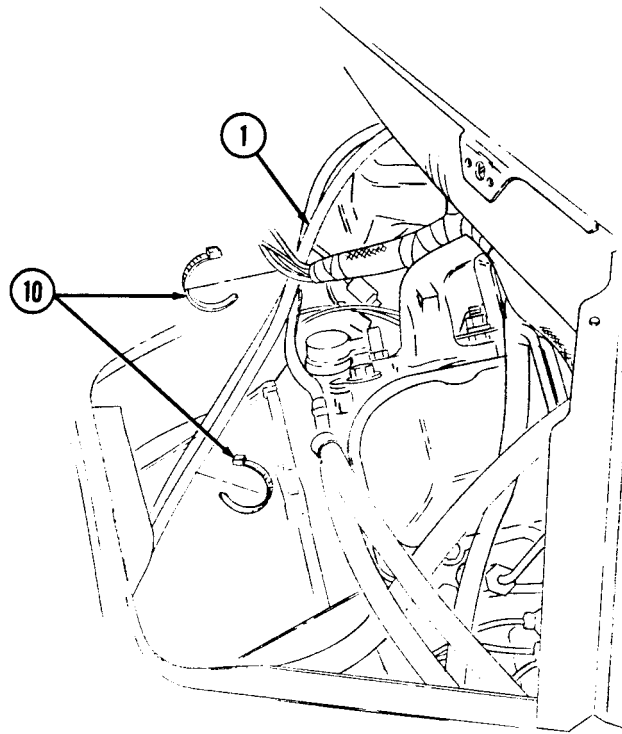
a. Removal

1. Slide back rubber boot (9) and remove nut (8), washer (7), and cable (1) from regulator (6).
2. Remove capscrew (3) securing clamp (4) and cable (1) to bracket (2).
3. Remove two tiedown straps (10) from cable (1). Discard tiedown straps (10).
4. Remove nut (15), screw (11), cable (1), leads (12), and cable (13) from terminal clamp (14) and remove cable (1) from battery box (16) and engine (5).



100 AMP CONFIGURATION

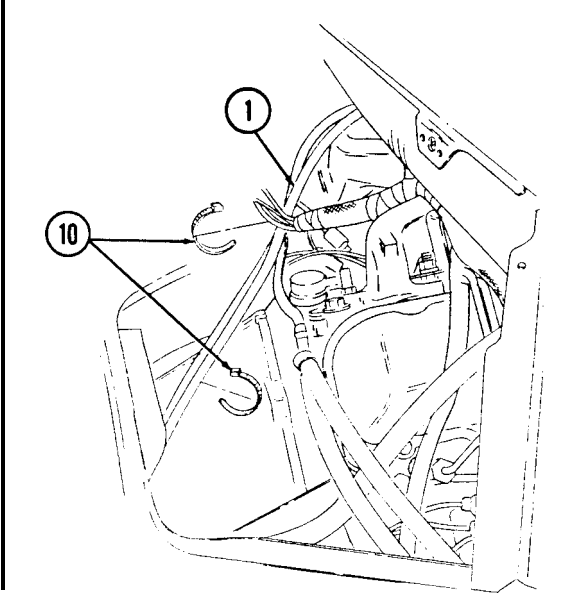
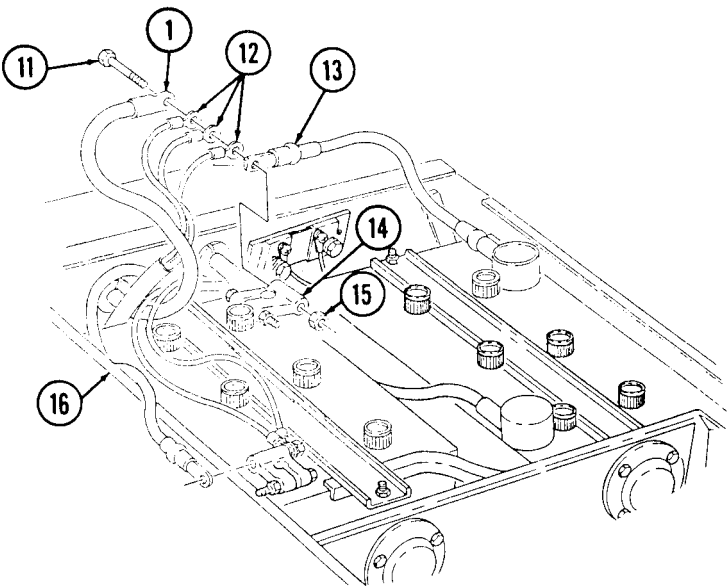
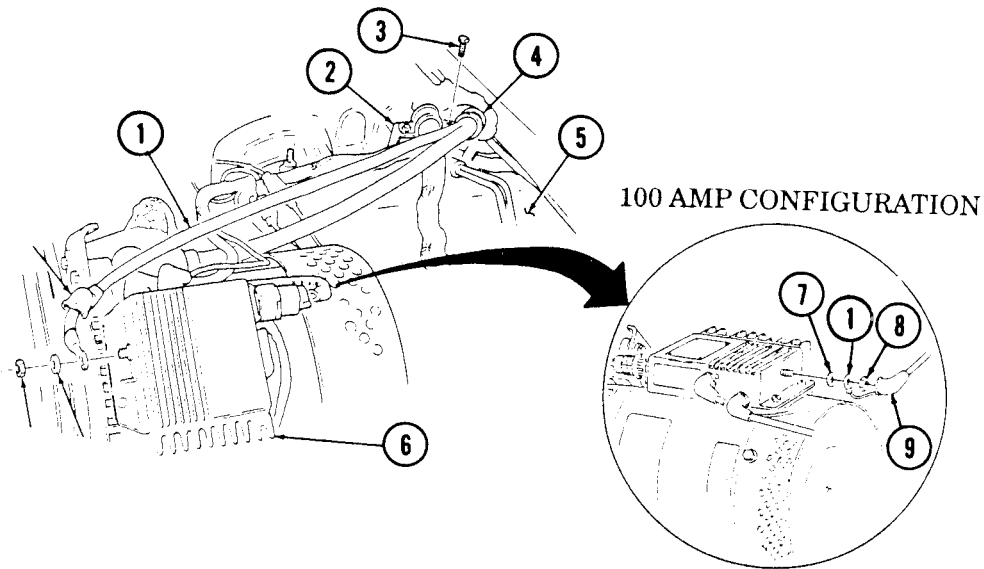
4-75. 12 VOLT ALTERNATOR CABLE REPLACEMENT (Cont'd)



4-75. 12 VOLT ALTERNATOR CABLE REPLACEMENT (Cont'd)

b. Installation

1. Position cable (1) in approximate mounting location on engine (5) and through hole in battery box (16).
2. Install cable (13), leads (12), and cable (1) on terminal clamp (14) with screw (11) and nut (15).
3. Install two tiedown straps (10) on cable (1).
4. Install cable (1) and clamp (4) on bracket (2) with capscrew (3).
5. Install cable (1) on regulator (6) with washer (7) and nut (8). Tighten nut (8) to 18-22 lb-in. 2.0-2.5 N·m). Slide rubber boot (9) over nut (8).



- FOLLOW-ON TASKS:**
- Lower and secure hood (TM 9-2320-280-10).
 - Connect battery ground cables (para. 4-73).
 - Install engine access cover (para. 10-15).

4-76. BUSS BAR REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M997A2, M1025A2, M1035A2,
M1043A2, M1045A2, M1097A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Five lockwashers (Appendix G, Item 150)
Lockwasher (Appendix G, Item 141)
Silicone compound (Appendix C, Item 48)

Equipment Condition

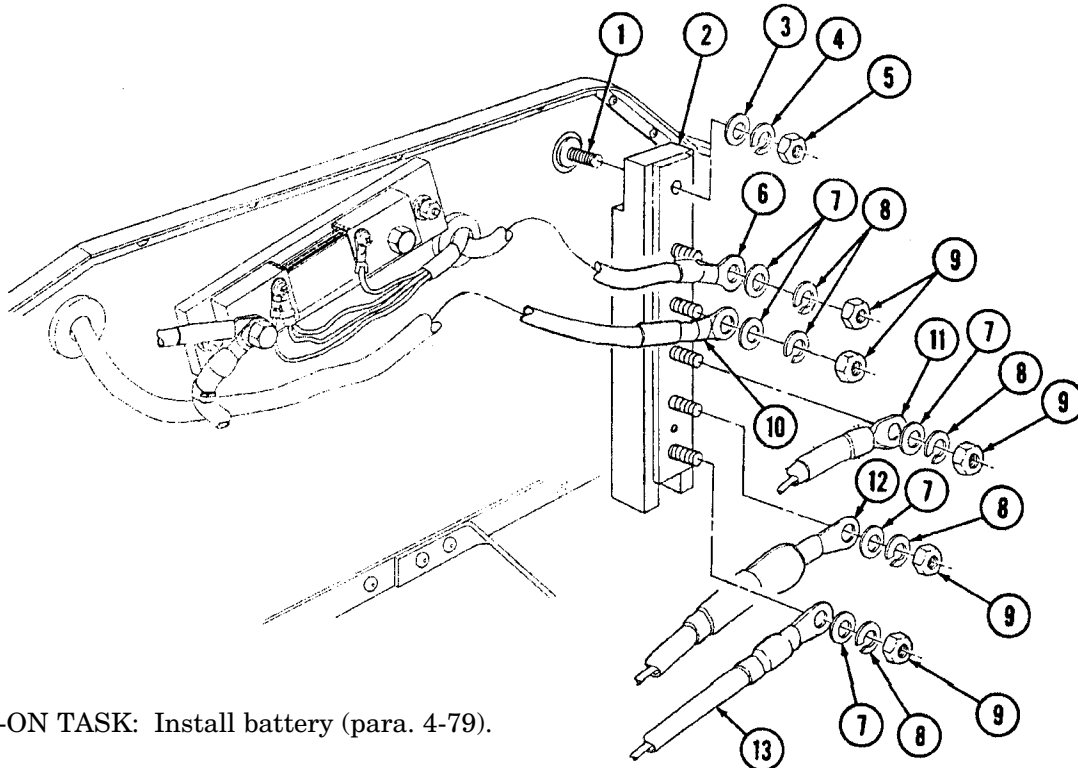
Battery removed (para. 4-79).

a. Removal

1. Remove five nuts (9), lockwashers (8), and washers (7), engine harness cable (6), alternator cable (10), battery cable (11), umbilical power cable (12) (M1097A2 vehicles only), and slave receptacle cable (13) from buss bar (2). Discard lockwashers (8).
2. Remove nut (5), lockwasher (4), washer (3), and buss bar (2) from power feed through stud (1). Discard lockwasher (4).

b. Installation

1. Install buss bar (2) to power feed through stud (1) with washer (3), lockwasher (4), and nut (5).
2. Install engine harness cable (6), alternator cable (10), battery cable (11), umbilical power cable (12) (M1097A2 vehicles only), and slave receptacle cable (13) on buss bar (2) with five washers (7), lockwashers (8), and nuts (9).
3. Apply silicone compound to buss bar (2), so that all exposed metallic surfaces are coated.



FOLLOW-ON TASK: Install battery (para. 4-79).

4-77. STARTER POWER CABLES REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Materials/Parts

Two lockwashers (Appendix G, Item 133)
Assembled locknut (Appendix G, Item 130)
Lockwasher (Appendix G, Item 141)
Lockwasher (Appendix G, Item 178)
Lockwasher (Appendix G, Item 137)
Two lockwashers (Appendix G, Item 150)
Tiedown strap (Appendix G, Item 306)
Adhesive sealant (Appendix C, Item 10)

Equipment Condition

- Battery ground cable disconnected (para. 4-73).
- Raise and secure hood (TM 9-2320-280-10).

NOTE

Prior to removal, tag all leads for installation.

a. Removal

1. Slide back rubber boot (1) on positive cable (3) for access to nut (8). Remove nut (8), lockwasher (9), washer (10), lead 6B/6C (11), and positive cable (3) from power stud (2). Discard lockwasher (9).
2. Remove nut (7), lockwasher (6), and ground cable (5) from ground stud (4). Discard lockwasher (6).
3. Remove screw (30), two clamps (32), positive cable (3), and ground cable (5) from starter (23) and remove clamps (32) from cables (3) and (5).
4. Remove nut (33), lockwasher (34), ground cable (5), lead 7C (36) (winch vehicles only), and STE/ICE-R lead 3C (35) from negative post (37) on starter (23). Discard lockwasher (34).

NOTE

Perform step 5 for all vehicles except "A2" vehicle series vehicles.
Perform steps 6 and 7 for M997A2, M1025A2, M1035A2, M1043A2, M1045A2, and M1097A2 vehicles only.

5. Remove nut (28), lockwasher (27), positive cable (3), positive accessory cable (26) (vehicles with winch or 200 amp alternator only), and STE/ICE-R leads 81A (25) and 81B (43) from positive post (24). Discard lockwasher (27)
6. Remove nut (28), lockwasher (27) and lead 81B (43) from positive post (24). Discard lockwasher (27).
7. Remove two nuts (44), lockwashers (45), washers (46), positive cable (48), and positive accessory cable (47) (vehicles with winch or 200 amp alternator only) from buss bar (49). Discard lockwasher (45).
8. Remove screw (38), clip (39), and leads 74A (41) and 74B (40) from solenoid (42).

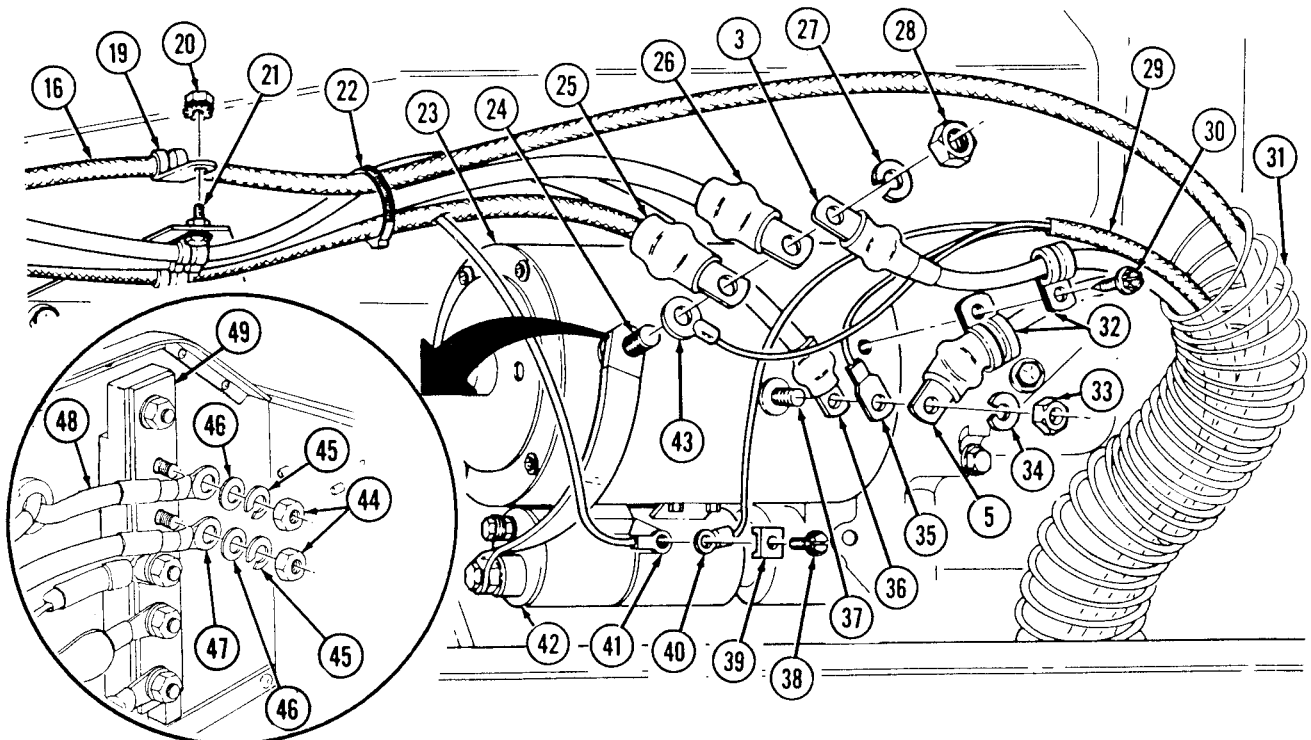
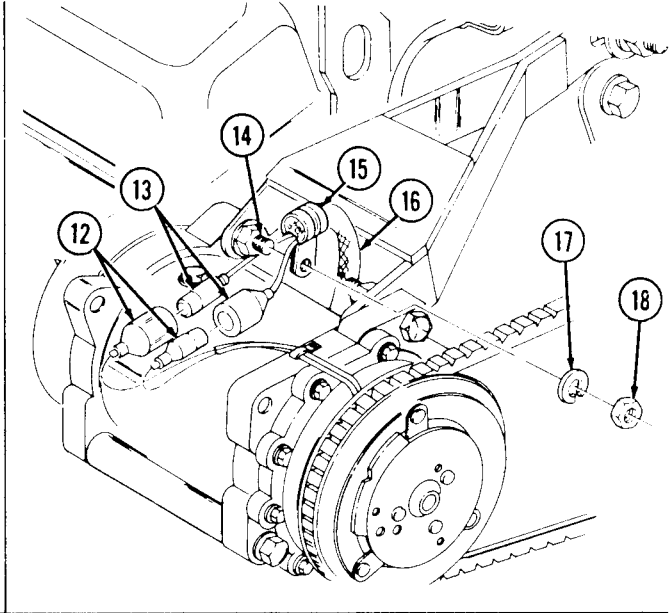
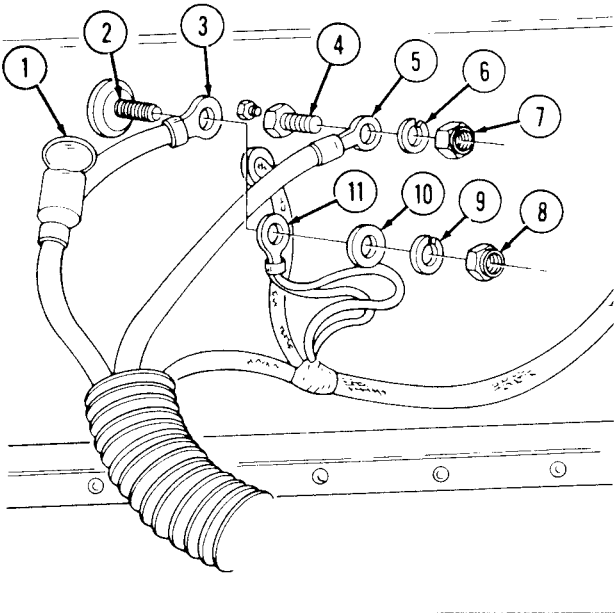
NOTE

Proceed to step 12 for all vehicles except M997, M997A1, and M997A2. Perform steps 9 through 11 for M997, M997A1 and M997A2 vehicles only.

9. Remove nut (18), lockwasher (17), clamp (15), and compressor harness (16) from capscrew (14). Discard lockwasher (17).
10. Disconnect compressor harness lead (13) from compressor leads (12).
11. Remove assembled locknut (20), clamp (19), and compressor harness (16) from cable bracket screw (21). Discard assembled locknut (20).

4-77. STARTER POWER CABLES REPLACEMENT (Cont'd)

12. Remove tiedown strap (22) and compressor harness (16) from alternator cable (26) and lead 81A (25). Discard tiedown strap (22).
13. Remove coil (31), positive cable (3), and ground cable (5) slowly while routing STE/ICE-R harness (29) and compressor harness (16) (M997 and M997A1 vehicles only) through coil (31).



"A2" series vehicles

4-77. STARTER POWER CABLES REPLACEMENT (Cont'd)

b. Installation

1. Install coil (16) on positive cable (11) and grommet cable (20). Route STE/ICE-R harness (14) and compressor harness (1) (M997 and M997A1 vehicles only) through coil (16), and place cables (11) and (20), STE/ICE-R harness (14), and compressor harness (1) (M997 and M997A1 vehicles only) in approximate mounting locations.
2. Install positive cable (11) and lead 6B/6C (37) on power stud (30) with washer (36), lockwasher (35), and nut (34). Tighten nut (34) 26 lb-ft (35 N•m). Slide rubber boot (29) over power stud (30).
3. Install ground cable (20) on ground stud (31) with lockwasher (32) and nut (33). Tighten nut (33) 75 lb-ft (102 N•m).

NOTE

Perform step 4 for all vehicles except "A2" series vehicles. Perform steps 5 and 6 for M997A2, M1025A2, M1035A2, M1043A2, M1045A2, and M1097A2 vehicles only.

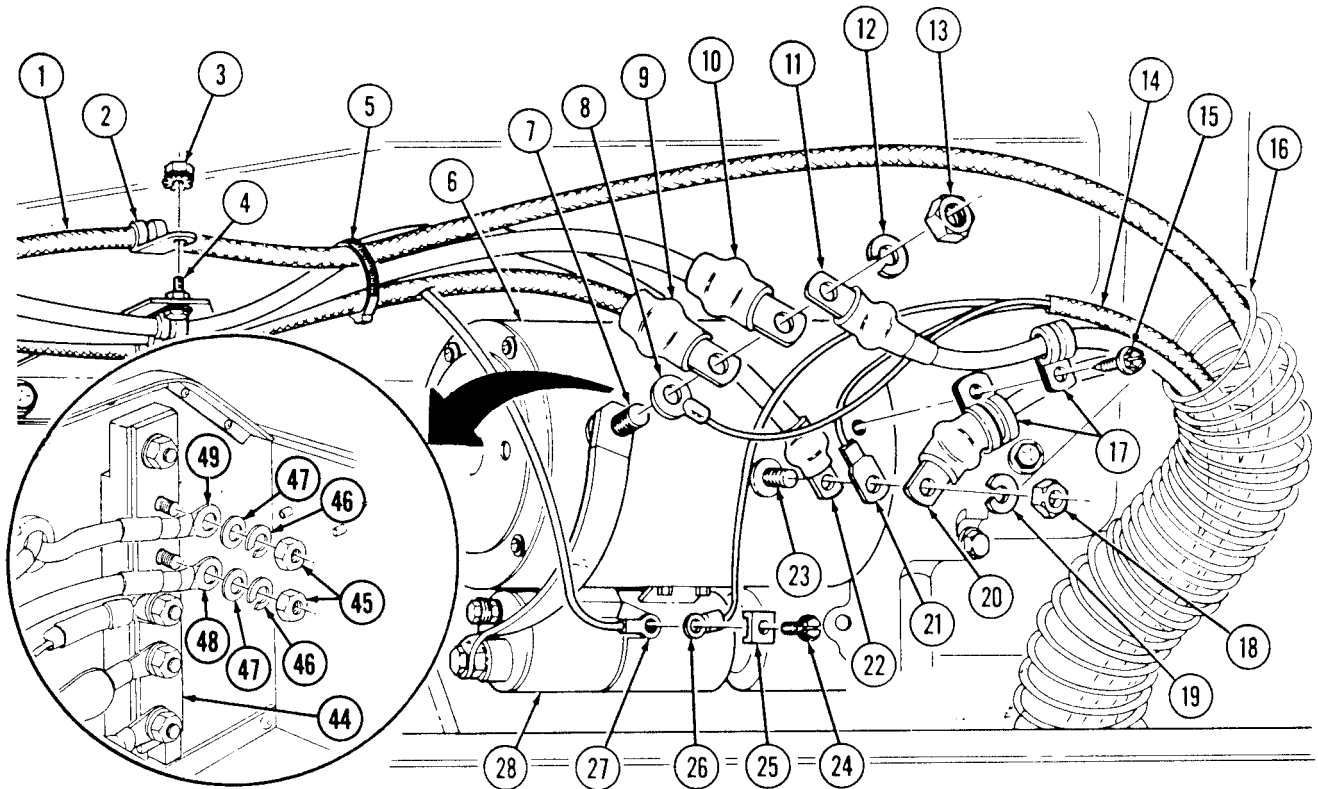
4. Install STE/ICE-R leads 81B (8) and 81A (9), positive accessory cable (10), and positive cable (11), (vehicles with winch or 200 amp alternator only) on positive post (7) with lockwasher (12) and nut (13). Tighten nut (13) 25-30 lb-ft (34-41 N•m).
5. Install lead 81B (8) on positive post (7) with lockwasher (12) and nut (13). Tighten nut (13) 25-30 lb-ft (34-41 N•m).
6. Install positive accessory cable (49) and positive cable (48) (vehicles with winch or 200 amp alternator only) on buss bar (44) with two washers (47), lockwashers (46), and nuts (45). Tighten nuts (45) 25-30 lb-ft (34-41 N•m).
7. Apply sealant to positive post (7) and cable terminals so that all exposed metallic surfaces are coated. The sealant should be evenly applied with a minimum thickness of .12 in. (3 mm).
8. Install lead 7C (22) (winch vehicles only), STE/ICE-R 3C lead (21), and ground cable (20) on negative post (23) with lockwasher (19) and nut (18). Tighten nut (18) 15-20 lb-ft (20-27 N•m).
9. Install leads 74A (27) and 74B (26) on solenoid (28) with clip (25) and screw (24).
10. Install two clamps (17) on positive cable (11) and ground cable (20) and secure to starter (6) with screws (15).

NOTE

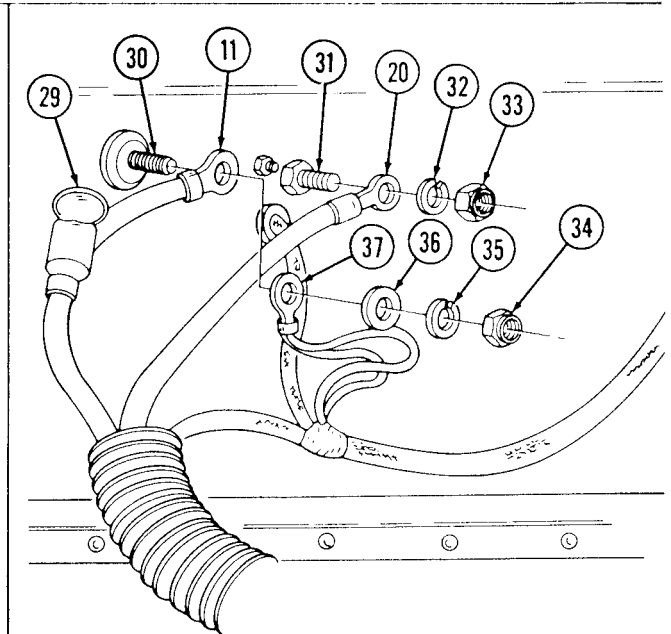
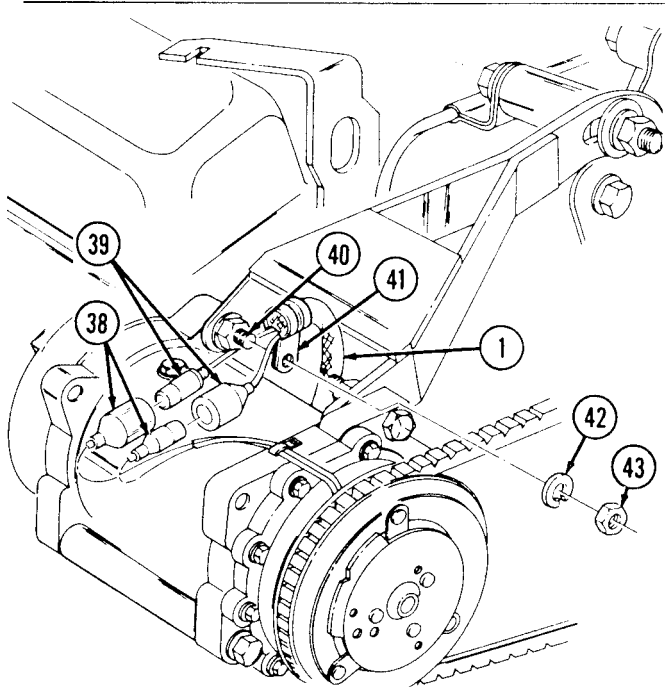
Perform steps 11 through 14 for M997, M997A1, and M997A2 vehicles only.

11. Connect compressor harness leads (39) to compressor leads (38).
12. Install clamp (41) on compressor harness (1) and capscrew (40) with lockwasher (42) and nut (43).
13. Install clamp (2) on compressor harness (1) and cable bracket screw (4) with assembled locknut (3).
14. Install compressor harness (1) on alternator cable (10) and lead 81A (9) with tiedown strap (5).

4-77. STARTER POWER CABLES REPLACEMENT (Cont'd)



"A2" series vehicles



- FOLLOW-ON TASKS:**
- Connect battery ground cable (para. 4-73)
 - Lower and secure hood (TM 9-2320-280-10).

4-78. BATTERY HOLDDOWN REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

- Battery box cover removed (para. 10-35).
- Battery ground cable disconnected (para. 4-73).
- Battery interconnecting cable and positive cable disconnected (para. 4-73).

General Safety Instructions

- Wear safety goggles and rubber gloves, and do not smoke when performing battery maintenance.
- Remove all jewelry.

WARNING

- Battery acid (electrolyte) is extremely harmful. Always wear safety goggles and rubber gloves, and do not smoke when performing battery maintenance. Severe injury will result if acid contacts eyes or skin.
- Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry or disconnected battery ground cable contacts battery terminal, a direct short can result, causing instant heating of tools, severe injury to personnel, or damage to equipment.

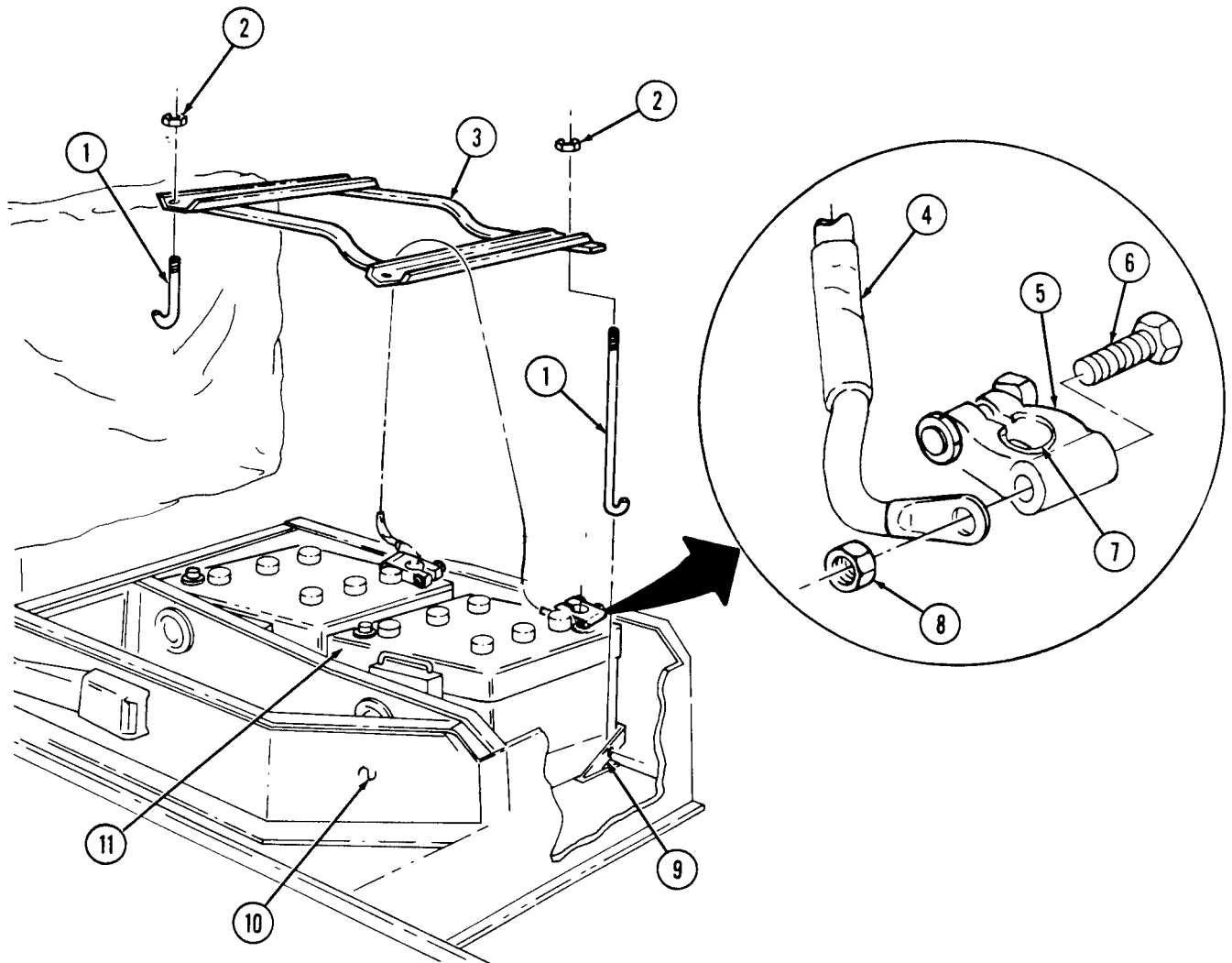
a. Removal

1. Remove nut (8), screw (6), and interconnecting cable (4) from battery terminal clamp (5) and terminal post (7).
2. Remove four nuts (2) and holddown rods (1) from battery holddown (3), battery box (10) and brackets (9).
3. Remove battery holddown (3).

b. Installation

1. Install battery holddown (3) on batteries (11), battery box (10), and brackets (9) with four holddown rods (1) and nuts (2).
2. Install interconnecting cable (4) on battery terminal clamp (5) at terminal post (7) with screw (6) and nut (8).

4-78. BATTERY HOLDDOWN REPLACEMENT (Cont'd)



- FOLLOW-ON TASKS:**
- Connect battery interconnecting cable and positive cable (para. 4-73)
 - Connect battery ground cable (para. 4-73).
 - Install battery box cover (para. 10-35).

4-79. BATTERY REPLACEMENT AND SERVICING

This task covers:

- a. Removal
- b. Servicing

- c. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-6140-200-14
TM 9-2320-280-24P

Equipment Condition

Battery holddown removed (para. 4-78).

General Safety Instructions

- Wear safety goggles and rubber gloves, and do not smoke when performing battery maintenance.
- Remove all jewelry.

WARNING

- Battery acid (electrolyte) is extremely harmful. Always wear safety goggles and rubber gloves, and do not smoke when performing battery maintenance. Severe injury will result if acid contacts eyes or skin.
- Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry or disconnected battery ground cable contacts battery terminal, a direct short can result, causing instant heating of tools, severe injury to personnel, or damage to equipment.

a. Removal

1. Loosen four screws (4) and nuts (2) from four battery terminal clamps (3) and terminals (1).
2. Using battery clamp puller, remove four battery terminal clamps (3) from terminals (1).
3. Place cables (6) in a position to prevent arcing with batteries.
4. Remove batteries (5) from battery box (7).

b. Servicing

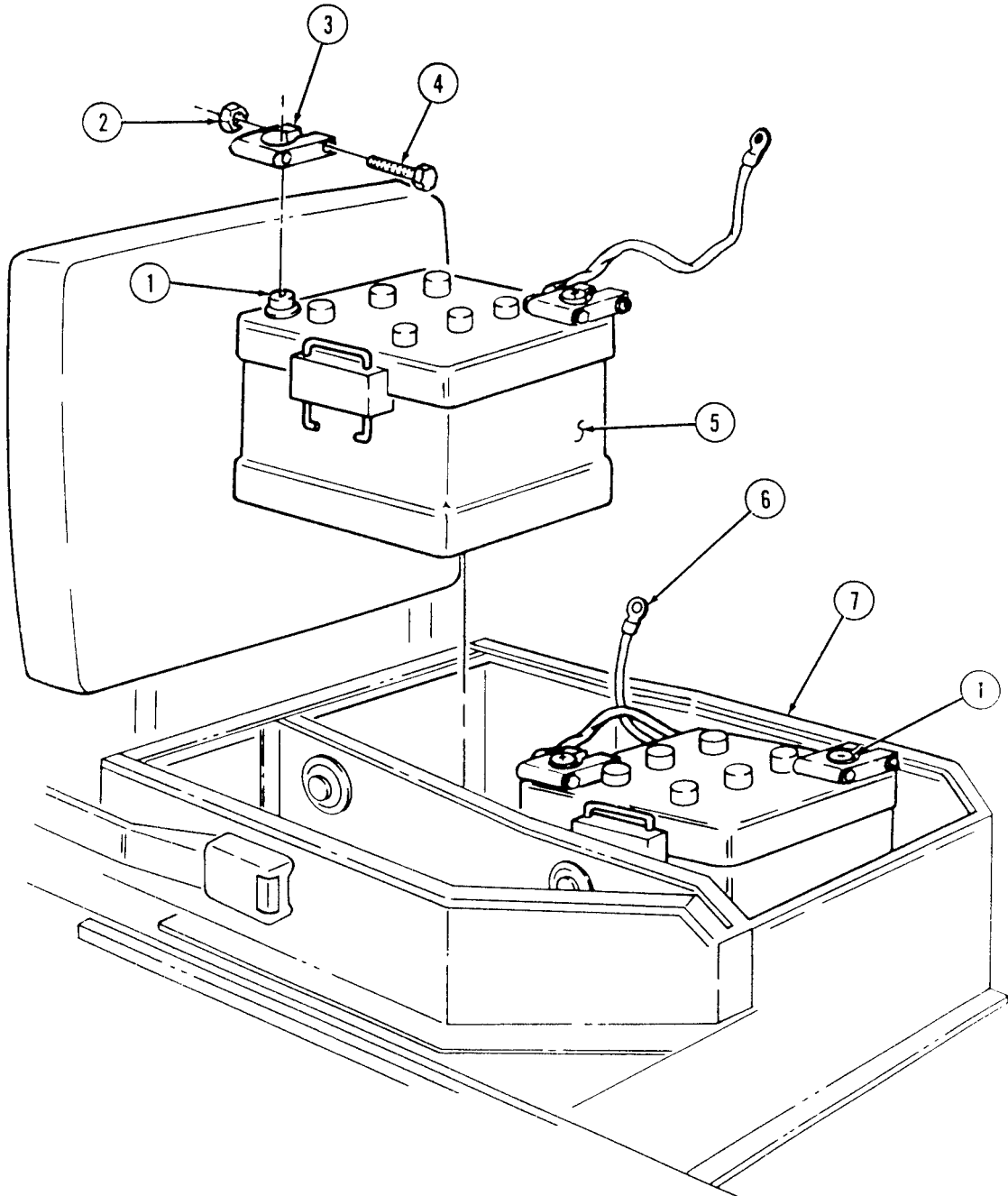
NOTE

For battery testing and servicing instructions refer to TM 9-6140-200-14.

c. Installation

1. Position batteries (5) in box (7).
2. Ensure negative (1) terminal posts are correctly located. Cables must reach their respective terminals without stretching.
3. Install four battery terminal clamps (3) to battery terminals (1).
4. Tighten four nuts (2) and screws (4) on battery terminal clamps (3) and battery terminals (1).

4-79. BATTERY REPLACEMENT AND SERVICING (Cont'd)



FOLLOW-ON TASK: Install battery holddown (para. 4-78).

4-80. BATTERY TRAY MAINTENANCE

This task covers:

- | | |
|---|--|
| <p>a. Removal</p> <p>b. Cleaning and Inspection</p> | <p>c. Preventive Modification</p> <p>d. Installation</p> |
|---|--|

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-6140-200-14
TM 9-2320-280-24P

Materials/Parts

Four locknuts (Appendix G, Item 70)
Sodium bicarbonate (Appendix C, Item 49)

Equipment Condition

Battery holddown removed (para. 4-78).

a. Removal

Remove four locknuts (6), washers (2), capscrews (1), washers (2), and battery tray (3) from battery box (5). Discard locknuts (6).

b. Cleaning and Inspection

NOTE

For additional information on battery box tray cleaning, refer to TM 9-6140-200-14.

1. Clean battery tray (3) with baking soda solution.
2. Inspect battery tray (3) for damage. Replace if damaged.
3. Inspect battery cable protectors (4) and battery compartment seals (7) for damage. Replace if damaged.

c. Preventive Modification

NOTE

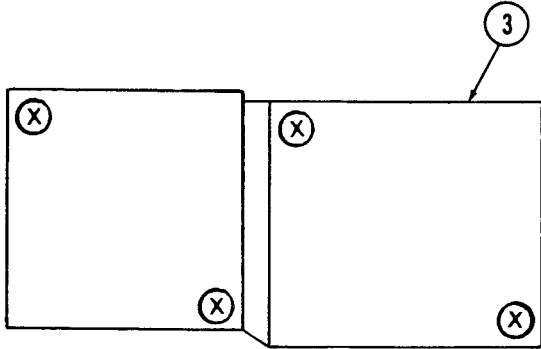
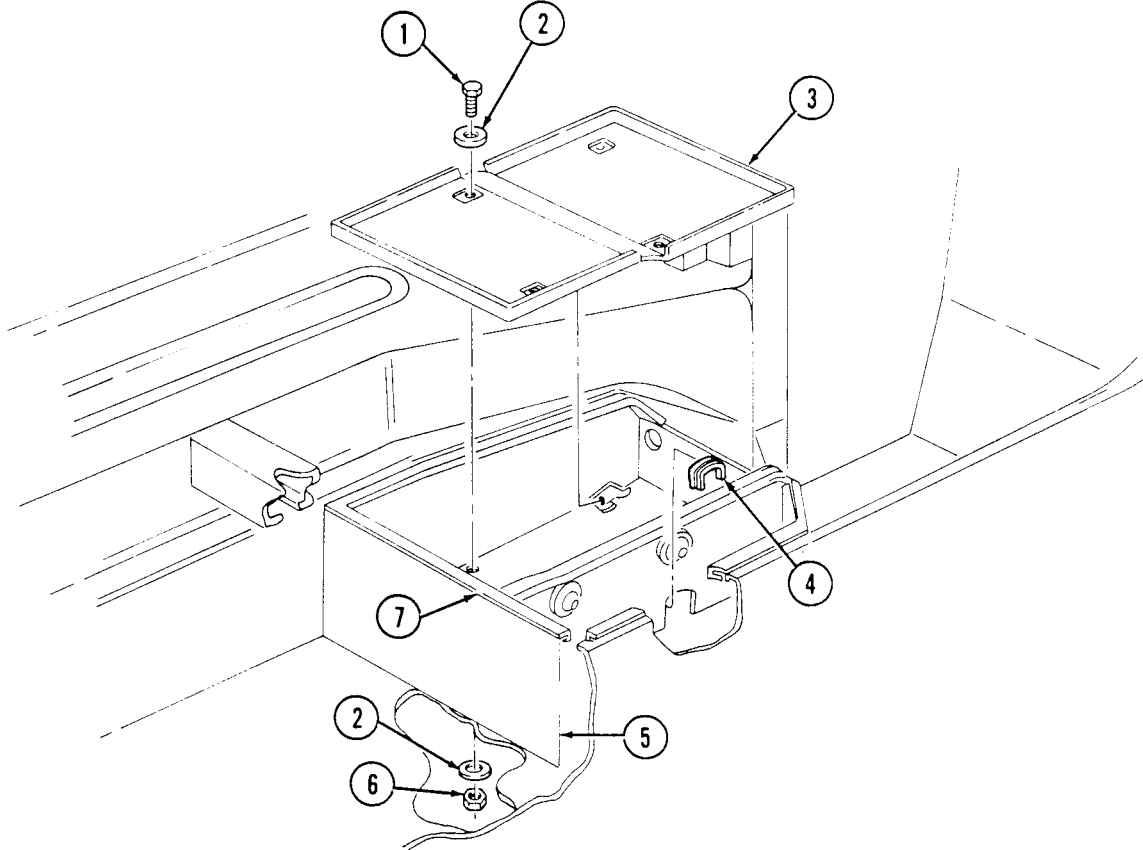
- The following step will prevent water from accumulating in the battery tray.
- Refer to hole diagram for location of holes.

Locate, mark, and drill four 1/2 inch holes in battery tray (3).

d. Installation

Install battery tray (3) on battery box (5) with four washers (2), capscrews (1), washers (2), and locknuts (6). Tighten locknuts (6) to 6 lb-ft (8 N•m).

4-80. BATTERY TRAY MAINTENANCE (Cont'd)



HOLE DIAGRAM

FOLLOW-ON TASK: Install battery holddown (para. 4-78).

4-81. SLAVE RECEPTACLE AND CABLE MAINTENANCE

This task covers:

- | | |
|--|------------------------|
| <p>a. Removal</p> <p>b. Inspection</p> | <p>c. Installation</p> |
|--|------------------------|

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Lockwasher (Appendix G, Item 148)
 Lockwasher (Appendix G, Item 141)
 Two lockwashers (Appendix G, Item 133)
 (serial numbers 1 through 99,999)
 Two lockwashers (Appendix G, Item 155)
 (serial numbers 100,000 and above)
 Four plain-assembled nuts
 (Appendix G, Item 200) (old configuration)
 Four plain-assembled nuts
 (Appendix G, Item 199) (new configuration)
 Grease (Appendix C, Item 24)

Manual References

TM 9-2320-280-24P

Equipment Condition

- Battery tray removed (para. 4-80).
- TOW wiring harness removed from power feed stud and shunt (para. 11-67).
M966, M966A1 M1036, M1045, M1045A1, M1045A2, M1046, M1046A1, M1121 only.

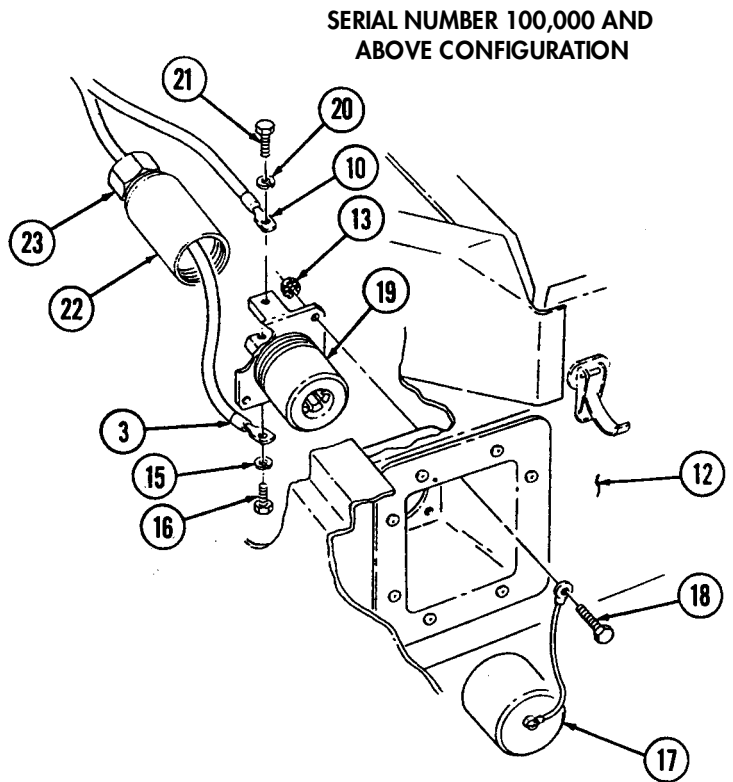
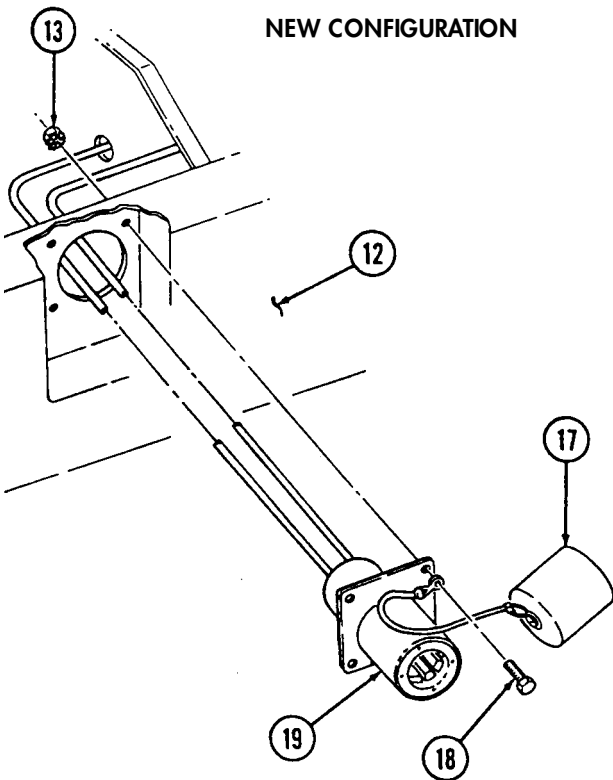
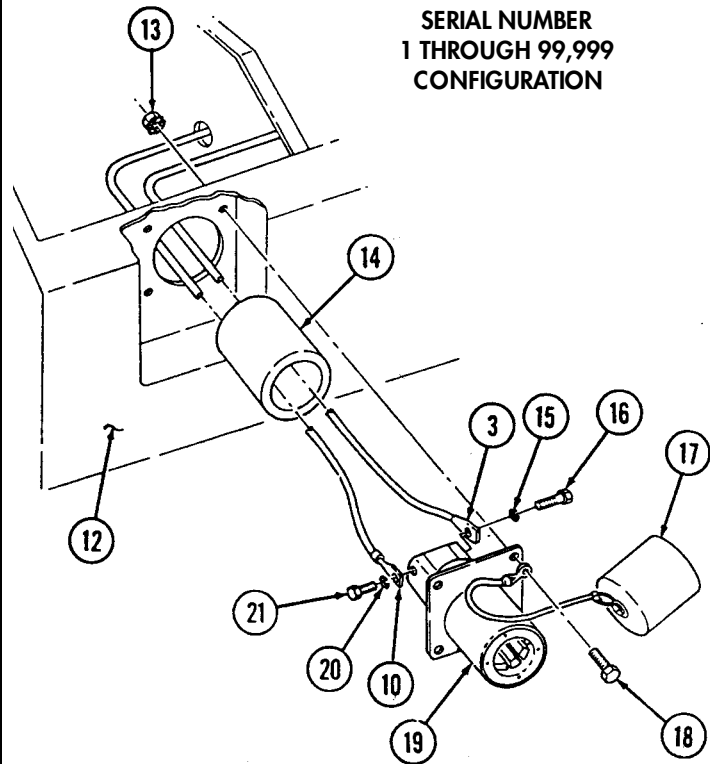
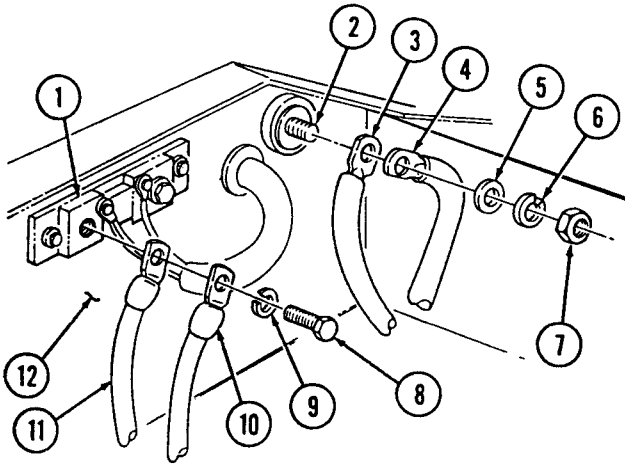
a. Removal

1. Remove capscrew (8), lockwasher (9), slave negative cable (10), and battery negative cable (11) from shunt (1). Discard lockwasher (9).
2. Remove nut (7), lockwasher (6), washer (5), battery positive cable (4), and slave positive cable (3) from power feed stud (2). Discard lockwasher (6).
3. Remove four plain-assembled nuts (13), capscrews (18), receptacle (19), and cover (17) from battery box (12). Discard plain-assembled nuts (13).

NOTE

- Prior to removal, tag leads for installation.
 - Perform steps 4 through 7 for vehicles with serial numbers 1 through 99,999.
 - Perform steps 8 through 10 for vehicles with serial numbers 100,000 and above.
4. Slide rubber boot (14) back to allow access to slave receptacle (19) connections.
 5. Remove capscrew (21), lockwasher (20), slave negative cable (10) from receptacle (19). Discard lockwasher (20).
 6. Remove capscrew (16), lockwasher (15), slave positive cable (3) from receptacle (19). Discard lockwasher (15).
 7. Remove rubber boot (14).
 8. Loosen compression nut (23) on backshell (22) and remove backshell (22) from receptacle (19).
 9. Remove capscrew (21), lockwasher (20), and slave negative cable (10) from receptacle (19). Discard lockwasher (20).
 10. Remove capscrew (16), lockwasher (15), and slave positive cable (3) from receptacle (19). Discard lockwasher (15).

4-81. SLAVE RECEPTACLE AND CABLE MAINTENANCE (Cont'd)



4-81. SLAVE RECEPTACLE AND CABLE MAINTENANCE (Cont'd)

b. Inspection

1. Inspect cover (17) for breaks or cracks. Replace if damaged.
2. Inspect cables (3) and (10) for damage. Repair if damaged (refer to para. 4-73).
3. Inspect rubber boot (14) for tears. Replace if torn.

c. Installation

CAUTION

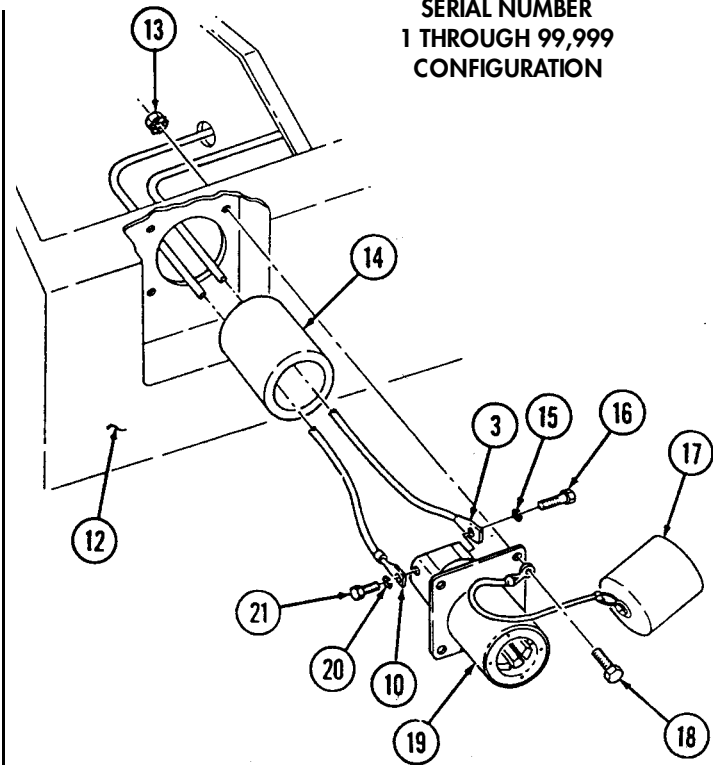
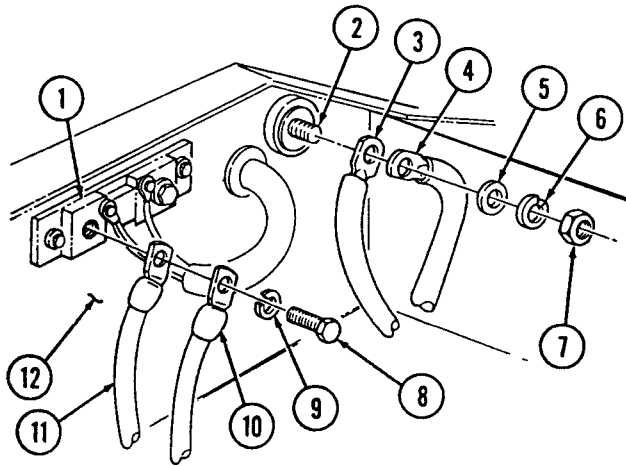
When making electrical connections, ensure hookup of positive (+) cable to positive electrode and negative (-) cable to negative electrode of the receptacle.

NOTE

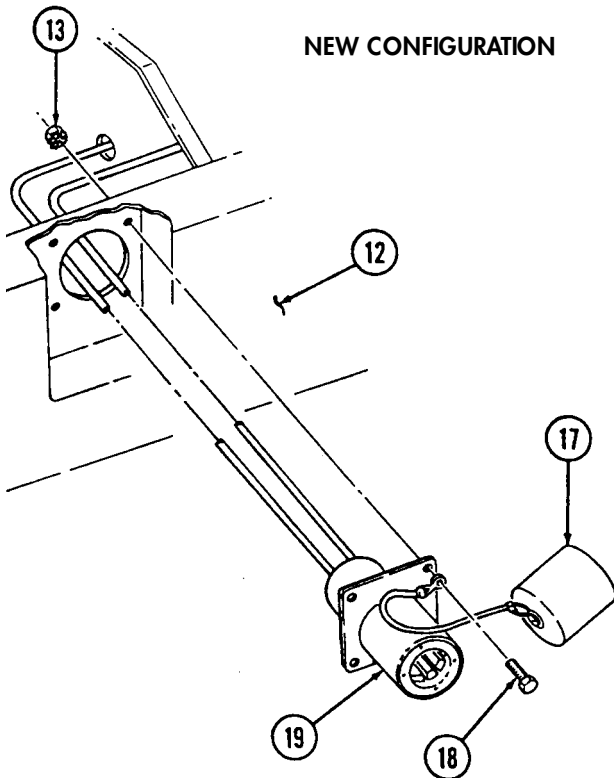
- Perform steps 1 through 4 for vehicles with serial numbers 1 through 99,999.
 - Perform steps 5 through 9 for vehicles with serial numbers 100,000 and above.
1. Install rubber boot (14) by sliding slave negative cable (10) and slave positive cable (3) through rubber boot (14).
 2. Install receptacle (19) by attaching slave positive cable (3) to receptacle (19) with lockwasher (15) and capscrew (16).
 3. Attach slave negative cable (10) to receptacle (19) with lockwasher (20) and capscrew (21).
 4. Slide rubber boot (14) forward to cover slave receptacle (19) connection.
 5. Attach slave positive cable (3) to receptacle (19) with lockwasher (15) and capscrew (16).
 6. Attach slave negative cable (10) to receptacle (19) with lockwasher (20) and capscrew (21).
 7. Using grease, coat receptacle (19) terminals, all exposed metal on rear of receptacle (19), and area under cover (17) on front of receptacle (19).
 8. Install backshell (22) on receptacle (19).
 9. Tighten compression nut (23) on backshell (22).
 10. Attach receptacle (19) to battery box (12) by installing cover (17) to receptacle (19) with four capscrews (18) and plain-assembled nuts (13).
 11. Attach slave positive cable (3) and battery positive cable (4) to power feed stud (2) with washer (5), lockwasher (6), and nut (7). Tighten nut (7) 26 lb-ft (35 N•m).
 12. Attach battery negative cable (11) and slave negative cable (10) to shunt (1) with lockwasher (9) and capscrew (8). Tighten capscrew (8) 96 lb-in. (11 N•m).

4-81. SLAVE RECEPTACLE AND CABLE MAINTENANCE (Cont'd)

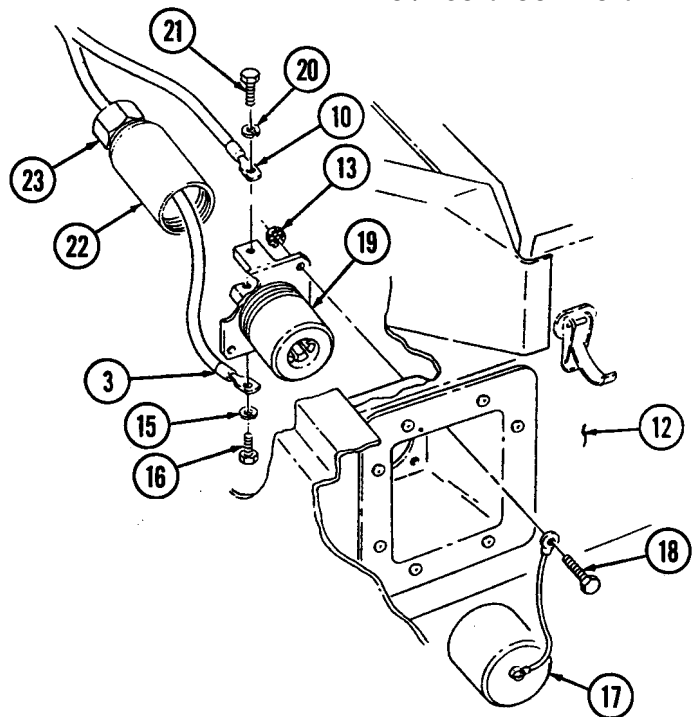
**SERIAL NUMBER
1 THROUGH 99,999
CONFIGURATION**



NEW CONFIGURATION



**SERIAL NUMBER 100,000 AND
ABOVE CONFIGURATION**



- FOLLOW-ON TASKS:**
- Install TOW wiring harness (M966, M966A1, M1036, M1045, M1045A1, M1045A2, M1046, M1046A1, M1121) (para. 11-67).
 - Install battery tray (para. 4-80).

4-82. WINCH POWER CABLE REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M1026, M1026A1, M1036, M1038, M1038A1,
M1042, M1044, M1044A1, M1046, M1046A1

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

Battery ground cable disconnected (para. 4-73).

Materials/Parts

Lockwasher (Appendix G, Item 135)
Three tiedown straps (Appendix G, Item 307)
Assembled locknut (Appendix G, Item 131)

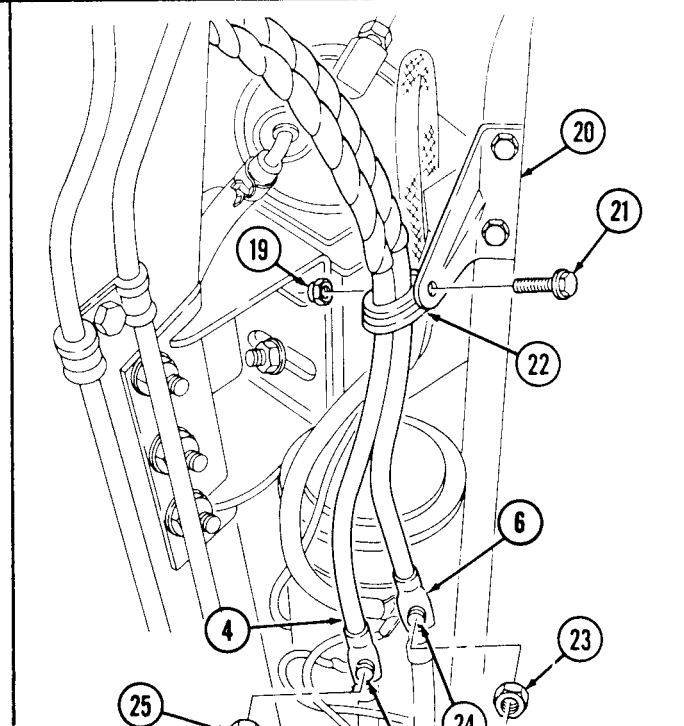
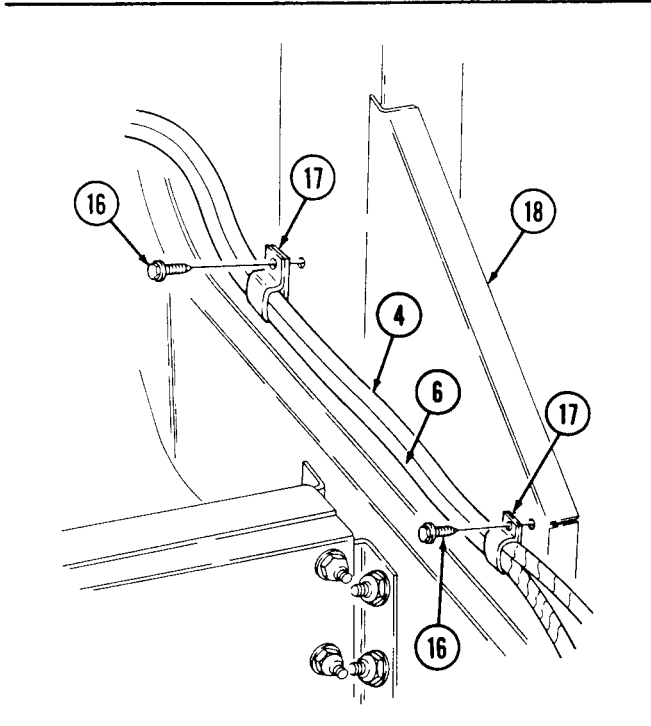
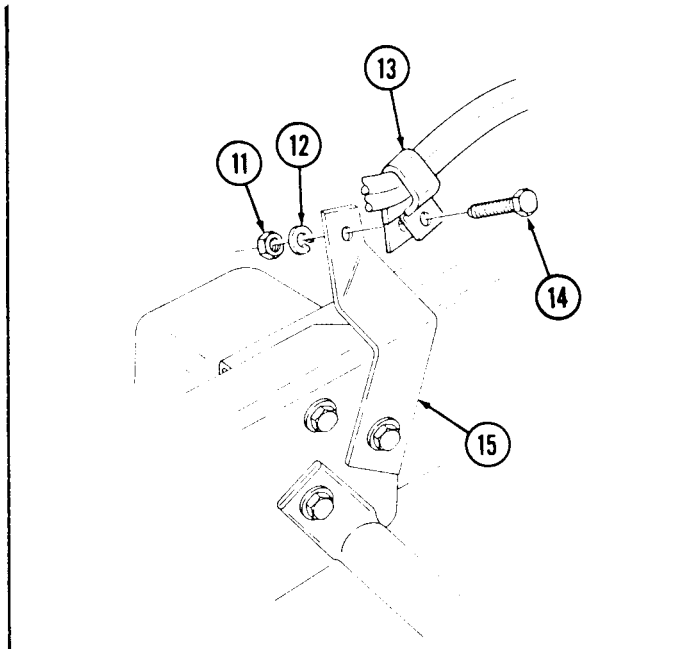
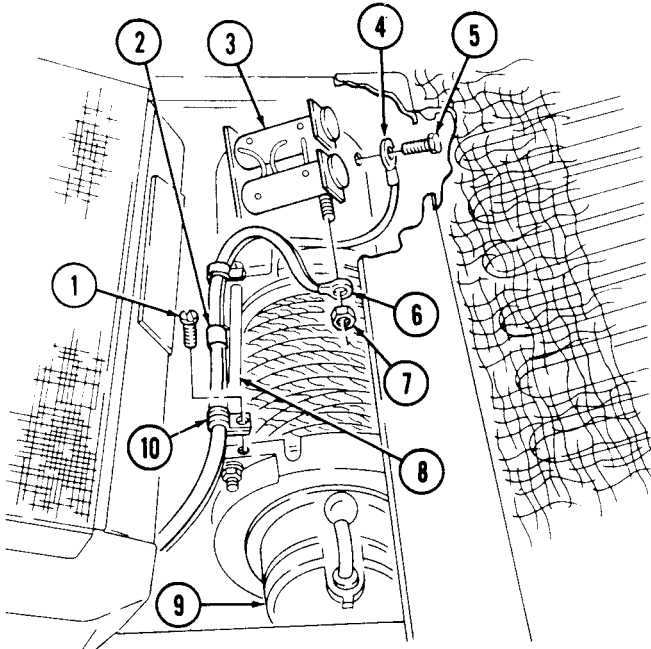
a. Removal

1. Remove three tiedown straps (2) from ventline (8), lead 7 (4), and lead 6 (6). Discard tiedown straps (2).
2. Remove capscrew (5) from lead 7 (4) and winch (9).
3. Remove nut (7) from lead 6 (6) and solenoid (3).
4. Remove two screws (1) and clamps (10) from lead 7 (4), lead 6 (6), and winch (9).
5. Remove screw (14), lockwasher (12), nut (11), and clamp (13) from lead 7 (4), lead 6 (6), and bracket (15). Discard lockwasher (12).
6. Remove two screws (16) and clamps (17) from lead 7 (4), lead 6 (6), and airlift bracket (18).
7. Remove assembled locknut (19), capscrew (21), and clamp (22) from lead 7 (4), lead 6 (6) and bracket (20). Discard assembled locknut (19).
8. Remove nut (25) and lead 7 (4) from starter negative stud (26).
9. Remove nut (23) and lead 6 (6) from starter positive stud (24).

b. Installation

1. Install lead 6 (6) on starter positive stud (24) with nut (23). Tighten nut (23) to 25-30 lb-ft (34-41 N•m).
2. Install lead 7 (4) on starter negative stud (25) with nut (26). Tighten nut (26) to 15-20 lb-ft (20-27 N•m).
3. Install lead 7 (4) and lead 6 (6) on bracket (20) with capscrew (21), assembled locknut (19), and clamp (22).
4. Install lead 7 (4) and lead 6 (6) on airlift bracket (18) with two screws (16) and clamps (17).
5. Install lead 7 (4) and lead 6 (6) on bracket (15) with screw (14), lockwasher (12), nut (11), and clamp (13).
6. Install lead 7 (4) and lead 6 (6) on winch (9) with two clamps (10) and screws (1).
7. Install lead 6 (6) on solenoid (3) with nut (7).
8. Install lead 7 (4) on winch (6) with capscrew (5).
9. Install lead 6 (6) and lead 7 (4) on vent line (8) with three tiedown straps (2).

4-82. WINCH POWER CABLE REPLACEMENT (Cont'd)



FOLLOW-ON TASKS: • Connect battery ground cable (para. 4-73).
 • Test winch for proper operation (TM 9-2320-280-10).

4-83. SHUNT REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-24P

Materials/Parts

Two lockwashers (Appendix G, Item 171)
Two assembled locknuts (Appendix G, Item 130)
Two lockwashers (Appendix G, Item 178)
Lockwasher (Appendix G, Item 148)

Equipment Condition

Batteries removed (para. 4-79).

Personnel Required

One mechanic
One assistant

NOTE

Prior to removal, tag leads for installation.

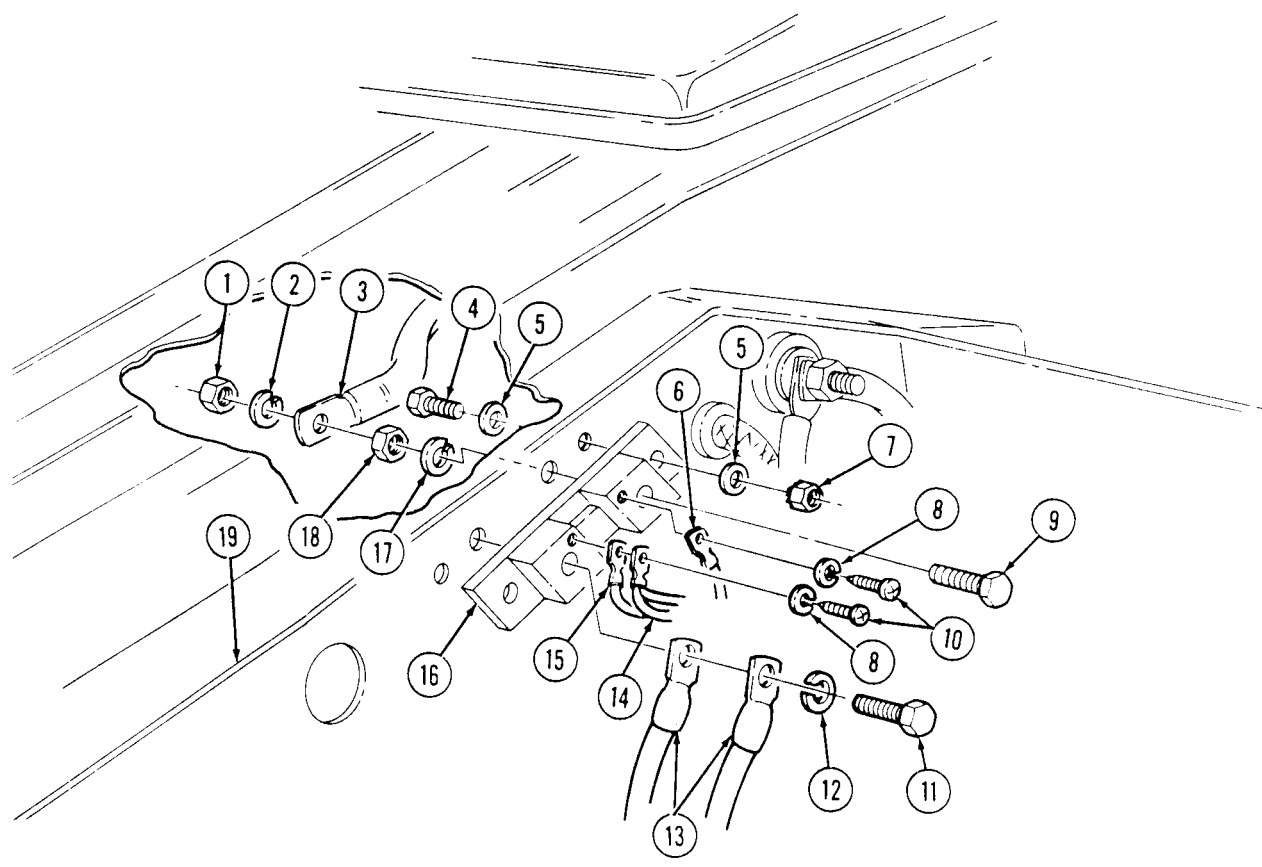
a. Removal

1. Remove two screws (10) and lockwashers (8) and disconnect leads 9A (15), 8A (6), 7B and 7D (14) from shunt (16). Discard lockwashers.
2. Remove nut (1) and lockwasher (2) securing starter cable (3) to capscrew (9) and disconnect starter cable (3). Discard lockwasher (2).
3. Remove nut (18), lockwasher (17), and capscrew (9) from shunt (16). Discard lockwasher (17).
4. Remove capscrew (11), lockwasher (12), and negative cables (13) from shunt (16). Discard lockwasher (12).
5. Remove two assembled locknuts (7), washers (5), capscrews (4), washers (5), and shunt (16) from battery box (19). Discard assembled locknuts (7).

b. Installation

1. Install shunt (16) to battery box (19) with two washers (5), capscrews (4), washers (5), and assembled locknuts (7). Tighten assembled locknuts (7) to 8 lb-ft (11 N.m).
2. Install negative cables (13) to shunt (16) with lockwasher (12) and capscrew (11). Tighten capscrew (11) to 8 lb-ft (11 N•m).
3. Install capscrew (9) to shunt (16) with lockwasher (17) and nut (18). Tighten nut (18) to 75 lb-ft (102 N•m).
4. Connect starter cable (3) to capscrew (9) with lockwasher (2) and nut (1). Tighten nut (1) to 18 to 22 lb-ft (24-30 N•m).
5. Instal leads 9A (15), 8A (6), 7B, and 7D (14) on shunt (16) with two lockwashers (8) and screws (10).

4-83. SHUNT REPLACEMENT (Cont'd)



FOLLOW-ON TASK: Install batteries (para. 4-79).

4-84. HOOD WIRING HARNESS REPLACEMENT

This task covers:

a. Removal

c. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Two locknuts (Appendix G, Item 74)
(A2 Series and M1123)
Two locknuts (Appendix G, Item 102) (Basic
and A1 Series)
Antiseize compound (Appendix C, Item 13)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

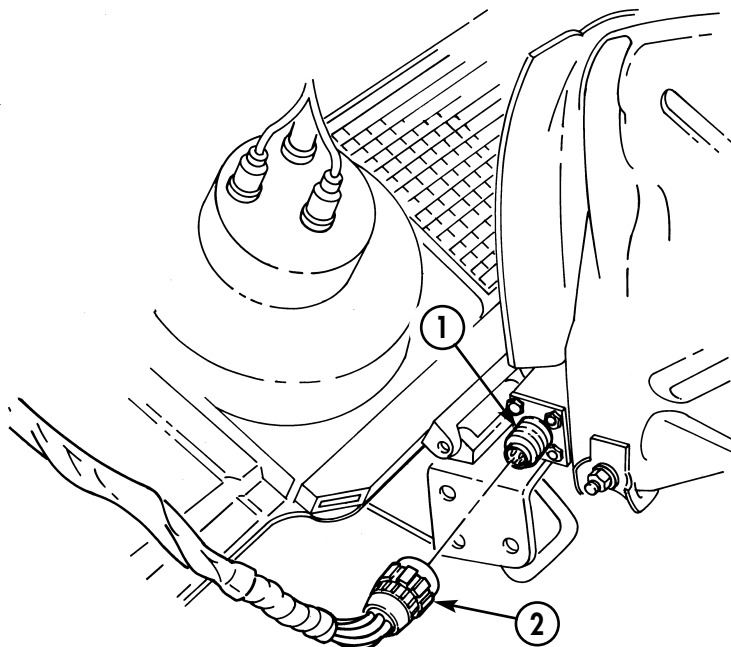
- Blackout drive light assembly removed (para. 4-50).
- Side marker light lenses and lamp removed (para. 4-54).

NOTE

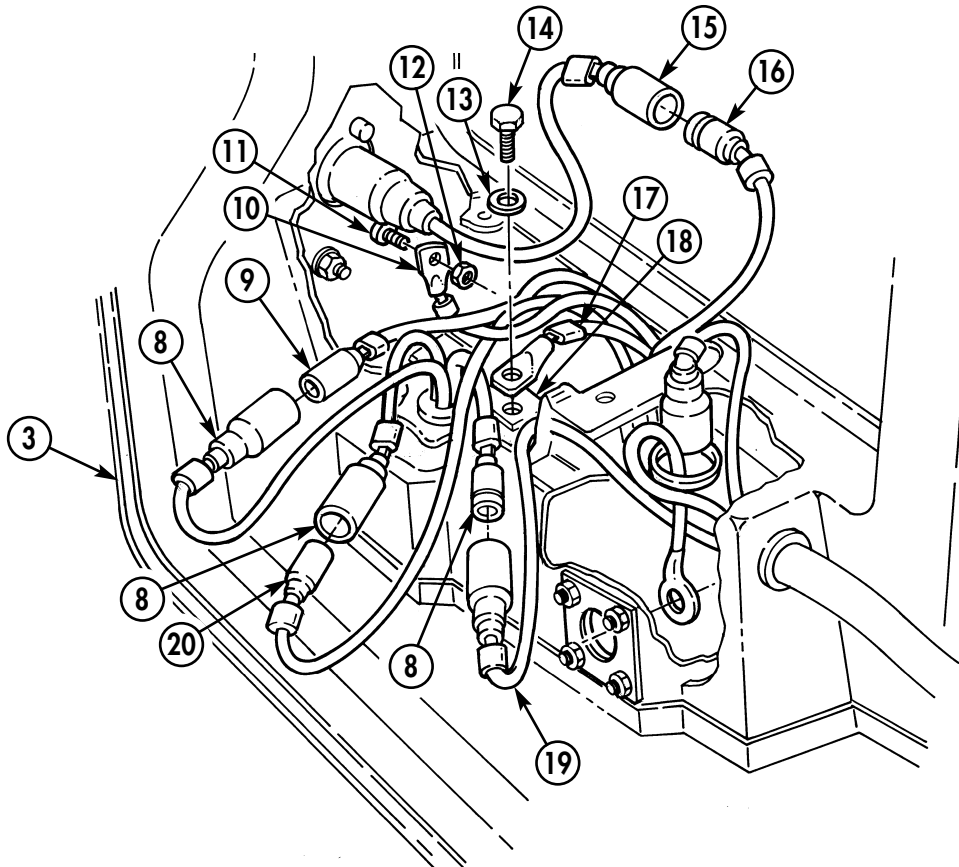
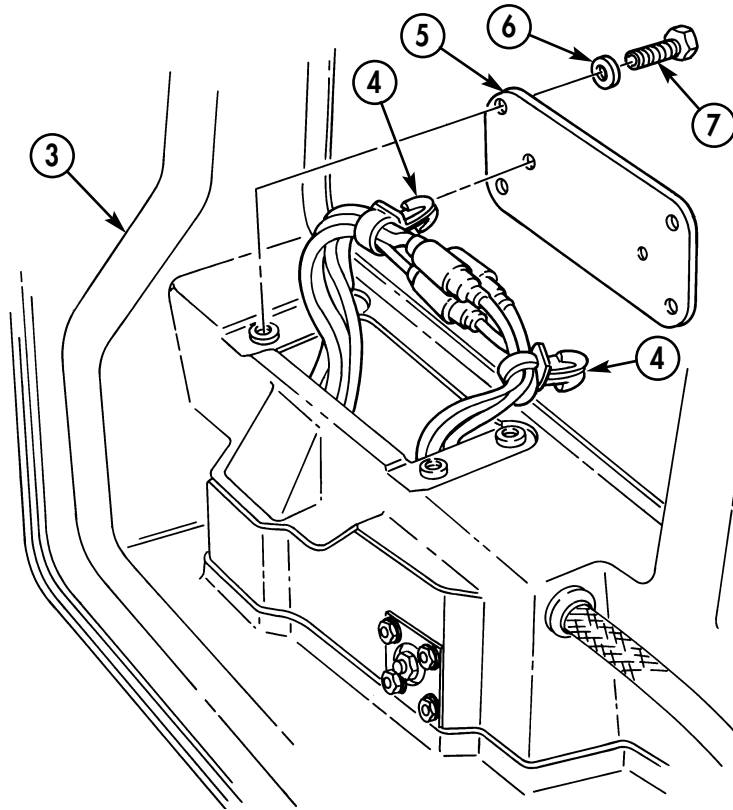
Prior to removal, tag leads for installation.

a. Removal

1. Disconnect connector plug (2) from connector receptacle (1).
2. Remove four capscrews (7) and washers (6) from left cover plate (5) and hood (3).
3. Remove two clips (4) from cover plate (5) and remove cover plate (5).
4. Disconnect harness leads 489C (16) from left side marker light terminal (15).
5. Disconnect harness leads 20E (9), 461B (20), and 491C (19) from three left composite light terminals (8).
6. Remove locknut (12), screw (11), and left side marker light ground 92C (10) from hood (3). Discard locknut (12).
7. Remove capscrew (14), washer (13), and left composite light ground 92B (17) from bus bar (18).



4-84. HOOD WIRING HARNESS REPLACEMENT (Cont'd)



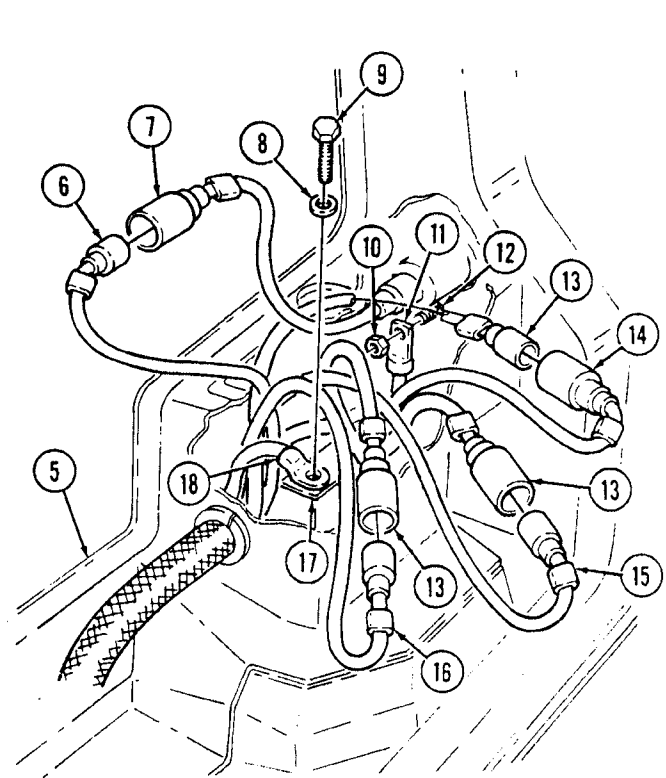
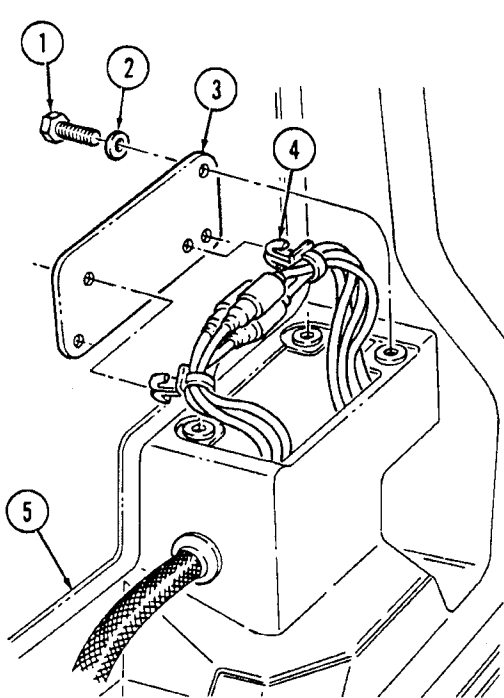
4-84. HOOD WIRING HARNESS REPLACEMENT (Cont'd)

8. Remove three capscrews (1) and washers (2) from right cover plate (3) and hood (5).
9. Remove two clips (4) from cover plate (3) and remove cover plate (3).
10. Disconnect harness lead 489D (6) at right side marker light terminal (7).
11. Disconnect harness leads 20F (14), 460B (15), and 491D (16) at right composite light terminals (13).
12. Remove locknut (10), screw (12), and right side marker light ground 92D (11) from hood (5). Discard locknut (10).
13. Remove capscrew (9), washer (8), and right composite light ground 92A (18) from bus bar (17).
14. Disconnect harness leads 17E (22), 18C (23), and 91D (25) at left headlight connectors (26).
15. Disconnect harness leads 17F (22), 18D (23), and 91C (25) at right headlight connectors (26).
16. Remove three capscrews (27), clamps (28), washers (29), and harness (21) from hood (5).
17. Remove two screw and washer assemblies (19), clamps (20), and harness (21) from hood (5).

CAUTION

Use care when removing harness. Failure to do so will cause damage to harness.

18. Remove grommet (24) and harness (21) from hood (5).



4-84. HOOD WIRING HARNESS REPLACEMENT (Cont'd)

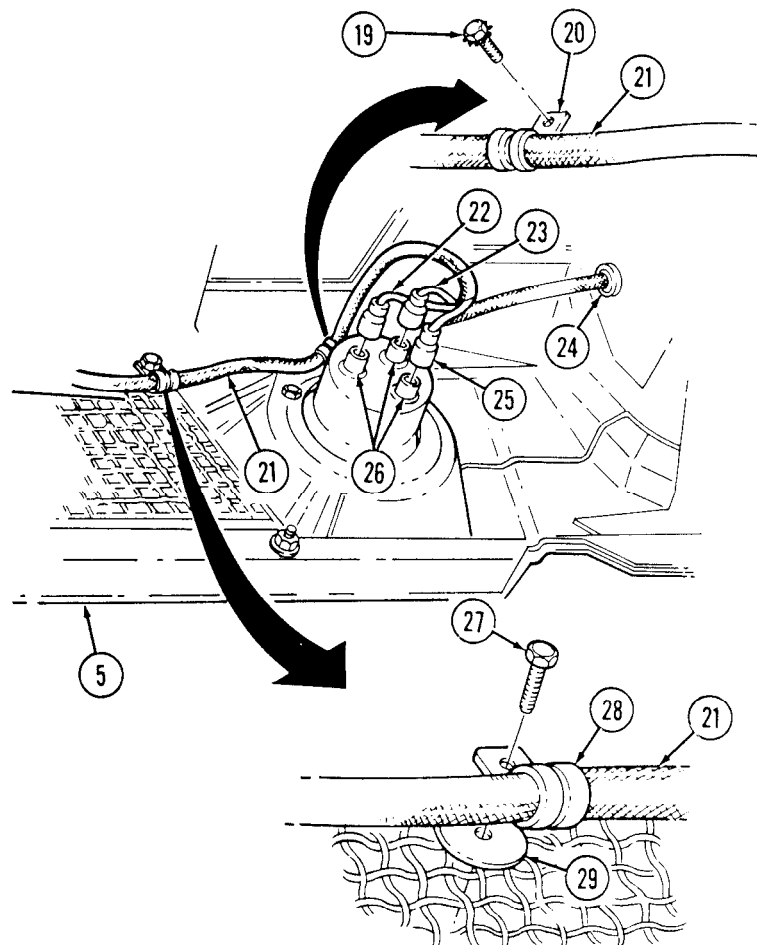
b. Installation

1. Position harness (21) on hood (5) in approximate mounting position.

CAUTION

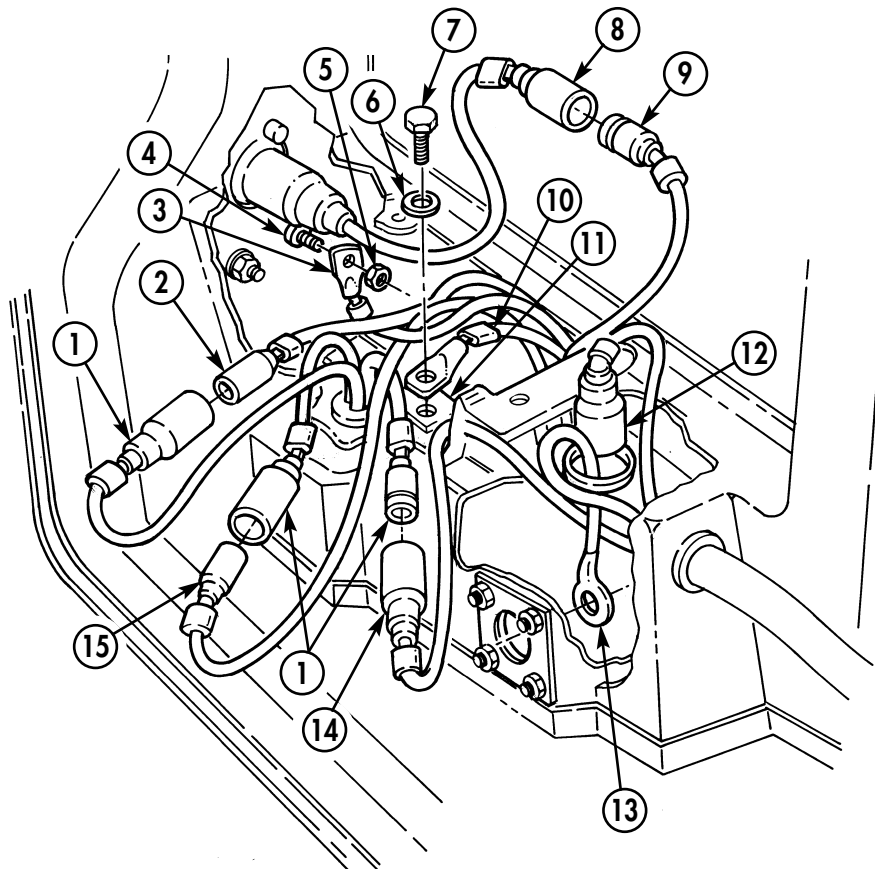
Use care when routing harness. Failure to do so will cause damage to harness.

2. Insert harness (21) and grommets (24) through opening in hood (5).
3. Connect harness leads 17E (22), 18C (23), and 91D (25) at left headlight connectors (26).
4. Connect harness leads 17F (22), 18D (23), and 91C (25) at right headlight connectors (26).
5. Secure harness (21) to hood (5) with three washers (29), clamps (28), and screws (27). Finger tighten screws (27).
6. Secure harness (21) to hood (5) with two screw and washer assemblies (19) and clamps (20). Finger tighten screw and washer assemblies (19).

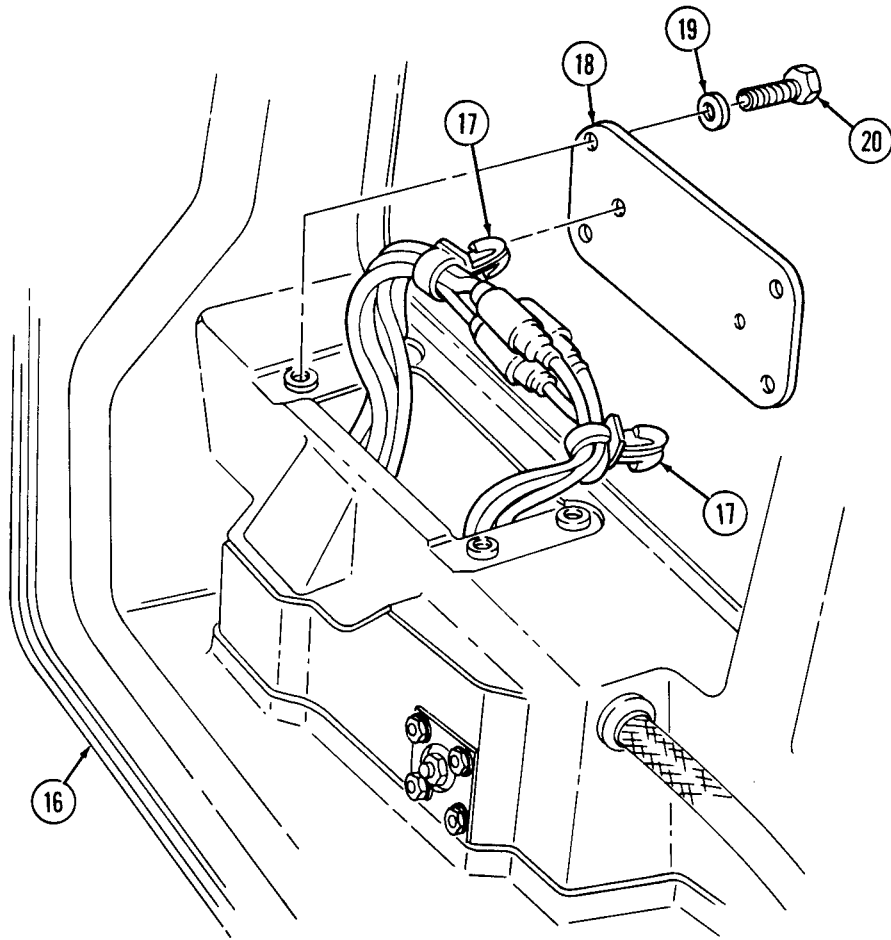


4-84. HOOD WIRING HARNESS REPLACEMENT (Cont'd)

7. Apply antiseize compound to left composite light ground 92B (10) and install on bus bar (11) with washer (6) and capscrew (7).
8. Apply antiseize compound to left side marker light ground 92C (3) and install on hood (16) with locknut (5) and screw (4).
9. Connect harness leads 20E (2), 461B (15), and 491B (14) at left composite light terminals (1).
10. Connect harness lead 489C (9) at left side marker light terminal (8).
11. Insert harness lead 19B (12) and harness lead 92E (13) through opening in hood (16).
12. Install leads (12) and (13) with two clips (17) on left cover plate (18).
13. Install left cover plate (18) with four washers (19) and capscrews (20).

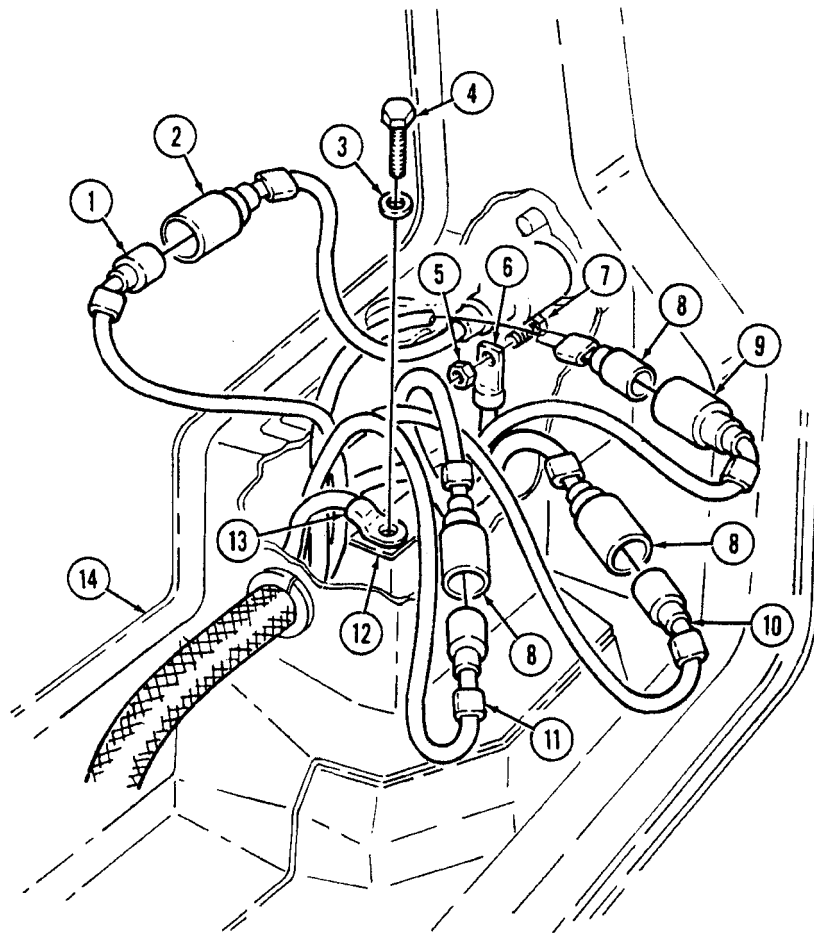


4-84. HOOD WIRING HARNESS REPLACEMENT (Cont'd)

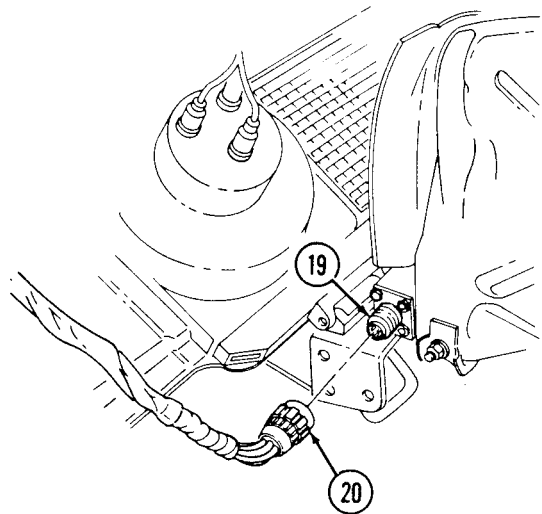
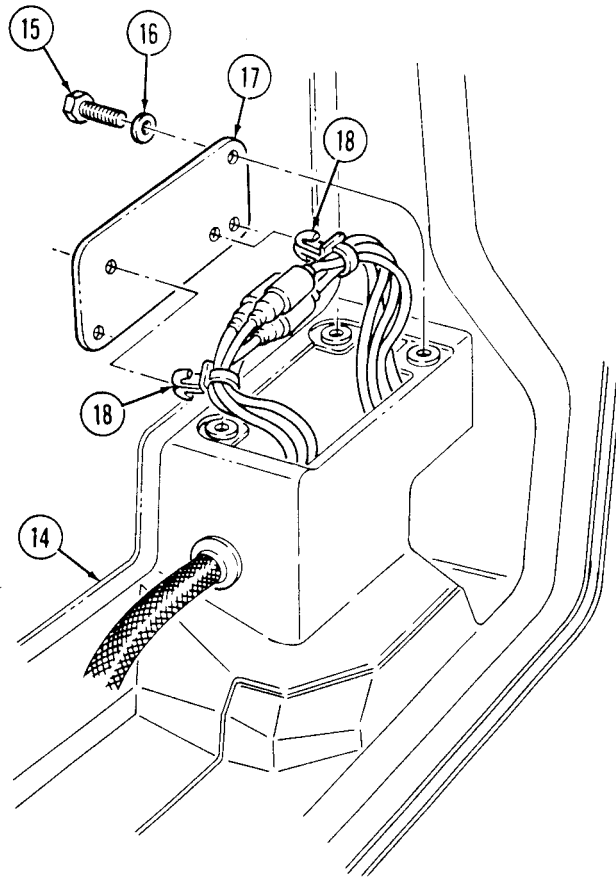


4-84. HOOD WIRING HARNESS REPLACEMENT (Cont'd)

14. Apply antiseize compound to right composite light ground 92A (13) and install on bus bar (12) with washer (3) and capscrew (4).
15. Apply antiseize compound to right side marker light ground 92C (6) and install on hood (14) with screw (7) and locknut (5).
16. Connect harness leads 20F (9), 460B (10), and 491D (11) at right composite light terminals (8).
17. Connect harness lead 489D (1) at right side marker light terminal (2).
18. Secure leads with two clips (18) and install clips (18) on right cover plate (17).
19. Install right cover plate (17) to hood (14) with three washers (16) and capscrews (15).
20. Connect connector plug (20) to connector receptacle (19).
21. Tighten all clamps securing harness.



4-84. HOOD WIRING HARNESS REPLACEMENT (Cont'd)



- FOLLOW-ON TASKS:
- Install side marker light lenses and lamp (para. 4-54).
 - Install drive blackout light (para. 4-50).
 - Check front lights for proper operation (TM 9-2320-280-10).

4-85. WIRING HARNESS CONNECTOR REPAIR

This task covers:

- | | |
|---|--|
| <ul style="list-style-type: none"> a. Terminal-Type Cable Connector Repair b. Male Cable Connector Repair c. Female Cable Connector Repair d. Connector Assembly Repair | <ul style="list-style-type: none"> e. Receptacle Assembly Repair f. Protective Control Box Lower Cannon Plug Assembly Repair |
|---|--|

INITIAL SETUP:

Tools

- General mechanic's tool kit:
 - automotive (Appendix B, Item 1)
- Connector repair kit (Appendix B, Item 165)

Manual References

- TB SIG-222
- TM 9-2320-280-24P

Equipment Condition

Battery ground cable disconnected (para. 4-73).

General Safety Instructions

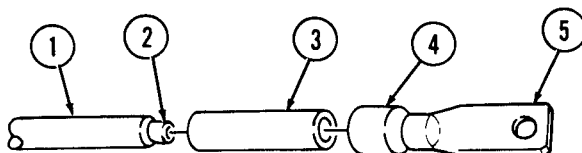
Remove all jewelry.

WARNING

Remove all jewelry such as rings dog tags, bracelets, etc. If jewelry or disconnected battery ground cable contacts battery terminal, a direct short can result, causing instant heating of tools, severe injury to personnel, or damage to equipment.

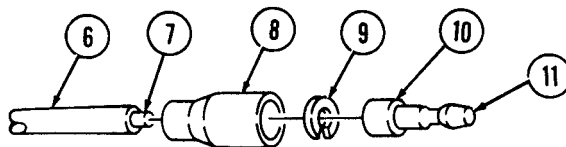
a. Terminal-Type Connector Repair

1. Strip cable insulation (1) from cable (2) to equal depth of terminal well (4).
2. Slide insulator (3) over cable insulation (1).
3. Insert cable (2) into terminal well (4) and crimp.
4. Slide insulator (3) over crimped end of terminal (5).



b. Male Cable Connector Repair

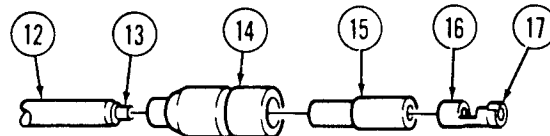
1. Strip cable insulation (6) from cable (7) to equal depth of terminal well (10).
2. Slide shell (8) over cable insulation (6).
3. Insert cable (7) into terminal well (10) and crimp.
4. Place slotted washer (9) over crimped junction at terminal (11).
5. Slide shell (8) over slotted washer (9) and terminal (11).



4-85. WIRING HARNESS CONNECTOR REPAIR (Cont'd)

c. Female Cable Connector Repair

1. Strip cable insulation (12) from cable (13) to equal depth of terminal well (16).
2. Slide shell (14) and sleeve (15) over cable insulation (12).
3. Insert cable (13) into terminal well (16) and crimp.
4. Slide shell (14) and sleeve (15) over terminal (17).

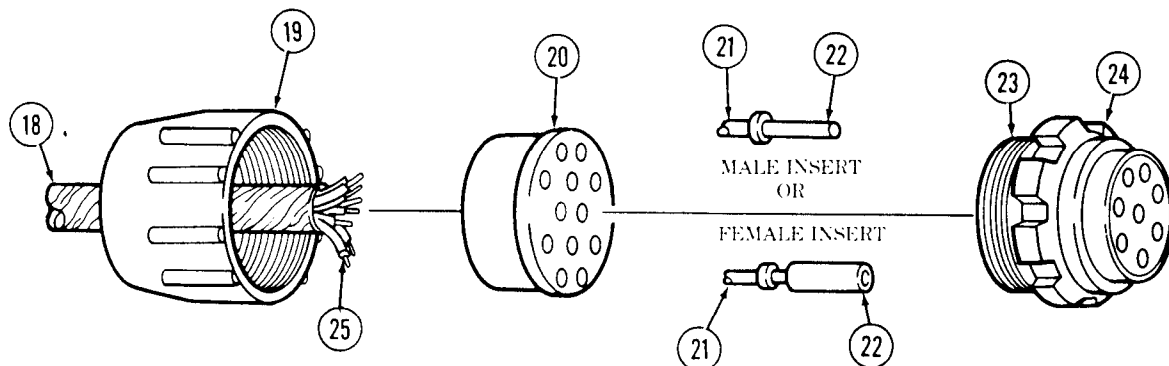


d. Connector Assembly Repair

NOTE

Refer to TB SIG-222 for soldering instructions.

1. Strip cable insulation (18) to depth of solder wells (21) on inserts (22).
2. Slide cable ends (25) through grommet retaining nut (19) and grommet (20).
3. Place cable ends (25) into solder wells (21) and solder.
4. Slide grommet (20) over inserts (22) and press into shell assembly (23) and coupling nut (24) until seated.
5. Screw grommet retaining nut (19) into shell assembly (23) until seated.



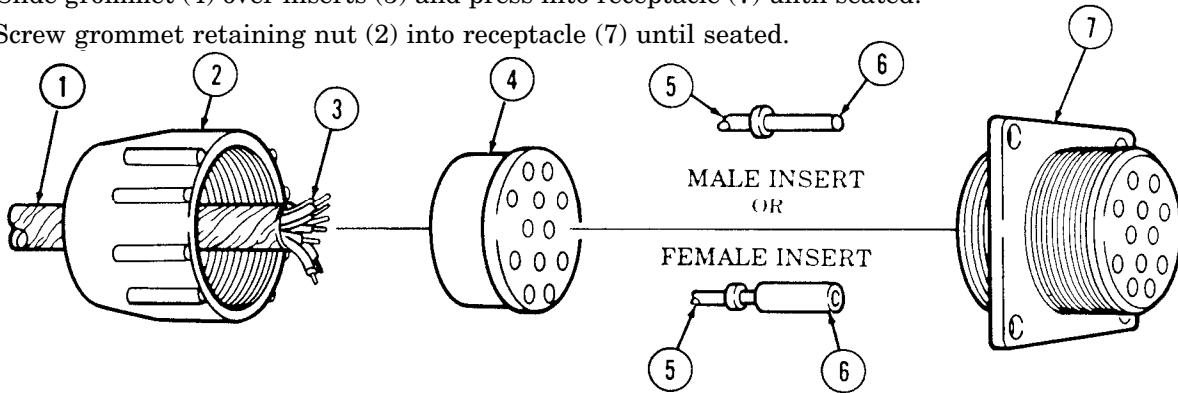
4-85. WIRING HARNESS CONNECTOR REPAIR (Cont'd)

e. Receptacle Assembly Repair

NOTE

Refer to TB SIG-222 for soldering instructions.

1. Strip cable insulation (1) to depth of solder wells (5) on inserts (6).
2. Slide cable ends (3) through grommet retaining nut (2) and grommet (4).
3. Place cable ends (3) into solder wells (5) and solder.
4. Slide grommet (4) over inserts (5) and press into receptacle (7) until seated.
5. Screw grommet retaining nut (2) into receptacle (7) until seated.



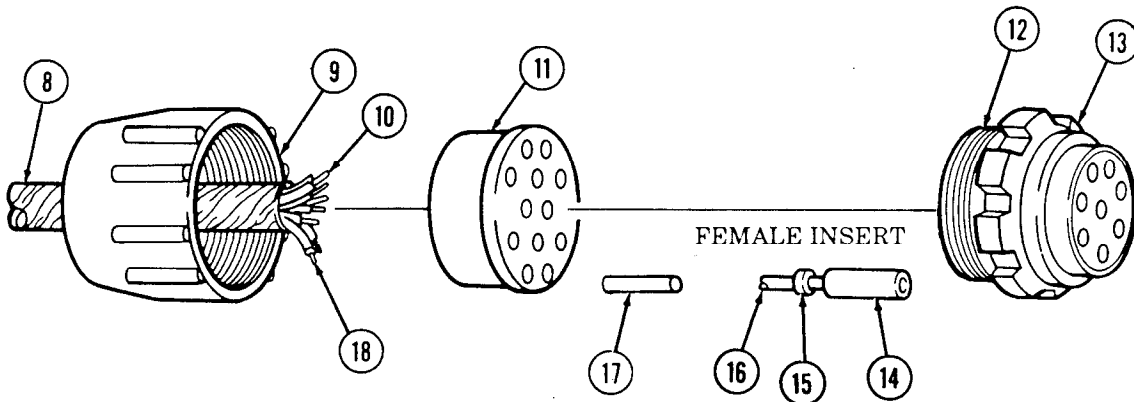
f. Protective Control Box Lower Cannon Plug Assembly Repair

1. Strip cable insulation (8) to depth of solder wells (16) on inserts (14).
2. Slide cable ends (10) through grommet retaining nut (9) and grommet (11).
3. Slide insulation sleeving (17) over lead 67A (18).
4. Place cable ends (10) into solder wells (16) and solder.

NOTE

Ensure insulation sleeving passes through grommet to provide a water tight fit.

5. Slide insulation sleeving (17) up to solder well end (15), and heat shrink insulation sleeving (17).
6. Slide grommet (11) over inserts (14) and press into shell assembly (12) and coupling nut (13) until seated.
7. Screw grommet retaining nut (9) into shell assembly (12) until seated.



FOLLOW-ON TASK: Connect battery ground cable (para. 4-73).

Section VII.
AMBULANCE ELECTRICAL SYSTEM MAINTENANCE

4-86. ELECTRICAL SYSTEM MAINTENANCE TASK SUMMARY

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4-86. ELECTRICAL SYSTEM MAINTENANCE TASK SUMMARY (Cont'd)

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4-87. CEILING LIGHT ASSEMBLY MAINTENANCE

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M996, M996A1, M997, M997A1, M997A2

Materials/Parts

Four blind rivets (Appendix G, Item 254)

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

NOTE

Dome and blackout light assemblies are removed and installed basically the same. This procedure covers the dome light assembly.

4-87. CEILING LIGHT ASSEMBLY MAINTENANCE (Cont'd)

a. Removal

1. Remove two screws (5) and lens (6) from light assembly (4).

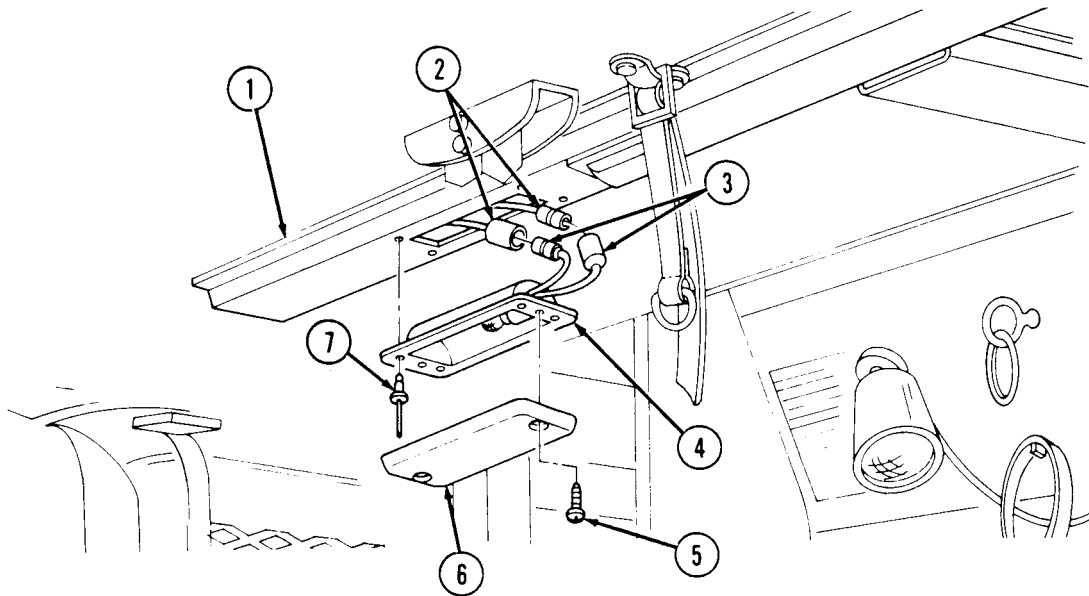
NOTE

For removal and installation of rivets, refer to para. 10-66.

2. Remove four rivets (7) from light assembly (4) and duct (1). Pull light assembly (4) away from duct (1) to allow access to leads.
3. Disconnect two leads (3) from harness connectors (2). Remove light assembly (4).

b. Installation

1. Connect two leads (3) to harness connectors (2).
2. Install light assembly (4) to duct (1) with four rivets (7).
3. Install lens (6) to light assembly (4) with two screws (5).



FOLLOW-ON TASK: Check operation of ceiling light (TM 9-2320-280-10).

4-88. SPOTLIGHT ASSEMBLY MAINTENANCE

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M996, M996A1, M997, M997A1, M997A2

Manual References

TM 9-2320-280-10
 TM 9-2320-280-24P

Tools

General mechanic's tool kit:
 automotive (Appendix B, Item 1)

Equipment Condition

Battery ground cable disconnected (para. 4-73).

NOTE

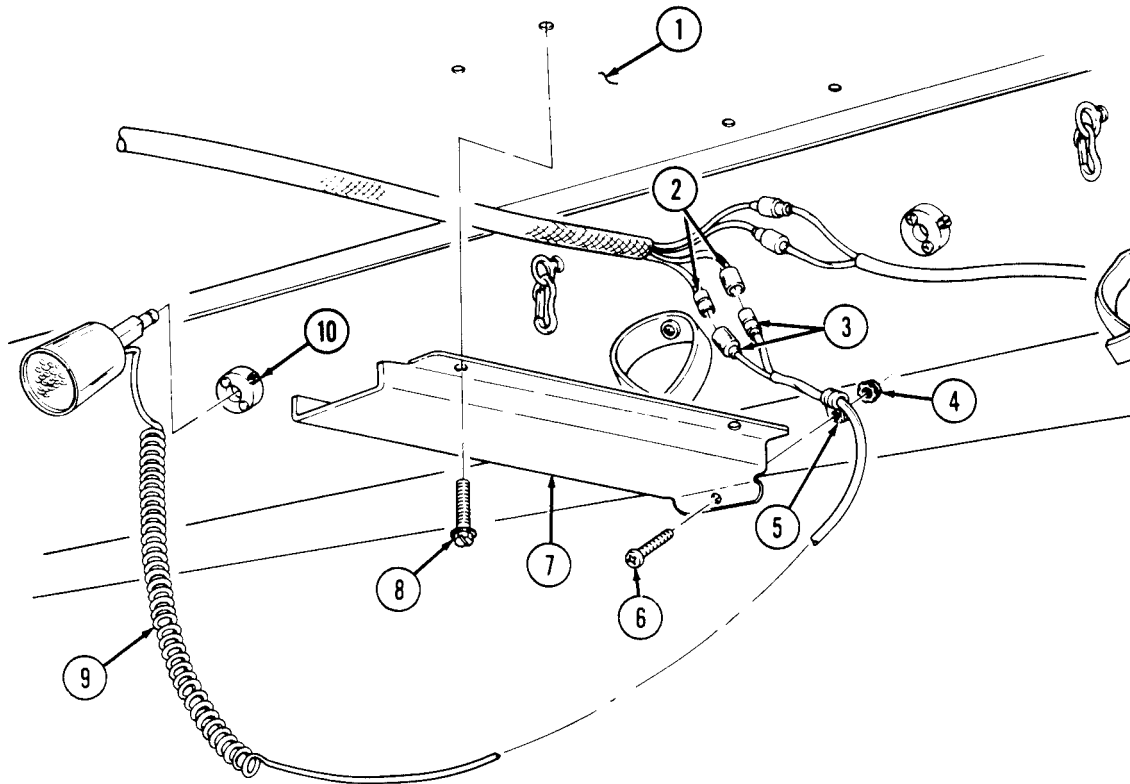
M996, M996A1, M997, M997A1, and M997A2 spotlight replacements are basically the same. This procedure covers the M996 and M996A1.

a. Removal

1. Remove four screws (8) and duct (7) from ceiling (1) and pull duct (7) away for access to clamp (5).
2. Remove screw (6), nut (4), and clamp (5) from duct (7). Remove duct (7).
3. Disconnect spotlight leads (3) from harness leads (2). Remove light assembly (9) from quick disconnect base (10).

b. Installation

1. Install light assembly (9) on quick disconnect base (10) and connect spotlight leads (3) to harness leads (2).
2. Install clamp (5) on light assembly (9) and duct (7) with screw (6) and nut (4).
3. Install duct (7) on ceiling (1) with four screws (8).

4-88. SPOTLIGHT ASSEMBLY MAINTENANCE (Cont'd)

- FOLLOW-ON TASKS:**
- Connect battery ground cable (para. 4-73).
 - Check operation of spotlight (TM 9-2320-280-10)

4-89. SPOTLIGHT SOCKET MAINTENANCE

This task covers:

- a. Removal
- b. Installation

c. Adjustment

INITIAL SETUP:

Applicable Models

M996, M996A1, M997, M997A1, M997A2

Manual References

TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

a. Removal

1. Pull spotlight (5) from socket (2).
2. Remove two screws (1) and socket (2) from body (4).

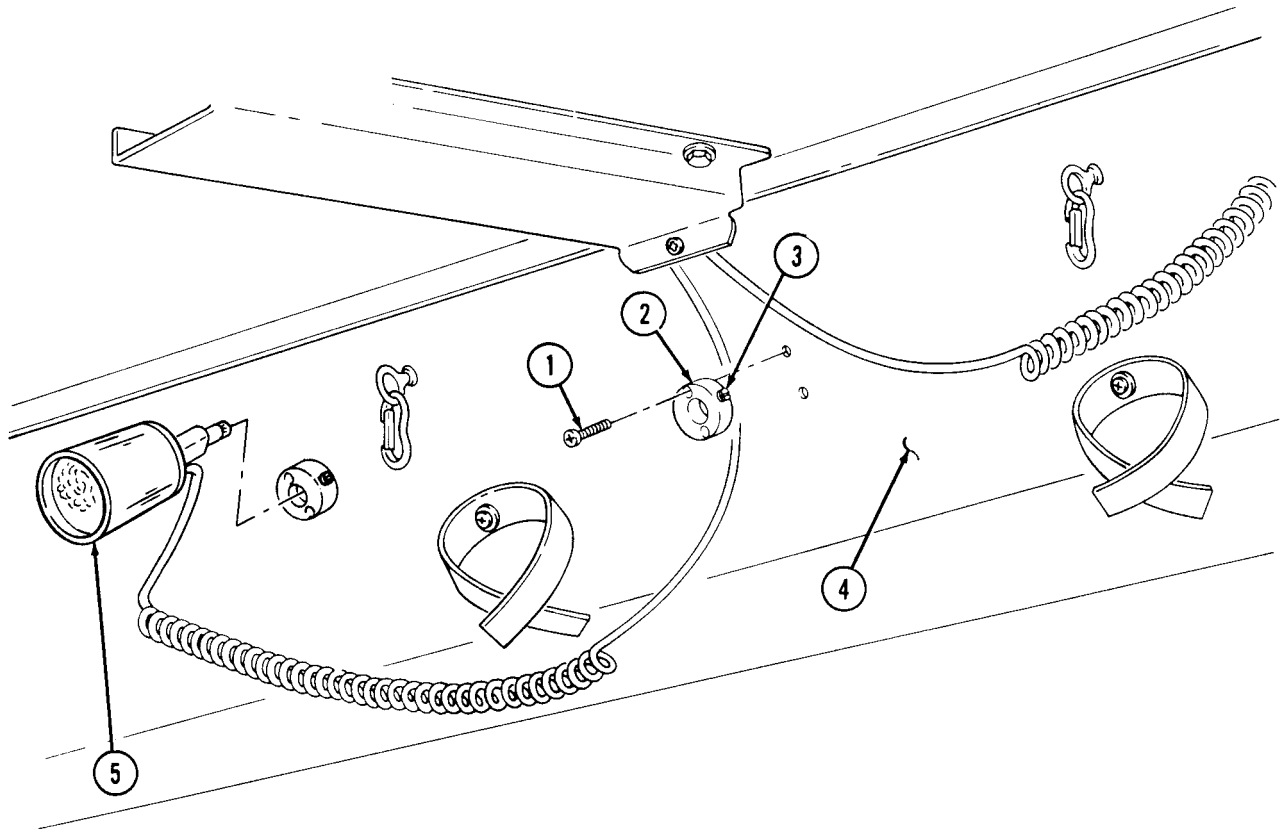
b. Installation

1. Install socket (2) on body (4) with two screws (1).
2. Install spotlight (5) into socket (2).

c. Adjustment

Adjust detent screw (3) for proper positioning of spotlight (5).

4-89. SPOTLIGHT SOCKET MAINTENANCE (Cont'd)



4-90. ELECTRICAL OUTLET/BRACKET MAINTENANCE

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M996, M996A1, M997, M997A1, M997A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

- Battery ground cable disconnected (para. 4-73).
- Rear doors opened (TM 9-2320-280-10).

NOTE

Prior to removal, tag leads for installation.

a. Removal

1. Slide rubber boot (1) away from outlet (4).
2. Remove two screws (3) and pull outlet (4) away from bracket (2).
3. Loosen screw (8) and move shield (9) away from screws (7).
4. Remove two screws (7), disconnect harness leads 714B (11) and 790A (10) and remove outlet (4).

NOTE

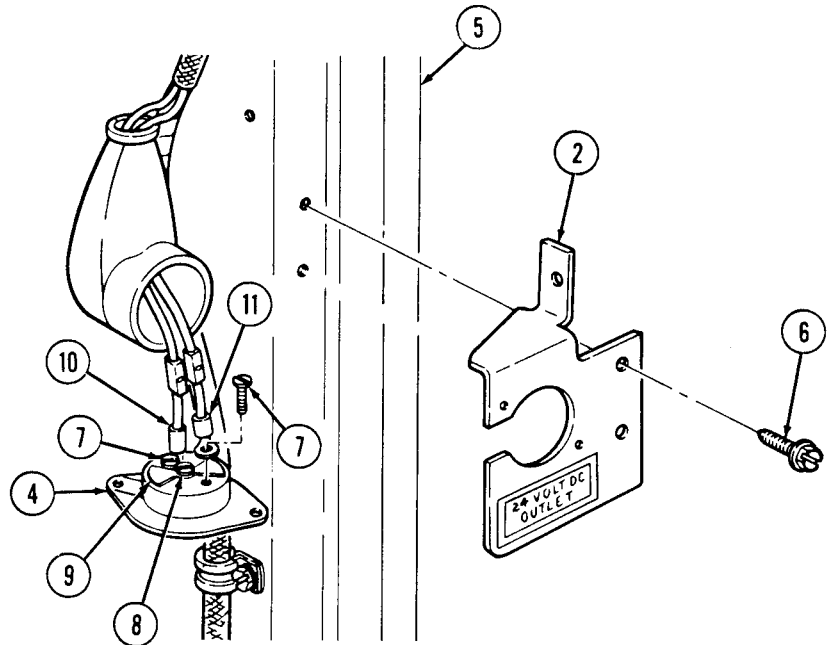
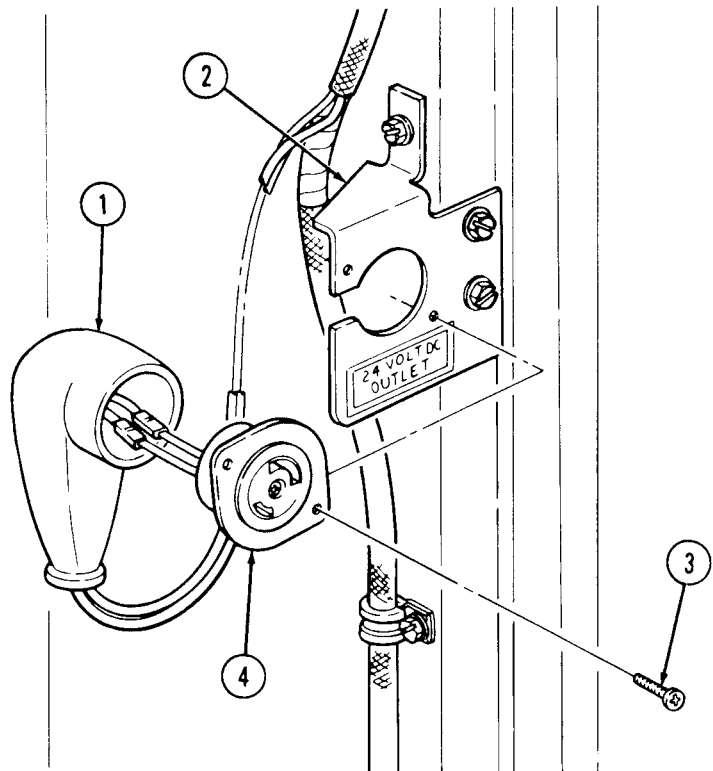
Perform step 5 only if removing bracket.

5. Remove three screws (6) and bracket (2) from body (5).

b. Installation

1. Install bracket (2) on body (5) with three screws (6).
2. Connect leads 714B (11) and 790A (10) to outlet (4) with two screws (7).
3. Position shield (9) over screws (7) and tighten screw (8).
4. Install outlet (4) on bracket (2) with two screws (3).
5. Slide boot (1) over back of outlet (4).

4-90. ELECTRICAL OUTLET/BRACKET MAINTENANCE (Cont'd)



4-91. REAR STEPS BLACKOUT SWITCH BRACKET REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M996, M996A1, M997, M997A1, M997A2

Manual References

TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

Blackout switch removed (para. 4-93).

Materials/Parts

Two blind rivets (Appendix G, Item 242)

NOTE

For instructions on replacement of rivets, refer to para. 10-66.

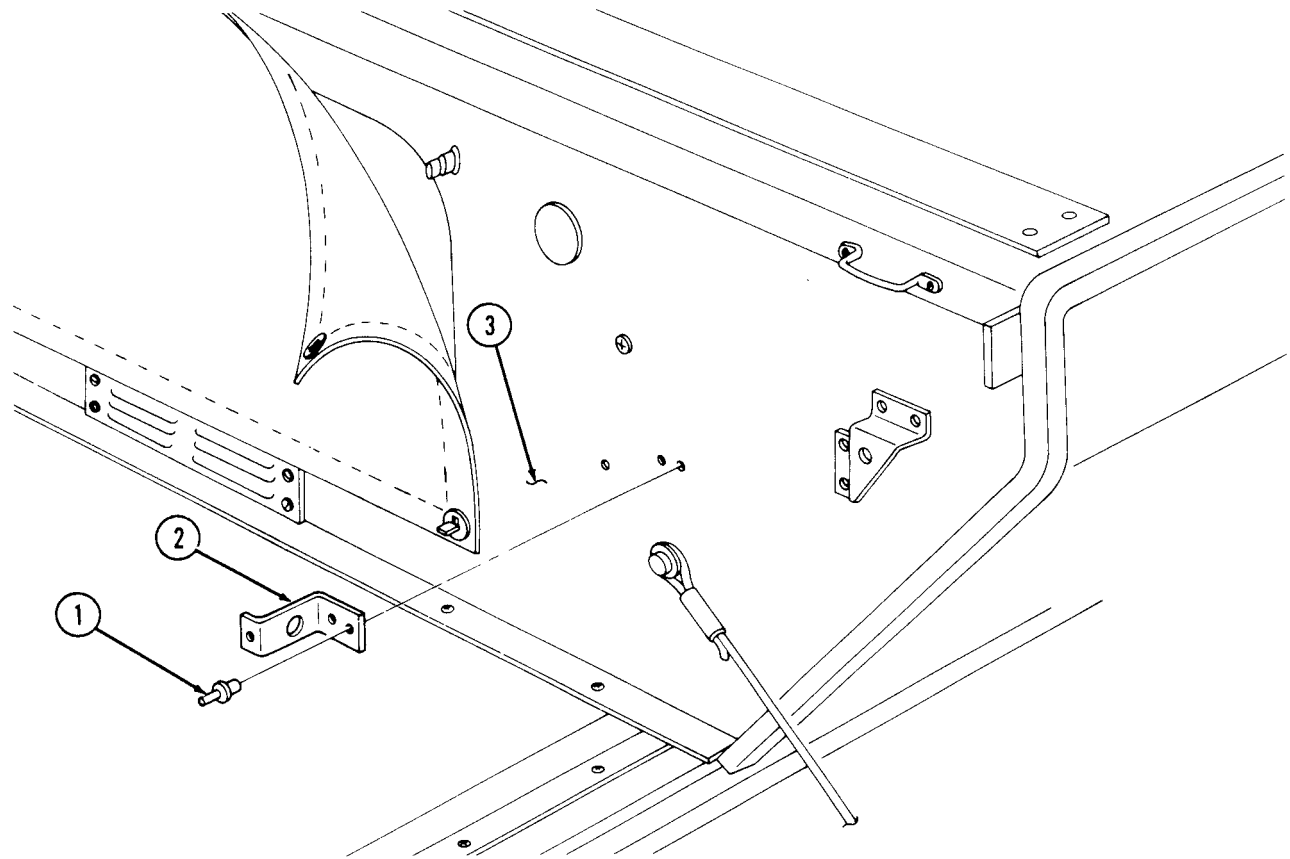
a. Removal

Remove two rivets (1) and switch bracket (2) from body (3).

b. Installation

Install bracket (2) on body (3) with two rivets (1).

4-91. REAR STEPS BLACKOUT SWITCH BRACKET REPLACEMENT (Cont'd)



FOLLOW-ON TASK: Install blackout switch (para. 4-93).

4-92. REAR STEPS BLACKOUT SWITCH REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M996, M996A1, M997, M997A1, M997A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Lockwasher (Appendix G, Item 168)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

- Rear steps lowered (TM 9-2320-280-10).
- Battery ground cable disconnected (para. 4-73).

NOTE

Prior to removal, tag leads for installation.

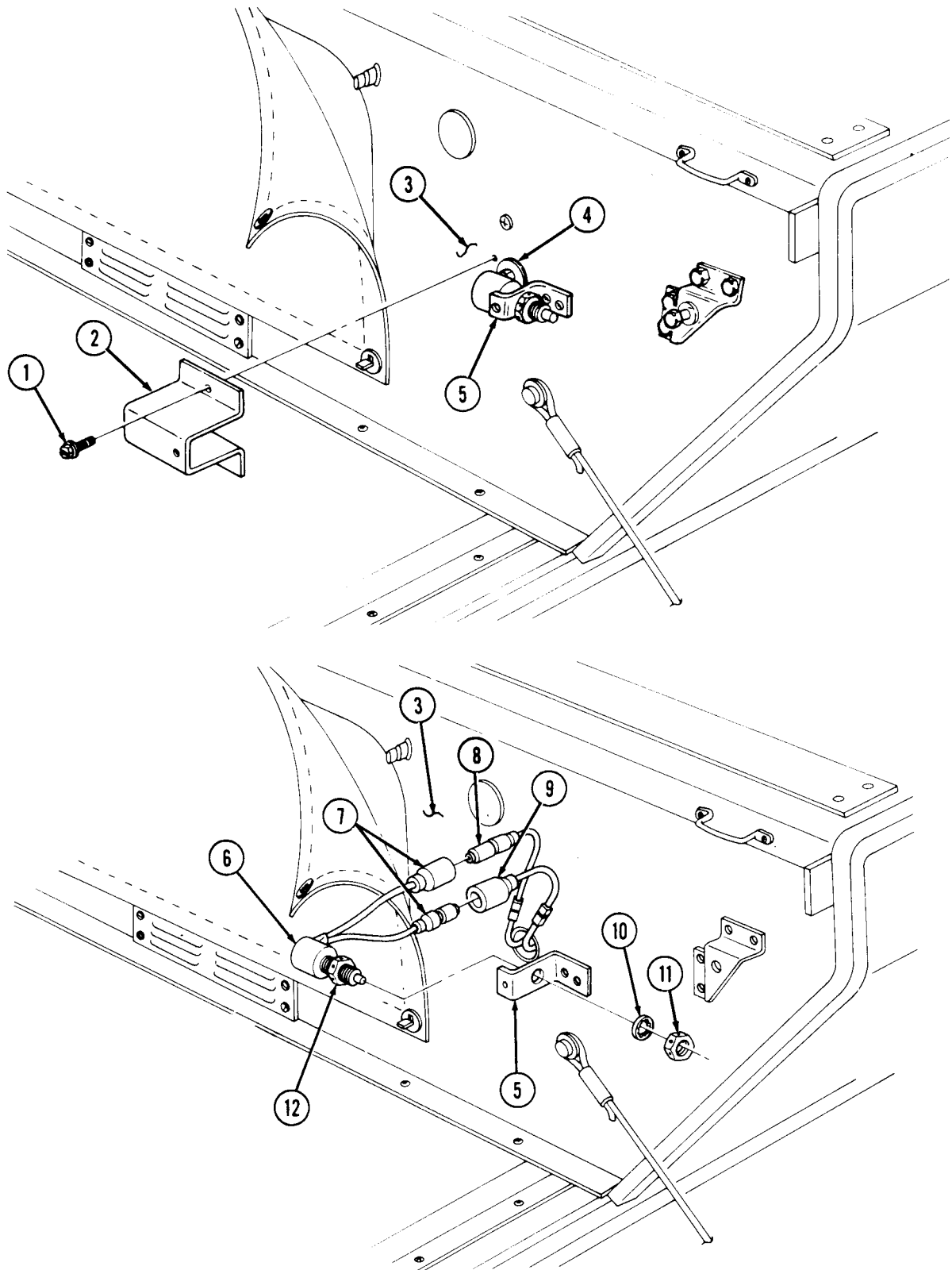
a. Removal

1. Remove three screws (1) and cover (2) from body (3) and bracket (5).
2. Remove grommet (4) from body (3).
3. Remove nut (11), lockwasher (10), and light switch (6) from bracket (5) and remove adjusting nut (12). Discard lockwasher (10).
4. Pull light switch leads (7) through hole in body (3).
5. Disconnect light switch leads (7) from harness leads 791C (8) and 791D (9). Remove light switch (6).

b. Installation

1. Connect light switch leads (7) to harness leads 791C (8) and 791D (9). Push through body (3).
2. Install grommet (4) in body (3).
3. Position adjusting nut (12) on switch (6) about halfway out on threads. Install switch (6) to bracket (5) with lockwasher (10) and nut (11).
4. Slowly raise rear steps to latched position while listening for switch (6) to "click". If necessary, adjust switch (6) in or out to ensure switch (6) clicks (closed) when steps are in raised and latched position.
5. Install cover (2) to body (3) and bracket (5) with three screws (1).

4-92. REAR STEPS BLACKOUT SWITCH REPLACEMENT (Cont'd)



FOLLOW-ON TASK: Connect battery ground cable (para. 4-73).

4-93. REAR DOOR BLACKOUT SWITCH/BRACKET MAINTENANCE

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M996, M996A1, M997, M997A1, M997A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Assembled locknut (Appendix G, Item 131)
Two lockwashers (Appendix G, Item 169)
Two locknuts (Appendix G, Item 76)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

- Battery ground cable disconnected (para. 4-73).
- Rear doors lowered (TM 9-2320-280-10).

a. Removal

1. Remove two locknuts (6), washers (2), capscrews (3), and washers (2) from bracket (1) and bracket (7). Discard locknuts (6).

NOTE

Prior to removal, tag leads for installation.

2. Disconnect two leads (4) from leads (5). Remove bracket (1).
3. Remove two screws (18), lockwashers (17), and leads (14) and (16) from switch (15). Discard lockwashers (17).
4. Remove two nuts (13), washers (12), screws (9), switch (15), switch lever (11), and spacer plate (10) from bracket (1).

NOTE

Perform step 5 only if wiring harness is damaged.

5. Remove assembled locknut (20) screw (8), clamp (19) and wiring harness (21) from bracket (1). Discard assembled locknut (20).

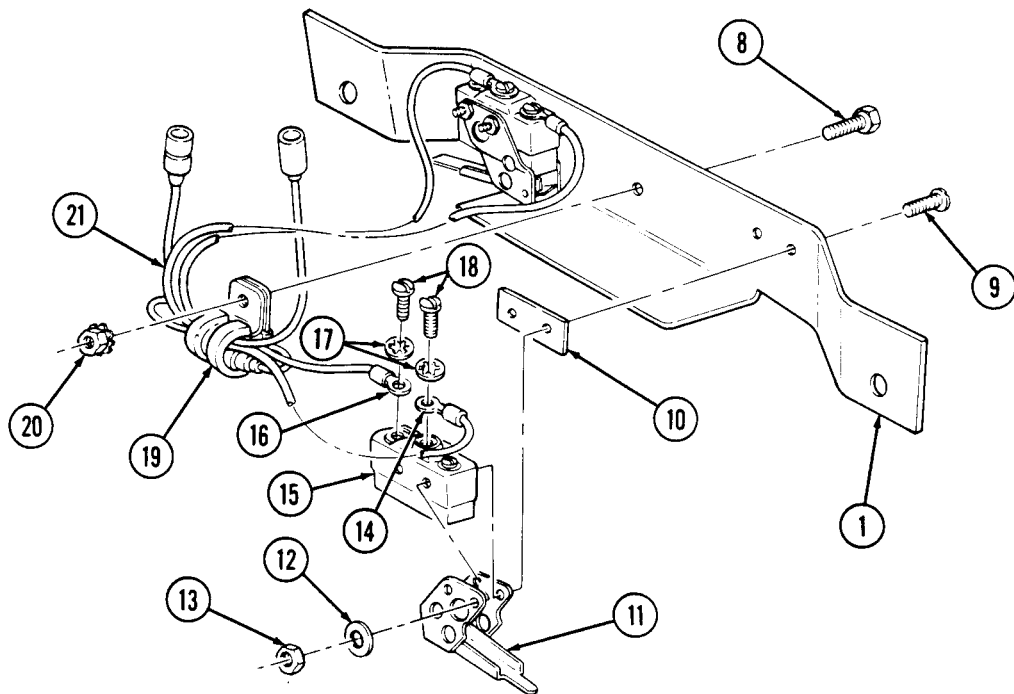
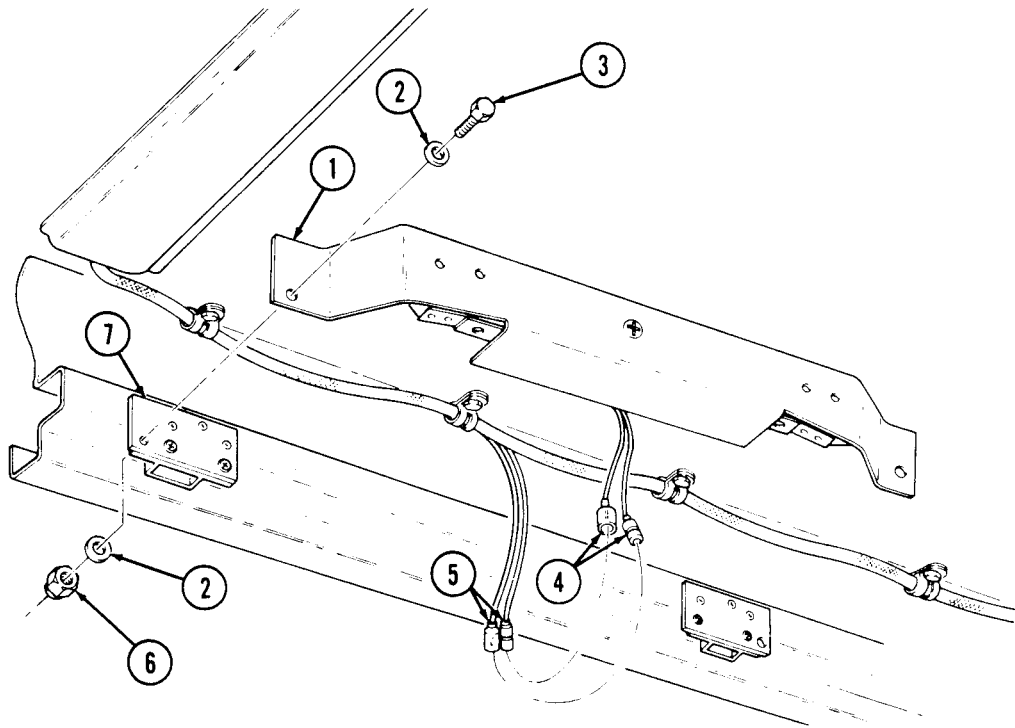
b. Installation

NOTE

Perform step 1, only if wiring harness was removed.

1. Install clamp (19) and wiring harness (21) on bracket (1) with screw (8) and assembled locknut (20).
2. Install spacer plate (10), switch lever (11), and switch (15) on bracket (1) with two screws (9), washers (12), and nuts (13).
3. Install leads (14) and (16) on switch (15) with two lockwashers (17) and screws (18).
4. Connect two leads (4) to leads (5).
5. Install bracket (1) on brackets (7) with two washers (2), capscrews (3), washers (2), and locknuts (6).

4-93. REAR DOOR BLACKOUT SWITCH/BRACKET MAINTENANCE (Cont'd)



- FOLLOW-ON TASKS:
- Connect battery ground cable (para. 4-73).
 - Check operation of interior blackout lights (TM 9-2320-280-10).

4-94. BULKHEAD DOOR BLACKOUT SWITCH AND BRACKET MAINTENANCE

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M996, M996A1, M997, M997A1, M997A2

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

Battery ground cable disconnected (para. 4-73).

Materials/Parts

Four lockwashers (Appendix G, Item 169)

a. Removal

1. Remove two screws (5) and washers (6) from switch cover (7) and bracket (4). Slide cover (7) away from switch (14) to allow access to switch (14).

NOTE

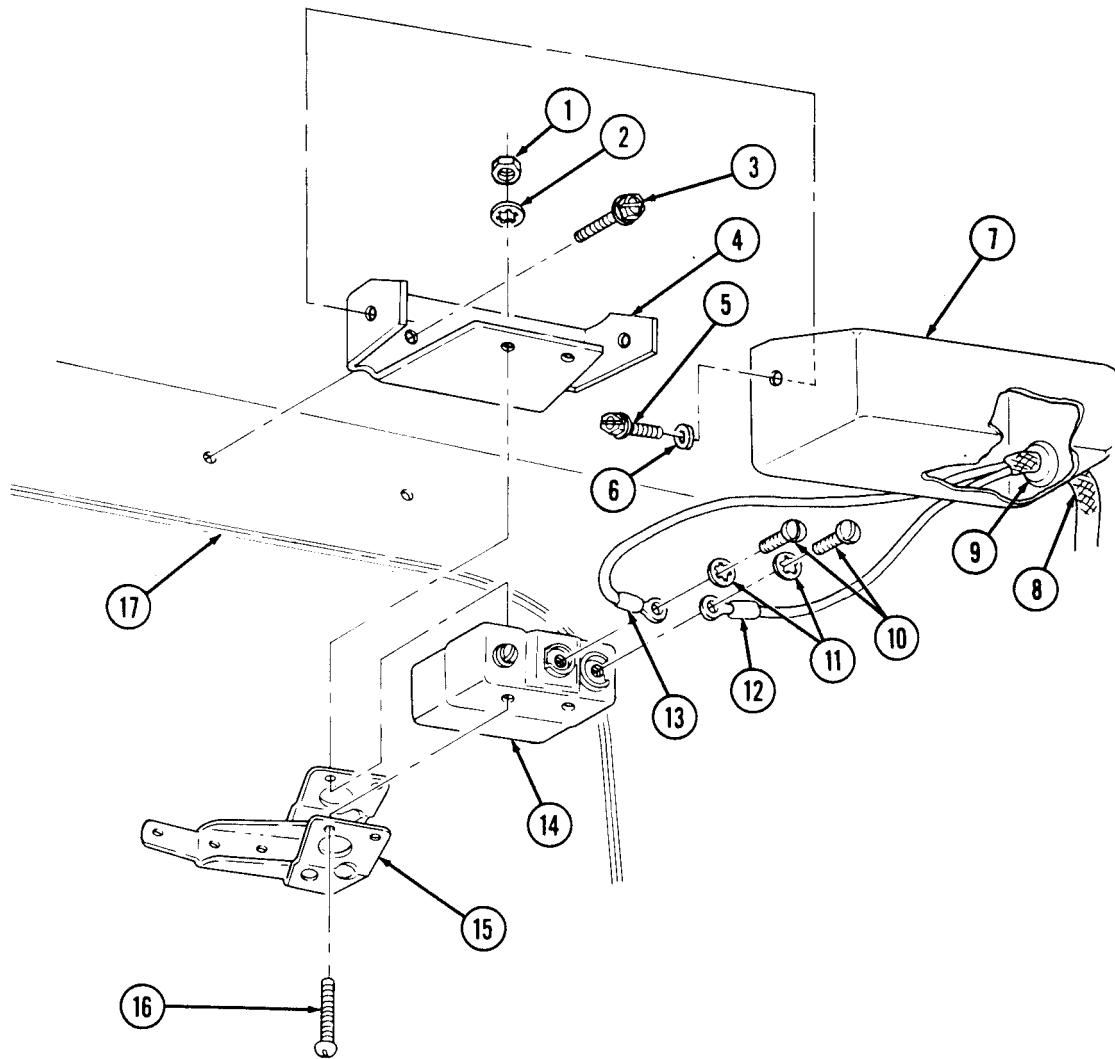
Prior to removal, tag leads for installation.

2. Remove two screws (10) lockwashers (11), and two leads (12) and (13) from switch (14). Discard lockwashers (11).
3. Remove cover (7) and grommet (9) from wiring harness (8).
4. Remove two nuts (1), lockwashers (2), screws (16), switch (14), and switch lever (15) from bracket (4). Discard lockwashers (2).
5. Remove two screws (3) and bracket (4) from body (17).

b. Installation

1. Install bracket (4) on body (17) with two screws (3).
2. Install switch (14) and switch lever (15) on bracket (4) with two screws (16), lockwashers (2), and nuts (1).
3. Install cover (7) and grommet (9) on wiring harness (8).
4. Connect two leads (12) and (13) to switch (14) with two lockwashers (11) and screws (10).
5. Slide cover (7) over switch (14) on bracket (4) with two washers (6) and screws (5).

4-94. BULKHEAD DOOR BLACKOUT SWITCH AND BRACKET MAINTENANCE (Cont'd)



- FOLLOW-ON TASKS:
- Connect battery ground cable (para. 4-73).
 - Check operation of interior blackout light (TM 9-2320-280-10).

4-95. BACKUP LIGHT ASSEMBLY MAINTENANCE (M996, M996A1, M997, M997A1, M997A2)

This task covers:

a. Light Assembly Removal

b. Light Assembly Installation

INITIAL SETUP:

Applicable Models

M996, M996A1, M997, M997A1, M997A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Four lockwashers (Appendix G, Item 136)
Two lockwashers (Appendix G, Item 139)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

Battery ground cable disconnected (para. 4-73).

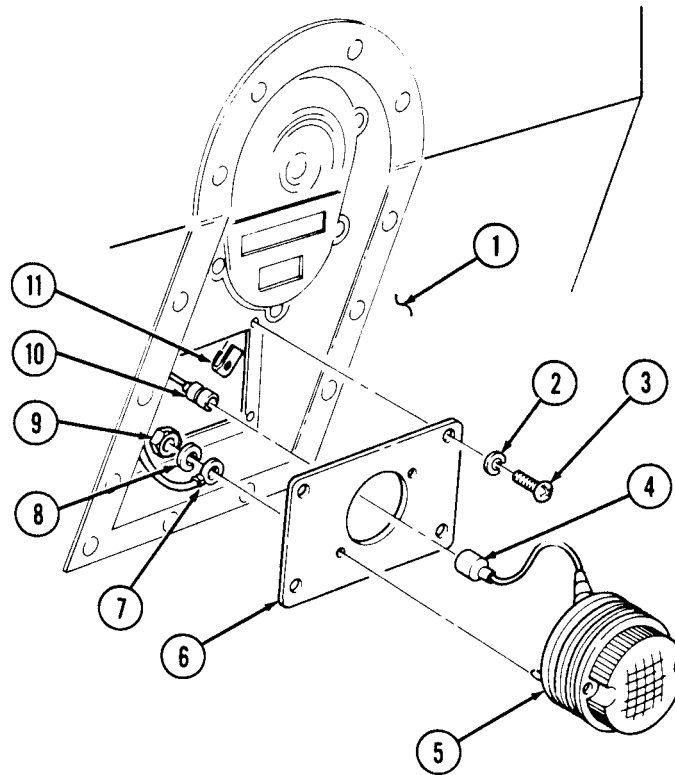
a. Light Assembly Removal

1. Remove four screws (3) and lockwashers (2) from plate (6) and body (1). Pull plate (6) away from body (1) to allow access to connections. Discard lockwashers (2).
2. Remove two nuts (9), lockwashers (8), housing (5), and lead (7) from plate (6). Discard lockwashers (8).
3. Disconnect lead (10) from lead (4). Remove housing (5).
4. Inspect speed nuts (11) for damage. Replace if damaged.

b. Light Assembly Installation

1. Install housing (5) and lead (7) on plate (6) with two lockwashers (8) and nuts (9).
2. Connect lead (4) to lead (10).
3. Install plate (6) on body (1) with four lockwashers (2) and screws (3).

**4-95. BACKUP LIGHT ASSEMBLY MAINTENANCE (M996, M996A1, M997, M997A1, M997A2)
(Cont'd)**



- FOLLOW-ON TASKS:**
- Connect battery ground cable (para. 4-73).
 - Check backup light operation (TM 9-2320-280-10).

4-96. CONTROL BOX ASSEMBLY REPLACEMENT (M997, M997A1, M997A2)

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M997, M997A1, M997A2

Manual References

TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

Battery ground cable disconnected
(para. 4-73).

Materials/Parts

Four lockwashers (Appendix G, Item 136)
Locknut (Appendix G, Item 128)
Lockwasher (Appendix G, Item 133)
Two plain-assembled nuts
(Appendix G, Item 201)
Three lockwashers (Appendix G, Item 135)
Two tiedown straps (Appendix G, Item 309)

a. Removal

1. Remove four screws (7), lockwashers (8), and cover (6) from control box (5). Discard lockwashers (8).

NOTE

Prior to removal, tag leads for installation.

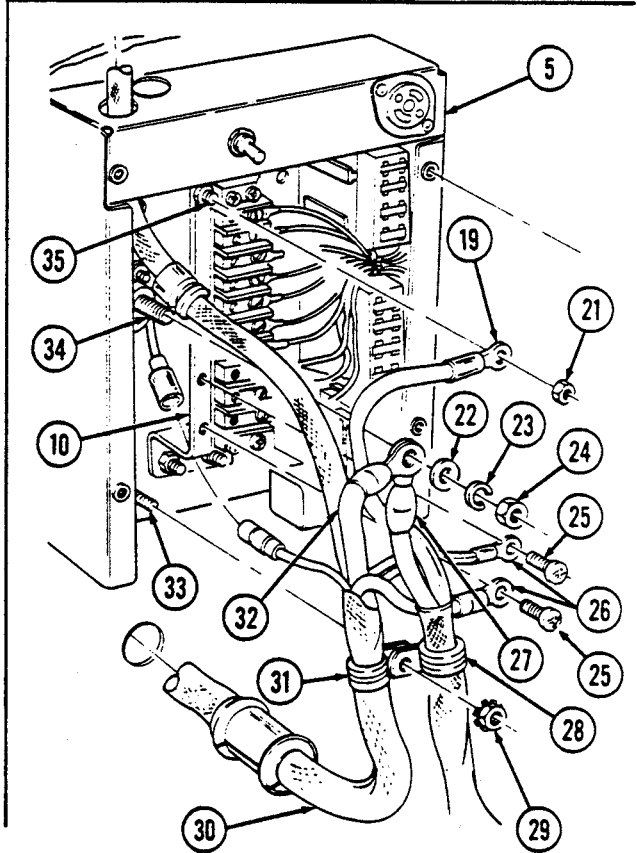
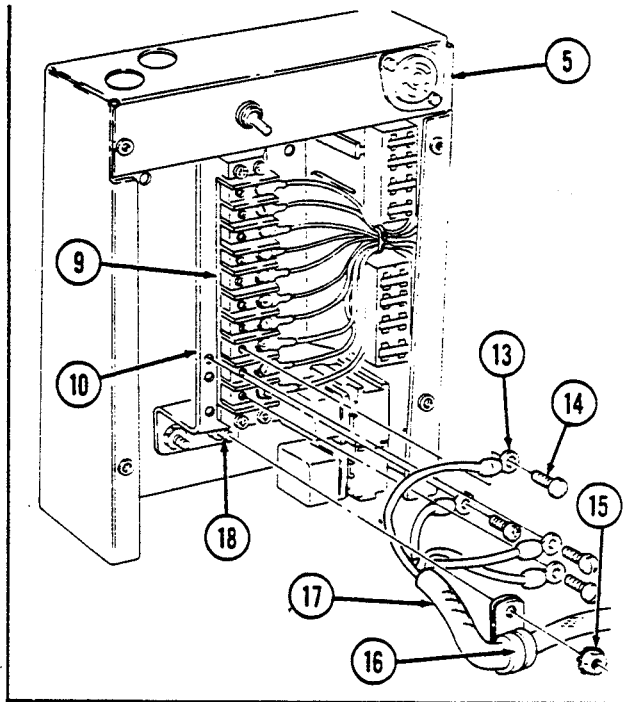
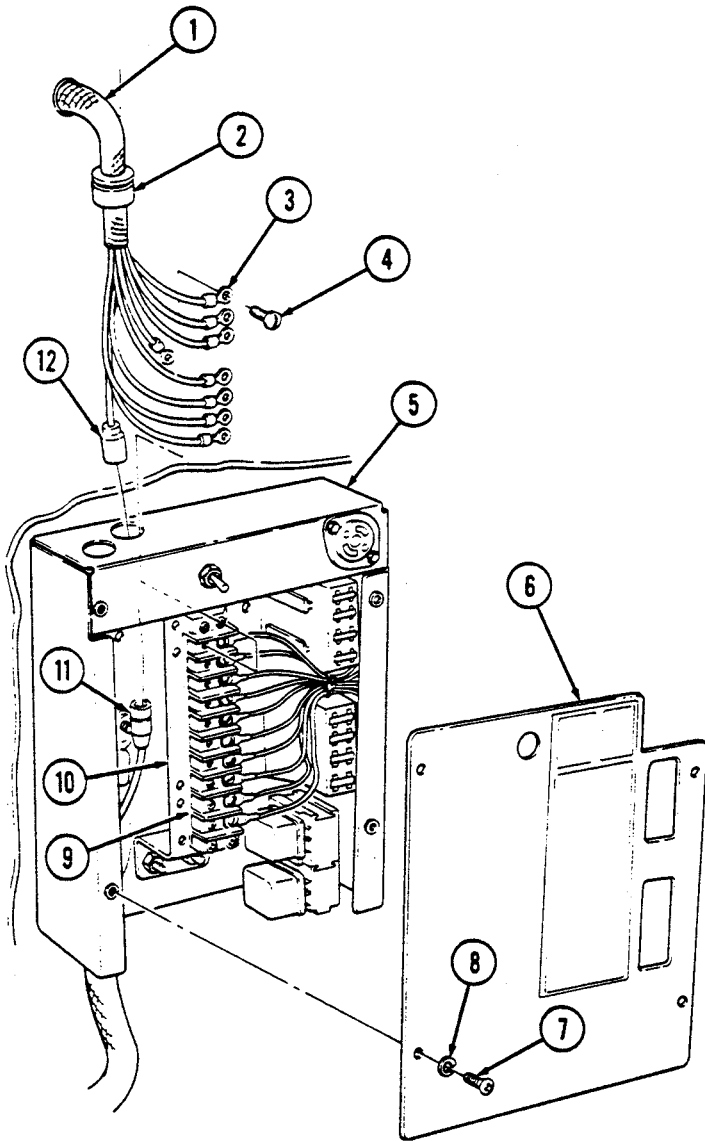
2. Remove eight screws (4) and light harness leads (3) from terminal block (9) and mounting buss (10).
3. Disconnect light harness lead 791B (12) from NBC harness lead 791A (11).

NOTE

Grommet must be removed through top of control box (5).

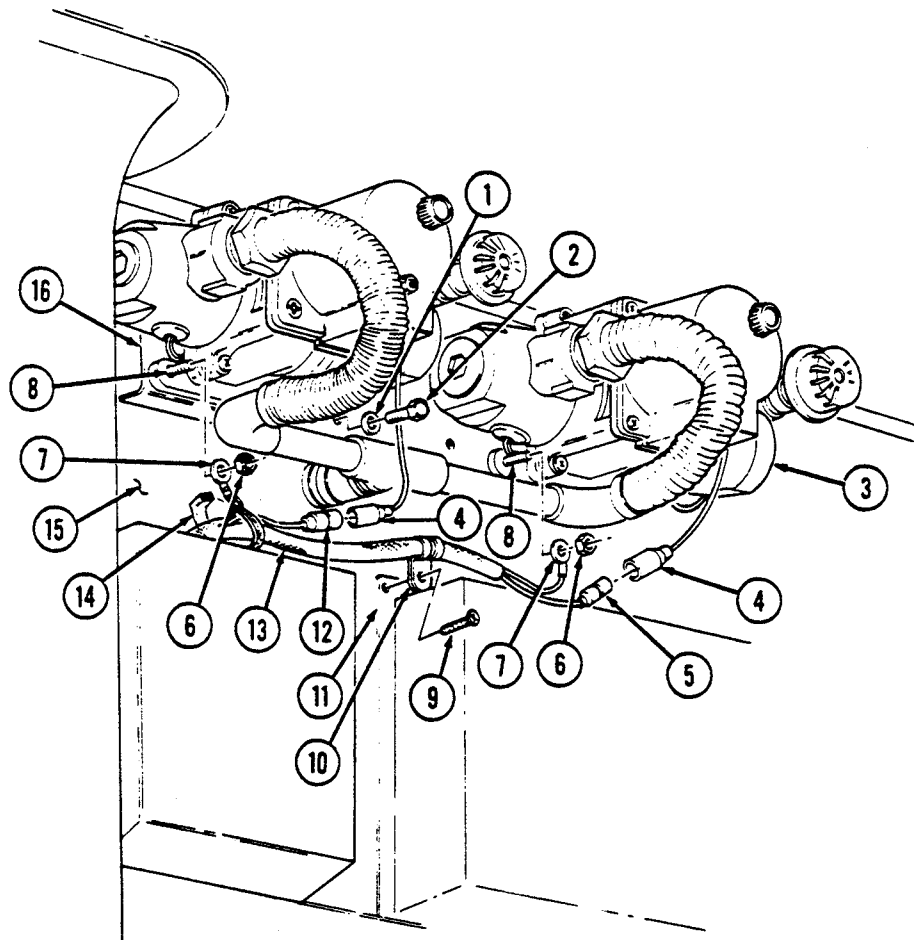
4. Remove grommet (2) and light harness (1) from control box (5).
5. Remove four screws (14) and four heating ventilating air conditioning leads (13) from mounting buss (10) and terminal block (9).
6. Remove plain-assembled nut (15), clamp (16), and heating ventilating air conditioning harness (17) from screw (18). Discard plain-assembled nut (15).
7. Remove nut (21) and ground cable (19) from ground stud (35).
8. Remove nut (24), lockwasher (23), washer (22), positive cable (27), and NBC cable (32) from power stud (34). Discard lockwasher (23).
9. Remove two screws (25) and NBC leads (26) from mounting buss (10).
10. Remove plain-assembled nut (29), NBC harness clamp (31), and power harness clamp (28) from stud (33). Discard plain-assembled nut (29).

4-96. CONTROL BOX ASSEMBLY REPLACEMENT (M997, M997A1, M997A2) (Cont'd)



4-96. CONTROL BOX ASSEMBLY REPLACEMENT (M997, M997A1, M997A2) (Cont'd)

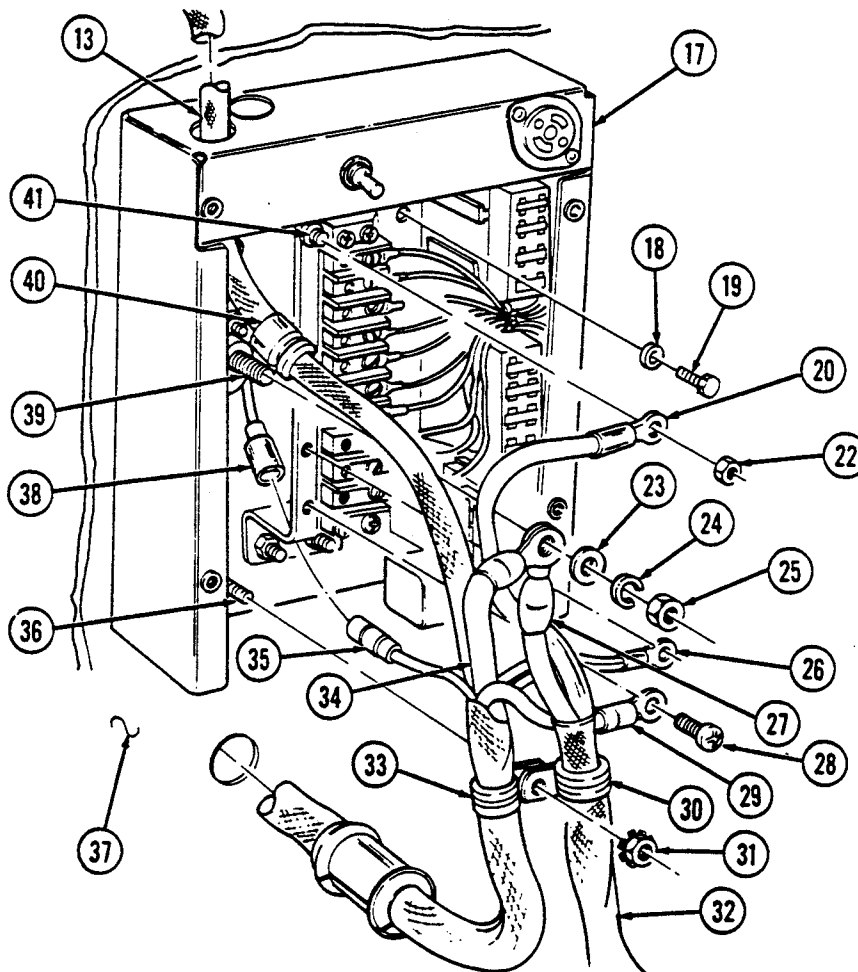
11. Remove two tiedown straps (14) and lead (12) from NBC harness (13). Discard tiedown straps (14).
12. Disconnect NBC harness leads 784A (5) and 784B (12) from heater leads (4).
13. Remove four capscrews (2) and washers (1) from NBC heater mounting plate (16) and body (15) and pull mounting plate (16) away for access to two capscrews (8).
14. Remove two nuts (6), capscrews (8), and ground terminals (7) from NBC heaters (3).
15. Remove screw (9), clamp (10), NBC harness (13), and A/C control box (11) from body (15).
16. Push grommet (40) down through hole in control box (17) and remove NBC harness (13) from control box (17).
17. Remove three screws (19), lockwashers (18), and control box (17) from body (37). Discard lockwashers (18).



4-96. CONTROL BOX ASSEMBLY REPLACEMENT (M997, M997A1, M997A2) (Cont'd)

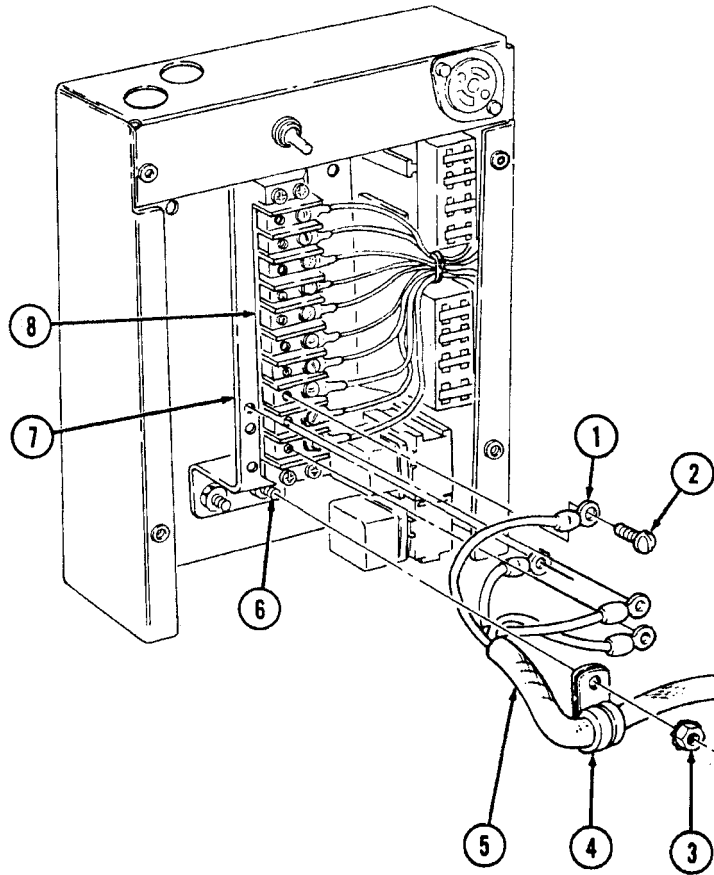
b. Installation

1. Install control box (17) on body (37) with three lockwashers (18) and screws (19).
2. Install NBC harness (13) with grommet (40) up through hole in control box (17).
3. Install two ground terminals (7) from NBC harness (13) on heaters (3) with two capscrews (8) and nuts (6).
4. Install leads 791 and 794 (26) and 793 (29) on control box (17) with two capscrews (28).
5. Install NBC heater mounting plate (16) on body (15) with four washers (1) and capscrews (2).
6. Connect NBC harness leads 784A (5) and 784B (12) to heater leads (4).
7. Install lead (12) on NBC harness (13) with two tiedown straps (14).
8. Install NBC harness (13), power harness (32), and clamp (33) on screw (36) with plain-assembled nut (31). Connect NBC harness lead 791A (35) to light harness lead 791B (38).
9. Install positive cable (27) and NBC cable (34) on power stud (39) with washer (23), lockwasher (24), and nut (25).
10. Install ground cable (20) on ground stud (41) with nut (22).

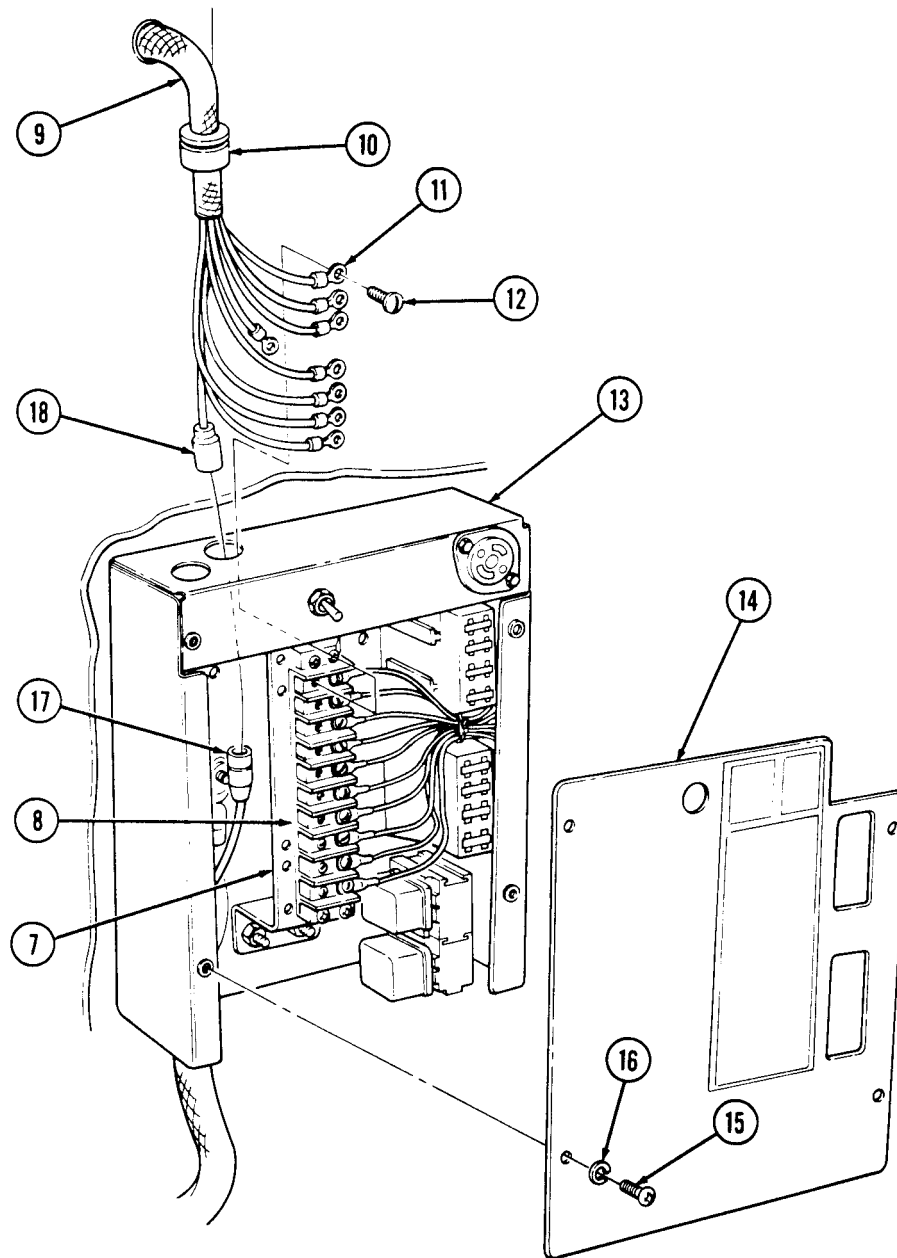


4-96. CONTROL BOX ASSEMBLY REPLACEMENT (M997, M997A1, M997A2) (Cont'd)

11. Install heating ventilating air conditioning harness (5) on screw (6) with clamp (4) and plain-assembled nut (3).
12. Install four control box leads (1) to mounting buss (7) and terminal block (8) with four screws (2).
13. Install light harness (9) down through hole in top of control box (13) and install grommet (10) in control box (13).
14. Connect light harness lead 791A (18) to NBC harness lead 791B (17).
15. Install eight light harness leads (11) on terminal block (8) and mounting buss (7) with eight screws (12).
16. Install cover (14) on control box (13) with four lockwashers (16) and screws (15).



4-96. CONTROL BOX ASSEMBLY REPLACEMENT (M997, M997A1, M997A2) (Cont'd)



FOLLOW-ON TASK: Connect battery ground cable (para. 4-73).

4-97. CONTROL BOX ASSEMBLY REPLACEMENT (M996, M996A1)

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M996, M996A1

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Four lockwashers (Appendix G, Item 136)
Two plain-assembled nuts
(Appendix G, Item 201)
Three lockwashers (Appendix G, Item 135)
Locknut (Appendix G, Item 128)
Lockwasher (Appendix G, Item 133)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

Battery ground cable disconnected
(para. 4-73).

a. Removal

1. Remove four screws (7), lockwashers (8), and cover (6) from control box (5). Discard lockwashers (8).

NOTE

Prior to removal, tag leads for installation.

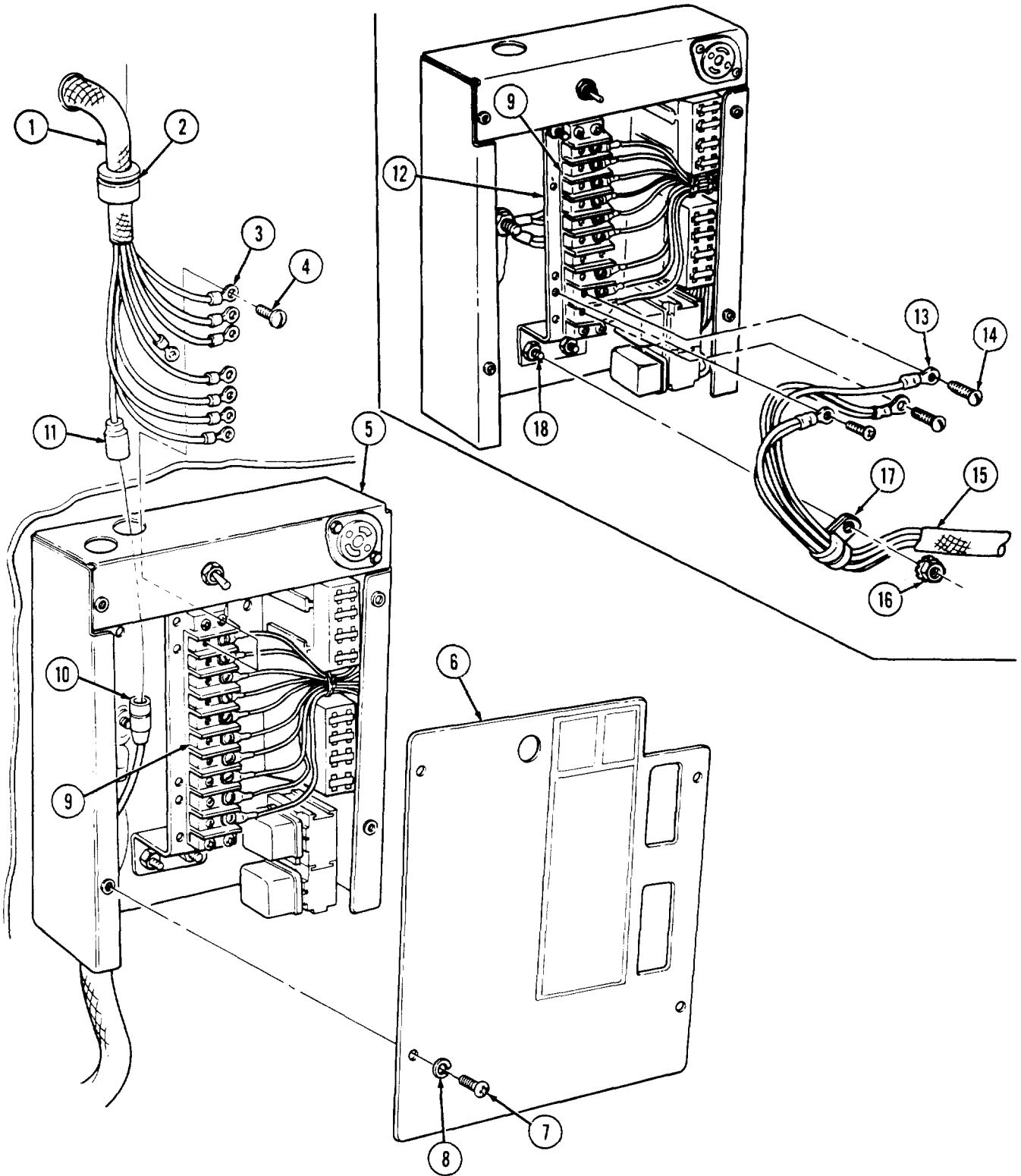
2. Remove seven screws (4) and seven light harness leads (3) from terminal block (9).
3. Disconnect light harness lead 791B (11) from NBC harness lead 791A (10).

NOTE

Grommet must be removed through top of control box.

4. Remove grommet (2) and light harness (1) from control box (5).
5. Remove plain-assembled nut (16), clamp (17), and heater harness (15) from mounting buss screw (18). Discard plain-assembled nut (16).
6. Remove three screws (14) and heater harness leads (13) from terminal block (9) and mounting buss (12).

4-97. CONTROL BOX ASSEMBLY REPLACEMENT (M996, M996A1) (Cont'd)



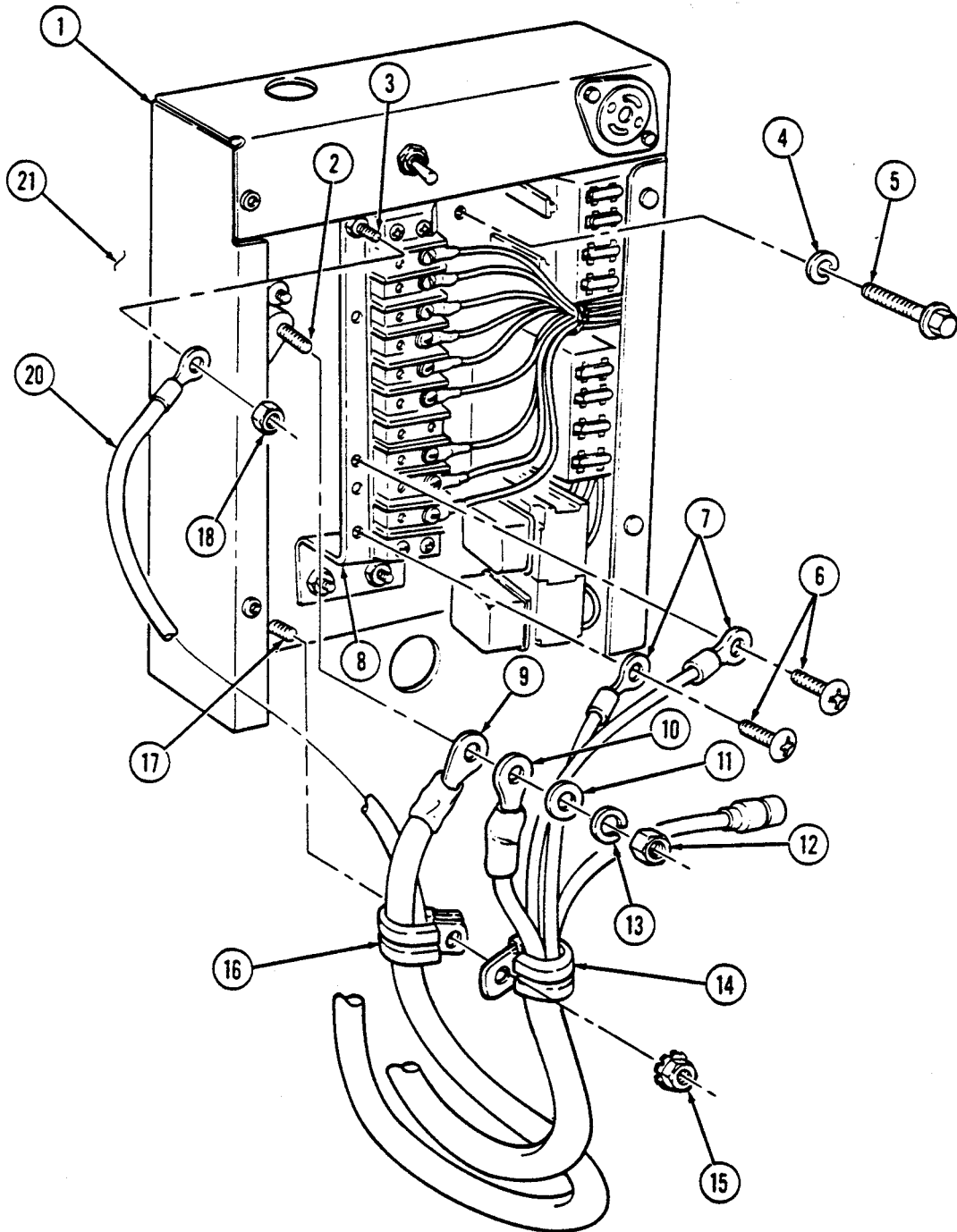
4-97. CONTROL BOX ASSEMBLY REPLACEMENT (M996, M996A1) (Cont'd)

7. Remove locknut (12), lockwasher (13), washer (11), NBC harness lead (10), and power cable (9) from positive stud (2). Discard lockwasher (13) and locknut (12).
8. Remove two screws (6) and two NBC harness leads (7) from mounting buss (8).
9. Remove plain-assembled nut (15), clamp (14), and NBC harness leads (7) and (10) from control box stud (17). Discard plain-assembled nut (15).
10. Remove nut (18) and negative cable (20) from mounting buss capscrew (3).
11. Remove power cable (9) from power stud (2) and clamp (16) from control box stud (17).
12. Remove three screws (5), lockwashers (4), and control box (1) from body (21). Discard lockwashers (4).

b. Installation

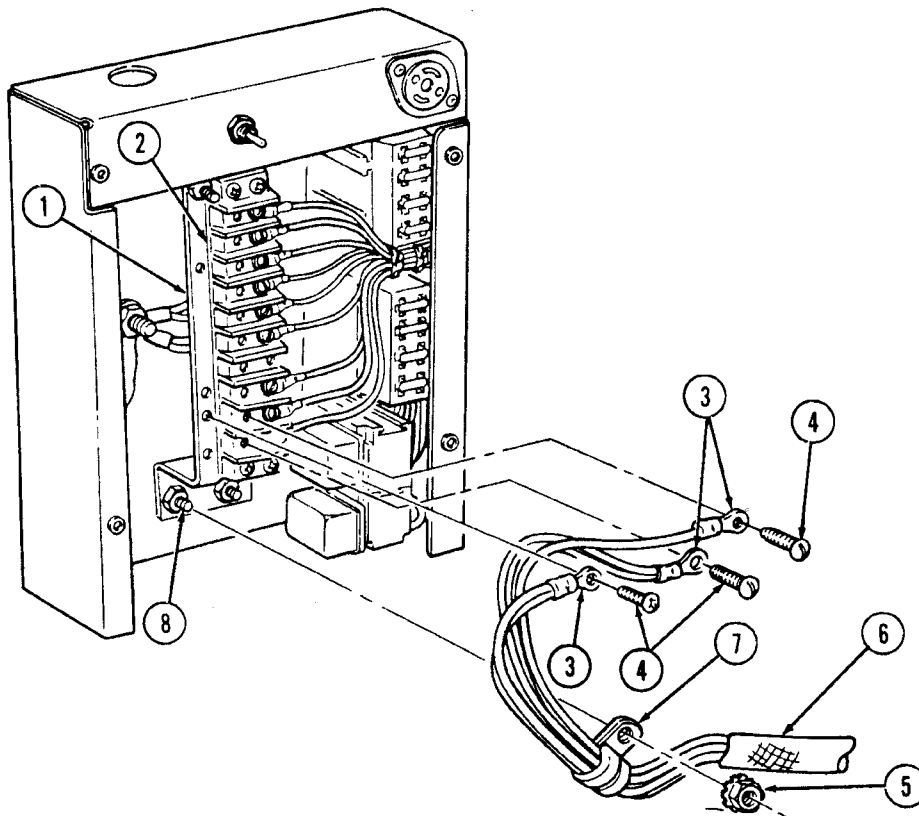
1. Install control box (1) on body (21) with three lockwashers (4) and screws (5).
2. Install negative cable (20) on mounting buss capscrew (3) with nut (18).
3. Install power cable (9) and NBC harness lead (10) on power stud (2) with washer (11), lockwasher (13), and locknut (12).
4. Install two NBC harness leads (7) on mounting buss (8) with two screws (6).
5. Install clamp (16) power cable (9), negative cable (20), clamp (14), and NBC harness leads (7) and (10), on control box stud (17) with plain-assembled nut (15).

4-97. CONTROL BOX ASSEMBLY REPLACEMENT (M996, M996A1) (Cont'd)

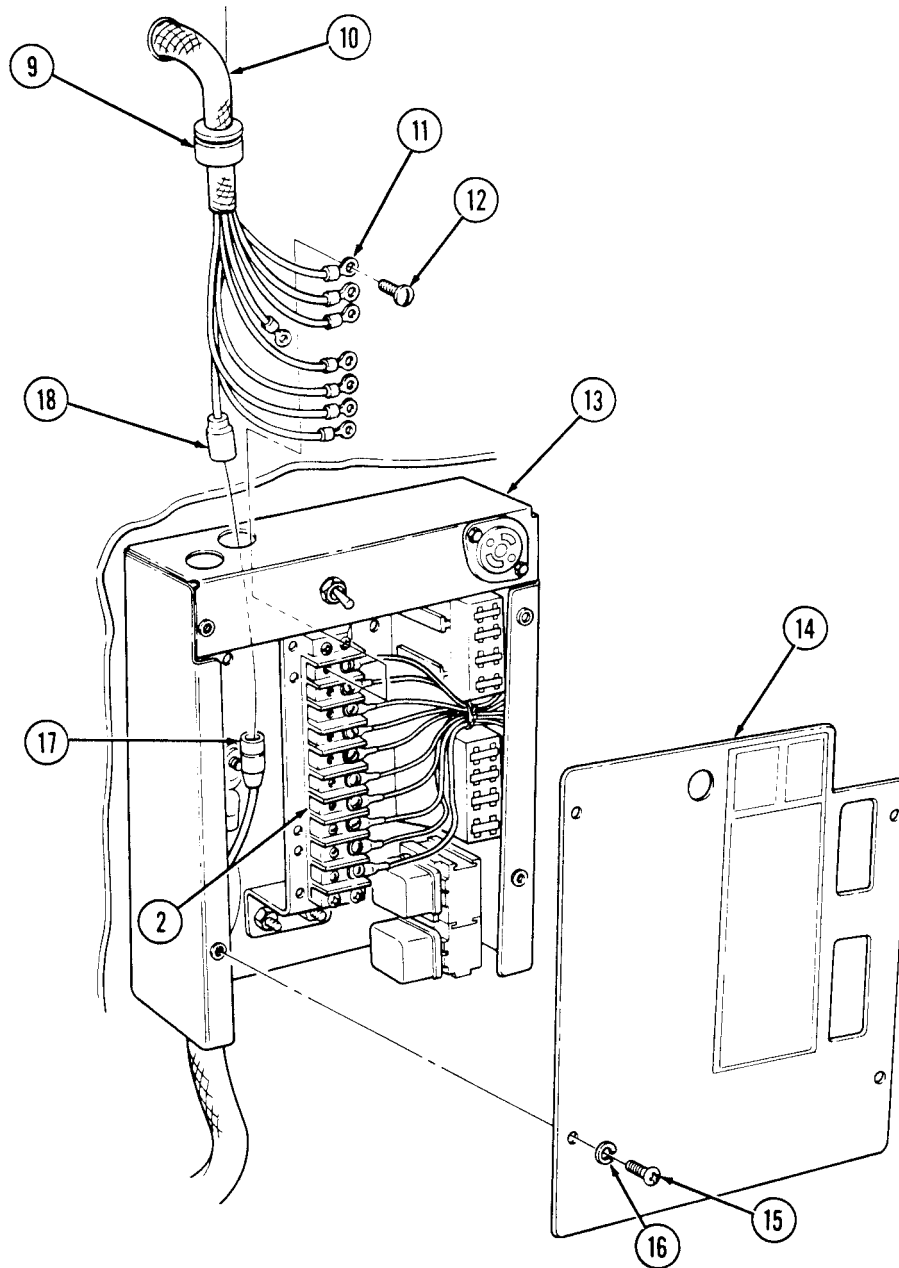


4-97. CONTROL BOX ASSEMBLY REPLACEMENT (M996, M996A1) (Cont'd)

6. Install three heater harness leads (3) to terminal block (2) and mounting buss (1) with three screws (4).
7. Install clamp (7) securing heater harness (6) to mounting buss screw (8) with plain-assembled nut (5).
8. Route light harness leads (11) and (18) through top of control box (13) and install grommet (9) and light harness (10) in control box (13).
9. Connect light harness lead 791B (18) to NBC harness lead 791A (17).
10. Install seven light harness leads (11) on terminal block (2) with seven screws (12).
11. Install cover (14) on control box (13) with four lockwashers (16) and screws (15).



4-97. CONTROL BOX ASSEMBLY REPLACEMENT (M996, M996A1) (Cont'd)



- FOLLOW-ON TASKS:
- Connect battery ground cable (para. 4-73).
 - Check operation of spotlight (TM 9-2320-280-10).

4-98. CONTROL BOX POWER CABLES REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M996, M996A1, M997, M997A1, M997A2

Tools

General mechanic's tool kit:
 automotive (Appendix B, Item 1)

Materials/Parts

Four lockwashers (Appendix G, Item 136)
 Plain-assembled nut (Appendix G, Item 201)
 Lockwasher (Appendix G, Item 148)
 Lockwasher (Appendix G, Item 141)
 Lockwasher (Appendix G, Item 133)
 Locknut (Appendix G, Item 128)

Manual References

TM 9-2320-280-10
 TM 9-2320-280-24P

Equipment Condition

Battery ground cable disconnected
 (para. 4-73).

NOTE

Replacement of the control box power cables is basically the same for M996, M996A1, M997, M997A1, and M997A2 vehicles.

a. Removal

1. Remove four screws (6), lockwashers (5), and cover (7) from control box (1). Discard lockwashers (5).
2. Remove nut (4) and ground cable (2) from ground stud (18).
3. Remove locknut (12), lockwasher (13), washer (14), NBC harness cable (15), and positive cable (11) from power stud (17). Discard lockwasher (13) and locknut (12).
4. Remove plain-assembled nut (9), two clamps (10), power harness (8), and NBC harness (22) from screw (16). Discard plain-assembled nut (9).

NOTE

Step 5 is for M997, M997A1, and M997A2 vehicles only.

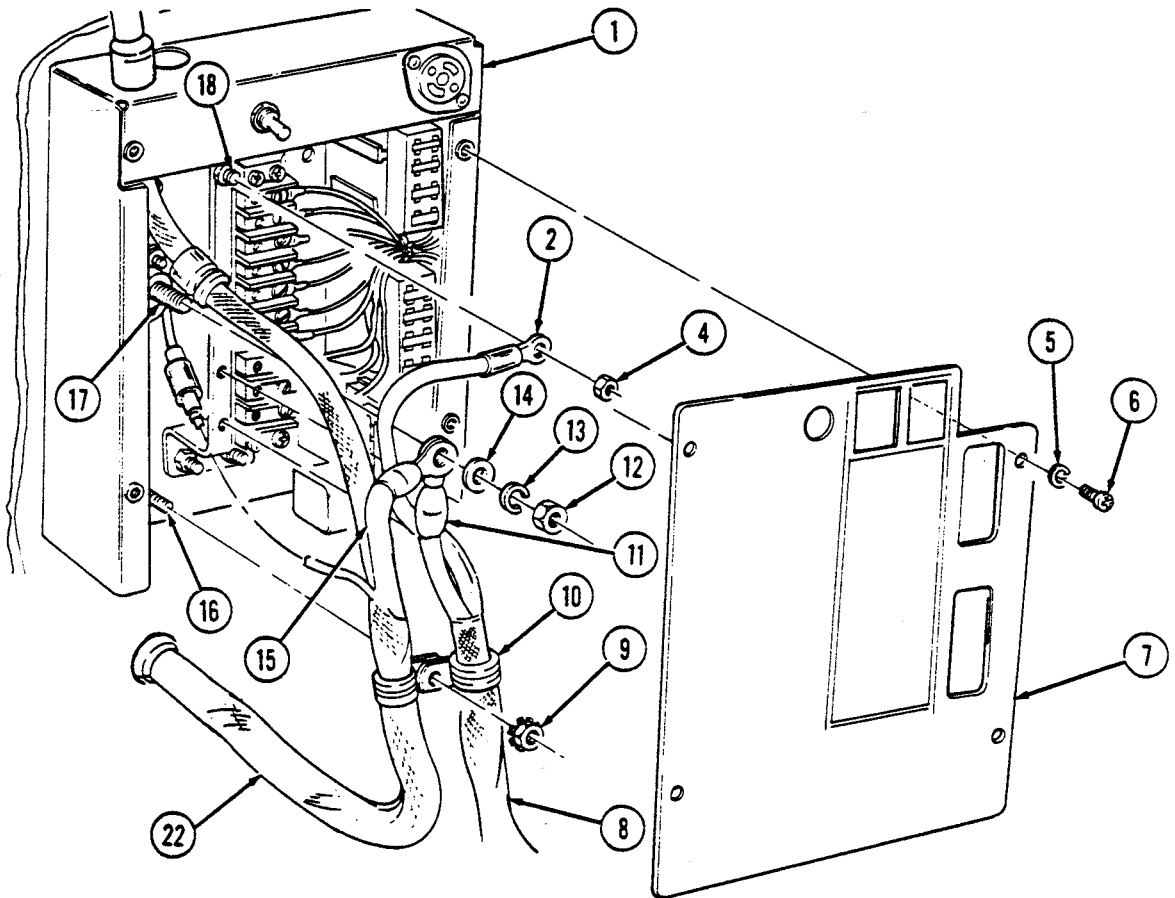
5. Remove two screws (20) two clamps (19) and power harness (8) from body (21) and remove clamps (19) from harness (8).

NOTE

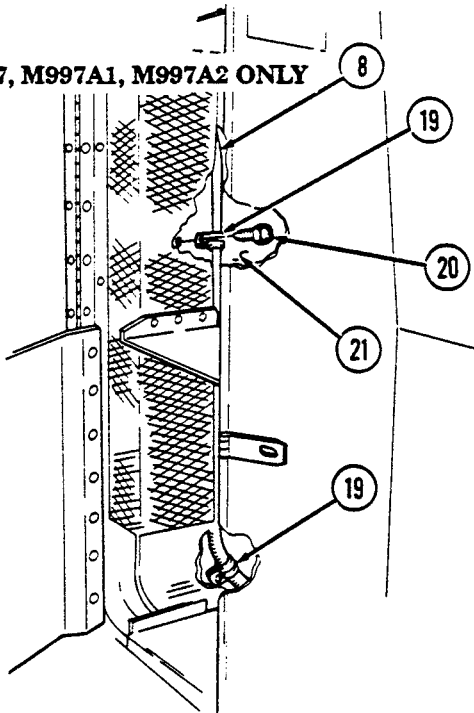
Steps 6 thru 8 apply to M996 and M996A1 vehicles only.

6. Remove four screws (20), five clamps (19), and power harness (8) from body (21). Remove clamps (19) from harness (8).

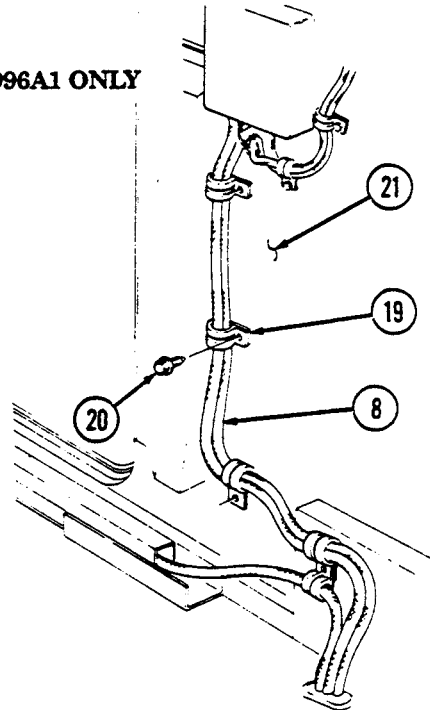
4-98. CONTROL BOX POWER CABLES REPLACEMENT (Cont'd)



M997, M997A1, M997A2 ONLY



M996, M996A1 ONLY



4-98. CONTROL BOX POWER CABLES REPLACEMENT (Cont'd)

7. Remove two screws (1) and three clamps (3) from power harness (8), resuscitator harness (2) and body (6).
8. Remove screw (1) and clamps (3) and (7) from body (6) and power harness (8).
9. Remove grommets (4) and (9), power harness (8), and resuscitator harness (2) from floor (5) and body (6).
10. Remove grommet (23) from battery box (20).
11. Remove capscrew (10), lockwasher (11), ground cable (13), and two cables (12) from shunt (16). Discard lockwasher (11).
12. Remove two screws (14), clamps (17), and positive cable (15) from battery box (20).
13. Remove nut (22), lockwasher (21), two battery cables (19), and positive cable (15) from power stud (18). Discard lockwasher (21).
14. Remove power harness (8) from vehicle.

b. Installation

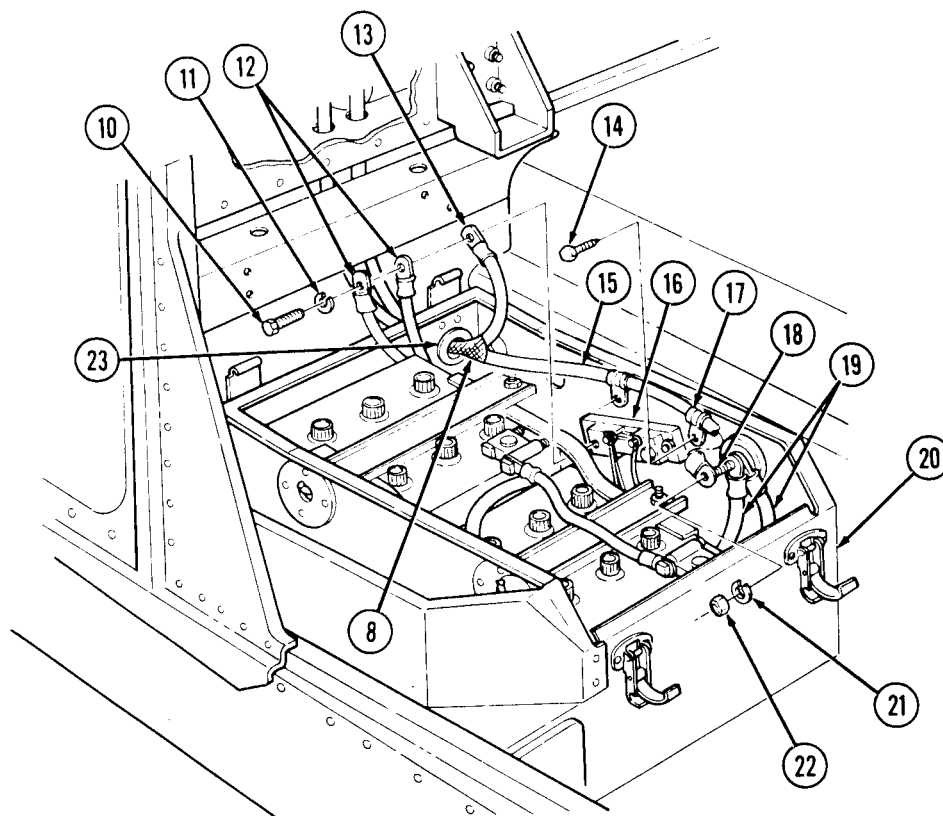
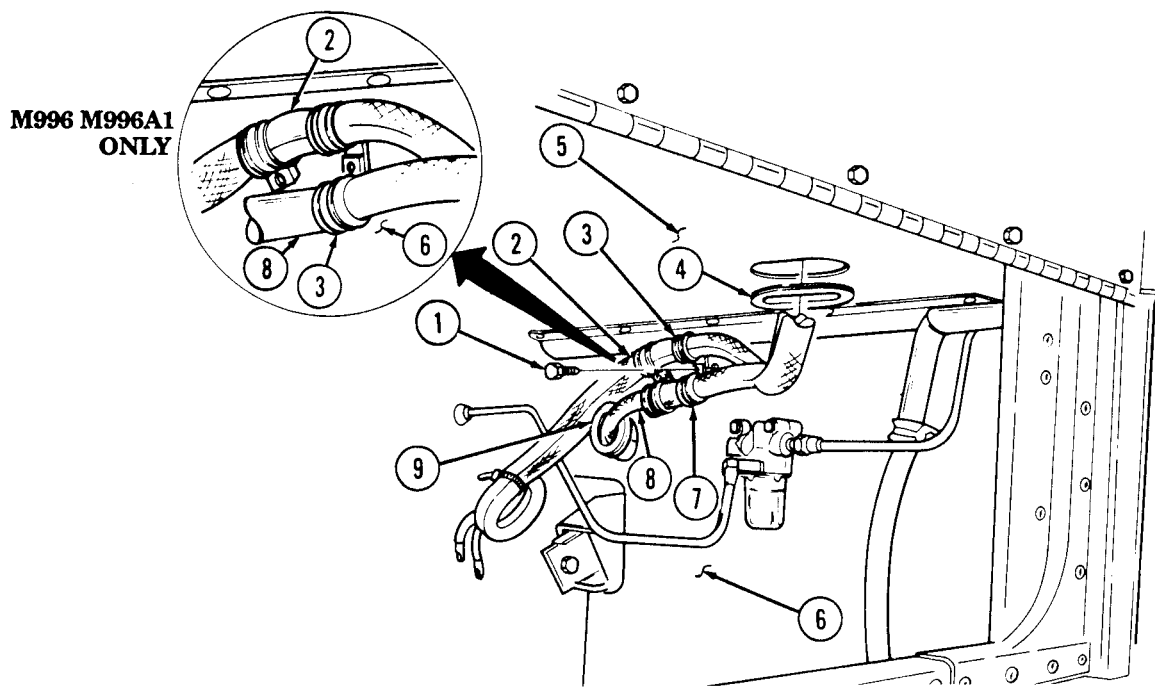
1. Route power harness (8) in approximate mounting location in vehicle.
2. Install positive cable (15) and two battery cables (19) on power stud (18) with lockwasher (21) and nut (22).
3. Install two clamps (17) on positive cable (15) and battery box (20) with two screws (14).
4. Install ground cable (13) and two cables (12) on shunt (16) with lockwasher (11) and capscrew (10).
5. Install grommet (23) on power harness (8) in battery box (20).

NOTE

Steps 6 thru 8 apply to M996 and M996A1 vehicles only.

6. Install clamp (7), power harness (8), and resuscitator harness clamp (3) on body (6) with screw (1).
7. Install three clamps (3), power harness (8), resuscitator harness (2), on body (6) with two screws (1).
8. Install power harness (8) and resuscitator harness (2) with two grommets (4) and (9) in floor (5) and body (6).

4-98. CONTROL BOX POWER CABLES REPLACEMENT (Cont'd)



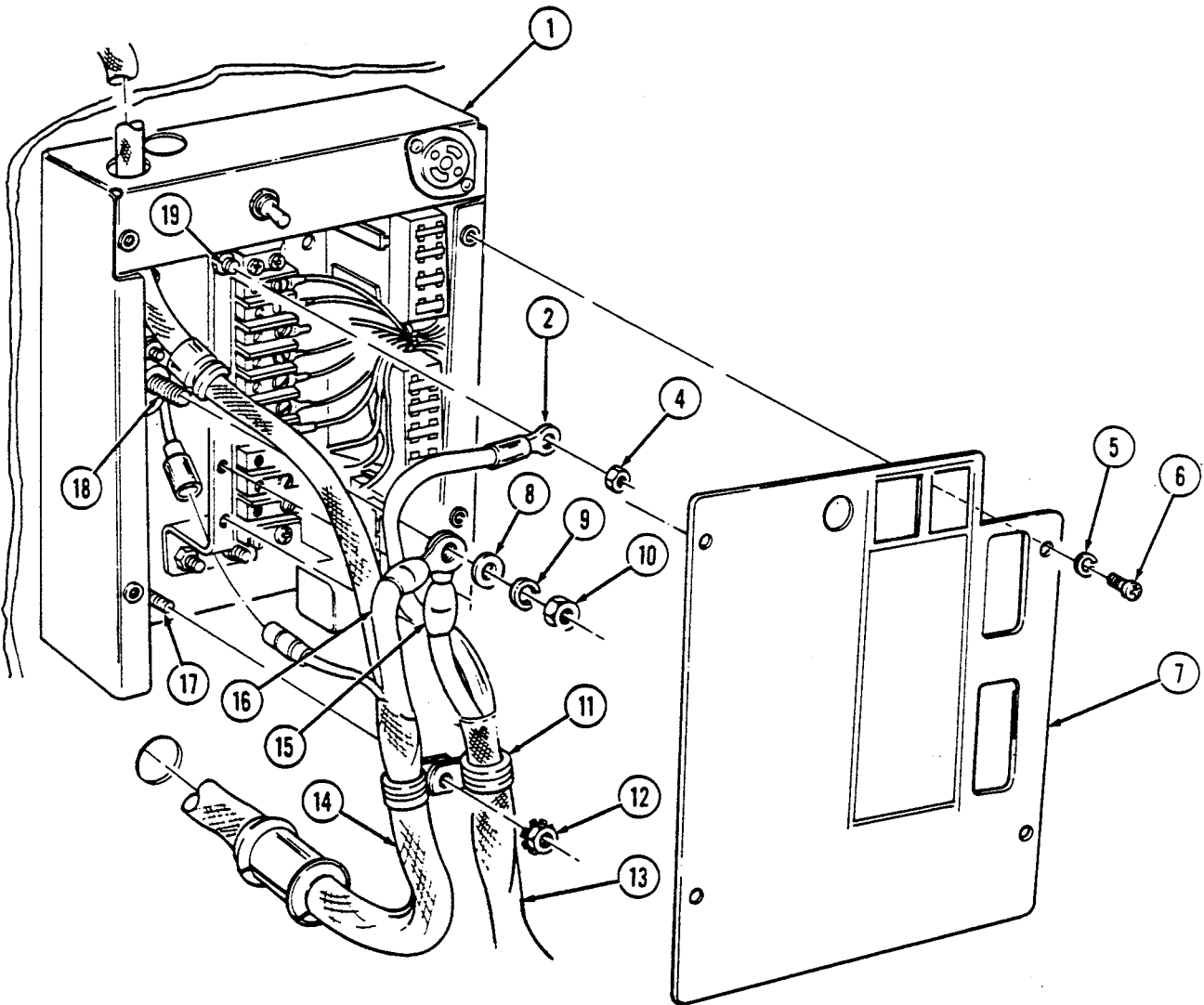
4-98. CONTROL BOX POWER CABLES REPLACEMENT (Cont'd)

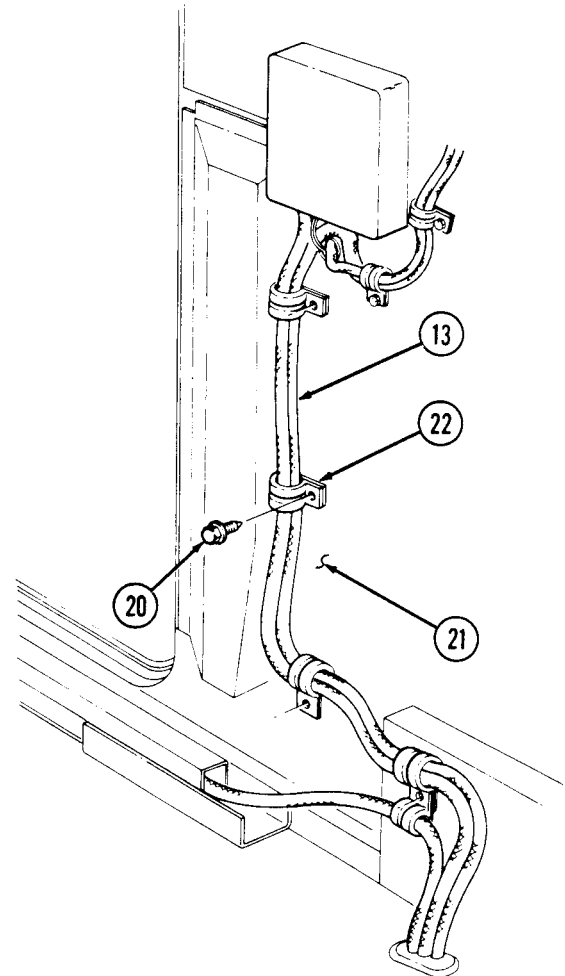
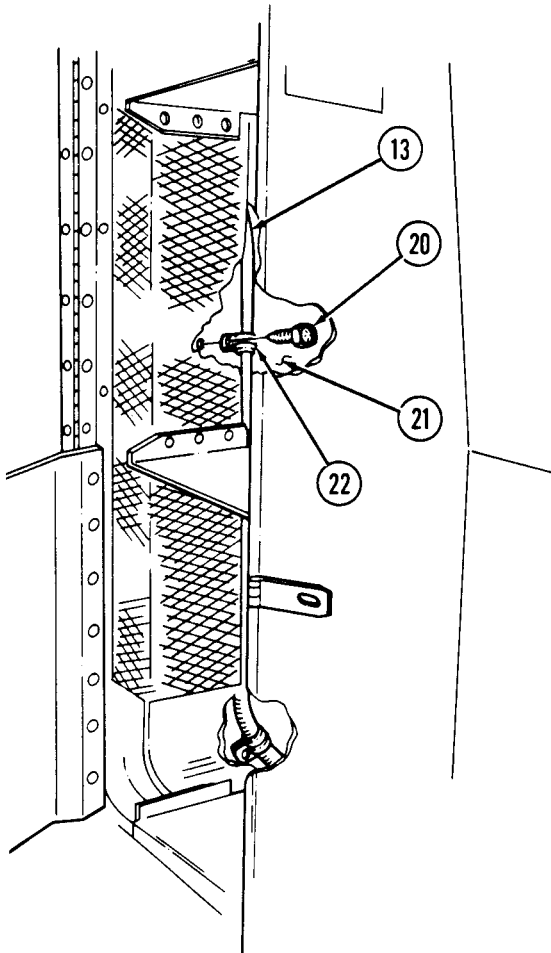
9. Install positive cable (15) and NBC harness cable (16) on control box power stud (18) with washer (8), lockwasher (9), and locknut (10).
10. Install ground cable (2) on ground stud (19) with nut (4).
11. Install two clamps (11), power harness (13), and NBC harness (14) on screw (17) with plain-assembled nut (12).
12. Install cover (7) on control box (1) with four lockwashers (5) and screws (6).
13. Install two clamps (22) and power harness (13) on body (21) with two screws (20).

NOTE

Step 14 applies to M996 and M996A1 vehicles only.

14. Install five clamps (22) and power harness (13) on body (21) with four screws (20).



4-98. CONTROL BOX POWER CABLES REPLACEMENT (Cont'd)**M996, M996A1 ONLY**

- FOLLOW-ON TASKS:**
- Connect battery ground cable (para. 4-73).
 - Check control box operation (TM 9-2320-280-10).

4-99. NBC CONTROL BOX AND WIRING HARNESS REPLACEMENT (M996, M996A1)

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M996, M996A1

Tools

General mechanic's kit:
automotive (Appendix B, Item 1)

Materials/Parts

Four lockwashers (Appendix G, Item 136)
Plain-assembled nut (Appendix G, Item 201)
Locknut (Appendix G, Item 128)
Three locknuts (Appendix G, Item 97)
Lockwasher (Appendix G, Item 133)
Three lockwashers (Appendix G, Item 135)
Five tiedown straps (Appendix G, Item 309)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

NBC control panel removed (para. 4-124).

a. Removal

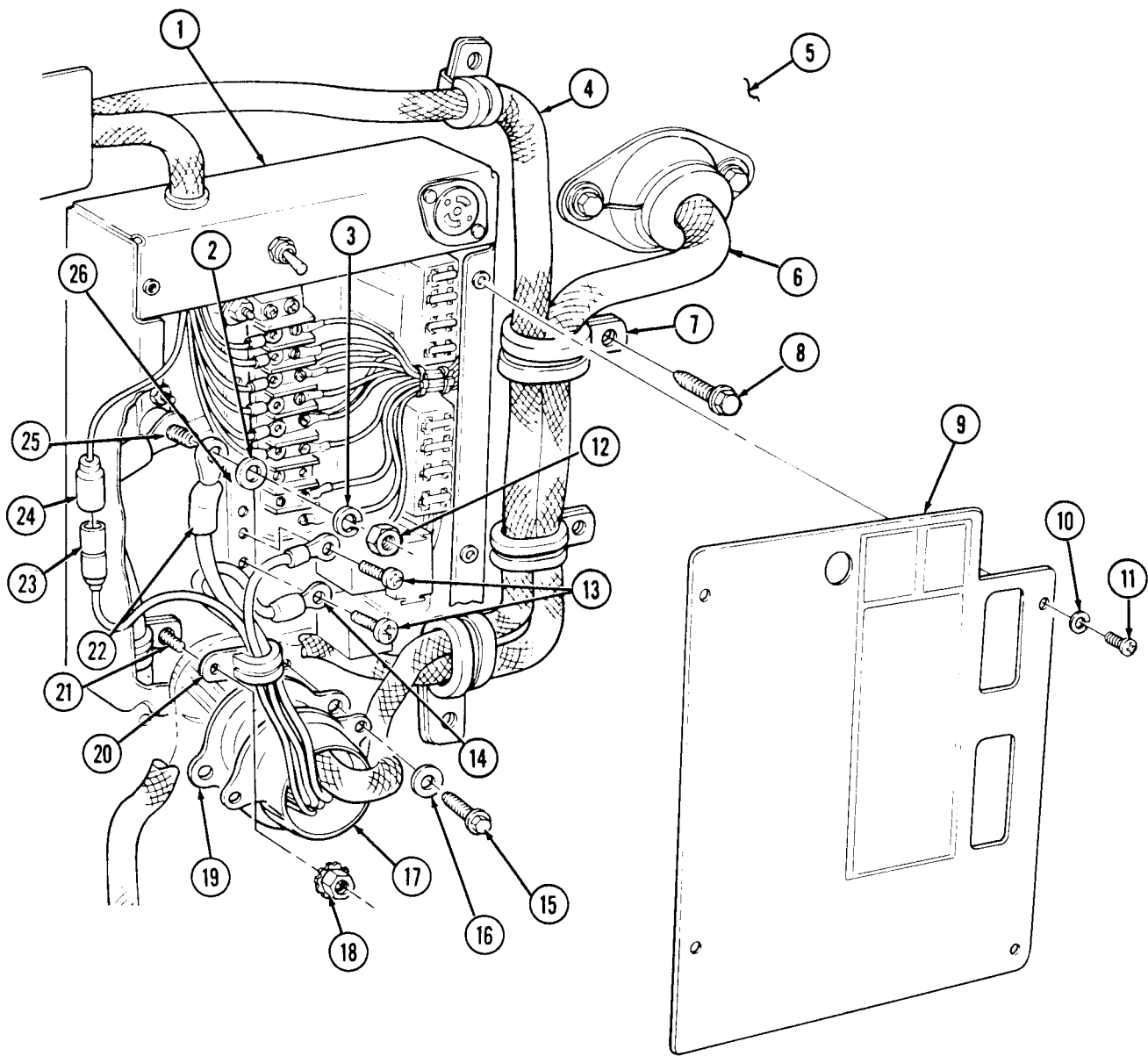
1. Remove four screws (11), lockwashers (10), and cover (9) from control box (1). Discard lockwashers (10).

NOTE

Prior to removal, tag all leads for installation.

2. Remove locknut (12), lockwasher (3), washer (2), and positive cable lead 782 (22) from positive stud (25). Discard lockwasher (3) and locknut (12).
3. Remove two screws (13) and NBC harness leads (14) from mounting buss (26).
4. Disconnect lead 791A (23) from light harness lead 791B (24).
5. Remove plain-assembled nut (18), clamp (20), and NBC harness (4) from control box stud (21). Discard plain-assembled nut (18).
6. Remove four screws (8), clamps (7), NBC harness (4), and heater harness (6) from body (5).
7. Remove two screws (15), washers (16), retainer (17), and grommet (19) from body (5) and remove retainer (17) and grommet (19) from NBC harness (4).

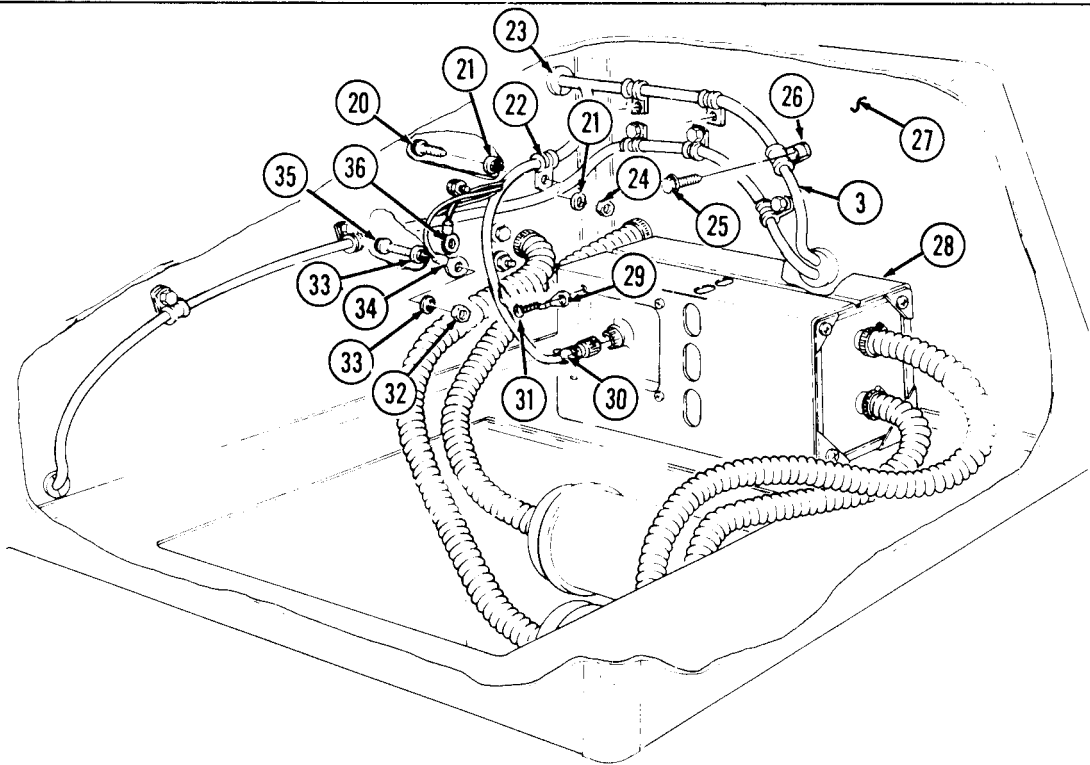
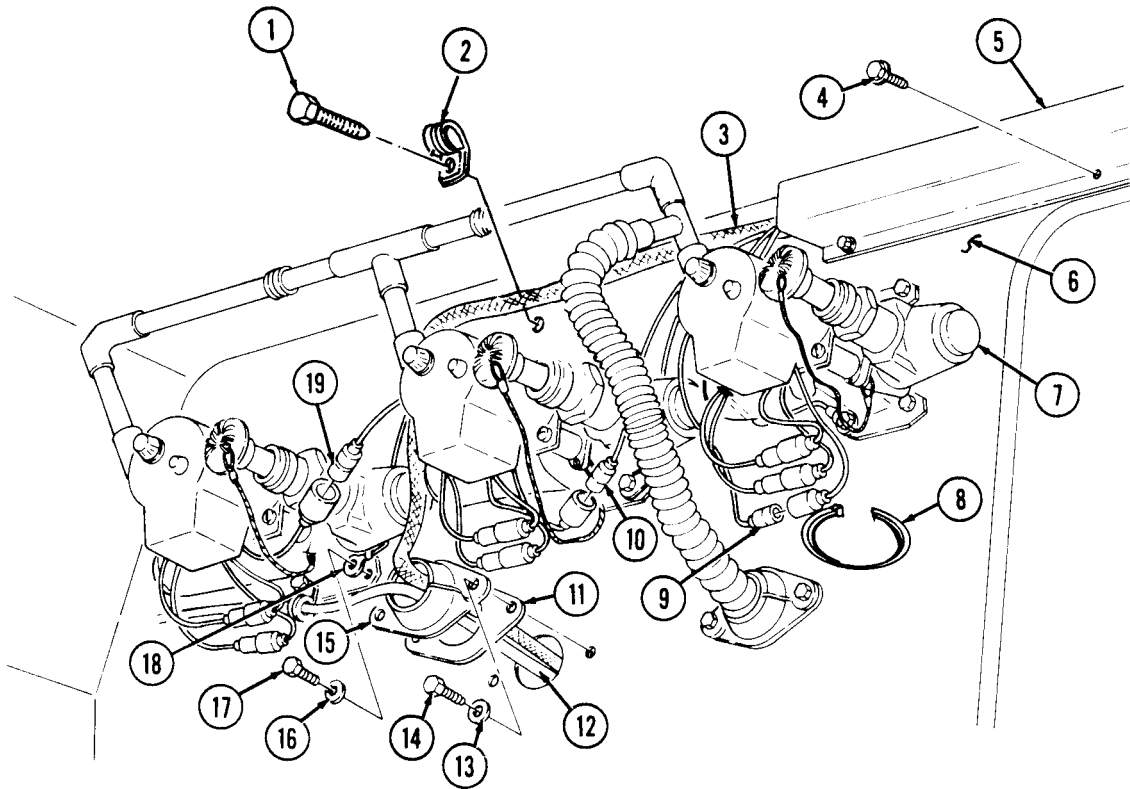
4-99. NBC CONTROL BOX AND WIRING HARNESS REPLACEMENT (M996, M996A1) Cont'd



4-99. NBC CONTROL BOX AND WIRING HARNESS REPLACEMENT (M996, M996A1) Cont'd

8. Remove four screws (4) and harness channel (5) from body (6). Pull channel (5) away from body (6).
9. Remove three tiedown straps (8). Discard tiedown straps (8).
10. Disconnect lead 785B (9), lead 785A (10), and lead 786A (19) from NBC heaters (7).
11. Remove three capscrews (17), lockwashers (16), and ground leads (18) from NBC heaters (7). Discard lockwashers (16).
12. Remove screw (1), clamp (2), and harness (3) from body (6).
13. Remove two screws (14), washers (13), grommet (11), retainer (15), and intercom cable (12) from body (6).
14. Remove three screws (25), clamps (26), and harness (3) from body (27). Remove clamps (26).
15. Remove locknut (24), washer (21), capscrew (20), washer (21), clamp (22), and harness (3) from body (27).
16. Remove two locknuts (32), washer (33), capscrew (35), washer (33), and leads 795B (36) and 795C (34) from body (27).
17. Remove screw (31) and ground (29) from NBC heaters and filter assembly (28).
18. Disconnect connector (30) from NBC heater and filter assembly (28).
19. Remove grommet (23) and harness (3) from body (27).

4-99. NBC CONTROL BOX AND WIRING HARNESS REPLACEMENT (M996, M996A1) Cont'd



4-99. NBC CONTROL BOX AND WIRING HARNESS REPLACEMENT (M996, M996A1) Cont'd

20. Remove two tiedown straps (11) from leads (12) and (13) and harness (8). Discard tiedown straps (11).
21. Disconnect leads 787A (12) and 786B (13) from NBC heaters (10).
22. Remove screw (15), clamp (14), and harness (8) from body (9).
23. Remove two screws (5) and cover (6) from bracket (16).
24. Pull cover (6) away from switch (1) to allow access to leads.
25. Remove two screws (3) and leads (2) and (4) from switch (1).
26. Pull leads (2) and (4) through grommet (7) in cover (6).

CAUTION

Use care when removing harness. Failure to do so will cause damage to harness.

27. Remove harness (8) from vehicle.

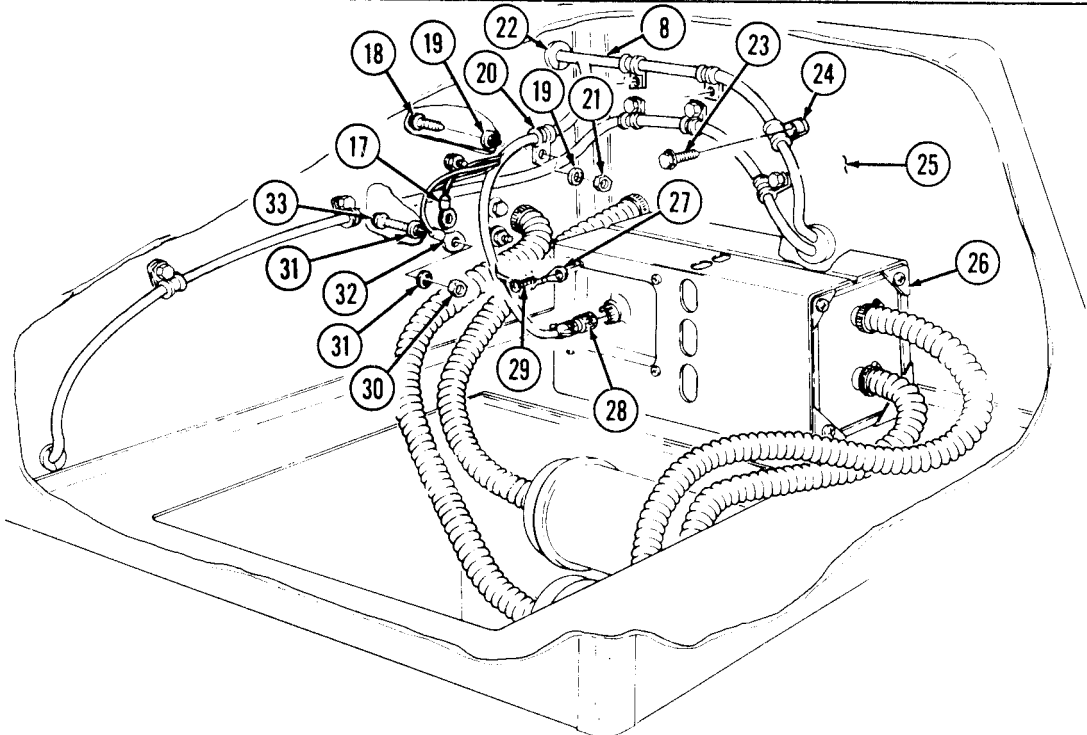
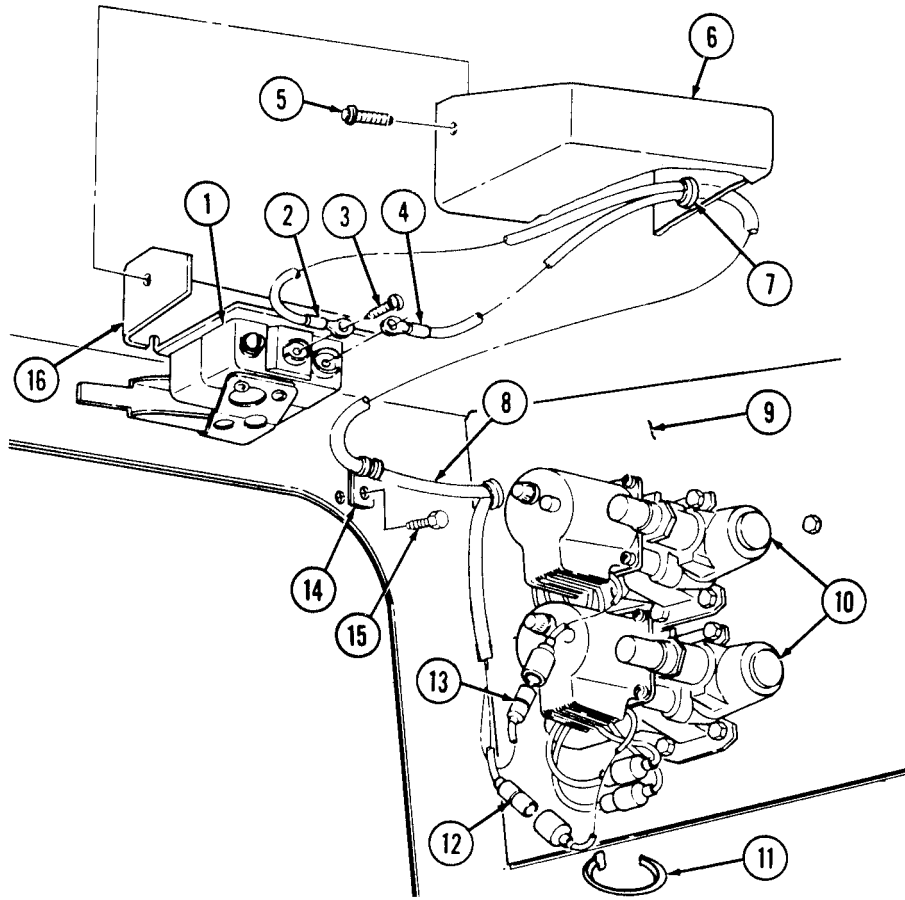
b. Installation

CAUTION

Use care when routing harness. Failure to do so will cause damage to harness.

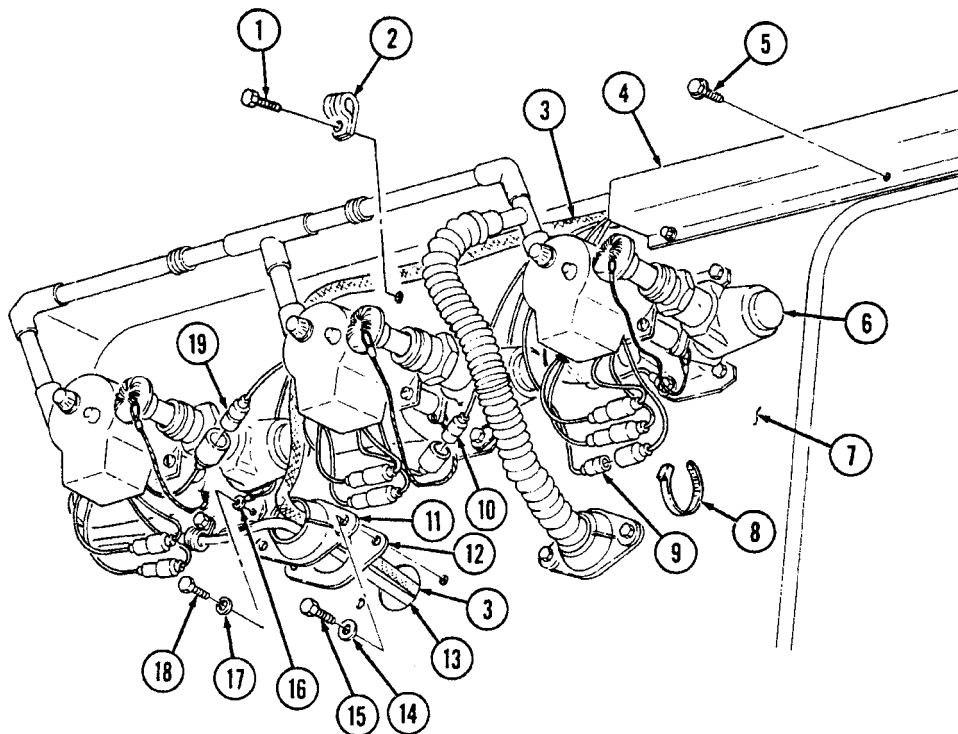
1. Route leads (2) and (4) through grommet (7) in cover (6).
2. Route harness (8) in approximate mounting location.
3. Connect leads (2) and (4) to switch (1) with two screws (3).
4. Install cover (6) to bracket (16) with two screws (5).
5. Install clamp (14) and harness (8) on body (25) with screw (15).
6. Connect leads 787A (12) and 786B (13) to NBC heaters (10).
7. Install two tiedown straps (11) on leads (12) and (13) and harness (8).
8. Install grommet (22) on harness (8) in body (25).
9. Install clamp (20) and harness (8) on body (25) with washer (19), cap screw (18), washer (19), and nut (21).
10. Install leads 795B (17) and 795C (32) on body (25) with two washers (31), cap screws (33), washers (31), and nuts (30).
11. Install three clamps (24) on harness (8) to body (25) with three screws (23).
12. Install ground (27) on NBC heater and filter assembly (26) with screw (29).
13. Connect harness (28) to NBC heater and filter assembly (26).

4-99. NBC CONTROL BOX AND WIRING HARNESS REPLACEMENT (M996, M996A1) Cont'd

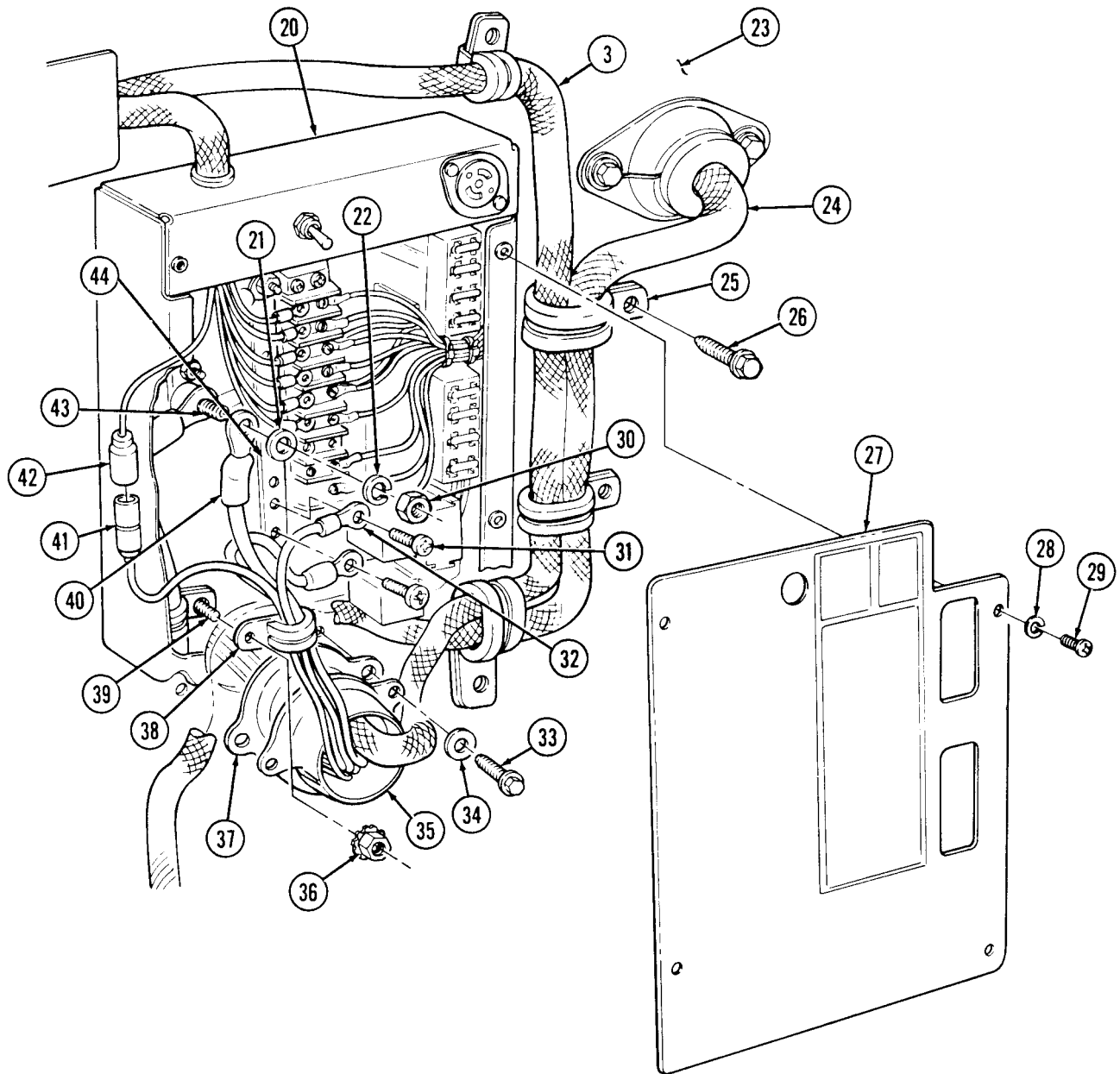


4-99. NBC CONTROL BOX AND WIRING HARNESS REPLACEMENT (M996, M996A1) Cont'd

14. Install grommet (12), retainer (11), harness (3), and intercom cable (13) to body (7) with two washers (14) and screws (15).
15. Install clamp (2) and harness (3) on body (7) with screw (1).
16. Install ground leads (16) on three NBC heaters (6) and body (7) with three lockwashers (17) and capscrews (18).
17. Connect lead 785A (9), lead 785B (10), and lead 786A (19) to NBC heaters (6).
18. Install three tiedown straps (8) on leads (9), (10), and (19), and harness (3).
19. Install harness channel (4) over harness (3) on body (7) with four screws (5).
20. Install four clamps (25) on harness (3) and heater harness (24) on body (23) with four screws (26).
21. Install positive lead 782 (40) on power stud (43) with washer (21), lockwasher (22), and locknut (30).
22. Install two NBC harness leads (32) on mounting buss (44) with two screws (31).
23. Connect lead 791A (41) to light harness lead 791B (42).
24. Install clamp (38) on NBC harness (3) and control box stud (39) with plain-assembled nut (36).
25. Install grommet (37) and retainer (35) on NBC harness (3) and body (23) with two washers (34) and screws (33).
26. Install cover (27) on control box (20) with four lockwashers (28) and screws (29).



4-99. NBC CONTROL BOX AND WIRING HARNESS REPLACEMENT (M996, M996A1) Cont'd



FOLLOW-ON TASK: NBC control panel installed (para. 4-124).

4-100. NBC CONTROL BOX AND WIRING HARNESS REPLACEMENT (M997, M997A1, M997A2)

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M997, M997A1, M997A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Locknut (Appendix G, Item 77)
Four lockwashers (Appendix G, Item 136)
Five lockwashers (Appendix G, Item 135)
Three assembled locknuts
(Appendix G, Item 130)
Five plain-assembled nuts
(Appendix G, Item 201)
Nine tiedown straps (Appendix G, Item 309)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

- Control panel removed (para. 4-124).
- Front cover panel removed (para. 11-187).

CAUTION

Use care when removing harness. Failure to do so will cause damage to harness.

a. Removal

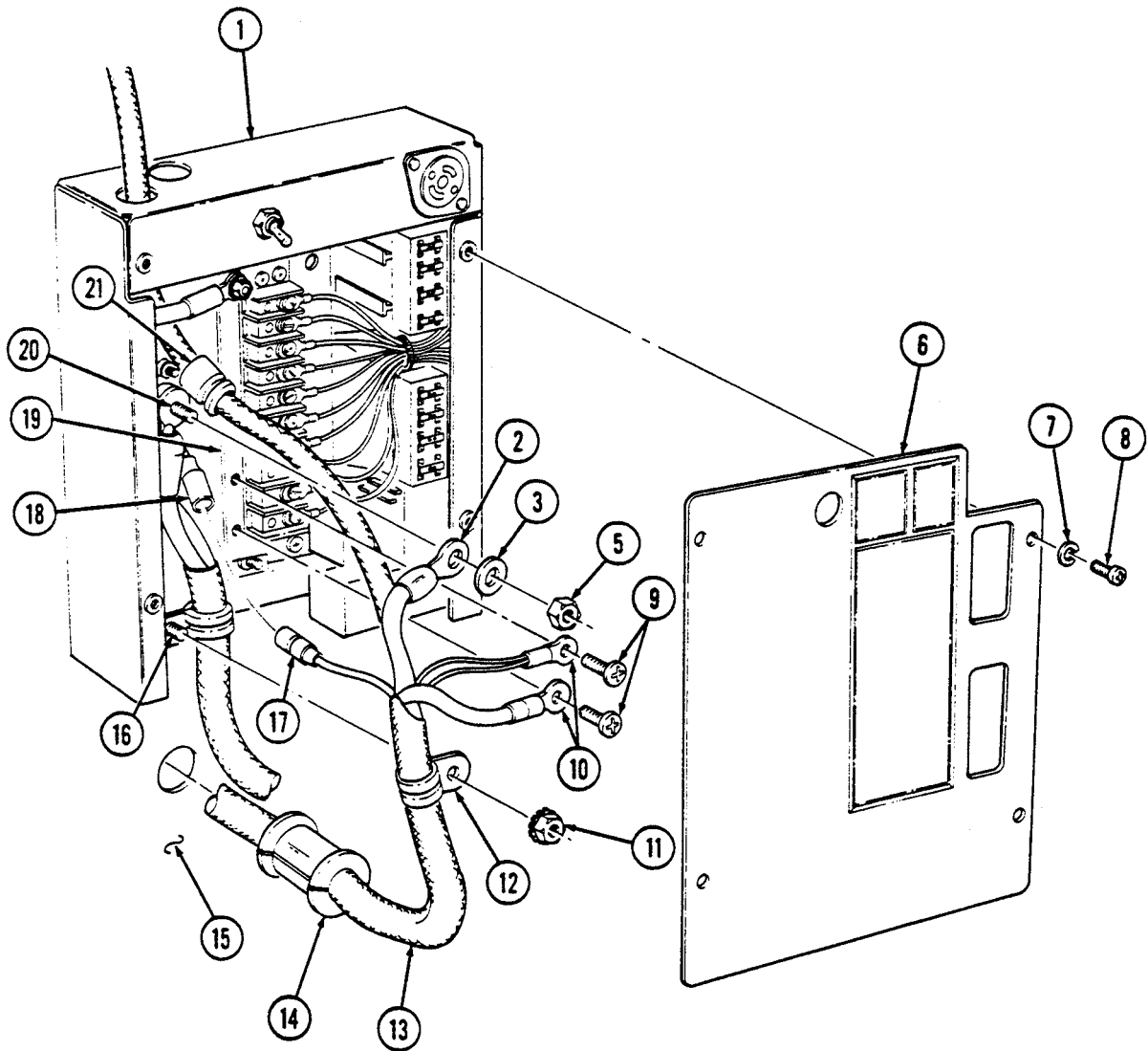
1. Remove four screws (8) lockwashers (7) and cover (6) from control box (1). Discard lockwashers (7).
2. Remove assembled locknut (11), clamp (12), and NBC harness (13) from control box stud (16). Discard assembled locknut (11).

NOTE

Prior to removal, tag leads for installation.

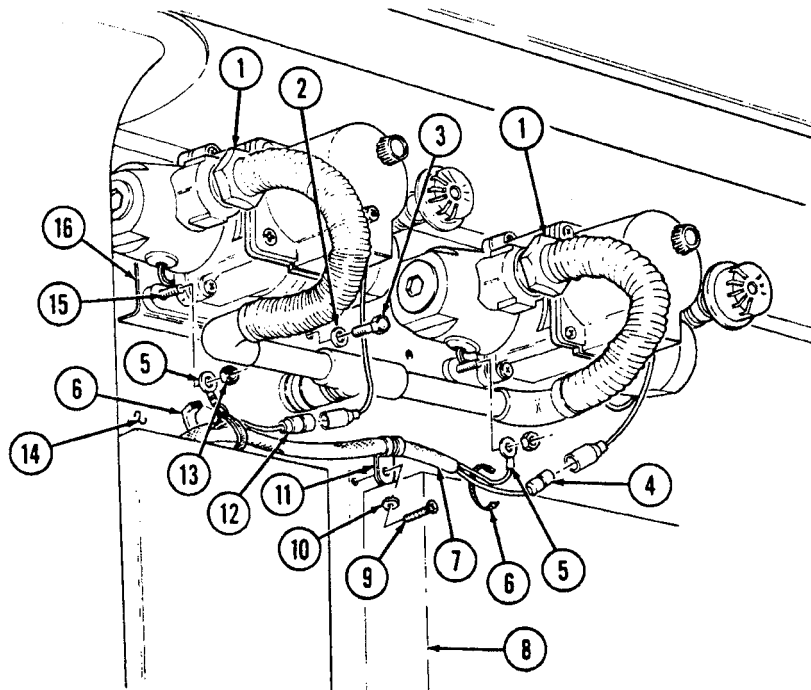
3. Remove nut (5), washer (3), and lead 782 (2) from power stud (20).
4. Disconnect NBC harness lead 791A (17) from light harness lead 791B (18).
5. Remove two screws (9) and NBC harness leads (10) from mounting buss (19).
6. Remove grommet (21) by pushing down through top of control box (1).
7. Remove grommet (14) and NBC harness (13) from body (15).

4-100. NBC CONTROL BOX AND WIRING HARNESS REPLACEMENT (M997, M997A1, M997A2) (Cont'd)

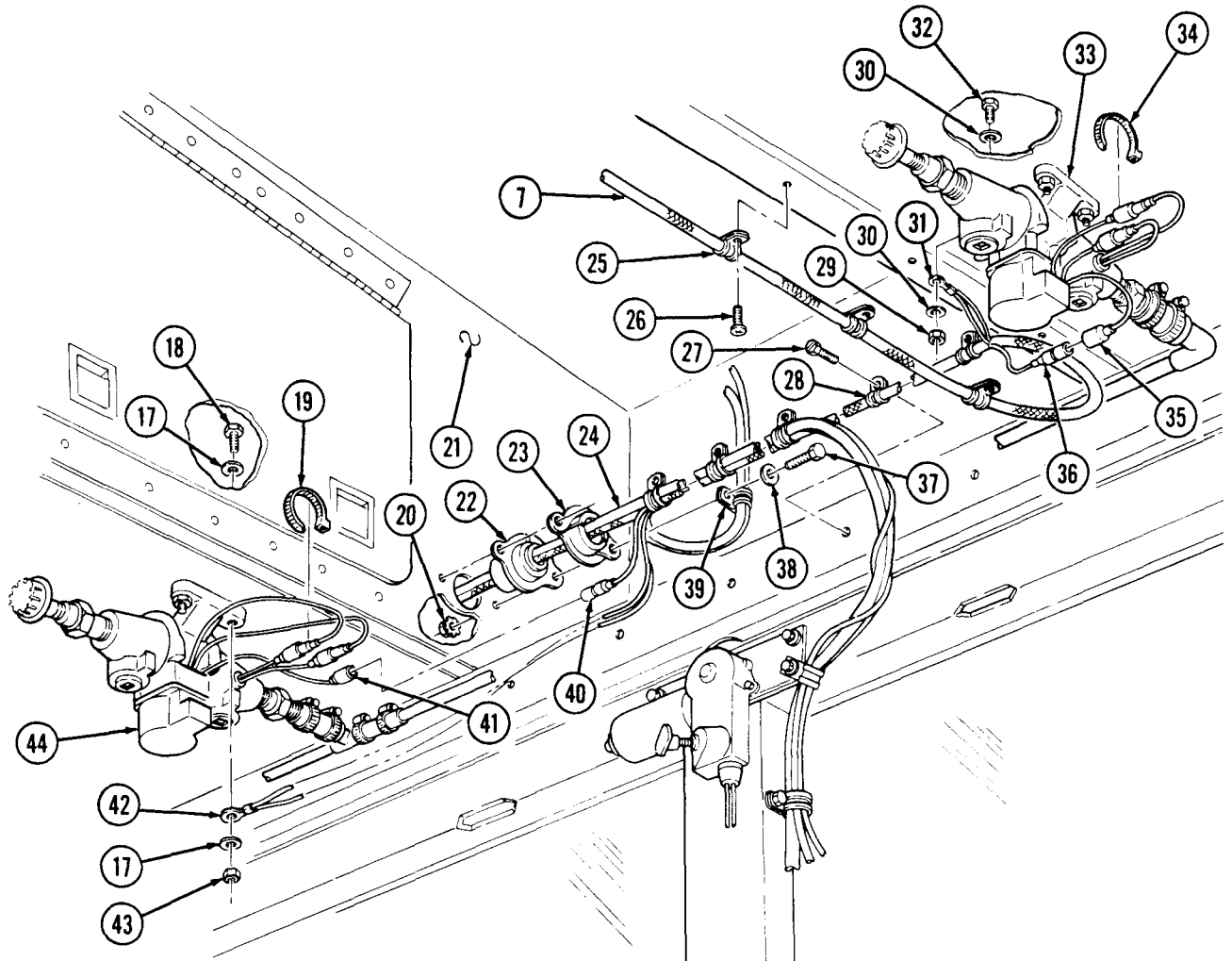


4-100. NBC CONTROL BOX AND WIRING HARNESS REPLACEMENT (M997, M997A1, M997A2) (Cont'd)

8. Remove two tiedown straps (6). Disconnect leads 784A (4) and 784B (12) from NBC heaters (1). Discard tiedown straps (6).
9. Remove four capscrews (3), washers (2), and mounting bracket (16) from body (14). Pull bracket (16) and NBC heaters (1) away from body (14) to allow access to ground leads (5) hardware.
10. Remove nut (13), capscrew (15), and ground terminals (5) from NBC heaters (1).
11. Remove screw (9), lockwasher (10), clamp (11), and harness (7) from A/C control box (8) and body (14). Remove clamp (11). Discard lockwasher (10).
12. Route harness (7) through body (14) into cab.
13. Remove two screws (26), clamps (25) and harness (7) from body (21).
14. Disconnect harness lead 785A (35) from NBC heater lead (36).
15. Remove nut (29), washer (30), capscrew (32), washer (30), and leads 796 and 796A (31) from NBC heater (33).
16. Remove five screws (27), clamps (28), harness (7), and intercom cable (24) from body (21). Remove clamps (28).
17. Remove tiedown straps (19) and (34). Disconnect harness lead 786A (40) from NBC heater lead (41). Discard tiedown straps (19) and (34).
18. Remove locknut (43), washer (17), capscrew (18), washer (17), and leads 796B and 796A (42) from NBC heater (44). Discard locknut (43).
19. Remove two assembled locknuts (20), capscrews (37), washers (38), clamp (39), grommet (22), retainer (23), harness (7), and intercom cable (24) from body (21). Discard assembled locknuts (20).



4-100. NBC CONTROL BOX AND WIRING HARNESS REPLACEMENT (M997, M997A1, M997A2) (Cont'd)



4-100. NBC CONTROL BOX AND WIRING HARNESS REPLACEMENT (M997, M997A1, M997A2) (Cont'd)

20. Remove three plain-assembled nuts (19), screws (13), and cover (18) from body (14). Discard plain-assembled nuts (19).
21. Remove two screws (20), clamps (21), harness (11), and intercom cable (12) from body (14).
22. Remove screw (7) and lead (9) from heater and filter assembly (10).
23. Remove two plain-assembled nuts (17), screws (15), clamps (16), harness (11), and intercom cable (12) from body (14). Discard plain-assembled nuts (17).
24. Disconnect connector (8) from heater and filter assembly (10).
25. Remove grommet (23) and harness (11) from body (14).
26. Remove screw (25), clamp (24), and harness (11) from body (14).
27. Remove two screws (5) and cover (26) from bracket (4). Pull cover (26) away from switch (3) to allow access to leads.
28. Remove two screws (27) and leads (2) and (6) from switch (3).
29. Remove harness (11) from grommet (22) and route harness (11) through opening in body (14).
30. Remove two screws (39), washers (38), retainer (37), grommet (36), harness (11), and intercom cable (12) from body (14).
31. Remove six tiedown straps (40) from NBC heater leads (34) and harness (11). Discard tiedown straps (40).
32. Disconnect leads 786B (45), 787A (44), and 787B (41) from NBC connectors (42).
33. Remove four screws (28), lockwashers (29), washers (30), and mounting bracket (31) from brackets (32). Pull bracket (31) away from body (14) to allow access to ground leads hardware. Discard lockwashers (29).
34. Loosen three hose clamps (49) and pull heaters (47) from fittings (48).
35. Remove three nuts (35) and ground leads (34), (43), and (46) from capscrews (33).
36. Remove harness (11) from vehicle.

b. Installation

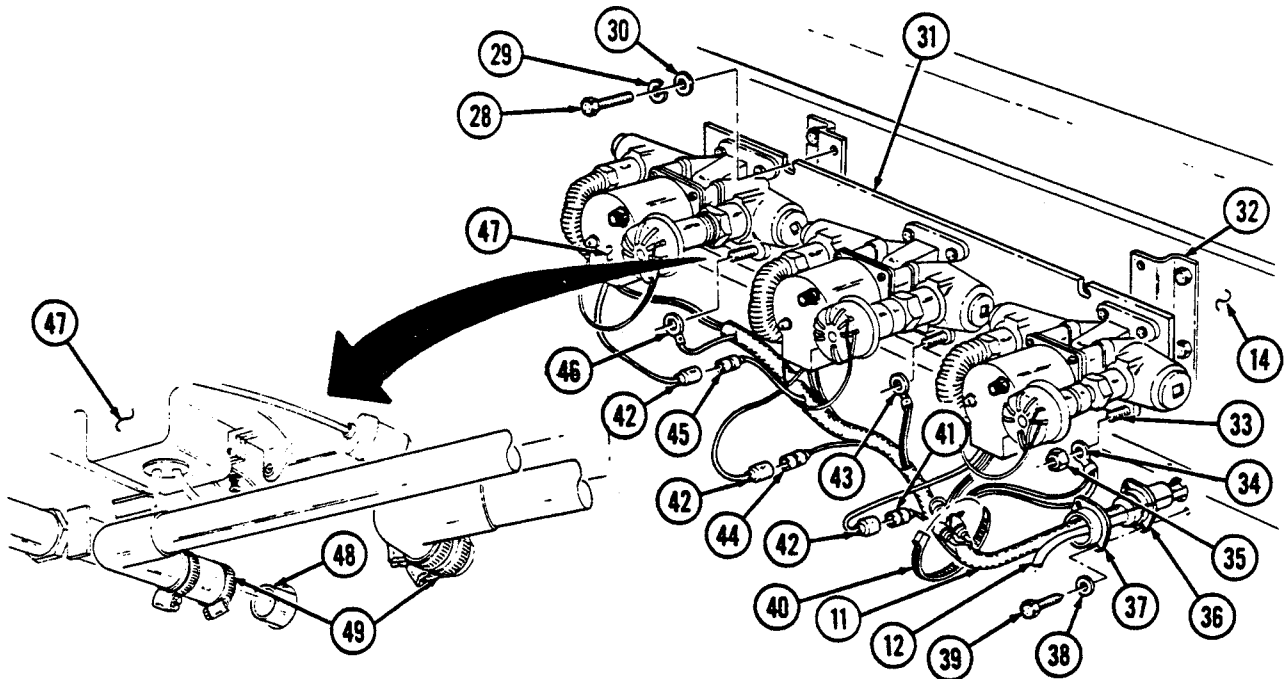
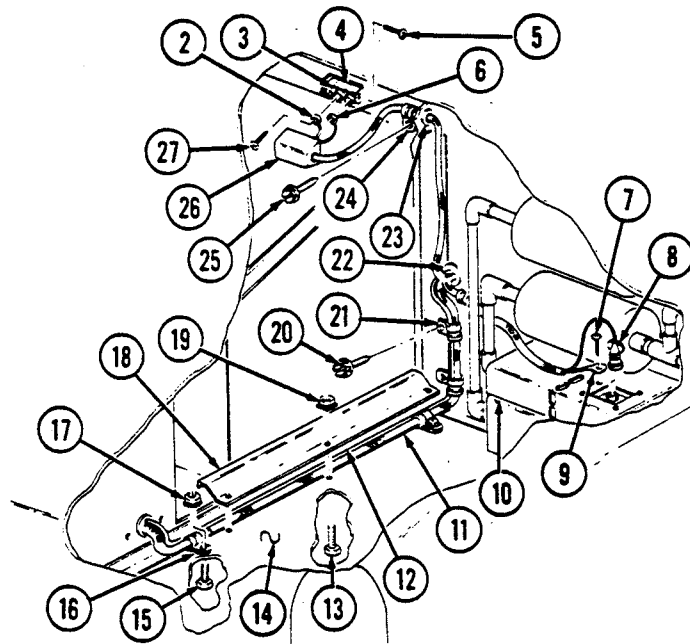
CAUTION

Use care when routing harness. Failure to do so will cause damage to harness.

1. Route harness (11) through vehicle in approximate mounting location.
2. Install leads (34), (43), and (46) on three capscrews (33) with nuts (35).
3. Connect three heaters (47) to fittings (48) and tighten clamps (49).
4. Install mounting bracket (31) to brackets (32) with four washers (30), lockwashers (29), and screws (28).
5. Connect leads 786B (45), 787A (44), and 787B (41) to NBC heater connectors (42).
6. Install six tiedown straps (40) on NBC heater leads (34) and harness (11).
7. Install grommet (36), retainer (37), harness (11), and intercom cable (12) on body (14) with washers (38) and screws (39).
8. Route harness (11) through grommet (22) and opening in body (14).
9. Install leads (2) and (6) on switch (3) with two screws (27).
10. Install cover (26) over switch (3) on bracket (4) with two screws (5).
11. Install clamp (24) and harness (11) on body (14) with screw (25).

4-100. NBC CONTROL BOX AND WIRING HARNESS REPLACEMENT (M997, M997A1, M997A2) (Cont'd)

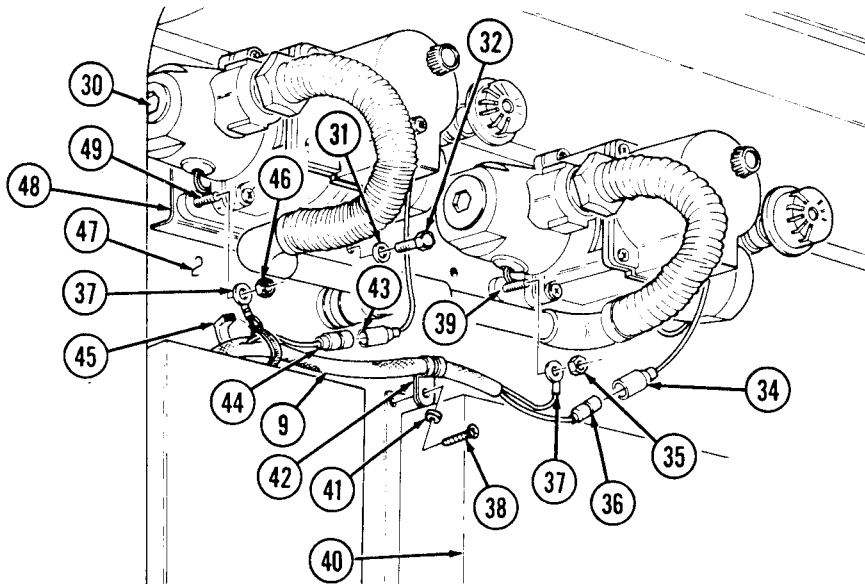
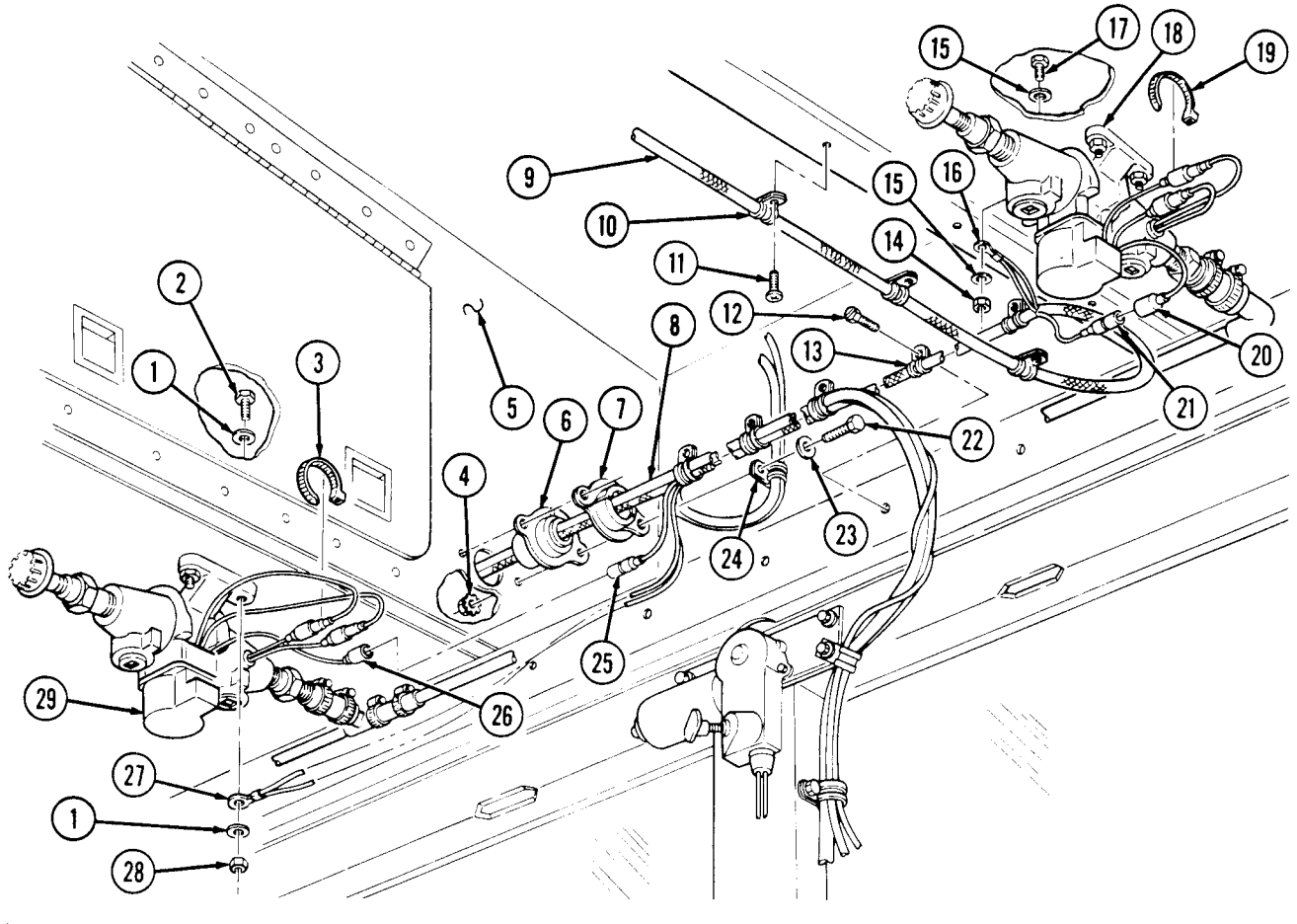
12. Install grommet (23) and harness (11) in body (14).
13. Connect connector (8) on heater and filter assembly (10).
14. Install lead (9) to heater and filter assembly (10) with screw (7).
15. Install two clamps (16), harness (11), and intercom cable (12) to body (14) with two screws (15) and plain-assembled nuts (17).
16. Install two clamps (21), harness (11), and intercom cable (12), on body (14) with two screws (20).
17. Install cover (18) over harness (11) and intercom cable (12), and to body (14) with three screws (13) and plain-assembled nuts (19).



4-100. NBC CONTROL BOX AND WIRING HARNESS REPLACEMENT (M997, M997A1, M997A2) (Cont'd)

- 18. Install grommet (6), retainer (7), harness (9), and intercom cable (8) on body (5) with clamp (24), two washers (23), capscrews (22), and assembled locknuts (4).
- 19. Install leads 796B and 796A (27) on NBC heater (29) with washer (1), capscrew (2), washer (1), and locknut (28).
- 20. Connect harness lead 786A (25) to NBC heater lead (26).
- 21. Install five clamps (13), harness (9), and intercom cable (8) on body (5) with five screws (12).
- 22. Install leads 796 and 796A (16) on NBC heater (18) with washer (15), capscrew (17), washer (15), and nut (14).
- 23. Connect harness lead 785A (21) on NBC heater lead (20).
- 24. Install two clamps (10) on harness (9) and body (5) with three screws (11).
- 25. Install tiedown straps (3) and (19) securing heater leads together.
- 26. Install clamp (42) and harness (9) on A/C control box (40) and body (47) with lockwasher (41) and screw (38).
- 27. Install two ground terminals (37) on NBC heaters (30) and bracket (48) with capscrews (39) and (49) and nuts (35) and (46).
- 28. Install bracket (48) and NBC heaters (30) on body (47) with four washers (31) and capscrews (32).
- 29. Connect leads 784A (36) and 784B (44) on NBC heater leads (34) and (43).
- 30. Install two tiedown straps (45) on harness (9) and leads.

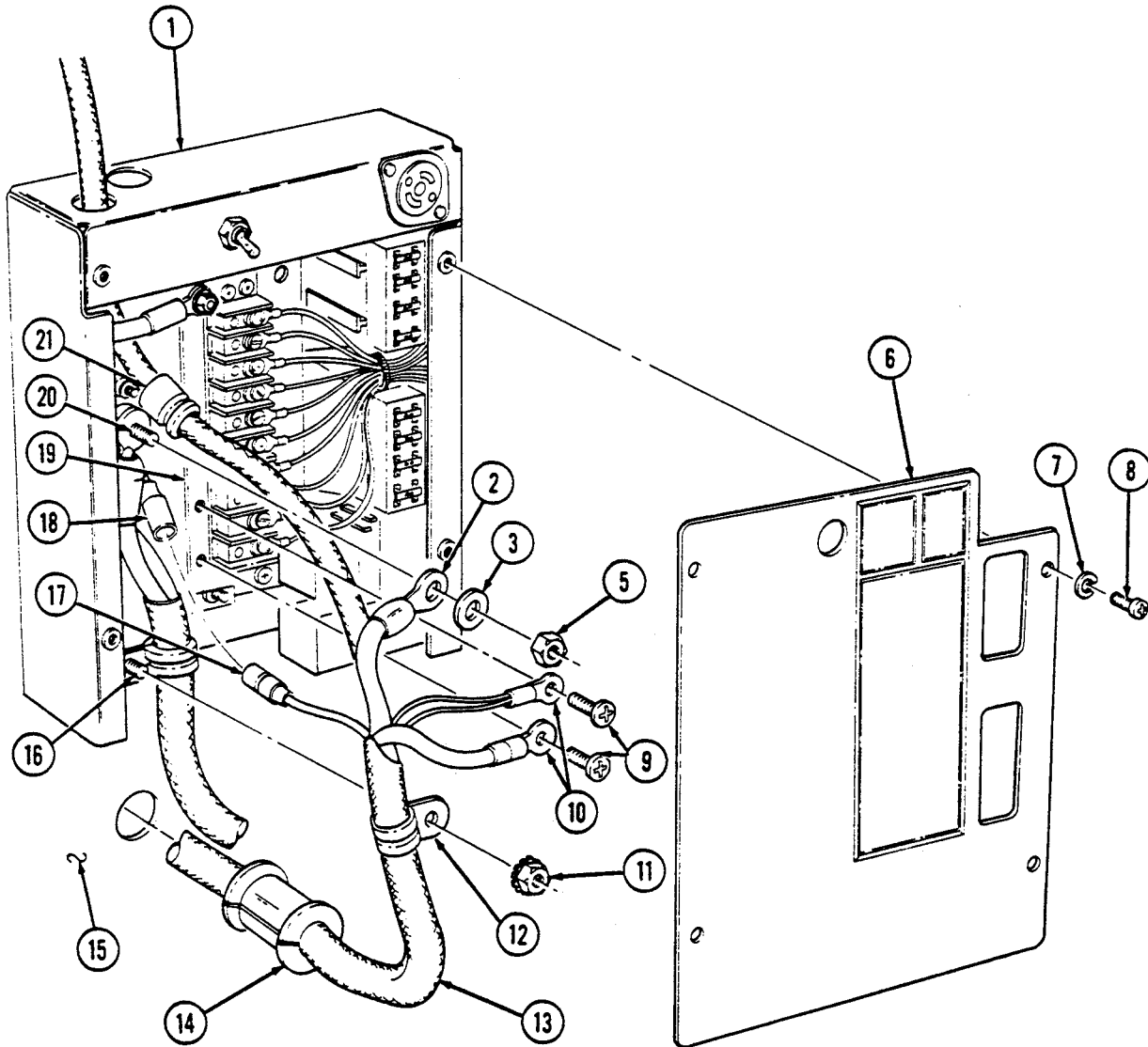
4-100. NBC CONTROL BOX AND WIRING HARNESS REPLACEMENT (M997, M997A1, M997A2) (Cont'd)



4-100. NBC CONTROL BOX AND WIRING HARNESS REPLACEMENT (M997, M997A1, M997A2) (Cont'd)

31. Install grommet (21) through top of control box (1) to secure NBC harness (13).
32. Install lead 782 (2) on power stud (20) with washer (3) and nut (5).
33. Connect NBC harness lead 791A (17) to light harness lead 791B (18).
34. Install two NBC harness leads (10) on mounting buss (19) with two screws (9).
- 35. Install clamp (12) and NBC harness (13) on control box stud (16) with assembled locknut (11).
36. Install cover (6) on control box (1) with four lockwashers (7) and screws (8).
37. Install grommet (14) in body (15) to secure NBC harness (13).

4-100. NBC CONTROL BOX AND WIRING HARNESS REPLACEMENT (M997, M997A1, M997A2) (Cont'd)



- FOLLOW-ON TASKS:**
- Install control panel (para. 4-124).
 - Install front cover panel (para. 11-187).

4-101. INTERIOR LIGHTING HARNESS ASSEMBLY REPLACEMENT (M997, M997A1, M997A2)

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M997, M997A1, M997A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Eight lockwashers (Appendix G, Item 136)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

- Battery ground cable disconnected (para. 4-73).
- Rear door blackout switch removed (para. 4-93).
- Electrical outlet/bracket removed (para. 4-90).

a. Removal

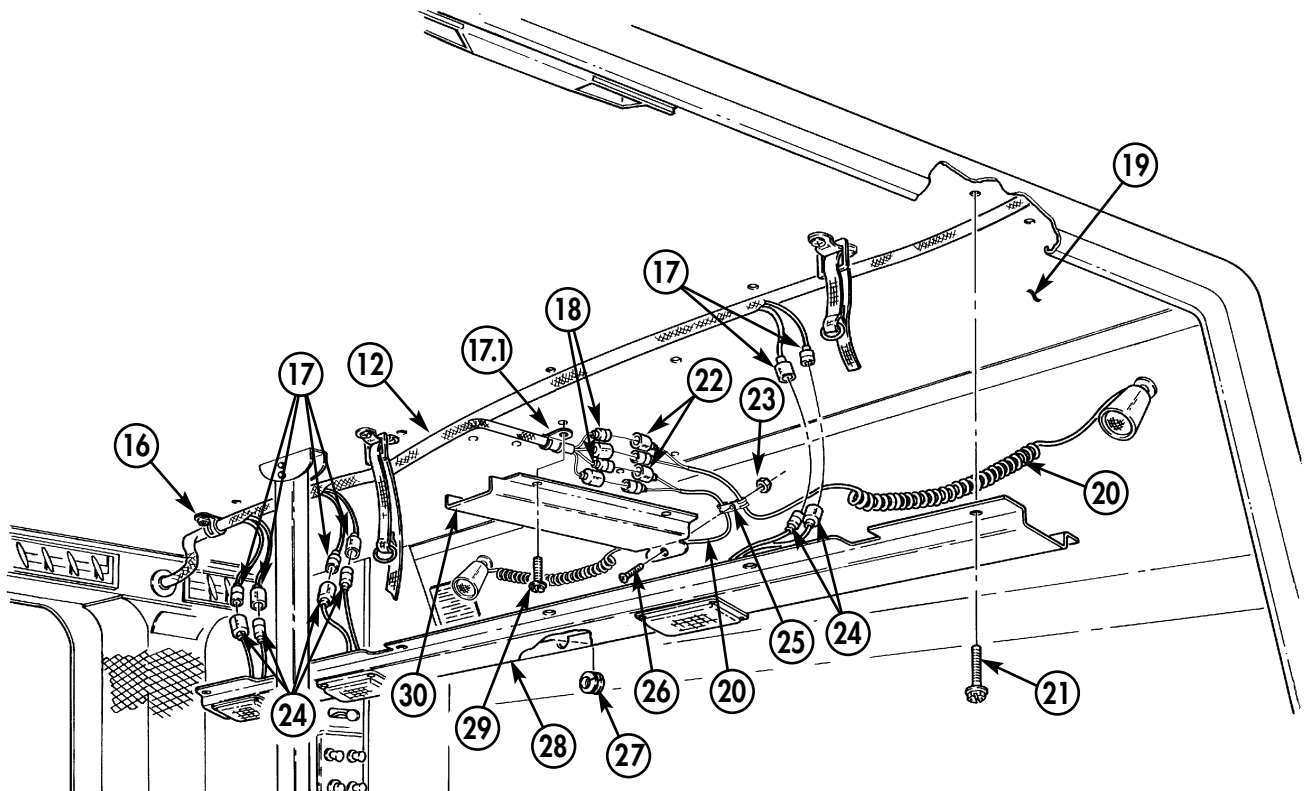
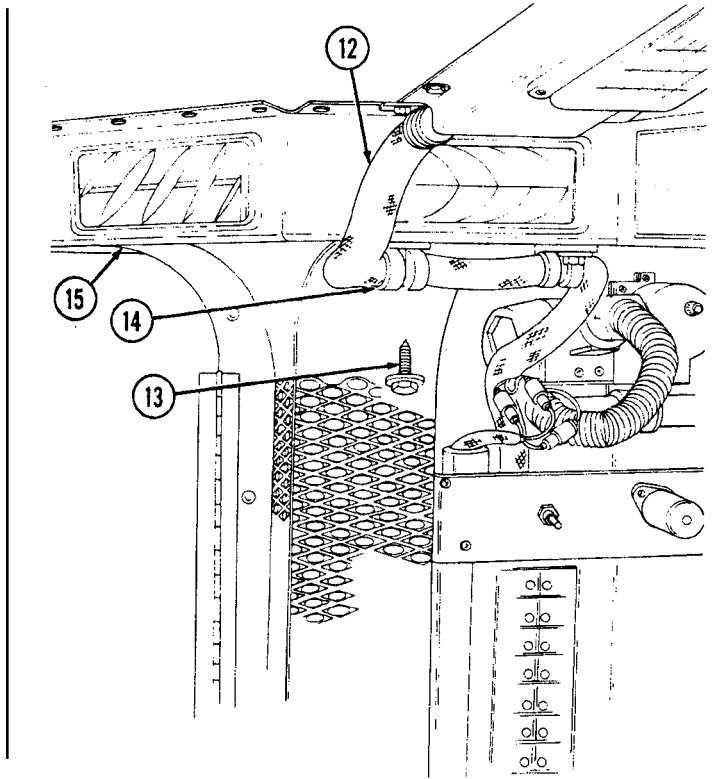
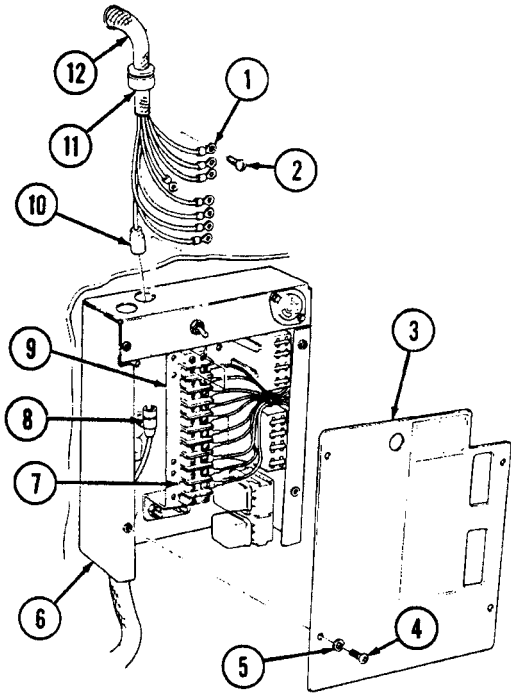
1. Remove four screws (4), lockwashers (5), and cover (3) from control box (6). Discard lockwasher (5).

NOTE

Prior to removal, tag leads for installation.

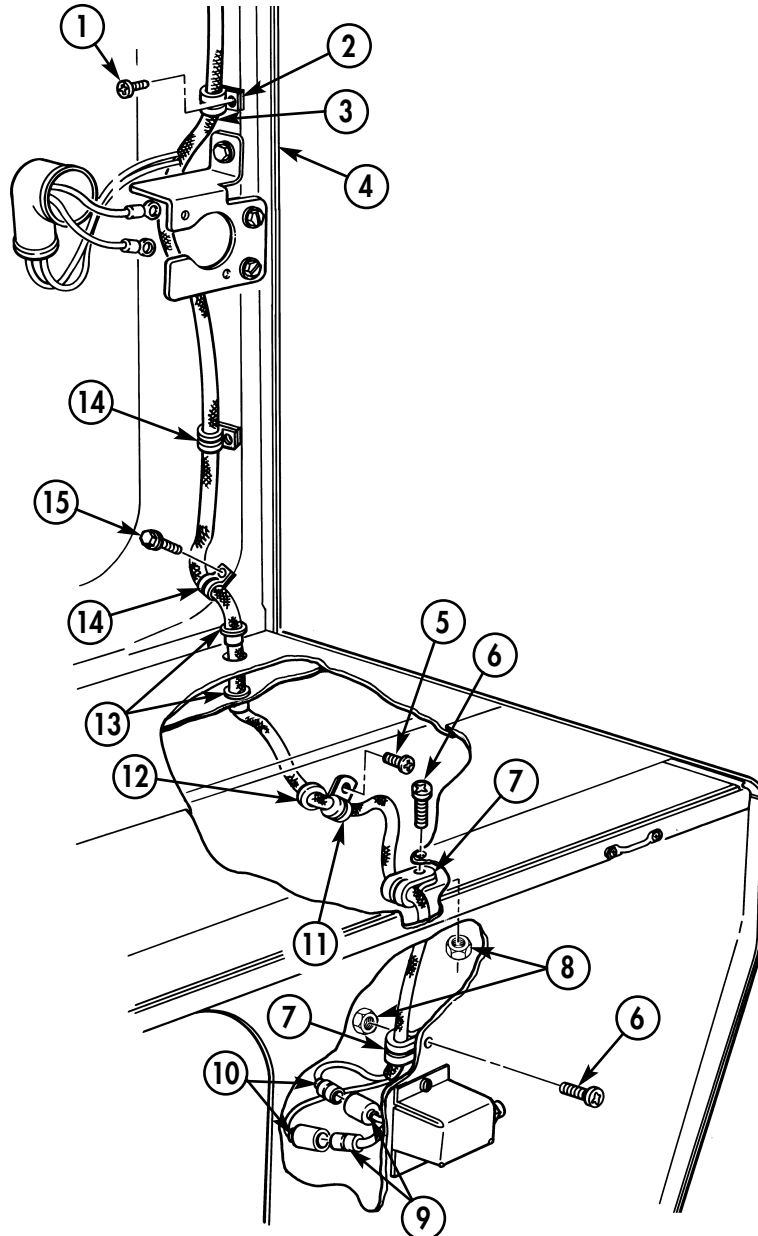
2. Remove eight screws (2) and lighting harness leads (1) from terminal block (7) and mounting buss (9).
3. Remove two screws (13), clamps (14), and lighting harness (12) from duct (15).
4. Disconnect lead 791B (10) from NBC harness lead 791A (8).
5. Remove grommet (11) and harness (12) from control box (6).
6. Deleted.
7. Remove four screws (29), clamp (17.1), and channel (30) from body (19) and pull channel (30) away for access to clamp (25).
8. Remove nut (23), screw (26), two clamps (25), and light harnesses (20) from cover (30).
9. Remove ten screws (21), cover (28), clamp (16), and harness (12) from body (19). Lower cover (28) to allow access to harness (12).
10. Disconnect six harness leads (17) from light leads (24). Remove harness cover (28) and grommet (27) from cover (28).
11. Disconnect four harness leads (18) from light leads (22).

4-101. INTERIOR LIGHTING HARNESS ASSEMBLY REPLACEMENT (M997, M997A1, M997A2) (Cont'd)

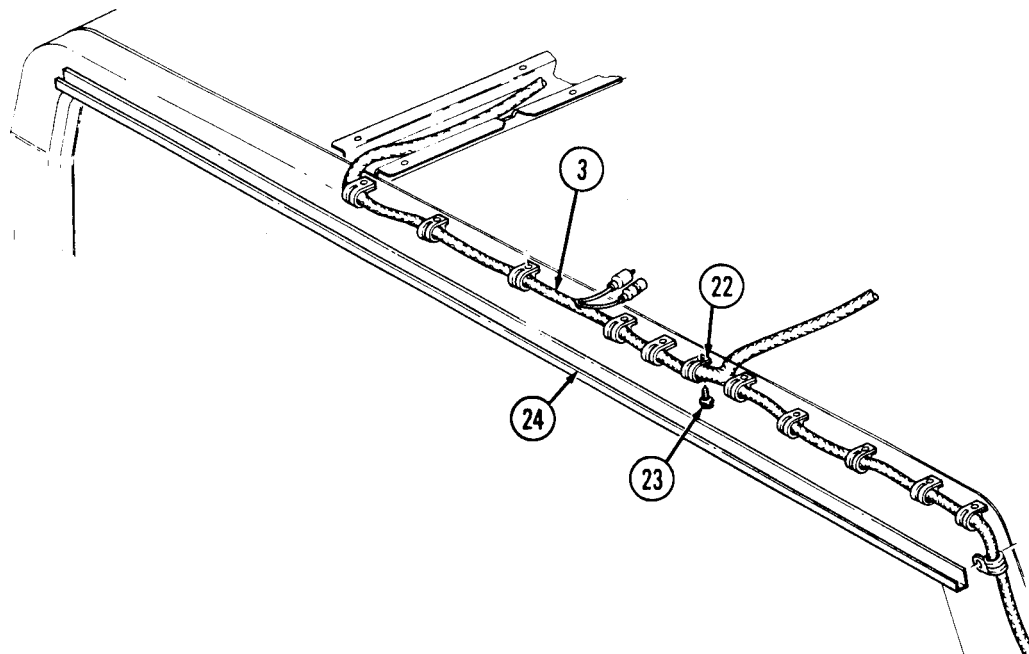
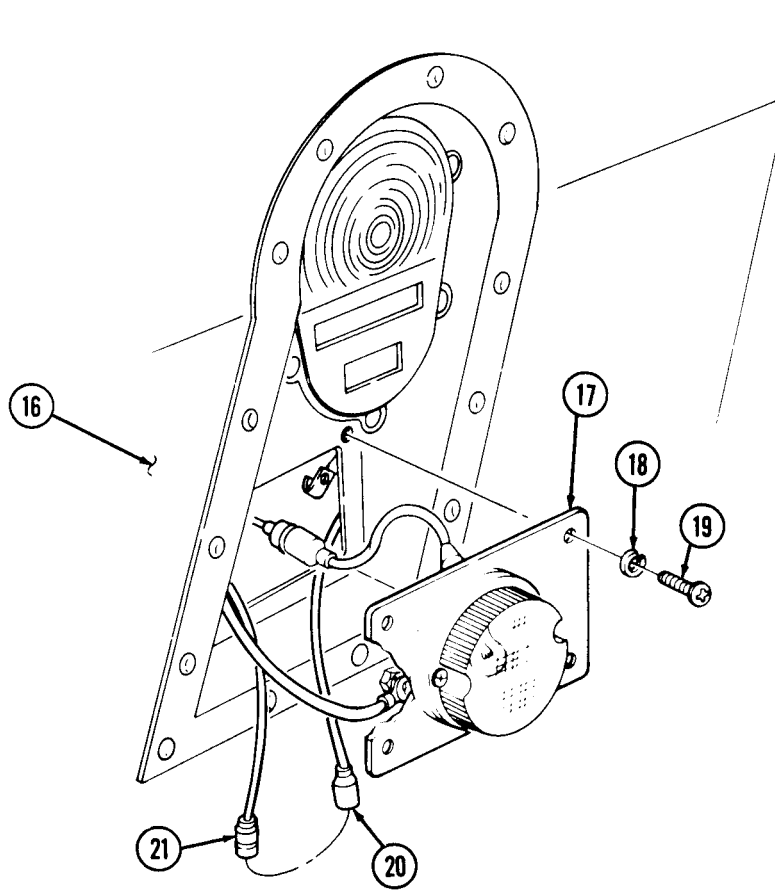


4-101. INTERIOR LIGHTING HARNESS ASSEMBLY REPLACEMENT (M997, M997A1, M997A2) (Cont'd)

12. Remove seven screws (1) and clamps (2) from harness (3) and body (4).
13. Remove two screws (15) and clamps (14) from harness (3) and body (4).
14. Remove two grommets (13) from harness (3) and body (4).
15. Remove four screws (19) and lockwashers (18) from backup light cover (17) and body (16). Pull cover (17) away from body (16) to allow access to harness (3). Discard lockwashers (18).
16. Disconnect harness lead 21H (21) from light harness 21G (20).
17. Remove grommet (12) and harness (3) from body (4).
18. Remove screw (5) and clamp (11) from harness (3) and body (4).
19. Remove two nuts (8), screws (6), and clamps (7) from harness (3) and body (4). Discard nuts (8).
20. Disconnect two harness leads (10) from blackout switch leads (9).
21. Remove six screws (23) and clamps (22) from harness (3) and body (24).



4-101. INTERIOR LIGHTING HARNESS ASSEMBLY REPLACEMENT (M997, M997A1, M997A2 (Cont'd)



4-101. INTERIOR LIGHTING HARNESS ASSEMBLY REPLACEMENT (M997, M997A1, M997A2) (Cont'd)

22. Remove four screws (7) from cover (6) and body (14).
23. Remove nut (3), screw (10), and cover (6) from two clamps (11) and light harnesses (11.1).
24. Disconnect four harness leads (5) from light leads (4).
25. Remove ten screws (13) from cover (8) and body (14). Lower cover (8) to allow access to harness (1).
26. Disconnect six harness leads (2) from light harness leads (12). Remove grommet (9) and harness cover (8).

CAUTION

Use care when removing harness. Failure to do so will cause damage to harness.

27. Remove harness (1) from body (14).

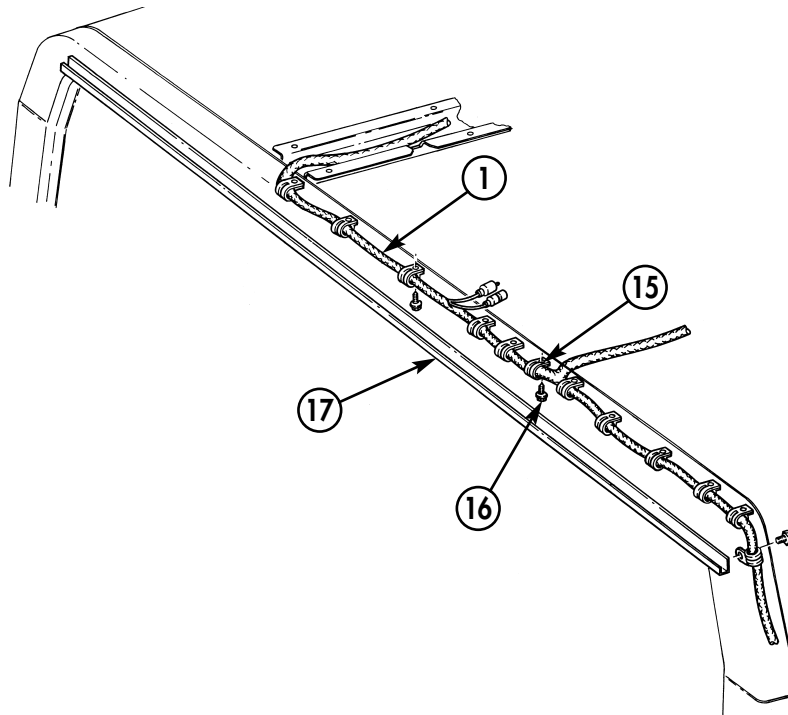
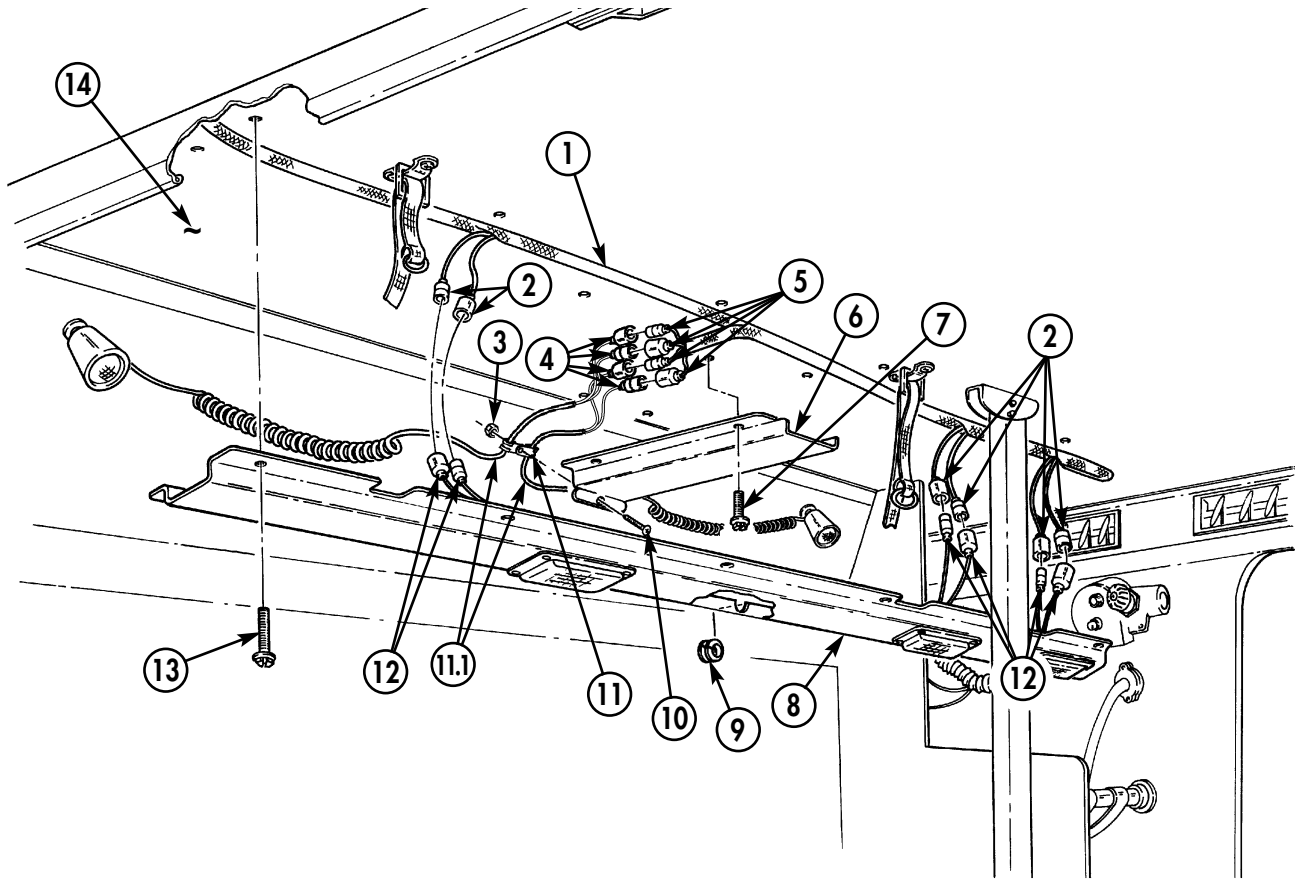
b. Installation

CAUTION

Use care when routing harness. Failure to do so will cause damage to harness.

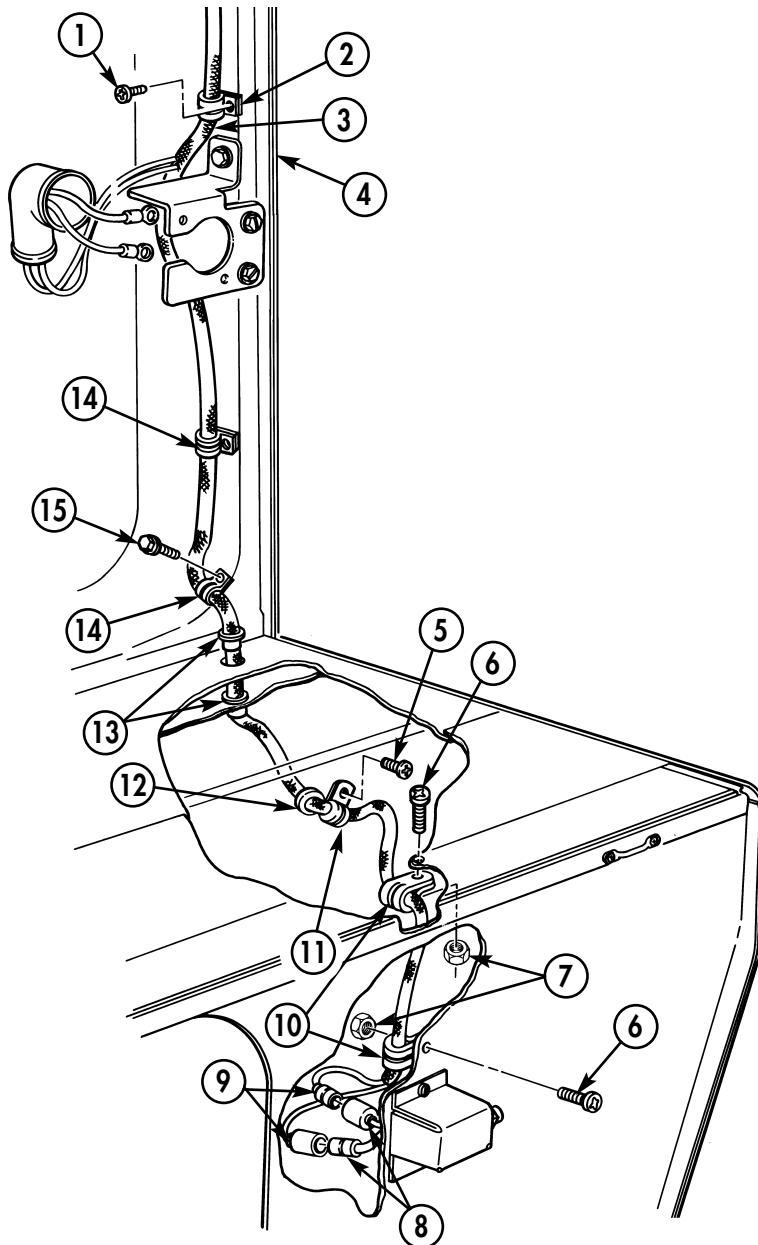
1. Route harness (1) through vehicle in approximate mounting location.
2. Position harness cover (8) over harness (1) and connect six harness leads (2) to light harness leads (12). Install grommet (9) and cover (8) to body (14) with ten screws (13).
3. Connect four harness leads (5) to light leads (4).
4. Install two clamps (11) and light harnesses (11.1) on cover (6) with screw (10) and nut (3).
5. Install cover (6) on body (14) with four screws (7).
6. Install six clamps (15) on harness (1) and body (17) with six screws (16).

4-101. INTERIOR LIGHTING HARNESS ASSEMBLY REPLACEMENT (M997, M997A1, M997A2) (Cont'd)

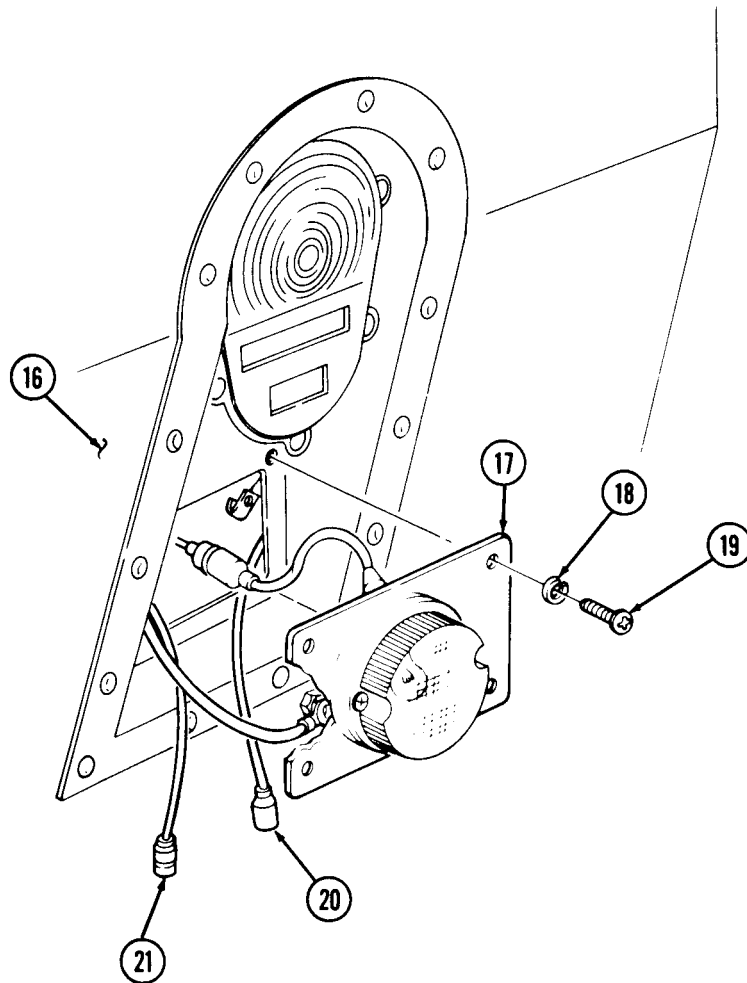


4-101. INTERIOR LIGHTING HARNESS ASSEMBLY REPLACEMENT (M997, M997A1, M997A2) (Cont'd)

7. Connect two harness leads (9) to blackout switch leads (8).
8. Install two clamps (10) on harness (3) and body (4) with two screws (6) and nuts (7).
9. Install clamp (11) on harness (3) and body (4) with screw (5).
10. Install grommet (12) and harness (3) in body (4).
11. Connect harness lead 24H (21) to lead 21G (20).
12. Install backup light cover (17) on body (16) with four lockwashers (18) and screws (19).
13. Install two grommets (13) on harness (3) and body (4).
14. Install two clamps (14) on harness (3) and body (4) with two screws (15).
15. Install seven clamps (2) on harness (3) and body (4) with seven screws (1).

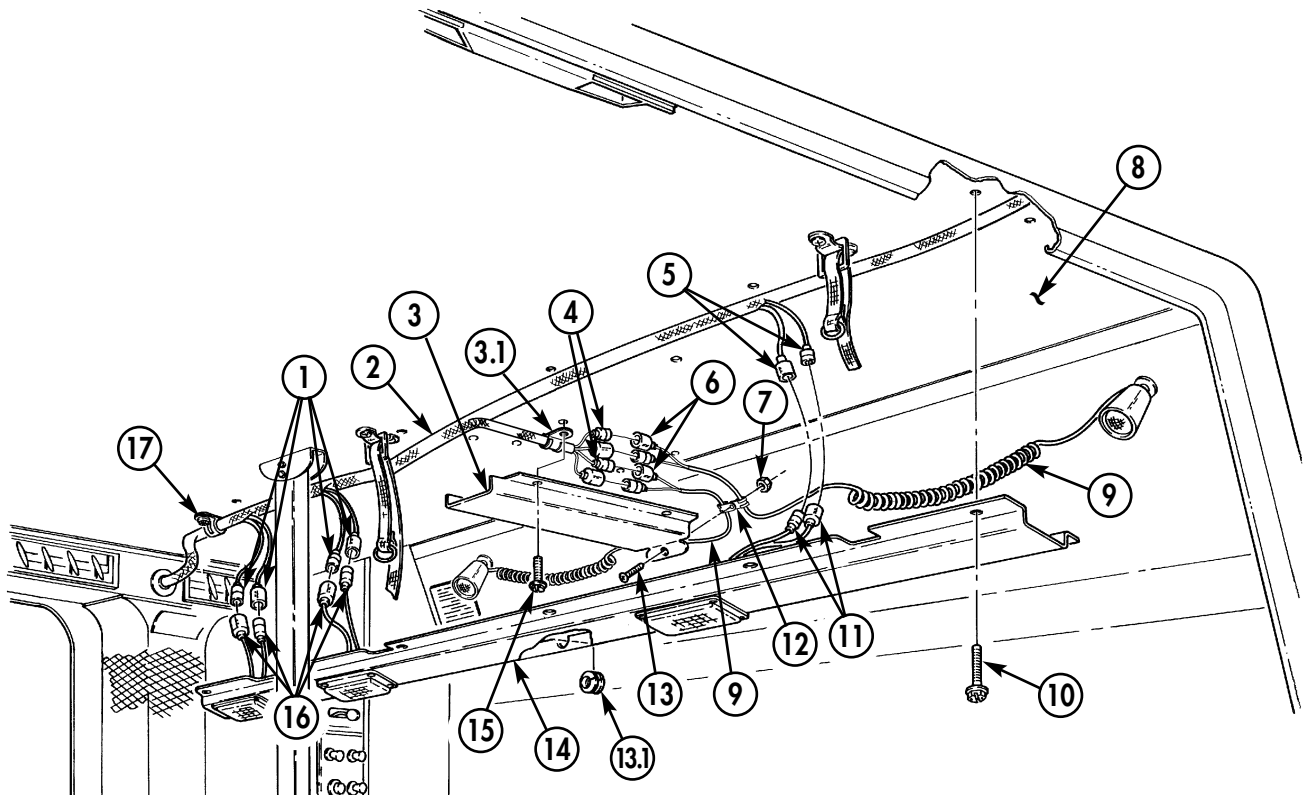


4-101. INTERIOR LIGHTING HARNESS ASSEMBLY REPLACEMENT (M997, M997A1, M997A2) (Cont'd)

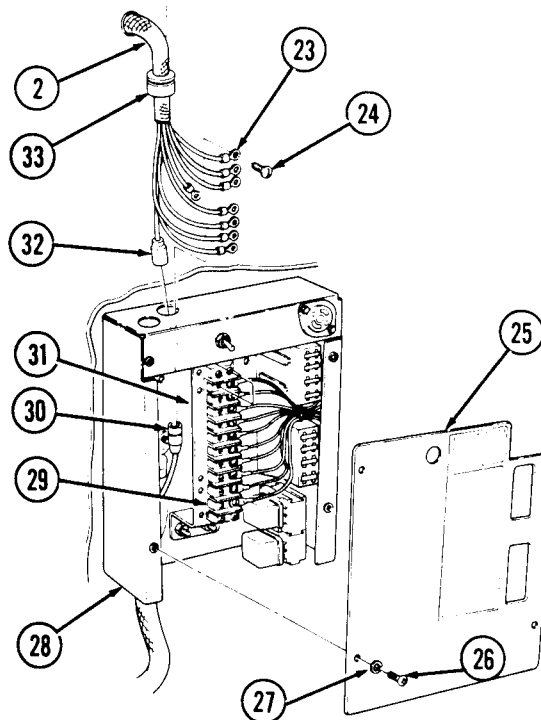
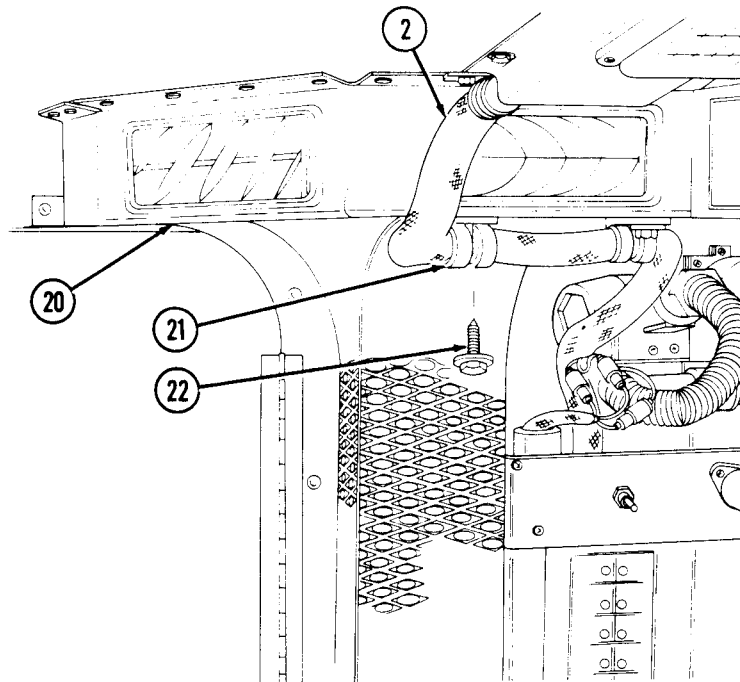


4-101. INTERIOR LIGHTING HARNESS ASSEMBLY REPLACEMENT (M997, M997A1, M997A2) (Cont'd)

16. Connect four harness leads (4) to light harness leads (6).
17. Install grommet (13.1) on cover (14) and connect six harness leads (1) and (5) to light leads (16) and (11).
18. Install clamp (17) and cover (14) on body (8) and harness (2) with ten screws (10).
19. Install two clamps (12) on light harnesses (9) and cover (3) with screw (13) and nut (7).
20. Install cover (3) and clamp (3.1) on body (8) with four screws (15).
21. Deleted.
22. Install two clamps (21) on harness (2) and duct (20) with two screws (22).
23. Connect lead 791B (32) to NBC harness lead 791A (30).
24. Install eight leads (23) on terminal block (29) and ground buss (31) with eight screws (24).
25. Install grommet (33) on control box (28).
26. Install cover (25) on control box (28) with four screws (26) and lockwashers (27).



4-101. INTERIOR LIGHTING HARNESS ASSEMBLY REPLACEMENT (M997, M997A1, M997A2) (Cont'd)



- FOLLOW-ON TASKS:**
- Connect battery ground cable (para. 4-73).
 - Check operation of interior dome lights (TM 9-2320-280-10).
 - Install rear door blackout switch (para. 4-93).
 - Install electrical outlet/bracket (para. 4-90).

4-102. INTERIOR LIGHTING HARNESS ASSEMBLY REPLACEMENT (M996, M996A1)

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M996, M996A1

Tools

General mechanic's kit:
 automotive (Appendix B, Item 1)

Materials/Parts

Eight lockwashers (Appendix G, Item 136)

Manual References

TM 9-2320-280-10
 TM 9-2320-280-24P

Equipment Condition

- Battery ground cable disconnected (para. 4-73).
- Rear door blackout switch/bracket removed (para. 4-93).
- Rear close out panel removed (para. 11-182).
- Electrical outlet/bracket removed (para. 4-90).

a. Removal

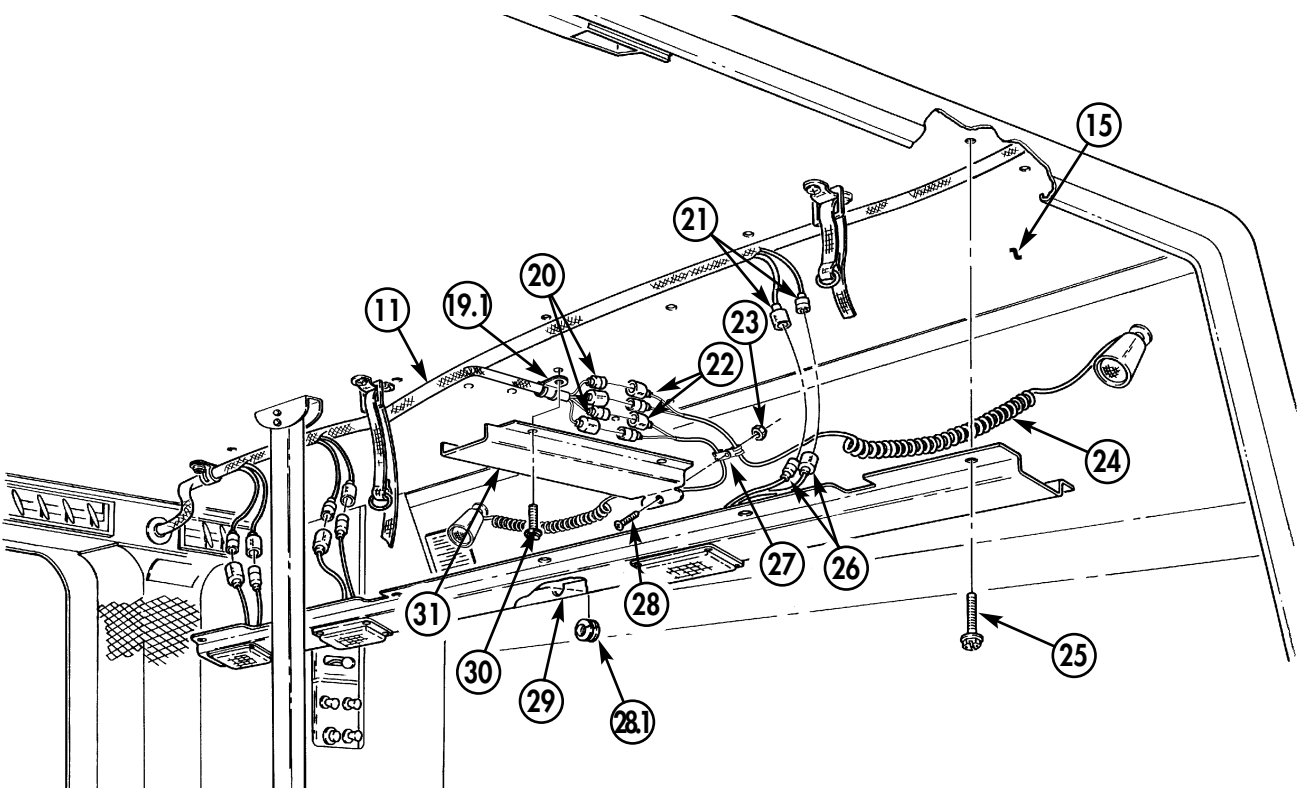
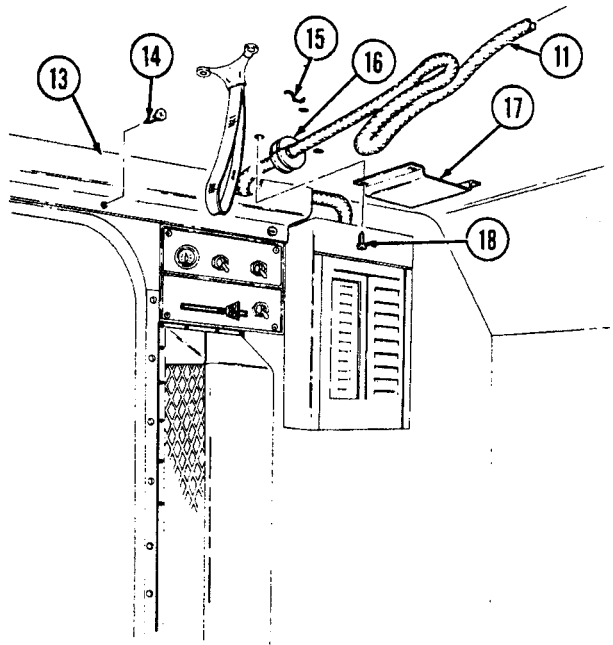
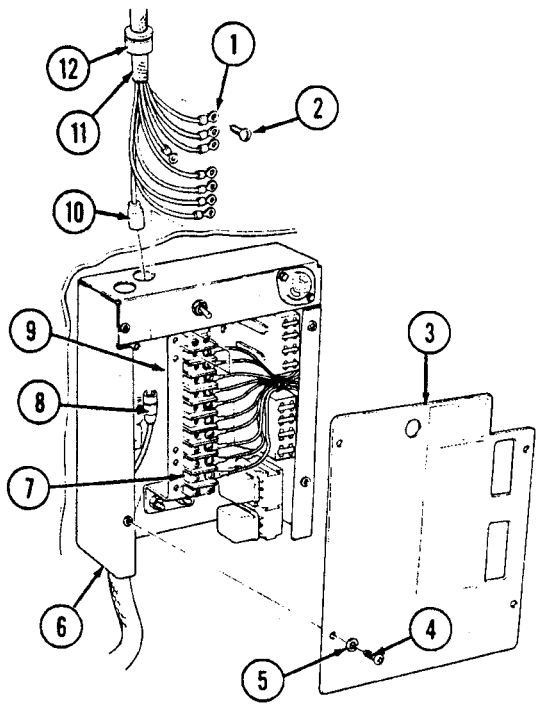
1. Remove four screws (4), lockwashers (5), and cover (3) from control box (6). Discard lockwasher (5).

NOTE

Prior to removal, tag leads for installation.

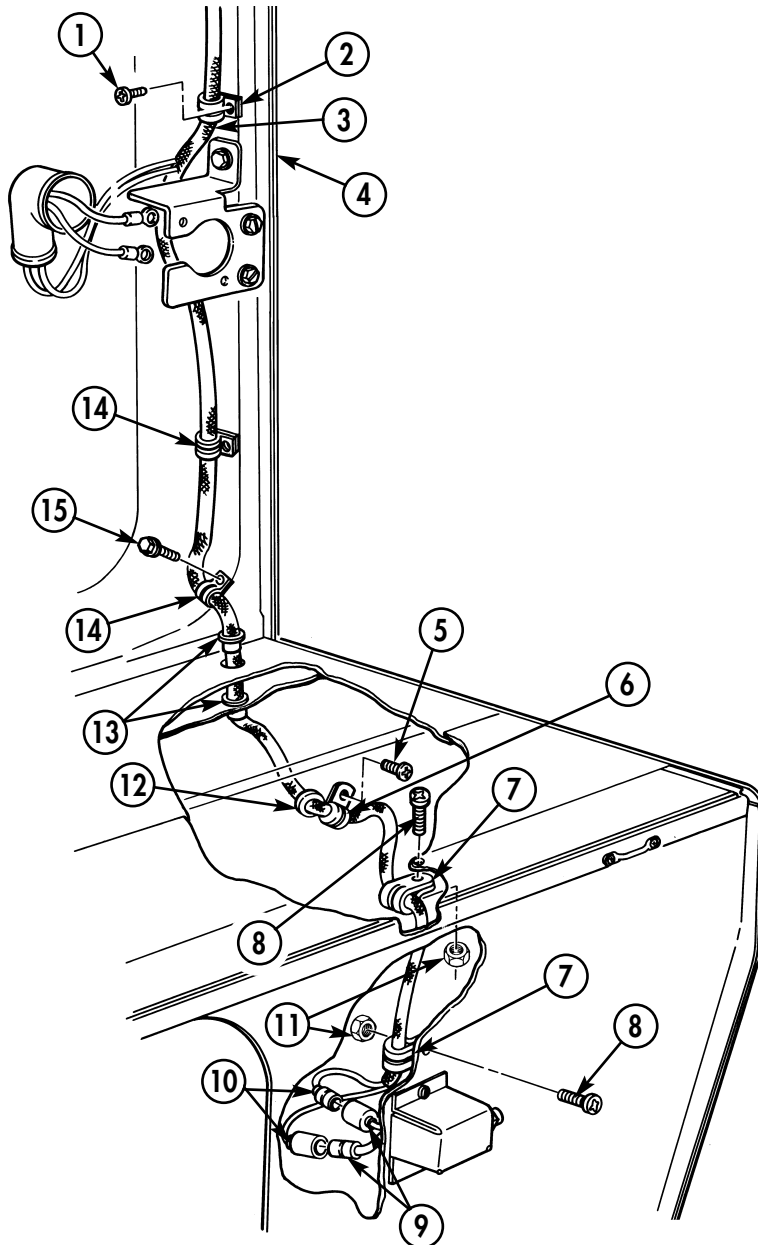
2. Remove eight screws (2) and lighting harness leads (1) from terminal block (7) and mounting buss (9).
3. Disconnect lead 791B (10) from NBC harness lead 791A (8).
4. Remove grommet (12) and harness (11) from control box (6).
5. Remove four screws (14) and cover (13) from body (15) and harness (11).
6. Remove grommet (16) from harness (11).
7. Remove four screws (18) and cover (17) from body (15).
8. Remove four screws (30) and clamp (19.1) from channel (31) and body (15).
9. Remove nut (23), screw (28), clamp (27), and light harness (24) from cover (31).
10. Remove grommet (28.1) from cover (29).
11. Remove ten screws (25) from cover (29) and body (15). Lower cover (29) to allow access to harness (11).
12. Disconnect six harness leads (21) from light leads (26). Remove harness cover (29).
13. Disconnect two harness leads (20) from light leads (22).

4-102. INTERIOR LIGHTING HARNESS ASSEMBLY REPLACEMENT (M996, M996A1) (Cont'd)

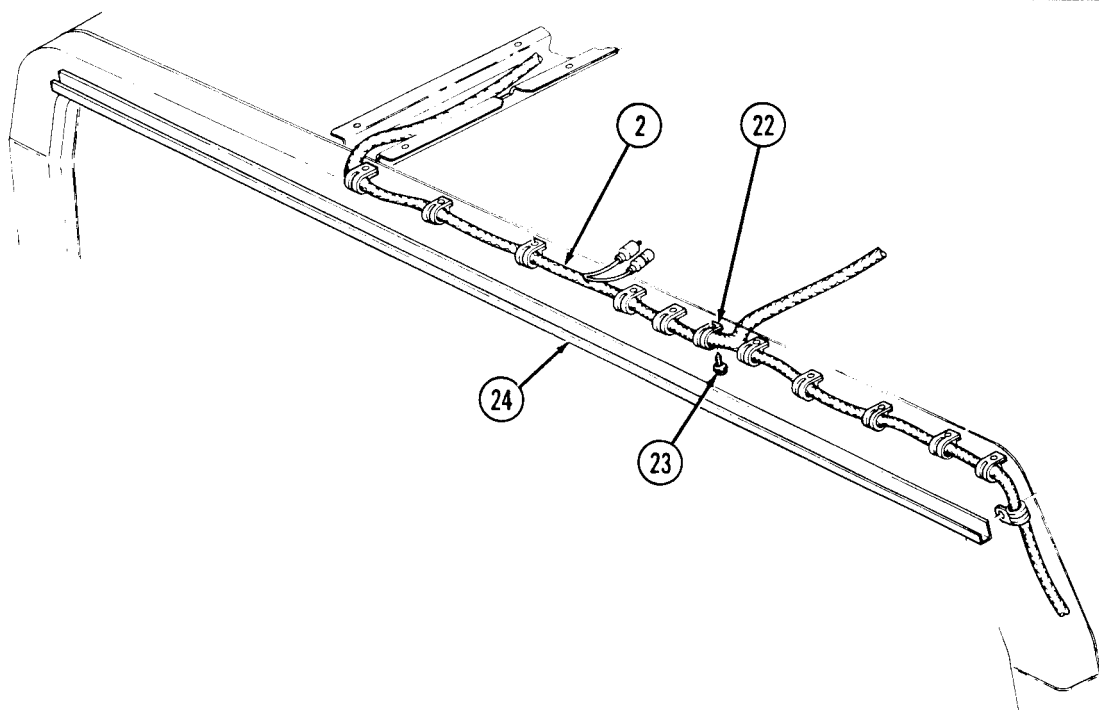
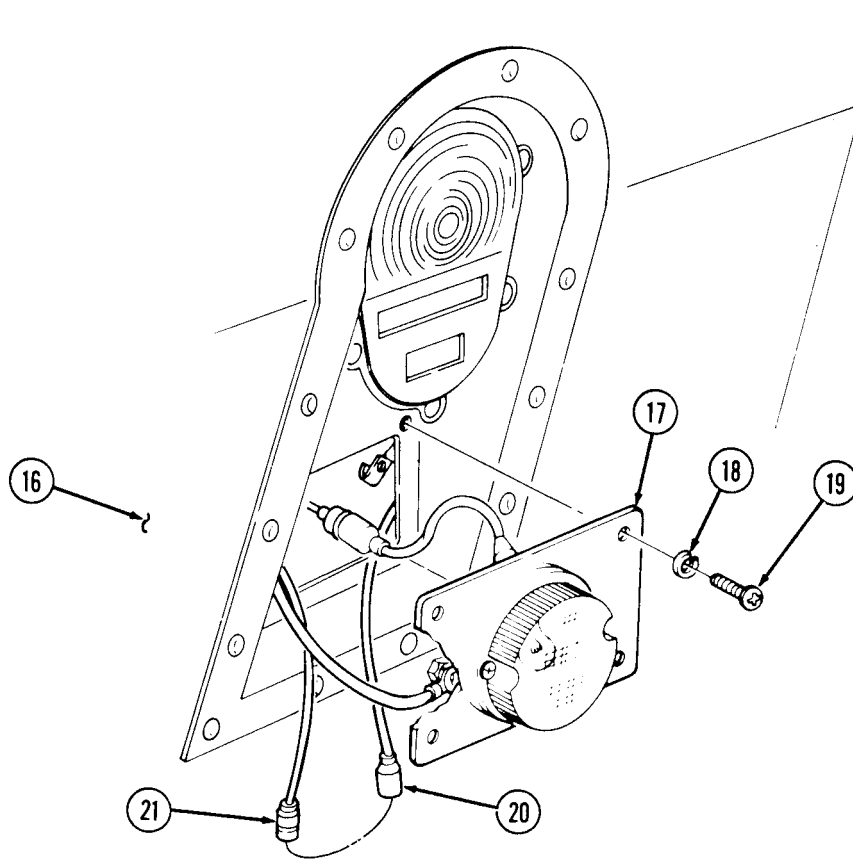


4-102. INTERIOR LIGHTING HARNESS ASSEMBLY REPLACEMENT (M996, M996A1) (Cont'd)

14. Remove seven screws (1) and clamps (3) from harness (2) and body (4).
15. Remove two screws (15) and clamps (14) from harness (2) and body (4).
16. Remove two grommets (13) from harness (2) and body (4).
17. Remove four screws (19) and lockwashers (18) from backup light cover (17) and body (16). Pull cover (17) away from body (16) to allow access to harness (2). Discard lockwashers (18).
18. Disconnect harness lead 21H (21) from light harness 21G (20).
19. Remove grommet (12) from harness (2) and body (4).
20. Remove screw (5) and clamp (6) from harness (2) and body (4).
21. Remove two nuts (11), screws (8), and clamps (7) from harness (2) and body (4)
22. Disconnect two harness leads (10) from blackout switch leads (9).
23. Remove six screws (23) and clamps (22) from harness (2) and body (24).



4-102. INTERIOR LIGHTING HARNESS ASSEMBLY REPLACEMENT (M996, M996A1) (Cont'd)



4-102. INTERIOR LIGHTING HARNESS ASSEMBLY REPLACEMENT (M996, M996A1) (Cont'd)

24. Remove four screws (7) from cover (6) and body (15).
- 25. Remove nut (3), screw (10), clamp (11), and cover (6) from light harness (14).
26. Remove grommet (9) from cover (8).
27. Disconnect two harness leads (5) from light leads (4).
28. Remove ten screws (13) from cover (8) and body (15). Lower cover (8) to allow access to harness (1).
29. Disconnect six harness leads (2) from light harness leads (12). Remove harness cover (8).

CAUTION

Use care when removing harness. Failure to do so will cause damage to harness.

30. Remove harness (1) from body (15).

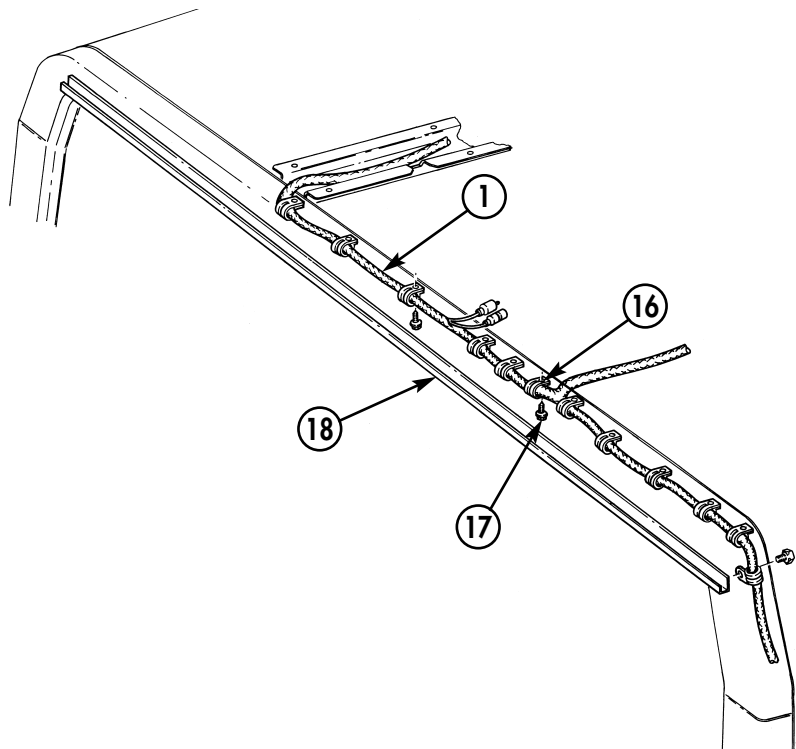
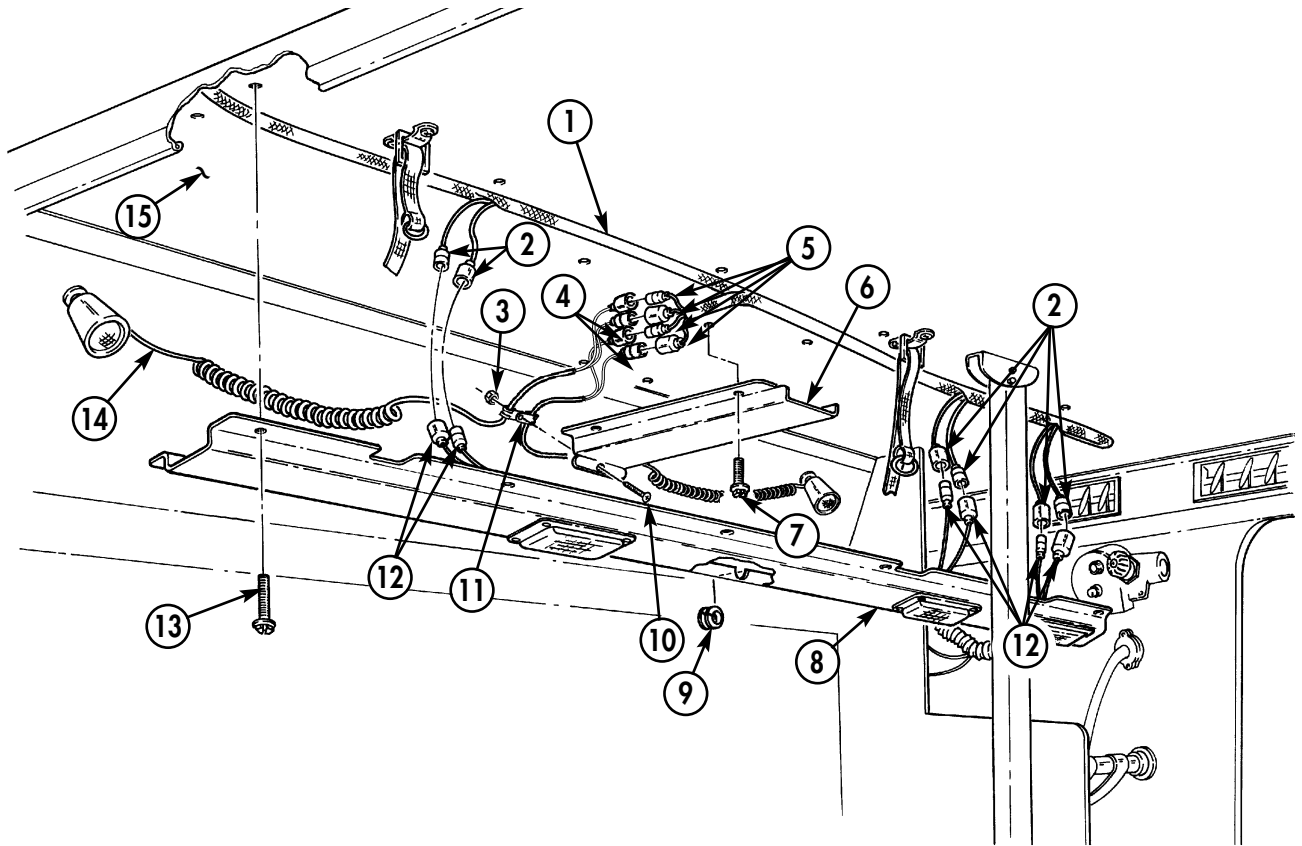
b. Installation

CAUTION

Use care when routing harness. Failure to do so will cause damage to harness.

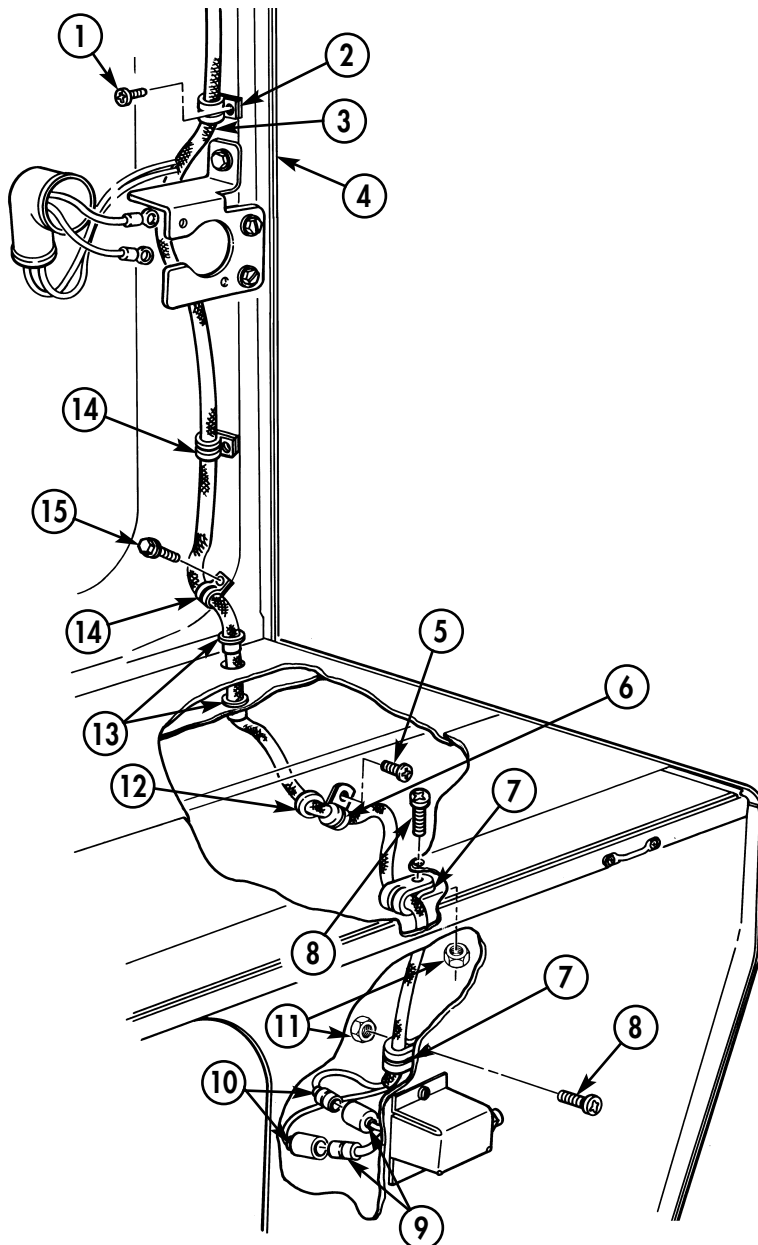
1. Route harness (1) through vehicle in approximate mounting location.
2. Position harness cover (8) over harness (1) and connect six harness leads (2) to light harness leads (12). Install cover (8) on body (15) with ten screws (13).
3. Connect two harness leads (5) to light leads (4).
4. Install grommet (9) on cover (8).
- 5. Install clamp (11) and light harness (14) on cover (6) with screw (10) and nut (3).
6. Install cover (6) on body (15) with four screws (7).
7. Install six clamps (16) and harness (1) on body (18) with six screws (17).

4-102. INTERIOR LIGHTING HARNESS ASSEMBLY REPLACEMENT (M996, M996A1) (Cont'd)

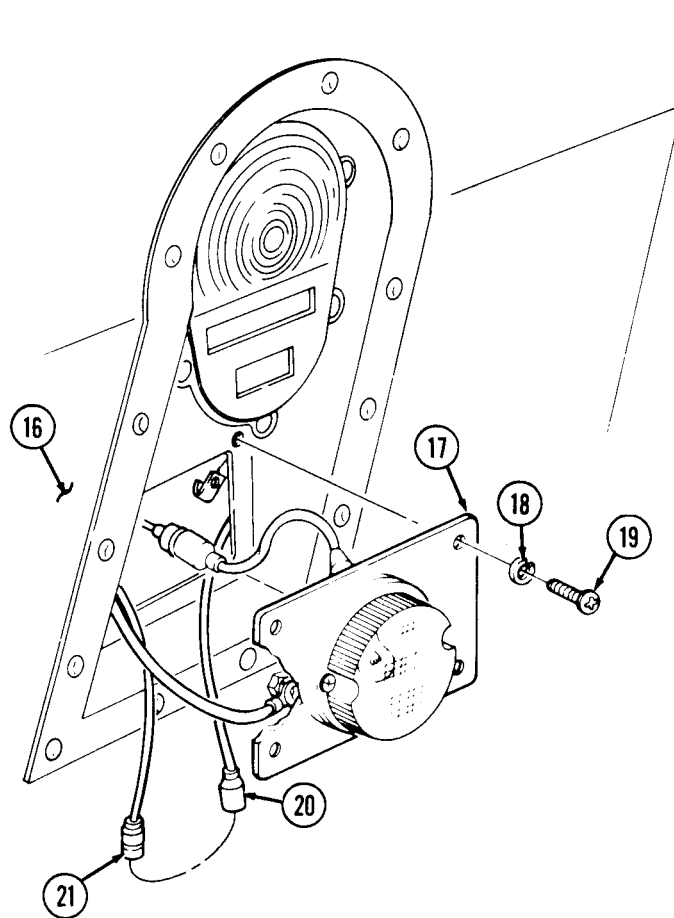


4-102. INTERIOR LIGHTING HARNESS ASSEMBLY REPLACEMENT (M996, M996A1) (Cont'd)

8. Connect two harness leads (10) to blackout switch leads (9).
9. Install two clamps (7) and harness (2) on body (4) with two screws (8) and nuts (11).
10. Install clamp (6) and harness (2) on body (4) with screw (5).
11. Install grommet (12) on harness (2) and body (4).
12. Connect harness lead 24H (21) to lead 21G (20).
13. Install backup light cover (17) on body (16) with four lockwashers (18) and screws (19).
14. Install grommet (13) on harness (2) and body (4).
15. Install two clamps (14) and harness (2) on body (4) with two screws (15).
16. Install seven clamps (3) and harness (2) on body (4) with seven screws (1).

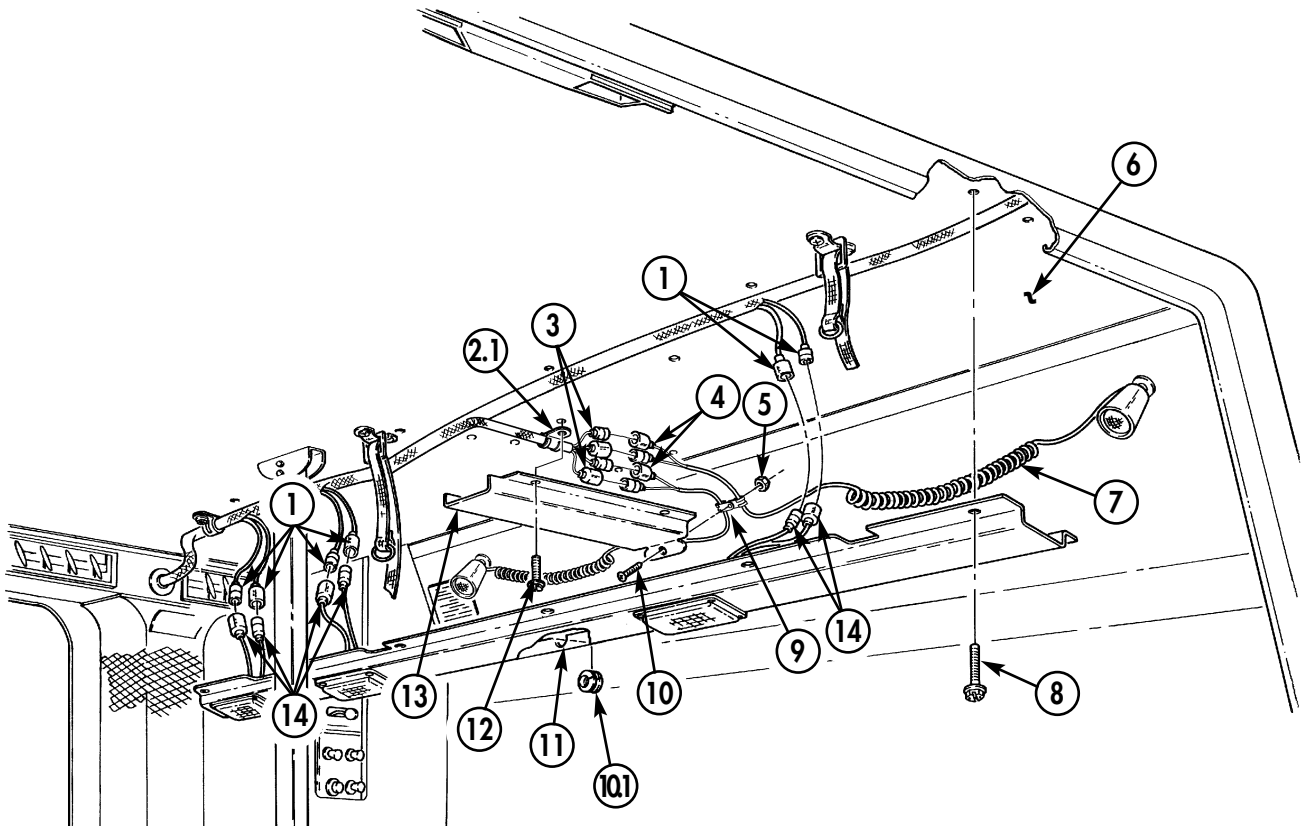


4-102. INTERIOR LIGHTING HARNESS ASSEMBLY REPLACEMENT (M996, M996A1) (Cont'd)

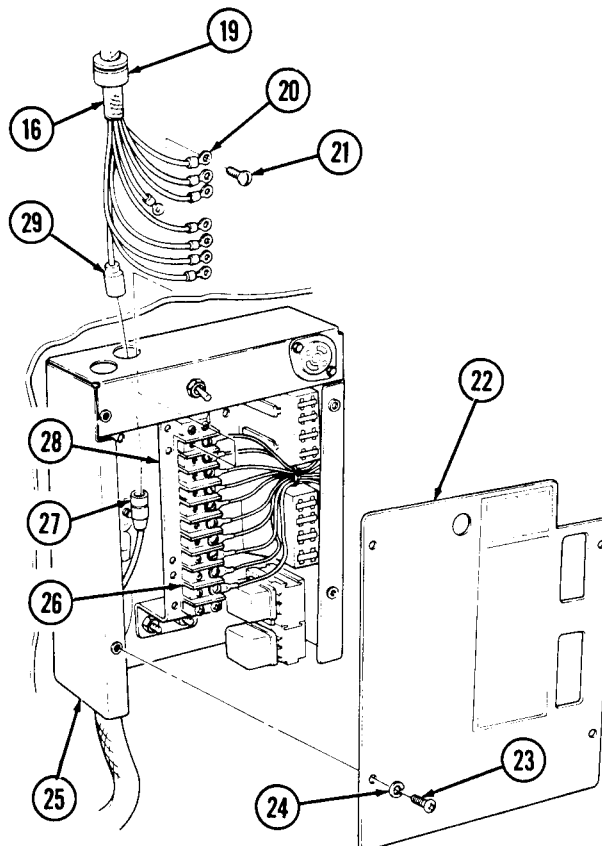
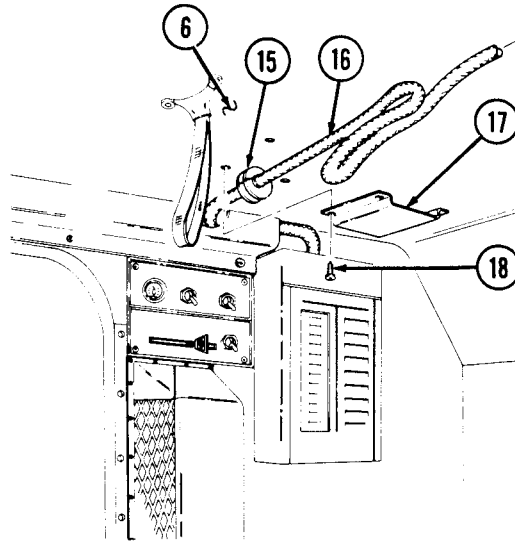


4-102. INTERIOR LIGHTING HARNESS ASSEMBLY REPLACEMENT (M996, M996A1) (Cont'd)

17. Connect two harness leads (3) on light harness leads (4).
18. Install grommet (10.1) on cover (11).
19. Position cover (11) and connect six harness leads (1) to light leads (14).
20. Install cover (11) on body (6) with ten screws (8).
21. Install clamp (9) on light harness (7) and cover (13) with screw (10) and nut (5).
22. Install cover (13) and clamp (2.1) on body (6) with four screws (12).
23. Install grommet (15) on harness (16).
24. Position grommet (19) and harness (16) in control box (25).
25. Install cover (17) on body (6) with four screws (18).
26. Connect lead 791B (29) to NBC harness lead 791A (27).
27. Install eight leads (20) on terminal block (26) and ground buss (28) with eight screws (21).
28. Install cover (22) on control box (25) with four screws (23) and lockwashers (24).



4-102. INTERIOR LIGHTING HARNESS ASSEMBLY REPLACEMENT (M996, M996A1) (Cont'd)



- FOLLOW-ON TASKS:
- Install rear close out panel (para. 11-182)
 - Connect battery ground cable (para. 4-73).
 - Check operation of interior dome lights (TM 9-2320-280-10).
 - Install rear door blackout switch/bracket (para. 4-93).
 - Install electrical outlet/bracket (para. 4-90).

4-103. WIRING HARNESS DUCT ASSEMBLY REPLACEMENT

This task covers:

- | | |
|---|---|
| <p>a. Spotlight Branch Duct Removal</p> <p>b. Main Duct Removal</p> | <p>c. Main Duct Installation</p> <p>d. Spotlight Branch Duct Installation</p> |
|---|---|

INITIAL SETUP:

Applicable Models

M996, M996A1, M997, M997A1, M997A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

Battery ground cable disconnected (para. 4-73).

NOTE

Harness duct replacement for M996, M996A1, M997, M997A1, and M997A2 are basically the same. This procedure covers M996 and M996A1 models only.

a. Spotlight Branch Duct Removal

1. Remove four screws (12) from duct (2), clamp (3), and ceiling (4) and pull duct (2) away from ceiling (4) for access to spotlight harness clamp (5).
2. Remove screw (11), nut (6), and spotlight wiring clamp (5) from duct (2).

b. Main Duct Removal

NOTE

- Spotlight branch duct must be removed before removing main duct. Main duct must be installed before installing spotlight branch duct.
 - Prior to removal, tag leads for installation.
1. Remove ten screws (8) from duct (7) and ceiling (4) and pull duct (7) away for access to wiring harness leads (1).
 2. Disconnect six light assembly leads (9) from wiring harness leads (1) and remove duct (7).
 3. Remove two ceiling lights (10) and blackout light (13) (para. 4-87).
 4. Inspect grommet (11.1) for damage. Replace if damaged.

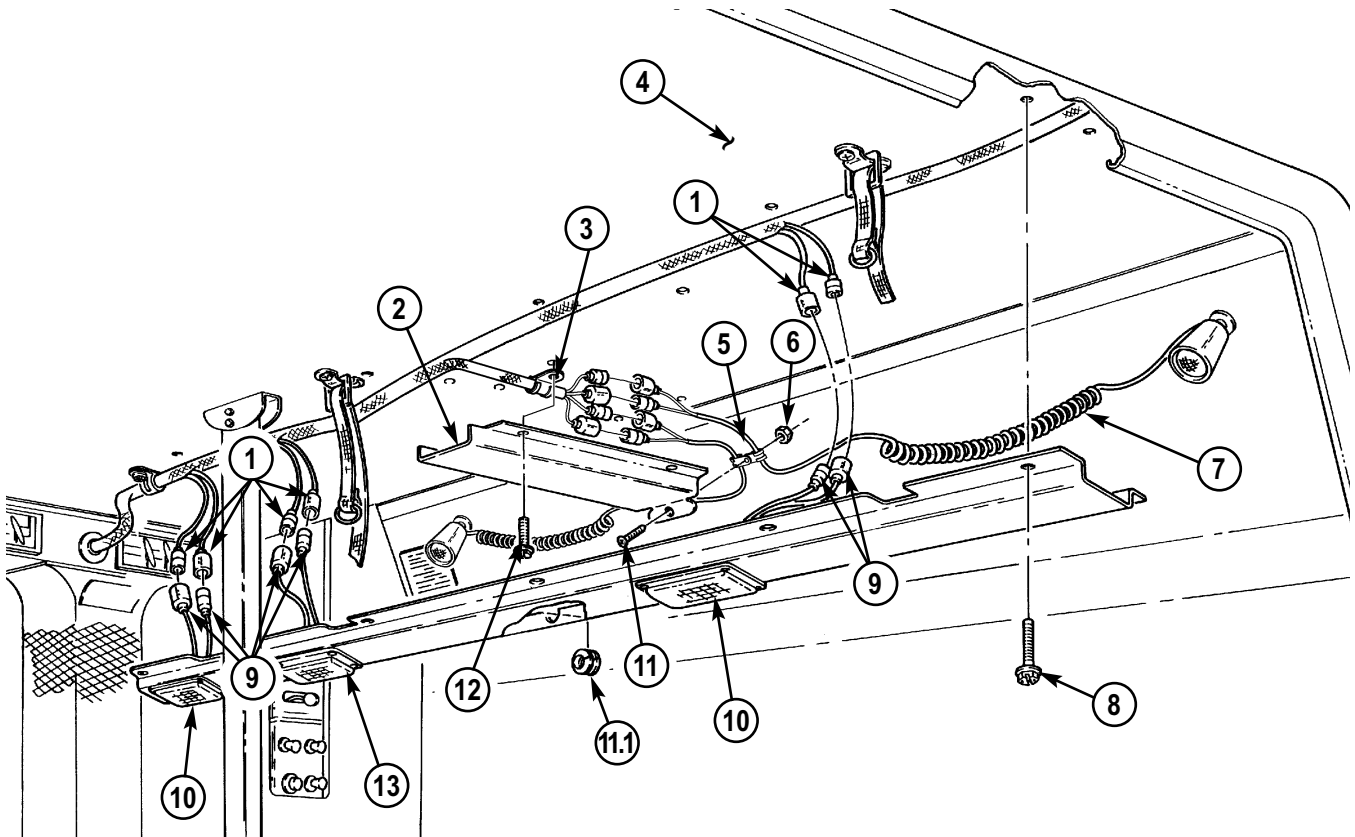
c. Main Duct Installation

1. Install two ceiling lights (10) and blackout light (13) (para. 4-87).
2. Connect six light assembly leads (9) to wiring harness leads (1).
3. Install duct (7) on ceiling (4) with ten screws (8)

d. Spotlight Branch Duct Installation

1. Install spotlight harness clamp (5) on duct (2) with screw (11) and nut (6).
2. Install duct (2) and clamp (3) on ceiling (4) with four screws (12).

4-103. WIRING HARNESS DUCT ASSEMBLY REPLACEMENT (Cont'd)



- FOLLOW-ON TASKS:**
- Connect battery ground cable (para. 4-73).
 - Check operation of interior lights (TM 9-2320-280-10).

4-104. RESUSCITATOR/ASPIRATOR CABLE REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M996, M996A1, M997, M997A1, M997A2

Manual References

TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

NOTE

- Replacement of resuscitator/aspirator cable is basically the same for M996, M996A1, M997, M997A1, and M997A2 vehicles. This procedure covers M997, M997A1, and M997A2 vehicles.
- For instructions on replacement of rivets, refer to para. 10-66.

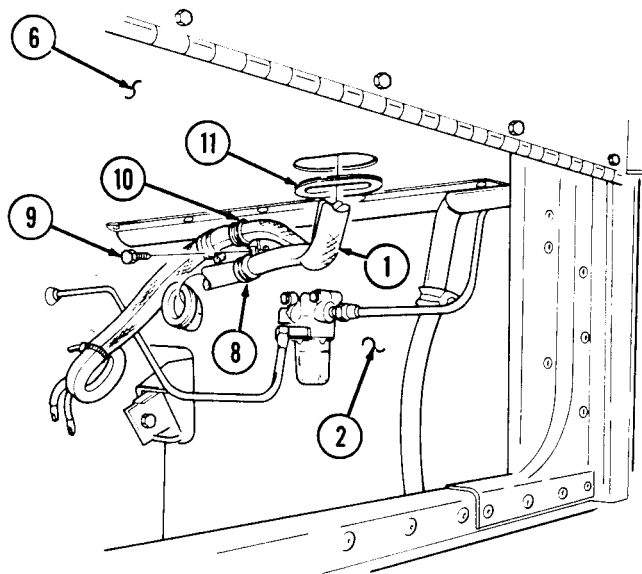
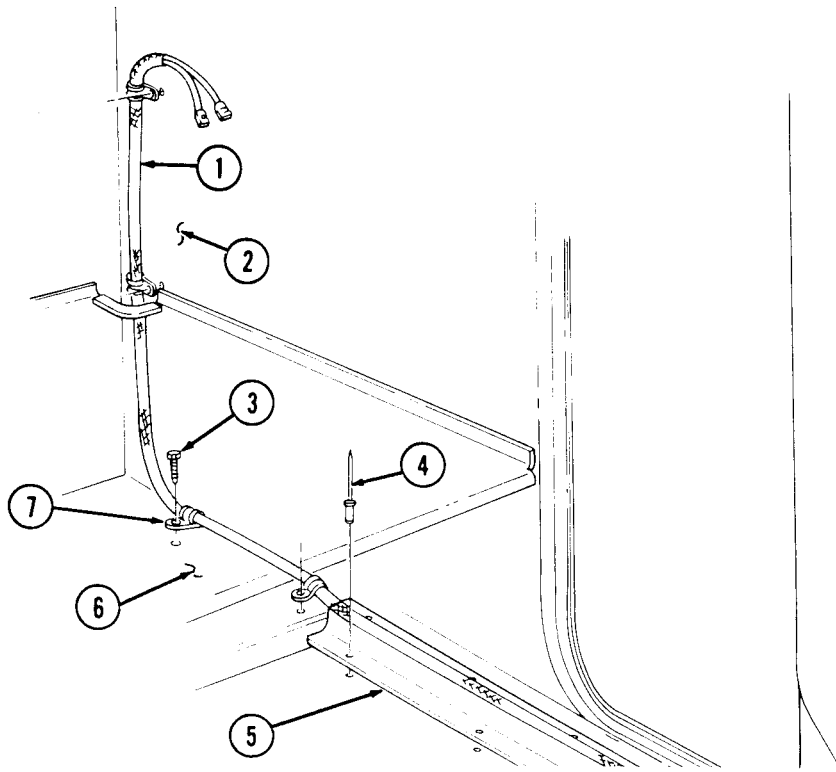
a. Removal

1. Remove two screws (3), clamps (7), and cable (1) from body (2) and floor (6).
2. Remove nine rivets (4) from cable duct (5) and floor (6) and slide duct (5) left to remove.
3. Remove two screws (9), clamps (10), cable (1), and power harness clamp (8) from body (2).
4. Remove grommet (11) from floor (6) and remove cable (1) through hole in floor (6).

b. Installation

1. Install grommet (11) in floor (6).
2. Route cable (1) through grommet (11) in floor (6) and position in approximate mounting location.
3. Connect cable (1) to resuscitator and power source. (Leave slack at each end of cable before clamping to connect resuscitation equipment if not installed.)
4. Install two clamps (7) and cable (1) on body (2) and floor (6) with two screws (3).
5. Install cable duct (5) over cable (1) and slide to right under heat duct to mounting position.
6. Install cable duct (5) on floor (6) with nine rivets (4).
7. Install two clamps (10), cable (1), and power harness clamp (8) on body (2) with two screws (9).

4-104. RESUSCITATOR/ASPIRATOR CABLE REPLACEMENT (Cont'd)



4-105. ANTENNA CABLES REPLACEMENT (M996, M996A1)

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M996, M996A1

Manual References

TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

Battery ground cable disconnected (para. 4-73).

Materials/Parts

Two tiedown straps (Appendix G, Item 307)

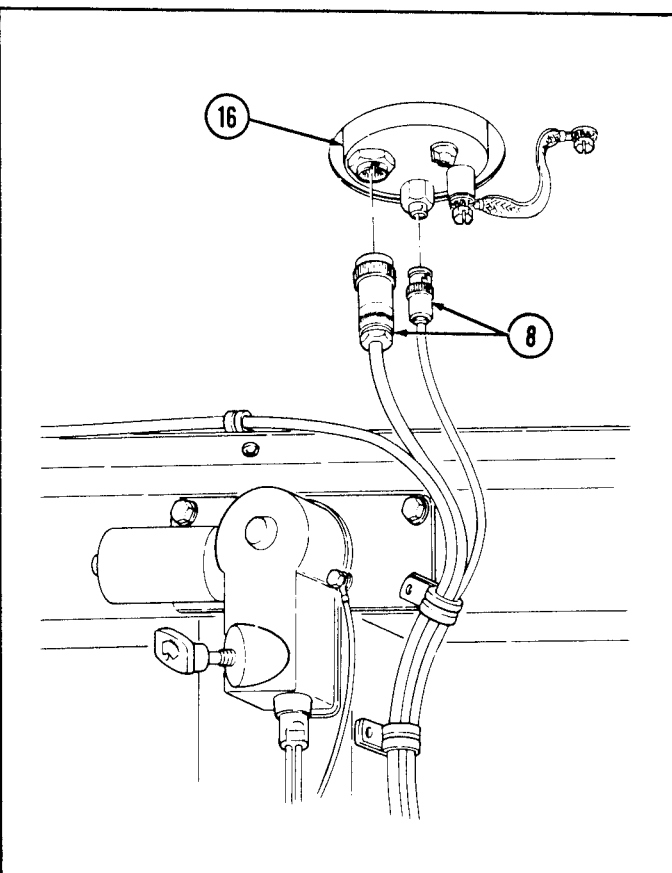
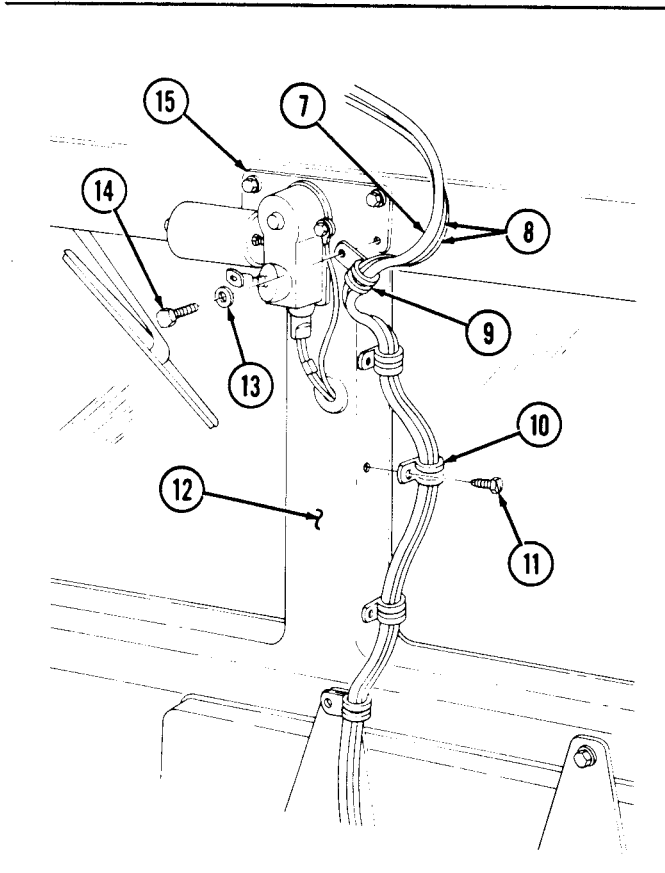
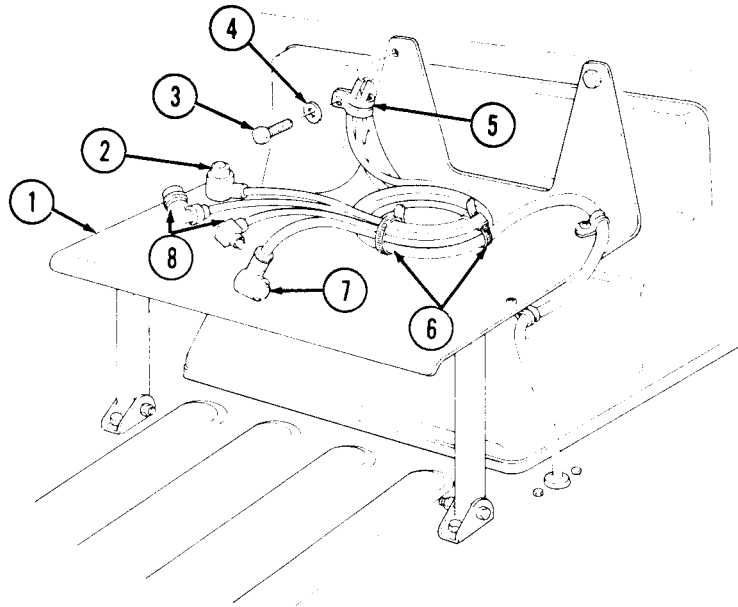
a. Removal

1. Remove two tiedown straps (6) from antenna cables (8), power cable (2), and intercom cable (7). Discard tiedown straps (6).
2. Remove capscrew (3), washer (4), clamp (5), two antenna cables (8), and intercom cable (7) from radio rack (1).
3. Remove three screws (11), clamps (10), two antenna cables (8) and intercom cable (7) from windshield (12).
4. Remove capscrew (14), washer (13), clamp (9), two antenna cables (8) and intercom cable (7) from plate (15) and windshield (12).
5. Remove two antenna cables (8) from antenna (16).

b. Installation

1. Install antenna cables (8) on antenna (16).
2. Install clamp (9) two antenna cables (8) and intercom cable (7) on plate (15) and windshield (12) with washer (13) and capscrew (14). Tighten capscrew (14) 6 lb-ft (8 N•m).
3. Install three clamps (10), two antenna cables (8) and intercom cable (7) on windshield (12) with three screws (11).
4. Install clamp (5), two antenna cables (8) and intercom cable (7) on radio rack (1) with washer (4) and capscrew (3). (Tighten capscrew (3) 6 lb-ft (8 N•m).
5. Install two antenna cables (8) on intercom cable (7) and power cable (2) with two tiedown straps (6).

4-105. ANTENNA CABLES REPLACEMENT (M996, M996A1) (Cont'd)



FOLLOW-ON TASK: Connect battery ground cable (para. 4-73).

4-106. ANTENNA CABLES REPLACEMENT (M997, M997A1, M997A2)

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M997, M997A1, M997A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

- Two tiedown straps (Appendix G, Item 308)
- Two lockwashers (old configuration only)
(Appendix G, Item 138)
- Two assembled locknuts (old configuration only)
(Appendix G, Item 130)
- Six assembled locknuts
(new configuration only)
(Appendix G, Item 130)

Manual References

- TM 9-2320-280-10
- TM 9-2320-280-24P

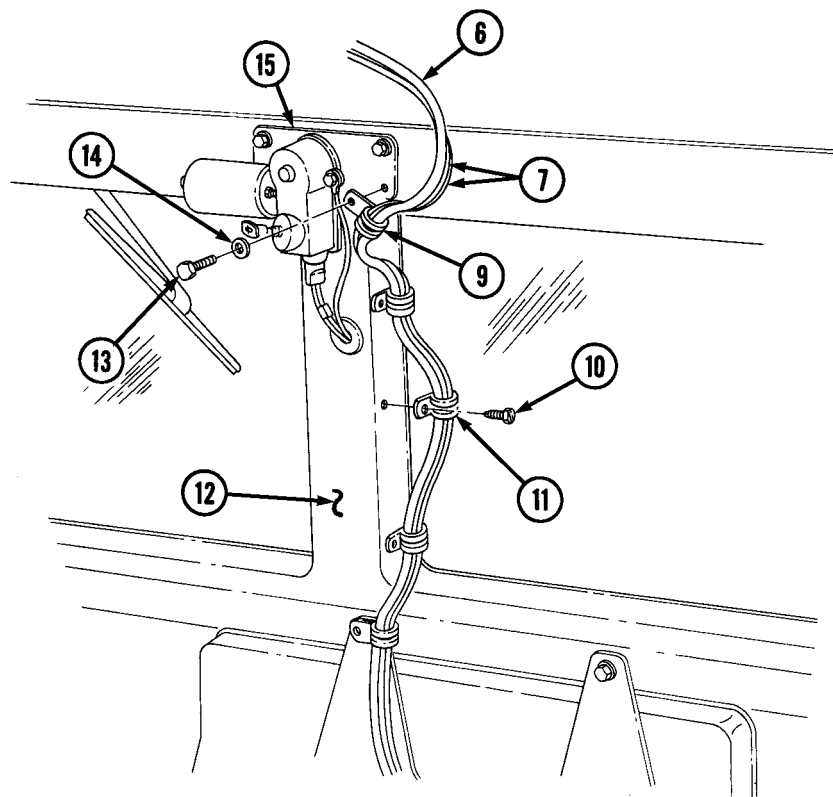
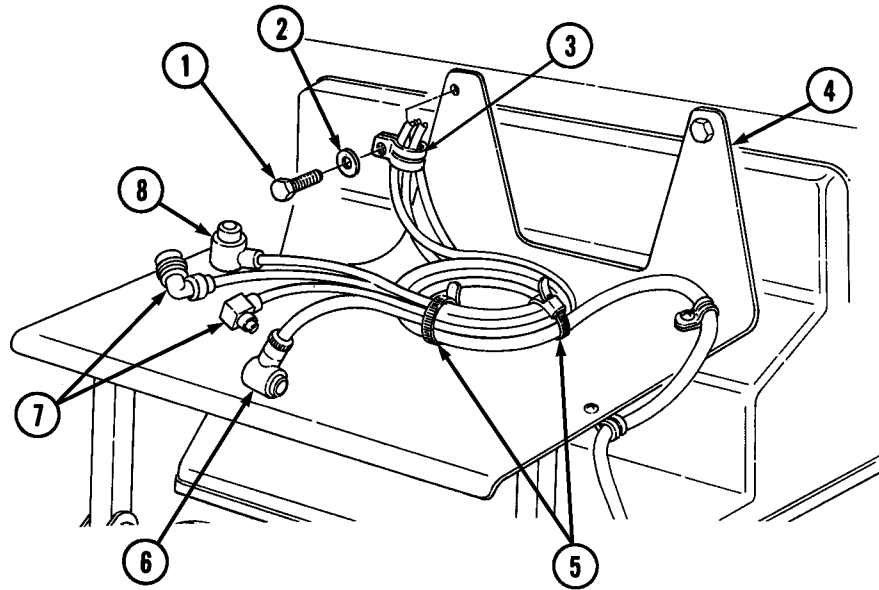
Equipment Condition

- NBC door opened (TM 9-2320-280-10).
- Battery ground cable disconnected (para. 4-73).

a. Removal

1. Remove two tiedown straps (5) from antenna cables (7), power cable (8), and intercom cable (6). Discard tiedown straps (5).
2. Remove capscrew (1), washer (2), clamp (3), antenna cables (7), and intercom cable (6) from radio rack (4).
3. Remove three screws (10), clamps (11), antenna cables (7), and intercom cable (6) from windshield (12).
4. Remove capscrew (13), washer (14), clamp (9), antenna cables (7), and intercom cable (6) from windshield (12) and plate (15).

4-106. ANTENNA CABLES REPLACEMENT (M997, M997A1, M997A2) (Cont'd)



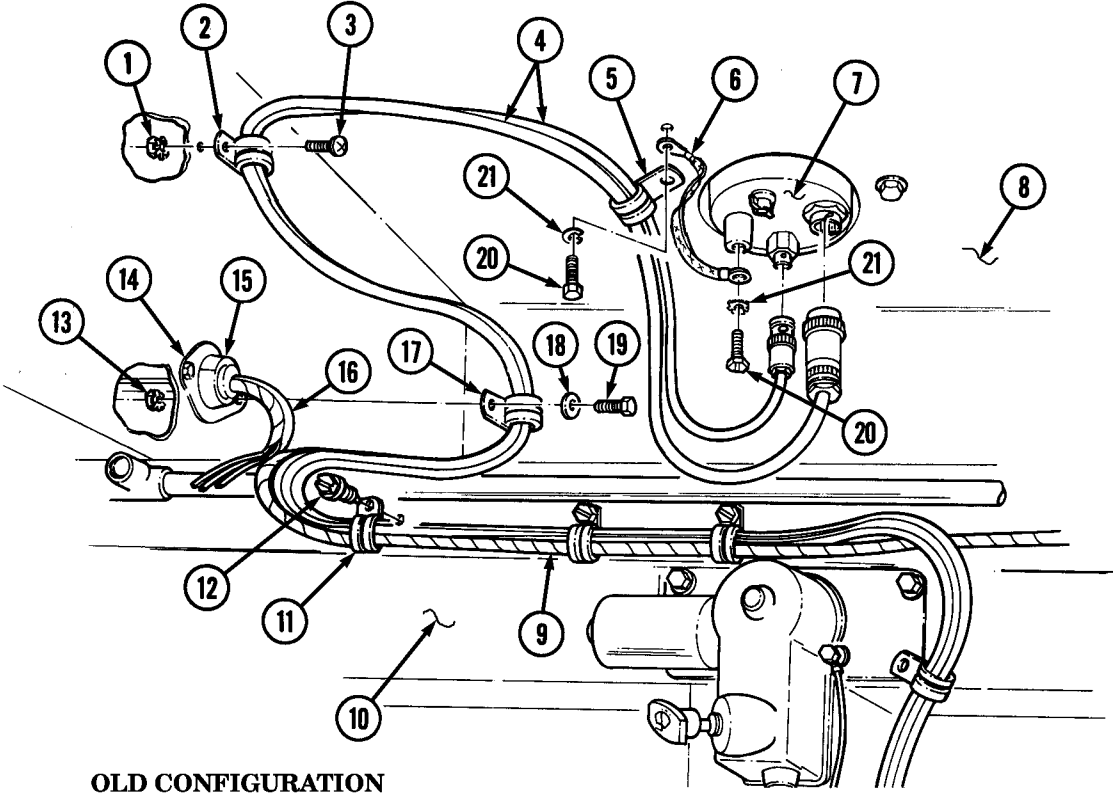
4-106. ANTENNA CABLES REPLACEMENT (M997, M997A1, M997A2) (Cont'd)

5. Remove three screws (12), clamps (11), antenna cables (4), intercom cable (16), and harness (9) from windshield (10).

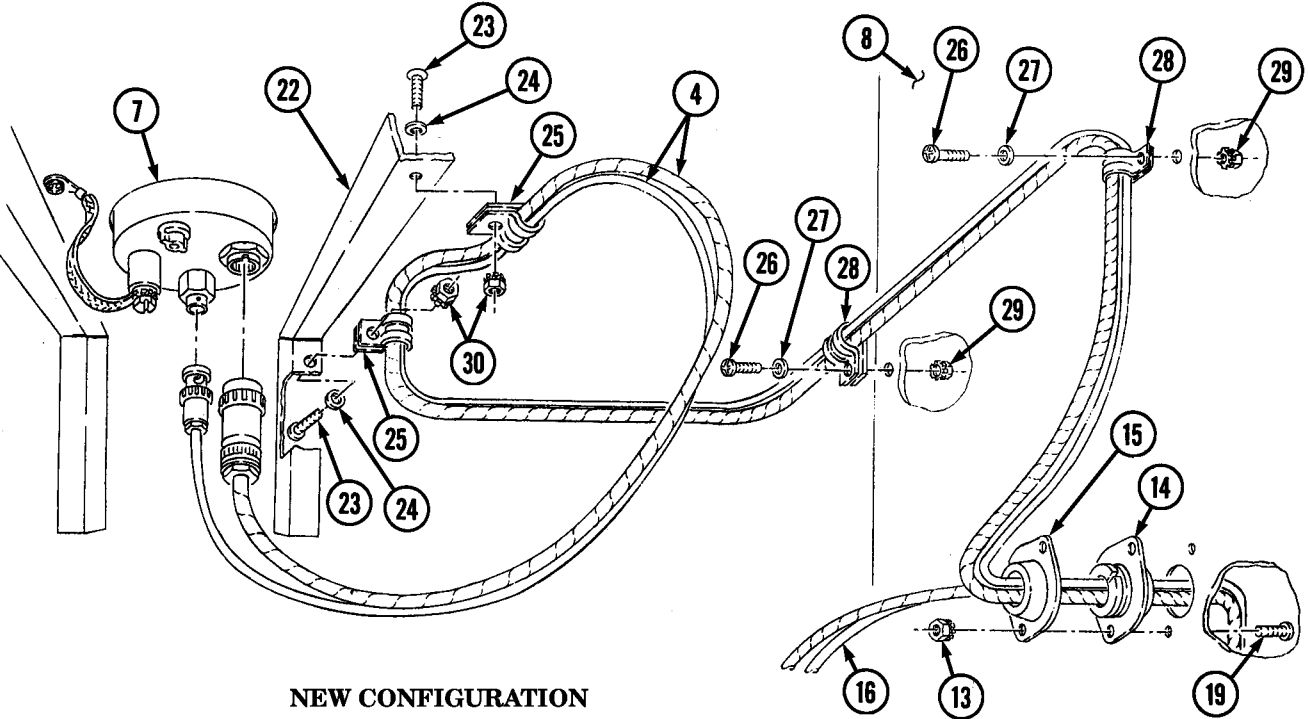
NOTE

- Perform steps 6 through 8 for old configuration.
 - Perform steps 9 through 11 for new configuration.
6. Remove assembled locknut (13), capscrew (19), washer (18), clamp (17), antenna cables (4), retainer (14), and grommet (15) from body (8). Discard assembled locknut (13).
 7. Remove assembled locknut (1), screw (3), clamp (2), and antenna cables (4) from body (8). Discard assembled locknut (1).
 8. Remove two capscrews (20), lockwashers (21), clamp (5), ground strap (6), and antenna cables (4) from antenna (7) and body (8). Discard lockwashers (21).
 9. Remove two assembled locknuts (30), capscrews (23), washers (24), clamps (25), and antenna cables (4) from reinforcement (22). Discard assembled locknuts (30).
 10. Remove two assembled locknuts (29), capscrews (26), washers (27), clamps (28), and antenna cables (4) from body (8). Discard assembled locknuts (29).
 11. Remove two assembled locknuts (13), capscrews (19), grommet (15), retainer (14), intercom cable (16), and antenna cables (4) from body (8). Discard assembled locknuts (13).
 12. Remove two antenna cables (4) from antenna (7).

4-106. ANTENNA CABLES REPLACEMENT (M997, M997A1, M997A2) (Cont'd)



OLD CONFIGURATION



NEW CONFIGURATION

4-106. ANTENNA CABLES REPLACEMENT (M997, M997A1, M997A2) (Cont'd)

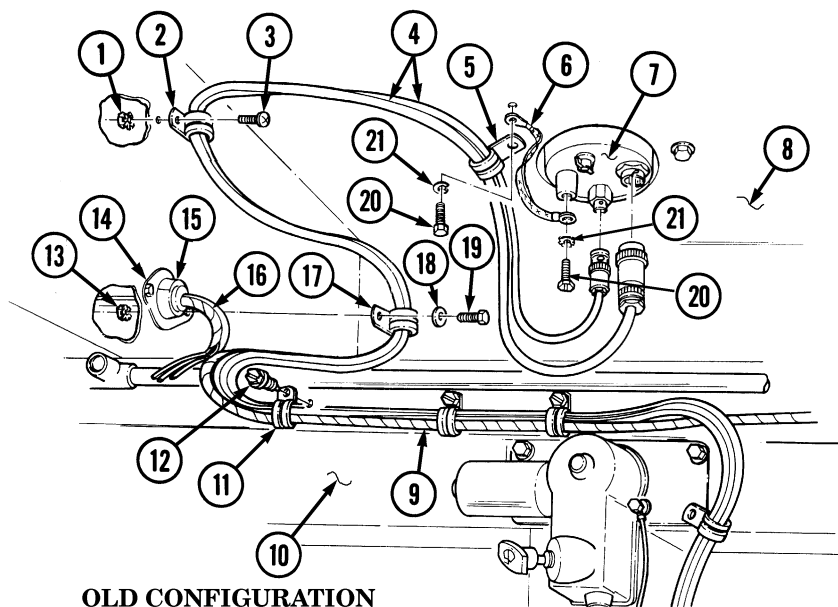
b. Installation

1. Connect two antenna cables (4) to antenna (7).

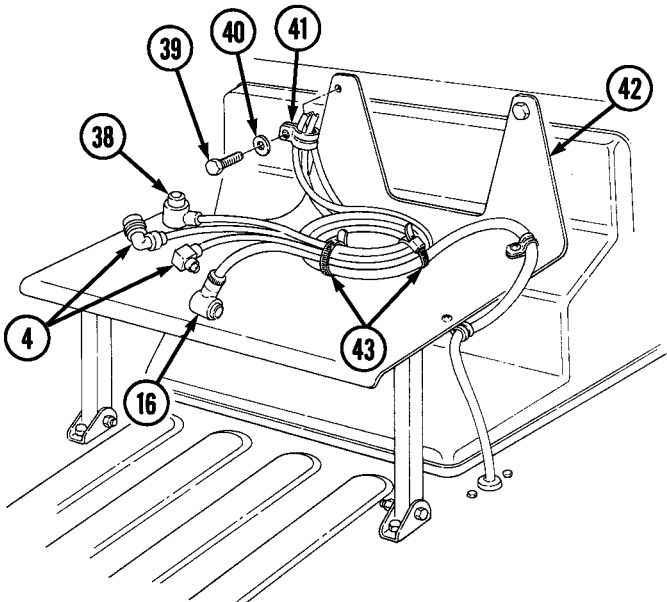
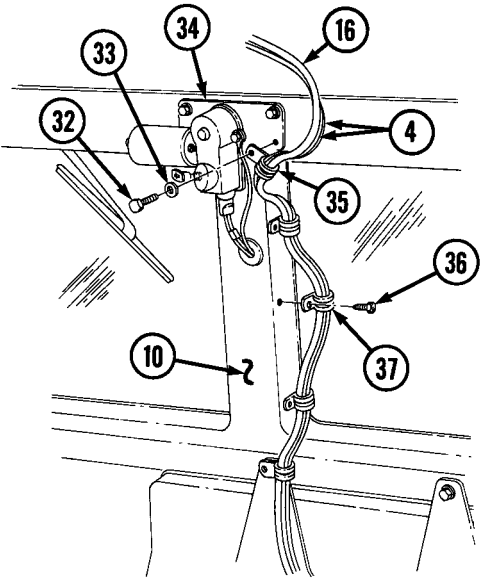
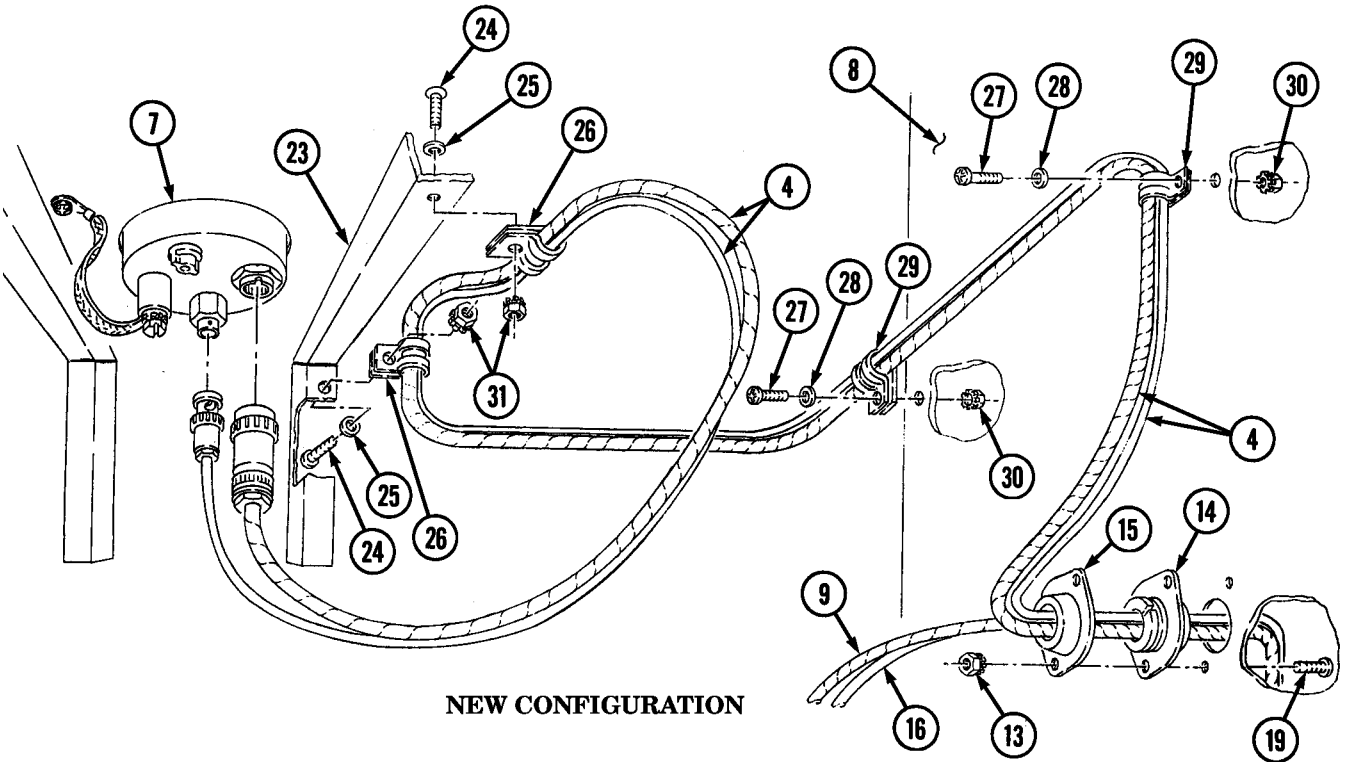
NOTE

- Perform steps 2 through 4 for old configuration.
- Perform steps 5 through 7 for new configuration.

2. Install clamp (5) on antenna cables (4) and ground strap (6) on body (8) and antenna (7) with two lockwashers (21) and capscrews (20). Tighten capscrews (20) 26 lb-ft (35 N•m).
3. Install clamp (2) and two antenna cables (4) on body (8) with screw (3) and assembled locknut (1).
4. Install clamp (17) and two antenna cables (4) on grommet (15), retainer (14), and body (8) with capscrew (19), washer (18), and assembled locknut (13).
5. Install two clamps (26) on antenna cables (4) and reinforcement (23) with washers (25), capscrews (24), and assembled locknuts (31).
6. Install grommet (15) and retainer (14) on antenna cables (4), wiring harness (9), intercom cable (16), and body (8) with two capscrews (19) and assembled locknuts (13).
7. Install two clamps (29) to antenna cables (4) on body (8) with washers (28), capscrews (27), and assembled locknuts (30).
8. Install three clamps (11) to antenna cables (4) and intercom cable (16) on windshield (10) with three screws (12).
9. Install clamp (35) to antenna cables (4) and intercom cable (16) on plate (34) with washer (33) and capscrew (32). Tighten capscrew (32) 72 lb-in. (8 N•m).
10. Install three clamps (37) on antenna cables (4) and intercom cable (16) on windshield (10) with three screws (36).
11. Install clamp (41) to antenna cables (4) and intercom cable (16) on radio rack (42) with washer (40) and capscrew (39). Tighten capscrew (39) 72 lb-in. (8 N•m).
12. Install two tiedown straps (43) and antenna cables (4) on intercom cable (16) and power cable (38) on radio rack (42).



4-106. ANTENNA CABLES REPLACEMENT (M997, M997A1, M997A2) (Cont'd)



FOLLOW-ON TASKS: • Connect battery ground cable (para. 4-73).
• Close NBC door (TM 9-2320-280-10).

4-107. INTERCOM CABLE REPLACEMENT (M996, M996A1)

This task covers:

a. Removal

b. Installation

INITIAL SETUP

Applicable Models

M996, M996A1

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Plain-assembled nut (Appendix G, Item 201)
Two assembled locknuts
(Appendix G, Item 130)
Two tiedown straps (Appendix G, Item 307)

Personnel Required

One mechanic
One assistant

Manual References

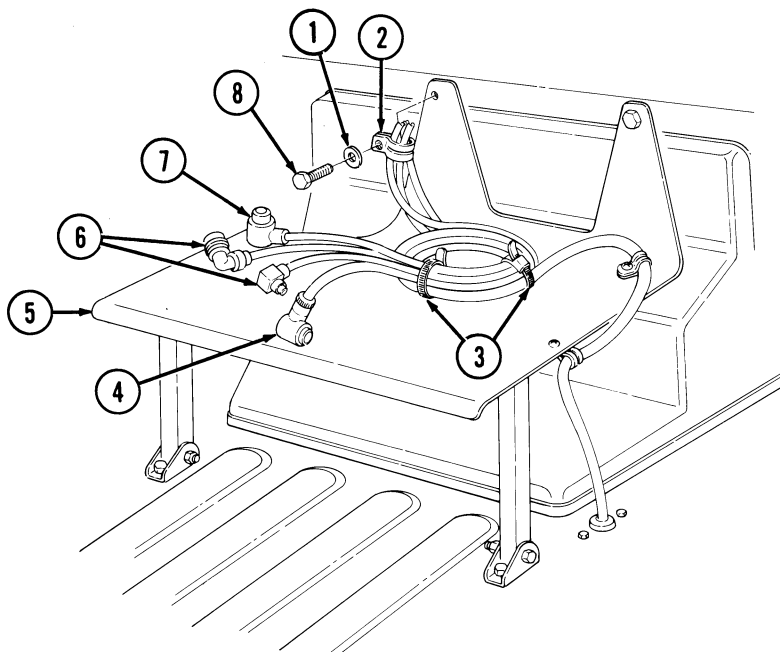
TM 9-2320-280-24P

Equipment Condition

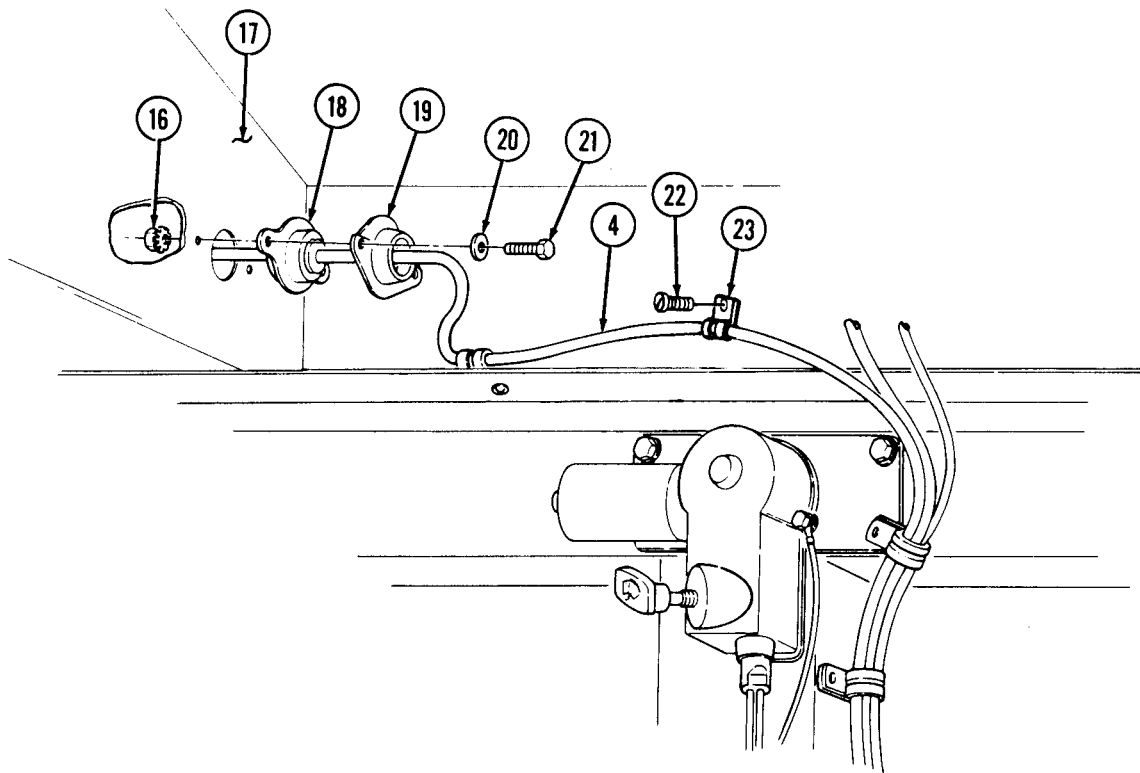
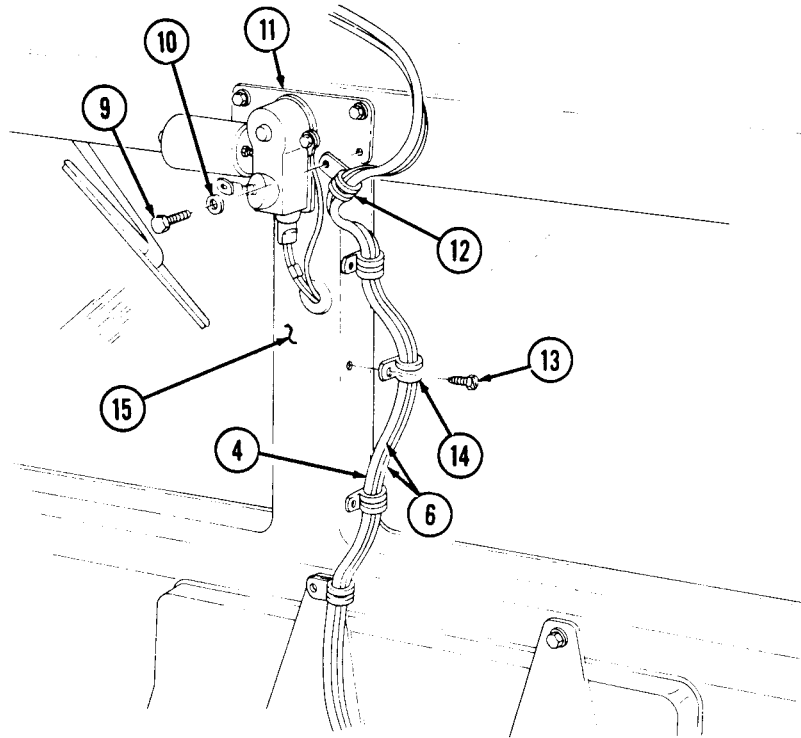
Battery ground cable disconnected (para. 4-73).

a. Removal

1. Remove two tiedown straps (3) from intercom cable (4), power cable (7) and two antenna cables (6). Discard tiedown straps (3).
2. Remove capscrew (8), washer (1), clamp (2), two antenna cables (6), and intercom cable (4) from radio rack (5).
3. Remove three screws (13), clamps (14), two antenna cables (6), and intercom cable (4) from windshield (15).
4. Remove capscrew (9), washer (10), clamp (12), intercom cable (4), and two antenna cables (6) from plate (11).
5. Remove two screws (22), clamps (23), and intercom cable (4) from body (17).
6. Remove two assembled locknuts (16), capscrews (21), washers (20), grommet (18), retainer (19), and intercom cable (4) from body (17). Discard assembled locknuts (16).



4-107. INTERCOM CABLE REPLACEMENT (M996, M996A1) (Cont'd)



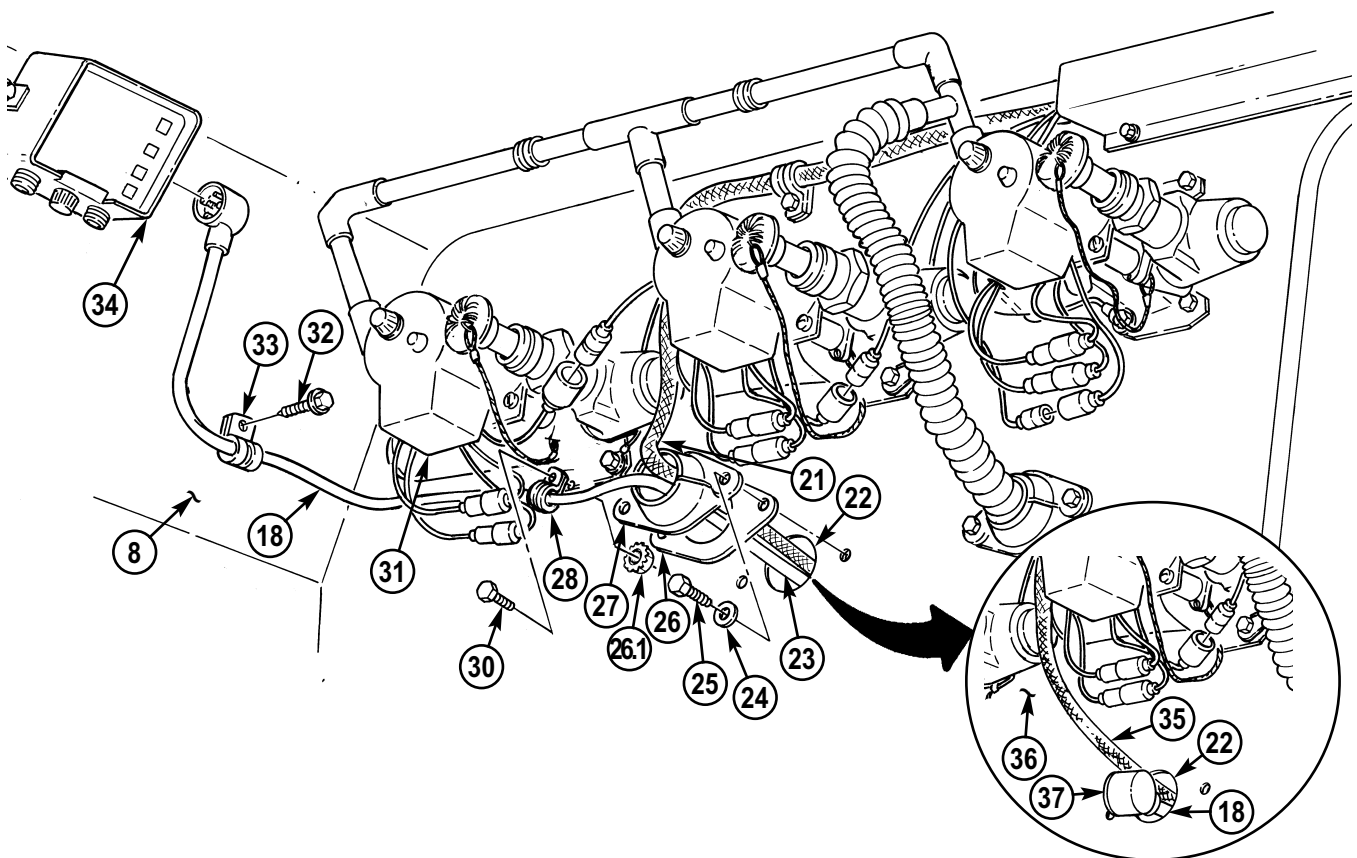
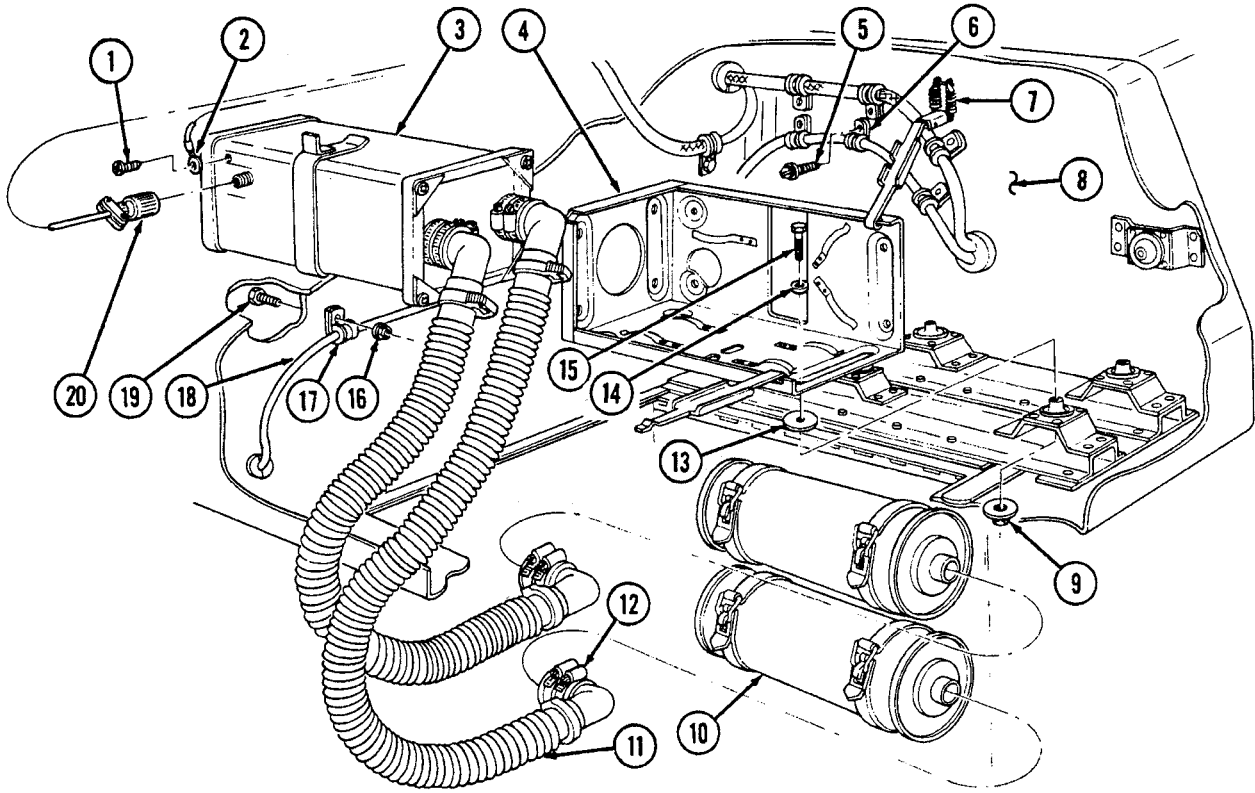
4-107. INTERCOM CABLE REPLACEMENT (M996, M996A1) (Cont'd)

7. Loosen two clamps (12) and remove hose assemblies (11) from filter canisters (10).
8. Disconnect electrical harness lead (20) from precleaner (3).
9. Remove screw (1) and ground wire (2) from precleaner (3).
10. Disconnect latch (7) and remove precleaner (3) from bracket (4).
- 11. Remove four capscrews (15), washers (14), large washers (13), nuts (9) and bracket (4) from body (8).
- 12. Remove two nuts (16), screws (19), clamps (17), and intercom cable (18) from body (8).
13. Remove three screws (5), clamps (6), and intercom cable (18) from body (8).
14. Remove two screws (25), washers (24), retainer (27), grommet (26), intercom cable (18), and harness (21) from body (8).
- 15. Remove capscrew (30), plain-assembled nut (26.1), clamp (28), and intercom cable (18) from NBC heater (31). Discard plain-assembled nut (26.1).
16. Remove screw (32), clamp (33), and intercom cable (18) from body (8).
17. Disconnect intercom cable (18) from intercom (34). Remove intercom cable (18) from vehicle while ensuring proper alignment of intercom cable connector (37) to avoid damage to wiring harness (35) as intercom cable (18) passes through hole (22) in bulkhead wall (36).

b. Installation

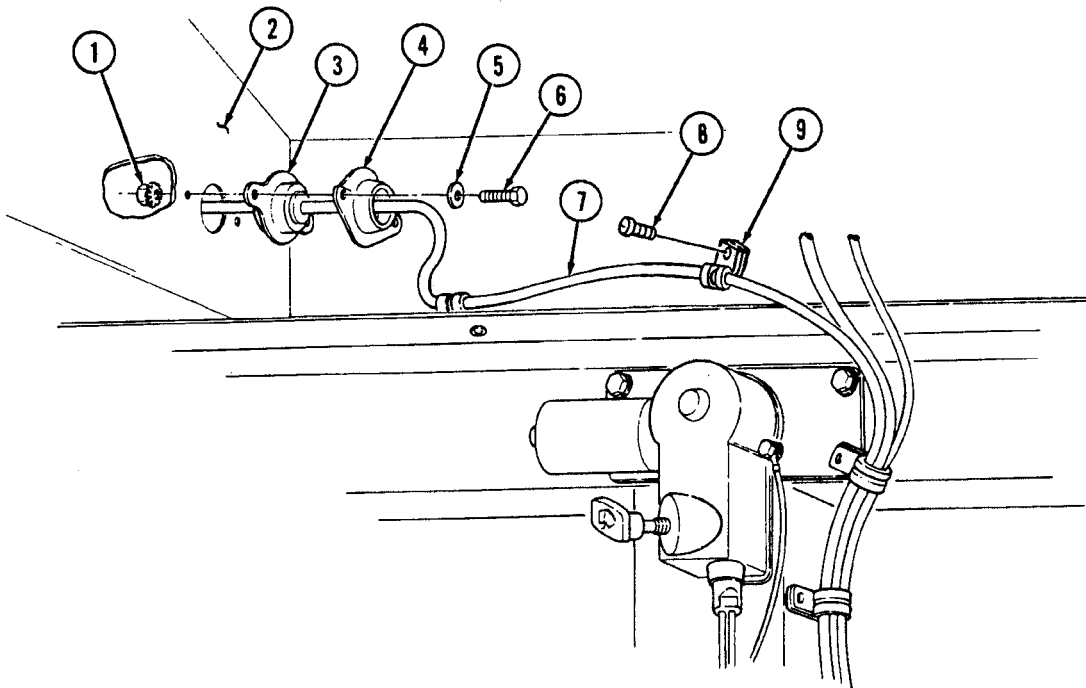
1. Ensure proper alignment of intercom cable connector (37) to avoid damage to wiring harness (35) as intercom cable (18) passes through hole (22) in bulkhead wall (36). Route intercom cable (18) through vehicle in approximate mounting location. Ensure yellow tape (23) is located in hole (22).
2. Connect intercom cable (18) to intercom (34).
3. Install clamp (33) and intercom cable (18) on body (8) with screw (32).
- 4. Install clamp (28) and intercom cable (18) on NBC heater (31) with plain-assembled nut (26.1) and capscrew (30).
5. Install grommet (26), retainer (27), over yellow tape (23) intercom cable (18), and harness (21) in body (8) with two washers (24) and screws (25).
6. Install three clamps (6) and intercom cable (18) on body (8) with three screws (5).
- 7. Install two clamps (17) and intercom cable (18) on body (8) with two screws (19) and nuts (16).
- 8. Install bracket (4) on body (8) with four capscrews (15), washers (14), large washers (13), and nuts (9).
9. Install precleaner (3) on bracket (4) with latch (7).
10. Install ground wire (2) on precleaner (3) with screw (1).
11. Connect electrical harness lead (20) to precleaner (3).
12. Install two hose assemblies (11) to filter canisters (10) with two clamps (12).

4-107. INTERCOM CABLE REPLACEMENT (M996, M996A1) (Cont'd)

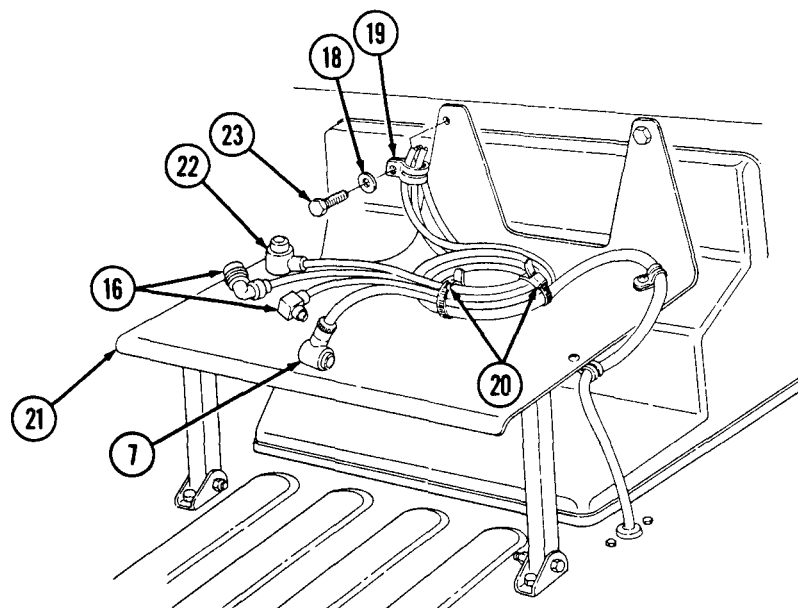
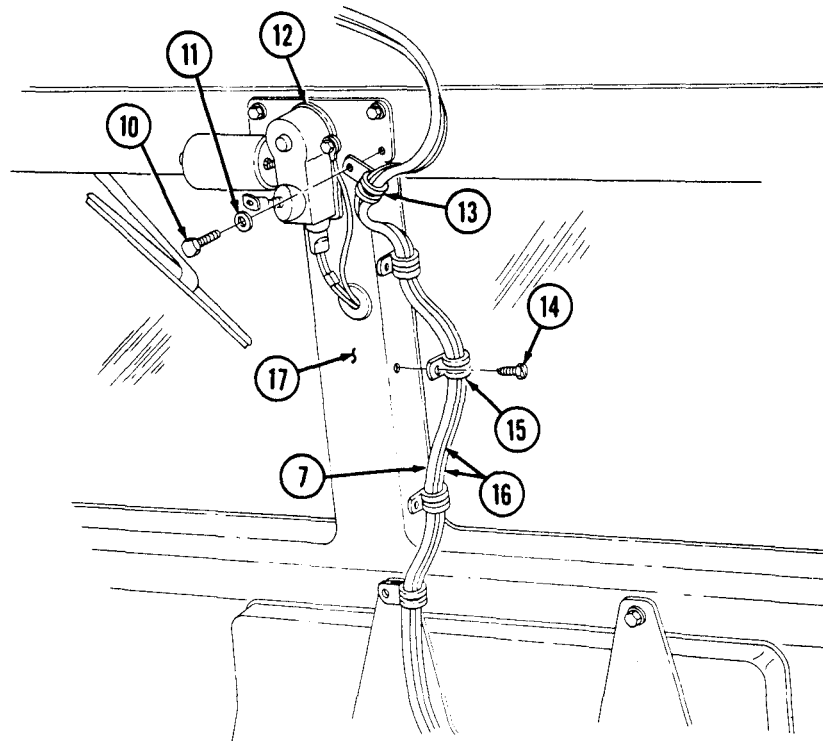


4-107. INTERCOM CABLE REPLACEMENT (M996, M996A1) (Cont'd)

13. Install grommet (3), retainer (4), and intercom cable (7) on body (2) with two washers (5), capscrews (6), and assembled locknuts (1).
14. Install two clamps (9) and intercom cable (7) on body (2) with two screws (8).
15. Install clamp (13), intercom cable (7), and two antenna cables (16) on plate (12) and windshield (17) with washer (11) and capscrew (10). Tighten capscrew (10) to 6 lb-ft (8 N•m).
16. Install three clamps (15), intercom cable (7), and two antenna cables (16) on windshield (17) with three screws (14).
17. Install clamp (19), intercom cable (7), and two antenna cables (16) on radio rack (21) with washer (18) and capscrew (23). Tighten capscrew (23) to 6 lb-ft (8 N•m).
18. Install intercom cable (7) on antenna cables (16) and power cable (22) with two tiedown straps (20).



4-107. INTERCOM CABLE REPLACEMENT (M996, M996A1) (Cont'd)



- FOLLOW-ON TASKS:
- Connect battery ground cable (para. 4-73).
 - Test NBC system operation (TM 9-2320-280-10)

4-108. INTERCOM CABLE REPLACEMENT (M997, M997A1, M997A2)

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M997, M997A1, M997A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Two tiedown straps (Appendix G, Item 308)
Seven assembled locknuts
(Appendix G, Item 130)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

- Battery ground cable disconnected (para. 4-73).
- NBC door opened (TM 9-2320-280-10).

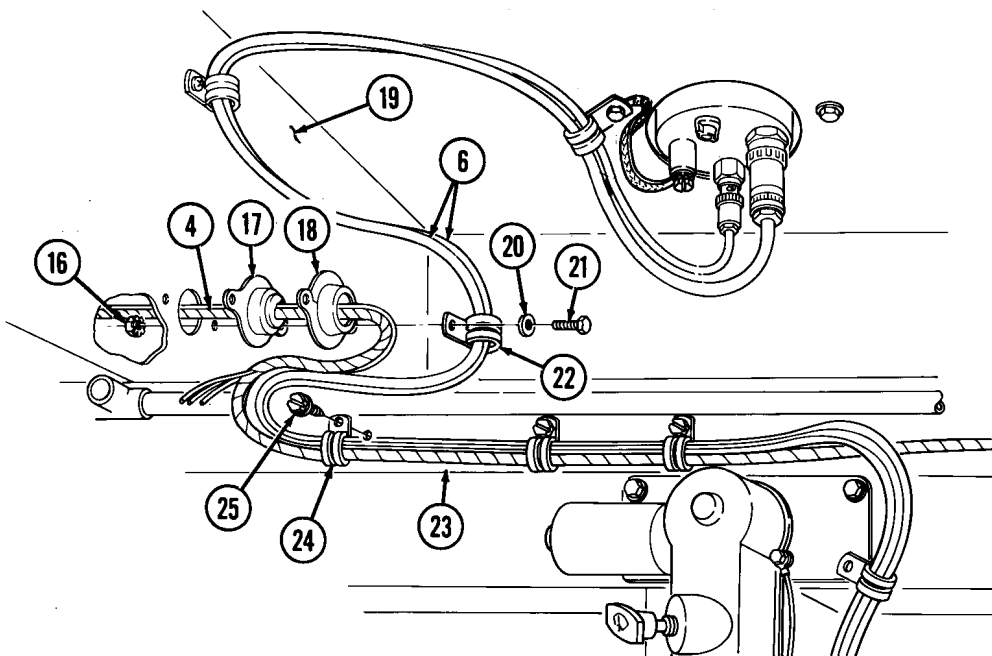
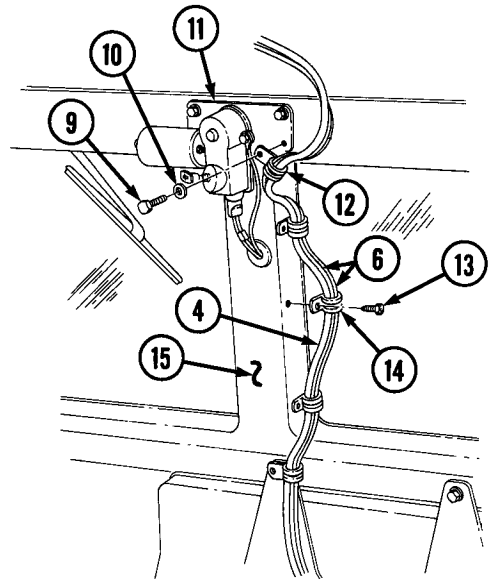
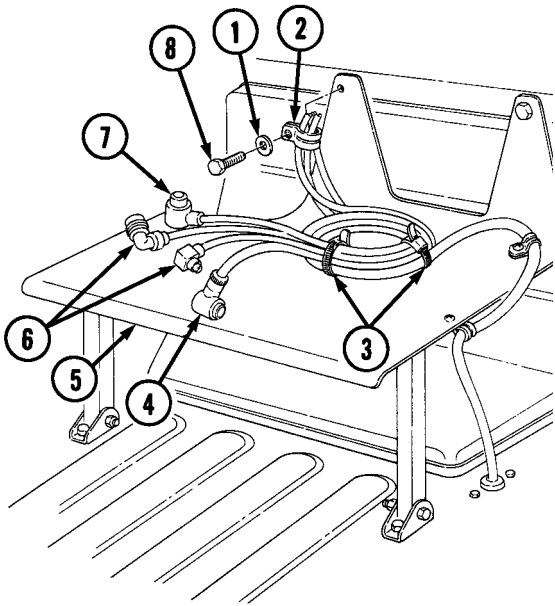
a. Removal

NOTE

Removal and installation of intercom cable is basically the same for old and new antenna mount configurations. This procedure covers the old configuration.

1. Remove two tiedown straps (3) from intercom cable (4), power cable (7), and two antenna cables (6). Discard tiedown straps (3).
2. Remove capscrew (8), washer (1), clamp (2), antenna cables (6), intercom cable (4), and power cable (7) from radio rack (5).
3. Remove three screws (13), clamps (14), two antenna cables (6), and intercom cable (4) from windshield (15).
4. Remove capscrew (9), washer (10), clamp (12), intercom cable (4), and two antenna cables (6) from plate (11) and windshield (15).
5. Remove three screws (25), clamps (24), intercom cable (4), two antenna cables (6), and wiring harness (23) from body (19).
6. Remove two assembled locknuts (16), capscrews (21), washers (20), grommet (17), retainer (18), intercom cable (4), wiring harness (23), two antenna cables (6), and clamp (22) from body (19). Discard assembled locknuts (16).

4-108. INTERCOM CABLE REPLACEMENT (M997, M997A1, M997A2) (Cont'd)

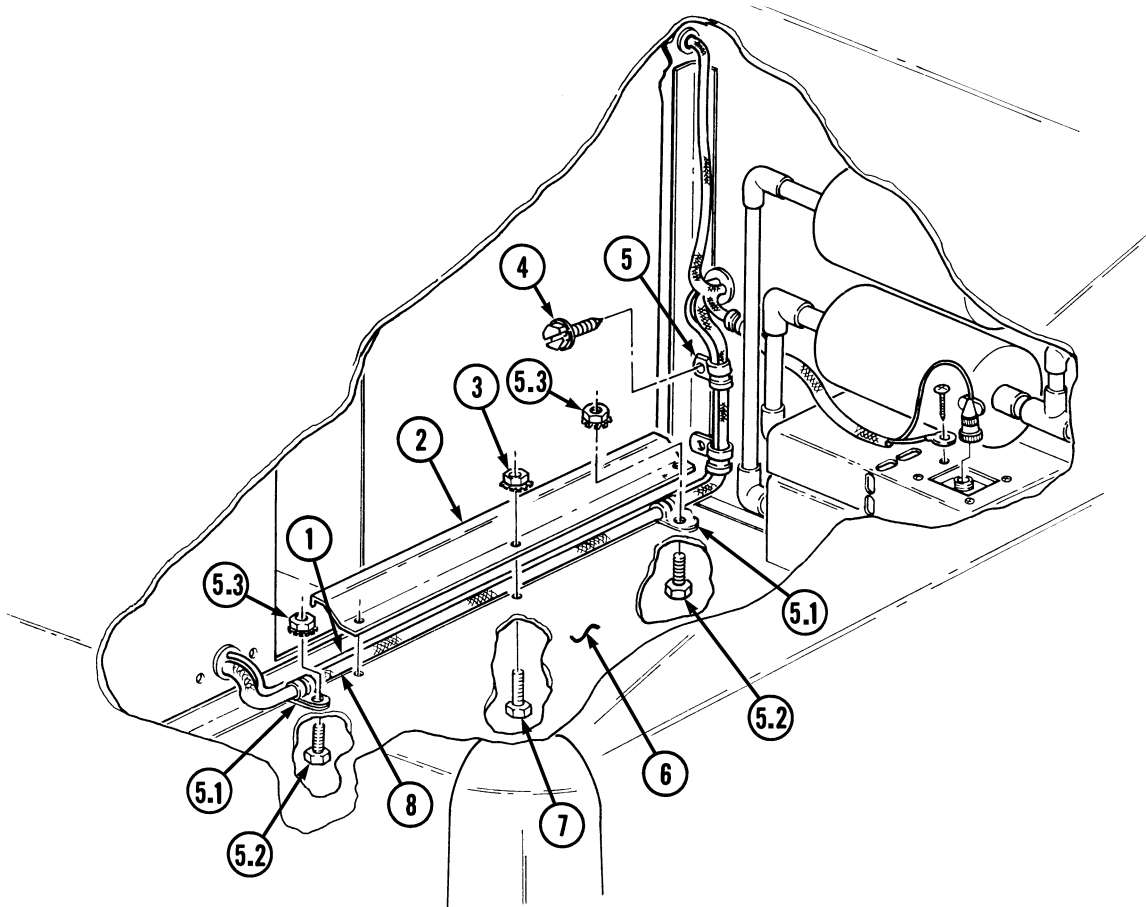


4-108. INTERCOM CABLE REPLACEMENT (M997, M997A1, M997A2) (Cont'd)

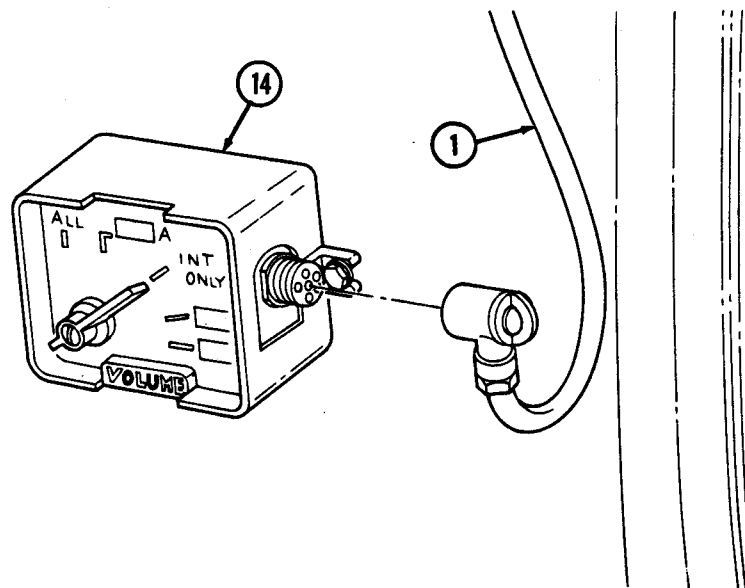
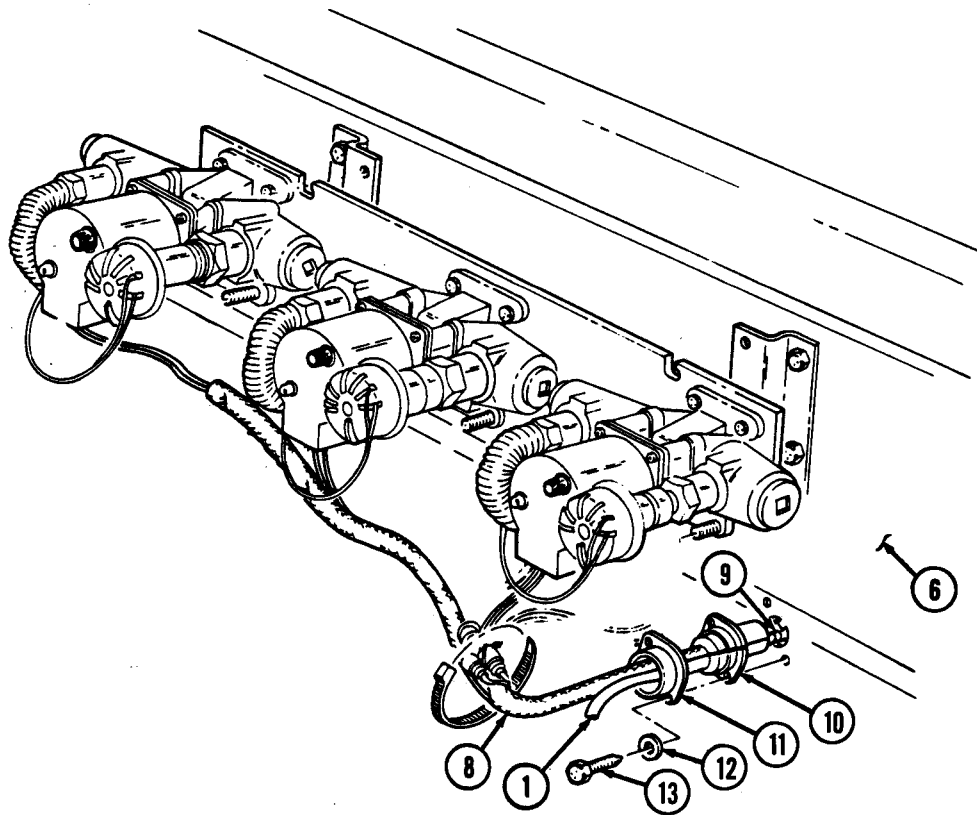
7. Remove three assembled locknuts (3), capscrews (7), and cover (2) from body (6). Discard assembled locknuts (3).
8. Remove two screws (4), clamps (5), intercom cable (1), and wiring harness (8) from body (6).
9. Remove two assembled locknuts (5.3), capscrews (5.2), and clamps (5.1) from body (6). Discard assembled locknuts (5.3).
10. Remove two screws (13), washers (12), grommet (10), retainer (11), intercom cable (1), and wiring harness (8) from body (6).
11. Remove intercom cable (1) from intercom (14) and vehicle.

b. Installation

1. Install intercom cable (1) on intercom (14).
2. Route intercom cable (1) in vehicle in approximate mounting location.
3. Install grommet (10), retainer (11), and wiring harness (8) over yellow tape (9), and intercom cable (1) on body (6) with two washers (12) and screws (13).
4. Install two clamps (5.1), intercom cable (1), and wiring harness (8) on body (6) with two capscrews (5.2) and assembled locknuts (5.3).
5. Install two clamps (5), intercom cable (1), and wiring harness (8) on body (6) with two screws (4).
6. Install cover (2), intercom cable (1), and wiring harness (8) on body (6) with three capscrews (7) and assembled locknuts (3).

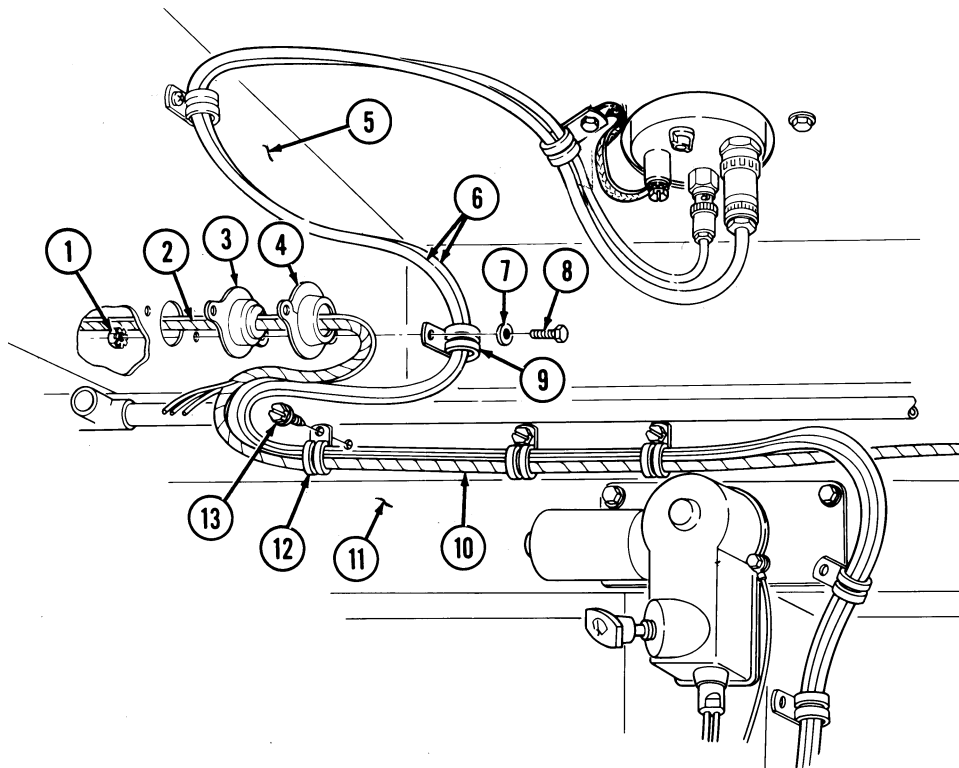


4-108. INTERCOM CABLE REPLACEMENT (M997, M997A1, M997A2) Cont'd

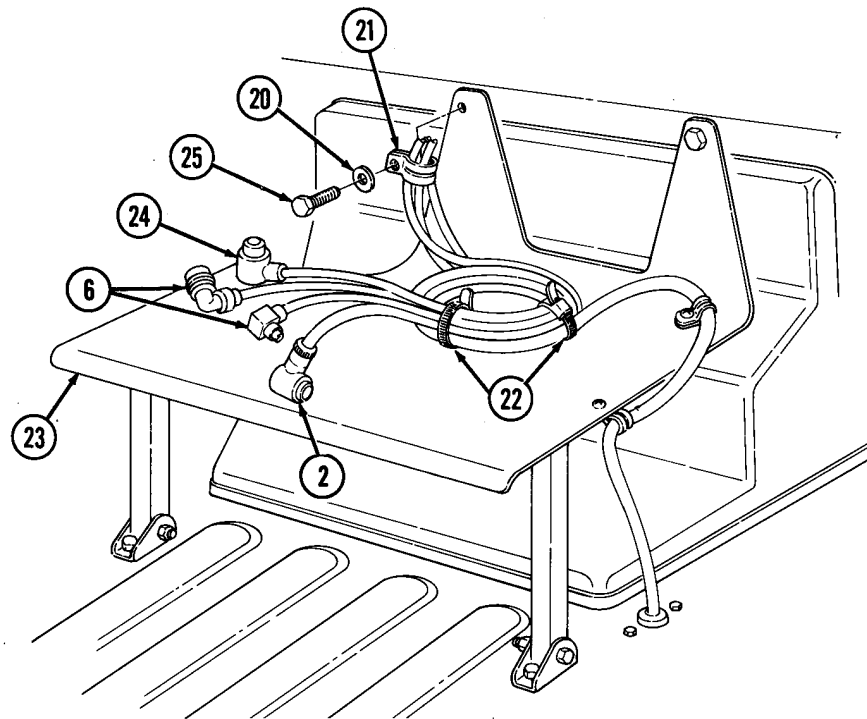
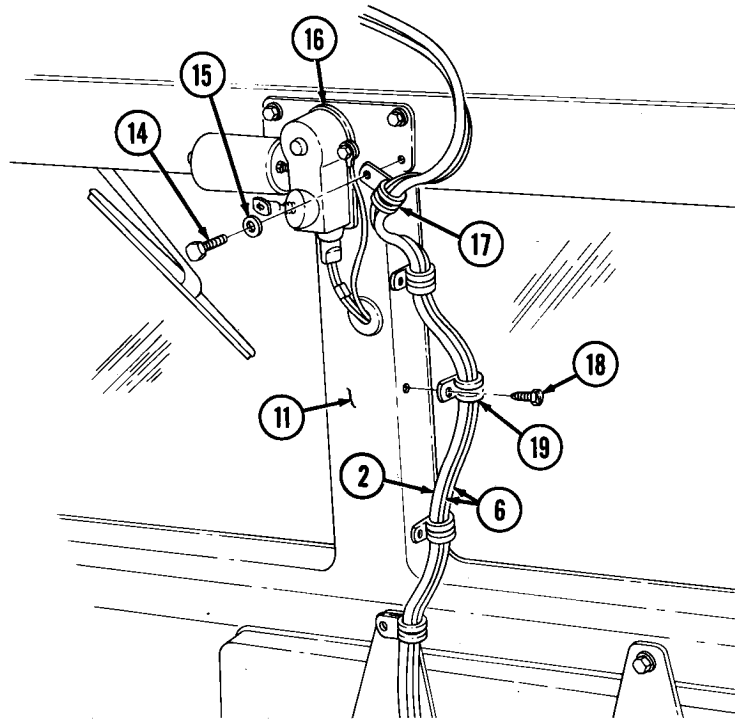


4-108. INTERCOM CABLE REPLACEMENT (M997, M997A1, M997A2) (Cont'd)

7. Install grommet (3), retainer (4), intercom cable (2), wiring harness (10), and two cables (6) on body (5) with two capscrews (8), washers (7), clamp (9), and two assembled locknuts (1).
8. Install three clamps (12), intercom cable (2), antenna cables (6), and wiring harness (10) on body (5) with three screws (13).
9. Install clamp (17), intercom cable (2), and antenna cables (6) on plate (16) and windshield (11) with washer (15) and screw (14). Tighten screw (14) to 71 lb-in. (8 N•m).
10. Install three clamps (19), intercom cable (2), and antenna cables (6) on windshield (11) with three screws (18).
11. Install clamp (21), intercom cable (2), and antenna cables (6) on radio rack (23) with washer (20) and capscrew (25). Tighten capscrew (25) to 71 lb-in. (8 N•m).
12. Secure intercom cable (2), antenna cables (6), and power cable (24) together with two tiedown straps (22) on radio rack (23).



4-108. INTERCOM CABLE REPLACEMENT (M997, M997A1, M997A2) (Cont'd)



- FOLLOW-ON TASKS:**
- Connect battery ground cable (para. 4-73).
 - Close NBC door (TM 9-2320-280-10).

4-109. 200 AMPERE ALTERNATOR (AA0013036AA) REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M996, M996A1, M997, M997A1

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Four lockwashers (Appendix G, Item 138)
Tiedown strap (Appendix G, Item 308)
Lockwasher (Appendix G, Item 142)
Two lockwashers (Appendix G, Item 133)
Two lockwashers (Appendix G, Item 153)
Two lockwashers (Appendix G, Item 188)
Sealant (Appendix C, Item 9)

Personnel Required

One mechanic
One assistant

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

- Battery ground cable removed (para. 4-73).
- Hood raised and secured (TM 9-2320-280-10).

General Safety Instructions

Alternator must be supported during removal and installation.

a. Removal

1. Remove four screws (1), lockwashers (21), cover (2), and gasket (3) from regulator (4). Discard lockwashers (21).

NOTE

Prior to removal, tag leads for installation.

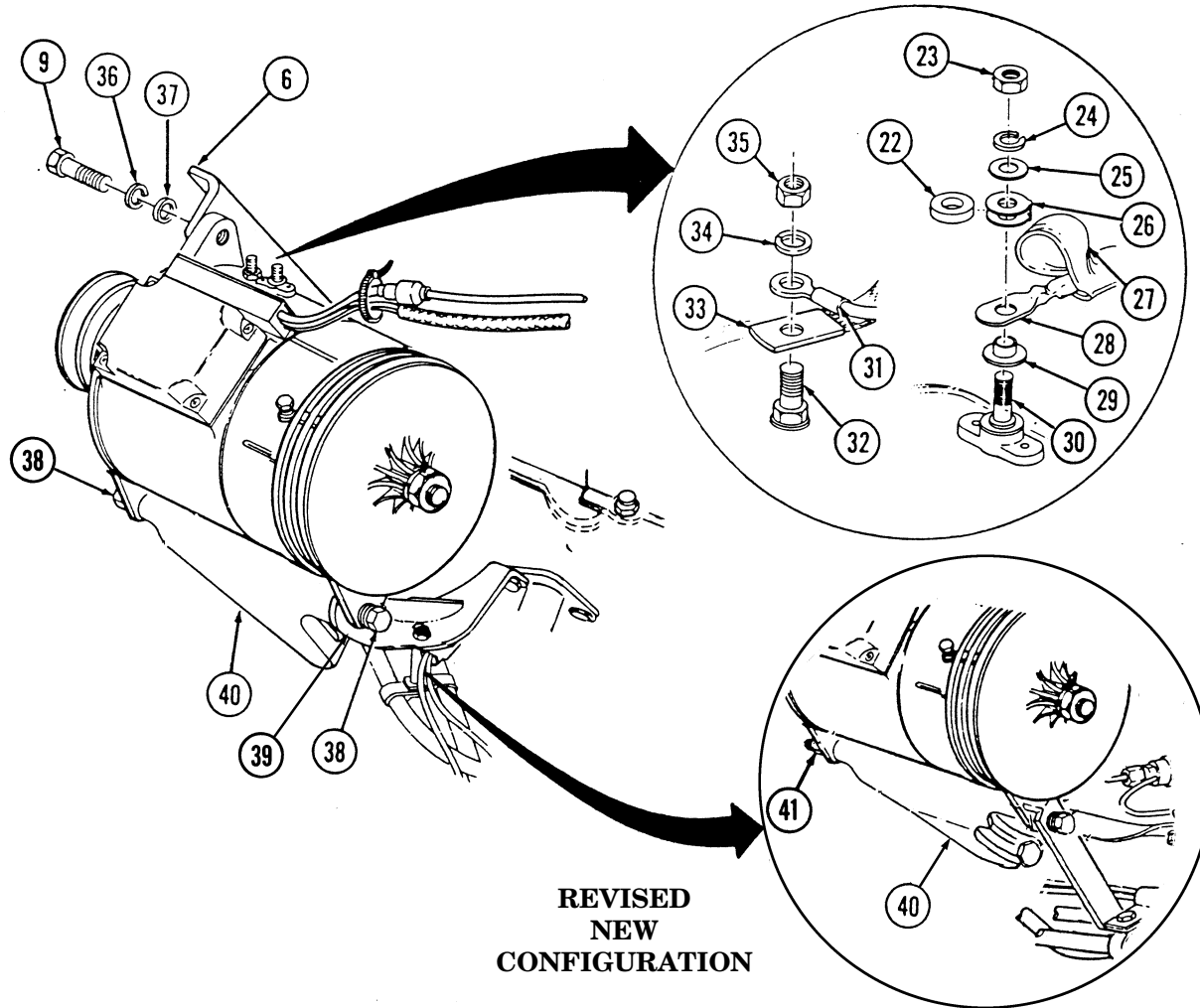
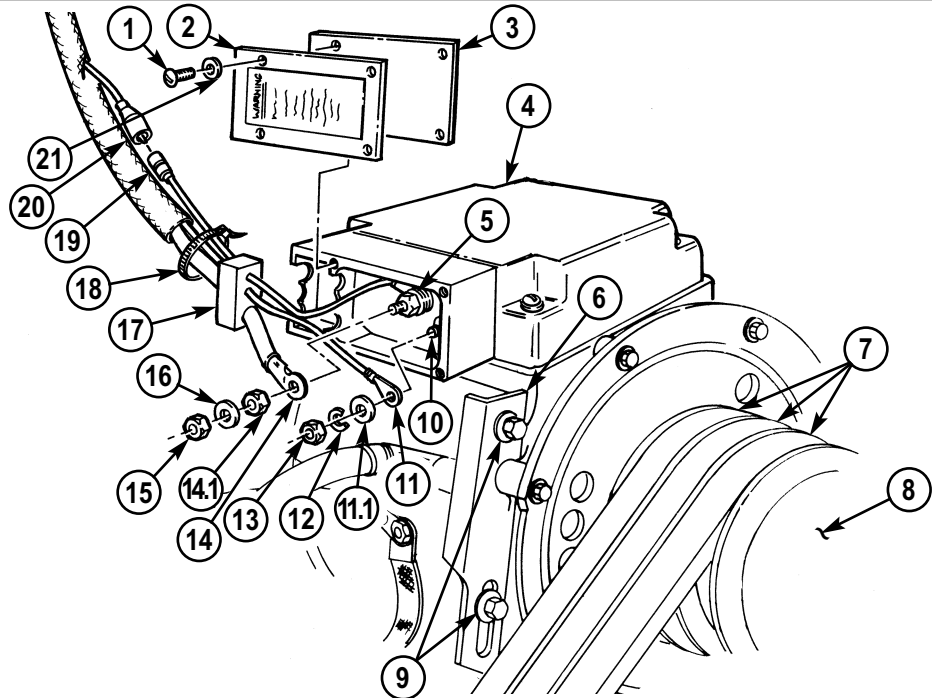
2. Remove nut (13), lockwasher (12), washer (11.1), and lead 2A (11) from stud (10). Discard lockwasher (12).
3. Remove nut (15), washer (16), nut (14.1), and lead 5A (14) from stud (5).
4. Remove rubber wedge (17) from opening in regulator (4).
5. Disconnect lead 568A (19) from harness lead (20).
6. Remove tiedown strap (18) securing lead 568A (19) to leads 5A (14) and 2A (11). Discard tiedown strap (18).

NOTE

Perform steps 8 and 9 for vehicles with revised new configuration.

7. Loosen two capscrews (9) on alternator adjusting bracket (6) and two capscrews (38) on alternator mounting bracket (40) and support bracket (39).
8. Loosen capscrew (9), lockwasher (36), and washer (37) on alternator adjusting bracket (6).
9. Loosen nut (41) on alternator mounting bracket (40).
10. Remove three drivebelts (7) from alternator pulley (8).
11. Slide back rubber boot (27) and remove nut (23), lockwasher (24), washer (25), fuse (26), insulator washer (22), alternator positive cable (28), and bushing (29) from positive stud (30). Discard lockwasher (24).
12. Remove nut (35), lockwasher (34), lead 3B (31), and ground strap (33) from ground stud (32). Discard lockwasher (34).

4-109. 200 AMPERE ALTERNATOR (AA0013036AA) REPLACEMENT (Cont'd)



**REVISED
NEW
CONFIGURATION**

4-109. 200 AMPERE ALTERNATOR (AA0013036AA) REPLACEMENT (Cont'd)

WARNING

Alternator must be supported during removal and installation.
Failure to support alternator may cause injury to personnel or
damage to equipment.

13. Remove capscrew (1), lockwasher (2), and washer (3) from alternator (13) and adjusting bracket (4). Discard lockwasher (2).

NOTE

- Perform step 15 for vehicles with new alternator support bracket configuration.
 - Perform step 16 for vehicles with revised new configuration.
14. Remove two capscrews (16), lockwashers (15), and washers (14) from alternator (13), support bracket (11), and mounting bracket (12). Discard lockwashers (15).
 15. Remove two capscrews (16), lockwashers (15), washers (14), and spacer (27) from alternator (13), power steering lines bracket (21), support bracket (23), and mounting bracket (12). Discard lockwashers (15).
 16. Remove nut (26), lockwasher (18), washer (19), long capscrew (22), and washer (20) from alternator (13), power steering lines bracket (21), support bracket (23), and mounting bracket (25). Discard lockwasher (18).
 17. Remove alternator (13).
 18. Remove five screws (5), washers (6), and guard (7) from alternator (13).
 19. Remove alternator pulley (17) (para. 4-3).

b. Installation

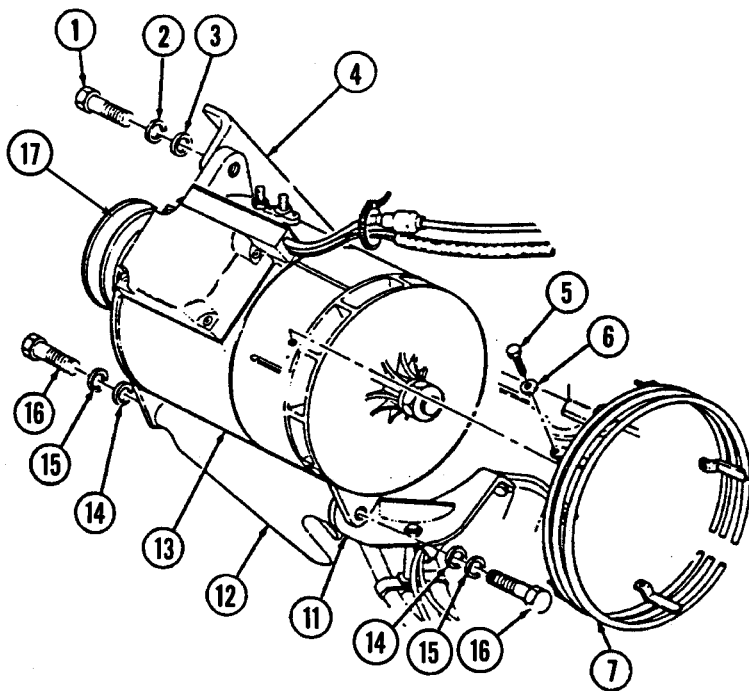
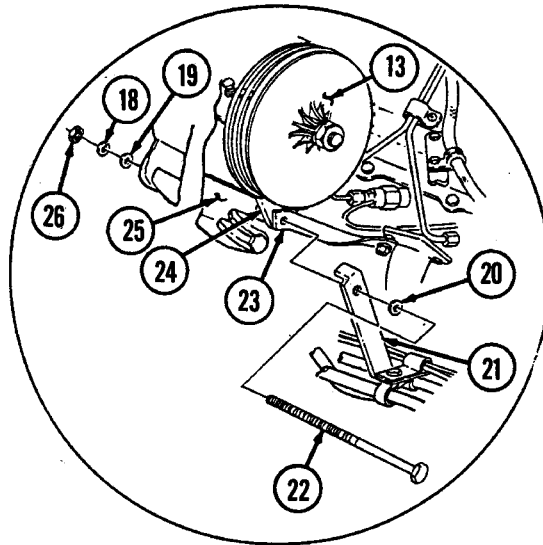
1. Install alternator pulley (17) (para. 4-3).
2. Install guard (7) to alternator (13) with five washers (6) and screws (5).

NOTE

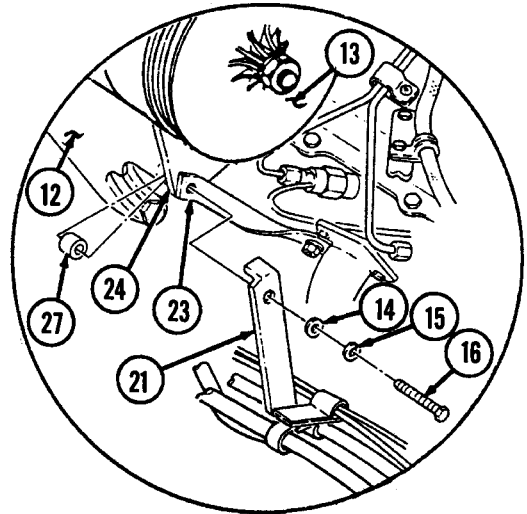
- Perform step 4 for vehicles with new alternator support bracket configuration.
 - Perform step 5 for vehicles with revised new configuration.
3. Position alternator (13) on mounting bracket (12) with support bracket (11) between mounting bracket (12) and alternator (13) and install two washers (14), lockwashers (15), and capscrews (16). Do not tighten capscrews (16).
 4. Position alternator (13) on mounting bracket (12) with support bracket (23) and power steering lines bracket (21) on the outside of alternator mounting flange (24) and install spacer (27), two washers (14), lockwashers (15), and capscrews (16).
 5. Position alternator (13) on mounting bracket (25) with support bracket (23) and power steering lines bracket (21) on the outside of alternator mounting flange (24) and install washer (20), long capscrew (22), washer (19), lockwasher (18), and nut (26).
 6. Align alternator (13) with adjusting bracket (4) and install washer (3), lockwasher (2), and capscrew (1). Do not tighten capscrew (1).

4-109. 200 AMPERE ALTERNATOR (AA0013036AA) REPLACEMENT (Cont'd)

REVISED
NEW
CONFIGURATION



NEW
CONFIGURATION



4-109. 200 AMPERE ALTERNATOR (AA0013036AA) REPLACEMENT (Cont'd)**NOTE**

Ensure terminals are clean before connections are made.

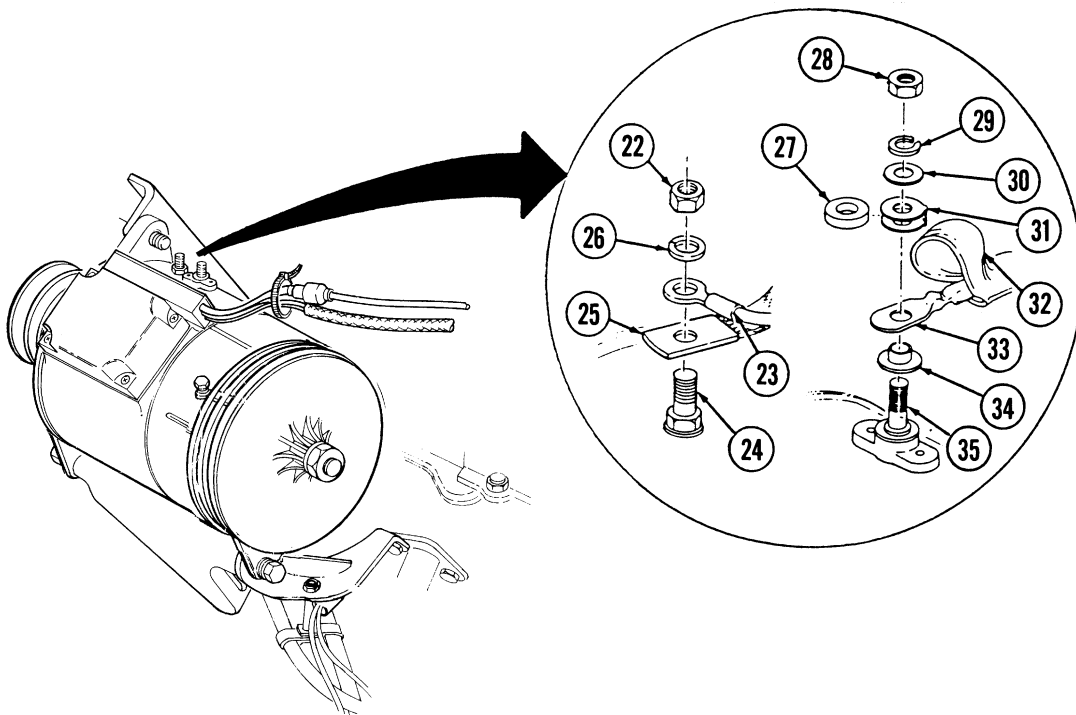
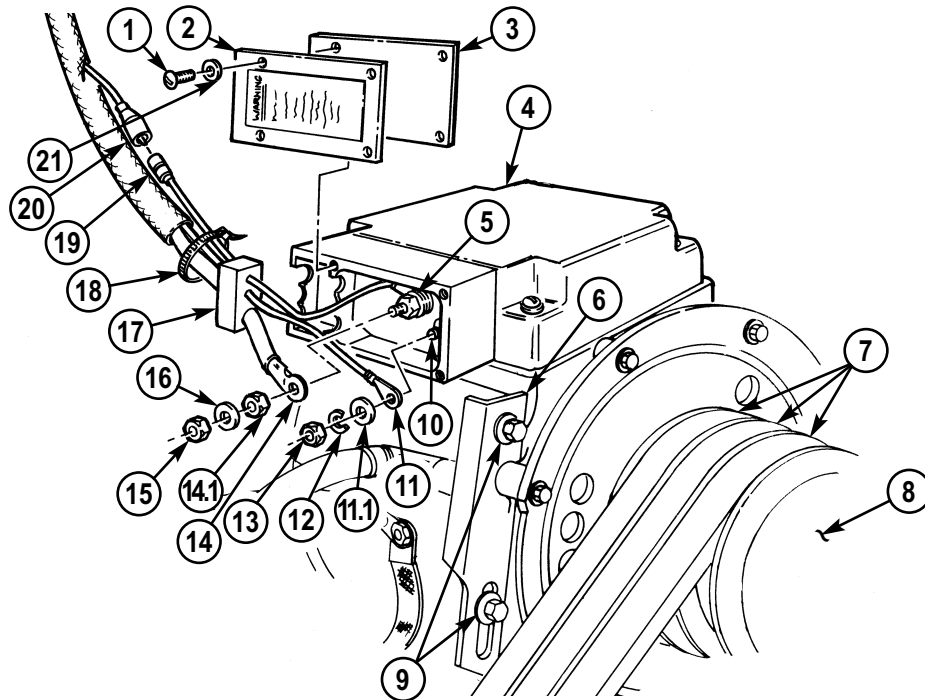
7. Install ground strap (25) and lead 3B (23) to ground stud (24) with lockwasher (26) and nut (22). Tighten nut (22) to 96-144 lb-in. (11-16 N•m).
8. Install insulator (27) in fuse (31).
9. Install bushing (34), positive cable (33), fuse (31), and insulator (27) on positive stud (35) with washer (30), lockwasher (29), and nut (28). Tighten nut (28) to 10-15 lb-ft (14-20 N•m). Slide rubber boot (32) over nut (28).

NOTE

Perform step 10 for vehicles equipped with deep water fording kits.

10. Apply sealant to positive stud (35) and positive cable (33) so that all exposed metallic surfaces are coated. The sealant should be evenly applied with a minimum thickness of 0.06 in. (1.5 mm).
11. Tighten two capscrews (9) on alternator mounting bracket (6) to 40 lb-ft. (54 N•m).
12. Install three drivebelts (7) on alternator pulley (8).
13. Install lead 5A (14) to stud (5) with washer (16), nut (14.1), and nut (15).
14. Install lead 2A (11) to stud (10) with washer (11.1), lockwasher (12), and nut (13).
15. Install rubber wedge (17) in opening in regulator (4).
16. Install gasket (3) and cover (2) to regulator (4) with four lockwashers (21) and screws (1).
15. Connect lead 568A (19) to harness lead (20) and secure to leads 2A (11) and 5A (14) using tiedown straps (18).

4-109. 200 AMPERE ALTERNATOR (AA0013036AA) REPLACEMENT (Cont'd)



- FOLLOW-ON TASKS:
- Adjust alternator belts (para. 3-82).
 - Connect battery ground cable (para. 4-75).
 - Lower and secure hood (TM 9-2320-280-10).

4-110. 200 AMPERE ALTERNATOR (12338796-1) REPLACEMENT (6.2L)

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M996, M996A1, M997, M997A1

Materials/Parts

Lockwasher (Appendix G, Item 133)
 Three lockwashers (Appendix G, Item 188)
 Lockwasher (Appendix G, Item 186)
 Lockwasher (Appendix G, Item 187)

Personnel Required

One mechanic
 One assistant

Manual References

TM 9-2320-280-10
 TM 9-2320-280-24P

Equipment Condition

- Battery ground cable disconnected (para. 4-73).
- Hood raised and secured (TM 9-2320-280-10).
- 200 ampere regulator removed (para. 4-115).

General Safety Instructions

Alternator must be supported during removal and installation.

a. Removal

NOTE

Prior to removal, tag leads for installation.

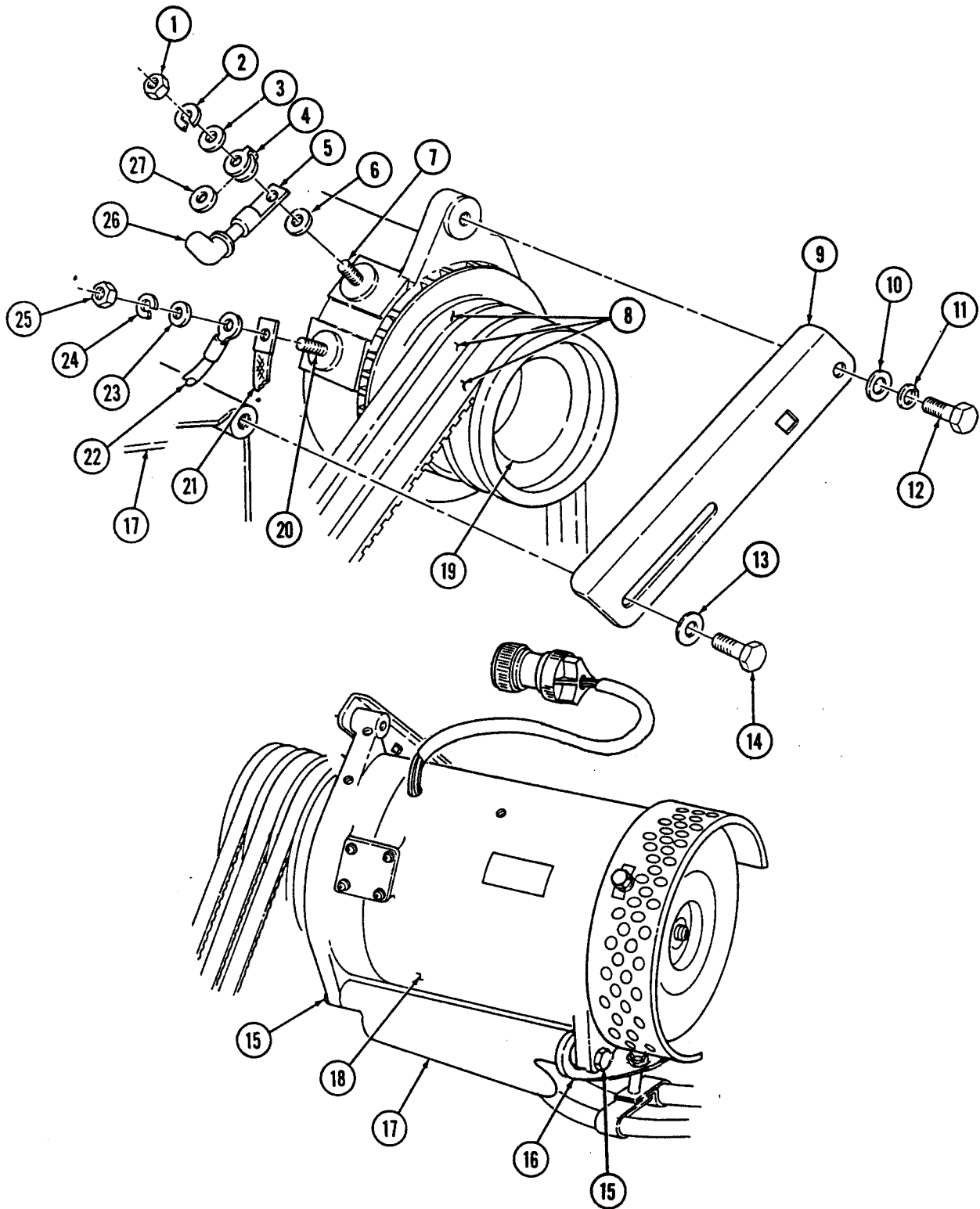
1. Remove nut (25), lockwasher (24), washer (23), lead 3B (22), and ground strap (21) from ground stud (20). Discard lockwasher (24).
2. Slide back rubber boot (26) and remove nut (1), lockwasher (2), washer (3), fuse link (4), insulator washer (27), alternator positive cable (5), and washer (6) from positive stud (7). Discard lockwasher (2).
3. Loosen two capscrews (12) and (14) on alternator adjusting bracket (9) and two capscrews (15) securing alternator (18) to alternator mounting bracket (17) and support bracket (16).
4. Remove three drivebelts (8) from alternator pulley (19).

WARNING

Alternator must be supported during removal and installation.
 Failure to support alternator may cause injury to personnel or damage to equipment.

5. Remove capscrew (12), lockwasher (11), and washer (10) securing alternator (18) to adjusting bracket (9). Discard lockwasher (11).
6. Remove capscrew (14), washer (13), and alternator adjusting bracket (9) from mounting bracket (17).

4-110. 200 AMPERE ALTERNATOR (12338796-1) REPLACEMENT (6.2L) (Cont'd)



4-110. 200 AMPERE ALTERNATOR (12338796-1) REPLACEMENT (6.2L) (Cont'd)

- Remove two capscrews (18), lockwashers (19), and washers (20) securing alternator (24) to support bracket (21) and mounting bracket (23). Discard lockwashers (19).

NOTE

- Perform step 8 for vehicles with new alternator support bracket configuration.
- Perform step 9 for vehicles with revised new configuration.

- Remove two capscrews (18), lockwashers (19), washers (20), and spacer (27) securing alternator (24), power steering lines bracket (25), and support bracket (21) to mounting bracket (23). Discard lockwashers (19).
- Remove nut (37), lockwasher (19), washer (20), long capscrew (38), and washer (20) securing alternator (24), power steering lines bracket (25), and support bracket (21) to mounting bracket (23), and alternator flange (26). Discard lockwasher (19).
- Remove alternator (24).
- Remove three capscrews (15), washers (16), and bushings (22) securing fan guard assembly (17) to alternator (24).
- Remove alternator pulley (28) (para. 4-3).

b Installation

- Install alternator pulley (28) (para. 4-3).
- Install fan guard assembly (17) on alternator (24) and secure with three bushings (22), washers (16), and capscrews (15).
- Position alternator (24) on mounting bracket (23) with support bracket (21) between mounting bracket (23) and alternator (24) and install two washers (20), lockwashers (19), and capscrews (18). Do not tighten capscrews (18).

NOTE

- Perform step 4 for vehicles with new alternator support bracket configuration.
- Perform step 5 for vehicles with revised new configuration.

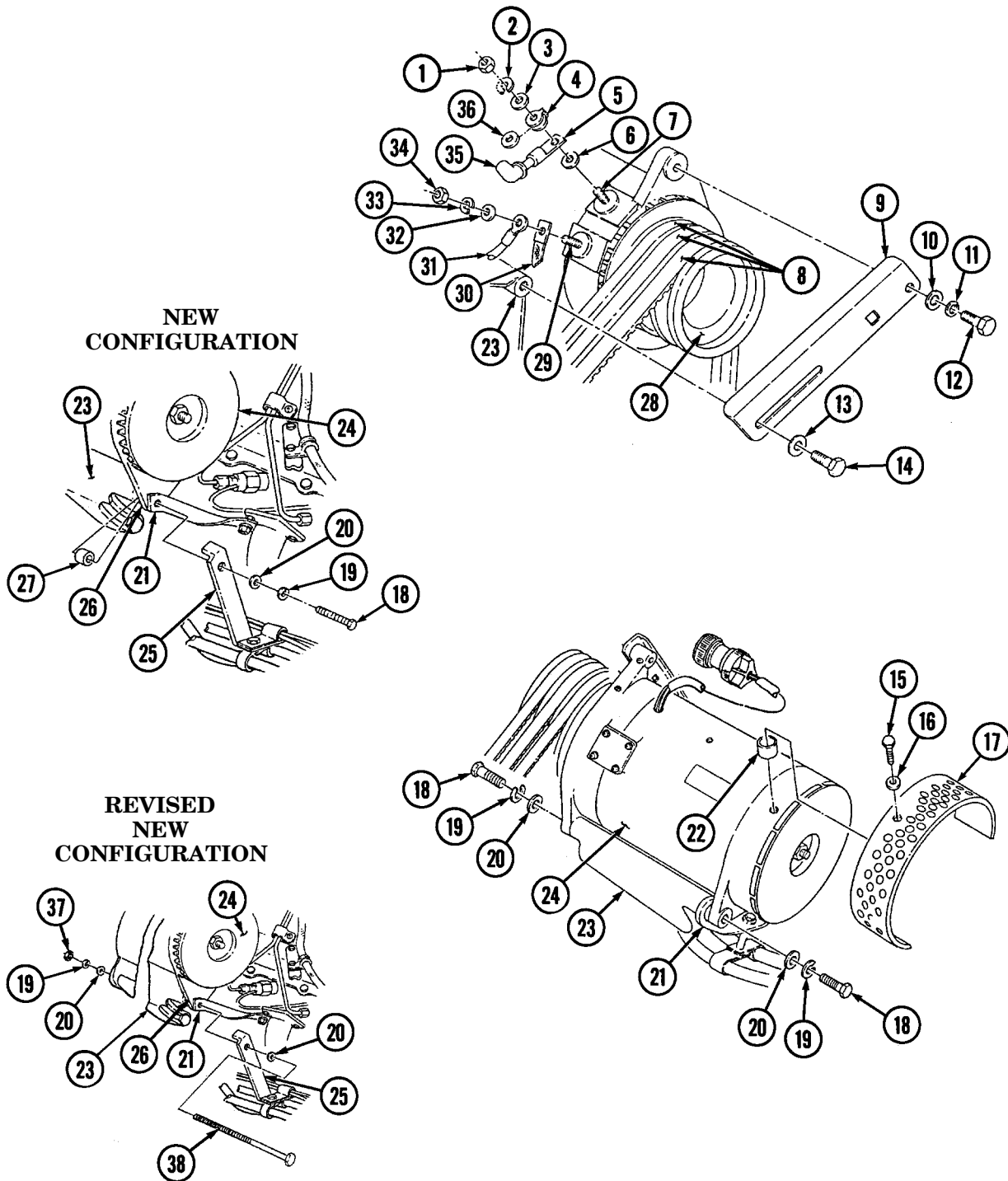
- Position alternator (24) on mounting bracket (23) with support bracket (21) and power steering lines bracket (25) on the outside of alternator mounting flange (26) and install spacer (27), two washers (20), lockwashers (19), and capscrews (18).
- Position alternator (24) on mounting bracket (23) with support bracket (21) and power steering lines bracket (25) on the outside of alternator mounting flange (26) and install washer (20), long capscrew (38), washer (20), lockwasher (19), and nut (37).
- Position alternator adjusting bracket (9) and install washer (10), lockwasher (11), and capscrew (12). Do not tighten capscrew (12).

NOTE

Ensure terminals are clean before connections are made.

- Align alternator (24) with adjusting bracket (9) and install washer (13) and capscrew (14). Do not tighten capscrew (14).
- Install insulator washer (36) in fuse link (4).
- Install washer (6), positive cable (5), fuse link (4), and insulator washer (36) on positive stud (7) and secure with washer (3), lockwasher (2), and nut (1). Tighten nut (1) to 10-15 lb-ft (14-20 N•m).
- Install ground strap (30) and lead 3B (31) to ground stud (29) and secure with washer (32), lockwasher (33), and nut (34). Tighten nut (34) to 96-144 lb-in. (11-16 N•m).
- Install rubber boot (35) over stud (7).
- Install three drivebelts (8) on alternator pulley (28).

4-110. 200 AMPERE ALTERNATOR (12338796-1) REPLACEMENT (6.2L) (Cont'd)



- FOLLOW-ON TASKS:
- Install 200 amp regulator (para. 4-115).
 - Adjust alternator belt (para. 3-82).
 - Connect battery ground cable (para. 4-73).
 - Lower and secure hood (TM 9-2320-280-10).

4-110.1. 200 AMPERE ALTERNATOR (12447109) REPLACEMENT (6.5L)

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M997A2, M1025A2, M1035A2, M1043A2,
M1045A2, M1097A2, M1123

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)
Maintenance and repair shop equipment:
automotive (Appendix B, Item 2)

Materials/Parts

Lockwasher (Appendix G, Item 187)
Two lockwashers (Appendix G, Item 188)
Lockwasher (Appendix G, Item 186)

Personnel Required

One mechanic
One assistant

Manual References

TM 9-2320-280-24P

Equipment Condition

Voltage regulator removed (para. 4-115).

General Safety Instructions

Alternator must be supported during removal and installation.

a. Removal

NOTE

Prior to removal, tag leads for installation.

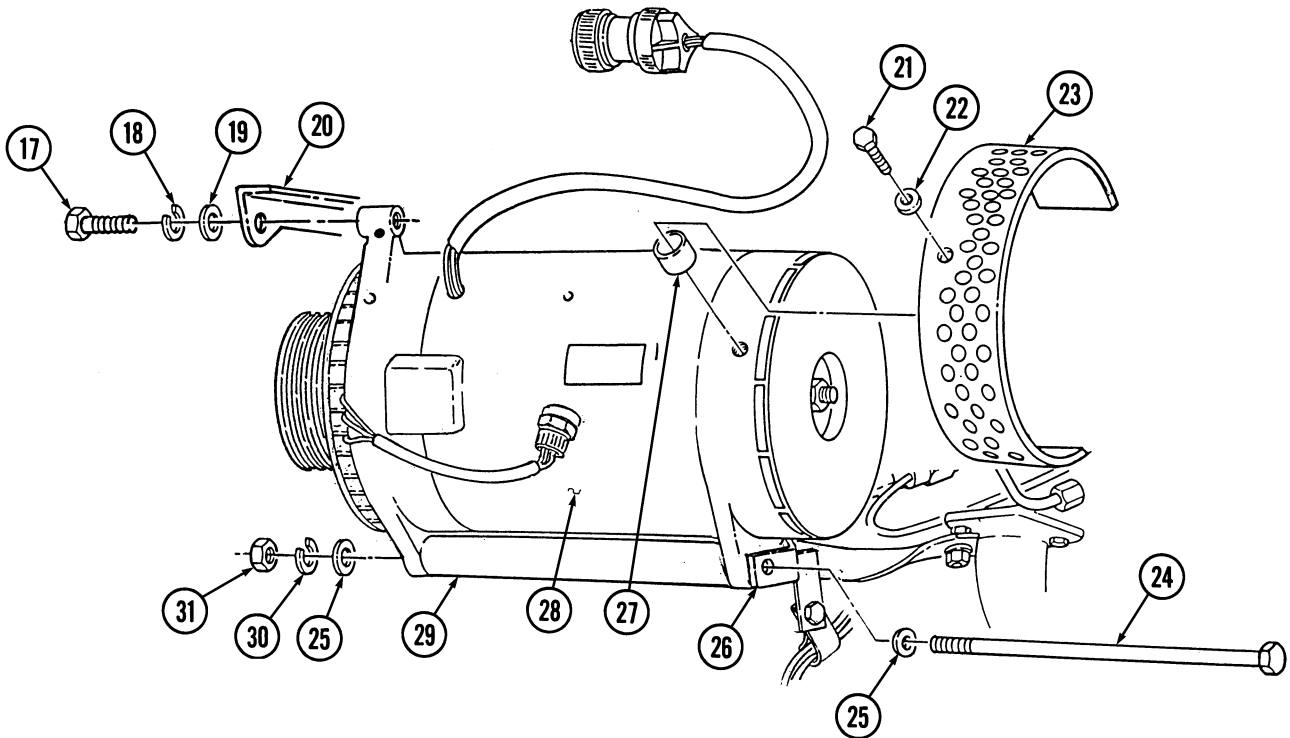
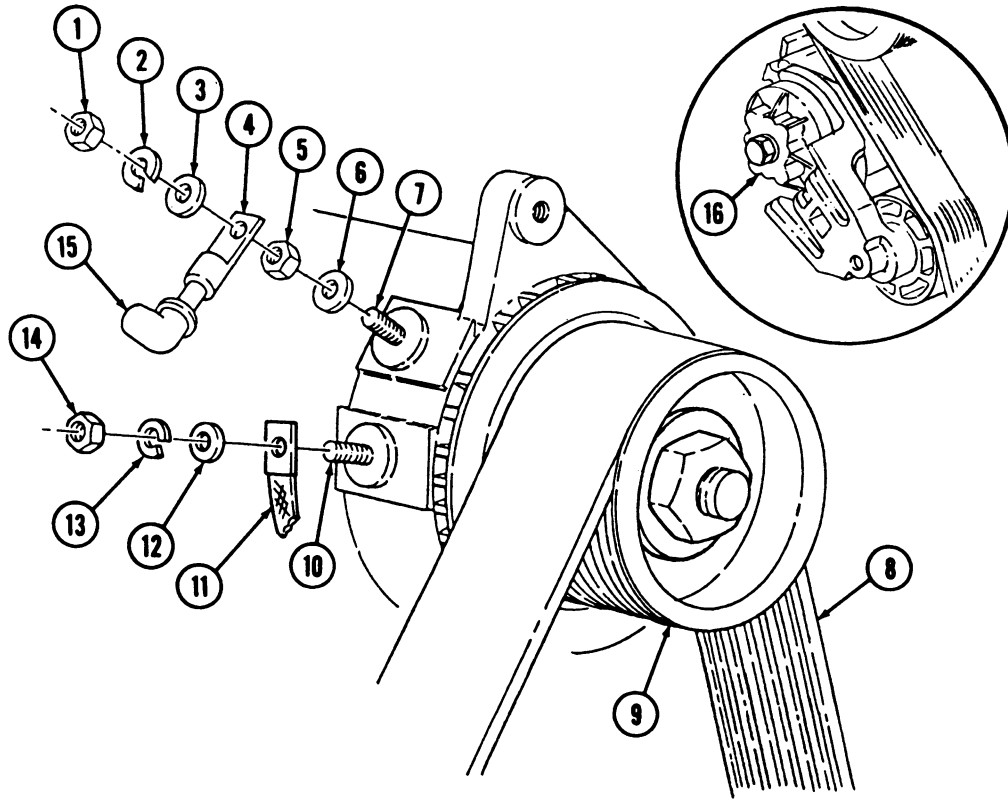
1. Remove nut (14), lockwasher (13), washer (12), and ground strap (11) from ground stud (10). Discard lockwasher (13).
2. Slide back rubber boot (15) and remove nut (1), lockwasher (2), washer (3), alternator positive cable (4), nut (5), and washer (6) from positive stud (7). Discard lockwasher (2).
3. Position 3/8-in. breaker bar on belt tensioner (16), move tensioner (16) clockwise, and remove drivebelt (8) from alternator pulley (9).

WARNING

Alternator must be supported during removal and installation.
Failure to support alternator may cause injury to personnel or damage to equipment.

4. Remove capscrew (17), lockwasher (18), and washer (19) from bracket (20) and alternator (28). Discard lockwasher (18).
5. Remove nut (31), lockwasher (30), washer (25), screw (24), washer (25), and alternator (28) from support bracket (26) and mounting bracket (29). Discard lockwasher (30).
6. Remove three capscrews (21), washers (22), bushings (27), and fan guard assembly (23) from alternator (28).
7. Remove alternator pulley (9) (para. 4-3).

4-110.1. 200 AMPERE ALTERNATOR (12447109) REPLACEMENT (6.5L) (Cont'd)



4-110.1. 200 AMPERE ALTERNATOR (12447109) REPLACEMENT (6.5L) (Cont'd)

b. Installation

1. Install alternator pulley (24) (para. 4-3).
2. Install fan guard assembly (7) on alternator (12) with three bushings (11), washers (6), and capscrews (5).

WARNING

Alternator must be supported during removal and installation.
Failure to support alternator may cause injury to personnel or damage to equipment.

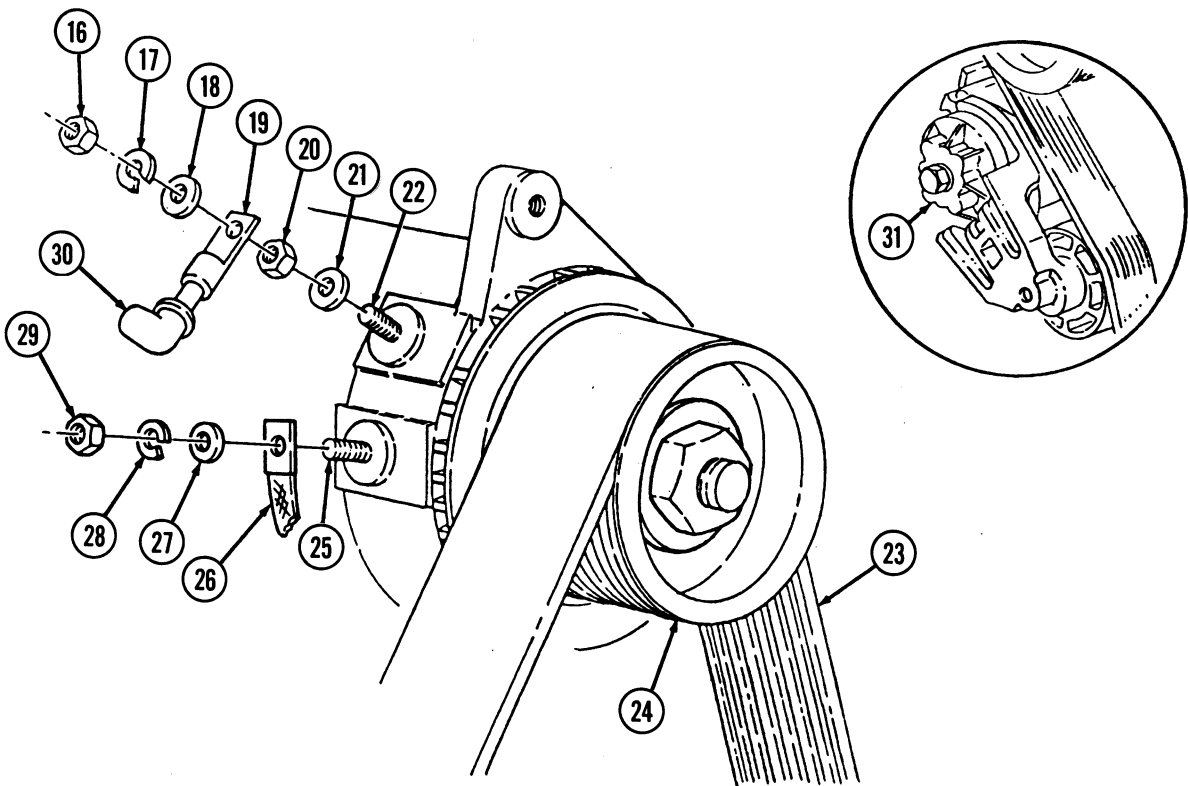
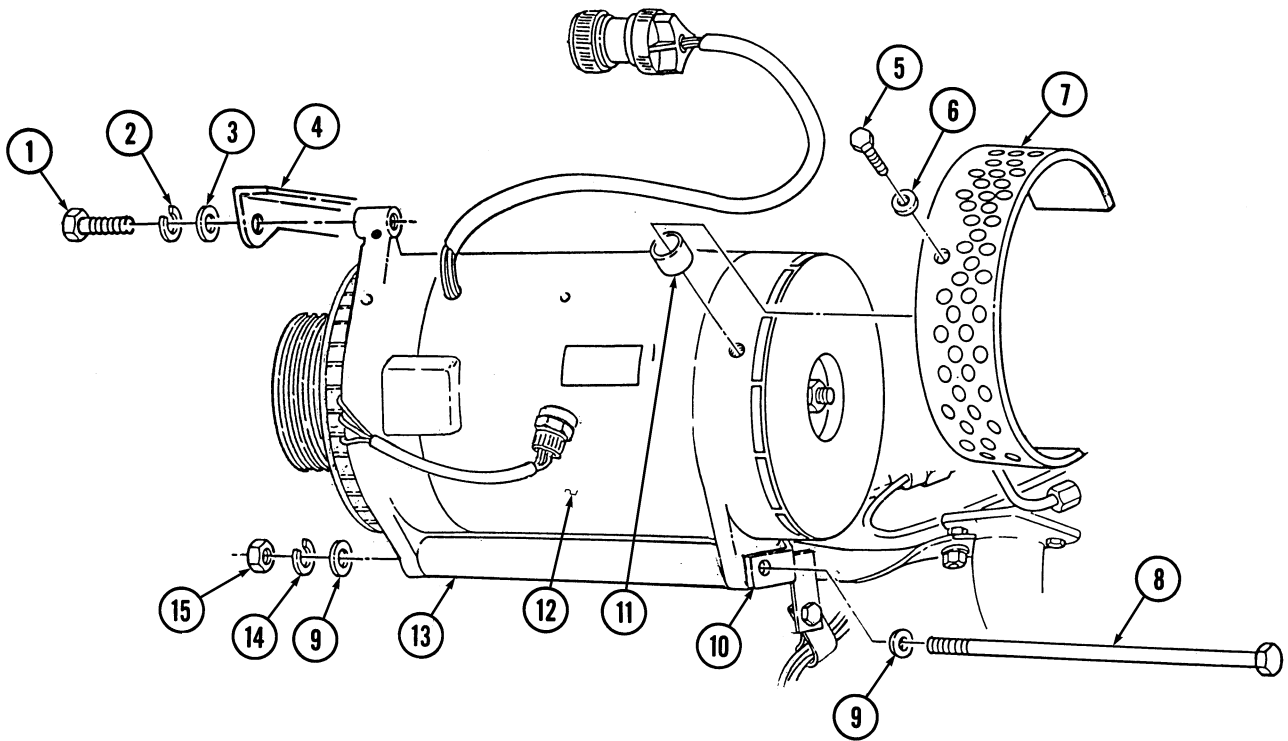
3. Position alternator (12) on mounting bracket (13) with support bracket (10) on outside of alternator (12) and install washer (9), capscrew (8), washer (9), lockwasher (14), and nut (15).
4. Install washer (3), lockwasher (2), and capscrew (1) on bracket (4) and alternator (12).

NOTE

Ensure terminals are clean before connections are made.

5. Install washer (21), nut (20), and positive cable (19) on positive stud (22) with washer (18), lockwasher (17), and nut (16). Tighten nut (16) to 10-15 lb-ft (14-20 N·m).
6. Slide rubber boot (30) over stud (22).
7. Install ground strap (26) on ground stud (25) with washer (27), lockwasher (28), and nut (29). Tighten nut (29) to 8-12 lb-ft (11-16 N·m).
8. Position 3/8-in. breaker bar on belt tensioner (31), move tensioner (31) clockwise, and install belt (23) on alternator pulley (24).

4-110.1. 200 AMPERE ALTERNATOR (12447109) REPLACEMENT (6.5L) (Cont'd)



FOLLOW-ON TASK: Install voltage regulator (para. 4-115).

4-111. 200 AMPERE ALTERNATOR CABLE (12446825) REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M997A2, M1097A2, M1123

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Lockwasher (Appendix G, Item 186)
Lockwasher (Appendix G, Item 150)
Adhesive sealant (Appendix C, Item 9)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

- Battery ground cables disconnected (para. 4-73).
- Hood raised and secured (TM 9-2320-280-10).
- Engine access cover removed (para. 10-15).

NOTE

Prior to removal, tag leads for installation.

a. Removal

1. Slide back rubber boot (1) and remove nut (3), lockwasher (4), washer (5), fuse (2), insulator (6), cable (7), and bushing (8) from positive stud (9). Discard lockwasher (4).
2. Remove capscrew (11), clamp (12), and cable (7) from bracket (10).
3. Remove nut (17), lockwasher (16), washer (15), and cable (7) from buss bar (14) and remove cable (7) from battery box (13). Discard lockwasher (16).

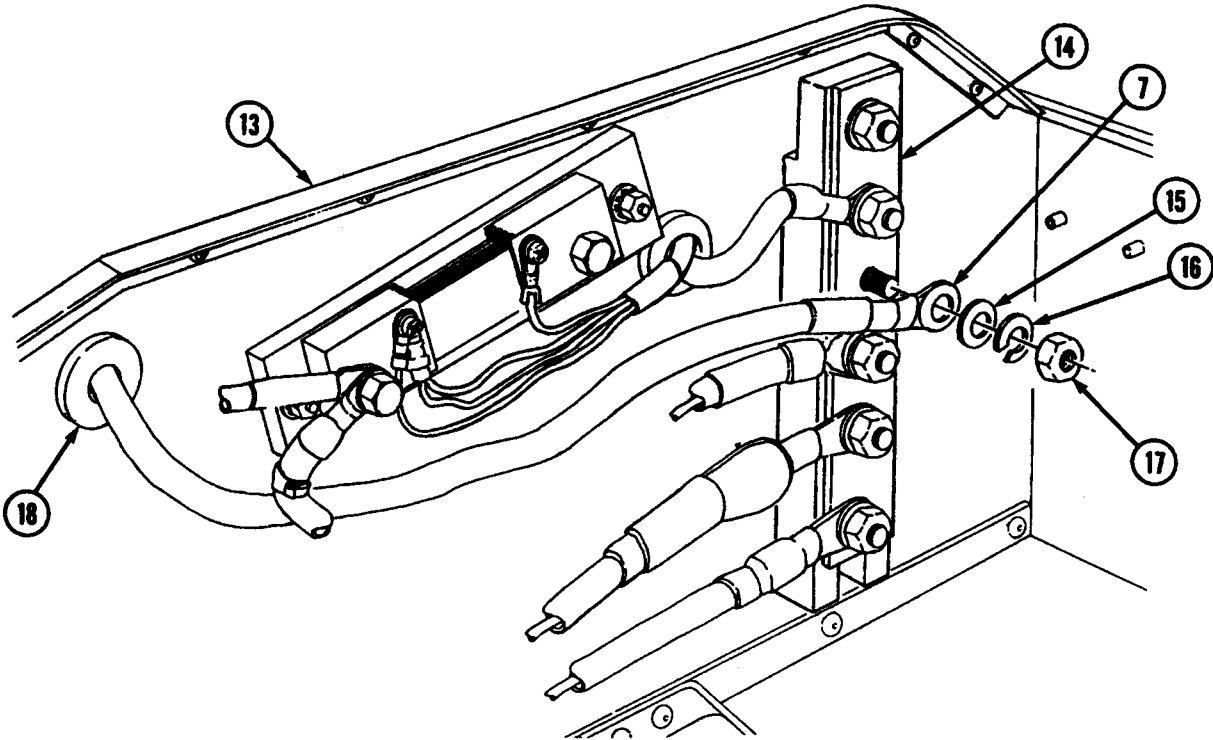
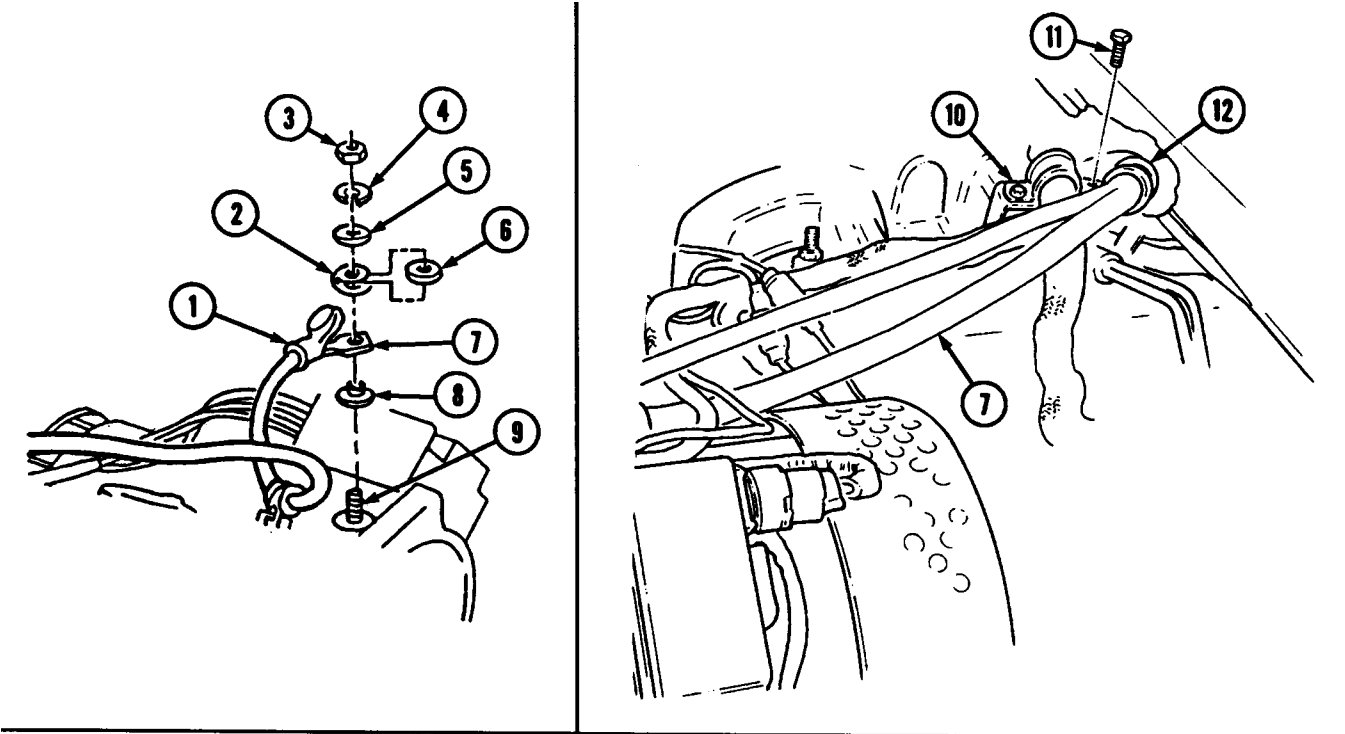
b. Installation

NOTE

Ensure terminals are clean before connections are made.

1. Route cable (7) through grommet (18) in battery box (13), and install cable (7) on buss bar (14) with washer (15), lockwasher (16), and nut (17).
2. Route cable (7) in approximate mounting location over heat shield, and secure cable (7) and clamp (12) on bracket (10) with capscrew (11).
3. Apply sealant to positive stud (9) and cable (7) so all exposed metallic surfaces are coated.
4. Install bushing (8), cable (7), fuse (2), and insulator (6) on positive stud (9) with washer (5), lockwasher (4), and nut (3). Tighten nut (3) to 10-15 lb-ft (14-20 N•m). Slide rubber boot (1) over nut (3).

4-111. 200 AMPERE ALTERNATOR CABLE (12446825) REPLACEMENT (Cont'd)



- FOLLOW-ON TASKS:**
- Install engine access cover (para. 10-15).
 - Lower and secure hood (TM 9-2320-280-10).
 - Connect battery ground cables (para. 4-73).
 - Start engine and check operation of voltmeter gauge (TM 9-2320-280-10).

4-112. 200 AMPERE ALTERNATOR CABLE (12339317) REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M996, M996A1, M997, M997A1, M1097, M1097A1

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Two lockwashers (Appendix G, Item 191)
Assembled locknut (Appendix G, Item 131)
Lockwasher (Appendix G, Item 186)

Materials/Parts (Cont'd)

Tiedown strap (Appendix G, Item 308)
Adhesive sealant (Appendix C, Item 9)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

- Battery ground cable disconnected (para. 4-73).
- Hood raised and secured (TM 9-2320-280-10).

NOTE

Prior to removal, tag leads for installation.

a. Removal

1. Remove tiedown strap (30), screw (31), clip (32), and 200 ampere cable (8) from starter (33). Discard tiedown strap (30).

NOTE

Step 2 applies to M997 and M997A1 vehicles only. Step 3 applies to M996, M996A1, M1097, and M1097A1 vehicles only.

2. Remove assembled locknut (9), bolt (24), cable (8), and clamps (28), (25), and (27) from oil pan bracket (26). Discard assembled locknut (9).
3. Remove assembled locknut (9), bolt (24), cable (8), and clamp (28) from oil pan bracket (26). Discard assembled locknut (29).
4. Remove nut (19), washer (20), clamps (21), and (22), and cable (8) from compressor (18).
5. Remove nut (15), lockwasher (16), cable (8), and clamp (17) from engine lift bracket (1). Discard lockwasher (16).
6. Remove nut (11), lockwasher (12), cable (8), and clamp (13) from water crossover stud (14). Discard lockwasher (12).
7. Slide back rubber boot (2) and remove nut (4), lockwasher (5), washer (6), fuse (3), insulator (7), cable (8), and bushing (9) from positive stud (10). Discard lockwasher (5).
8. Remove cable (8) from vehicle.

b. Installation

NOTE

Ensure terminals are clean before connections are made.

1. Install bushing (9), cable (8), fuse (3), and insulator (7) on positive stud (10) with washer (6), lockwasher (5), and nut (4). Tighten nut (4) to 10-15 lb-ft (14-20 N•m). Slide rubber boot (2) over nut (4).

NOTE

For vehicles equipped with deep water fording kits, perform step 2.

2. Apply sealant to positive stud (10) and cable (8) so all exposed metallic surfaces are coated. The sealant should be evenly applied with a minimum thickness of .06 in. (1.5 mm).
3. Install clamp (13) and cable (8) on water crossover stud (14) with lockwasher (12) and nut (11).
4. Install clamp (17) on cable (8) and engine lift bracket (1) with lockwasher (16) and nut (15).

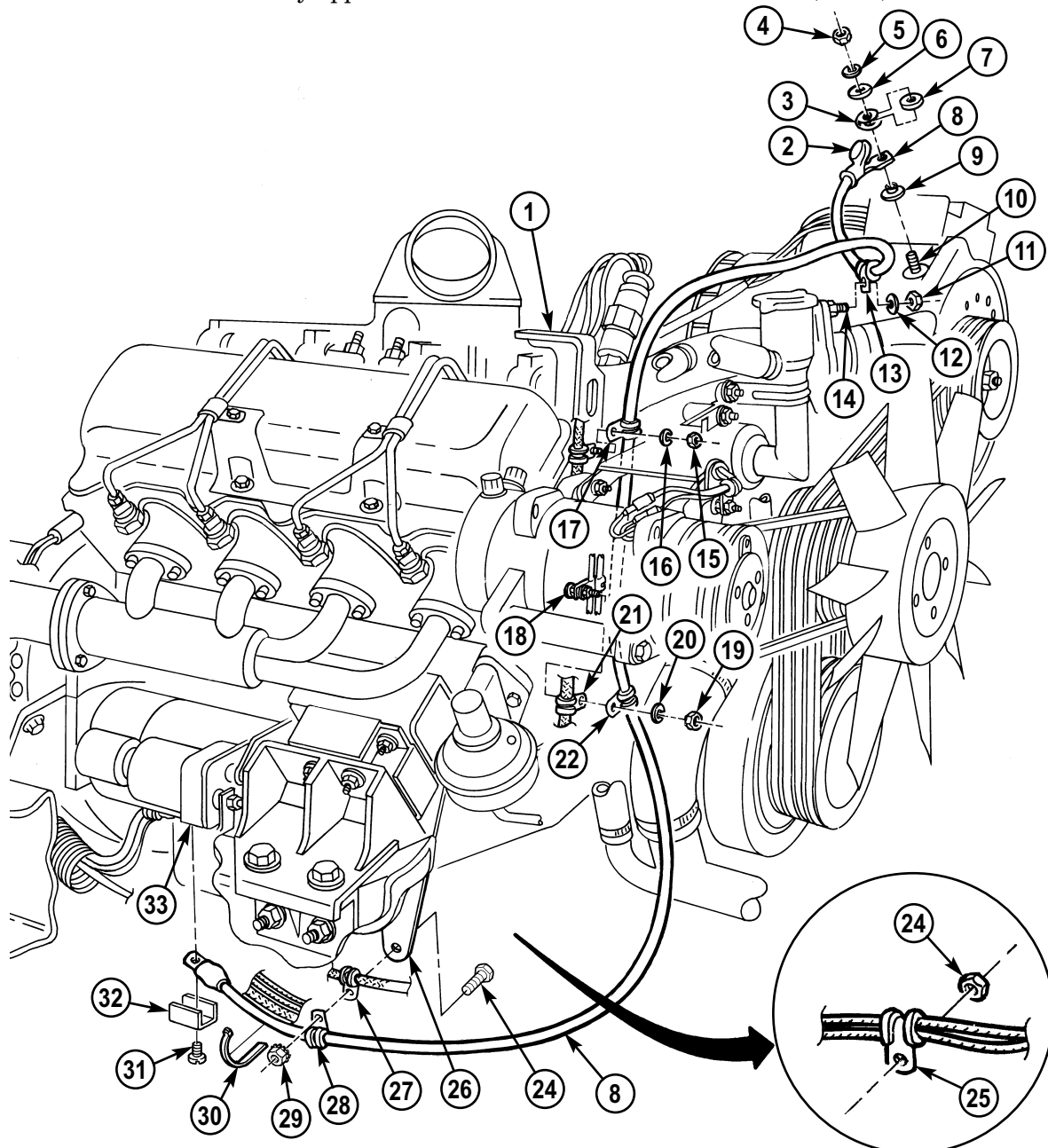
4-112. 200 AMPERE ALTERNATOR CABLE (12339317) REPLACEMENT (Cont'd)

5. Install clamp (22) on cable (8) and secure clamp (21) to compressor (18) with washer (20) and nut (19).

NOTE

Step 6 applies to M997 and M997A1 vehicles only. Step 7 applies to M996 and M996A1 vehicles only.

6. Install clamps (28), (27), and (25) on cable (8) and oil pan bracket (26) with bolt (24) and assembled locknut (29).
7. Install clamp (28) on cable (8) and oil pan bracket (26) with bolt (24) and assembled locknut (29).
8. Install cable (8) on starter (33) with clip (32) and screw (31). Connect tiedown strap (30).
9. Apply sealant to screw (31) and cable (8) so that all exposed metallic surfaces are coated. The sealant should be evenly applied with a minimum thickness of .12 in. (3 mm).



- FOLLOW-ON TASKS:**
- Lower and secure hood (TM 9-2320-280-10).
 - Connect battery ground cable (para. 4-73).
 - Start engine and check operation of voltmeter gauge (TM 9-2320-280-10)

4-113. 200 AMPERE UMBILICAL POWER CABLE REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M1097, M1097A1, M1097A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Three lockwashers (Appendix G, Item 138)
Lockwasher (Appendix G, Item 141)
Lockwasher (Appendix G, Item 150)
Lockwasher (Appendix G, Item 148)
Silicone compound (Appendix C, Item 48)

Personnel Required

One mechanic
One assistant

Manual References

TM 9-2320-280-24P

Equipment Condition

- Batteries removed (para. 4-79).
- Fixed rear door removed (para. 10-14).

a. Removal

NOTE

- Prior to removal, tag leads for installation.
- Perform step 1 for M1097A2 vehicles only. Perform step 2 for M1097 and M1097A1 vehicles.

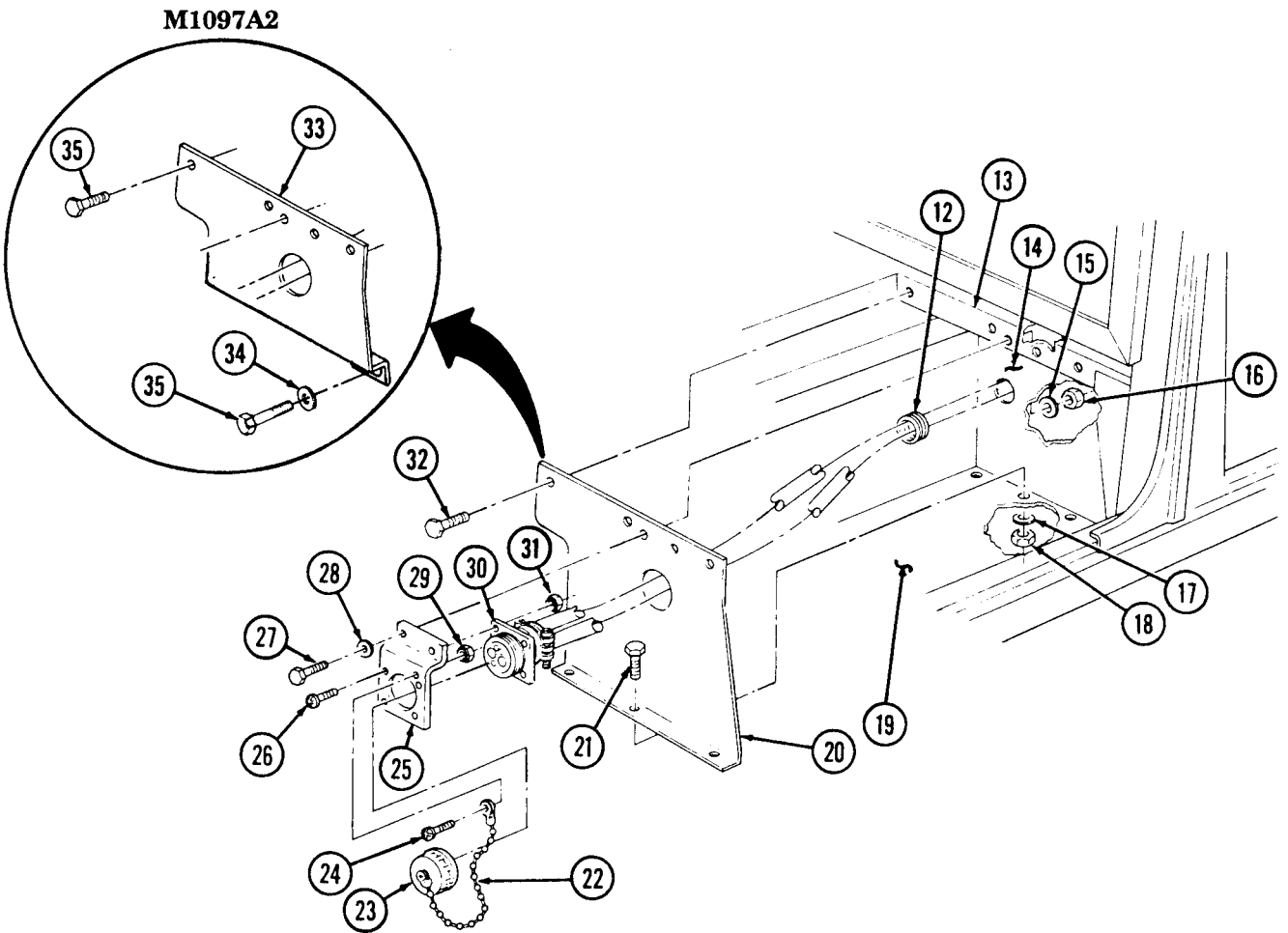
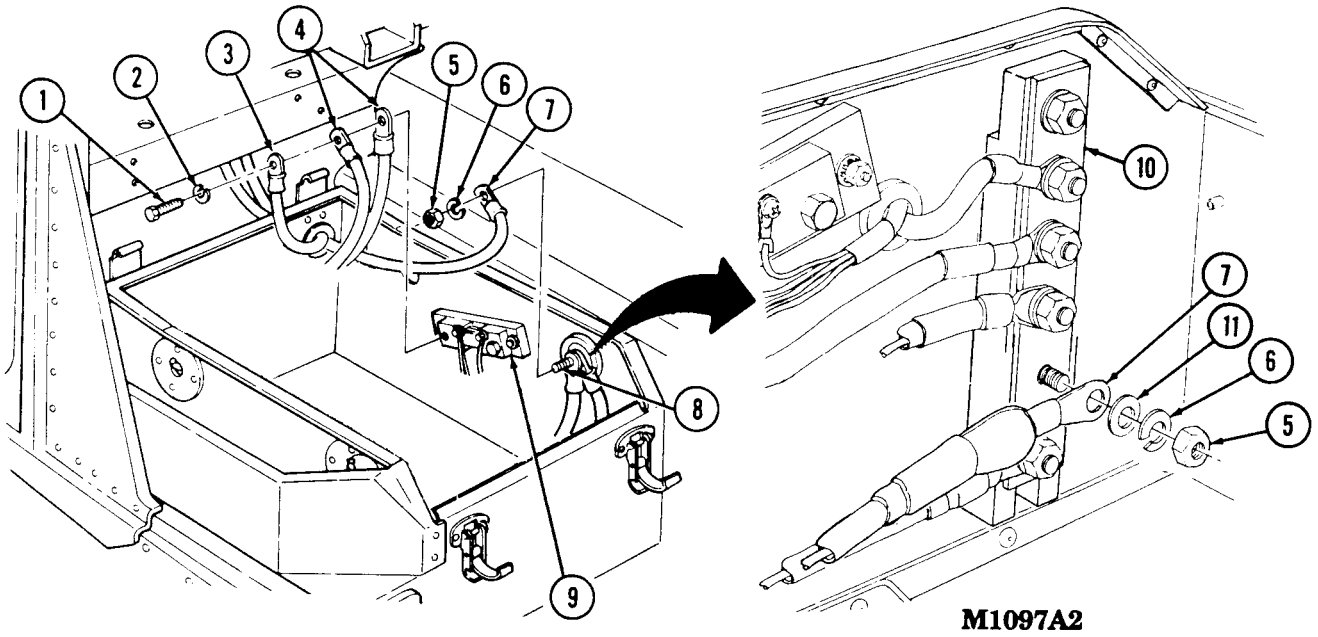
1. Remove nut (5), lockwasher (6), washer (11), and positive power cable (7) from buss bar (10). Discard lockwasher (6).
2. Remove nut (5) lockwasher (6), and positive power cable (7) from power stud (8). Discard lockwasher (6).
3. Remove capscrew (1), lockwasher (2), negative power cable (3), and two cables (4) from shunt (9). Discard lockwasher (2).

NOTE

Perform step 4 for M1097A2 vehicles only. Perform steps 5 and 6 for M1097 and M1097A1 vehicles only.

4. Remove five capscrews (35), two washers, (34), and coverplate (33) from "B" beam (13).
5. Remove three capscrews (32) from coverplate (20) and "B" beam (13).
6. Remove three nuts (18), lockwashers (17), capscrews (21), and coverplate (20) from cargo floor (19). Discard lockwashers (17).
7. Remove two nuts (16), washers (15), capscrews (27), washers (28), and mounting bracket (25) from coverplate (20).
8. Remove nut (29) and screw (24) from cover chain (22) and mounting bracket (25).
9. Remove cover (23) and cover chain (22) from umbilical power cable assembly (30).
10. Remove four nuts (31), screws (26), and mounting bracket (25) from umbilical power cable assembly (30).
11. Pull umbilical power cable assembly (30) through grommet (12) and coverplate (20) and remove from vehicle.
12. Remove grommet (12) from battery box (14).

4-113. 200 AMPERE UMBILICAL POWER CABLE REPLACEMENT (Cont'd)



4-113. 200 AMPERE UMBILICAL POWER CABLE REPLACEMENT (Cont'd)

b. Installation

1. Install grommet (12) on battery box (14).
2. Route umbilical power cable assembly (30) through coverplate (20) and grommet (12) and position in approximate mounting location.
3. Install umbilical power cable assembly (30) on mounting bracket (25) with three screws (24) and nuts (31).
4. Install cover (23) on umbilical power cable assembly (30).
5. Install cover chain (22) on mounting bracket (25) with screw (24) and nut (29).

NOTE

Perform step 6 for M1097A2 vehicles only. Perform steps 7 and 8 for M1097 and M1097A1 vehicles.

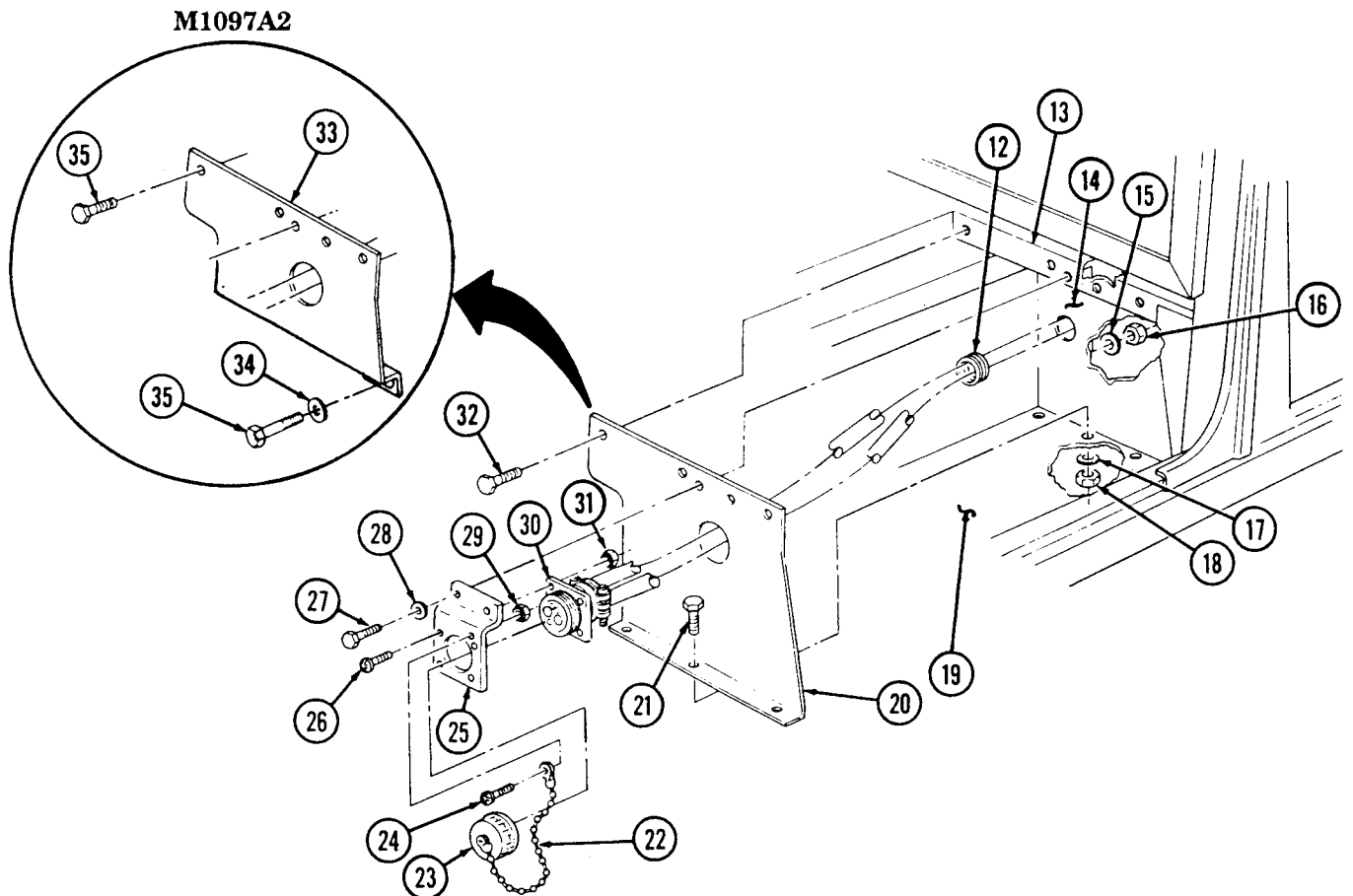
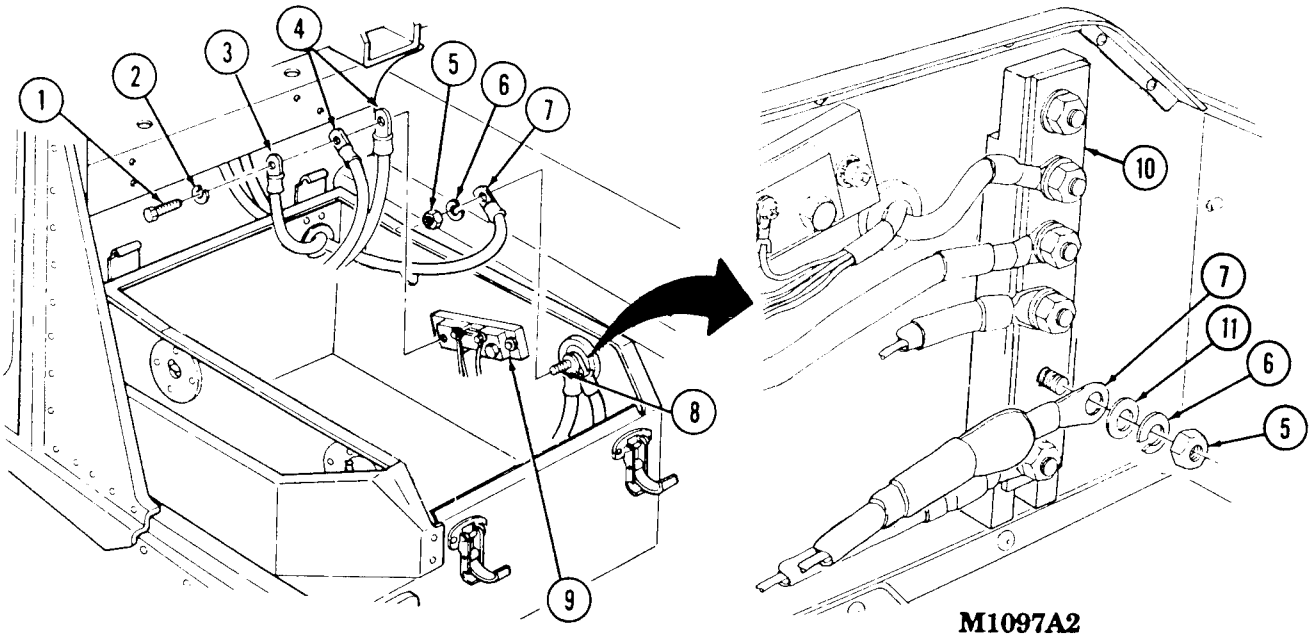
6. Install coverplate (33) on "B" beam (13) with two washers (34) and five capscrews (35).
7. Install mounting bracket (25) on coverplate (20) with two washers (28), capscrews (27), washers (15), and nuts (16).
8. Install coverplate (20) on "B" beam (13) with three capscrews (32).
9. Install coverplate (20) to cargo floor (19) with three capscrews (21), lockwashers (17), and nuts (18). Tighten nuts (18) to 65 lb-ft (88 N•m).
10. Install two cables (4) and negative power cable (3) on shunt (9) with lockwasher (2) and capscrew (1).

NOTE

Perform step 11 for M1097A2 vehicles only. Perform step 12 for M1097 and M1097A1 vehicles.

11. Install positive power cable (7) on buss bar (10) with washer (11), lockwasher (6), and nut (5).
12. Install positive power cable (7) on power stud (8) with lockwasher (6) and nut (5).
13. Apply silicone compound to cable (7) so that all exposed metallic surfaces are coated.

4-113. 200 AMPERE UMBILICAL POWER CABLE REPLACEMENT (Cont'd)



- FOLLOW-ON TASKS:
- Install fixed rear door (para. 10-14).
 - Install batteries (para. 4-79).

4-114. 200 AMPERE REGULATOR (A0013036AA) REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M996, M996A1, M997, M997A1

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Four lockwashers (Appendix G, Item 138)
Six lockwashers (Appendix G, Item 142)
Four lockwashers (Appendix G, Item 143)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

- Battery ground cable disconnected (para. 4-73).
- Hood raised and secured (TM 9-2320-280-10).

a. Removal

1. Remove four screws (1), lockwashers (2), cover (3), and gasket (4) from regulator (5). Discard lockwashers (2).

NOTE

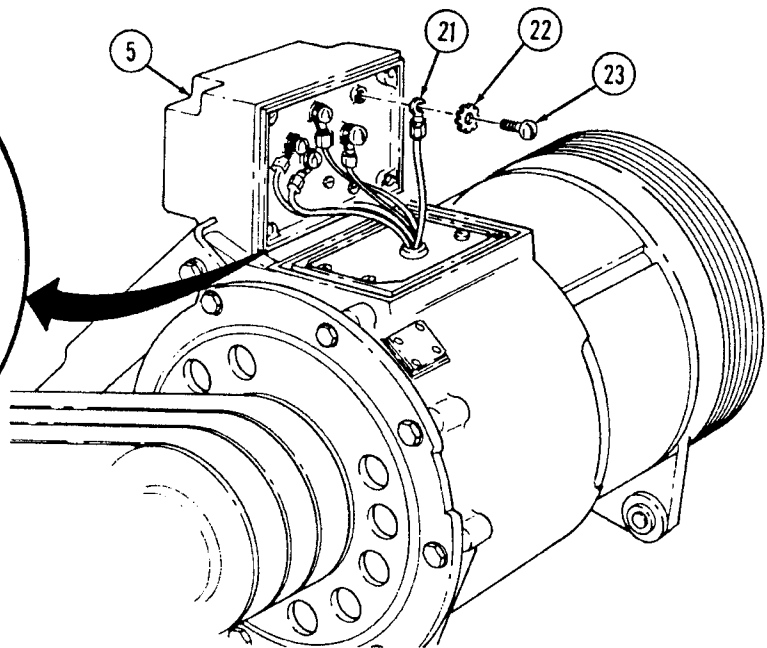
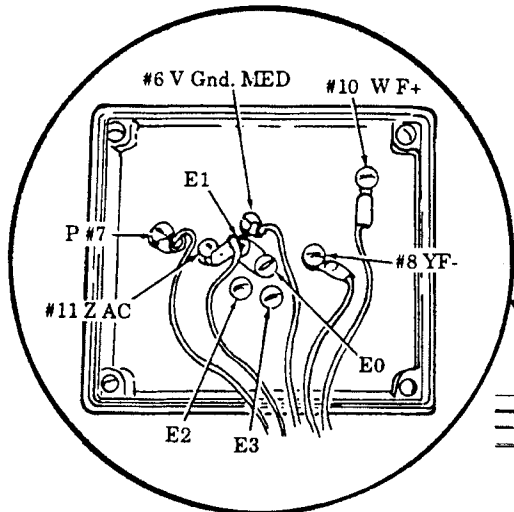
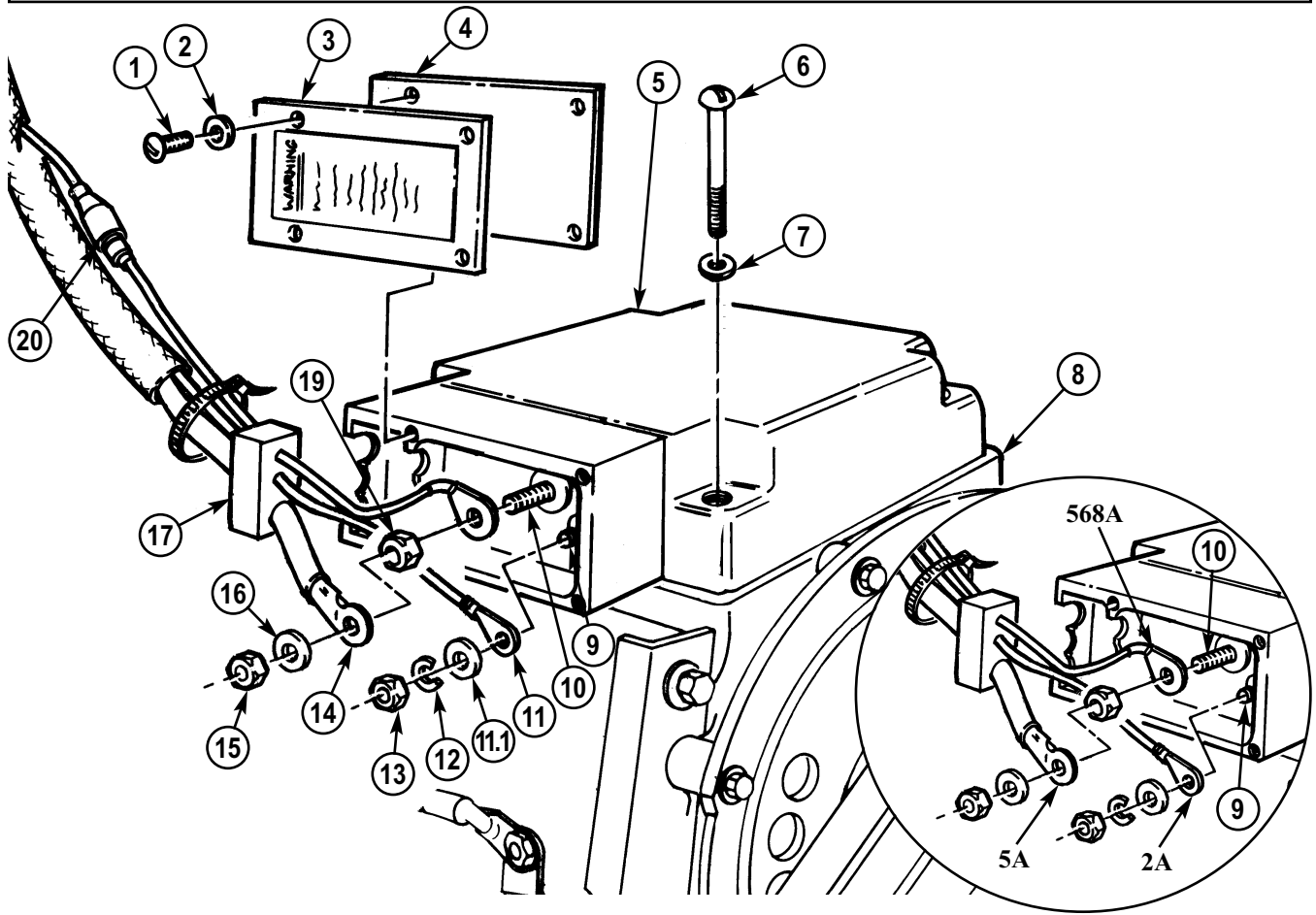
Prior to removal, tag leads for installation.

2. Remove nut (13), lockwasher (12), washer (11.1), and lead 2A (11) from stud (9). Discard lockwasher (12).
3. Remove nut (15), washer (16), and lead 5A (14) from stud (10).
4. Remove rubber wedge (17) from opening in regulator (5).
5. Remove four screws (6) and lockwashers (7) from regulator (5) and alternator (8) and pull regulator (5) away for access to leads (21). Discard lockwashers (7).
6. Remove five screws (23), lockwashers (22), leads (21), and regulator (5) from alternator (8). Discard lockwashers (22).
7. Remove nut (19) and lead 568A (20) from stud (10).

b. Installation

1. Install lead 568A (20) on stud (10) with nut (19).
2. Install five leads (21) on regulator (5) with five lockwashers (22) and screws (23).
3. Install regulator (5) on alternator (8) with four lockwashers (7) and screws (6).
4. Install lead 5A (14) on stud (10) with washer (16) and nut (15).
5. Install lead 2A (11) on stud (9) with washer (11.1), lockwasher (12), and nut (13).
6. Install rubber wedge (17) in opening in regulator (5).
7. Install gasket (4) and cover (3) on regulator (5) with four lockwashers (2) and screws (1).

4-114. 200 AMPERE REGULATOR (A0013036AA) REPLACEMENT (Cont'd)



- FOLLOW-ON TASKS:**
- Lower and secure hood (TM 9-2320-280-10).
 - Connect battery ground cable (para. 4-73).

4-115. 200 AMPERE REGULATOR (12338796-1, S-311) REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M997A2, M1025A2, M11035A2, M1043A2,
M1045A2, M1097, M1097A1, M1097A2

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

- Battery ground cables disconnected (para. 4-73).
- Hood raised and secured (TM 9-2320-280-10).

Materials/Parts

Two spring tension washers
(Appendix G, Item 318)
Lockwasher (Appendix G, Item 185)
Sealing Compound (Appendix C, Item 45)

a. Removal

NOTE

Prior to removal, tag leads for installation.

1. Disconnect regulator plug (13) from voltage regulator (12).
2. Slide back rubber boot (4) and remove nut (3), lead 5A (2), and washer (1) from red (energize) terminal (26).
3. Slide back rubber boot (5) and remove nut (6), lead 2A (7), and washer (8) from yellow (AC) terminal (9).

NOTE

Perform steps 4 and 5 for M997A2, M1025A2, M1035A2,
M1043A2, M1045A2, and M1097A2 vehicles only.

4. Slide back rubber boot (22) and remove nut (23), lead (21), and washer (24) from terminal (25).
5. Disconnect regulator connector (17) from alternator connector (16).
6. Remove two screws (20), spring tension washers (19), and washers (18) from voltage regulator (12) and alternator (15). Discard spring tension washers (19).
7. Remove capscrew (10), lockwasher (11), spacer (14), and voltage regulator (12) from alternator (15). Discard lockwasher (11).

b. Installation

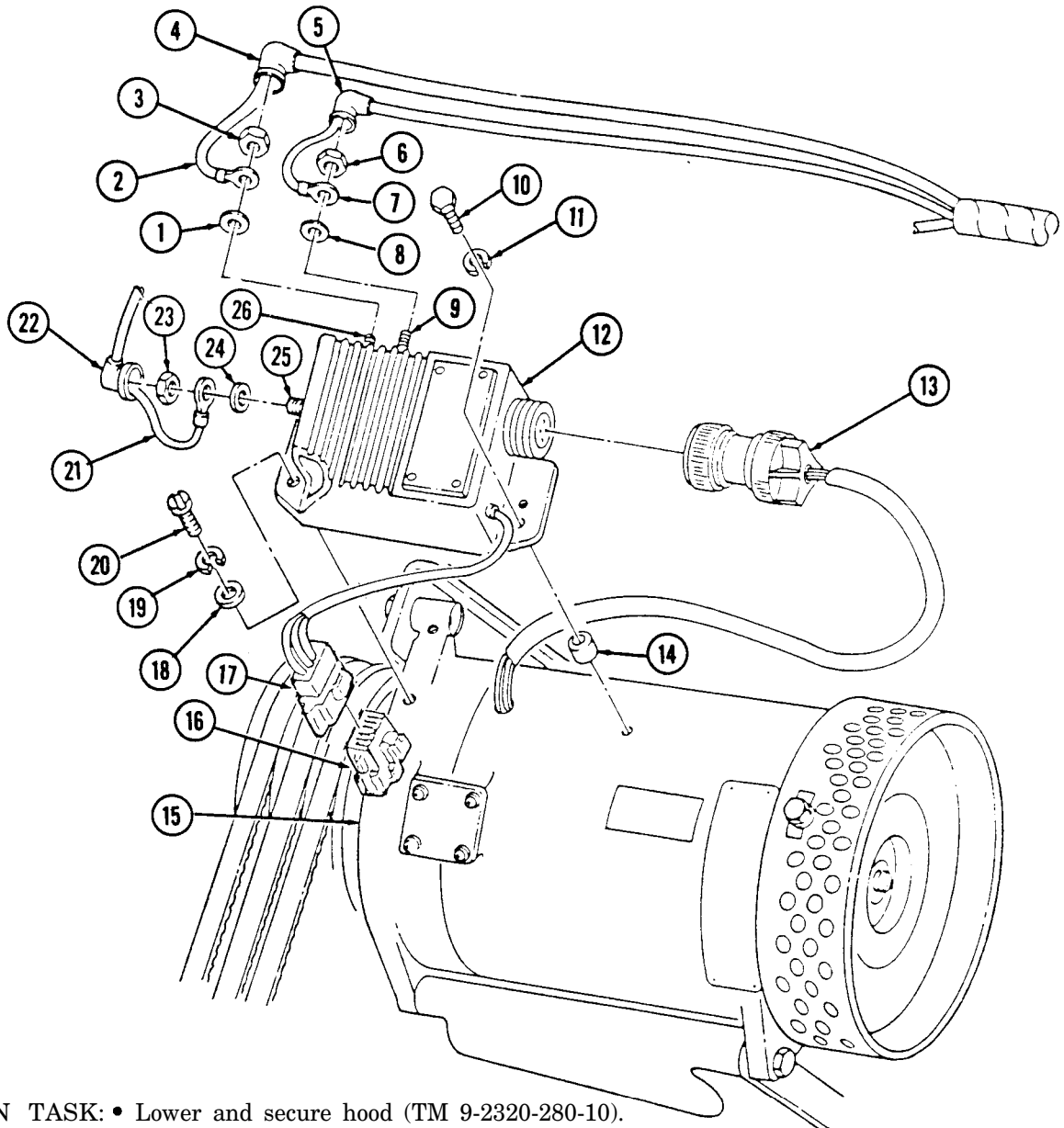
1. Apply sealing compound to threads of capscrew (10).
2. Install spacer (14) and voltage regulator (12) on alternator (15) with lockwasher (11) and capscrew (10). Tighten capscrew (10) to 88-94 lb-in. (10-11 N•m).
3. Install two washers (18), spring tension washers (19) and screws (20) on voltage regulator (12) and alternator (15). Tighten screws (20) to 30-34 lb-in. (3-4 N•m).

4-115. 200 AMPERE REGULATOR (12338796-1, S-311) REPLACEMENT (Cont'd)

NOTE

Perform steps 4 and 5 for M997A2, M1025A2, M1035A2, M1043A2, M1045A2, and M1097A2 vehicles only.

4. Install washer (24), lead (21), and nut (23) on terminal (25). Tighten nut (23) to 18-22 lb-in. (2.0-2.5 N•m). Slide rubber boot (22) over terminal (25).
5. Connect regulator connector (17) to alternator connector (16).
6. Install washer (1), lead 5A (2), and nut (3) on red (energize) terminal (26). Tighten nut (3) to 23-27 lb-in. (2.6-3.0 N•m). Slide rubber boot (4) over terminal (26).
7. Install washer (8), lead 2A (7), and nut (6) on yellow (AC) terminal (9). Tighten nut (6) to 18-22 lb-in. (2.0-2.5 N•m). Slide rubber boot (5) over terminal (9).
8. Connect regulator plug (13) to voltage regulator (12).



- FOLLOW-ON TASK:**
- Lower and secure hood (TM 9-2320-280-10).
 - Connect battery ground cables (para. 4-73).

4-116. CONTROL BOX TERMINAL BLOCK AND MOUNTING BUSS REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M996, M996A1, M997, M997A1, M997A2

Manual References

TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

Control box removed (para. 4-96 or 4-97).

Materials/Parts

Ten plain-assembled nuts
(Appendix G, Items 201)

NOTE

- Prior to removal, tag leads for installation.
- M996 and M996A1 require only nine screws and leads.

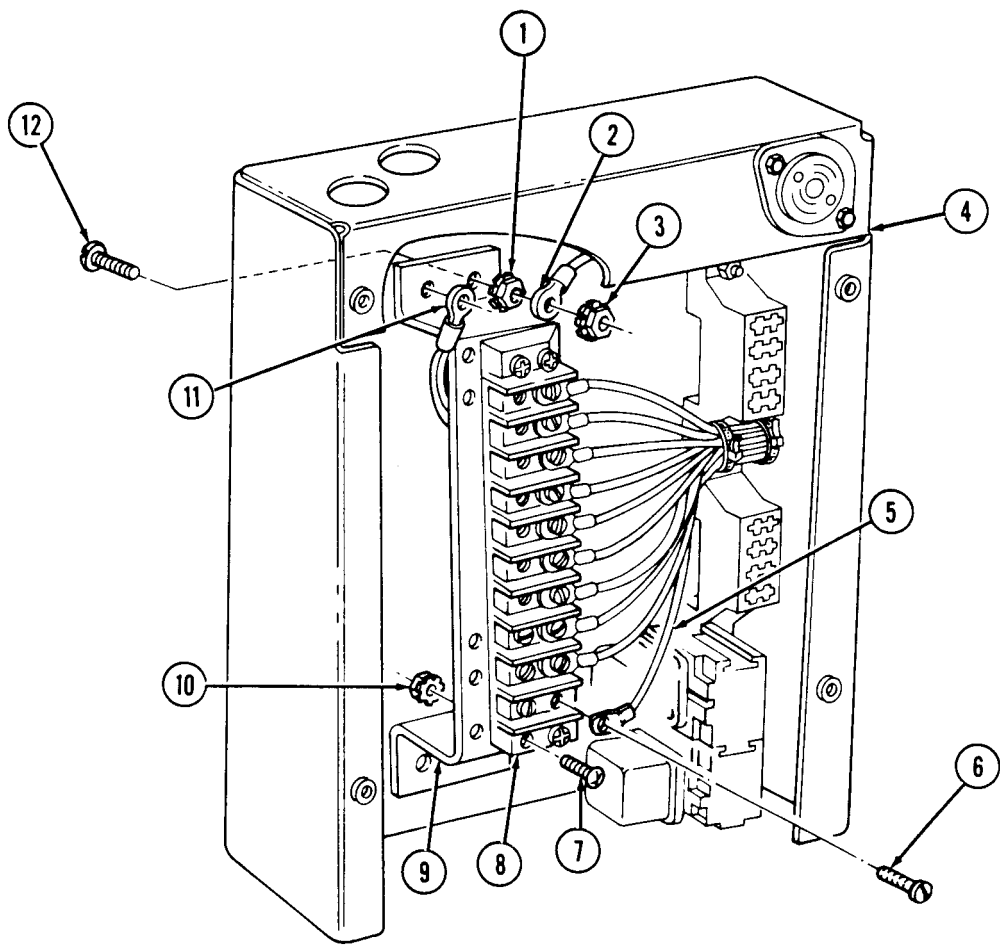
a. Removal

1. Remove ten screws (6) and leads (5) from terminal block (8).
2. Remove two plain-assembled nuts (3), two leads 790 (2) and 797 and 797A (11) from screws (12). Discard plain-assembled nuts (3).
3. Remove four plain-assembled nuts (1), screws (12), terminal (8), and mounting buss (9) from control box (4). Discard four plain-assembled nuts (1).
4. Remove four plain-assembled nuts (10), screws (7), and terminal block (8) from mounting buss (9). Discard plain-assembled nuts (10).

b. Installation

1. Install terminal block (8) on mounting buss (9) with four screws (7) and plain-assembled nuts (10).
2. Install mounting buss (9) on control box (4) with four screws (12) and plain-assembled nuts (1).
3. Install two leads 790 (2) and 797 and 797A (11) with two screws (12) and plain-assembled nuts (3).
4. Install ten leads (5) to terminal block (8) with ten screws (6).

4-116. CONTROL BOX TERMINAL BLOCK AND MOUNTING BUSS REPLACEMENT



FOLLOW-ON TASK: Install control box (para. 4-96 or 4-97).

4-117. CONTROL BOX FUSE BLOCK AND RELAY SOCKET REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M996, M996A1, M997, M997A1, M997A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Two plain-assembled nuts
(Appendix G, Item 201)
Two tiedown straps (Appendix G, Item 308)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

- Control box removed (para. 4-96 or 4-97).
- If replacing a fuse block: remove fuses (TM 9-2320-280-10).
- If replacing relay socket: remove relays (para. 4-120).

NOTE

Procedures for replacing the upper fuse block, and relay socket are basically the same. This procedure covers replacement of the lower fuse block.

a. Removal

1. Remove two tiedown straps (3) from fuse block leads (7). Discard tiedown straps (3).
2. Remove two plain-assembled nuts (6), washers (5), and screws (2) from fuse block (4) and control box (1) and pull fuse block (4) away for access to leads (7). Discard plain-assembled nuts (6).

NOTE

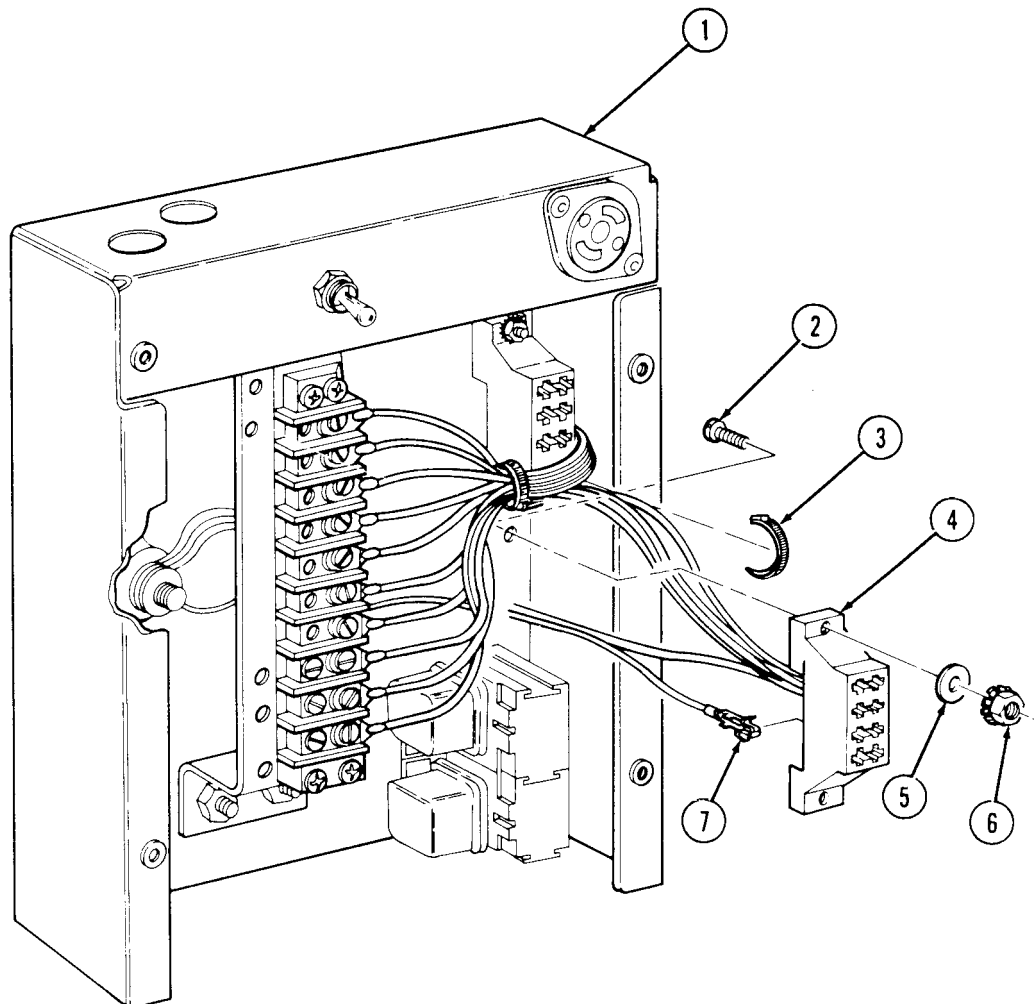
Prior to removal, tag leads for installation.

3. Disconnect six leads (7) from fuse block (4) and remove fuse block (4).

b. Installation

1. Connect six leads (7) to fuse block (4).
2. Install fuse block (4) on control box (1) with two screws (2), washers (5), and plain-assembled nuts (6).
3. Install fuse block leads (7) with two tiedown straps (3).

4-117. CONTROL BOX FUSE BLOCK AND RELAY SOCKET REPLACEMENT (Cont'd)



- FOLLOW-ON TASKS:**
- If relay socket was replaced: install relays (para. 4-120).
 - If fuse block was replaced: install fuses (TM 9-2320-280-10)
 - Install control box (para. 4-96 or 4-97).

4-118. CONTROL BOX LIGHT SWITCH REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M996, M996A1, M997, M997A1, M997A2

Manual References

TM 9-2320-280-10
 TM 9-2320-280-24P

Tools

General mechanic's tool kit:
 automotive (Appendix B, Item 1)

Equipment Condition

Battery ground cable disconnected (para. 4-73).

Materials/Parts

Four lockwashers (Appendix G, Item 136)
 Plain-assembled nut (Appendix G, Item 201)

a. Removal

1. Remove four screws (9), lockwashers (8), and cover (7) from control box (2). Discard lockwashers (8).

NOTE

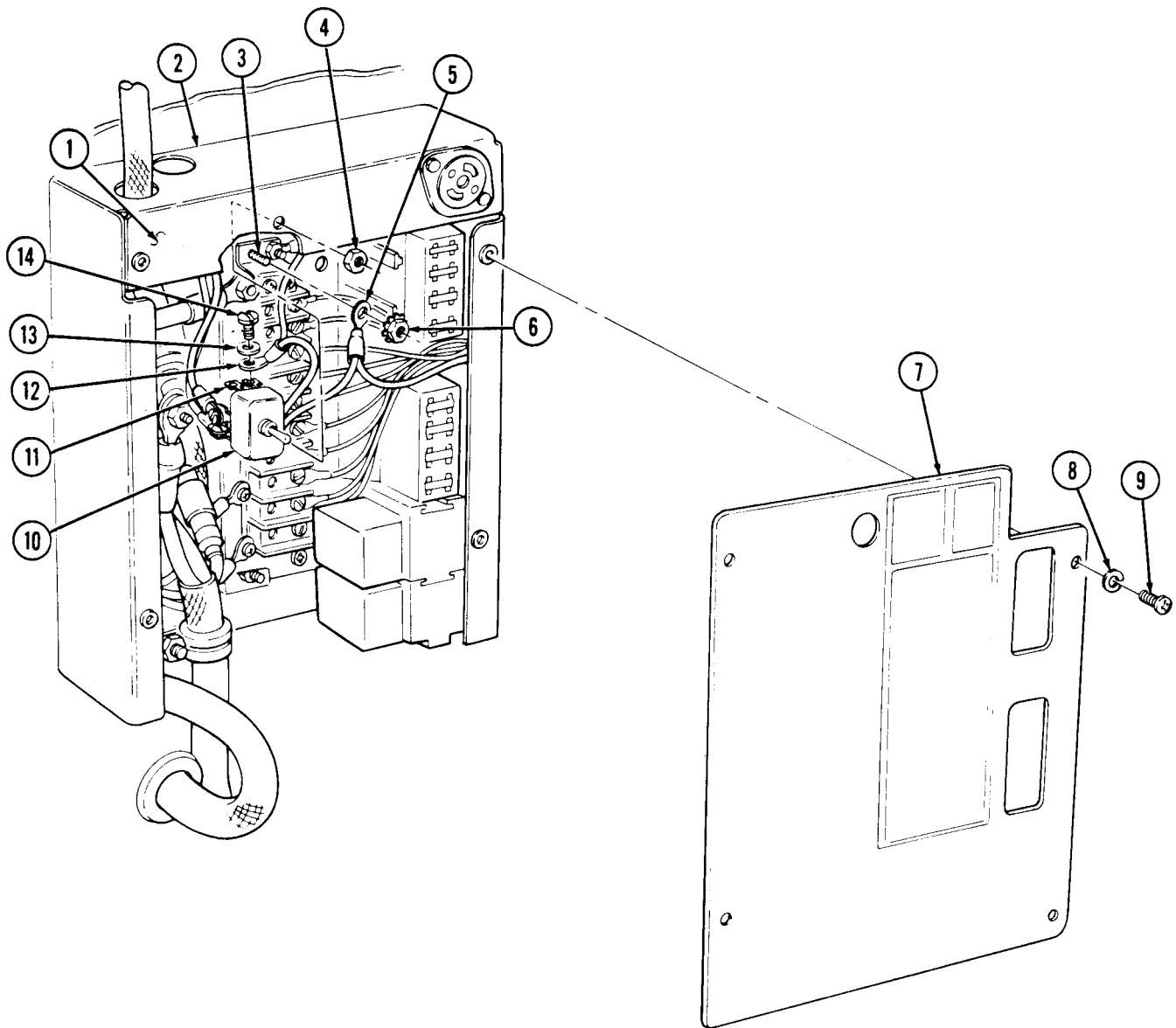
Prior to removal, tag leads for installation.

2. Remove plain-assembled nut (6) and lead 797/797A (5) from control box screw (3). Discard plain-assembled nut (6).
3. Remove nut (4) from switch (10) and top panel (1) and pull switch (10) out from under panel (1) for access to leads (12).
4. Remove five screws (14) and washers (13) from leads (12) and switch terminals (11) and remove switch (10).

b. Installation

1. Install five leads (12) on switch terminals (11) with five washers (13) and screws (14).
2. Install switch (10) on top panel (1) with nut (4).
3. Install lead 797/797A (5) on control box screw (3) with plain-assembled nut (6).
4. Install cover (7) to control box (2) with four lockwashers (8) and screws (9).

4-118. CONTROL BOX LIGHT SWITCH REPLACEMENT (Cont'd)



FOLLOW-ON TASKS: • Connect battery ground cable (para. 4-73).
 • Check operation of ambulance compartment lights (TM 9-2320-280-10).

4-119. CONTROL BOX ELECTRICAL PLUG AND RECEPTACLE REPLACEMENT

This task covers:

- a. Plug Removal
- b. Plug Installation

- c. Receptacle Removal
- d. Receptacle Installation

INITIAL SETUP:

Applicable Models

M996, M996A1, M997, M997A1, M997A2

Manual References

TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

Battery ground cable disconnected (para. 4-73)
(receptacle only).

a. Plug Removal

1. Turn and pull plug (4) from receptacle (3).
2. Remove two screws (5) from plug (4). Open plug (4) and ensure positive (10), negative (12), and ground (11) leads for plug (4) are properly installed.

b. Plug Installation

1. Close plug (4) and install two screws (5) on plug (4).
2. Insert plug (4) on receptacle (3).

c. Receptacle Removal

NOTE

For instructions on replacement of rivets, refer to para. 10-66.

1. Remove two rivets (6) and receptacle (3) from control box (1). Pull receptacle (3) away for access to leads (2).

NOTE

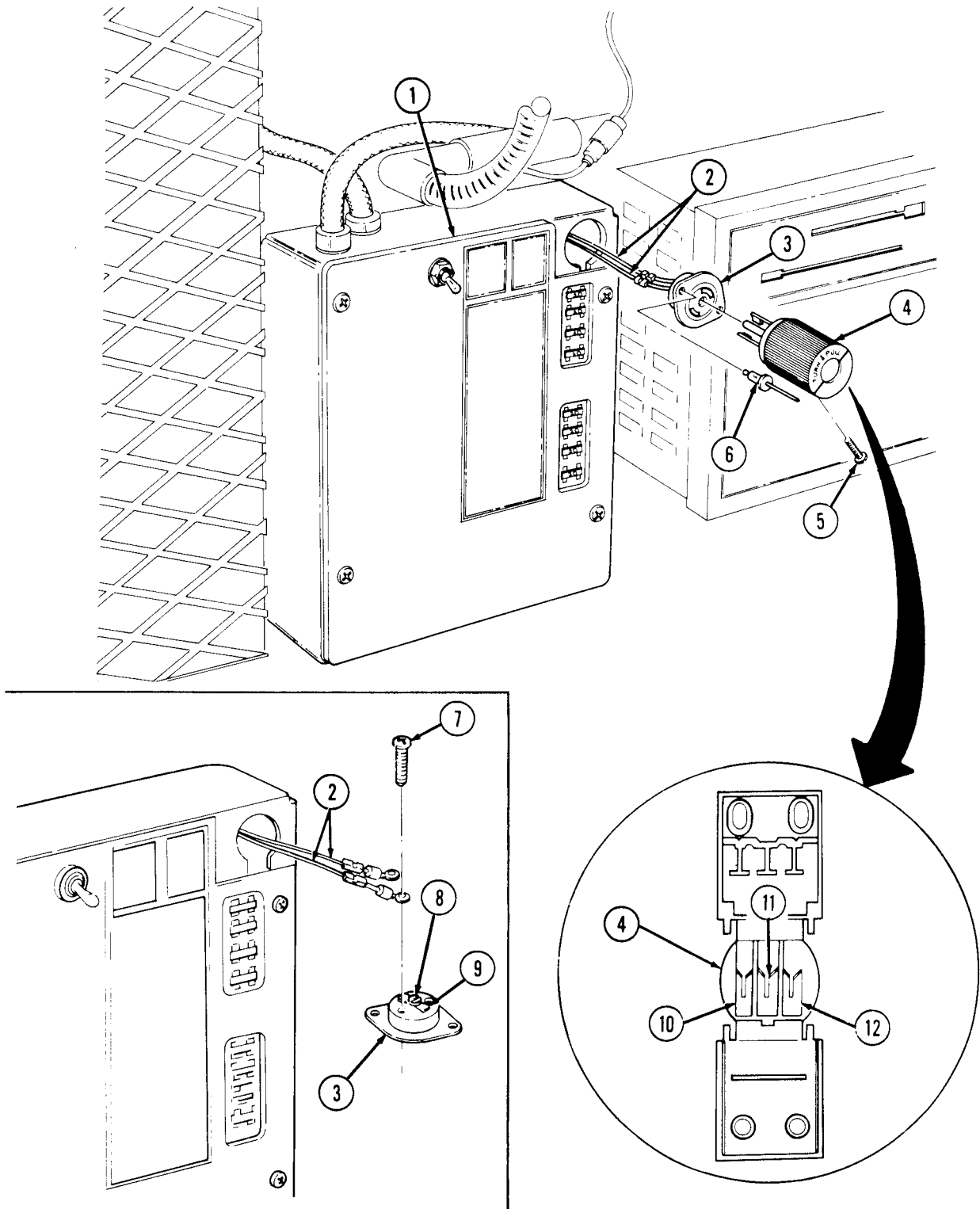
Prior to removal, tag leads for installation.

2. Loosen screw (8) and push shield (9) away for access to leads (2).
3. Remove two screws (7), and leads (2) from receptacle (3).

d. Receptacle Installation

1. Install two leads (2) on receptacle (3) with two screws (7). Position shield (9) over screws (7) and tighten screw (8).
2. Install receptacle (3) on control box (1) with two rivets (6).

4-119. CONTROL BOX ELECTRICAL PLUG AND RECEPTACLE REPLACEMENT (Cont'd)



FOLLOW-ON TASK: Connect battery ground cable (para. 4-73).

4-120. CONTROL BOX RELAY REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M996, M996A1, M997, M997A1, M997A2

Manual References

TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

Battery ground cable disconnected (para. 4-73).
(receptacle only).

Materials/Parts

Four lockwashers (Appendix G, Item 136)

NOTE

Prior to removal, tag leads for installation.

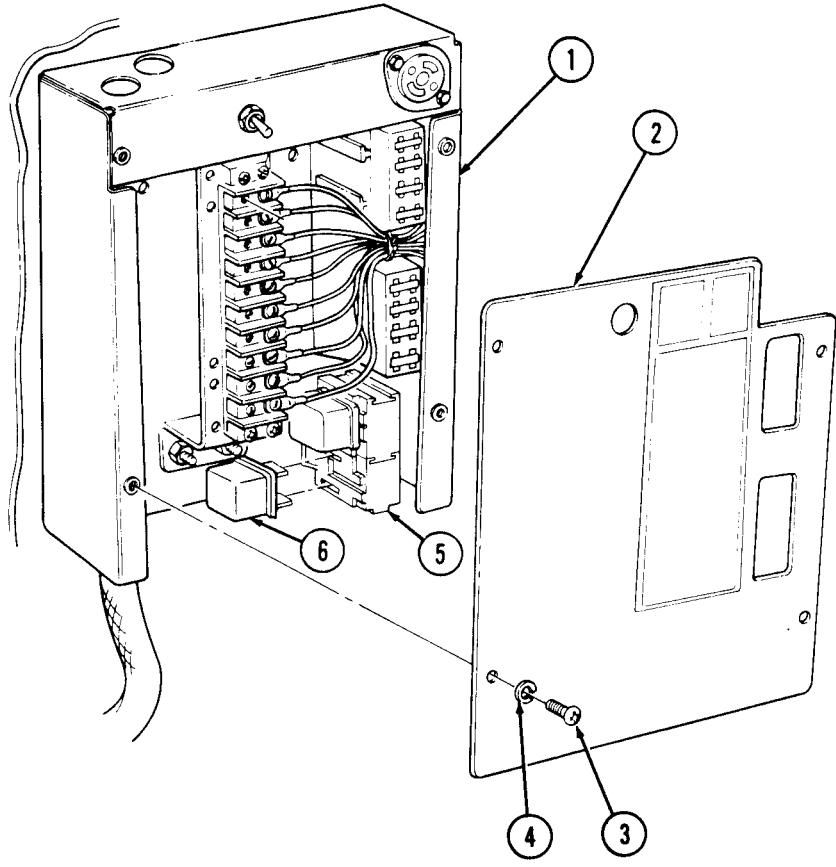
a. Removal

1. Remove four screws (3), lockwashers (4), and cover (2) from control box (1). Discard lockwashers (4).
2. Remove relay (6) from relay socket (5).

b. Installation

1. Install relay (6) in relay socket (5).
2. Install cover (2) on control box (1) with four lockwashers (4) and screws (3).

4-120. CONTROL BOX RELAY REPLACEMENT (Cont'd)



FOLLOW-ON TASK: Connect battery ground cable (para. 4-73).

**4-121. CONDENSER FAN/PRESSURE SWITCH WIRING HARNESS REPLACEMENT
(M997, M997A1, M997A2)**

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M997, M997A1, M997A2

Manual References

TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

- Battery ground cable disconnected (para. 4-73).
- Air intake compartment panels removed (para. 11-184).

Materials/Parts

Lockwasher (Appendix G, Item 182)

NOTE

Prior to removal, tag leads for installation.

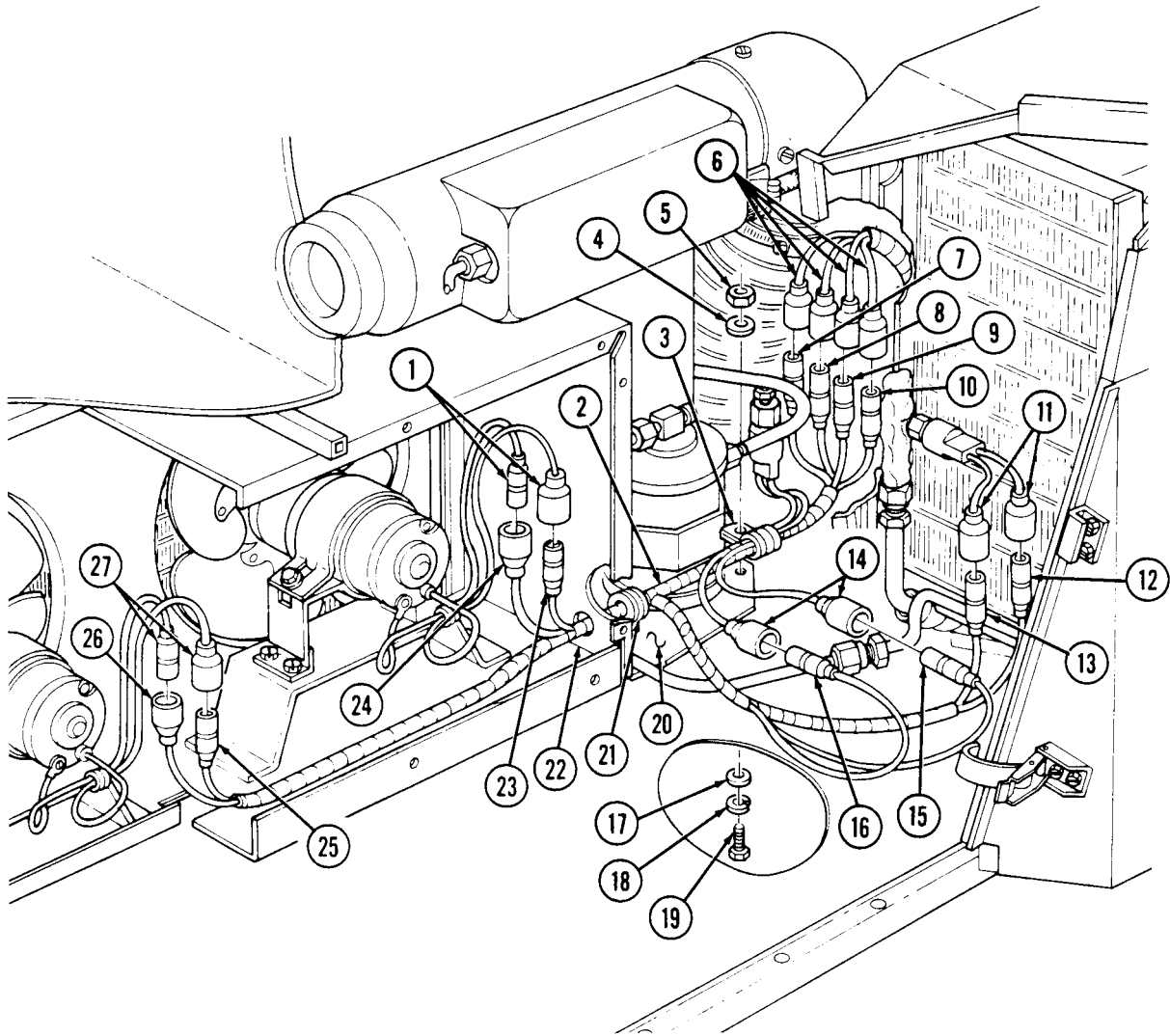
a. Removal

1. Disconnect leads 436A (12) and 436B (13) from low pressure switch leads (11).
2. Remove nut (5), washer (4), capscrew (19), lockwasher (18), washer (17), and clamp (3) from harness (2) and dryer panel (20). Discard lockwasher (18).
3. Disconnect leads 436A (7), 436C (8), 799J (9), and 437A (10) from control box leads (6).
4. Disconnect leads 436B (15) and 436C (16) from high pressure switch leads (14).
5. Disconnect leads 437C (25), 799L (26), 437B (23), and 799K (24) from condenser fan leads (27) and (1).
6. Remove grommet (21) from condenser panel (22) and remove harness (2).

b. Installation

1. Install leads 799L (26), 437C (25), 437B (23), and 799K (24) through condenser panel (22) and connect to condenser fan leads (1) and (27).
2. Install grommet (21) on harness (2) and condenser panel (22).
3. Connect leads 436A (7), 436C (8), 799J (9), and 437A (10) to control box leads (6).
4. Connect leads 436B (15) and 436C (16) to high pressure switch leads (14).
5. Connect leads 436A (12) and 436B (13) to low pressure switch leads (11).
6. Install clamp (3) on harness (2) and dryer panel (20) with washer (17), lockwasher (18), capscrew (19), washer (4), and nut (5).

4-121. CONDENSER FAN/PRESSURE SWITCH WIRING HARNESS REPLACEMENT
(M997, M997A1, M997A2) (Cont'd)



- FOLLOW-ON TASKS:
- Install air intake compartment panels (para. 11-184).
 - Connect battery ground cable (para. 4-73).

**4-122. COMPRESSOR/HEATER FUEL PUMP WIRING HARNESS REPLACEMENT
(M997, M997A1, M997A2)**

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M997, M997A1, M997A2

Manual References

TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

- Passenger seat back removed (para. 10-45).
- Heater fuel pump removed (para. 11-194).

Materials/Parts

Two lockwashers (Appendix G, Item 133)
Two locknuts (Appendix G, Item 70)
Lockwasher (Appendix G, Item 178)
Two assembled locknuts (Appendix G, Item 131)
Two tiedown straps (Appendix G, Item 308)

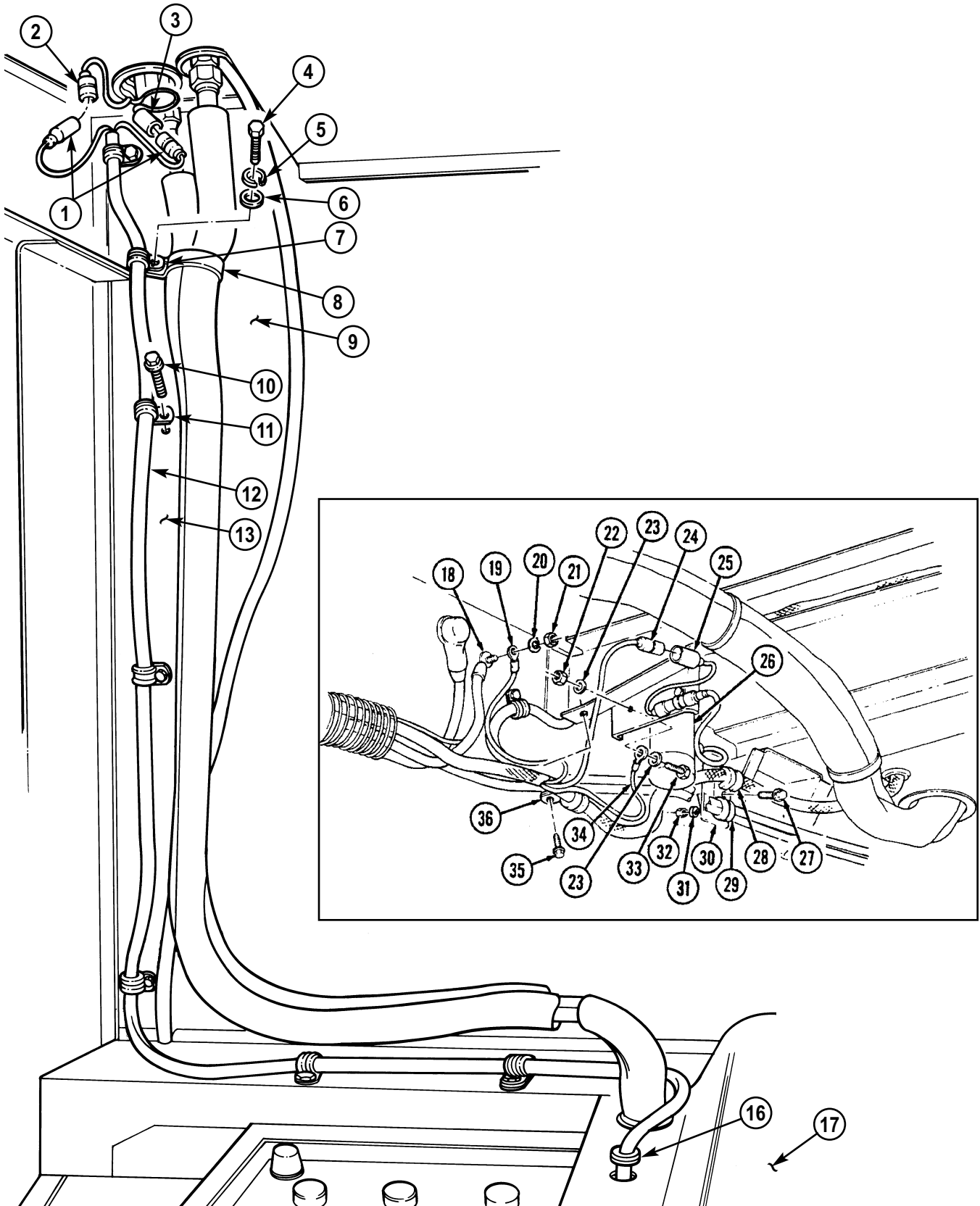
a. Removal

NOTE

Prior to removal, tag leads for installation.

1. Disconnect harness leads (1) from control box leads 436D (3) and 723B (2).
2. Remove capscrew (4), lockwasher (5), washer (6), and clamp (7) from AC line clamp (8) and body (9). Discard lockwasher (5).
3. Remove six screws (10), clamps (11), and harness (12) from body (9) and "B" beam (13).
4. Deleted.
5. Remove grommet (16) from harness (12) and tunnel (17).
6. Remove locknut (32), washer (31), screw (27), and clamp (28) from fuel line clamp (29), body bracket (30) and harness. Discard locknut (32).
7. Remove locknut (22), washer (23), capscrew (33), and washer (23) from harness ground (34) and fuel pump (26). Discard locknut (22).
8. Remove nut (21) and lockwasher (20), and ground terminal (19) from ground stud (18). Discard lockwasher (20).
9. Disconnect harness lead (24) from fuel pump lead (25).
10. Remove screw (35) and clamp (36) from harness (12) and body (9).

4-122. COMPRESSOR/HEATER FUEL PUMP WIRING HARNESS REPLACEMENT (M997, M997A1, M997A2) (Cont'd)



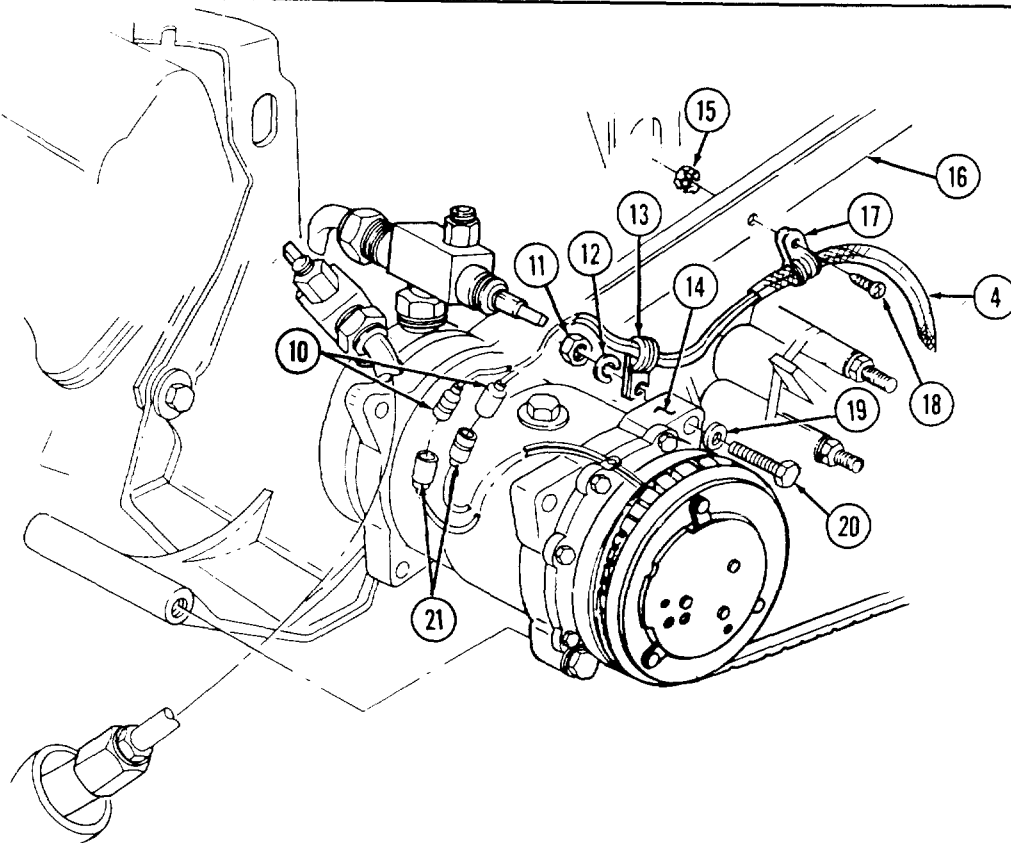
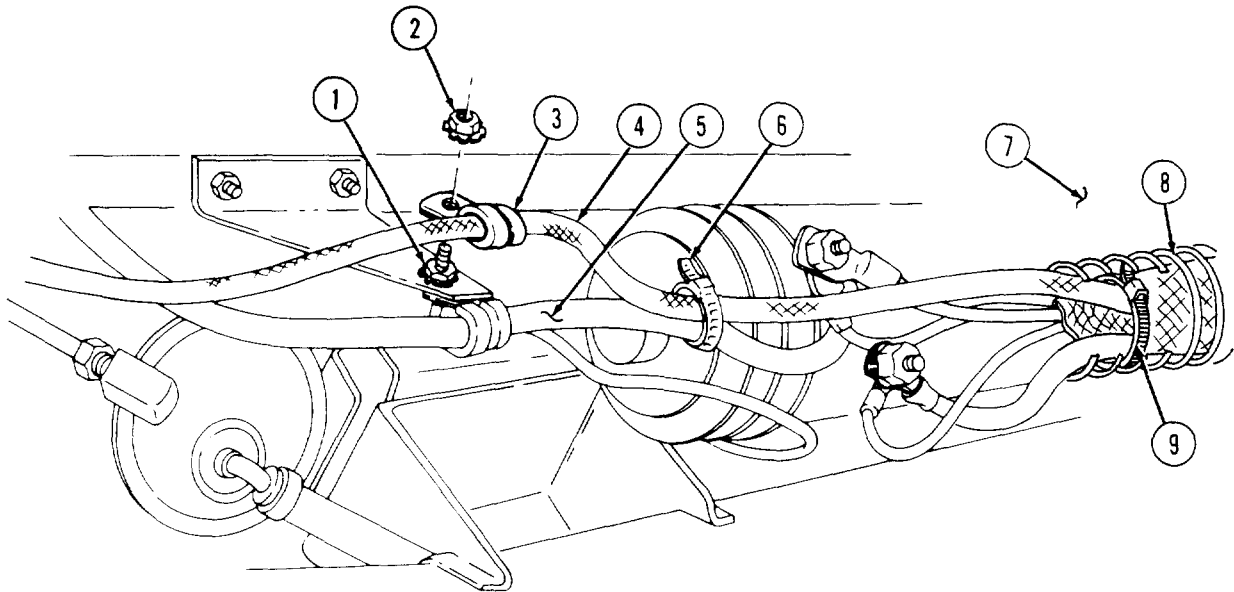
**4-122. COMPRESSOR/HEATER FUEL PUMP WIRING HARNESS REPLACEMENT
(M997, M997A1, M997A2) (Cont'd)**

11. Remove assembled locknut (2) and clamp (3) from harness (4) and starter cable bracket screw (1). Discard assembled locknut (2).
12. Remove tiedown strap (6) from harness (4) and starter positive cable (5). Discard tiedown strap (6).
13. Remove screw (18) and assembled locknut (15) and clamp (17) from harness (4) and compressor bracket (16). Discard assembled locknut (15).
14. Remove nut (11), lockwasher (12), washer (19), capscrew (20), and clamp (13) from harness (4) and compressor (14). Discard lockwasher (12).
15. Disconnect harness leads (10) from leads (21).
16. Remove tiedown strap (9) from inside protective shield (8). Discard tiedown strap (9).
17. Remove harness (4) by routing through tunnel (7) and starter cable protective shield (8).

b. Installation

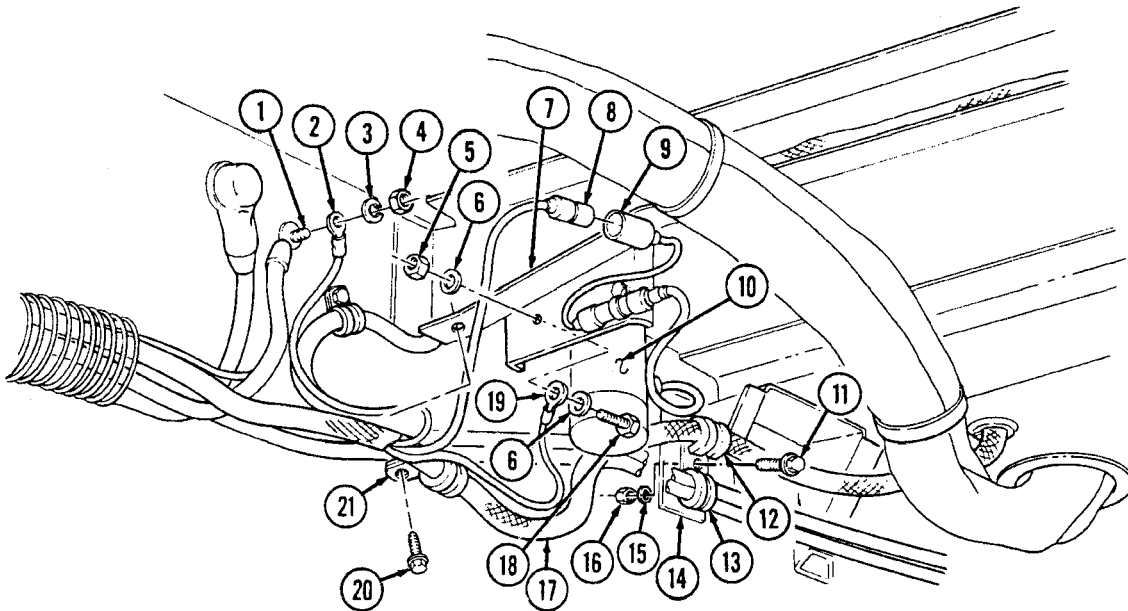
1. Route harness (4) through protective shield (8) and tunnel (7), and place in approximate mounting location.
2. Secure harness (4) with tiedown strap (9) inside of protective shield (8).
3. Connect harness leads (10) to leads (21).
4. Install clamp (13) on harness (4) and compressor (14) with washer (19), capscrew (20), lockwasher (12), and nut (11).
5. Install clamp (17) on harness (4) and compressor bracket (16) with screw (18) and assembled locknut (15).
6. Install clamp (3) on harness (4) and starter cable bracket screw (1) with assembled locknut (2).
7. Secure harness (4) to starter positive cable (5) with tiedown strap (6).

4-122. COMPRESSOR/HEATER FUEL PUMP WIRING HARNESS REPLACEMENT
(M997, M997A1, M997A2) (Cont'd)

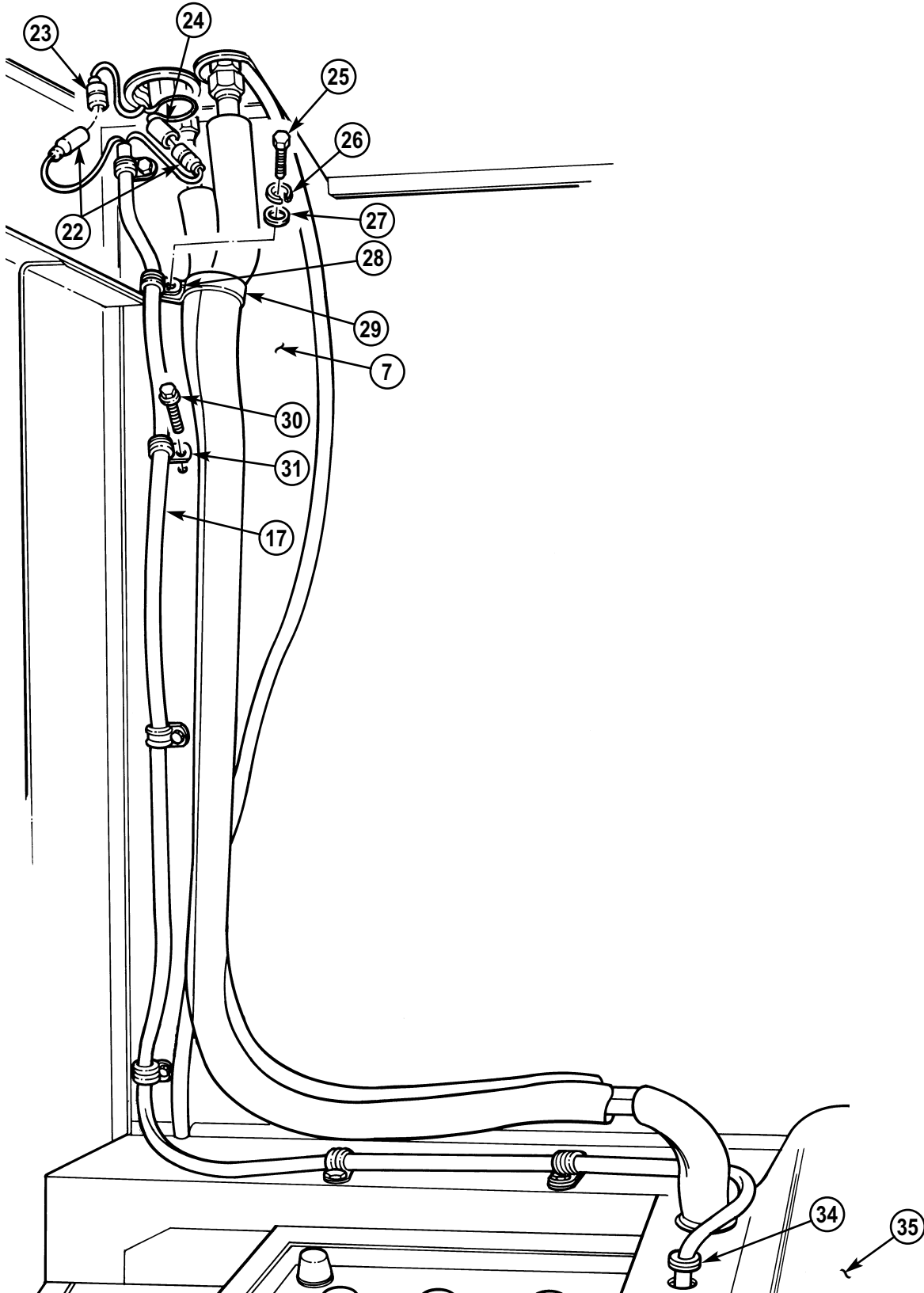


**4-122. COMPRESSOR/HEATER FUEL PUMP WIRING HARNESS REPLACEMENT
(M997, M997A1, M997A2) (Cont'd)**

8. Install clamp (21) on harness (17) and body rail (7) with screw (20).
9. Connect harness lead (8) to fuel pump lead (9).
10. Install harness ground terminal (2) on ground stud (1) with lockwasher (3) and nut (4).
11. Install harness ground (19) on fuel pump (10) with washer (6), capscrew (18), washer (6), and locknut (5).
12. Install clamp (12) on harness (17) and install clamp (12) and fuel line clamp (13) on body bracket (14) with screw (11), washer (15), and locknut (16).
13. Connect harness leads (22) to control box leads 436D (24) and 723B (23).
14. Install six clamps (31) on harness (17) and body (7) with six screws (30).
15. Install clamp (28) on harness (17), AC line clamp (29), and body (7) with washer (27), lockwasher (26), and capscrew (25).
16. Deleted.
17. Install grommet (34) on tunnel (35) and harness (17).



**4-122. COMPRESSOR/HEATER FUEL PUMP WIRING HARNESS REPLACEMENT
(M997, M997A1, M997A2) (Cont'd)**



FOLLOW-ON TASKS:

- Install passenger seatback (para. 10-45).
- Install heater fuel pump (para. 11-194).

4-123. HEATER/VENT SYSTEM CONTROL BOX AND WIRING HARNESS REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M996, M996A1

Manual References

TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

Blower assembly removed (para. 11-212).

Materials/Parts

Two locknuts (Appendix G, Item 70)
Plain-assembled nut (Appendix G, Item 201)
Plug button (Appendix G, Item 8)
Four lockwashers (Appendix G, Item 136)
Tiedown strap (Appendix G, Item 308)

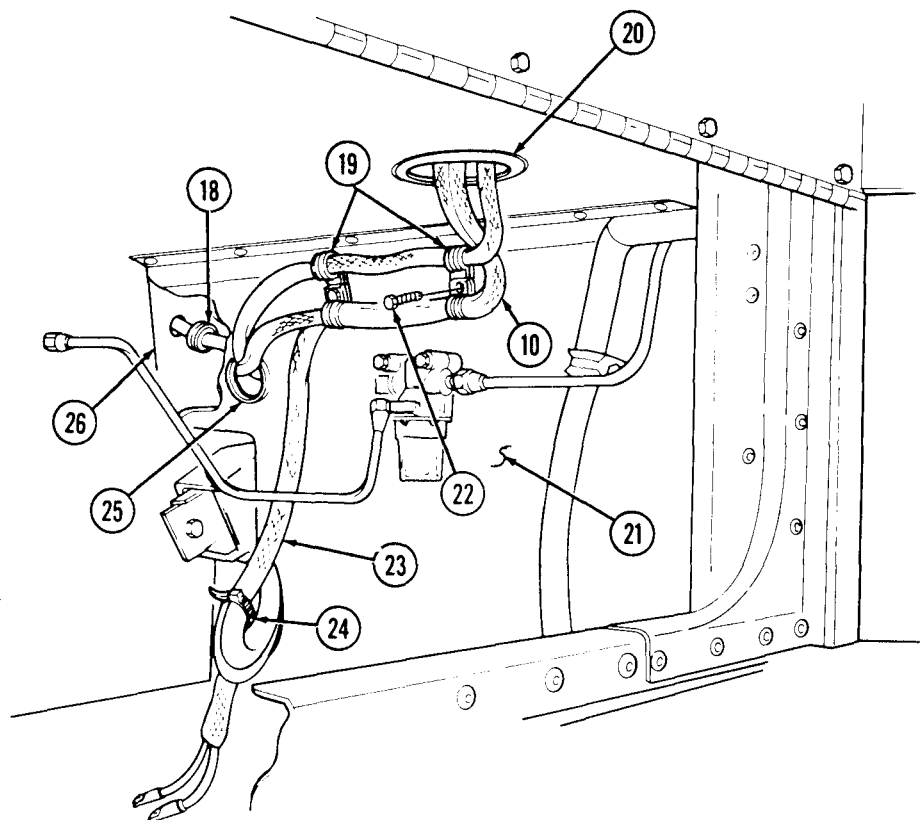
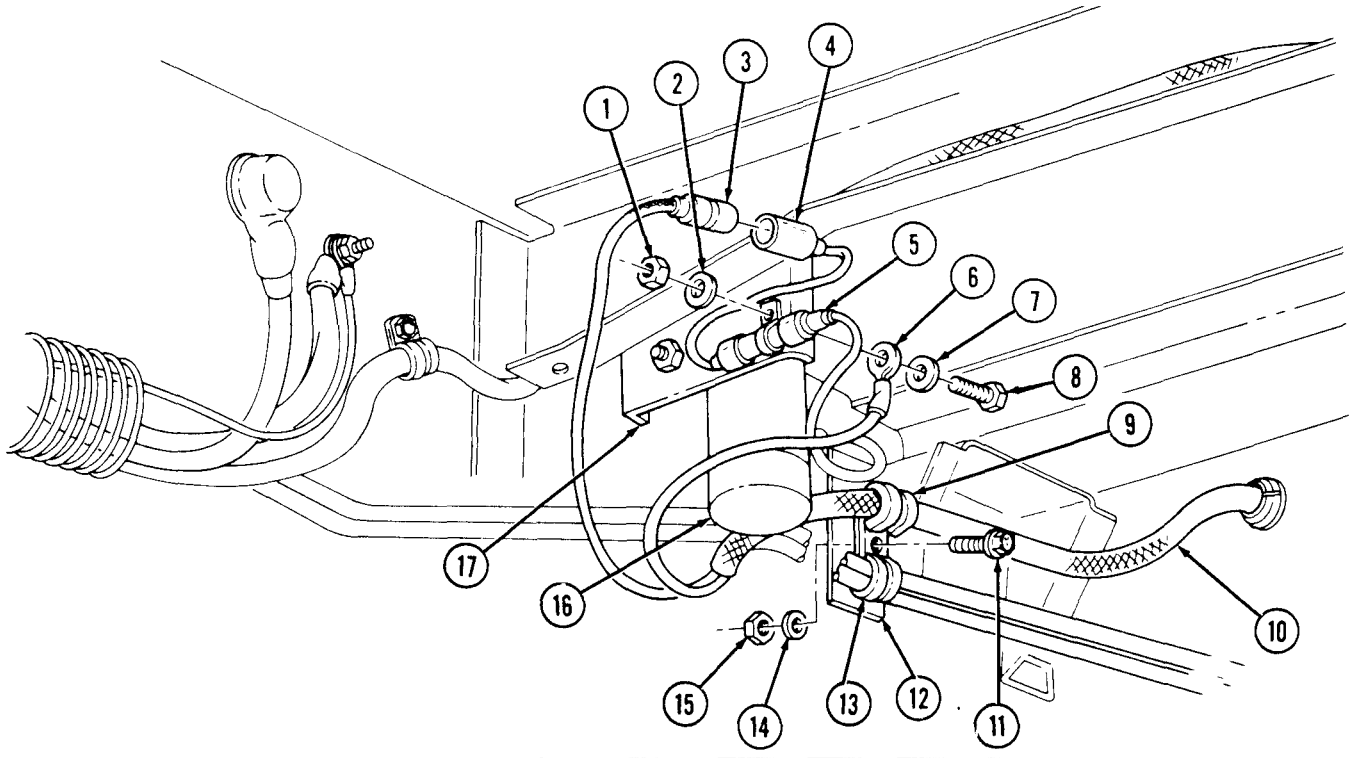
a. Removal

NOTE

Prior to removal, tag leads for installation.

1. Remove locknut (1), washer (2), capscrew (8), washer (7), ground terminal (6), and capacitor (5) from fuel pump (16) and bracket (17). Discard locknut (1).
2. Disconnect control box lead (3) from fuel pump lead (4).
3. Remove locknut (15), washer (14), capscrew (11), and clamp (9) from control box harness (10), fuel line clamp (13), and body bracket (12). Discard locknut (15).
4. Remove grommet (18) from tunnel (26) and harness (10) and route harness (10) through hole in tunnel (26) and battery box grommet (25) into stowage compartment.
5. Remove two screws (22) and clamps (19) from harness (10), resuscitator harness (23), and body (21).
6. Remove tiedown strap (24) from harness (10) and resuscitator harness (23). Discard tiedown strap (24).
7. Route harness (10) up through grommet (20) into patient compartment.

4-123. HEATER/VENT SYSTEM CONTROL BOX AND WIRING HARNESS REPLACEMENT (Cont'd)



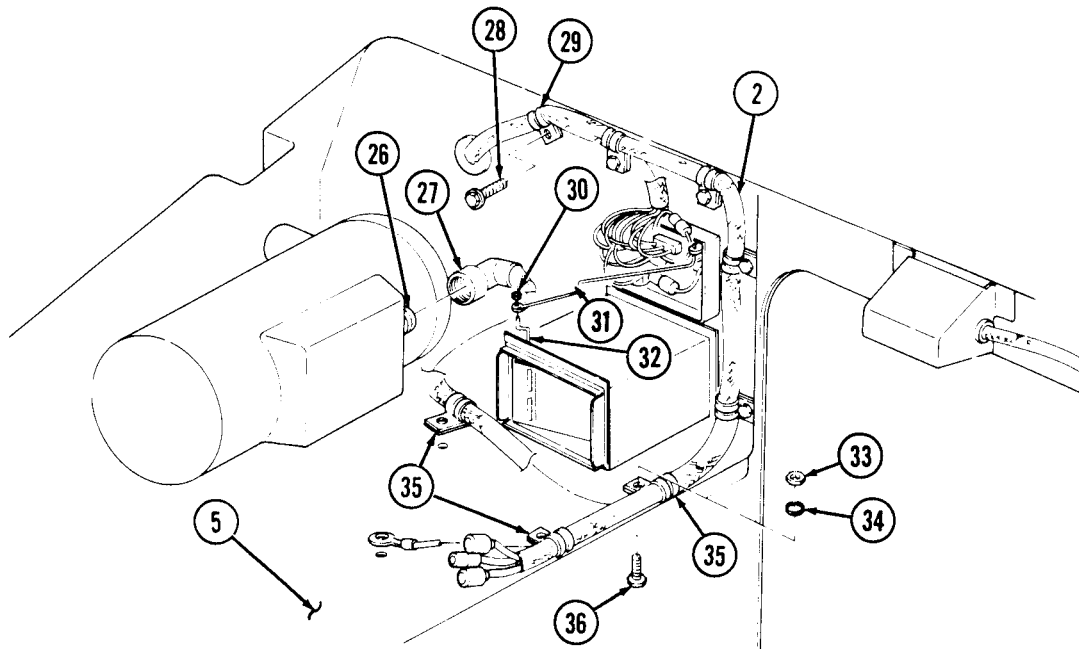
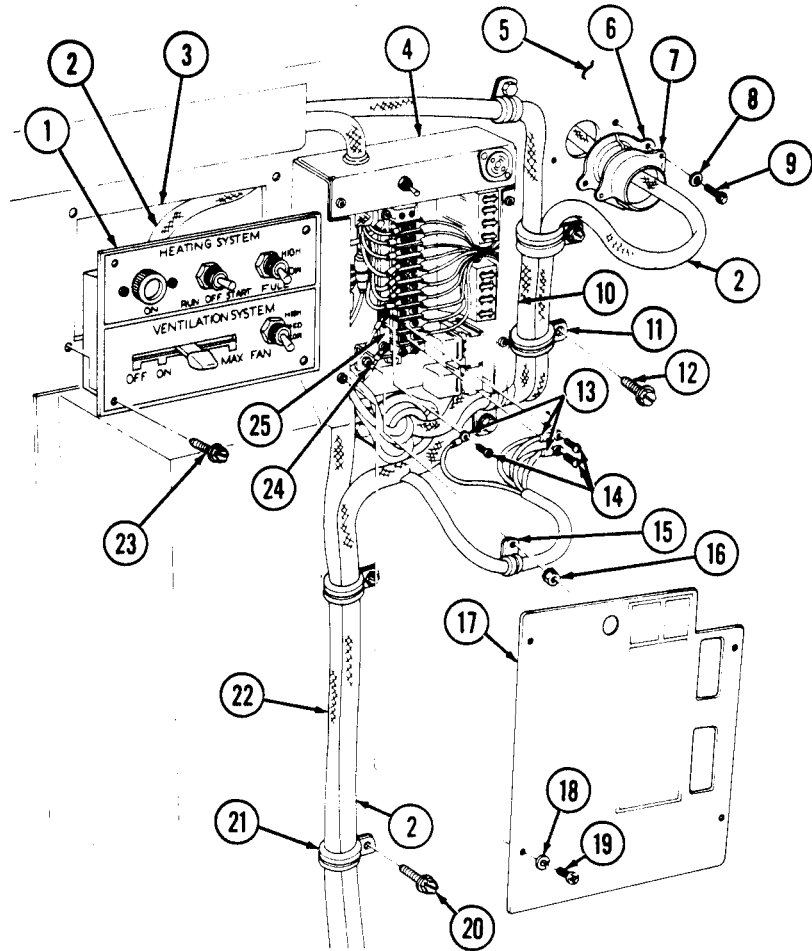
4-123. HEATER/VENT SYSTEM CONTROL BOX AND WIRING HARNESS REPLACEMENT (Cont'd)

8. Remove three screws (20), clamps (21), harness (2), and battery cable harness (22) from body (5).
9. Remove four screws (19), lockwashers (18), and cover (17) from circuit box (4). Discard lockwashers (18).
10. Remove plain-assembled nut (16) and clamp (15) from harness (2) and screw (24). Discard plain-assembled nut (16).
11. Remove three screws (14) from harness leads (13) and terminal block (25).
12. Remove three screws (12), clamps (11), and harness (2) from NBC harness (10) and body (5).
13. Remove two screws (9), washers (8), retainer (7) and grommet (6) from body (5) and harness (2).
14. Route harness (2) through grommet (6) hole in body (5).
15. Remove five screws (28) and clamps (29) from harness (2) and body (5).
16. Remove three nuts (33), lockwashers (34), capscrews (36), and clamps (35) from harness (2) and body (5). Discard lockwashers (34).
17. Disconnect plug (27) from heater receptacle (26).
18. Remove plug button (30) and control lever linkage (31) from duct door arm (32). Discard plug button (30).
19. Remove four screws (23), control box (1), and harness (2) from body (5).

b. Installation

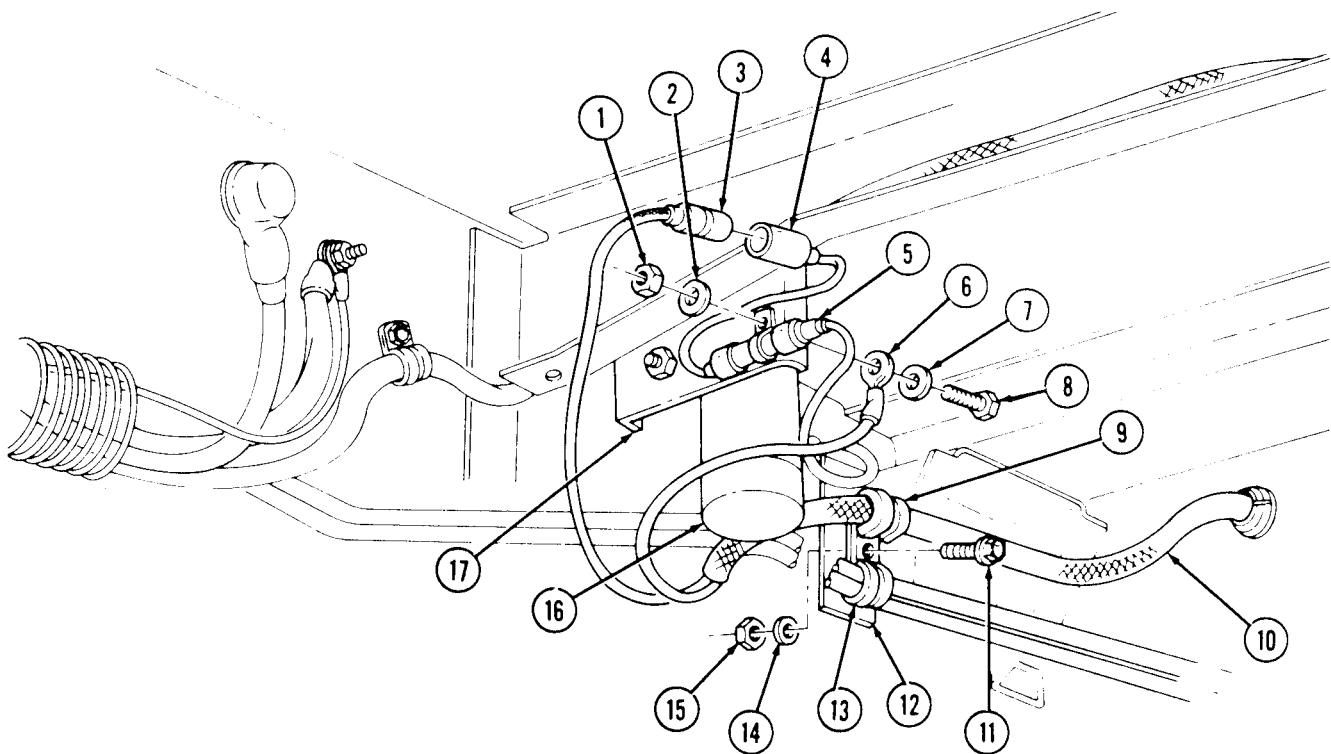
1. Route harness (2) through control box opening (3) in body (5) and install control box (1) on body (5) with four screws (23).
2. Attach control lever linkage (31) to duct door arm (32) with plug button (30).
3. Install three clamps (35) on harness (2) and body (5) with capscrews (36), lockwashers (34), and nuts (33).
4. Connect control box plug (27) to heater receptacle (26).
5. Route harness (2) through grommet (6) hole in body (5).
6. Install five clamps (29) on harness (2) and body (5) with five screws (28).
7. Install three harness leads (13) to terminal block (25) with three screws (14).
8. Install clamp (15) on harness (2) and screw (24) with plain-assembled nut (16).
9. Install grommet (6) and retainer (7) on harness (2) and body (5) with two washers (8) and screws (9).
10. Install harness (2) in three clamps (11) with NBC harness (10), on body (5) with three screws (12).
11. Install cover (17) on circuit box (4) with four lockwashers (18) and screws (19).
12. Install harness (2) in three clamps (21) with battery cable harness (22), on body (5) with three screws (20).

4-123. HEATER/VENT SYSTEM CONTROL BOX AND WIRING HARNESS REPLACEMENT (Cont'd)

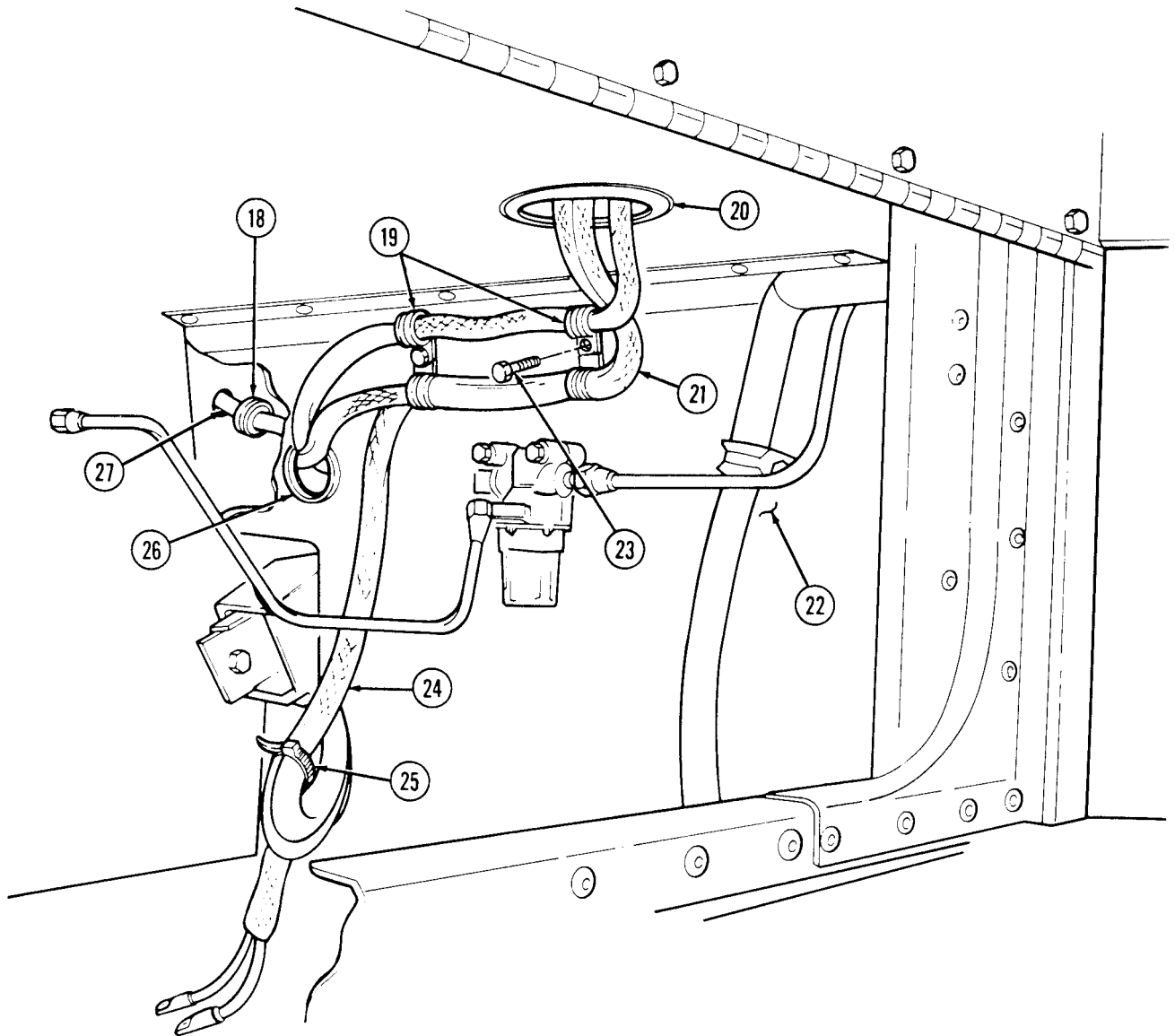


4-123. HEATER/VENT SYSTEM CONTROL BOX AND WIRING HARNESS REPLACEMENT (Cont'd)

13. Route harness (21) down through grommet (20) into body (22) through battery box grommet (26) and through hole in tunnel (27).
14. Connect control box lead (3) to fuel pump lead (4).
15. Install fuel pump (16), capacitor (5), and ground terminal (6) on bracket (17) with washer (7), capscrew (8), washer (2), and locknut (1).
16. Install clamp (9) on harness (10) and install clamp (9) and clamp (13) on body bracket (12) with capscrew (11), washer (14), and locknut (15).
17. Install grommet (18) on harness (21) and into tunnel (27).
18. Install harness (21) in two clamps (19) on body (22) with two screws (23).
19. Install harness (21) on resuscitator harness (24) with tiedown strap (25).



4-123. HEATER/VENT SYSTEM CONTROL BOX AND WIRING HARNESS REPLACEMENT (Cont'd)



FOLLOW-ON TASK: Blower assembly installed (para. 11-212).

4-124. NBC CONTROL PANEL REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M996, M996A1, M997, M997A1, M997A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Five lockwashers (Appendix G, Item 169)
Lockwasher (Appendix G, Item 134)
Four plain-assembled nuts
(Appendix G, Item 201)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

- Battery ground cable disconnected (para. 4-73).
- NBC control panel fuses removed (TM 9-2320-280-10).
- NBC wiring harness removed: M996 and M996A1 (para. 4-99), M997, M997A1 and M997A2 (para. 4-100).

a. Removal

NOTE

M996 ambulance will not have cushioned wire clamp on ceiling.

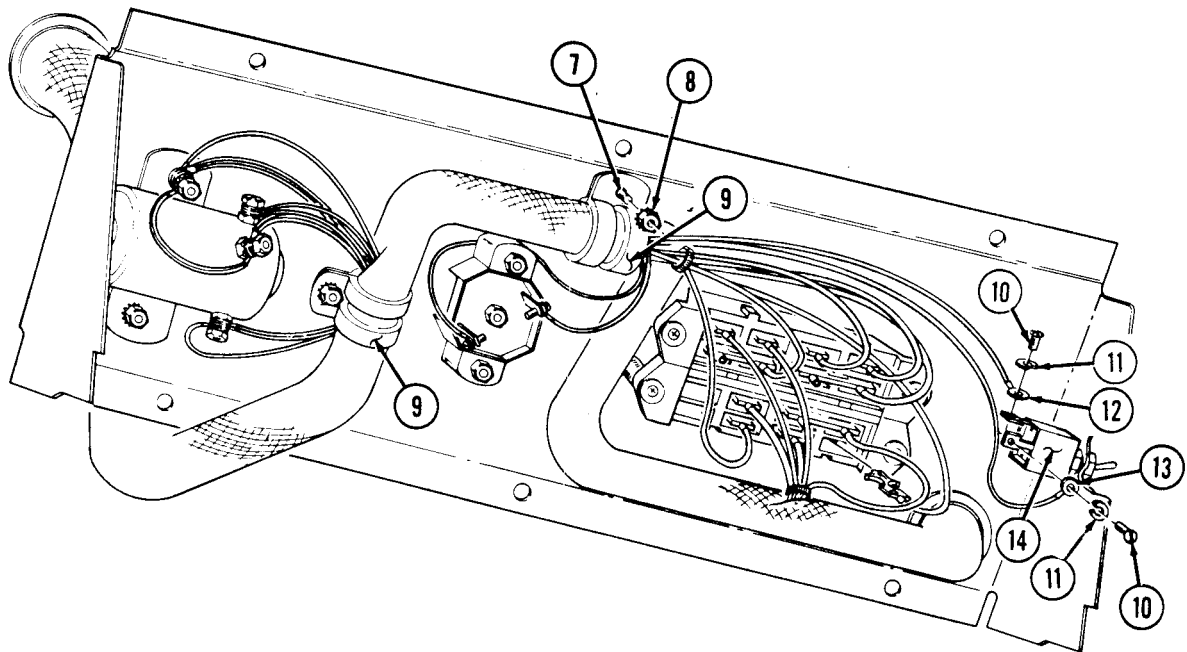
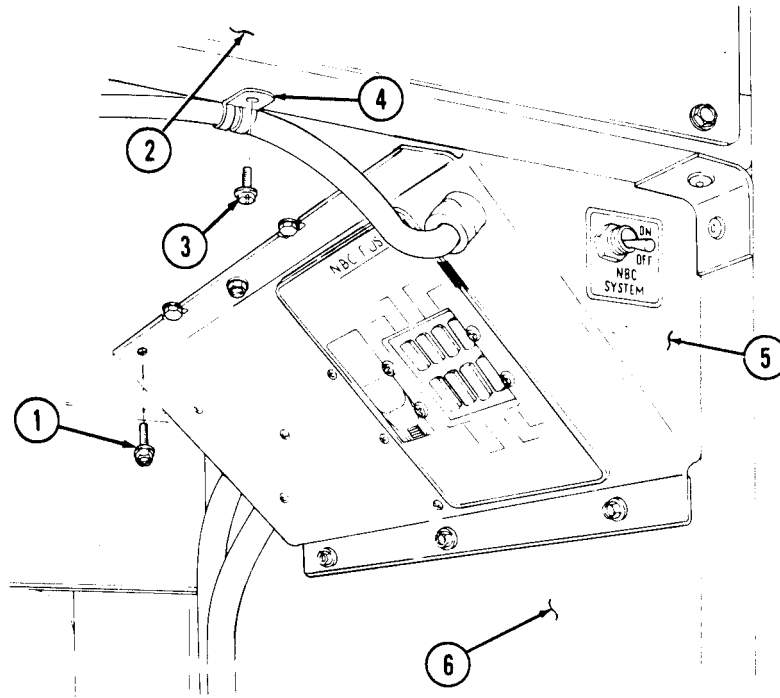
1. Remove screw (3) from cushioned wire clamp (4) and passenger ceiling (2).
2. Remove six screws (1) from NBC control panel (5) and ambulance body (6).
3. Remove two plain-assembled nuts (8) and screws (7) from two cushioned wire clamps (9). Discard plain-assembled nuts (8).

NOTE

Prior to removal, tag all leads for installation.

4. Remove two screws (10), lockwashers (11), and leads 783 (13) and 783A (12) from NBC control panel ON/OFF toggle switch (14). Discard lockwashers (11).

4-124. NBC CONTROL PANEL REPLACEMENT (Cont'd)



4-124. NBC CONTROL PANEL REPLACEMENT (Cont'd)

5. Remove two screws (12), lockwashers (13), and leads 782A (14) and 783 (16) from NBC control panel circuit breaker (15). Discard lockwashers (13).
6. Remove plain-assembled nut (11), diode (24), and leads 783A (17) and 783B (18) from NBC control panel relay (19). Discard plain-assembled nut (11).

NOTE

M996 and M996A1 ambulances have three leads, 785, 786, and 787, on NBC control panel relay.

7. Remove nut (5), lockwasher (6), and leads 784 (7), 787 (8) 785 (9), and 786 (10) from NBC control panel relay (19). Discard lockwasher (6).
8. Remove nut (22), lockwasher (23), and leads 782 (21) and 782A (20) from NBC control panel relay (19). Discard lockwasher (23).
9. Remove plain-assembled nut (25), leads 795 (3), 796 (4), and 793 (2), and diode (24) from NBC control panel relay ground (1). Discard plain-assembled nut (25).

CAUTION

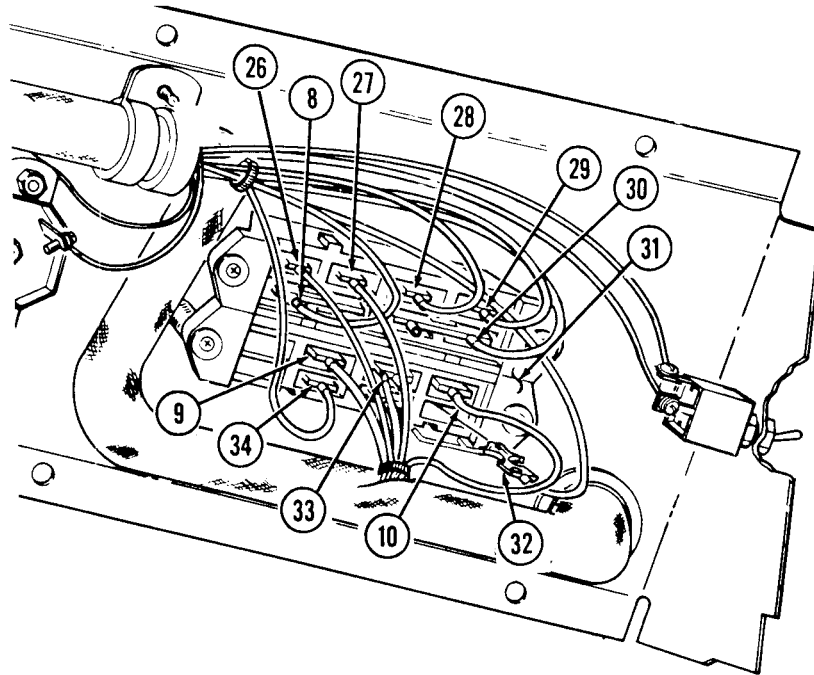
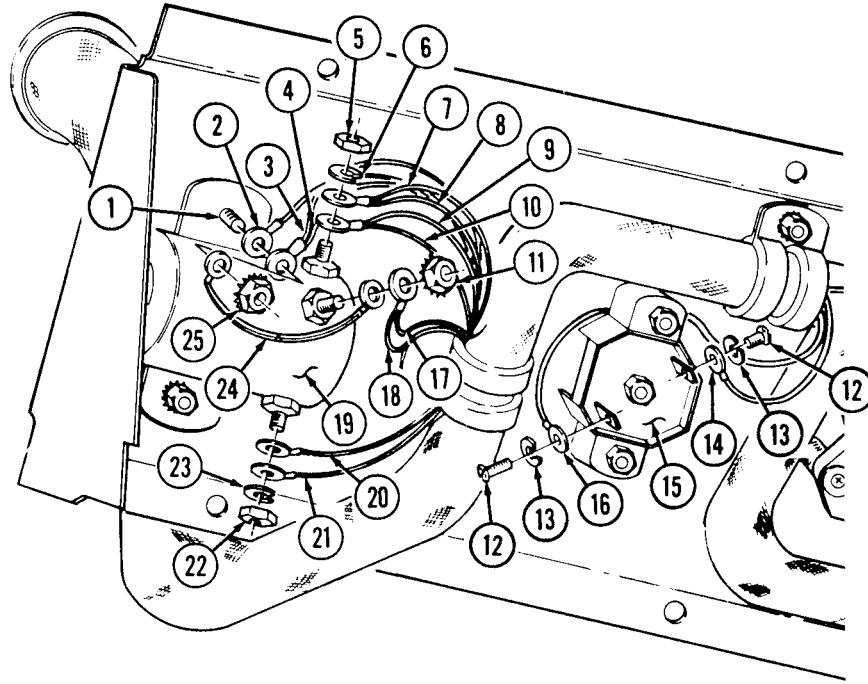
Use care when removing lead clips from NBC control panel fuse block to prevent damage to leads, wire clips, and/or fuse block.

NOTE

- For M997, M997A1 and M997A2 ambulances, perform steps 10 through 16 for removal of leads from NBC fuse block.
- For M996 and M996A1 ambulances, perform steps 17 through 21 for removal of leads from NBC fuse block.
- Leads 787, 784, and 786 have two way jumpers connecting fuses for heaters 4 & 5, 6 & 7, and 2 & 3 respectively.

10. Remove leads 787B (26) and 787 (8) from NBC fuse block (31) for heater fuse #4.
11. Remove lead 787A (27) from NBC fuse block (31) for heater fuse #5.
12. Remove leads 784 (30) and 784B (28) from NBC fuse block (31) for heater fuse #6.
13. Remove lead 784A (29) from NBC fuse block (31) for heater fuse #7.
14. Remove leads 785A (9) and 785 (34) from NBC fuse block (31) for heater fuse #1.
15. Remove lead 786A (33) from NBC fuse block (31) for heater fuse #2.
16. Remove lead 786 (32) and lead 786B (10) from NBC fuse block (31) for heater fuse #3.

4-124. NBC CONTROL PANEL REPLACEMENT (Cont'd)



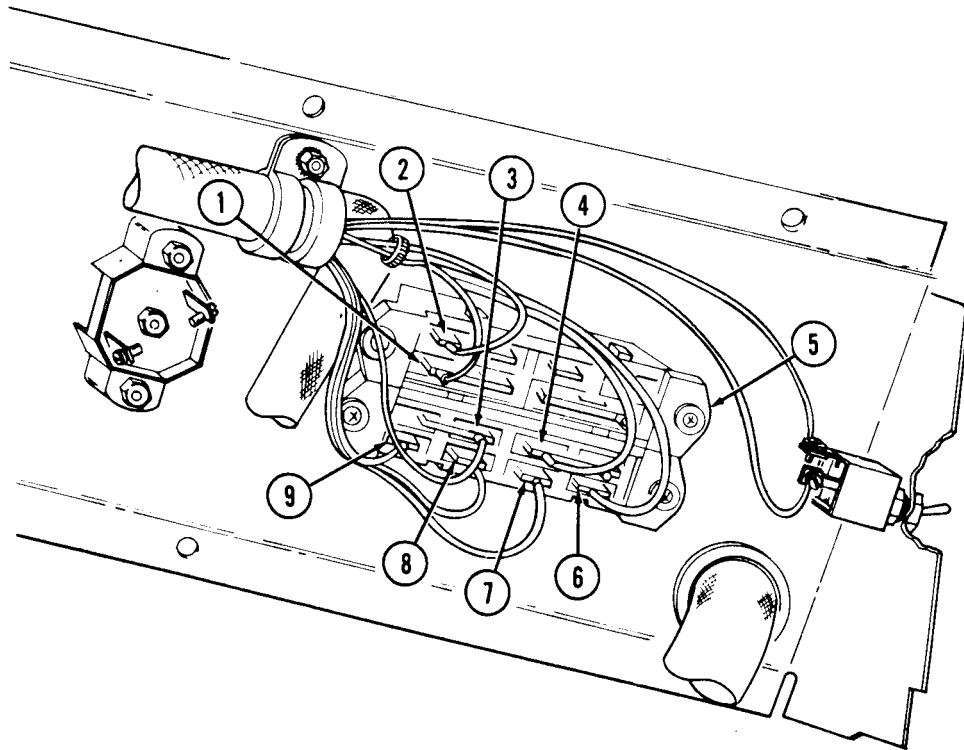
4-124. NBC CONTROL PANEL REPLACEMENT (Cont'd)

NOTE

Leads 785 and 786 have two way jumpers connecting fuses for heaters 1 & 2 and 3 & 4 respectively.

17. Remove leads 785 (3) and 785A (9) from NBC fuse block (5) for heater fuse #1.
18. Remove lead 785B (8) from NBC fuse block (5) for heater fuse #2.
19. Remove leads 786 (4) and 786A (7) from NBC fuse bock (5) for heater fuse #3.
20. Remove lead 786B (6) from NBC fuse block (5) for heater fuse #4.
21. Remove leads 787 (1) and 787A (2) from NBC fuse block (5) for heater fuse #5.

4-124. NBC CONTROL PANEL REPLACEMENT (Cont'd)



4-124. NBC CONTROL PANEL REPLACEMENT (Cont'd)

b. Installation

WARNING

Use care when installing leads to NBC control panel fuse block. Ensure lead clips lock into place. Failure to do so may cause damage to equipment and/or injury to personnel.

1. Install two cushioned wire clamps (17) with wire harness (14) in place onto NBC control panel (12) with screws (15) and plain-assembled nuts (16).

NOTE

- For M997, M997A1 and M997A2 ambulances, perform steps 8 through 14 for installation of leads to NBC fuse block.
- For M996 and M996A1 ambulances, perform steps 15 through 19 for installation of leads to NBC fuse block.
- Leads 787, 784, and 786 have two way jumpers connecting fuses for heaters 4 & 5, 6 & 7, and 2 & 3 respectively.

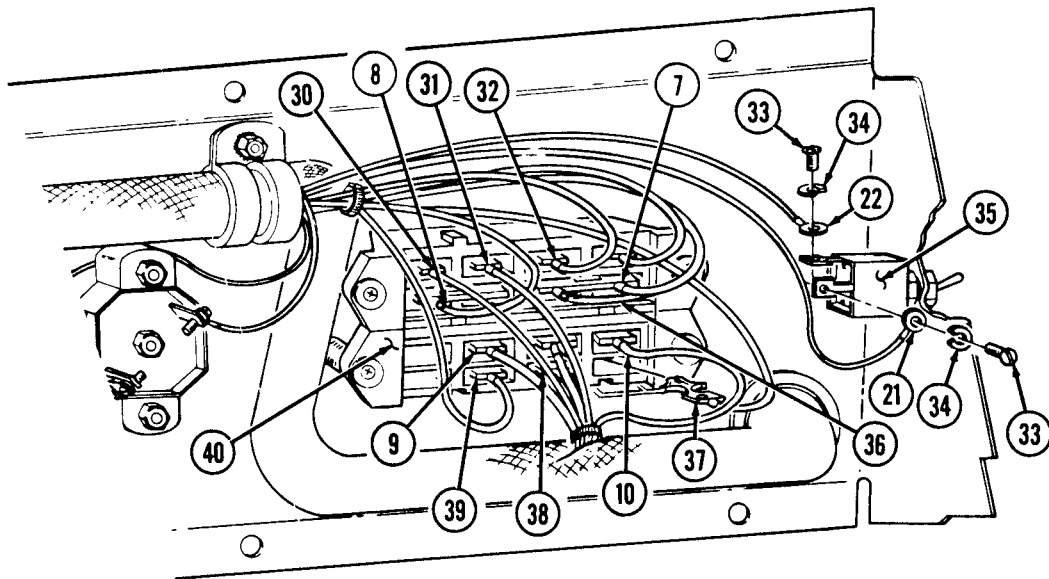
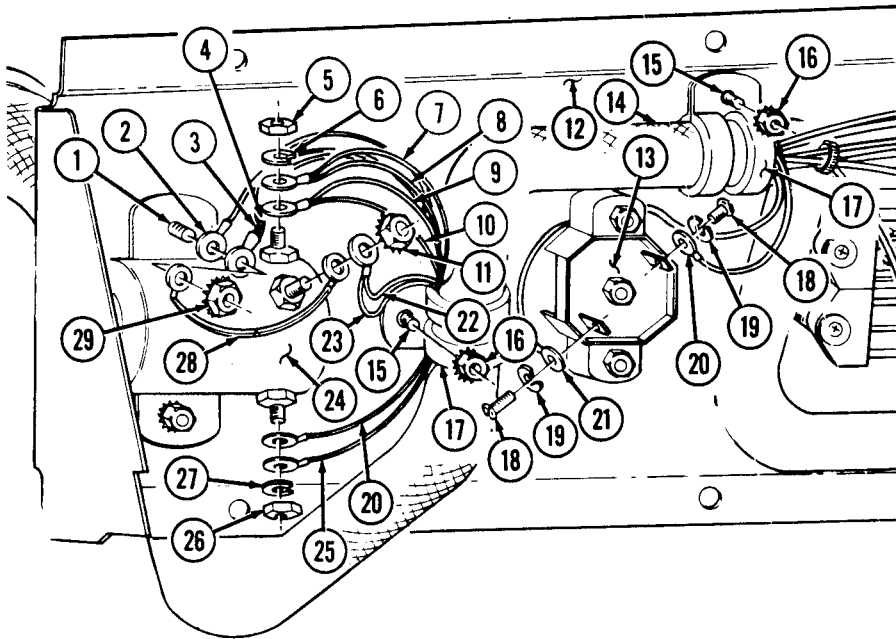
2. Install leads 795 (3), 796 (4) and lead 793 (2), and diode (28) onto NBC control panel relay ground (1) with plain-assembled nut (29).

NOTE

M996 and M996A1 ambulances have three leads, 785, 786, and 787, secured to NBC control panel relay.

3. Install leads 784 (7), 787 (8), and leads 785 (9), 786 (10) onto NBC control panel relay (24) with nut (5) and lockwasher (6).
4. Install leads 783A (22) and 783B (23) and remaining lead from diode (28) onto NBC control panel relay (24) with plain-assembled nut (11).
5. Install leads 782 (25) and 782A (20) onto NBC control panel relay (24) with nut (26) and lockwasher (27).
6. Install leads 782A (20) and 783 (21) onto NBC control panel circuit breaker (13) with two screws (18) and lockwashers (19).
7. Install leads 783 (21) and 783A (22) onto NBC control panel ON/OFF toggle switch (35) with two screws (33) and lockwashers (34).
8. Install leads 787B (30) and 787 (8) into NBC fuse block (40) for heater fuse #4.
9. Install lead 787A (31) into NBC fuse block (40) for heater fuse #5.
10. Install lead 784B (32) into NBC fuse block (40) for heater fuse #6.
11. Install lead 784A (36) and 784 (7) into NBC fuse block (40) for heater fuse #7.
12. Install leads 785 (9) and 785A (39) into NBC fuse block (40) for heater fuse #1.
13. Install leads 786 (10) and 786B (38) into NBC fuse block (40) for heater fuse #2.
14. Install lead 786A (37) into NBC fuse block (40) for heater fuse #3.

4-124. NBC CONTROL PANEL REPLACEMENT (Cont'd)

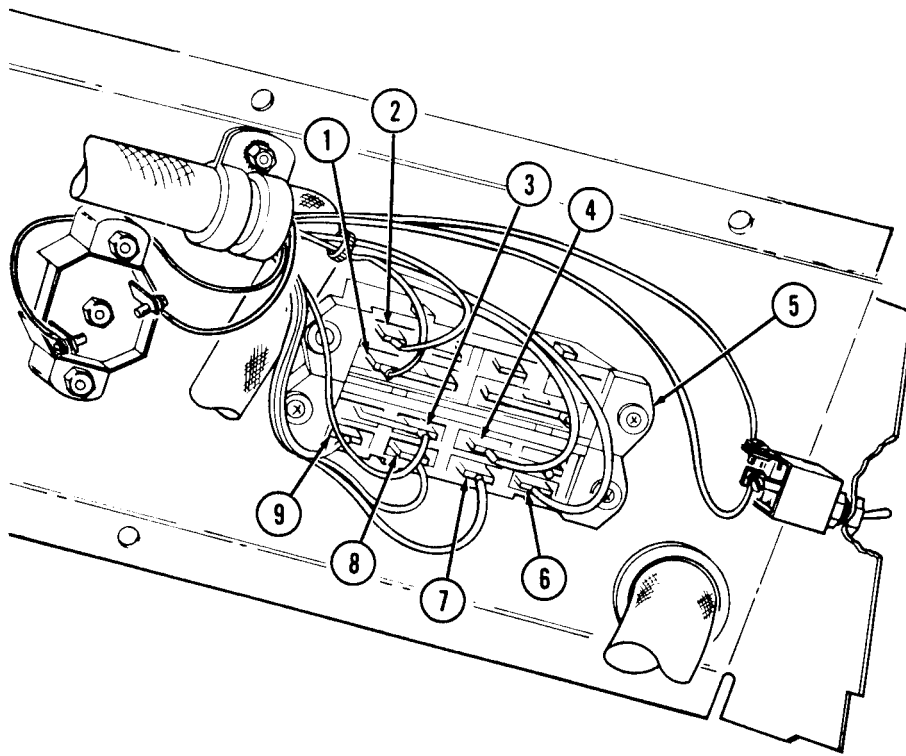


4-124. NBC CONTROL PANEL REPLACEMENT (Cont'd)

NOTE

Leads 785 and 786 have two way jumpers connecting fuses for heaters 1 & 2 and 3 & 4 respectively.

- 15. Install leads 787 (1) and 787A (2) on NBC fuse block (5) for heater fuse #5.
- 16. Install lead 786B (6) on NBC fuse block (5) for heater fuse #4.
- 17. Install leads 786 (4) and 786A (7) on NBC fuse block (5) for heater fuse #3.
- 18. Install lead 785A (9) on NBC fuse block (5) for heater fuse #2.
- 19. Install leads 785 (3) and 785B (8) on NBC fuse block (5) for heater fuse #1.



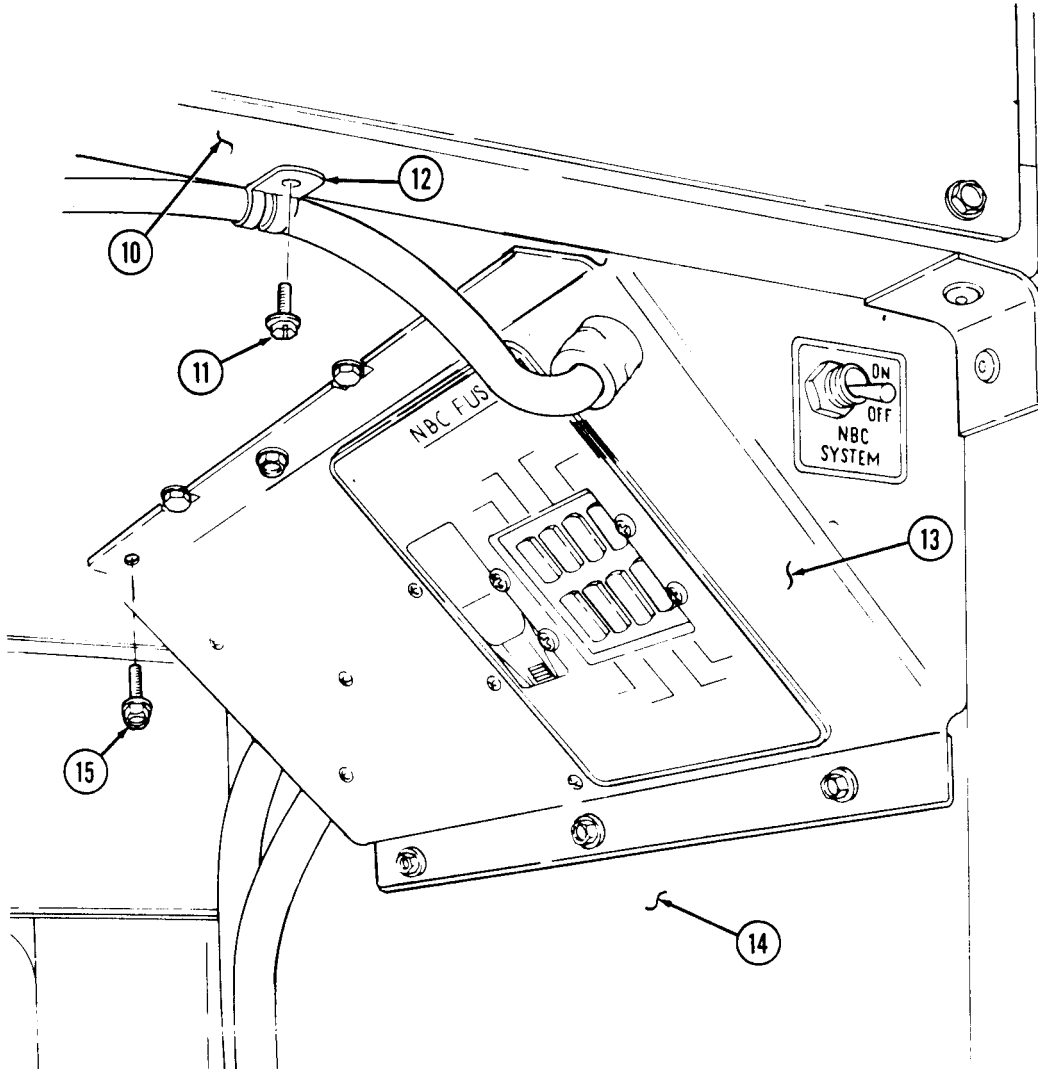
4-124. NBC CONTROL PANEL REPLACEMENT (Cont'd)

20. Install NBC control panel (13) on ambulance body (14) with six screws (15).

NOTE

M996 and M996A1 ambulances will not have cushioned wire clamp on ceiling.

21. Install cushioned wire clamp (12) on passenger ceiling (10) with screw (11).



- FOLLOW-ON TASKS:**
- Install NBC wiring harness: M996 and M996A1 (para. 4-99) M997, M997A1 and M997A2 (para. 4-100).
 - Install NBC control panel fuses (TM 9-2320-280-10).
 - Install battery ground cable to battery (para. 4-73).

4-125. HEAT/VENT CONTROL PANEL REMOVAL (M996, M996A1)

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M996, M996A1

Manual References

TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

- Battery ground cable disconnected (para. 4-73).
- Heater compartment panel removal (para. 11-204).

Materials/Parts

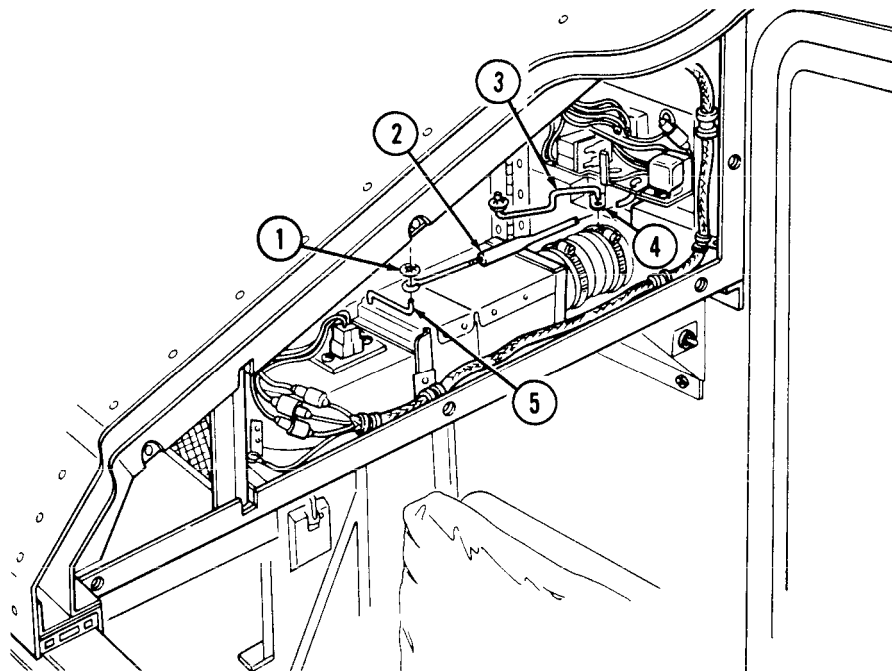
Plug button (Appendix G, Item 8)

a. Removal

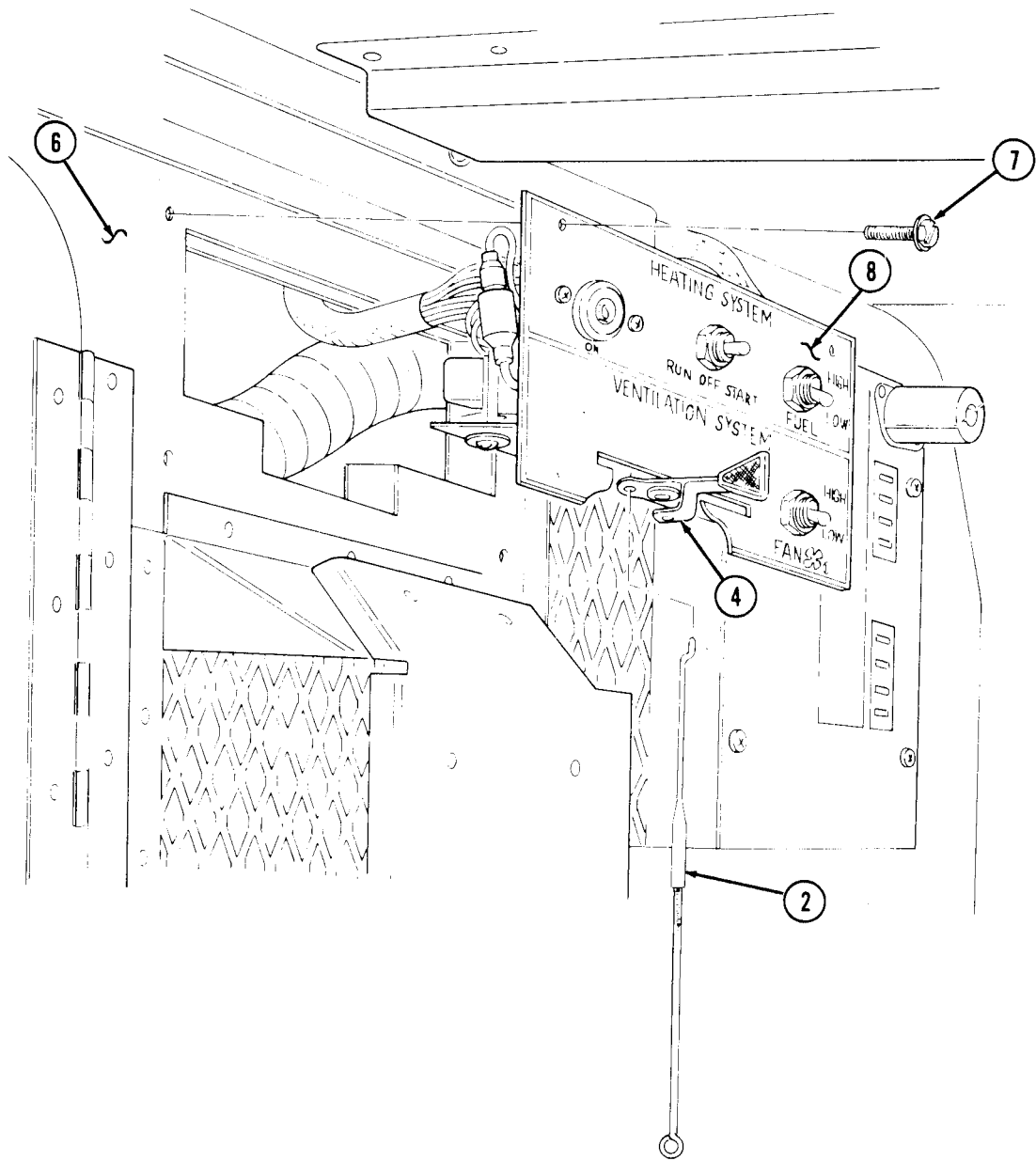
1. Remove plug button (1) from control arm (2) and blower duct arm (5). Discard plug button (1).
2. Disconnect vent door control arm (3) from switch lever assembly (4).
3. Remove four screws (7), control panel (8), and control arm (2) from body (6).

b. Installation

1. Connect control arm (2) to switch lever assembly (4) and install control panel (8) on body (6) with four screws (7).
2. Connect vent door control arm (3) to switch lever assembly (4).
3. Install control arm (2) on blower duct arm (5) with plug button (1).



4-125. HEAT/VENT CONTROL PANEL REMOVAL (M996, M996A1) (Cont'd)



- FOLLOW-ON TASKS:
- Connect battery ground cable (para. 4-73).
 - Install heater compartment panel (para. 11-204).

**4-126. HEAT/VENT CONTROL PANEL RELAY AND SWITCH MAINTENANCE
(M996, M996A1)**

This task covers:

- a. Heater Run-Start Switch Removal
- b. Heater Run-Start Switch Installation
- c. 24-Volt Relay Removal
- d. 24-Volt Relay Installation
- e. Relay Socket Removal
- f. Relay Socket Installation
- g. Heat On Light Removal
- h. Heat On Light Installation
- i. Spot Vent Switch Removal
- j. Spot Vent Switch Installation
- k. Fuel Hi-Low Switch Removal
- l. Fuel Hi-Low Switch Installation
- m. Fan Hi-Low Switch Removal
- n. Fan Hi-Low Switch Installation
- o. Rollover Switch Removal
- p. Rollover Switch Installation

INITIAL SETUP:

Applicable Models

M996, M996A1

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Twenty lockwashers
(Appendix G, Item 169)
Three plain-assembled nuts
(Appendix G, Item 201)

Manual References

TM 9-2320-280-24P

Equipment Condition

- Battery ground cable disconnected (para. 4-73).
- Heater compartment panel removed (para. 11-204).
- Heat/vent control panel removed (para. 4-125).

NOTE

Prior to removal, tag leads for installation.

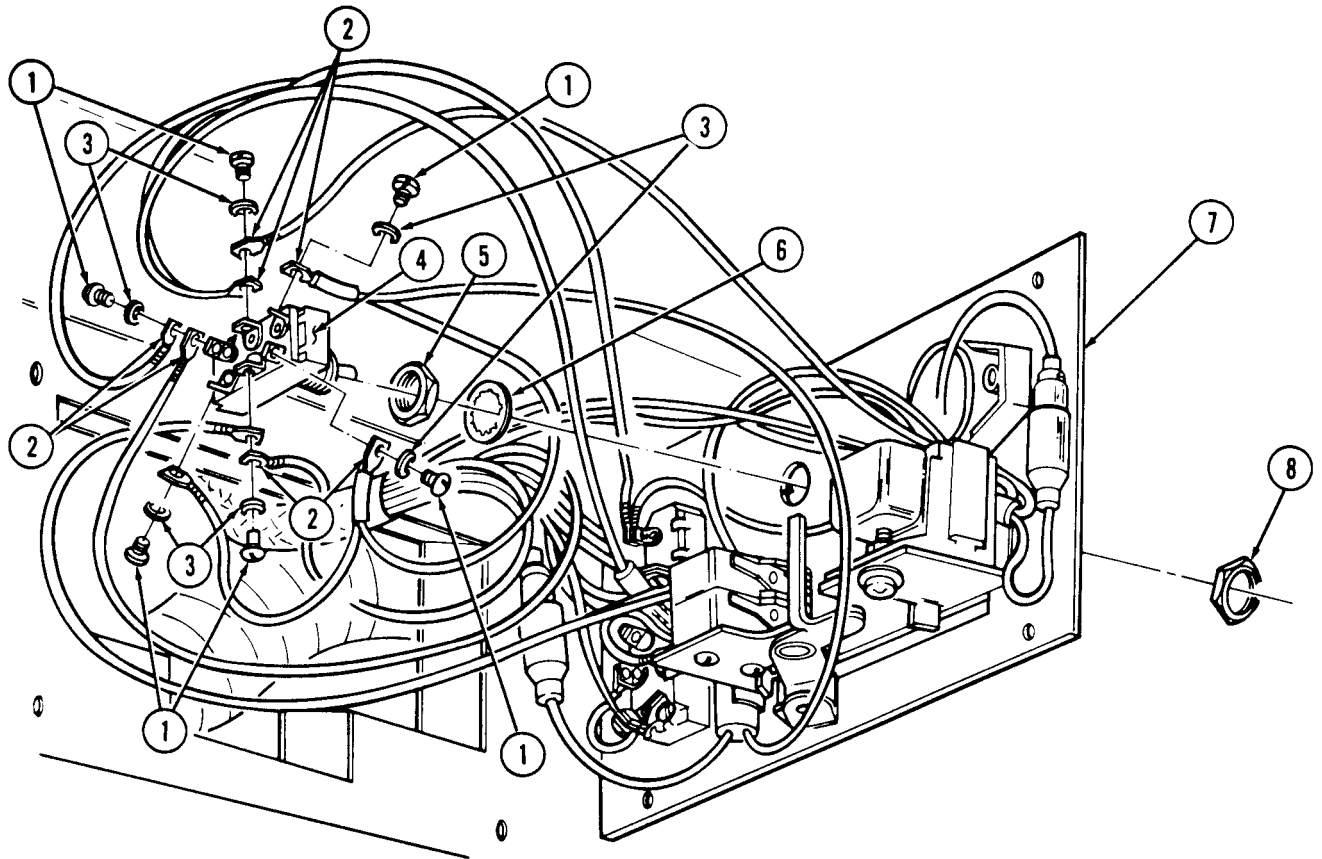
a. Heater Run-Start Switch Removal

1. Remove nut (8), switch (4), washer (6), and nut (5) from panel (7).
2. Remove six screws (1), lockwashers (3), and seven terminals (2) from switch (4). Discard lockwashers (3).

b. Heater Run-Start Switch Installation

1. Install seven terminals (2) on switch (4) with six lockwashers (3) and screws (1).
2. Install nut (5), washer (6), and switch (4) on panel (7) with nut (8).

4-126. HEAT/VENT CONTROL PANEL RELAY AND SWITCH MAINTENANCE
(M996, M996A1) (Cont'd)



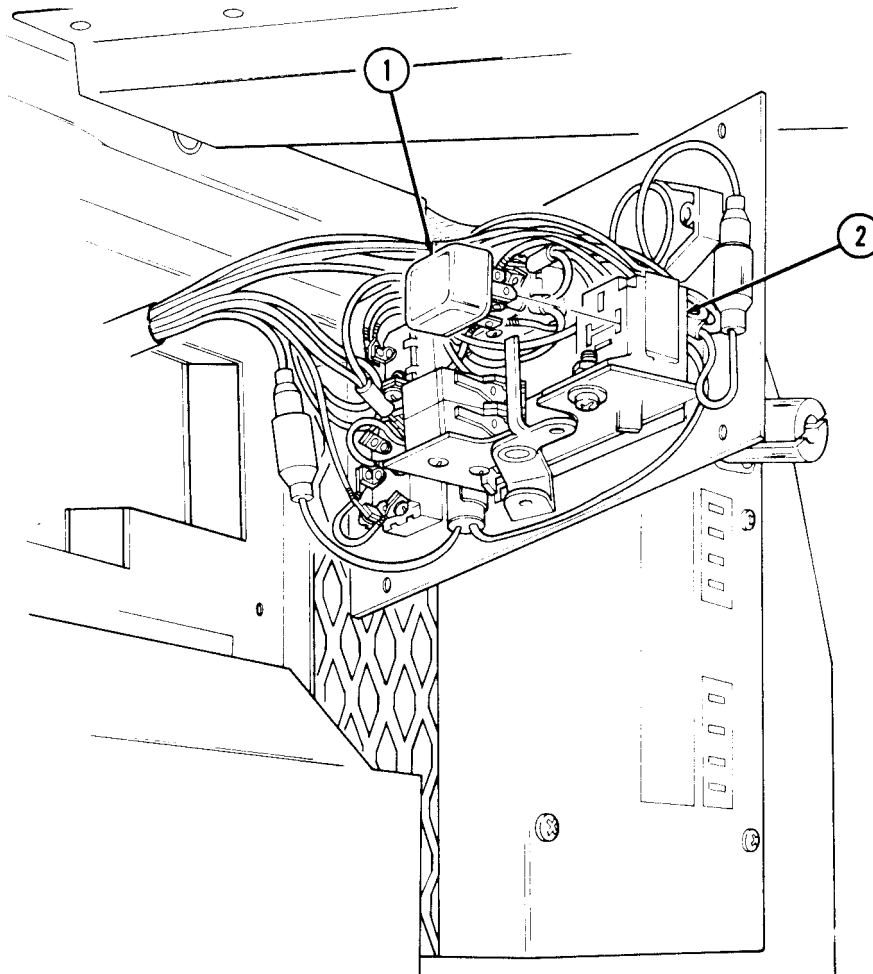
**4-126. HEAT/VENT CONTROL PANEL RELAY AND SWITCH MAINTENANCE
(M996, M996A1) (Cont'd)**

c. 24-Volt Relay Removal

Remove 24-volt relay (1) from relay mounting socket (2).

d. 24-Volt Relay Installation

Install 24-volt relay (1) on relay mounting socket (2).



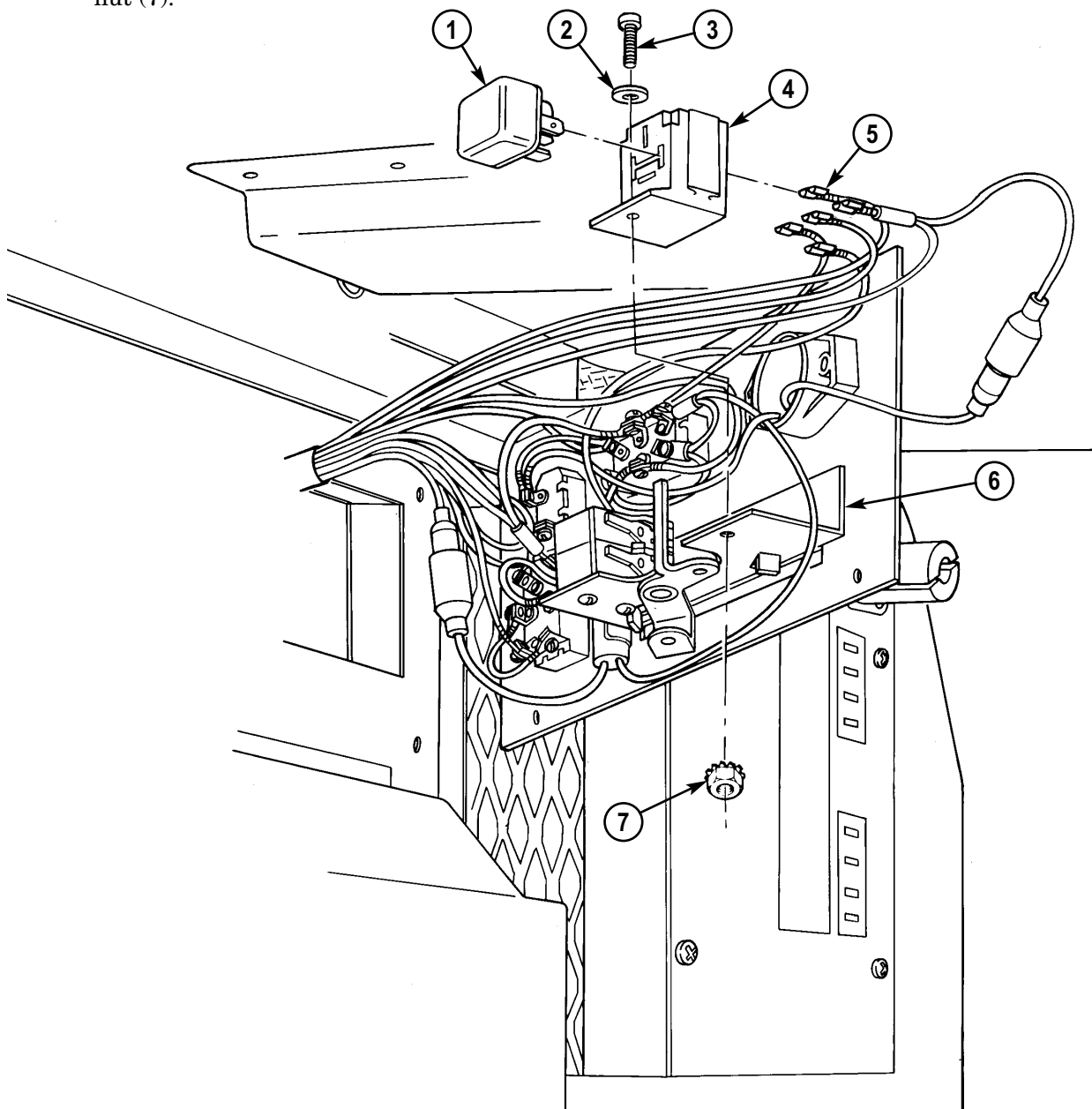
4-126. HEAT/VENT CONTROL PANEL RELAY AND SWITCH MAINTENANCE (M996, M996A1) (Cont'd)

e. Relay Socket Removal

1. Remove screw (3), washer (2), plain-assembled nut (7), and relay mounting socket (4) from mounting bracket (6). Discard plain-assembled nut (7).
2. Remove 24-volt relay (1) and five terminals (5) from relay mounting socket (4).

f. Relay Socket Installation

1. Install five terminals (5) and 24-volt relay (1) on relay mounting socket (4).
2. Install relay mounting socket (4) on bracket (6) with screw (3), washer (2), and plain-assembled nut (7).



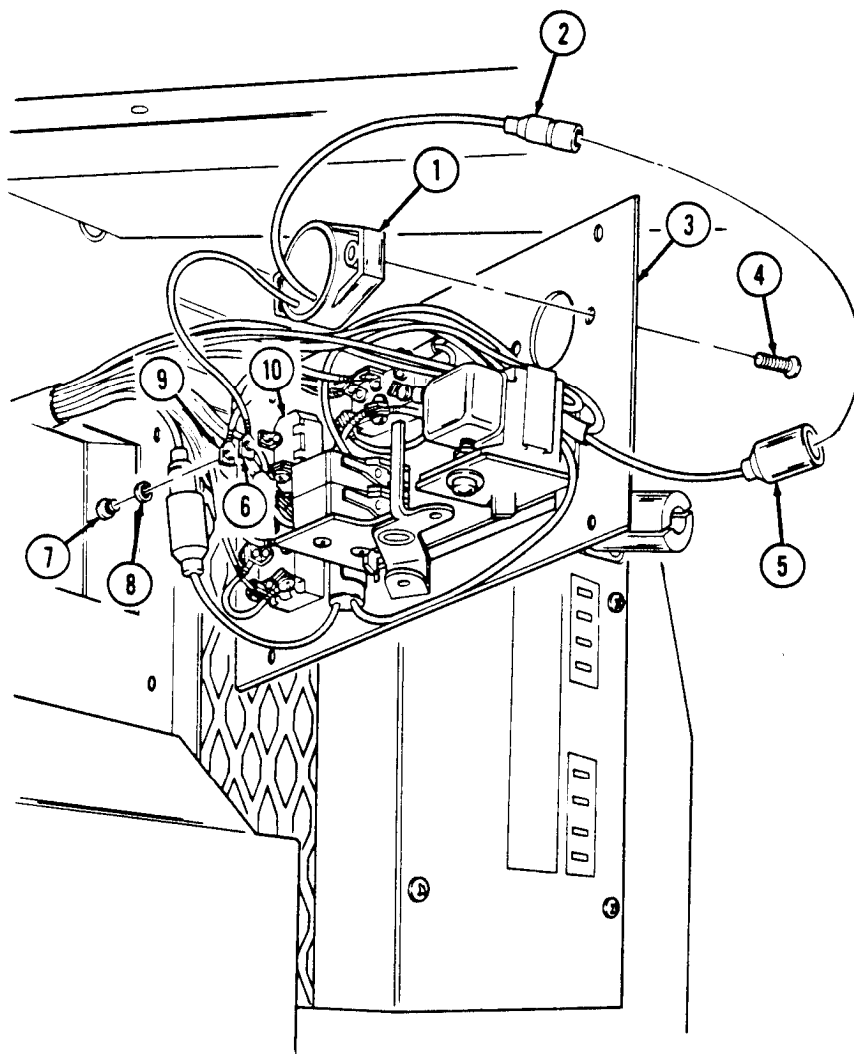
**4-126. HEAT/VENT CONTROL PANEL RELAY AND SWITCH MAINTENANCE
(M996, M996A1) (Cont'd)**

g. Heat On Light Removal

1. Remove screw (7), lockwasher (8), terminal (9), and light terminal (6) from heater HI-LOW switch (10). Discard lockwasher (8).
2. Disconnect light lead (2) from relay lead (5). Remove two screws (4) and light (1) from panel (3).

h. Heat On Light Installation

1. Install light (1) on panel (3) with two screws (4). Connect relay lead (5) to light lead (2).
2. Install light terminal (6) and terminal (9) on HI-LOW switch (10) with lockwasher (8) and screw (7).



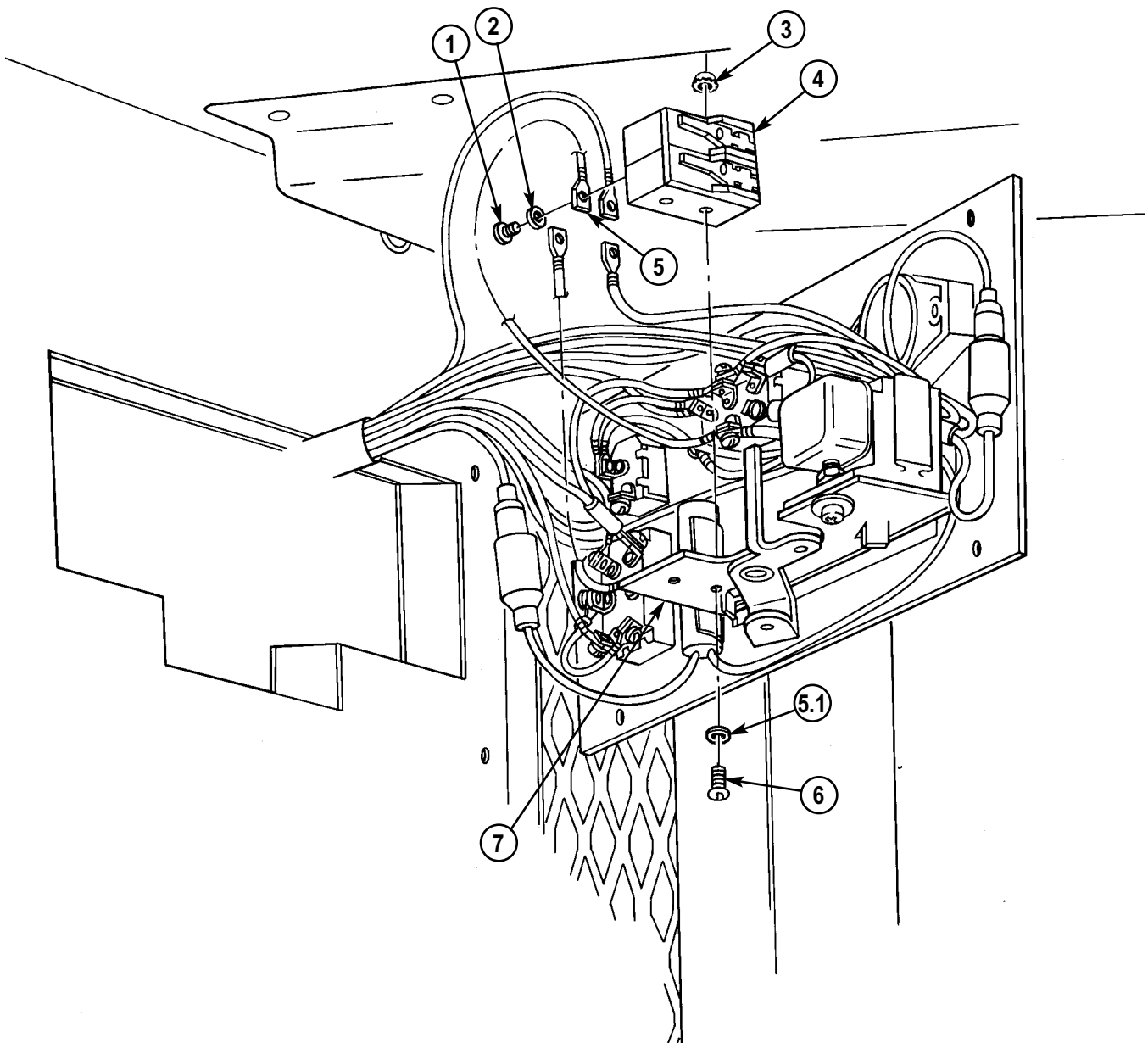
4-126. HEAT/VENT CONTROL PANEL RELAY AND SWITCH MAINTENANCE (M996, M996A1) (Cont'd)

i. Spot Vent Switch Removal

1. Remove two screws (6), washers (5.1), plain-assembled nuts (3), and switch (4) from lever bracket (7). Discard plain-assembled nuts (3).
2. Remove four screws (1), lockwashers (2), and terminals (5) from switch (4). Discard lockwashers (2).

j. Spot Vent Switch Installation

1. Install four terminals (5) on switch (4) with lockwashers (2) and screws (1).
2. Install switch (4) on lever bracket (7) with two screws (6), washers (5.1), and plain-assembled nuts (3).



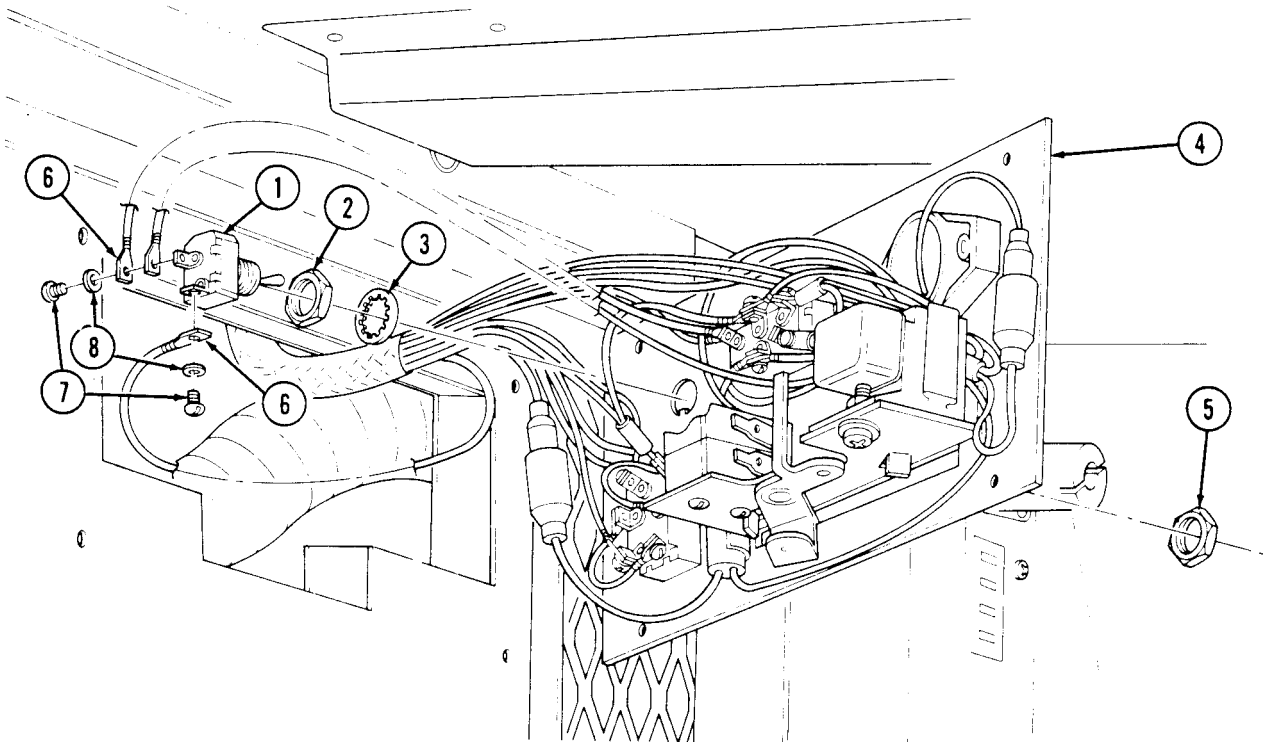
4-126. HEAT/VENT CONTROL PANEL RELAY AND SWITCH MAINTENANCE (M996, M996A1) (Cont'd)

k. Fuel Hi-Low Switch Removal

1. Remove nut (5), switch (1) washer (3) and nut (2) from panel (4).
2. Remove two screws (7), lockwashers (8) and three terminals (6) from switch (1). Discard lockwashers (8).

l. Fuel Hi-Low Switch Installation

1. Install three terminals (6) on switch (1) with two lockwashers (8) and screws (7).
2. Install nut (2), washer (3), and switch (1) on panel (4) with nut (5).



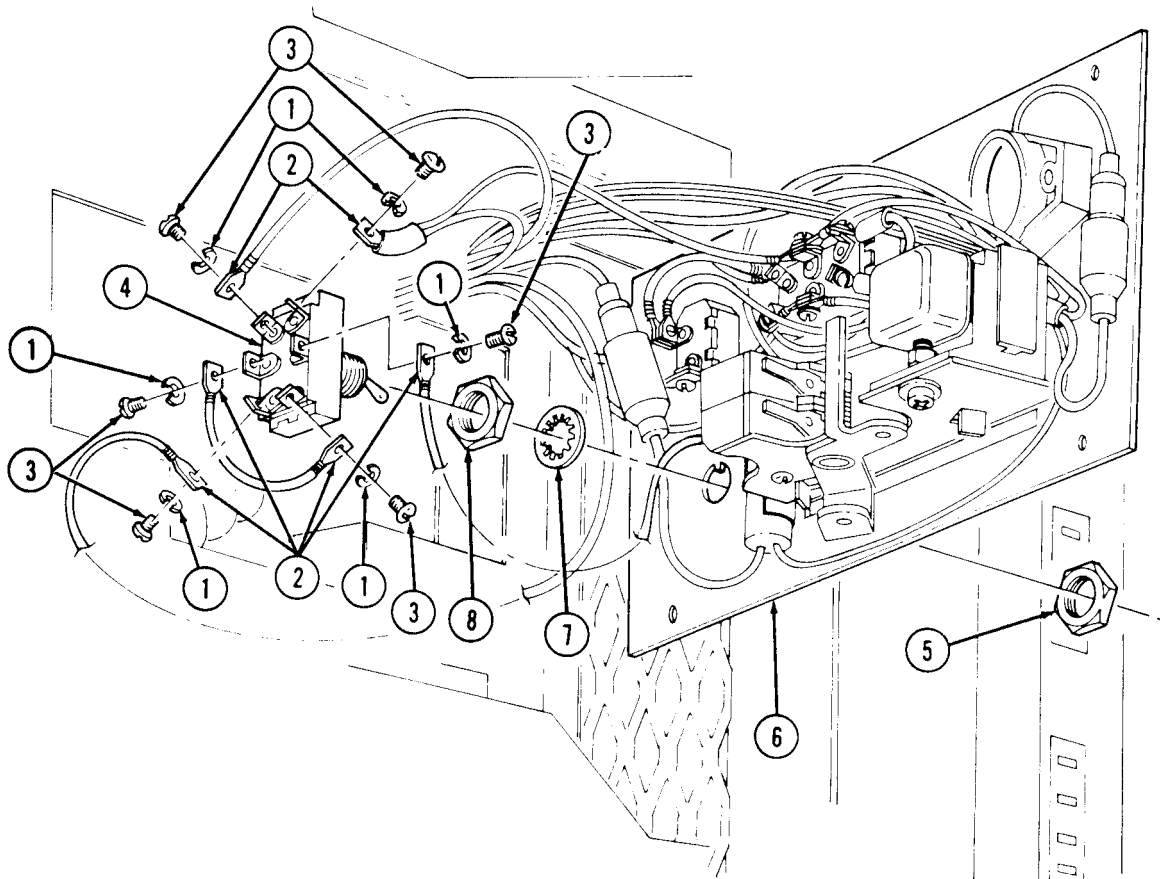
4-126. HEAT/VENT CONTROL PANEL RELAY AND SWITCH MAINTENANCE (M996, M996A1) (Cont'd)

m. Fan Hi-Low Switch Removal

1. Remove nut (5), switch (4), washer (7), and nut (8) from panel (6).
2. Remove six screws (3), lockwashers (1) and six terminals (2) from switch (4). Discard lockwashers (1).

n. Fan Hi-Low Switch Installation

1. Install six terminals (2) on switch (4) with six lockwashers (1) and screws (3).
2. Install nut (8), washer (7), and switch (4) on panel (6) with nut (5).



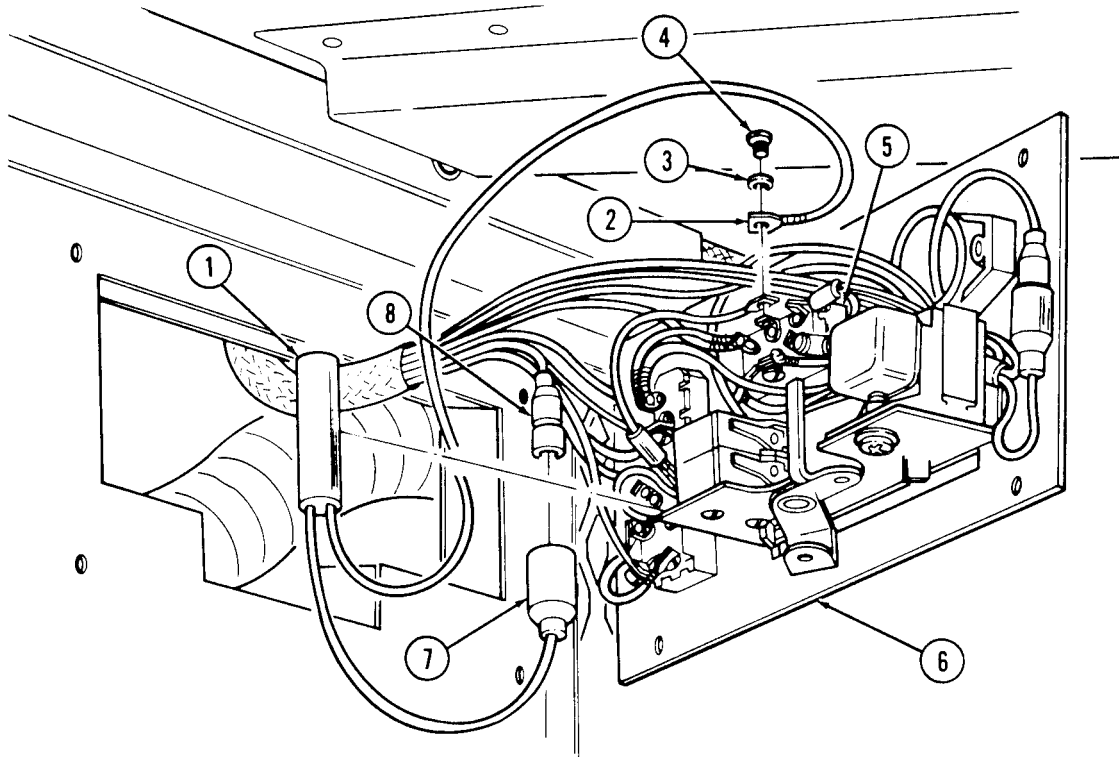
4-126. HEAT/VENT CONTROL PANEL, RELAY AND SWITCH MAINTENANCE (M996, M996A1) (Cont'd)

o. Rollover Switch Removal

1. Disconnect rollover switch lead (7) from harness lead (8).
2. Remove screw (4) and lockwasher (3) from two terminals (2) and heater RUN-START switch (5) and remove rollover switch (1). Discard lockwasher (3).

p. Rollover Switch Installation

1. Install two terminals (2) on heater RUN-START switch (5) with lockwasher (3) and screw (4).
2. Connect harness lead (8) to rollover switch lead (7) and snap in rollover switch (1) in switch bracket (6).



- FOLLOW-ON TASKS:
- Install heat/vent control panel (para. 4-125).
 - Install heater compartment panel (para. 11-204).
 - Connect battery ground cable (para. 4-73).

4-127. HEAT/AIR-CONDITIONING CONTROL PANEL RELAY AND SWITCH MAINTENANCE (M997, M997A1, M997A2)

This task covers:

- | | |
|---|------------------------------------|
| a. Heat A/C Panel Removal | h. Fuel Hi-Low Switch Installation |
| b. Heat A/C Panel Installation | i. Fan Hi-Low Switch Removal |
| c. Heater Run-Start Switch Removal | j. Fan Hi-Low Switch Installation |
| d. Heater Run-Start Switch Installation | k. A/C On-Off Switch Removal |
| e. Heat On Light Removal | l. A/C On-Off Switch Installation |
| f. Heat On Light Installation | m. Rollover Switch Removal |
| g. Fuel Hi-Low Switch Removal | n. Rollover Switch Installation |

INITIAL SETUP:

Applicable Models

M997, M997A1, M997A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Nine lockwashers (Appendix G, Item 169)
Two lockwashers (Appendix G, Item 138)

Manual References

TM 9-2320-280-24P

Equipment Condition

Battery ground cable disconnected (para. 4-73).

a. Heat A/C Control Panel Removal

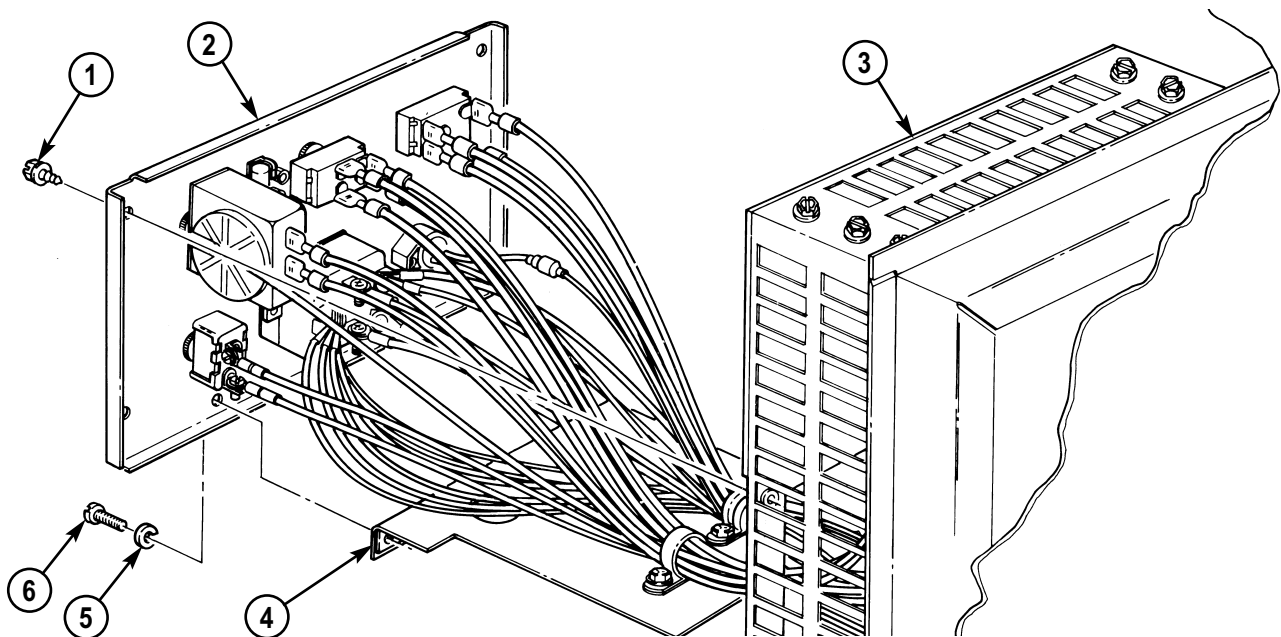
Remove four screws (1), two bolts (6), lockwashers (5) and panel (2) from harness bracket (4) and control box (3). Pull panel (2) away from control box (3). Discard lockwashers (5).

b. Heat A/C Control Panel Installation

NOTE

Check for loose or disconnected wires before installing panel.

Install panel (2) on harness bracket (4) and control box (3) with two lockwashers (5), bolts (6), and four screws (1).



4-127. HEAT/AIR-CONDITIONING CONTROL PANEL RELAY AND SWITCH MAINTENANCE (M997, M997A1, M997A2) (Cont'd)

NOTE

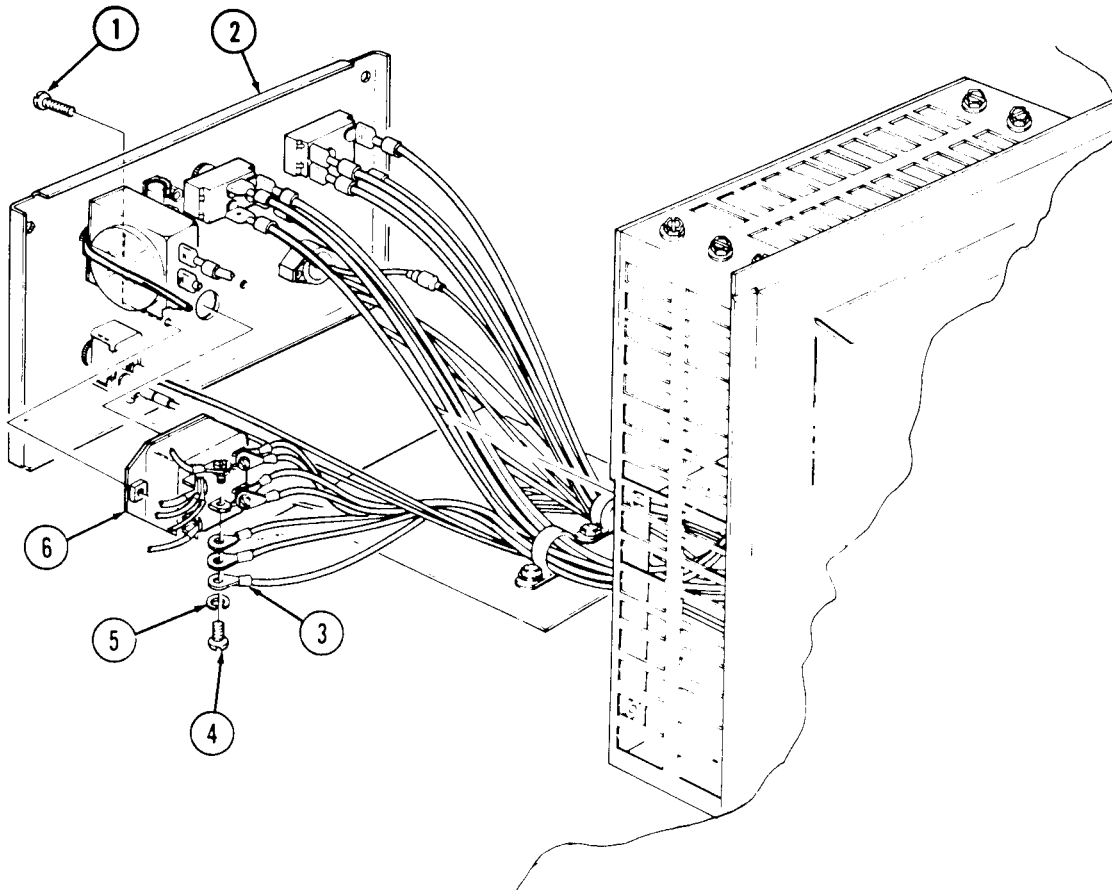
Prior to removal, tag leads for installation.

c. Heater Run-Start Switch Removal

1. Remove two screws (1) and switch (6) from panel (2).
2. Remove six screws (4), lockwashers (5), and twelve terminals (3) from switch (6). Discard lockwashers (5).

d. Heater Run-Start Switch Installation

1. Install twelve terminals (3) on switch (6) with six lockwashers (5) and screws (4).
2. Install switch (6) on panel (2) with two screws (1).



4-127. HEAT/AIR-CONDITIONING CONTROL PANEL RELAY AND SWITCH MAINTENANCE (M997, M997A1, M997A2) (Cont'd)

NOTE

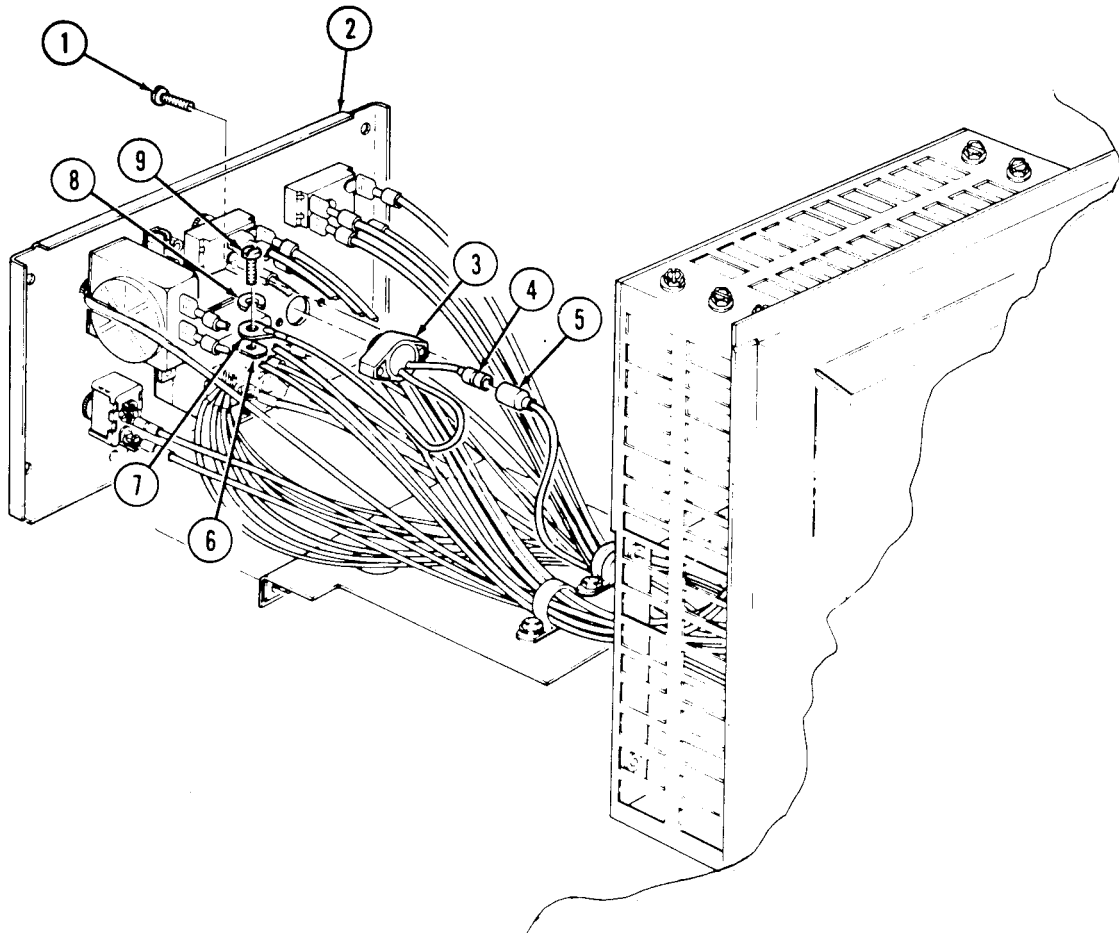
Prior to removal, tag leads for installation.

e. Heat On Light Removal

1. Remove screw (9), lockwasher (8), and light terminal (7) from heater run-start switch (6). Discard lockwasher (8).
2. Disconnect light lead (4) from relay lead (5) and remove two screws (1) and light (3) from panel (2).

f. Heat On Light Installation

1. Install light (3) on panel (2) with two screws (1) and connect relay lead (5) to light lead (4).
2. Install light terminal (7) on heater run-start switch (6) with lockwasher (8) and screw (9).



4-127. HEAT/AIR-CONDITIONING CONTROL PANEL RELAY AND SWITCH MAINTENANCE (M997, M997A1, M997A2) (Cont'd)

g. Fuel Hi-Low Switch Removal

1. Remove nut (1), switch (6), washer (8), and nut (7) from panel (2).
2. Remove two screws (4), lockwashers (5), and terminals (3) from switch (6). Discard lockwashers (5).

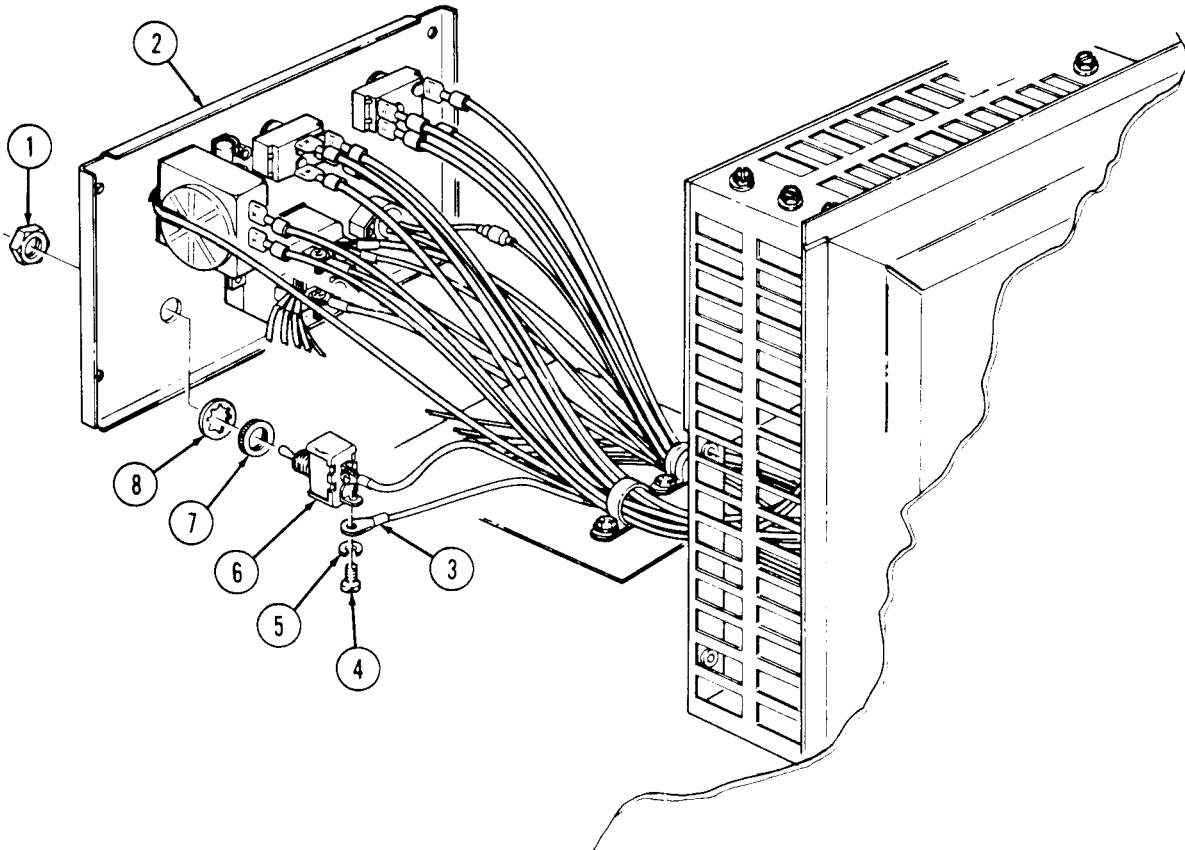
h. Fuel Hi-Low Switch Installation

1. Install two terminals (3) on switch (6) with two lockwashers (5) and screws (4).

NOTE

Position toggle switch in low position.

2. Install nut (7), washer (8), and switch (6) on panel (2) with nut (1).



4-127. HEAT/AIR-CONDITIONING CONTROL PANEL RELAY AND SWITCH MAINTENANCE (M997, M997A1, M997A2) (Cont'd)

NOTE

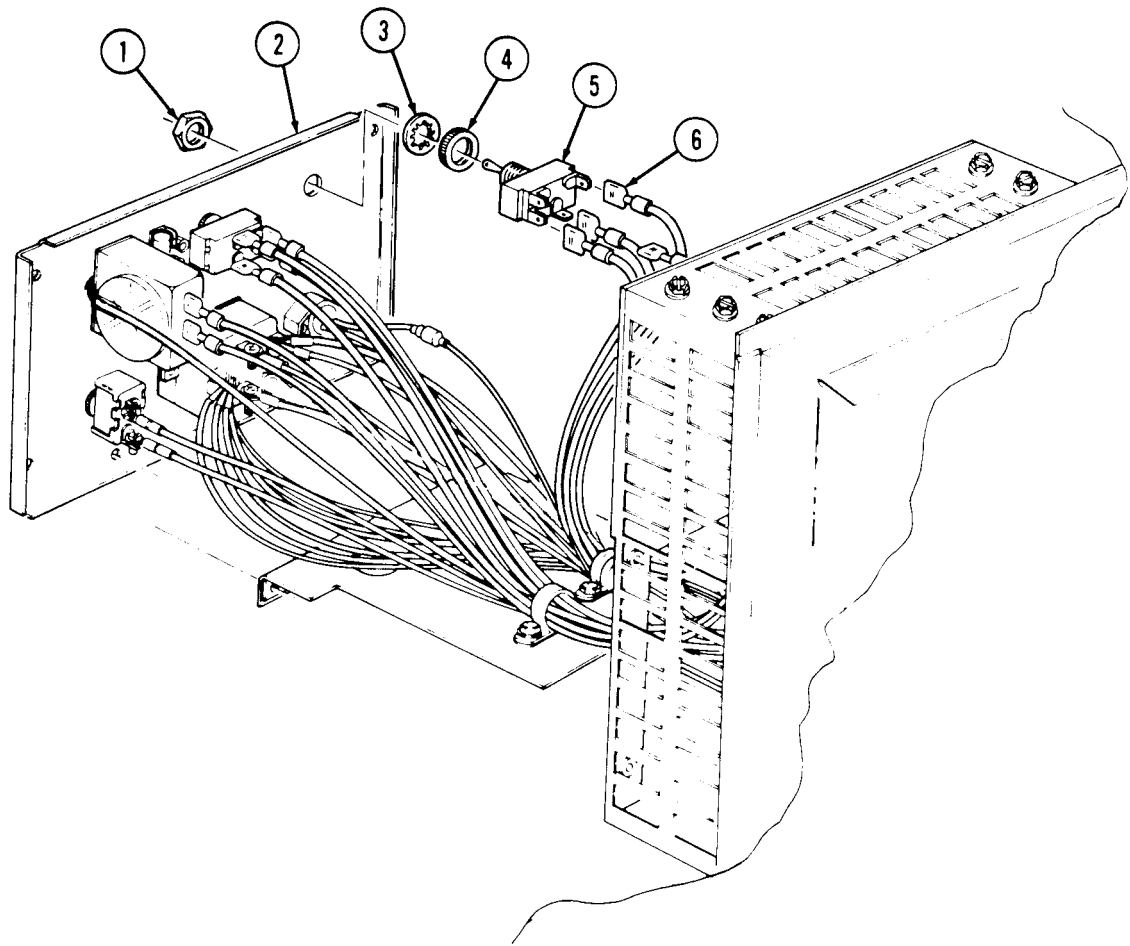
Prior to removal, tag leads for installation.

i. Fan Hi-Low Switch Removal

1. Remove nut (1), switch (5), washer (3), and nut (4) from panel (2).
2. Pull four terminals (6) from switch (5) and remove switch (5).

j. Fan Hi-Low Switch Installation

1. Connect four terminals (6) to switch (5).
2. Install nut (4), washer (3), and switch (5) on panel (2) with nut (1).



4-127. HEAT/AIR-CONDITIONING CONTROL PANEL RELAY AND SWITCH MAINTENANCE [M997, M997A1, M997A2) (Cont'd)

NOTE

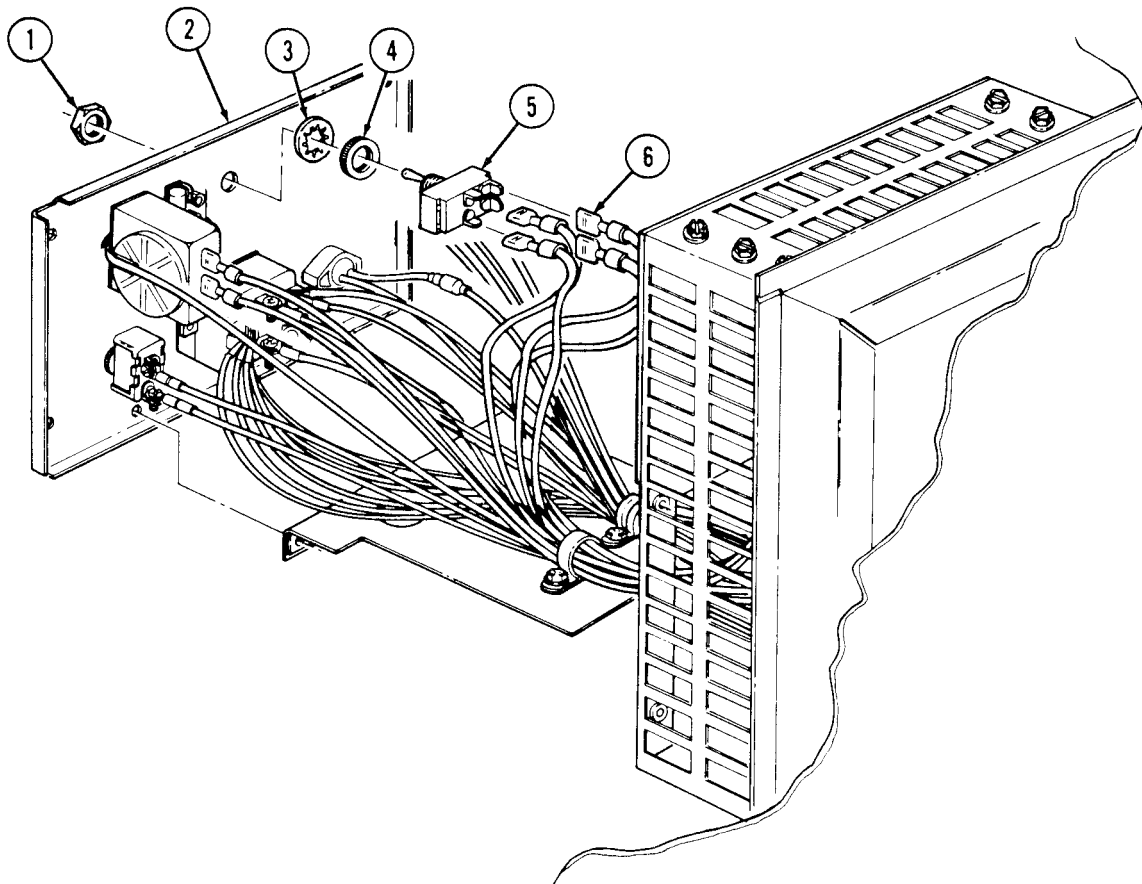
Prior to removal, tag leads for installation.

k. A/C On-Off Switch Removal

1. Remove nut (1), switch (5), washer (3), and nut (4) from panel (2).
2. Pull four terminals (6) from switch (5) and remove switch (5).

l. A/C On-Off Switch Installation

1. Connect four terminals (6) to switch (5).
2. Install nut (4), washer (3), and switch (5) on panel (2) with nut (1).



**4-127. HEAT/AIR-CONDITIONING CONTROL PANEL RELAY AND SWITCH
MAINTENANCE (M997, M997A1, M997A2) (Cont'd)****NOTE**

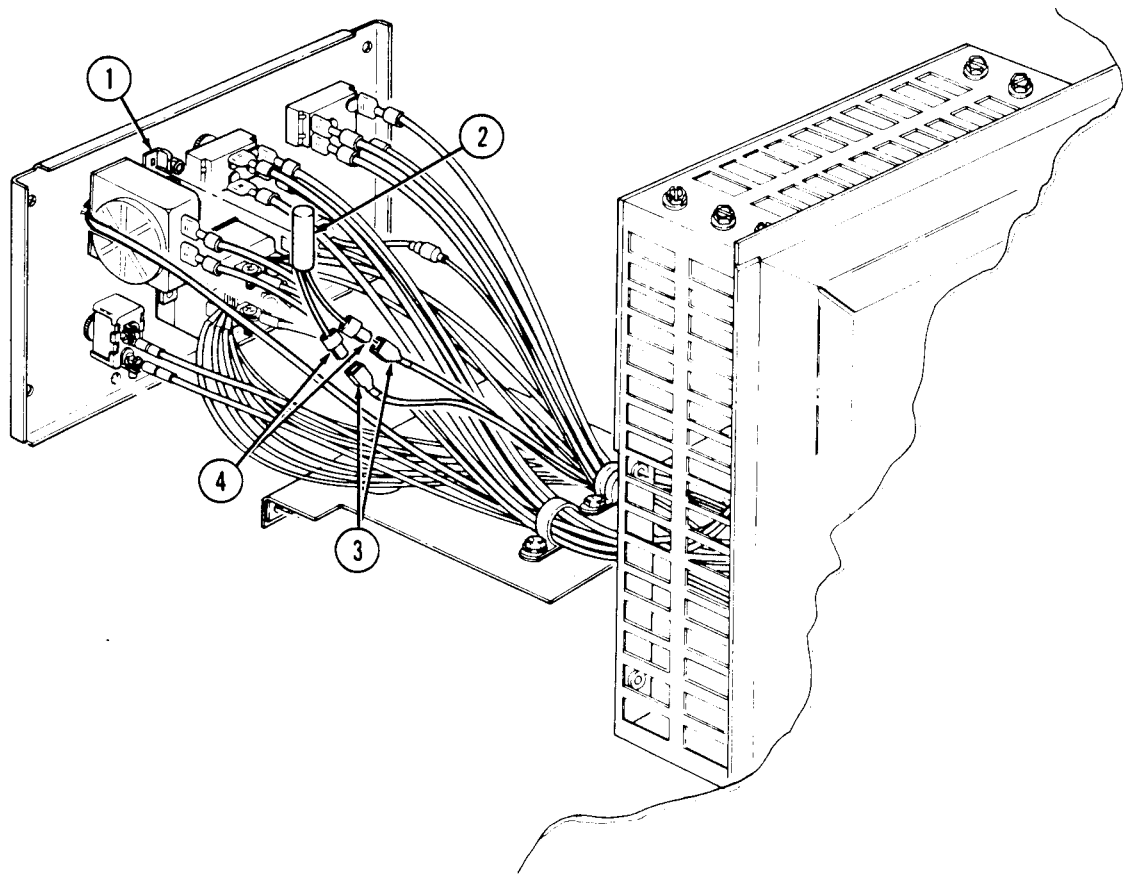
Prior to removal, tag leads for installation.

m. Rollover Switch Removal

Disconnect two rollover switch leads (4) from harness leads (3) and pull rollover switch (2) out of switch bracket (1).

n. Rollover Switch Installation

Connect two harness leads (3) to rollover switch leads (4) and snap in rollover switch (2) into switch bracket (1).



FOLLOW-ON TASK: Connect battery ground cable (para. 4-73).

CHAPTER 5 TRANSMISSION AND TRANSFER CASE MAINTENANCE

Section I. TRANSMISSION MAINTENANCE

5-1. TRANSMISSION MAINTENANCE TASK SUMMARY

TASK PARA.	PROCEDURES	PAGE NO.
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5-3.	Transmission Oil Cooler Lines Replacement	5-8
5-4.	Transmission Bypass Valve Replacement	5-12
5-5.	Transmission Oil Dipstick Tube Replacement	5-14
5-6.	Neutral Start Switch Replacement	5-16
5-7.	Shift Controls Housing Assembly (SF-5583581) Replacement	5-18
5-8.	Shift Controls Housing Assembly (SF-5583581) Maintenance	5-20
5-9.	Shift Controls Housing Assembly (SF-5583581) Repair	5-22
5-10.	Shift Controls Housing Assembly (EX 3725) Replacement (4L80-E)	5-26
5-11.	Shift Controls Housing Assembly (EX 3725) Maintenance	5-28
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5-19.	Converter Housing Cover Replacement	5-44
5-20.	Transmission Mount Replacement	5-45
5-21.	Transmission Road Test	5-46

5-2. TRANSMISSION SERVICE

This task covers:

- | | |
|--|---|
| <p>a. Draining Fluid</p> <p>b. Transmission Filter Removal</p> | <p>c. Transmission Filter Installation</p> <p>d. Replenishing Fluid</p> |
|--|---|

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Materials/Parts

Nonmetallic round seal (Appendix G, Item 286)
Filter assembly (Appendix G, Item 31) (3L80)
Gasket (Appendix G, Item 48) (3L80)
Filter element kit (Appendix G, Item 33) (4L80-E)
Gasket (Appendix G, Item 58) (4L80-E)
Two locknuts (Appendix G, Item 103)
Transmission fluid (Appendix C, Item 26 or 27)
Drycleaning solvent (Appendix C, Item 18)

General Safety Instructions

Drycleaning solvent is flammable and will not be used near an open flame.

a. Draining Fluid

NOTE

- Transmission service for the 3L80 and 4L80-E transmissions is basically the same. Differences are noted.
- Do not shift through driving gear ranges when warming transmission fluid for removal. Shifting through driving gear ranges is a procedure used only when refilling transmission fluid.
- Transmission should be warm when draining fluid.
- Have drainage container ready to catch fluid.

1. Remove drainplug (1) and gasket (2) from oil pan (3). Allow fluid to drain.

NOTE

Inspect fluid for grit, foaming, and/or milkiness. If present, notify DS maintenance.

2. Install gasket (2) and drainplug (1) in oil pan (3) and tighten drain plug (1) to 20 lb-ft (27 N•m).

b. Transmission Filter Removal

NOTE

Perform steps 1 through 5 for 3L80 transmissions only.

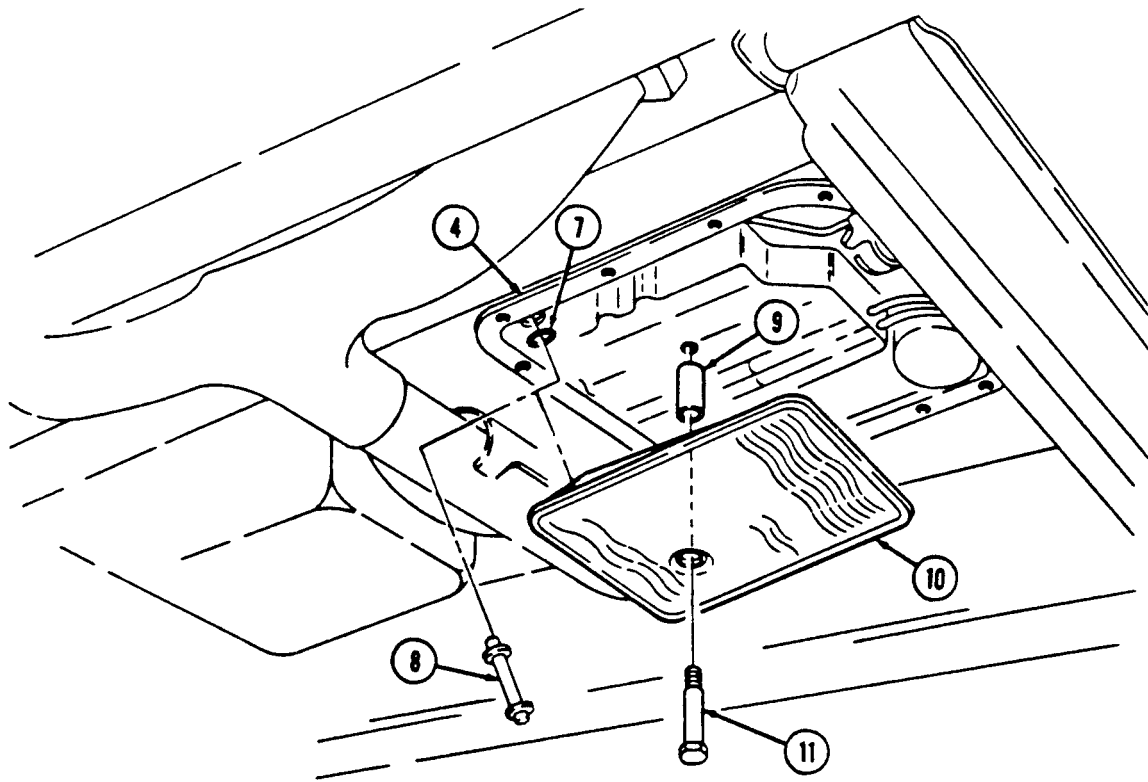
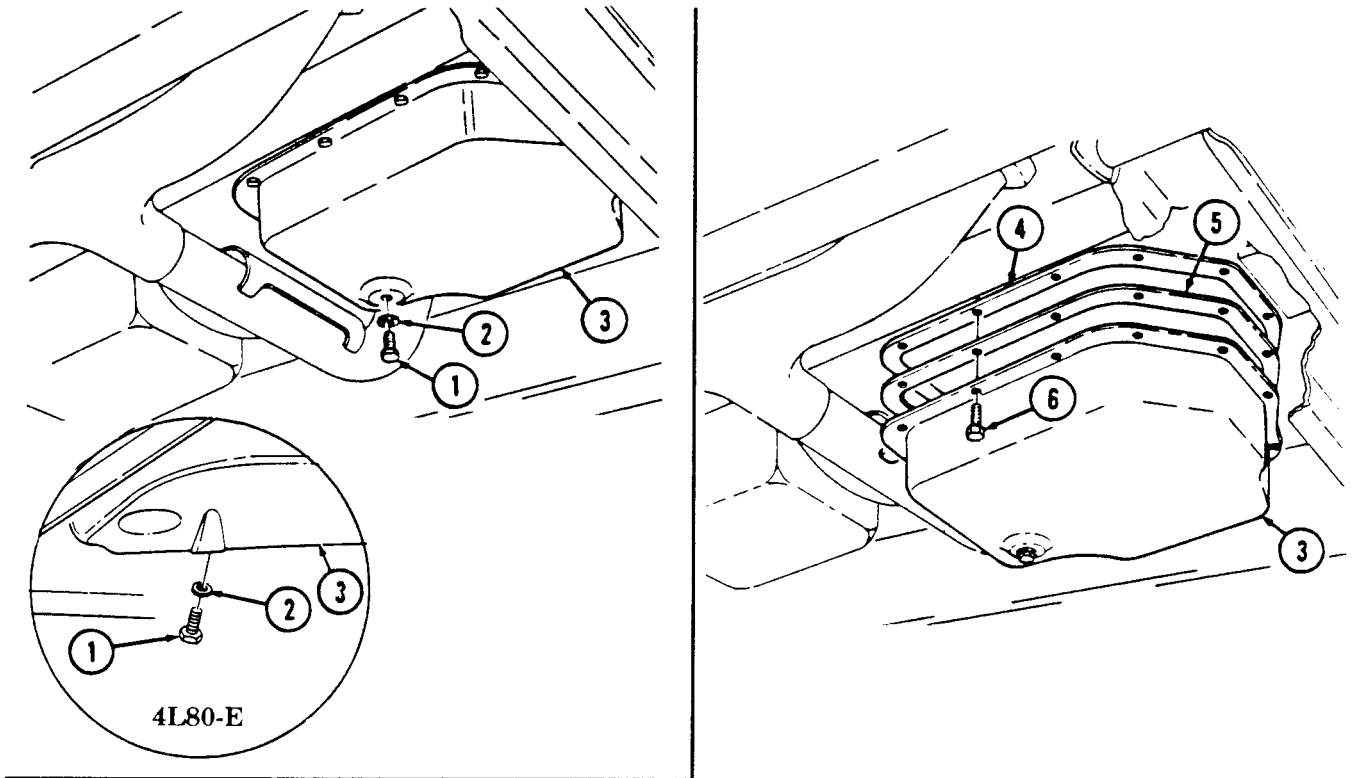
1. Remove thirteen capscrews (6), oil pan (3), and gasket (5) from transmission (4). Discard gasket (5).
2. Clean gasket (5) material from transmission (4) and oil pan (3) mating surfaces.
3. Remove capscrew (11), oil filter (10), and spacer (9) from transmission (4).
4. Pull suction tube (8) from oil filter (10) and remove seal (7). Discard seal (7).

WARNING

Drycleaning solvent is flammable and will not be used near an open flame. A fire extinguisher will be kept nearby when the solvent is used. Use only in well ventilated places. Failure to do this may result in injury to personnel and/or damage equipment.

5. Clean suction tube (8) and oil pan (3) thoroughly with drycleaning solvent.

5-2. TRANSMISSION SERVICE (Cont'd)



5-2. TRANSMISSION SERVICE (Cont'd)

NOTE

Perform steps 6 through 9 for 4L80-E transmissions only.

CAUTION

Transfer case must be supported during removal and installation of crossmember for access to oil pan capscrew and to prevent damage to equipment.

6. Place support under transfer case and remove two locknuts (3), washers (2), capscrews (6), and crossmember (4) from support brackets (1) and (5). Discard locknuts (3).

NOTE

Oil pan gasket is reusable. Discard only if damaged.

7. Remove seventeen capscrews (12), oil pan (11), and gasket (10) from transmission (7).
8. Remove magnet (9) from oil pan (11). Remove filter (8) from transmission (7).

WARNING

Drycleaning solvent is flammable and will not be used near an open flame. A fire extinguisher will be kept nearby when the solvent is used. Use only in well-ventilated places. Failure to do this may result in injury to personnel and/or damage to equipment.

9. Clean oil pan (11) thoroughly with drycleaning solvent.

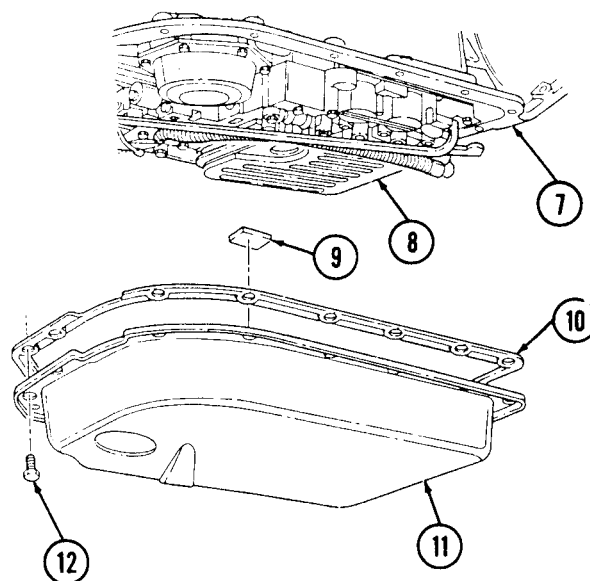
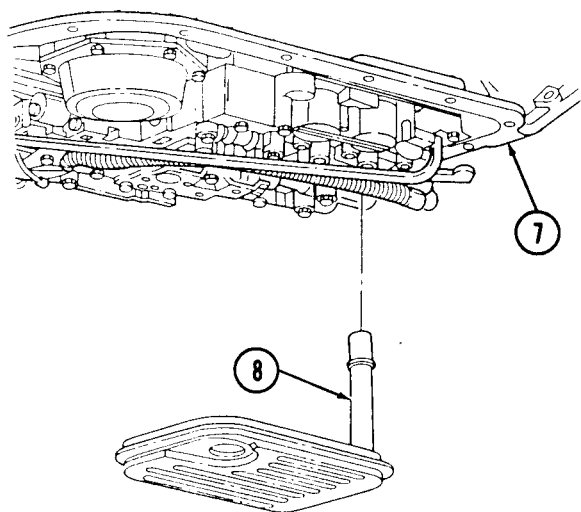
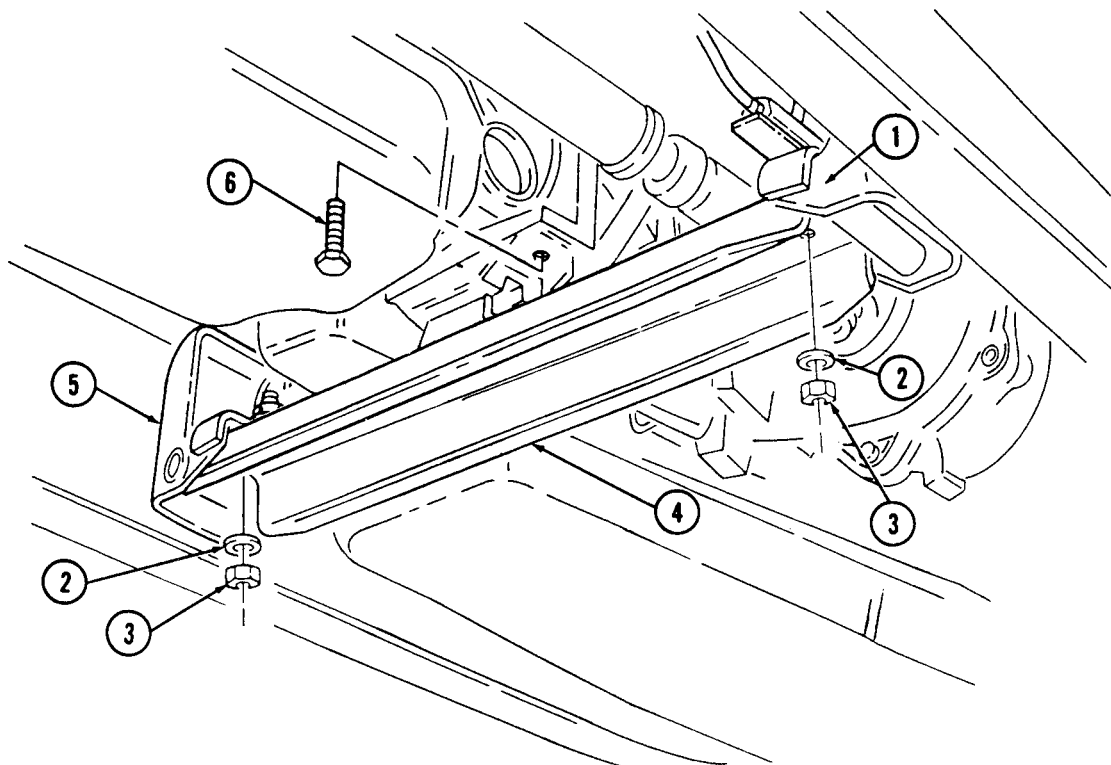
c. Transmission Filter Installation

NOTE

Perform steps 1 through 4 for 4L80-E transmissions only.

1. Install filter (8) in transmission (7). Install magnet (9) in oil pan (11).
2. Install gasket (10) and oil pan (11) on transmission (7) with seventeen capscrews (12). Tighten capscrews (12) to 18 lb-ft (24 N•m).
3. Install crossmember (4) on support brackets (1) and (5) with two capscrews (6), washers (2), and locknuts (3). Tighten locknuts (3) to 90 lb-ft (122 N•m).
4. Remove support from transfer case.

5-2. TRANSMISSION SERVICE (Cont'd)

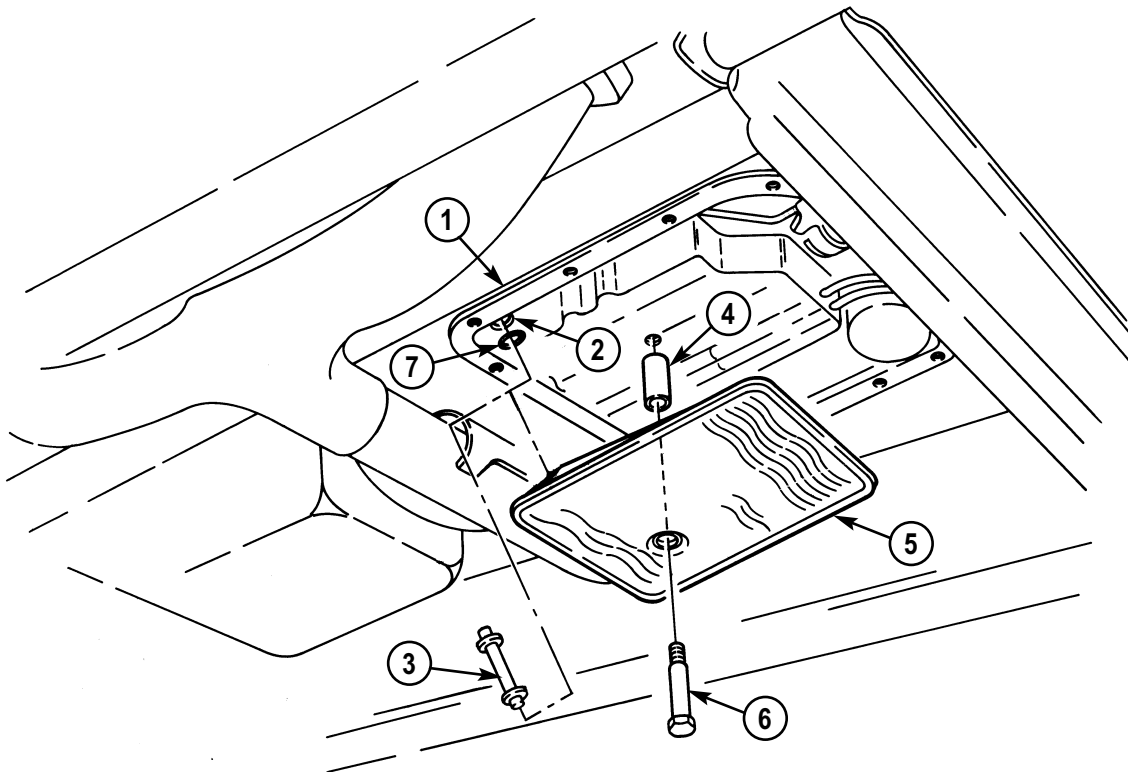


5-2. TRANSMISSION SERVICE (Cont'd)

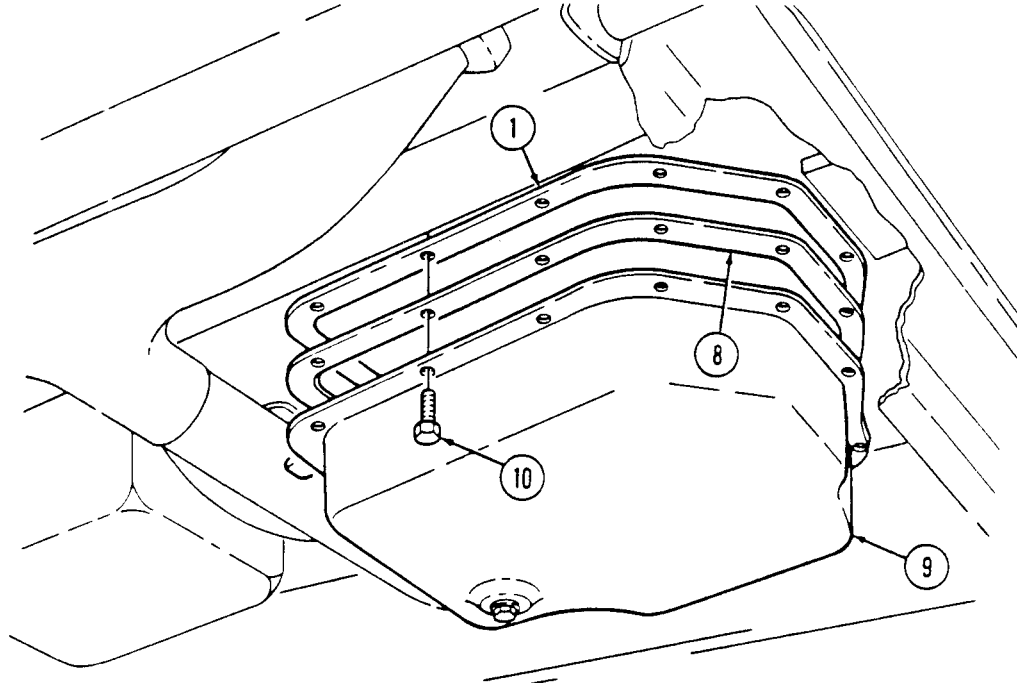
NOTE

Perform steps 5 through 9 for 3L80 transmissions only.

5. Insert end of suction tube (3) marked "filter" into oil filter (5).
6. Install seal (7) onto upper end of suction tube (3) marked "case" and slide downward.
7. Position oil filter (5) on transmission (1) inserting suction tube (3) into oil input port (2).
8. Install oil filter (5) and spacer (4) on transmission (1) with capscrew (6). Tighten capscrew (6) to 10-15 lb-ft (14-20 N•m).
9. Install gasket (8) and oil pan (9) on transmission (1) with thirteen capscrews (10). Tighten capscrews (10) to 12 lb-ft (16 N•m).

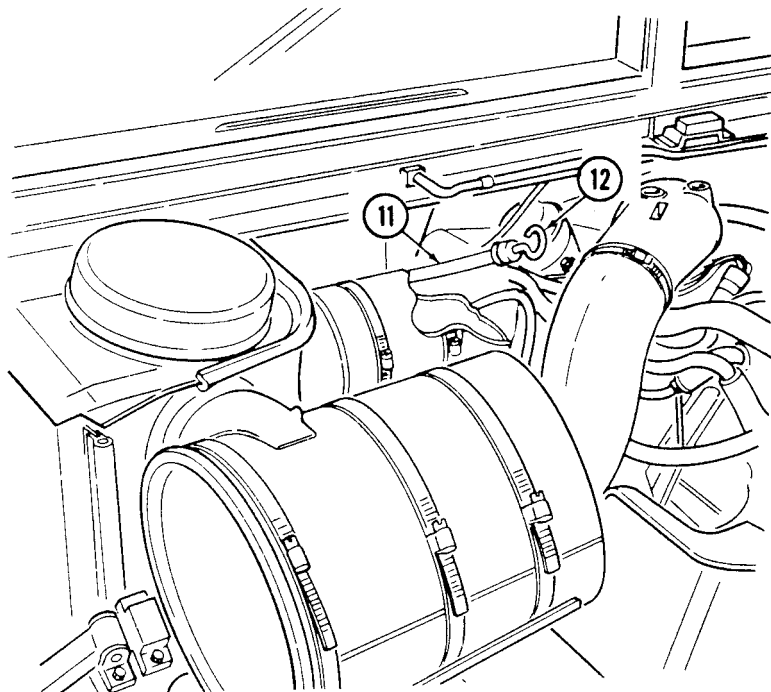


5-2. TRANSMISSION SERVICE (Cont'd)



d. Replenishing Fluid

1. Remove transmission oil dipstick (12) from dipstick tube (11).
2. Check transmission fluid and fill to proper level (TM 9-2320-280-10).
3. Install transmission oil dipstick (12) in dipstick tube (11).



FOLLOW-ON TASK: Operate vehicle (TM 9-2320-280-10) and check for leaks.

5-3. TRANSMISSION OIL COOLER LINES REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Four locknuts (Appendix G, Item 70)
Locknut (Appendix G, Item 99)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

- Right splash shield removed (oil cooler lines to oil cooler only) (para. 10-20).
- Left splash shield access cover removed (para. 10-18).

General Safety Instructions

Allow transmission to cool before performing this task.

WARNING

Allow transmission to cool before performing this task. Severe injury to personnel may result.

NOTE

- Removal and installation procedures are the same for all lines, regardless of function, size or location. All oil cooler ports should be plugged to prevent contamination. Remove plugs prior to connection.
- Left splash shield can be modified to add engine access cover. Refer to appendix D, Fig. D-86 and D-87 for installation.

a. Removal

1. Remove retaining clamps (3) from cooler lines (4).
2. Loosen hose clamps (1) on rubber hoses (2) and cooler lines (4).
3. Loosen hose clamps (5) on cooler lines (4).

NOTE

Have drainage container ready to catch fluid.

4. Disconnect cooler lines (4) at each end and allow to drain.

NOTE

Perform step 5 for M997A2, M1025A2, M1035A2, M1043A2, M1045A2, M1097A2, and M1123 vehicles only.

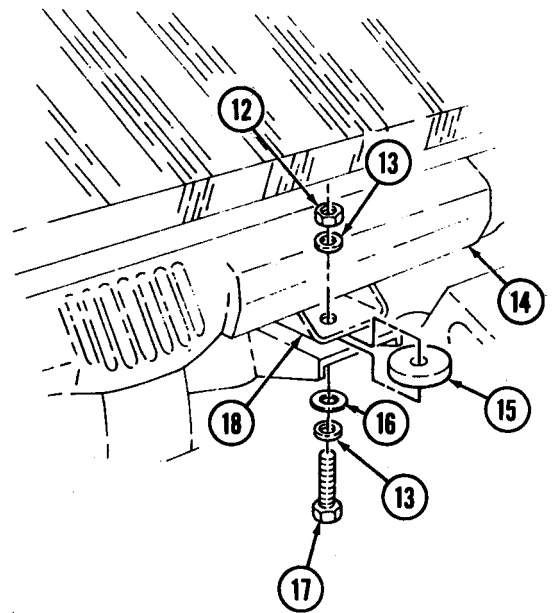
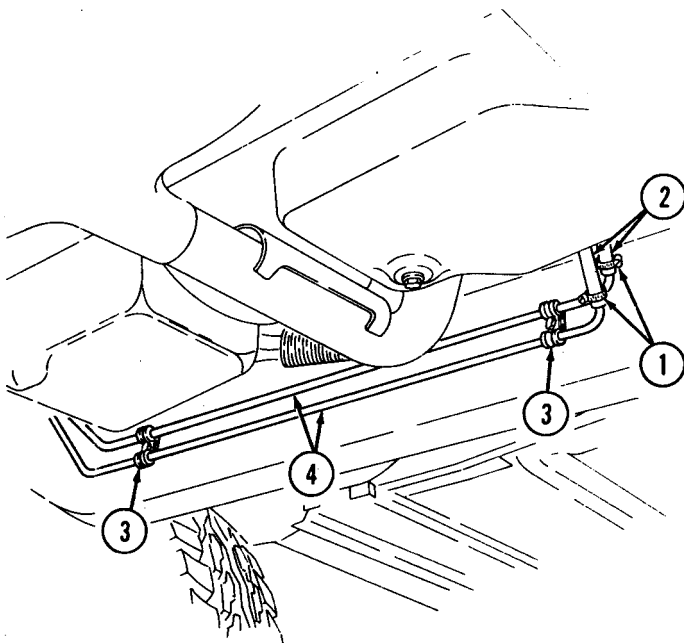
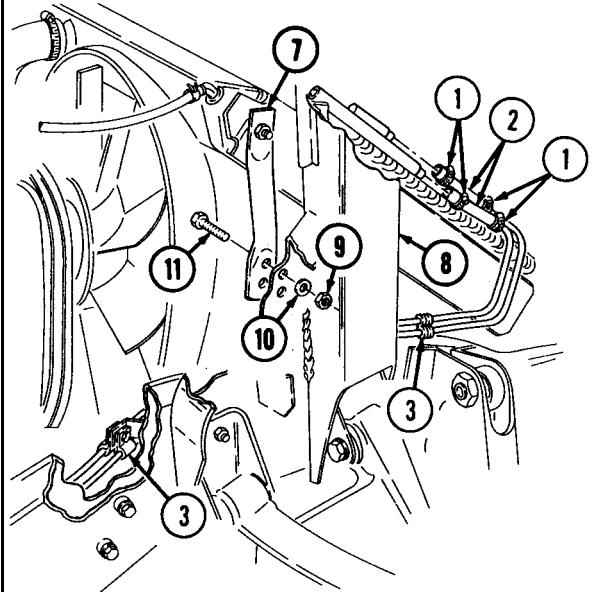
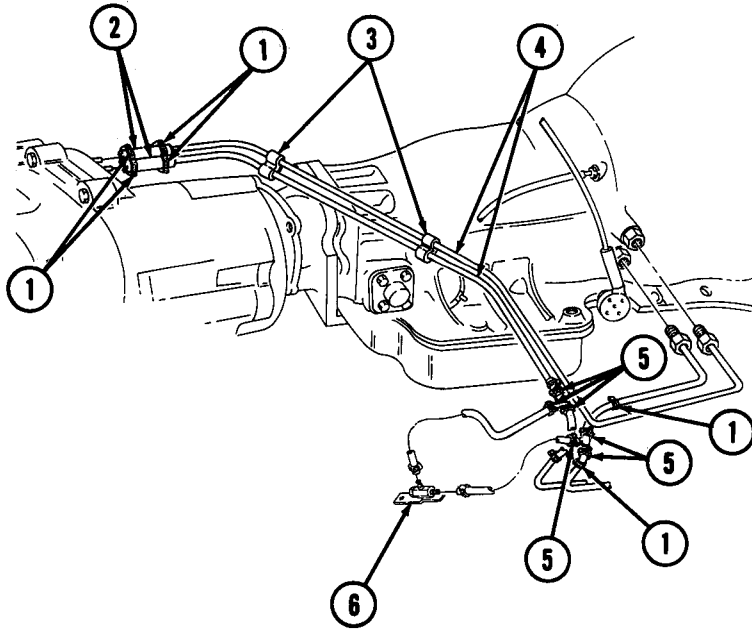
5. Disconnect two cooler lines (4) from by-pass valve (6).

NOTE

Perform steps 6 and 7 to allow access only if removing oil cooler lines from oil cooler.

6. Remove four locknuts (9), washers (10), and capscrews (11) from radiator supports (7) and airlift brackets (8). Discard locknuts (9).
7. Remove locknut (12), washer (13), capscrew (17), washer (13), large washer (16), and mount (15) from radiator (14) and front mounting bracket (18). Discard locknut (12).
8. Remove cooler lines (4) and rubber hoses (2) from vehicle.

5-3. TRANSMISSION OIL COOLER LINES REPLACEMENT (Cont'd)



5-3. TRANSMISSION OIL COOLER LINES REPLACEMENT (Cont'd)

b. Installation

1. Position rubber hoses (2) and cooler lines (4) in proper position.

NOTE

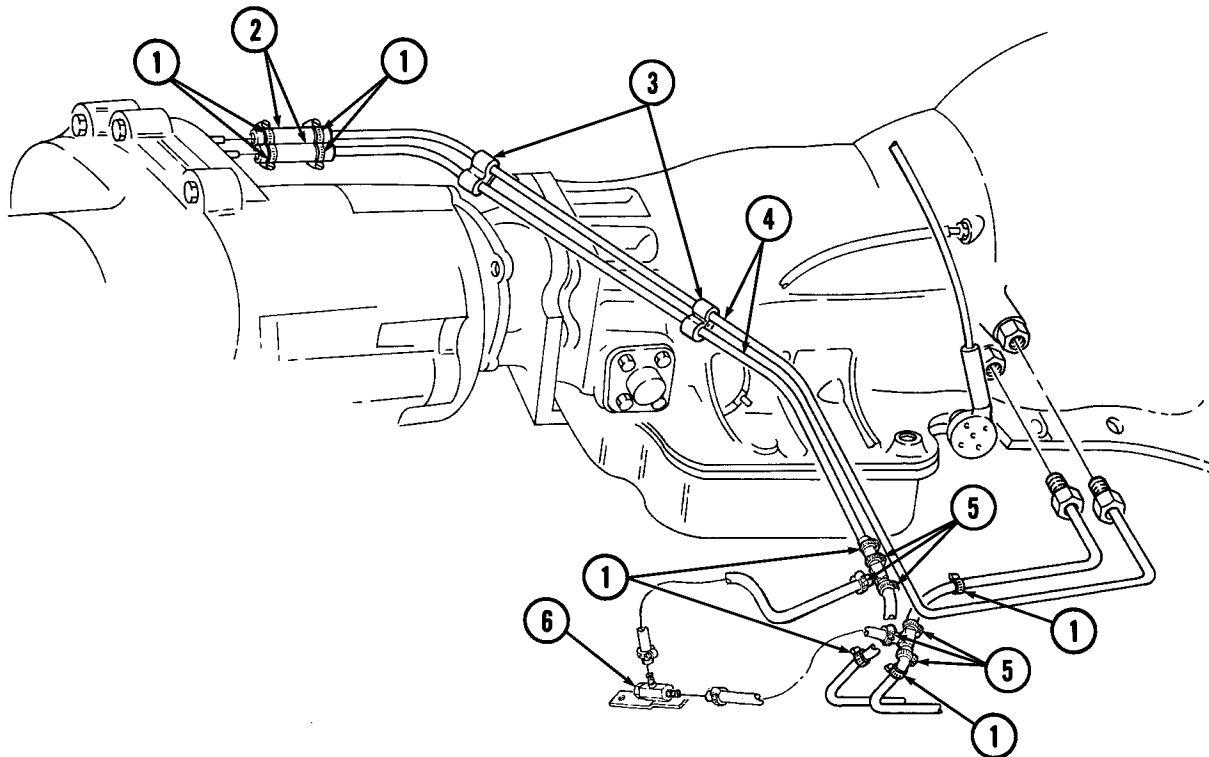
Perform step 3 for M997A2, M1025A2, M1035A2, M1043A2, M1045A2, M1097A2, and M1123 vehicles only.

2. Connect two cooler lines (4) to by-pass valve (6) and hoses (2).
3. Tighten hose clamps (1) on rubber hoses (2) to cooler lines (4).
4. Tighten hose clamps (5) on cooler lines (4).

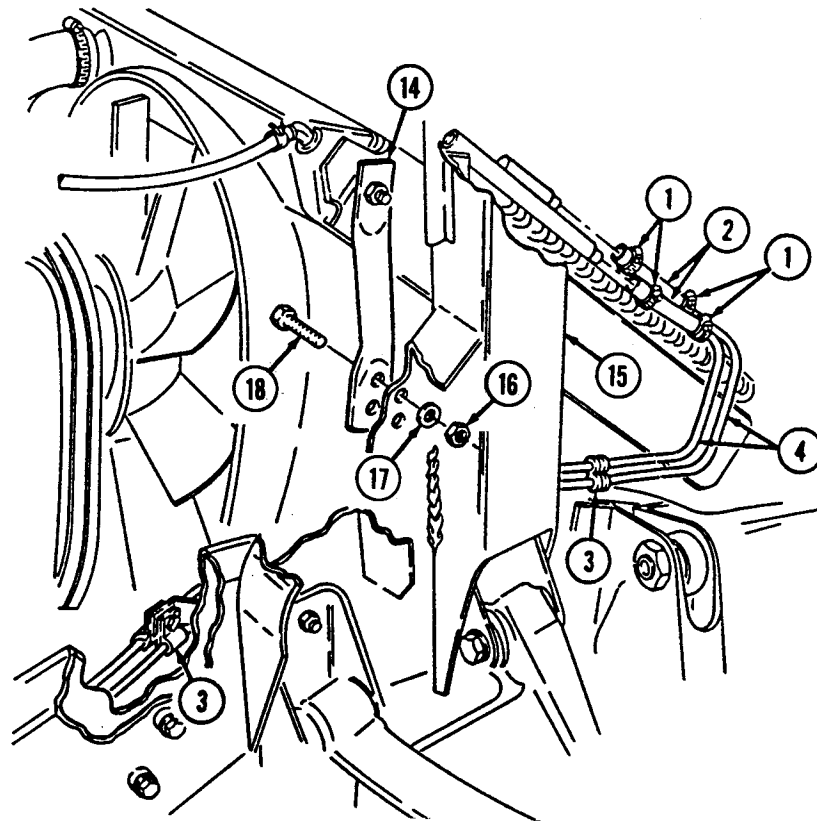
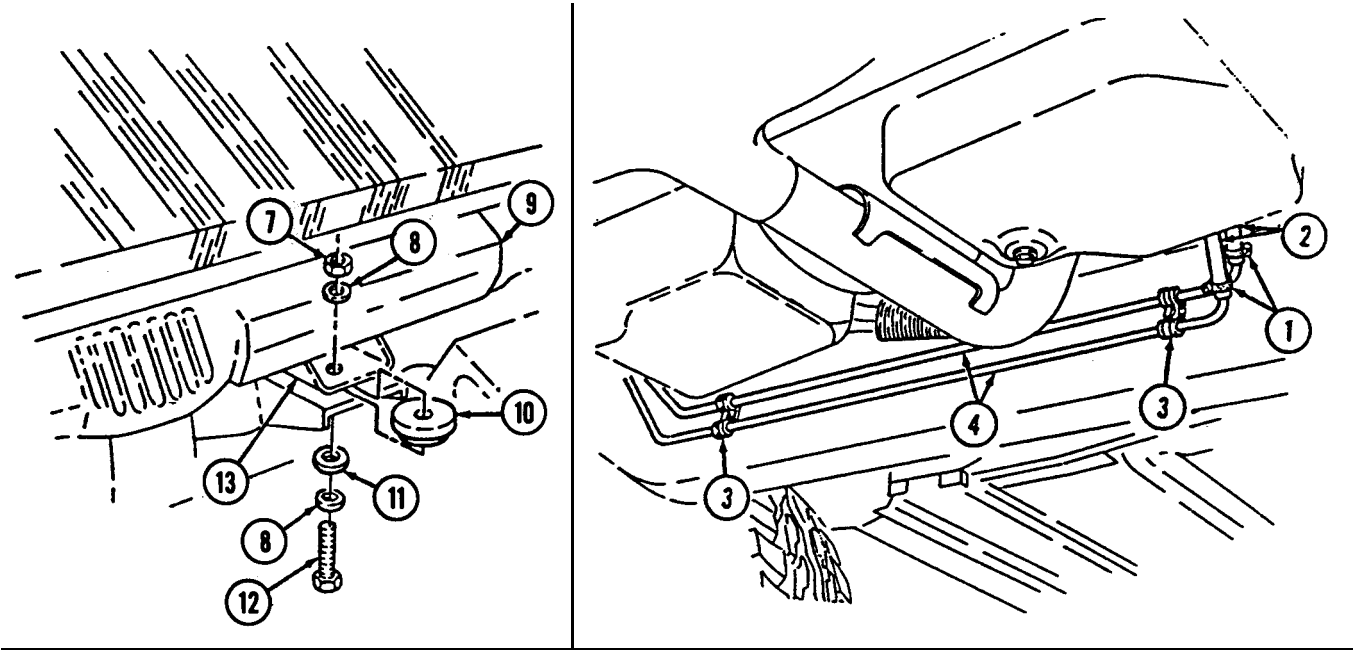
NOTE

Perform steps 5 and 6 only if installing oil cooler lines to oil cooler.

5. Install radiator (9) to front mounting bracket (13) with mount (10), large washer (11), washer (8), capscrew (12), washer (8), and locknut (7). Tighten capscrew (12) to 30 lb-ft (41 N·m).
6. Install radiator supports (14) to airlift brackets (15) with four capscrews (18), washers (17), and locknuts (16). Tighten locknuts (16) to 31 lb-ft (42 N·m).
7. Install retaining clamps (3) on cooler lines (4).



5-3. TRANSMISSION OIL COOLER LINES REPLACEMENT (Cont'd)



- FOLLOW-ON TASKS:**
- Fill transmission to proper level (TM 9-2320-280-10).
 - Start engine (TM 9-2320-280-10) and check for leaks.
 - Install right splash shield, if removed (para 10-20).
 - Install left splash shield access cover, if removed (para. 10-18).

5-4. TRANSMISSION BYPASS VALVE REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M997A2, M1025A2, M1035A2, M1043A2,
M1045A2, M1097A2, M1123

Manual References

TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

General Safety Instructions

Allow transmission to cool before performing this task.

WARNING

Allow transmission to cool before performing this task. Severe injury to personnel may result.

CAUTION

Cover or plug all open lines and connections immediately after disconnection to prevent contamination. Remove all plugs prior to connection.

a. Removal

1. Loosen hose clamps (1) and (8) on rubber hoses (2) and (9).

NOTE

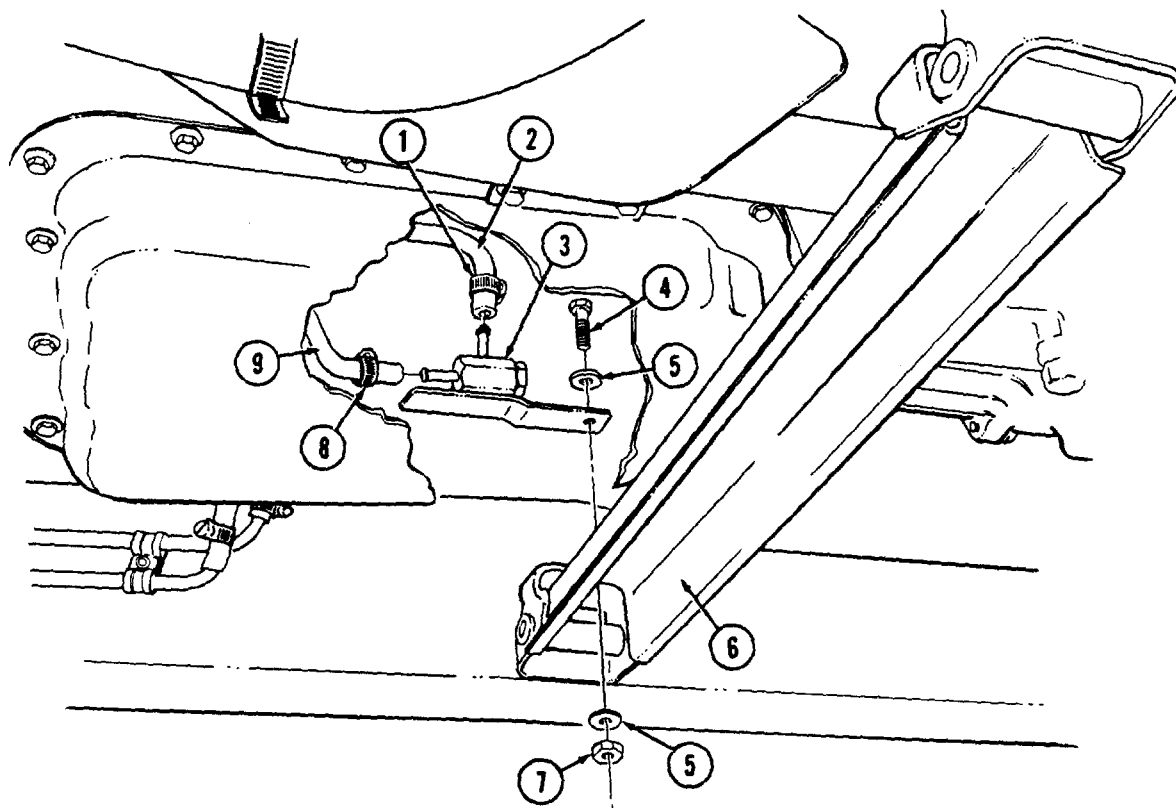
Have drainage container ready to catch fluid.

2. Disconnect rubber hoses (2) and (9) from bypass valve (3).
3. Remove nut (7), washer (5), capscrew (4), washer (5), and bypass valve (3) from transmission crossmember (6).

b. Installation

1. Install bypass valve (3) on transmission crossmember (6) with washer (5), capscrew (4), washer (5), and nut (7). Tighten nut (7) to 28 lb-ft (38 N·m).
2. Connect hoses (2) and (9) to bypass valve (3) and tighten clamps (1) and (8).

5-4. TRANSMISSION BYPASS VALVE REPLACEMENT (Cont'd)



- FOLLOW-ON TASKS:
- Fill transmission to proper level (TM 9-2320-280-10).
 - Start engine (TM 9-2320-280-10) and check for leaks.

5-5. TRANSMISSION OIL DIPSTICK TUBE REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Materials/Parts

Packing (3L80) (Appendix G, Item 224)
Seal (4L80-E) (Appendix G, Item 288)

Equipment Condition

- Hood raised and secured (TM 9-2320-280-10).
- Right exhaust manifold rear heat shield removed (para. 3-54).

NOTE

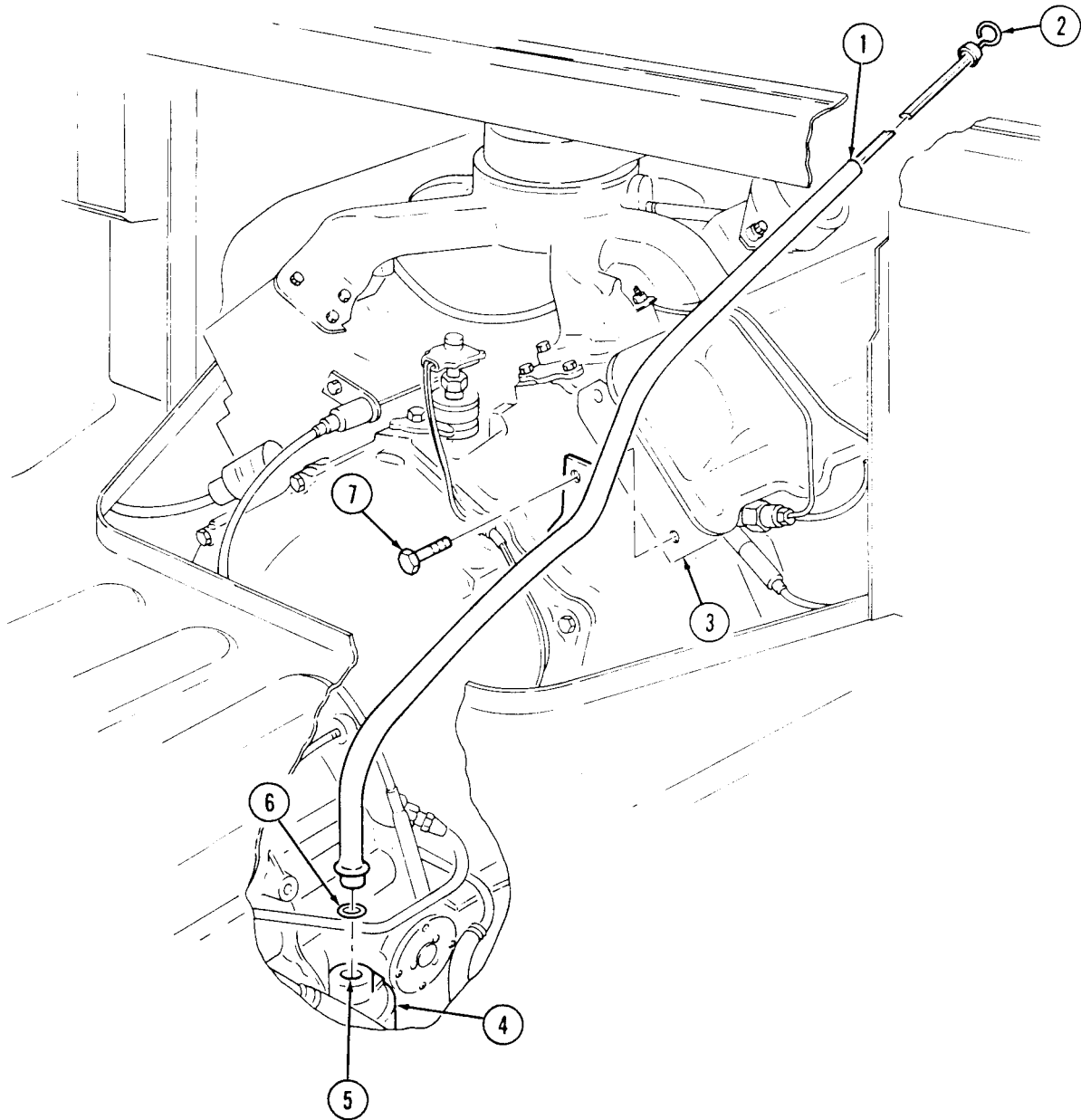
- Plug open transmission port to prevent contamination. Remove plug prior to installation of oil dipstick tube.
- Have drainage container ready to catch fluid.

a. Removal

1. Remove transmission oil dipstick (2) from dipstick tube (1).
2. Remove capscrew (7) from dipstick tube (1) and cylinder head (3).
3. Remove dipstick tube (1) from transmission (4).
4. Remove packing (6) from dipstick tube (1). Discard packing (6).

b. Installation

1. Install packing (6) on dipstick tube (1).
2. Push dipstick tube (1) into opening (5) in transmission (4).
3. Install dipstick tube (1) on cylinder head (3) with capscrew (7). Tighten capscrew (7) to 25-37 lb-ft (34-50 N•m).
4. Install transmission oil dipstick (2) into dipstick tube (1).

5-5. TRANSMISSION OIL DIPSTICK TUBE REPLACEMENT (Cont'd)

- FOLLOW-ON TASKS:**
- Install right exhaust manifold rear heat shield (para. 3-54).
 - Fill transmission to proper level (TM 9-2320-280-10).
 - Lower and secure hood (TM 9-2320-280-10).
 - Start engine (TM 9-2320-280-10) and check for leaks.

5-6. NEUTRAL START SWITCH REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Materials/Parts

Tiedown strap (Appendix G, Item 305)
Sealing compound (Appendix C, Item 44)

Equipment Condition

Shift controls housing removed (para. 5-7 or 5-10).

a. Removal

NOTE

- Prior to removal, tag leads for installation.
- Perform steps 3 through 5 for M997A2, M1025A2, M1035A2, M1043A2, M1045A2, M1097A2, and M1123 vehicles only. Perform steps 1 and 2 for all other vehicles.

1. Remove rubber boot (4) from shift control housing assembly (1).
2. Remove neutral start switch (2) from shift control housing assembly (1).
3. Remove boot (10) from shift controls housing (6).
4. Remove two screws (8) and neutral start switch (7) from housing (6).
5. Remove tiedown strap (11) and neutral start switch leads (9) from backup light switch leads (12). Discard tiedown strap (11).

b. Installation

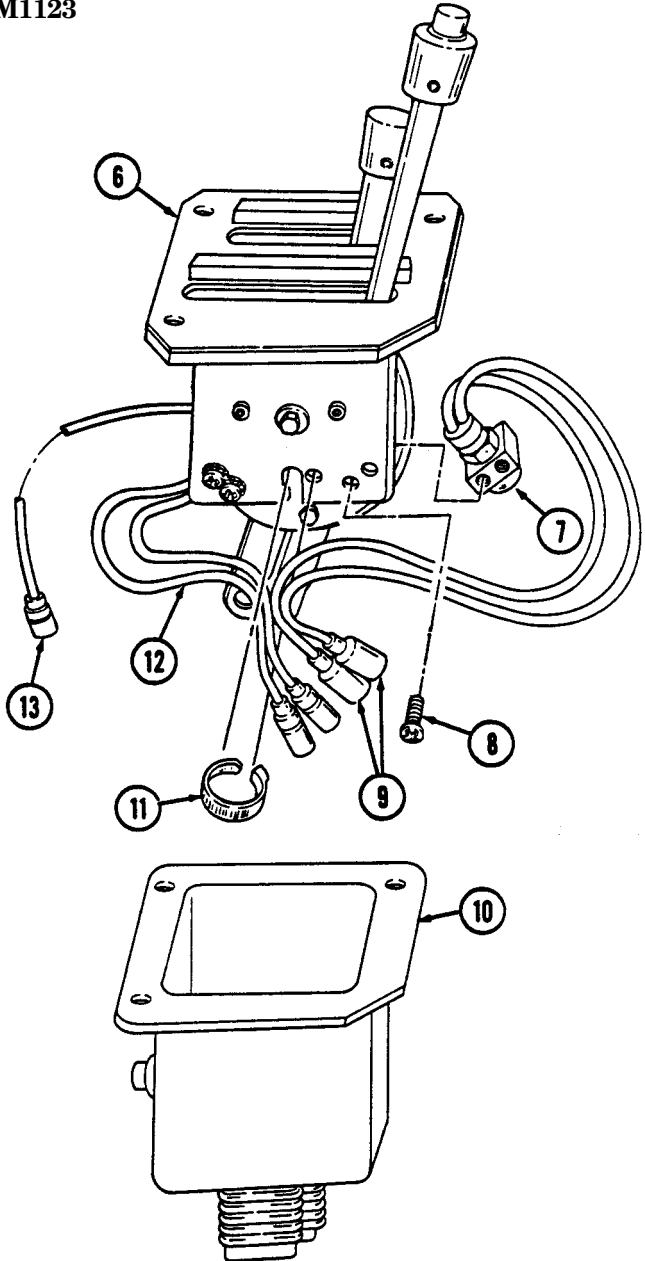
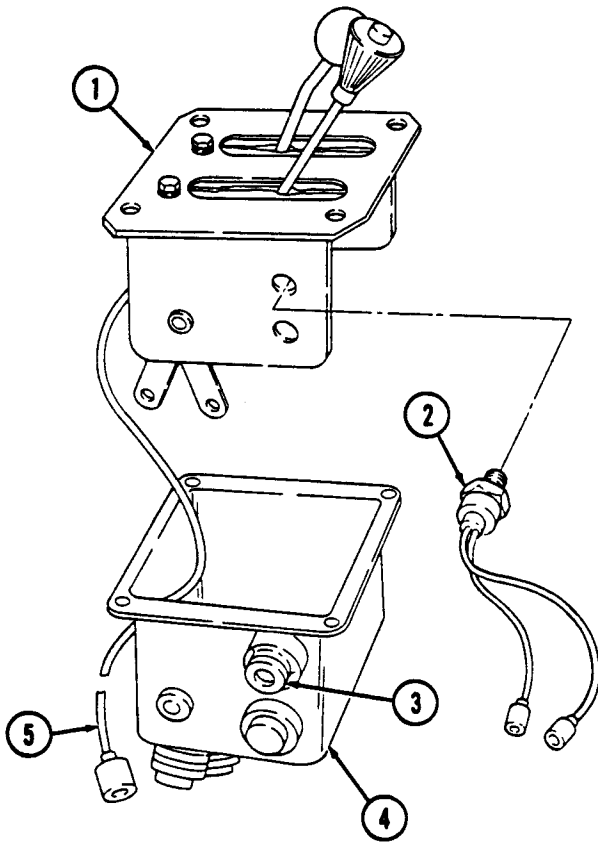
NOTE

Perform steps 1 through 3 for M997A2, M1025A2, M1035A2, M1043A2, M1045A2, M1097A2, and M1123 vehicles only. Perform steps 4 and 5 for all other vehicles.

1. Install neutral start switch (7) on shift control housing (6) with two screws (8).
2. Install neutral start switch leads (9) on backup light switch leads (12) with tiedown strap (11).
3. Position neutral start switch leads (9), backup light switch leads (12), and light lead (13) through boot (10), and install boot (10) on housing (6).
4. Apply sealing compound to threads of neutral switch (2), install neutral switch into shift control housing assembly (1). Tighten neutral start switch (2) to 27-30 lb-ft (37-42 N•m).
5. Install leads from neutral start switch (2) and shift selector indicator lead (5) through nipples (3) on rubber boot (4) and install rubber boot (4) on shift control housing assembly (1).

5-6. NEUTRAL START SWITCH REPLACEMENT (Cont'd)

M997A2, M1025A2, M1035A2,
M1043A2, M1045A2, M1097A2,
M1123



- FOLLOW-ON TASKS:**
- Install shift controls housing (para. 5-7 or 5-10).
 - Check neutral start switch for proper operation (TM 9-2320-280-10).

5-7. SHIFT CONTROLS HOUSING ASSEMBLY (SF-5583581) REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

All vehicles except: M997A2, M1025A2, M1035A2, M1043A2, M1045A2, M1097A2, M1123

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Two cotter pins (Appendix G, Item 12)
Four locknuts (Appendix G, Item 70)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Personnel Required

One mechanic
One assistant

Equipment Condition

Battery ground cables disconnected (para. 4-73).

Maintenance Level

Unit

a. Removal

NOTE

If shift controls housing assembly is to be reinstalled, tape trunnions to shift rod to prevent loss of adjustment. Transfer case shift rod trunnion is removed from shift rod only if damaged or shift rods are replaced.

1. Remove cotter pin (5), washer (6), trunnion (9), and rub strip (8) from transmission shift lever arm (10). Discard cotter pin (5).
2. Remove cotter pin (2), washer (3), trunnion (4), and rub strip (7) from transfer case shift arm (1). Discard cotter pin (2).

NOTE

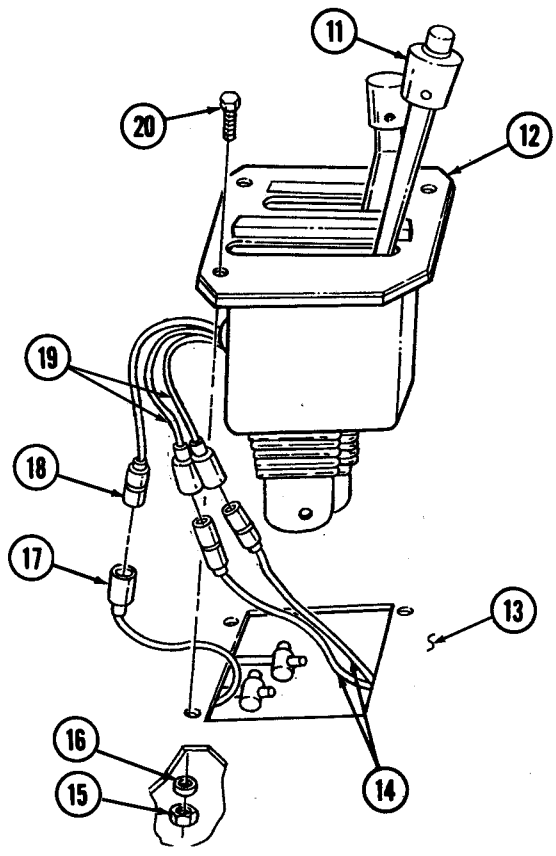
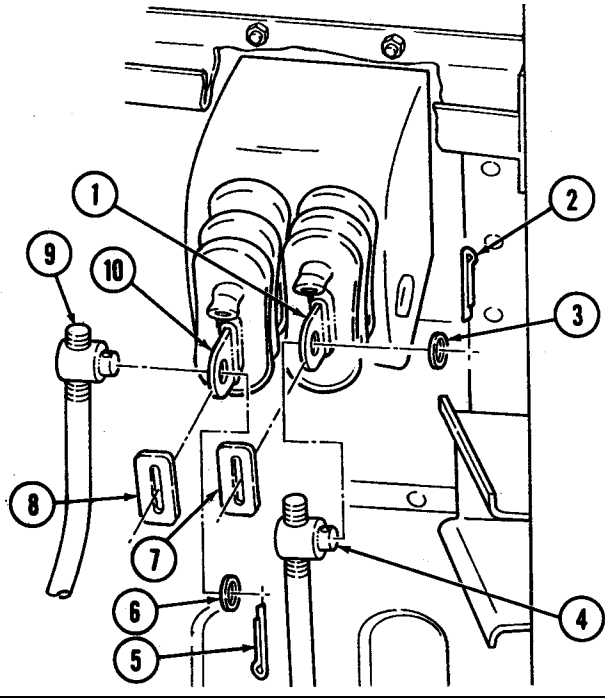
Tag leads for installation.

3. Disconnect two body harness leads 14A/14B (14) from neutral start switch leads 14 (19).
4. Disconnect body harness lead (17) from shift selector indicator lead 17J (18).
5. Remove four locknuts (15), washers (16), capscrews (20), and shift controls housing assembly (12) from body (13). Discard locknuts (15).

b. Installation

1. Position shift controls housing assembly (12) in body (13) with transmission lever (11) on right, and install with four capscrews (20), washers (16), and locknuts (15). Tighten locknuts (15) to 6 lb-ft (8 N•m).
2. Connect two body harness leads 14A/14B (14) to neutral start switch leads 14 (19).
3. Connect body harness lead (17) to shift selector indicator lead 17J (18).
4. Install rub strip (7) and trunnion (4) on transfer case shift arm (1) with washer (3) and cotter pin (2).
5. Install rub strip (8) and trunnion (9) on transmission shift lever arm (10) with washer (6) and cotter pin (5).

5-7. SHIFT CONTROLS HOUSING ASSEMBLY (SF-5583581) REPLACEMENT (Cont'd)



- FOLLOW-ON TASKS:**
- Connect battery ground cables (para. 4-73).
 - Start engine (TM 9-2320-280-10), check shift controls for proper operation, and adjust as needed (paras. 5-12 and 5-23).

5-8. SHIFT CONTROLS HOUSING ASSEMBLY (SF-5583581) MAINTENANCE

This task covers:

a. Disassembly

b. Assembly

INITIAL SETUP:

Applicable Models

All vehicles except: M997A2, M1025A2, M1035A2, M1043A2, M1045A2, M1097A2, M1123

Manual References

TM 9-2320-280-24P

Equipment Condition

Shift controls housing assembly removed (para. 5-7).

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

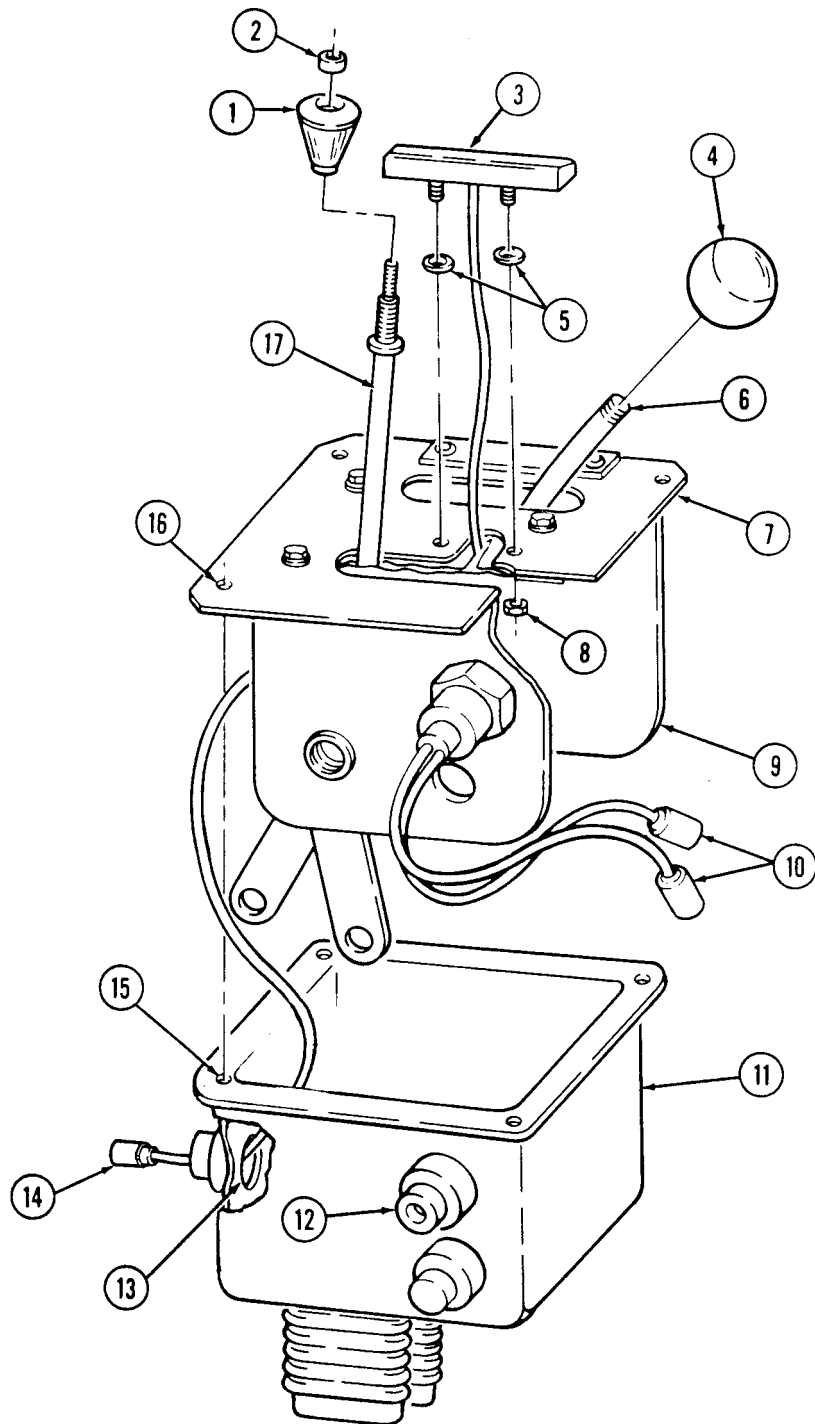
a. Disassembly

1. Remove knob (4) from transfer shift tube (6).
2. Remove button (2) from transmission shift knob (1).
3. Remove knob (1) from transmission shift tube (17).
4. Remove neutral start switch leads (10) from openings (12) in boot (11).
5. Slide rubber boot (11) off shift controls housing assembly (9).
6. Remove two nuts (8), washers (5), and shift selector indicator (3) from bezel (7).

b. Assembly

1. Install shift selector indicator (3) and two washers (5) on bezel (7) with two nuts (8).
2. Install rubber boot (11) on shift controls housing assembly (9), placing neutral start switch leads (10) through openings (12) in boot (11).
3. Place shift indicator lead (14) through opening (13) in boot (11).
4. Slide rubber boot (11) onto shift controls housing assembly (9). Ensure that mounting screw holes (16) in shift control housing assembly (9) align with holes (15) in boot (11).
5. Install knob (1) on transmission shift tube (17).
6. Install button (2) on transmission shift knob (1).
7. Install knob (4) on transfer shift tube (6).

5-8. SHIFT CONTROLS HOUSING ASSEMBLY (SF-5583581) MAINTENANCE (Cont'd)



FOLLOW-ON TASK: Install shift control housing assembly (para. 5-7).

5-9. SHIFT CONTROLS HOUSING ASSEMBLY (SF-5583581) REPAIR

This task covers:

- | | |
|---|--|
| <ul style="list-style-type: none"> a. Disassembly b. Cleaning | <ul style="list-style-type: none"> c. Inspection d. Assembly |
|---|--|

INITIAL SETUP:

Applicable Models

All vehicles except: M997A2, M1025A2, M1035A2, M1043A2, M1045A2, M1097A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Spring pin (Appendix G, Item 299)
Retaining ring (Appendix G, Item 232)

Materials/Parts (Cont'd)

Three locknuts (Appendix G, Item 70)
Sealing compound (Appendix C, Item 44)

Manual References

TM 9-2320-280-24P

Equipment Condition

Shift controls housing assembly disassembled (para. 5-8).

a. Disassembly

1. Remove retaining ring (12) from shift control shaft (23) and shift controls housing (7). Discard retaining ring (12).
2. Remove spring pin (16) from spring retaining collar (15) and shift control shaft (23). Discard spring pin (16).
3. Remove shift control shaft (23), spring retaining collar (15), and shift control compression spring (17) from shift controls housing (7).
4. Remove transfer shift lever (10) by sliding down and out from shift controls housing (7).
5. Remove two nylon flanged bearings (13) from transfer shift lever arm (14).
6. Remove spring pin (11) from transfer shift lever arm (14) and remove transfer shift lever (10) from transfer shift lever arm (14).
7. Remove transmission shift tube (28) by sliding down and out from shift controls housing (7).

NOTE

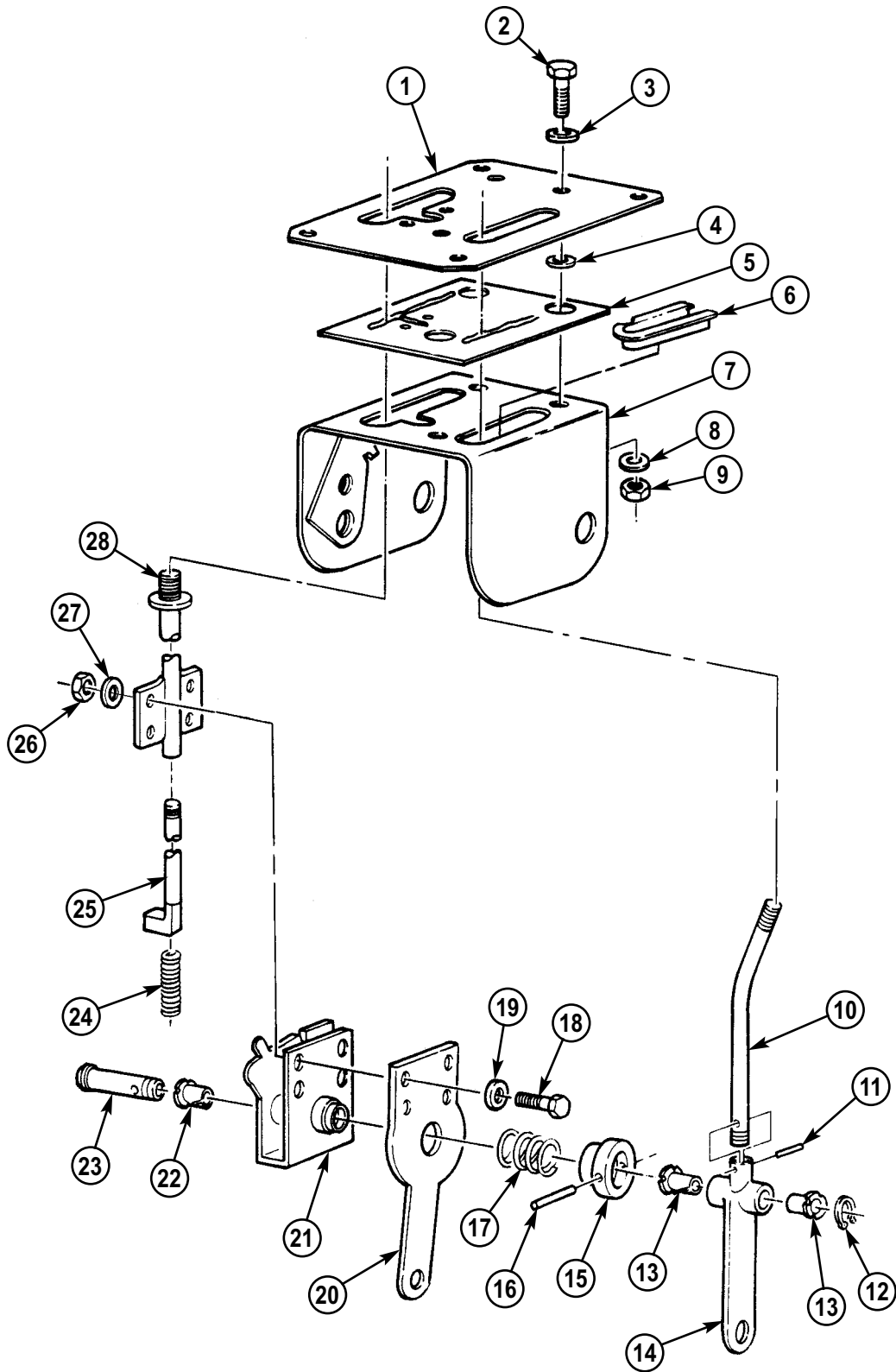
Note position of transmission shift lever for installation.

8. Remove four nuts (26), washers (27), capscrews (18), washers (19), transmission shift tube (28), shift lever latch spring (24), and transmission shift lever (20) from bracket and shaft assembly (21).
9. Remove nylon flanged bearing (22) from bracket and shaft assembly (21).
10. Remove shift lever latch rod (25) by sliding out from transmission shift tube (28).
11. Remove three locknuts (9), washers (8), capscrews (2), washers (3), and bezel (1) from wiper (5) and shift controls housing (7). Discard three locknuts (9).
12. Remove three washers (4) and wiper (5) from shift controls housing (7).
13. Remove bearing (6) from shift controls housing (7).

b. Cleaning

1. Clean all shift control housing assembly parts in accordance with para. 2-10.

5-9. SHIFT CONTROLS HOUSING ASSEMBLY (SF-5583581) REPAIR (Cont'd)



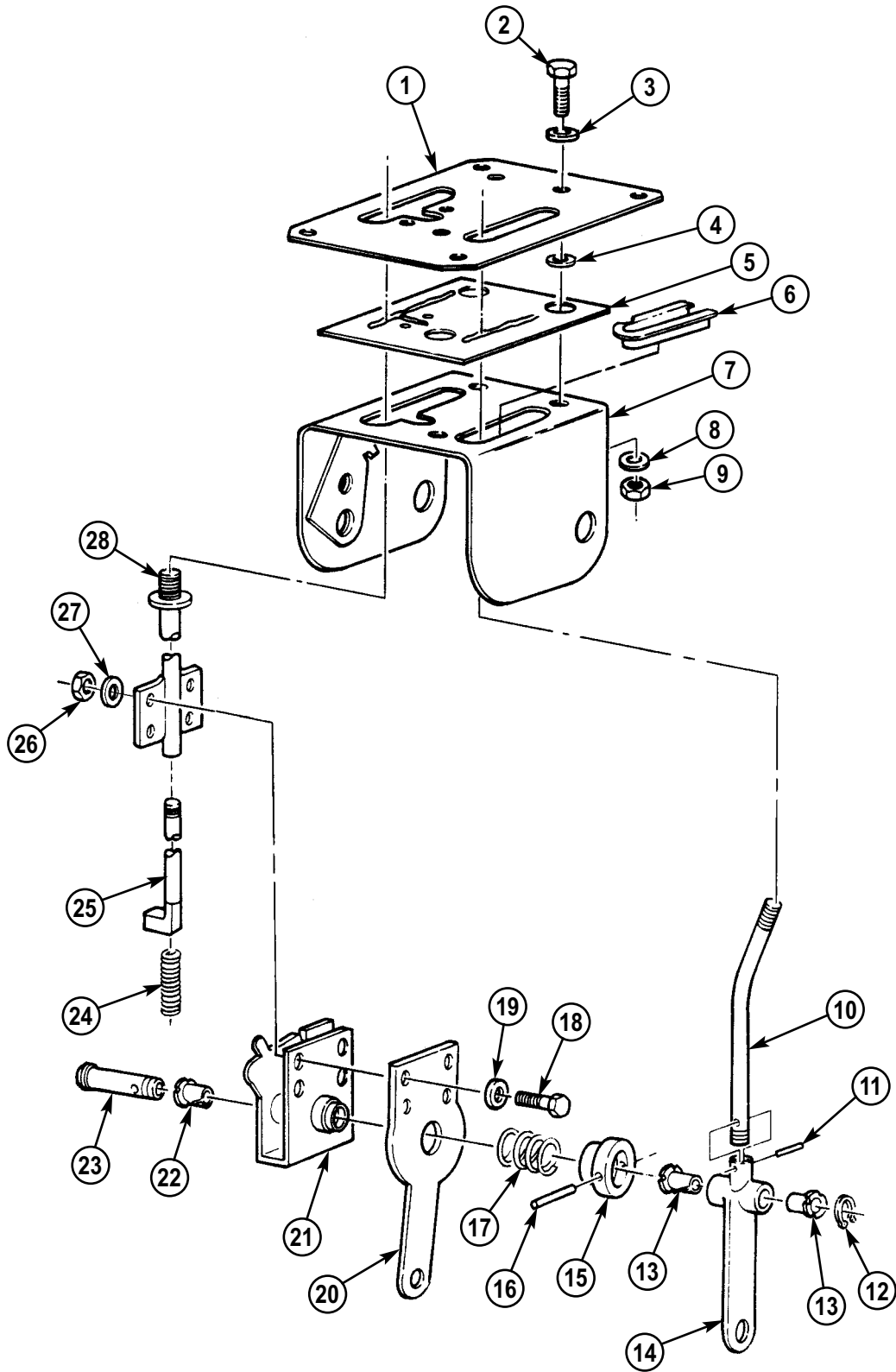
5-9. SHIFT CONTROLS HOUSING ASSEMBLY (SF-5583581) REPAIR (Cont'd)**c. Inspection**

1. Inspect shift controls housing (7) for damage. Replace shift controls housing assembly if damaged.
2. Inspect transmission shift tube (28), bracket and shaft assembly (21), transmission shift lever (20), bezel (1), and shift lever latch rod (25) for damage. Replace if damaged.
3. Inspect wiper (5) for tears. Replace if torn.
4. Inspect shift lever latch spring (24) and shift control compression spring (17) for distortion or damage. Replace if distorted or damaged.
5. Inspect nylon flanged bearings (22) and (13) for damage. Replace if damaged.
6. Inspect shift control shaft (23), spring retaining collar (15) and shift lever (14) for damage. Replace if damaged.

d. Assembly

1. Install bearing (6) in shift controls housing (7).
2. Apply thin coat of adhesive between shift controls housing assembly (7) and wiper (5).
3. Position wiper (5) and three washers (4) on shift controls housing (7).
4. Install bezel (1) on shift controls housing (7) with three washers (3), capscrews (2), washers (8), and locknuts (9).
5. Install shift lever latch rod (25) by pushing up into transmission shift tube (28).
6. Position transmission shift lever (20), shift lever latch spring (24), and transmission shift tube (28) to bracket and shaft assembly (21) and secure with four washers (19), capscrews (18), washers (27), and nuts (26).
7. Install transmission shift tube (28) by pushing up through shift controls housing (7) and install nylon flanged bearing (22) into bracket and shaft assembly (21).
8. Install transfer shift lever (10) in transfer shift lever arm (14) with spring pin (11).
9. Install transfer shift lever (10) by pushing up through shift controls housing (7) and install two nylon flanged bearings (13) in transfer shift lever arm (14).
10. Position shift control compression spring (17) and spring retaining collar (15) into shift controls housing (7).
11. Install shift control shaft (23) through shift controls housing (7), bracket and shaft assembly (21), compression spring (17), spring retaining collar (15), transfer shift lever arm (14), and out of shift controls housing (7).
12. Secure shift control shaft (23) in shift controls housing (7) with retaining ring (12).
13. Secure spring retaining collar (15) on shift control shaft (23) with spring pin (16).

5-9. SHIFT CONTROLS HOUSING ASSEMBLY (SF-5583581) REPAIR (Cont'd)



FOLLOW-ON TASK: Assemble shift controls housing assembly (para 5-8).

5-10. SHIFT CONTROLS HOUSING ASSEMBLY (12460111/12460112) REPLACEMENT (4L80-E)

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M997A2, M1025A2, M1035A2, M1043A2, M1045A2, M1097A2, M1123

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Personnel Required

One mechanic
One assistant

Materials/Parts

Two cotter pins (Appendix G, Item 12)
Four locknuts (Appendix G, Item 70)

Equipment Condition

Battery ground cable disconnected (para. 4-73).

a. Removal

NOTE

If shift controls housing assembly is to be reinstalled, tape trunnions to shift rods to prevent loss of adjustment. Shift rod trunnions are removed from shift rods only if damaged or shift rods are replaced.

1. Remove cotter pin (5), washer (6), trunnion (7), and rub strip (6.1) from transmission shift lever arm (8). Discard cotter pin (5).
2. Remove cotter pin (2), washer (3), trunnion (4), and rub strip (3.1) from transfer case shift arm (1). Discard cotter pin (2).

NOTE

- Tag leads for installation.
- Perform step 3 for M997A2 and M1035A2 only.

3. Disconnect two body harness leads (12) from backup light switch leads (11).
4. Disconnect two body harness leads 14A/14B (14) from neutral start switch leads 14 (19).
5. Disconnect body harness lead (17) from shift selector indicator lead 17J (18).
6. Remove four locknuts (15), washers (16), capscrews (9), and shift controls housing assembly (10) from body (13). Discard locknuts (15).
7. Slide boot (20) off shift controls housing assembly (10).

b. Installation

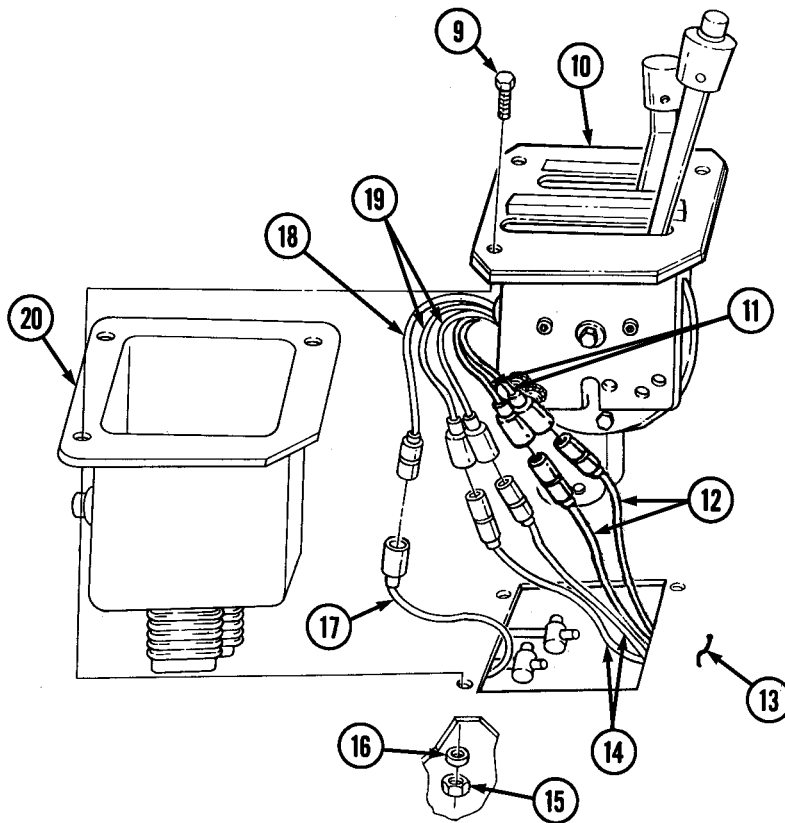
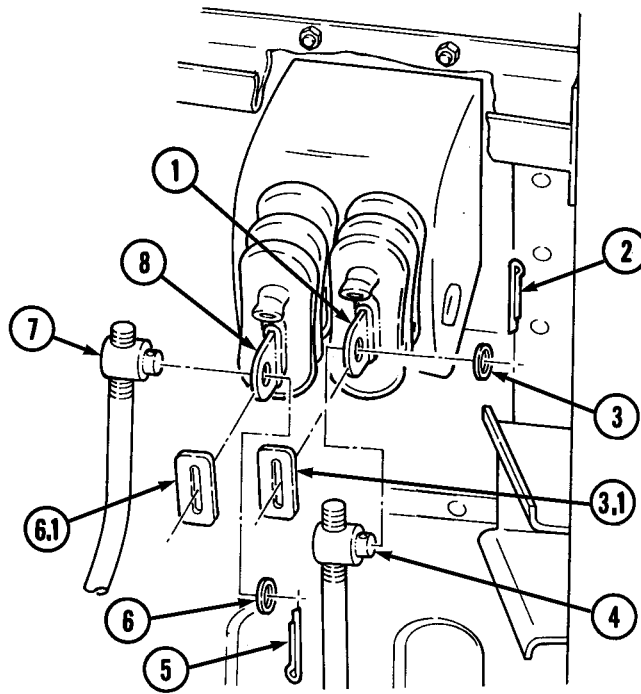
1. Slide boot (20) onto shift controls housing assembly (10).
2. Position shift controls housing assembly (10) in body (13) with transmission lever on right and install with four capscrews (9), washers (16), and locknuts (15). Tighten locknuts (15) to 6 lb-ft (8 N•m).

NOTE

Perform step 3 for M997A2 and M1035A2 only.

3. Connect two body harness leads (12) to backup light switch leads (11).
4. Connect two body harness leads 14A/14B (14) to neutral start switch leads 14 (19).
5. Connect body harness lead (17) to shift selector indicator lead 17J (18).
6. Install rub strip (3.1) and trunnion (4) on transfer case shift arm (1) with washer (3) and cotter pin (2).
7. Install rub strip (6.1) and trunnion (7) on transmission shift lever arm (8) with washer (6) and cotter pin (5).

**5-10. SHIFT CONTROLS HOUSING ASSEMBLY (12460111/12460112) REPLACEMENT
(4L80-E) (Cont'd)**



- FOLLOW-ON-TASKS:**
- Connect battery ground cable (para. 4-73).
 - Start engine (TM 9-2320-280-10), check shift controls for proper operation, and adjust as needed (paras. 5-13 and 5-23).

5-11. SHIFT CONTROLS HOUSING ASSEMBLY (12460111/12460112) MAINTENANCE

This task covers:

a. Disassembly

b. Assembly

INITIAL SETUP:

Applicable Models

M997A2, M1025A2, M1035A2, M1043A2,
M1045A2, M1097A2, M1123

Materials/Parts

Heat shrink (Appendix D, Fig. D-1)
Tiedown strap (Appendix G, Item 305)

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-24P

Equipment Condition

Shift controls housing assembly removed (para. 5-10).

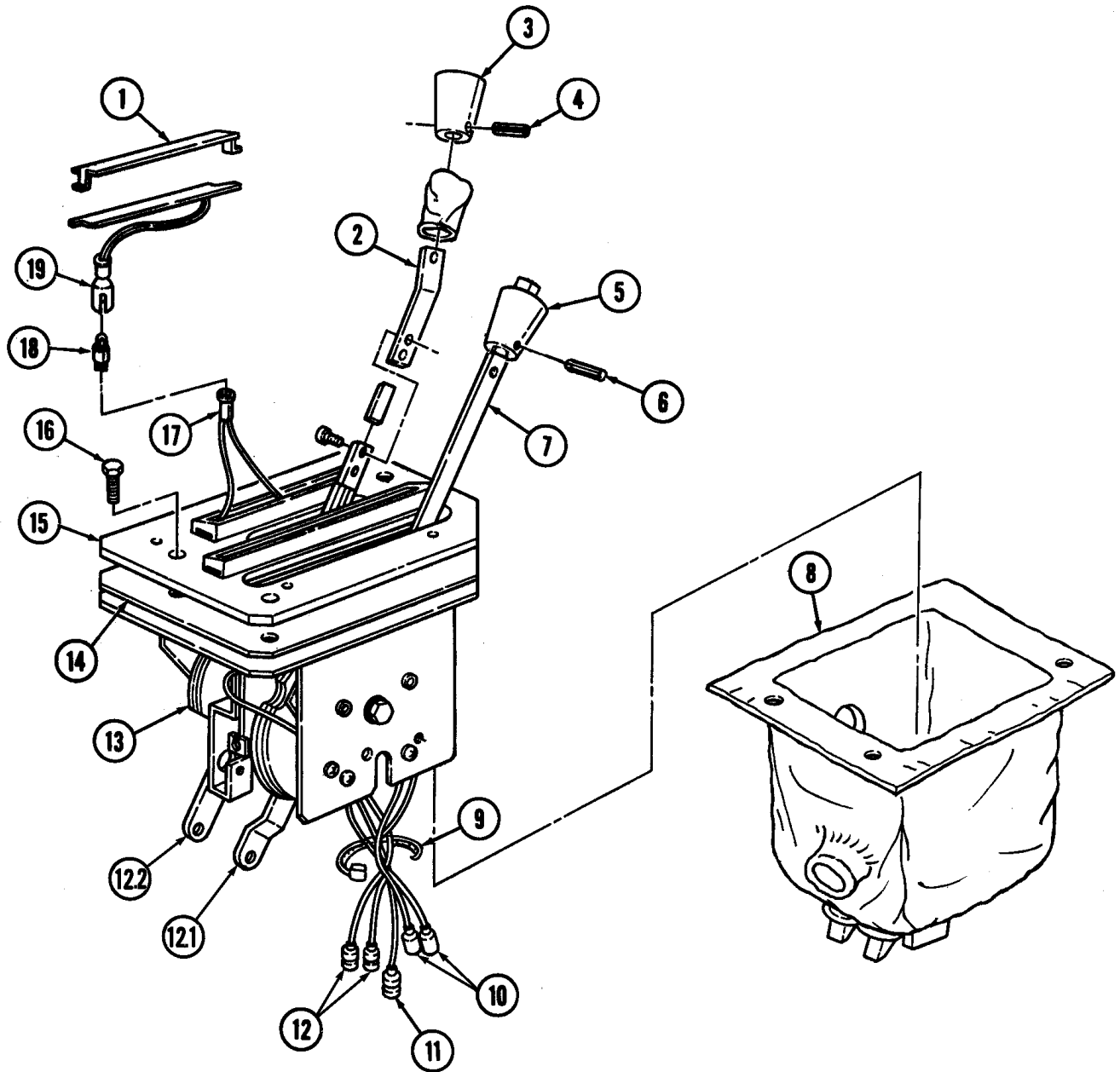
a. Disassembly

1. Remove pin (4) and knob (3) from transfer case shift tube (2).
2. Remove pin (6) and knob (5) from transmission shift tube (7).
3. Remove neutral start and backup switch leads (10) and (12) from openings in boot (8).
4. Remove shift indicator lead (11) from opening in boot (8).
5. Slide boot (8) off shift controls housing assembly (13).
6. Remove two transmission selector lens covers (1).
7. Remove two fiber optic indicator strips (19) from bulbs (18).
8. Remove two bulbs (18) from sockets (17).
9. Remove four screws (16), cover plate (15), and gasket (14) from shift controls housing assembly (13).
10. Remove tiedown strap (9) from leads (10), (12), and (11). Discard strap (9).

b. Assembly

1. Install gasket (14) and cover plate (15) on shift controls housing assembly (13) with four screws (16).
2. Install two bulbs (18) in sockets (17).
3. Install two fiber optic indicator strips (19) on bulbs (18).
4. Install two transmission selector lens covers (1).
- 4.1. Apply heat shrink to transmission shift lever arm (12.1) and transfer shift arm (12.2) if not already installed.
5. Install boot (8) on shift controls housing assembly (13), placing neutral start, backup light switch, and shift indicator leads (10), (12), and (11) through openings in boot (8).
6. Complete sliding boot (8) onto shift controls housing assembly (13), ensuring mounting screw holes align.
7. Install knob (5) on transmission shift tube (7) with pin (6).
8. Install knob (3) on transfer case shift tube (2) with pin (4).
9. Install tiedown strap (9) on leads (10), (11), and (12).

5-11. SHIFT CONTROLS HOUSING ASSEMBLY (12460111/12460112) MAINTENANCE (Cont'd)



FOLLOW-ON TASK: Install shift control housing assembly (para. 5-10).

5-12. TRANSMISSION SHIFT ROD MAINTENANCE (3L80)

This task covers:

- | | |
|---|---|
| <ul style="list-style-type: none"> a. Removal b. Installation | <ul style="list-style-type: none"> c. Adjustment |
|---|---|

INITIAL SETUP:

Applicable Models

All vehicles except: M997A2, M1025A2, M1035A2, M1043A2, M1045A2, M1097A2, M1123

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Two cotter pins (Appendix G, Item 12)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

a. Removal

1. Place transmission shift lever arm (7) to "N" (neutral) position.
2. Remove cotter pin (9) and washer (8) from shift rod trunnion (6) and shift lever arm (7). Discard cotter pin (9).
3. Remove cotter pin (1) and washer (2) from shift rod trunnion (4) and transmission selector lever (3) and disconnect shift rod (5). Discard cotter pin (1).
4. Remove shift rod trunnion (6) from shift rod (5).

b. Installation

1. Install shift rod trunnion (6) to shift rod (5).
2. Connect shift rod trunnion (4) to transmission selector lever (3) with washer (2) and cotter pin (1).
3. Adjust shift rod (para. c).

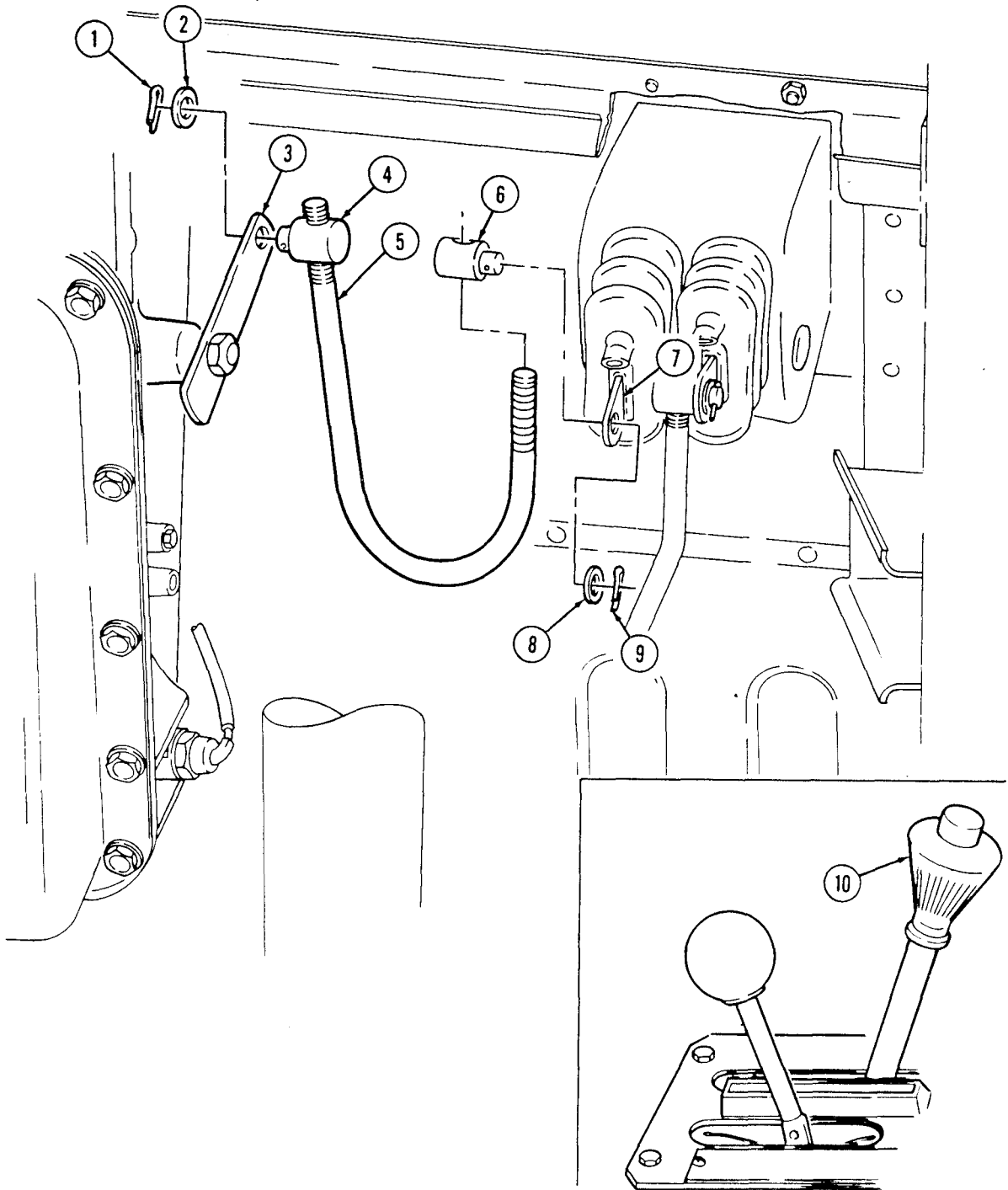
c. Adjustment

CAUTION

If the manual control linkage arm is not in the proper detent for each transmission selector lever position, transmission will be damaged.

1. Move shifter (10) into "1" position and ensure transmission selector lever (3) is in the forward position, "1".
2. Turn shift rod trunnion (6) so that it slips easily into hole in the shift lever arm (7).
3. Secure shift rod (5) and trunnion (6) to shift lever arm (7) with washer (8) and cotter pin (9).

5-12. TRANSMISSION SHIFT ROD MAINTENANCE (3L80) Cont'd



FOLLOW-ON TASK: Operate vehicle (TM 9-2320-280-10) and test transmission shift lever for proper operation

5-13. TRANSMISSION SHIFT ROD MAINTENANCE (4L80-E)

This task covers:

- | | |
|---|---|
| <ul style="list-style-type: none"> a. Removal b. Installation | <ul style="list-style-type: none"> c. Adjustment |
|---|---|

INITIAL SETUP:

Applicable Models

M997A2, M1025A2, M1035A2, M1043A2, M1045A2, M1097A2

Materials/Parts

Four cotter pins (Appendix G, Item 12)

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

a. Removal

1. Place transmission shift lever (7) in neutral.
2. Remove cotter pin (5), washer (6), and trunnion (3) from shift arm (4). Discard cotter pin (5).
3. Remove cotter pin (13) and washer (12) from rear trunnion (9). Remove trunnion (9) and shift rod (8) from relay lever (11). Discard cotter pin (13).

NOTE

Mark positions of trunnions on shift rod for installation.

4. Remove cotter pins (2) and (10) and trunnion (9) from shift rod (8). Discard cotter pins (2) and (10).

b. Installation

1. Install trunnion (9) on shift rod (8) on position marked with cotter pins (2) and (10).
2. Install trunnion (9) on relay lever (11) with washer (12) and cotter pin (13). Do not spread cotter pin (13).
3. Install trunnion (3) on shift arm (4) with washer (6) and cotter pin (5). Do not spread cotter pin (5).
4. Check shift rod (8) adjustment (para. c).

c. Adjustment

CAUTION

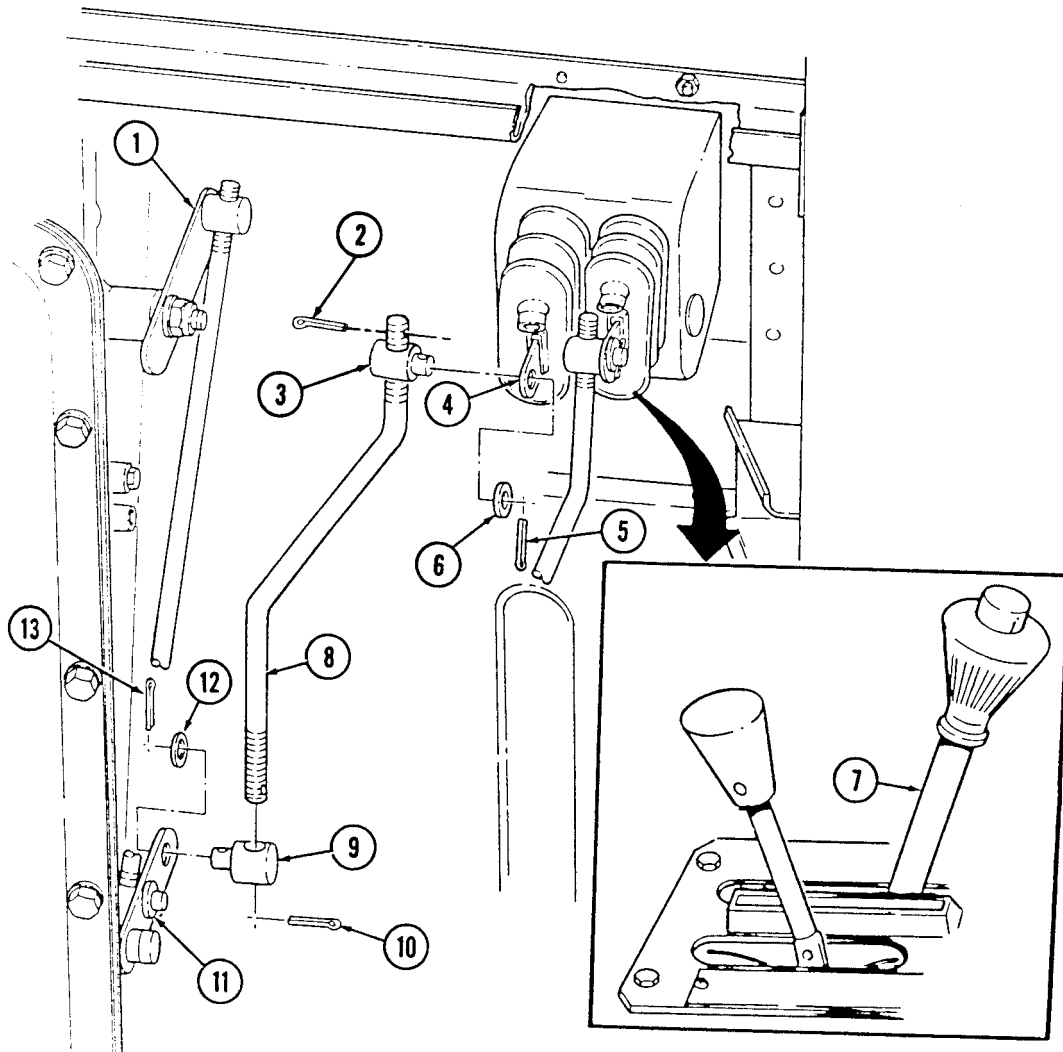
If the manual control linkage is not in proper detent for selector lever position, transmission will be damaged.

NOTE

Proper adjustment makes end of shift rod movement parallel to relay lever movement.

1. Move shifter (7) to "1" position and ensure lever (1) is in forward detent position "1" or LOW. If not, remove cotter pin (5) and washer (6). Turn trunnion (3) until trunnion (3) aligns with shift arm (4).
2. To align shift rod (8), turn trunnion (3) in one direction and trunnion (9) same amount in opposite direction.
3. When adjustment is correct spread both cotter pins (5) and (13).

5-13. TRANSMISSION SHIFT ROD MAINTENANCE (4L80-E) (Cont'd)



FOLLOW-ON TASK: Operate vehicle (TM 9-2320-280-10) and test transmission shift lever for proper operation.

5-14. MODULATOR ASSEMBLY REPLACEMENT (3L80)

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

All vehicles except: M997A2, M1025A2, M1035A2, M1043A2, M1045A2, M1097A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Packing retainer (Appendix G, Item 230)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

- Hood raised and secured (TM 9-2320-280-10).
- Engine access cover removed (para. 10-15).

General Safety Instructions

Allow transmission to cool before performing this task.

a. Removal

WARNING

Allow transmission to cool before performing this task. Failure to do this may cause injury.

1. Pull off cable clip (6) from modulator control rod head (3).
2. Loosen mounting nuts (8) and (4) on cable bracket (1) and remove cable (7) and washer (5) from bracket (1).
3. Underneath vehicle, remove capscrew (11) and modulator retaining clip (12) from transmission (13).

NOTE

Have drainage container ready to catch fluid.

4. Remove modulator (10) and packing retainer (14) from transmission (13). Discard packing retainer (14).

b. Installation

1. Install packing retainer (14) on modulator (10) and install modulator (10) in transmission (13).
2. Install modulator retaining clip (12) on transmission (13) with capscrew (11). Tighten capscrew (11) to 18 lb-ft (24 N•m).

NOTE

Do not tighten mounting nuts.

3. Position modulator cable (7) through cable bracket (1) and install washer (5) and start mounting nut (4).

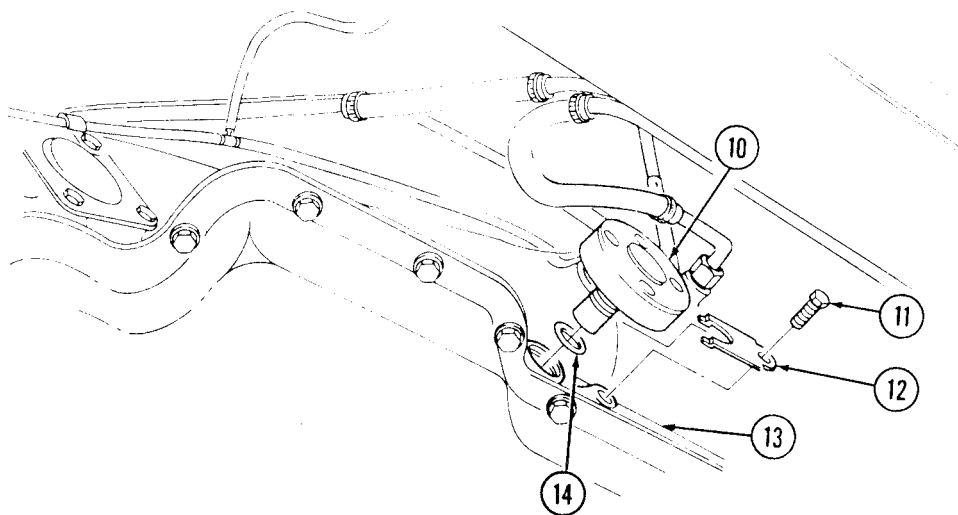
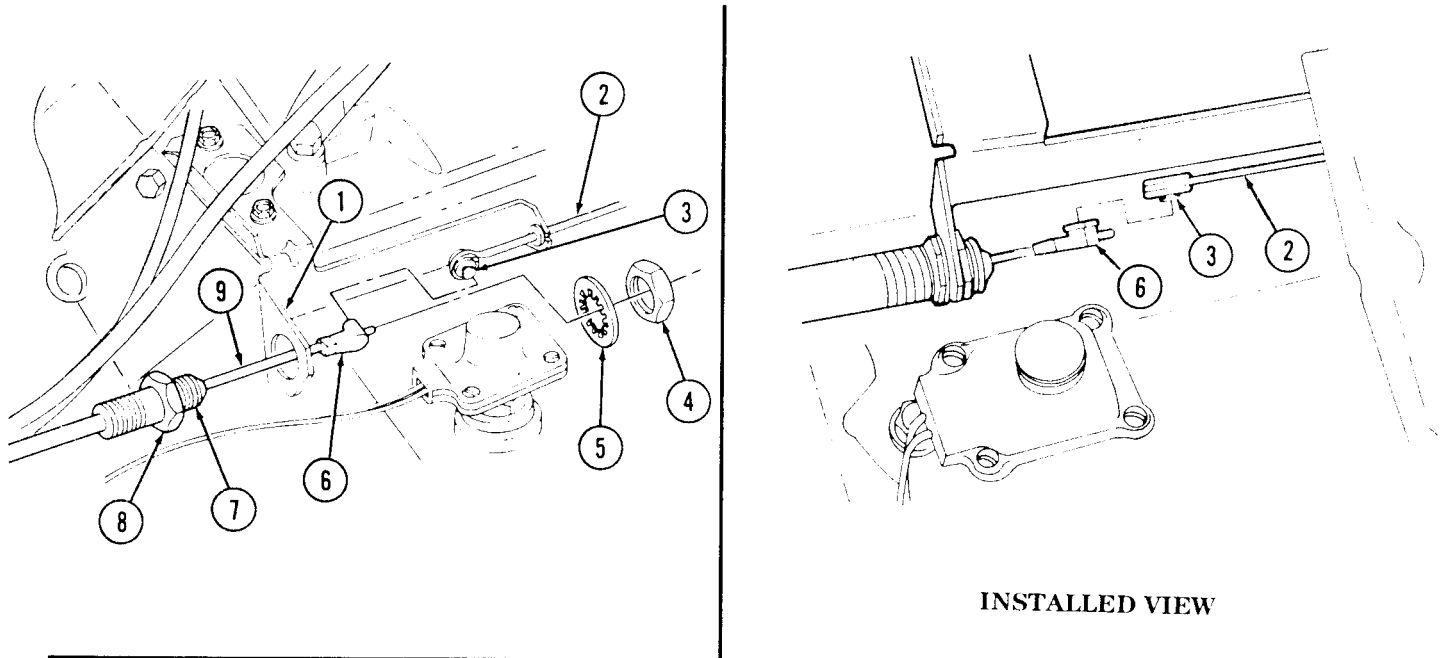
CAUTION

Ensure cable is clear of exhaust system or other sources of extreme heat to prevent damage to equipment.

4. Pull modulator control rod (2) to the rear until stop is engaged and hold in position.
5. With modulator cable core (9) in idle position (cable core (9) is extended), adjust modulator mounting nuts (4) and (8) until modulator control rod head (3) and cable clip (6) align.

5-14. MODULATOR ASSEMBLY REPLACEMENT (3L80) (Cont'd)

6. Tighten mounting nuts (4) and (8) and recheck alignment. Readjust if alignment has changed.
7. Pull modulator cable core (9) outward and connect cable clip (6) to modulator control rod head (3).
8. Check modulator cable (7) for ease and smoothness of operation and ensure cable core (9) returns to the idle position.



- FOLLOW-ON TASKS:**
- Install engine access cover (para. 10-15).
 - Fill transmission to proper fluid level (TM 9-2320-280-10).
 - Lower and secure hood (TM 9-2320-280-10).
 - Road test and check for proper operation (para. 5-21).

5-15. MODULATOR LINK REPLACEMENT (3L80)

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

All vehicles except: M997A2, M1025A2, M1035A2, M1043A2, M1045A2, M1097A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Gasket (Appendix G, Item 51)

Manual References

TM 9-2320-280-24P

Equipment Condition

- Engine access cover removed (para. 10-15).
- Cooling system drained (para. 3-60).

a. Removal

1. Pull off cable clip (6) from modulator link pin (5).
2. Remove two capscrews (1) and bracket (2) from cylinder head (10).
3. Loosen rear cable nut (8) and remove front cable nut (3), modulator cable (9), and washer (7) from bracket (2).
4. Slide modulator link (4) forward and disconnect from fuel injection pump (11).

NOTE

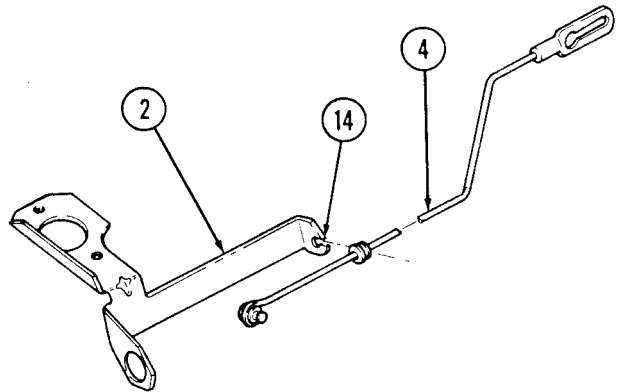
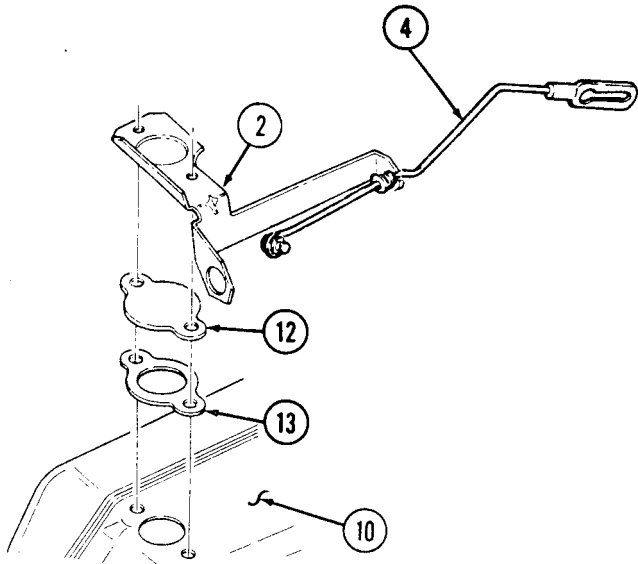
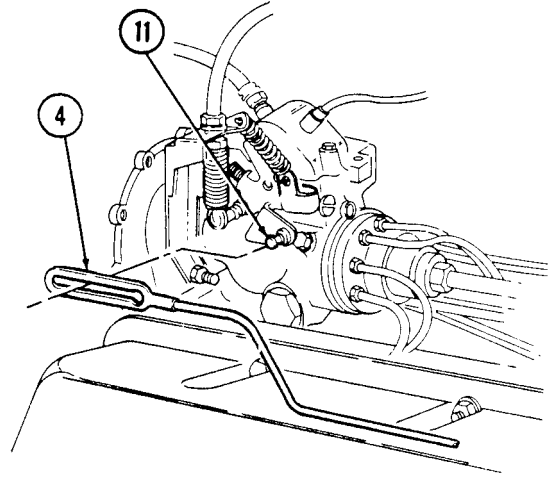
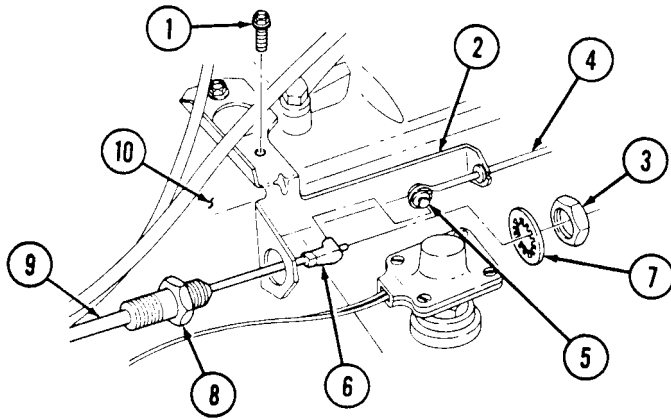
Note orientation of modulator link and bracket for installation.

5. Remove bracket (2), modulator link (4), water jacket cover (12), and gasket (13) from cylinder head (10). Discard gasket (13).
6. Spread slot (14) and remove modulator link (4) from bracket (2).

b. Installation

1. Install modulator link (4) in bracket (2) and crimp slot (14).
2. Slide modulator link (4) forward and connect to fuel injection pump (11).
3. Install gasket (13), cover (12), modulator link (4), and bracket (2) on cylinder head (10) with two capscrews (1).
4. Position modulator cable (9) through bracket (2), install washer (7), and start front cable nut (3).
5. Pull cable clip (6) out and connect to modulator link pin (5). Tighten rear cable nut (8).

5-15. MODULATOR LINK REPLACEMENT (3L80) (Cont'd)



- FOLLOW-ON TASKS:
- Install engine access cover (para. 10-15).
 - Fill cooling system (para. 3-60).

5-16. TRANSMISSION VENT LINE REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-24P

Materials/Parts

Adhesive sealant (Appendix C, Item 9)

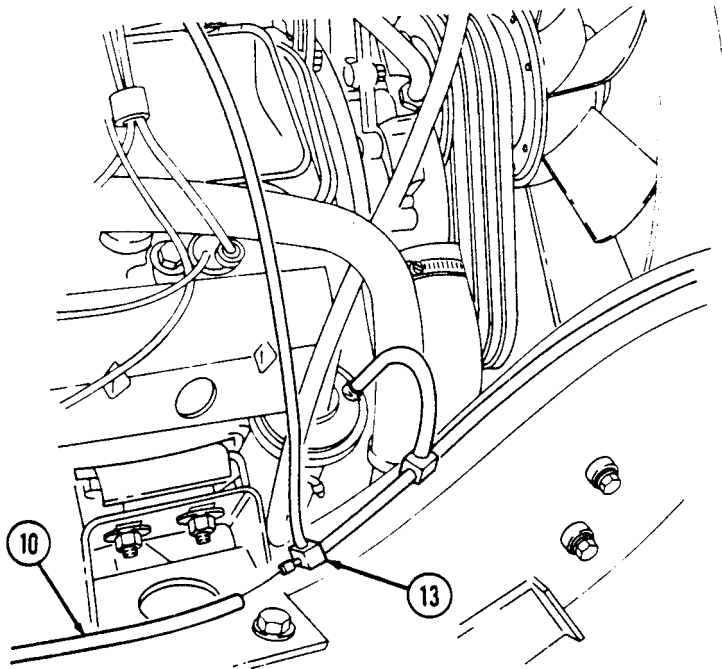
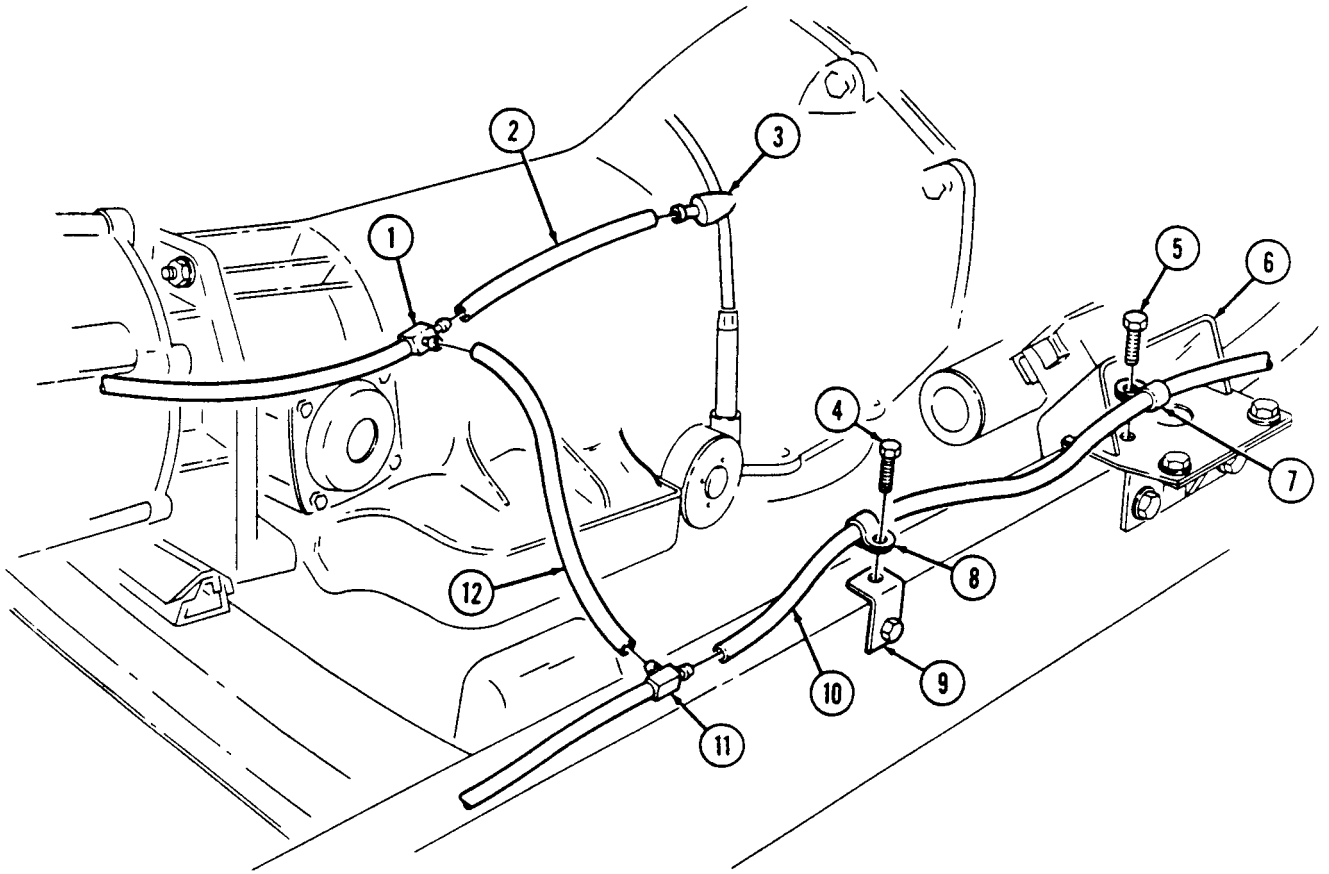
a. Removal

1. Remove vent line (2) from transmission (3) and tee fitting (1).
2. Remove vent line (12) from tee fittings (1) and (11).
3. Remove capscrew (5), clamp (7), and vent line (10) from engine mount bracket (6).
4. Remove capscrew (4), clamp (8), and vent line (10) from bracket (9).
5. Remove vent line (10) from tee fittings (11) and (13).
6. Remove clamps (7) and (8) from vent line (10).

b. Installation

1. Install clamps (7) and (8) on vent line (10).
2. Install vent line (10) on tee fittings (11) and (13).
3. Install vent line (10) and clamp (7) on engine mount bracket (6) with capscrew (5).
4. Install vent line (10) and clamp (8) on bracket (9) with capscrew (4).
5. Install vent line (12) on tee fittings (11) and (1).
6. Install vent line (2) on tee fittings (1) and transmission (3).
7. Apply adhesive sealant around fittings (1), (11), and (13).

5-16. TRANSMISSION VENT LINE REPLACEMENT (Cont'd)



5-17. SEALED LOWER CONVERTER HOUSING COVER MAINTENANCE

This task covers:

- | | |
|---|---|
| <ul style="list-style-type: none"> a. Removal b. Inspection | <ul style="list-style-type: none"> c. Installation |
|---|---|

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

- Gasket (Appendix G, Item 43)
(Basic/A1 Series)
- Gasket (Appendix G, Item 57)
(M1123 and A2 Series)
- Adhesive (Appendix C, Item 5)
- Drycleaning solvent (Appendix C, Item 18)

Manual References

TM 9-2320-280-24P

Equipment Condition

- Battery ground cables disconnected (para. 4-73).
- Crossover pipe removed (para. 3-50).
- Sealed upper converter housing cover removed (para. 5-18).

General Safety Instructions

Drycleaning solvent is flammable and will not be used near an open flame.

a. Removal

NOTE

- Step 1 applies to all vehicles except M1123 and A2 series.
 - Step 2 applies to M1123 and A2 series vehicles.
1. Remove four capscrews (2) and converter housing cover (3) from transmission (1).
 2. Remove three capscrews (2) and converter housing cover (3) from transmission (1) and oil pan flange (5).
 3. Remove gasket (4) from converter housing cover (3). Discard gasket (4).

b. Inspection

1. Inspect converter housing cover (3) for pitting, cracking, and excessive wear. Replace if pitted, cracked, or excessively worn.

WARNING

Drycleaning solvent is flammable and will not be used near an open flame. A fire extinguisher will be kept nearby when the solvent is used. Use only in well-ventilated places. Failure to do this may result in injury to personnel and/or damage to equipment.

2. Remove gasket material and sealant from converter housing cover (3) and transmission (1) with drycleaning solvent.

c. Installation

NOTE

- For M1123 and A2 series vehicles, gasket must be bent over edge of converter housing cover to ensure gasket seats properly.
 - For basic and A1 series vehicles, bend gasket over edge of converter housing if required to ensure gasket seats properly.
1. Apply adhesive to gasket (4) and install on converter housing cover (3).

5-17. SEALED LOWER CONVERTER HOUSING COVER MAINTENANCE (Cont'd)

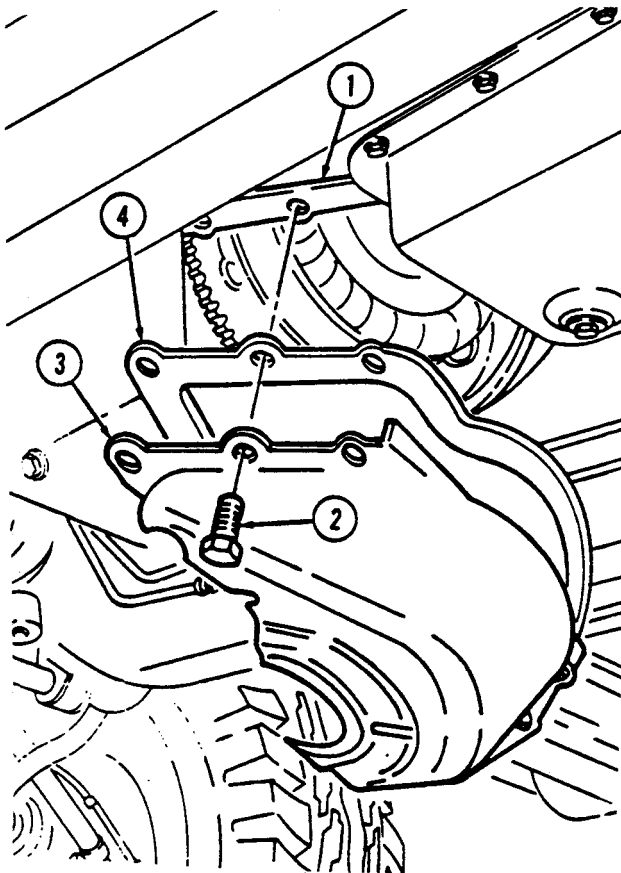
CAUTION

For M1123 and A2 series vehicles, ensure converter housing cover is seated on oil pan flange to prevent converter housing cover from hitting flywheel and damaging converter housing cover.

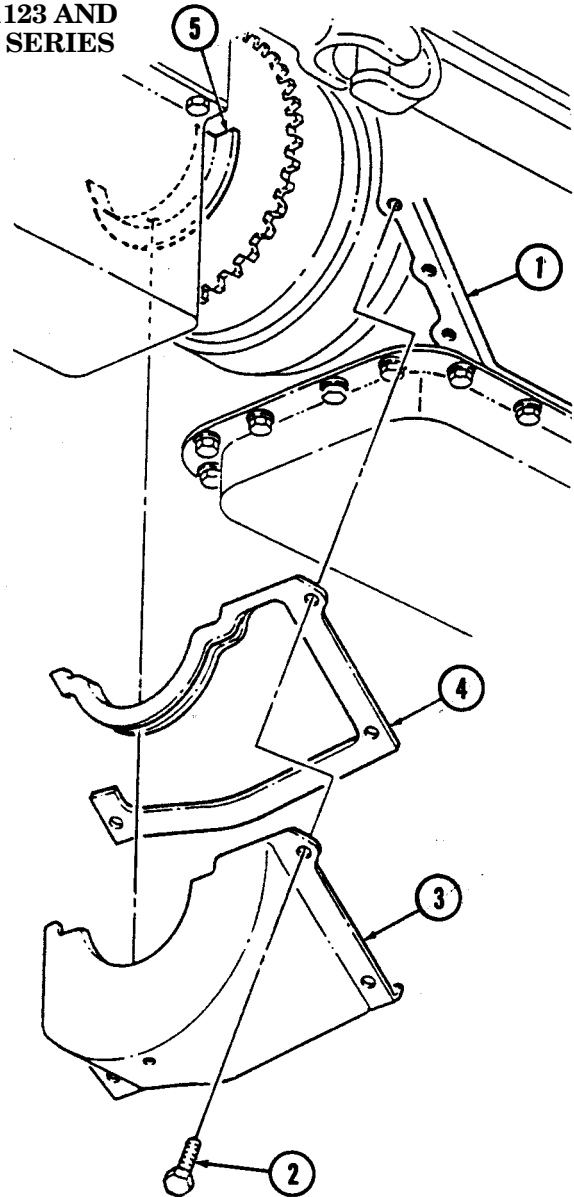
NOTE

- Step 2 applies to all vehicles except M1123 and A2 series.
 - Step 3 applies to M1123 and A2 series vehicles.
2. Apply adhesive to converter housing gasket (4). Install converter housing cover (3) on transmission (1) with four capscrews (2).
 3. Install converter housing cover (3) on oil pan flange (5) and transmission (1) with three capscrews (2).

BASIC/A1 SERIES



M1123 AND A2 SERIES



- FOLLOW-ON TASKS:**
- Connect battery ground cables (para. 4-73).
 - Install crossover pipe (para. 3-50).
 - Install sealed upper converter housing cover (para. 5-18).

5-18. SEALED UPPER CONVERTER HOUSING COVER (2-PIECE) MAINTENANCE

This task covers:

- a. Removal
- b. Inspection
- c. Installation

INITIAL SETUP

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Gasket (Appendix G, Item 44)
Adhesive (Appendix C, Item 5)
Drycleaning solvent (Appendix C, Item 18)

Manual References

TM 9-2320-280-24P

Equipment Condition

Battery ground cable disconnected (para. 4-73).

General Safety Instructions

Drycleaning solvent is flammable and will not be used near an open flame.

a. Removal

1. Remove two capscrews (3) and converter housing cover (4) from transmission (1) .
2. Remove gasket (5) from converter housing cover (4). Discard gasket (5).

b. Inspection

WARNING

Drycleaning solvent is flammable and will not be used near an open flame. A fire extinguisher will be kept nearby when the solvent is used. Use only in well-ventilated places. Failure to do this may result in injury to personnel and/or damage to equipment.

1. Inspect converter housing cover (4) for pitting, cracking, and excessive wear. Replace if pitted, cracked, or excessively worn.
2. Remove gasket material and sealant from converter housing cover (4) and transmission (1) with drycleaning solvent.

c. Installation

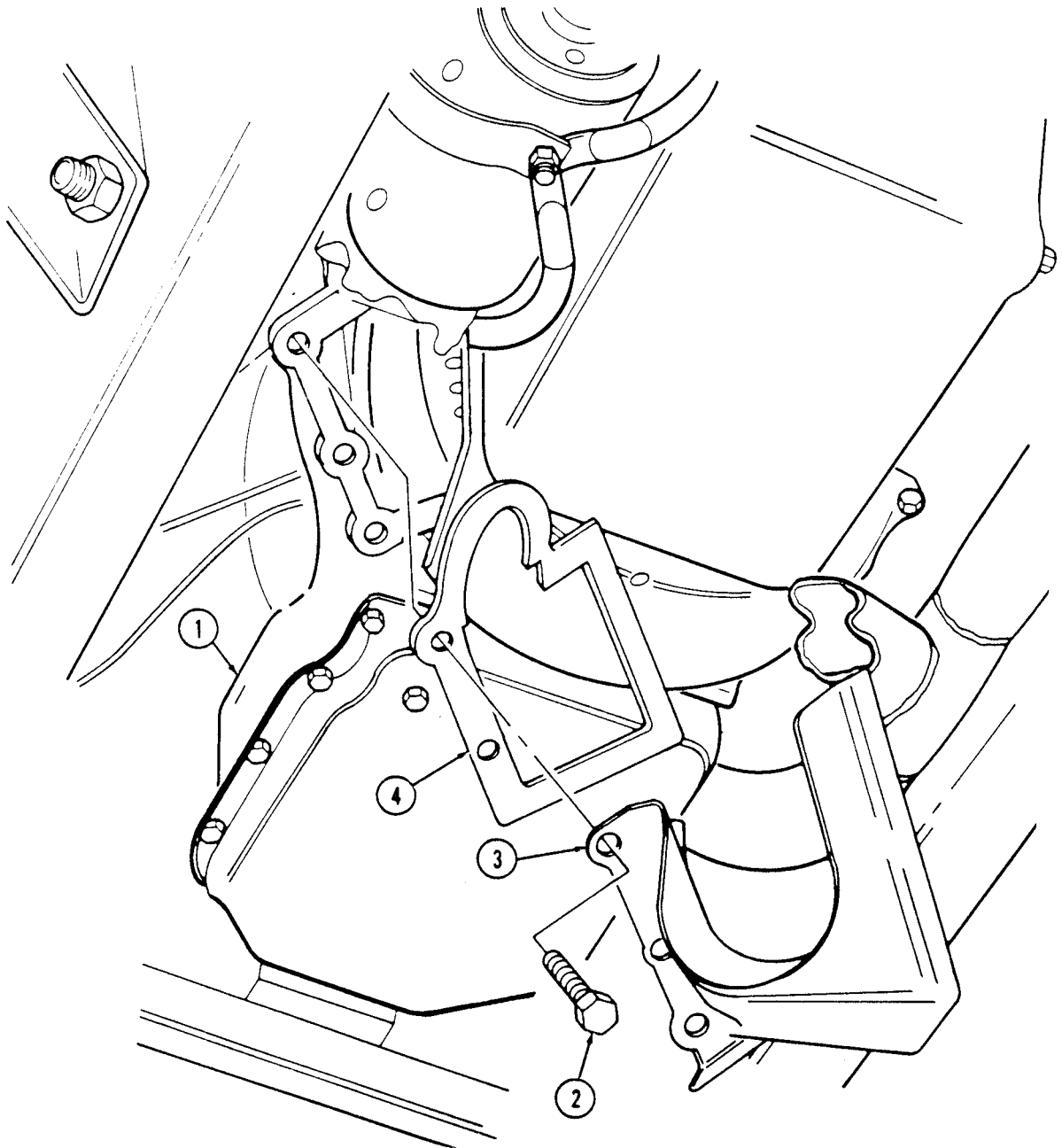
1. Apply adhesive to gasket (5) and install on converter housing cover (3).

NOTE

Gasket may require bending over edge of converter housing cover to make gasket seat properly.

2. Apply adhesive to converter housing cover edge (5) and install converter housing cover (4) on transmission (1) with two capscrews (3).
3. Apply adhesive to fill any gaps between housing cover (4).

5-18. SEALED UPPER CONVERTER HOUSING COVER (2-PIECE) MAINTENANCE (Cont'd)



FOLLOW-ON TASK: Connect battery ground cable (para. 4-73).

5-19. CONVERTER HOUSING COVER REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

- Battery ground cable disconnected (para. 4-73).
- Crossover pipe removed (para. 3-50).

Manual References

TM 9-2320-280-24P

NOTE

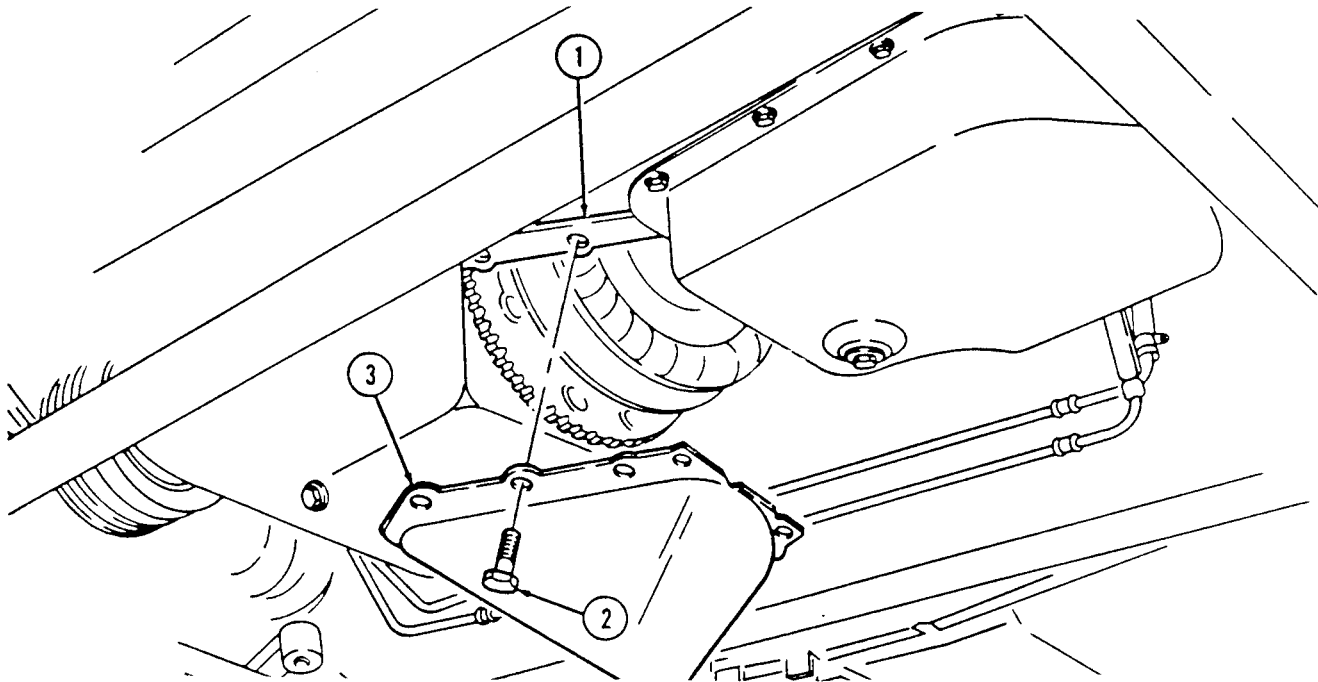
For two-piece torque converter housing cover replacement, refer to paragraphs 5-17 and 5-18.

a. Removal

Remove six capscrews (2) and converter housing cover (3) from transmission (1).

b. Installation

Install converter housing cover (3) on transmission (1) with six capscrews (2).



FOLLOW-ON TASKS: • Install crossover pipe (para. 3-50).
• Connect battery ground cable (para. 4-73).

5-20. TRANSMISSION MOUNT REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-24P

Materials/Parts

Two lockwashers (Appendix G, Item 178)

Equipment Condition

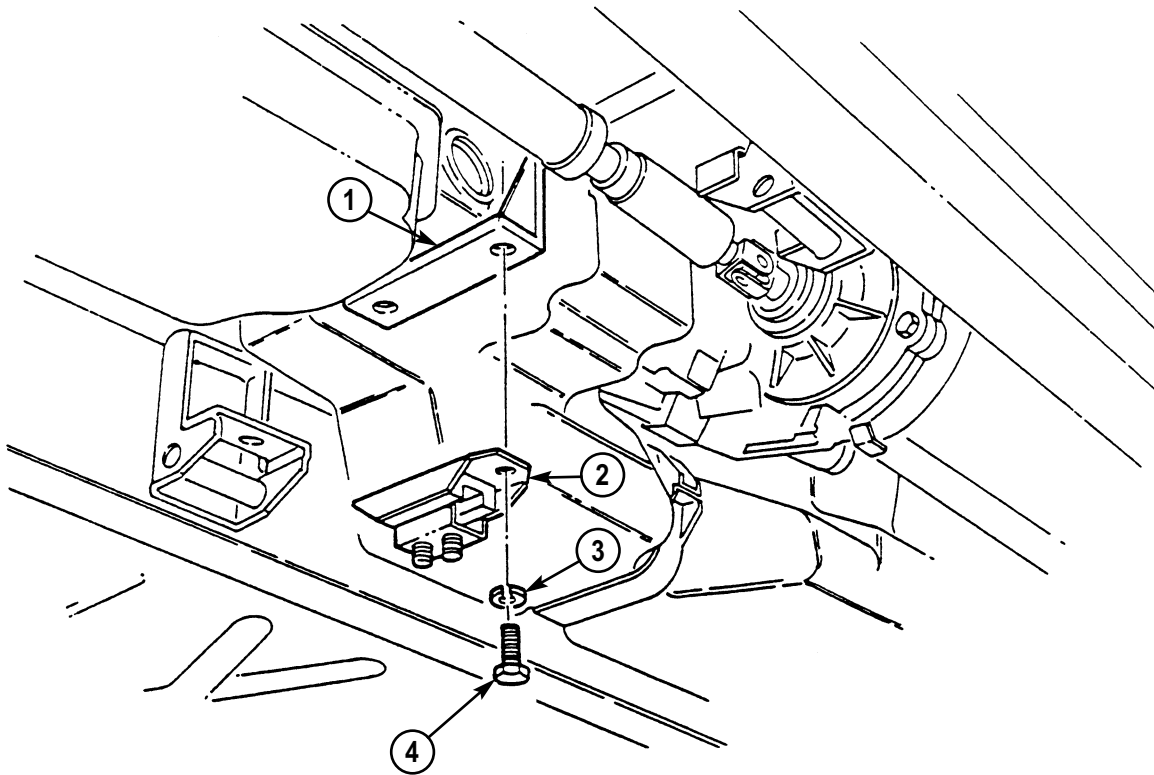
Transmission mount crossmember removed
(para. 9-15).

a. Removal

Remove two capscrews (4), lockwashers (3), and transmission mount (2) from adapter (1). Discard lockwashers (3).

b. Installation

Install transmission mount (2) on adapter (1) with two lockwashers (3) and capscrews (4). Tighten capscrews (4) to 65 lb-ft (88 N•m).



FOLLOW-ON TASK: Install transmission mount crossmember (para. 9-15).

5-21. TRANSMISSION ROAD TEST

This task covers:

a. Road Test (3L80)

b. Road Test (4L80-E)

INITIAL SETUP:

Tools

General mechanic's tool kit
automotive (Appendix B, Item 1)

Equipment Condition

- Transmission fluid at proper level (para. 5-2).
- Adjust manual shift linkage (para. 5-12).
- Adjust modulator cable (para. 5-15).

Manual References

TM 9-2320-280-24P

a. Road Test (3L80)

1. Position transmission shift lever in "D" (drive) and accelerate vehicle from 0 mph. A 1-2 and 2-3 shift should occur at all throttle openings. Shift points will vary with throttle openings. Allow vehicle to decrease in speed to 0 mph and 3-2 and 2-1 shifts should occur.
2. Position transmission shift lever in "2" (low 2) and accelerate vehicle from 0 mph. A 1-2 shift should occur at all throttle openings (no 2-3 shift can be obtained in this range). The 1-2 shift in "2" (low 2) is somewhat firmer than in "D" (drive). This is normal.
3. Position transmission shift lever in "1" (low 1) and accelerate the vehicle from 0 mph. No upshift should occur in this range.
4. Position transmission shift lever in "D" (drive) and with the vehicle speed at approximately 35 mph, close throttle and move transmission shift lever to "2" (low 2). Transmission should downshift to 2nd gear. An increase in engine rpm and an engine braking effect should be noticed.
5. Position transmission shift lever in "2" (low 2) and with vehicle speed at approximately 25 mph, close throttle and move transmission shift lever to "1" (low 1). Transmission should downshift to 1st gear. An increase in engine rpm and engine braking effect should be noticed.
6. Position transmission shift lever in "R" (reverse) and check for reverse operation.

b. Road Test (4L80-E)

1. Position shift lever in "ⓓ" (overdrive) and accelerate vehicle from 0 mph. A 1-2, 2-3, and 3-4 shift should occur at all throttle openings. Allow vehicle to coast down to about 0 mph and 4-3, 3-2, and 2-1 shifts should occur.
2. Position transmission shift lever in "D" (drive) and accelerate vehicle from 0 mph. A 1-2 and 2-3 shift should occur at all throttle openings. Allow vehicle to coast down to about 0 mph and 3-2 and 2-1 shifts should occur.
3. Position transmission shift lever in "2" (low two) and accelerate vehicle from 0 mph. A 1-2 shift should occur at all throttle openings. No 2-3 shift can be obtained in this range. A 1-2 shift in 2 is somewhat firmer than in "D". This is normal.
4. Position shift lever in "1" and accelerate the vehicle from 0 mph. No upshifts should occur in this range.
5. Position shift lever in "ⓓ" and with the vehicle speed at approximately 45 mph, close throttle and move lever to "3". Transmission should downshift to 3rd gear. An increase in engine rpm and engine braking effect should be noticed.
6. Position shift lever in "D" and with the vehicle speed at approximately 35 mph, close throttle and move lever to "2". Transmission should downshift to 2nd gear. An increase in engine rpm and engine braking effect should be noticed.

5-21. TRANSMISSION ROAD TEST (Cont'd)

7. Position shift lever "2" and with the vehicle speed at approximately 25 mph (40 km), close the throttle and move lever to "1". Transmission should downshift to 1st gear. An increase in engine RPM and engine braking effect should be noticed.
8. Position shift lever in "R" and check for reverse operation.
9. Hard shifting may indicate an underfilled or clogged system.

Section II. TRANSFER CASE MAINTENANCE

5-22. TRANSFER CASE MAINTENANCE TASK SUMMARY

TASK PARA.	PROCEDURES	PAGE NO.
5-23.	Transfer Case Shift Rod Maintenance	5-48
5-24.	Speedometer Driven Gear Maintenance	5-50
5-25.	Transfer Case Vent Line Replacement	5-52
5-26.	Transfer Case Oil Seals Replacement	5-53

5-23. TRANSFER CASE SHIFT ROD MAINTENANCE

This task covers:

- | | |
|---|---|
| <ul style="list-style-type: none"> a. Removal b. Installation | <ul style="list-style-type: none"> c. Adjustment |
|---|---|

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Materials/Parts

Two cotter pins (Appendix G, Item 17)
(Basic/A1 Series)
Two cotter pins (Appendix G, Item 18)
(A2 Series)

a. Removal

1. Remove cotter pin (8) and washer (7) from transfer case range rod (5) and transfer case range lever (6). Discard cotter pin (8).
2. Remove cotter pin (3), washer (2), and shift rod trunnion (4) from bearing and arm assembly (1). Discard cotter pin (8).
3. Remove shift rod trunnion (4) from shift rod (5).

b. Installation

1. Install shift rod trunnion (4) on shift rod (5).
2. Install shift rod (5) into transfer case range lever (6) with washer (7) and cotter pin (8).
3. Adjust shift rod (para. c).

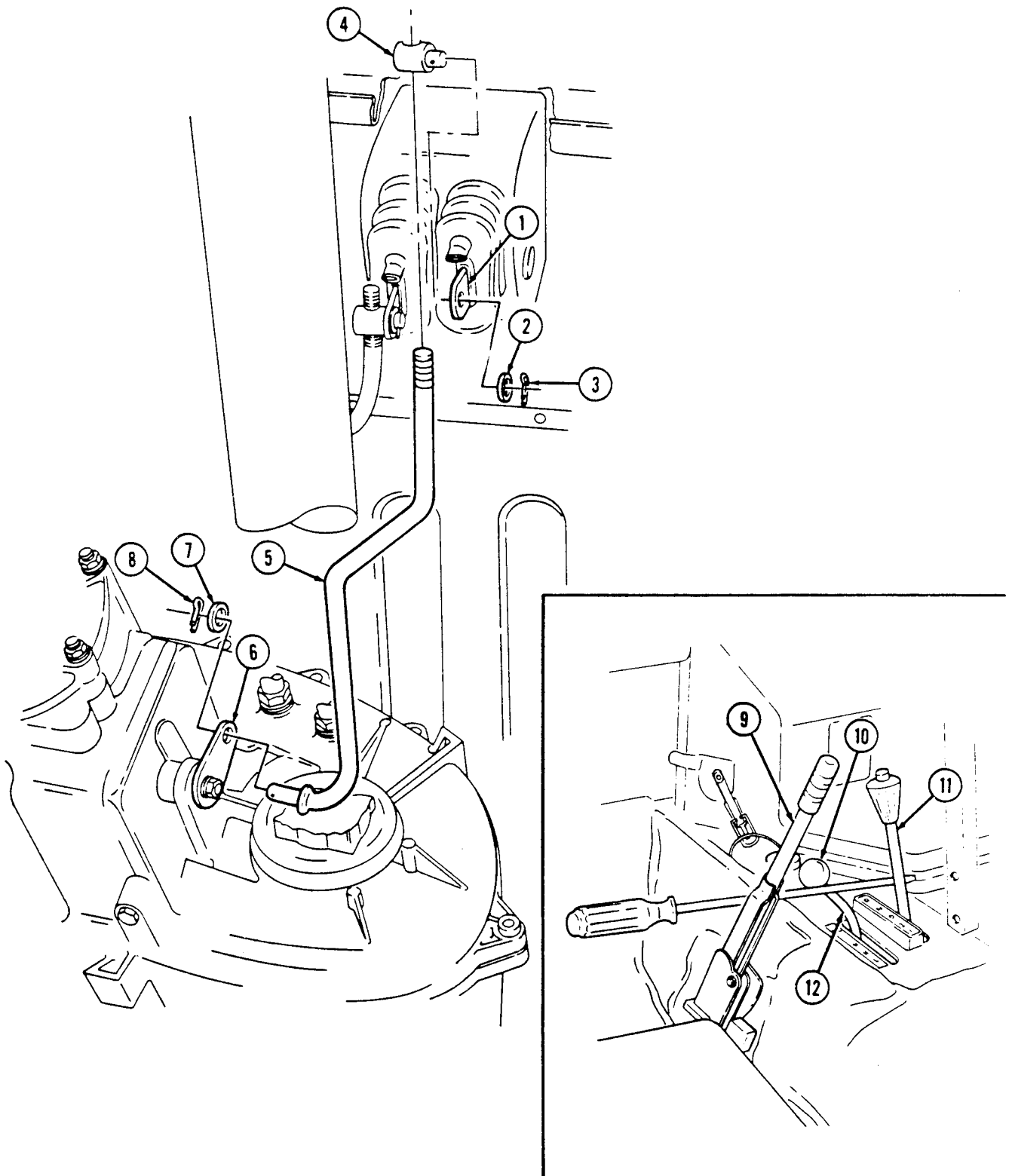
c. Adjustment

NOTE

The shift rod must be adjusted so that the detents of the transfer case lever correspond with the positions on the transfer case name plate.

1. Make sure parking brake lever (9) is engaged and place transmission shift lever (11) in "D" (drive) position.
2. Place transfer case shift lever (12) all the way forward in "HL" (high lock) position.
3. Place long screwdriver in front of parking brake lever (9) and transmission shift lever (11), and behind knob (10) on transfer case shift lever (12) to hold transfer case shift lever (12) forward.
4. Place transfer case range lever (6) in the rearward position, "HL".
5. Turn shift rod trunnion (4) so that it slips easily into the hole in bearing and arm assembly (1).
6. Secure shift rod trunnion (4) to bearing and arm assembly (1) with washer (2) and cotter pin (3).
7. Remove screwdriver from transfer case shift lever (12) and place transmission shift lever (11) in "N" (neutral) position.

5-23. TRANSFER CASE SHIFT ROD MAINTENANCE (Cont'd)



FOLLOW-ON TASK: Operate vehicle (TM 9-2320-280-10) and check for proper shifter operation.

5-24. SPEEDOMETER DRIVEN GEAR MAINTENANCE

This task covers:

- | | |
|---|---|
| <ul style="list-style-type: none"> a. Removal b. Inspection | <ul style="list-style-type: none"> c. Installation |
|---|---|

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Special Tools

Mirror, inspection (Appendix B, Item 107)

Materials/Parts

O-ring (Appendix G, Item 213)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

a. Removal

1. Disconnect flex drive shaft (1) from correction adapter (2).
2. Loosen nut (3) and remove correction adapter (2) from pinion adapter (6).

NOTE

Perform step 2.1 only if drive tip is broken.

- 2.1. Remove drive tip (10) from correction adapter (2).
3. Remove screw (4) and clamp (5) securing pinion adapter (6) to transfer case (8).
4. Pull pinion adapter (6) out of transfer case (8).
5. Remove O-ring (7) from pinion adapter (6). Discard O-ring (7).
6. Remove driven gear (9) from transfer case (8).

b. Inspection

Inspect driven gear (9) and drive tip (10) for damage or wear. Replace if broken or worn.

c. Installation

1. Install O-ring (7) on pinion adapter (6).

NOTE

Note number stamped on driven gear.

2. Install driven gear (9) into pinion adapter (6).

NOTE

Numbers on pinion adapter represent number stamped on driven gear. When installing adapter, numbers on adapter must match with numbers on transfer case housing.

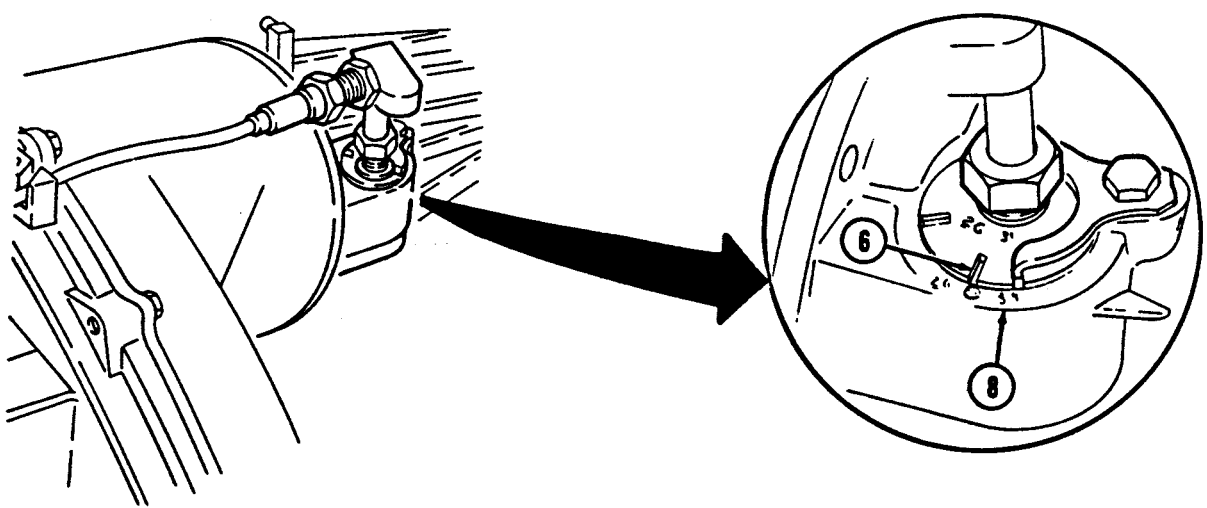
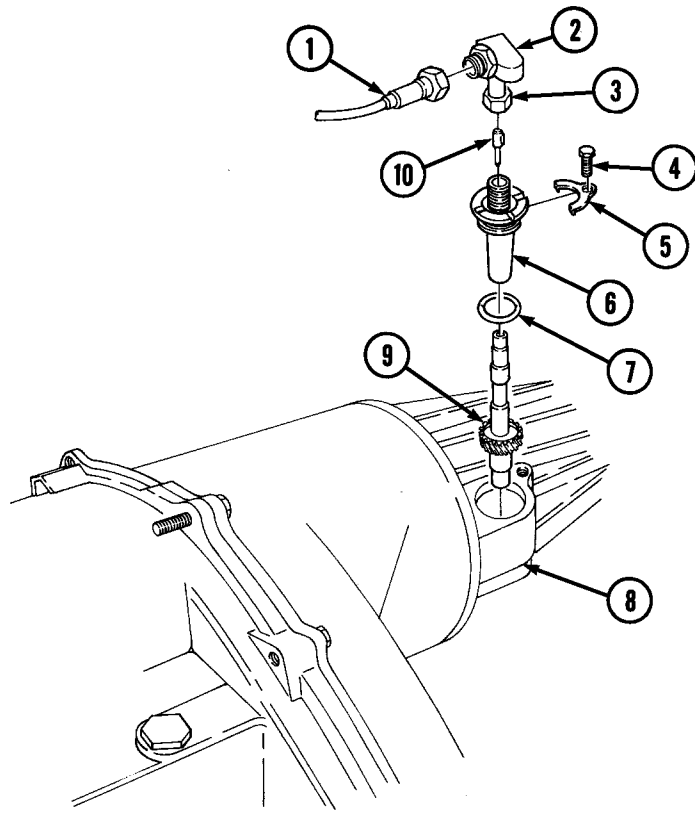
3. Install and align pinion adapter (6) into transfer case (8) and secure with clamp (5) and capscrew (4). Tighten capscrew (4) to 15 lb-ft (20 N•m).

NOTE

Perform step 3.1 only if drive tip was removed.

- 3.1. Install drive tip (10) in correction adapter (2).
4. Install correction adapter (2) on pinion adapter (6) and tighten nut (3).
5. Connect flex drive shaft (1) to correction adapter (2).

5-24. SPEEDOMETER DRIVEN GEAR MAINTENANCE(Cont'd)



FOLLOW-ON TASK: Operate vehicle (TM 9-2320-280-10) and check speedometer for proper operation.

5-25. TRANSFER CASE VENT LINE REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-24P

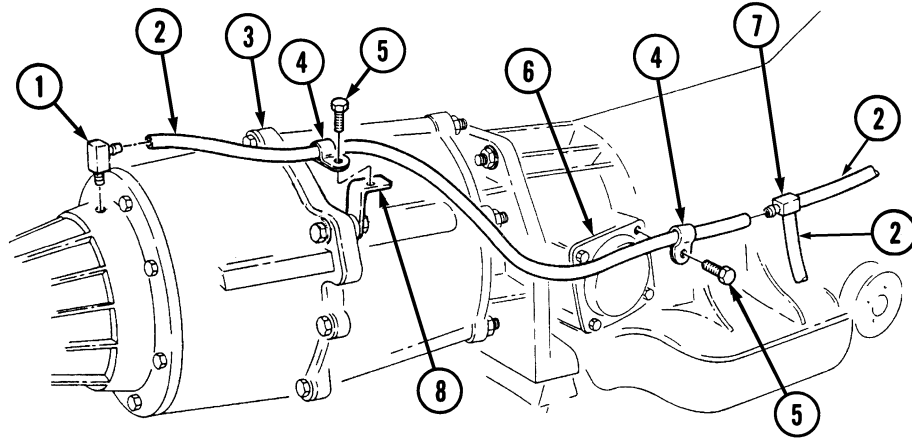
a. Removal

NOTE

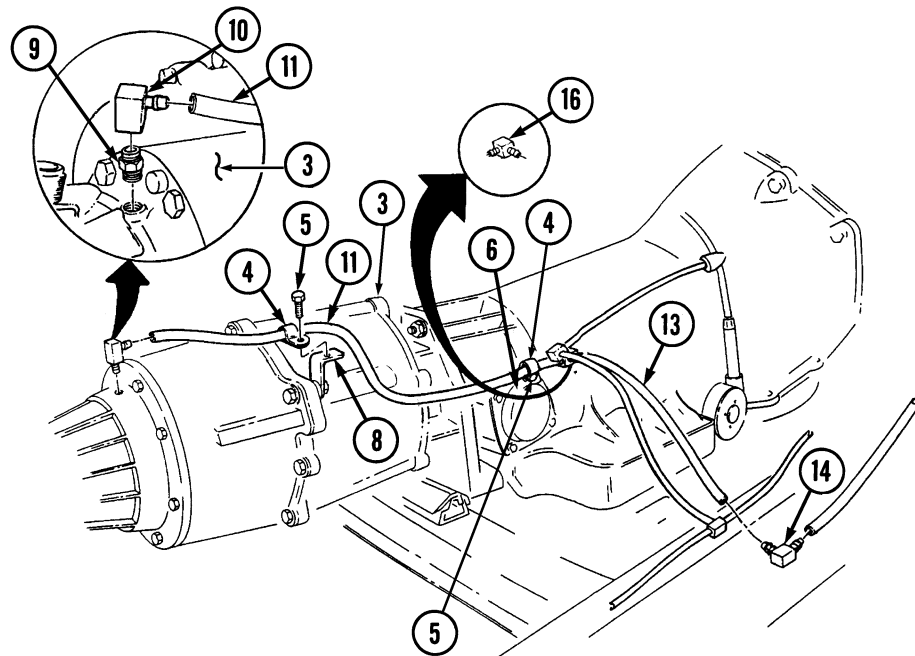
- Perform steps 1 through 5 for old configuration.
- Perform steps 6 through 20 for new configuration.

1. Disconnect vent line (2) from elbow (1).
2. Remove elbow (1) from transfer case (3).
3. Remove two capscrews (5), clamps (4), and vent line (2) from bracket (8) and transmission governor cover (6).
4. Disconnect three vent lines (2) from tee (7).
5. Remove clamps (4) from vent line (2).
6. Disconnect vent line (11) from elbow (10).
7. Remove elbow (10) and pipe nipple (9) from transfer case (3).
8. Remove two capscrews (5), clamps (4), and vent line (11) from bracket (8) and transmission governor cover (6).
9. Deleted.
10. Disconnect vent lines (11) and (13) from elbow (16).
11. Remove clamps (4) from vent line (11).
12. Disconnect vent line (13) from elbow (14).

5-25. TRANSFER CASE VENT LINE REPLACEMENT (Cont'd)



OLD CONFIGURATION



NEW CONFIGURATION

5-25. TRANSFER CASE VENT LINE REPLACEMENT (Cont'd)

13. Remove capscrew (1) from bracket (2) on frame rail (3).
14. Remove capscrew (4) and clamp (5) from bracket (2) and remove clamp (5) from hose (6) and vent line (7).
- 15. Deleted.
16. Disconnect vent lines (8) and (12) from elbow (10).
17. Disconnect vent line (15) from elbow (13) on air cleaner (14) and tee (16).
18. Remove elbow (13) from air cleaner (14)
19. Remove vent lines (17) and (18) from tee (16).
- 20. Deleted.

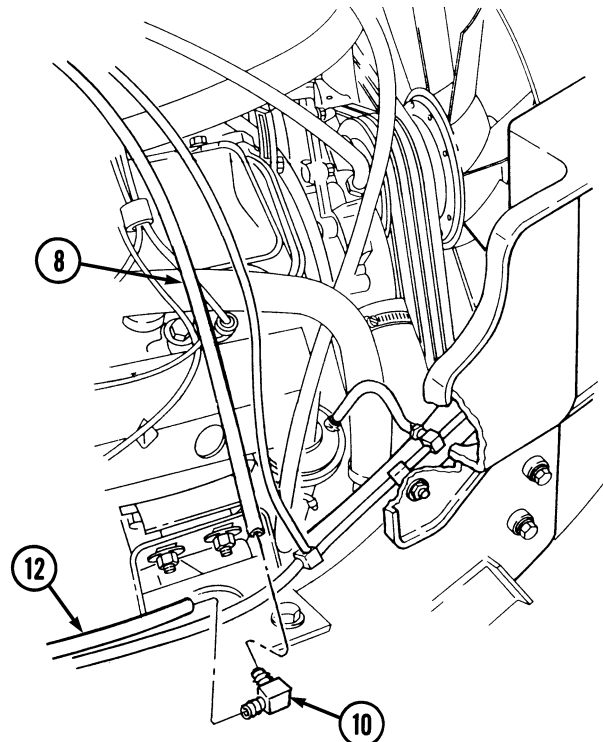
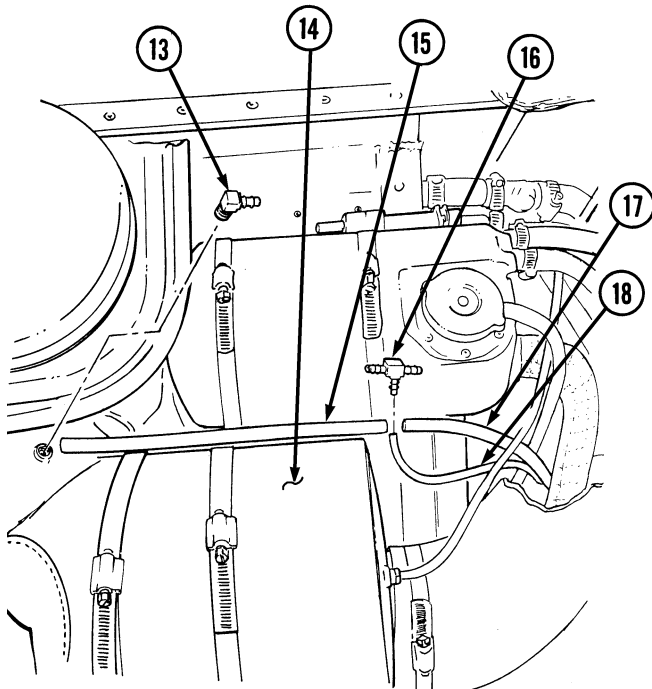
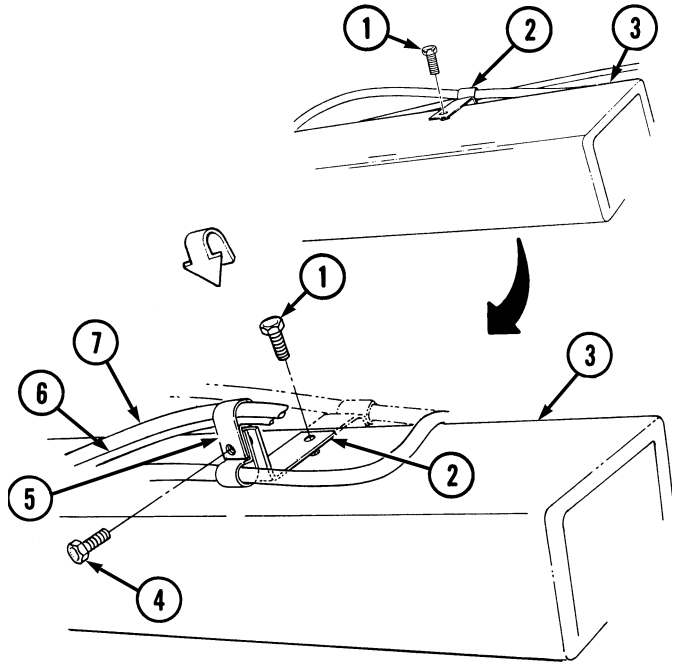
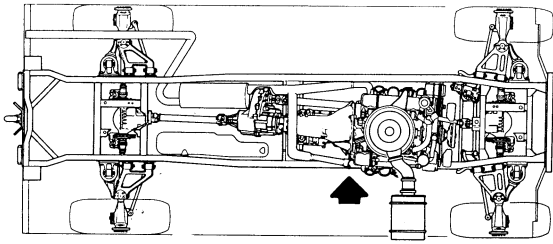
b. Installation

NOTE

- Perform steps 1 through 14 for new configuration.
- Perform steps 15 through 19 for old configuration.

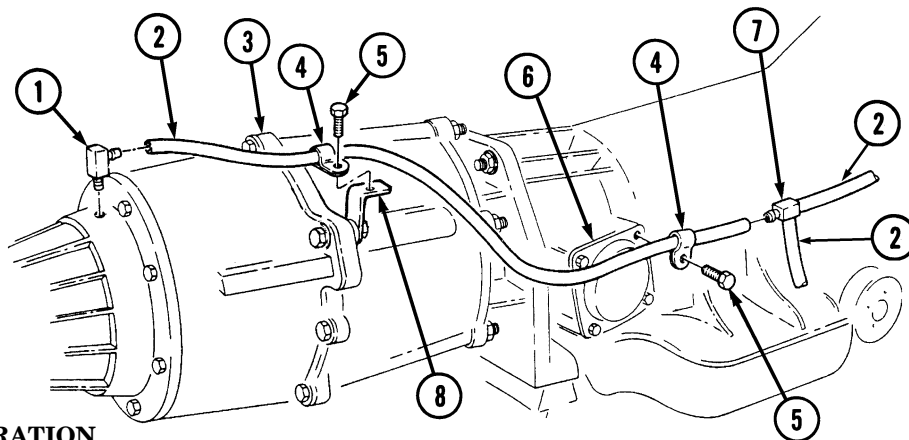
1. Install vent lines (17) and (18) on tee (16).
- 2. Deleted.
3. Install elbow (13) on air cleaner (14).
4. Connect vent line (15) to elbow (13) and tee (16).
5. Connect vent lines (8) and (12) to elbow (10).
- 6. Deleted.
7. Position bracket (2) on frame rail (3) and secure with capscrew (1).
8. Route existing hose (6) and vent line hose (7) through clamp (5) and secure to bracket (2) with capscrew (4).

5-25. TRANSFER CASE VENT LINE REPLACEMENT (Cont'd)

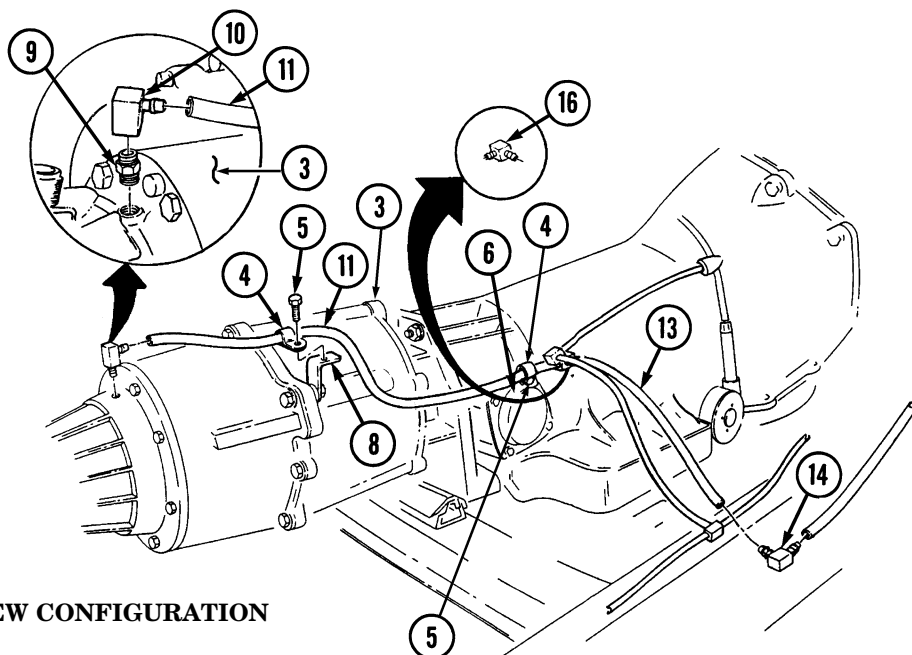


5-25. TRANSFER CASE VENT LINE REPLACEMENT (Cont'd)

9. Connect vent line (13) to elbow (14) and elbow (16).
10. Install vent line (11) on transmission governor cover (6) and bracket (8) with two clamps (4) and capscrews (5). Tighten capscrews (5) to 15 lb-ft (20 N·m).
11. Connect vent line (11) to elbow (16).
12. Deleted.
13. Install pipe nipple (9) and elbow (10) to transfer case (3).
14. Connect vent line (11) to elbow (10).
15. Install two clamps (4) on vent line (2).
16. Connect three vent lines (2) to tee (7).
17. Install two clamps (4) and capscrews (5) on bracket (8) and transmission governor cover (6). Tighten capscrews (5) to 15 lb-ft (20 N·m).
18. Install elbow (1) in transfer case (3).
19. Connect vent line (2) to elbow (1).



OLD CONFIGURATION



NEW CONFIGURATION

5-26. TRANSFER CASE OIL SEALS REPLACEMENT

This task covers:

- | | |
|--------------------------------|-------------------------------|
| a. Front Oil Seal Removal | c. Rear Oil Seal Removal |
| b. Front Oil Seal Installation | d. Rear Oil Seal Installation |

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Special Tools

Yoke seal installer (Model 218)
(Appendix B, Item 94)
Output shaft seal installer (Model 242)
(Appendix B, Item 112)
Seal installer (Model 242)
(Appendix B, Item 116.1)

Special Tools (Cont'd)

Seal installer (Model 242)
(Appendix B, Item 116.2)
Drive handle (Model 242)
(Appendix B, Item 116.3)

Materials/Parts

Washer seal (Appendix G, Item 292)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

a. Front Oil Seal Removal

NOTE

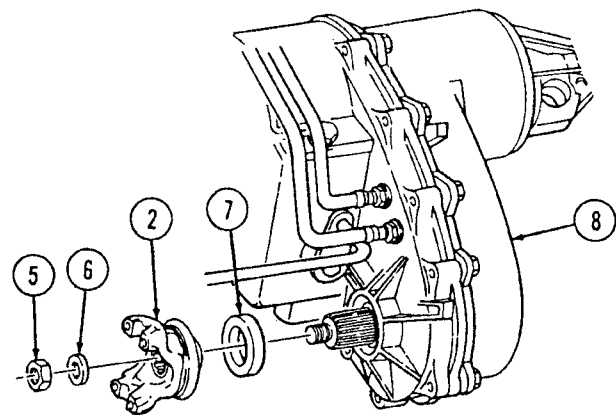
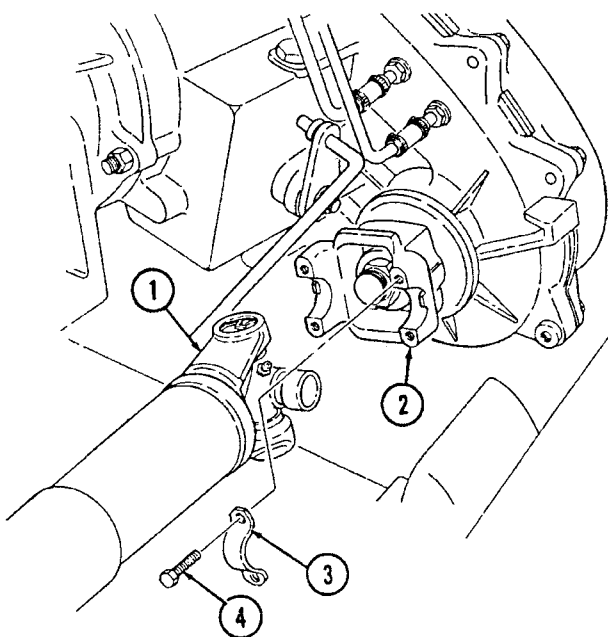
Removal and installation procedures are basically the same for model 218 front and rear oil seals and model 242 front oil seal. This procedure covers the front oil seal. For replacement of rear oil seal for model 242, refer to para. 5-26.c.

1. Remove four capscrews (4), two straps (3), and front propeller shaft (1) from output yoke (2).

NOTE

Have drainage container ready to catch fluid.

2. Remove nut (5), washer seal (6), and output yoke (2) from transfer case (8). Discard washer seal (6).
3. Remove output oil seal (7) from transfer case (8).



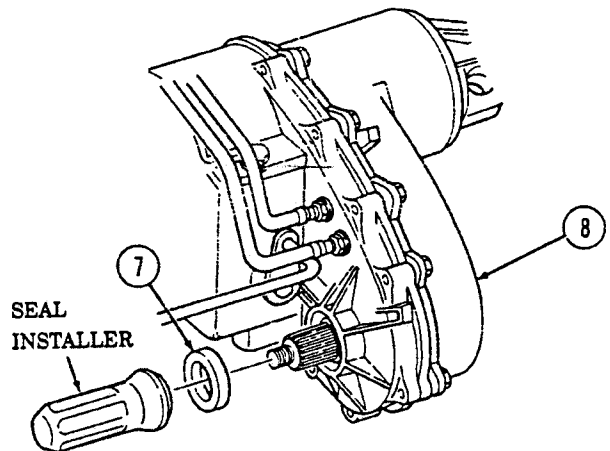
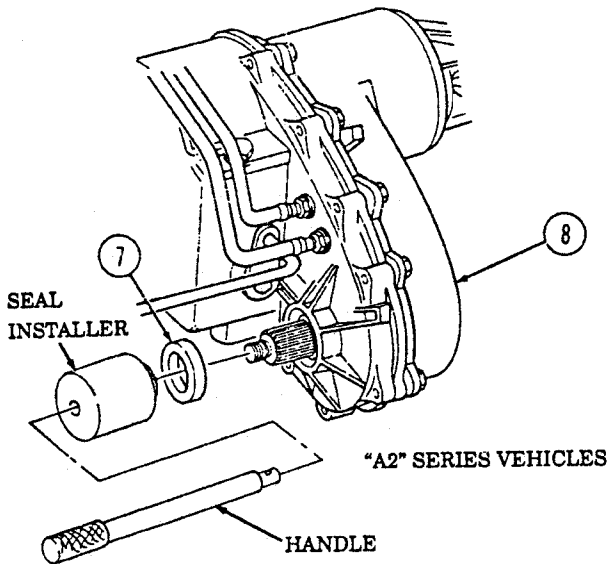
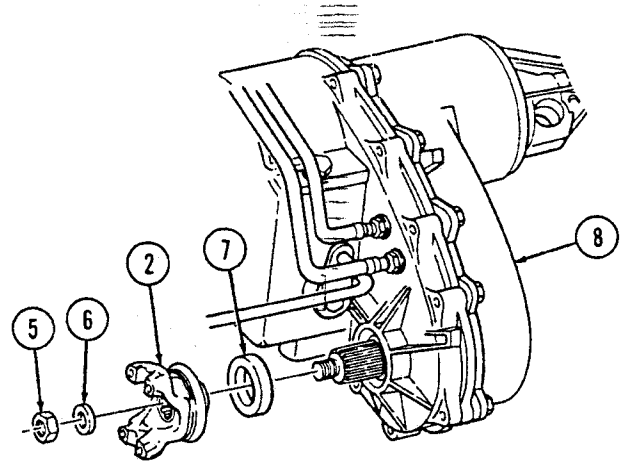
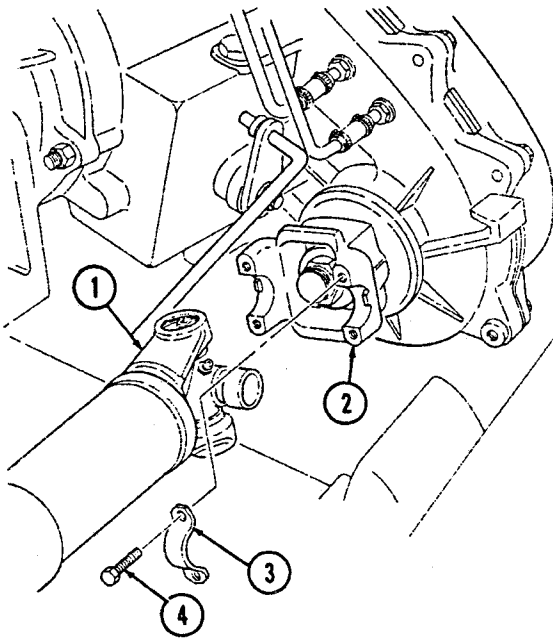
5-26. TRANSFER CASE OIL SEALS REPLACEMENT (Cont'd)

b. Front Oil Seal Installation

NOTE

- Ensure rubber surface of seal faces yoke seal installer.
- Ensure depth of seal is .07-.10 mm below casting surface.

1. Using seal installer, install oil seal (7) on transfer case (8).
2. Install output yoke (2) and washer seal (6) on transfer case (8) with nut (5). Tighten nut (5) to 110 lb-ft (149 N-m).
3. Connect front propeller shaft (1) to output yoke (2) with two straps (3) and four capscrews (4). Tighten capscrews (4) to 13-18 lb-ft (18-24 N-m).



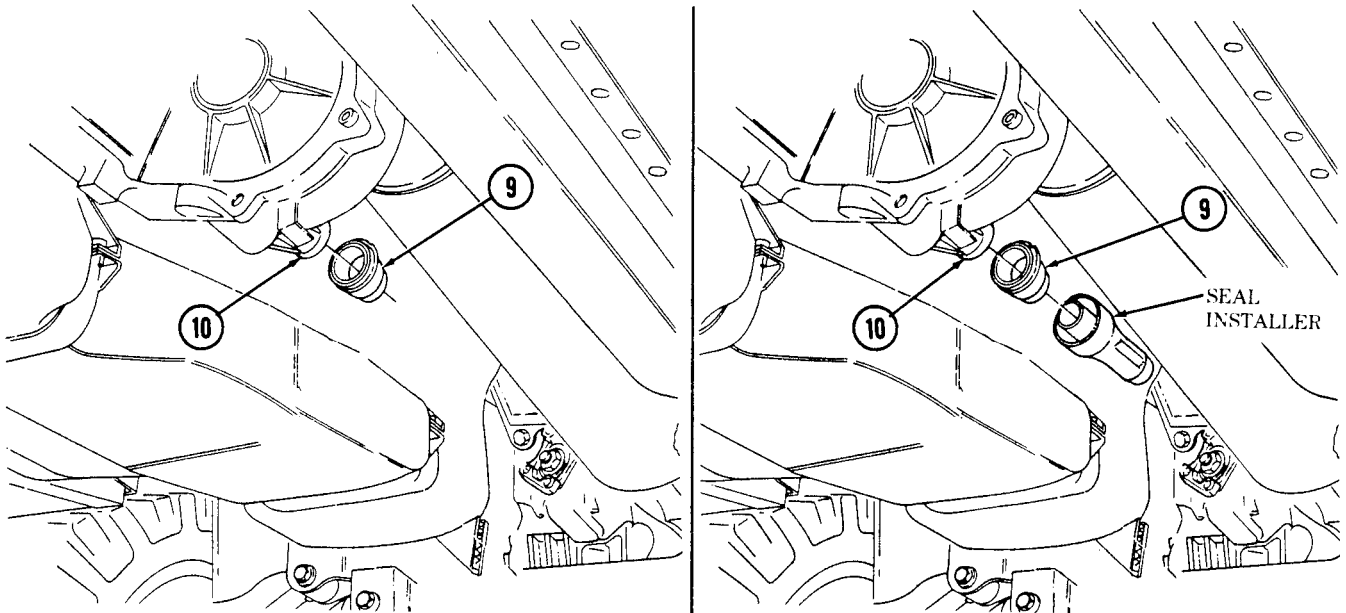
5-26. TRANSFER CASE OIL SEALS REPLACEMENT (Cont'd)**c. Rear Oil Seal Removal****NOTE**

The following procedure applies to model 242 transfer case rear oil seal.

1. Remove rear propeller shaft (para. 6-5).
2. Remove oil seal (9) from transfer case extension (10).

d. Rear Oil Seal Installation

1. Using output shaft seal installer, install oil seal (9) on transfer case extension (10).
2. Install rear propeller shaft (para. 6-5).



FOLLOW-ON TASK: Fill fluid to proper level (TM 9-2320-280-10).

CHAPTER 6

PROPELLER SHAFTS, AXLES, AND SUSPENSION MAINTENANCE

Section I. PROPELLER SHAFTS MAINTENANCE

6-1. PROPELLER SHAFTS MAINTENANCE TASK SUMMARY

TASK PARA.	PROCEDURES	PAGE NO.
6-2.	Front Propeller Shaft Assembly Maintenance	6-2
6-3.	Front Propeller Shaft Assembly Repair	6-6
6-4.	Rear Propeller Shaft Maintenance	6-8
6-5.	Rear Propeller Shaft Maintenance (1330 series)	6-10
6-6.	Rear Propeller Shaft Repair	6-12
6-7.	Universal Joint Repair	6-14



6-2. FRONT PROPELLER SHAFT ASSEMBLY MAINTENANCE

This task covers:

- | | |
|---|---|
| <ul style="list-style-type: none"> a. Removal b. Inspection | <ul style="list-style-type: none"> c. Installation |
|---|---|

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Materials/Parts

Cotter pin (Appendix G, Item 17)
(Basic/A1 Series)
Cotter pin (Appendix G, Item 18)
(A2 Series)

NOTE

Propeller shaft bearing caps should be taped together to prevent loss of bearings.

a. Removal

1. Remove four capscrews (3) and two bearing straps (2) from front propeller shaft assembly (4) and differential pinion yoke (1).

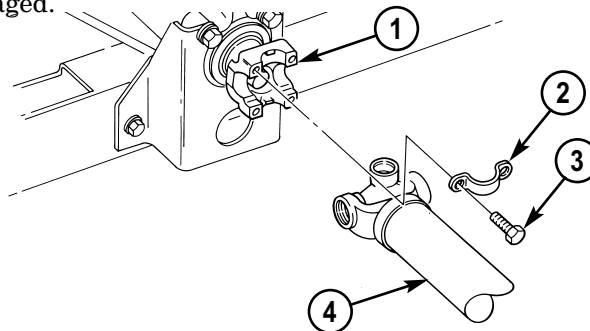
NOTE

Step 2 applies to all vehicles except M1097, "A1" and "A2" series.
Step 3 applies to M1097, "A1" and "A2" series.

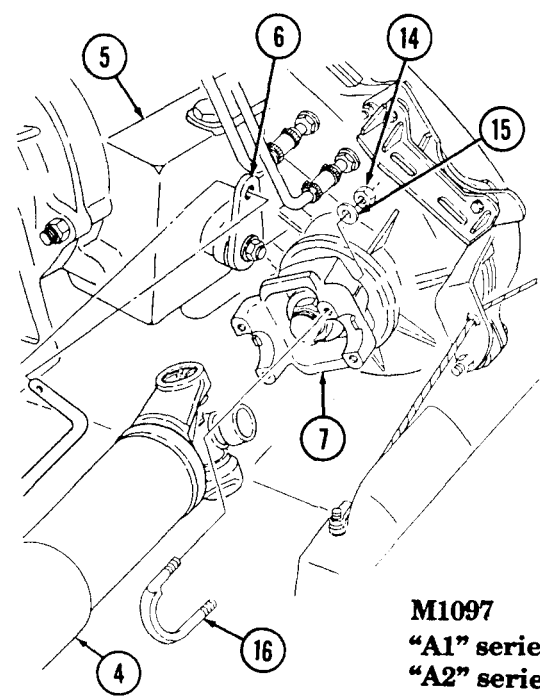
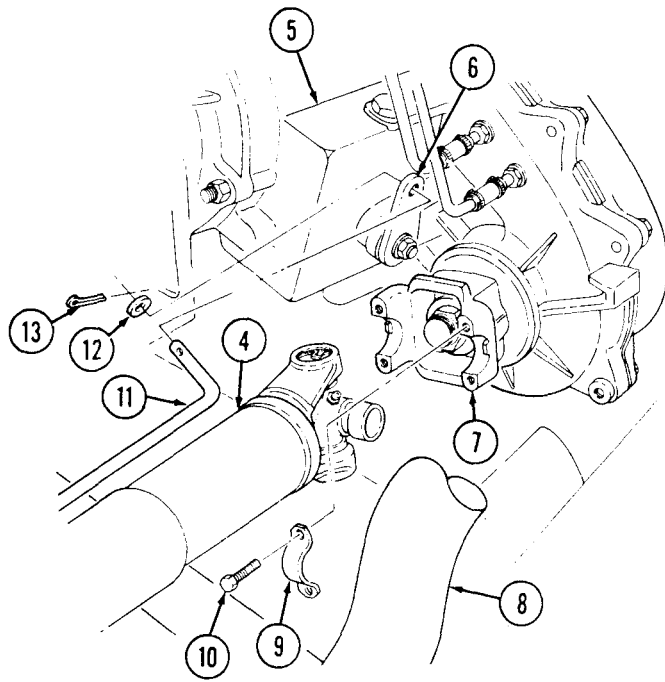
2. Remove four capscrews (10) and two bearing straps (9) from front propeller shaft assembly (4) and transfer case output yoke (7).
3. Remove four nuts (14), washers (15), and two U-bolts (16) from front propeller shaft assembly (4) and transfer case output yoke (7).
4. Remove cotter pin (13), washer (12), and transfer case shift rod (11) from transfer case shift lever (6). Discard cotter pin (13).
5. Remove two nuts (17), washers (18), capscrews (20), washers (18), and center bearing (19) from engine mount (21).
6. Move front propeller shaft assembly (4) forward, then rearward over top of transfer case (5) and pipe (8), and remove front propeller shaft assembly (4).

b. Inspection

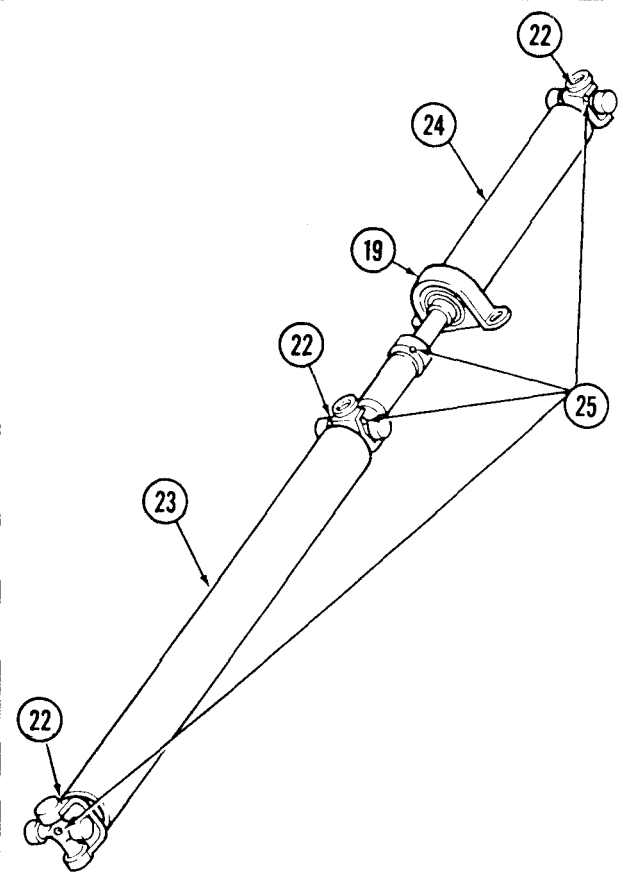
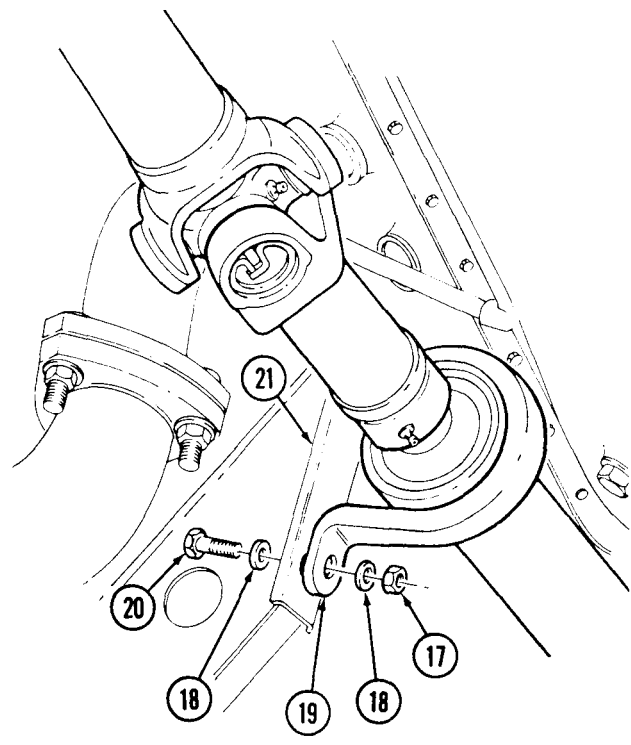
1. Inspect drive shaft (23) and coupling shaft (24) for cracks and damage. Replace either (para. 6-3) if cracked or damaged.
2. Inspect grease fittings (25) and universal joints (22) for serviceability. Replace universal joints (22) (para. 6-7) or grease fittings (25) if unserviceable.
3. Inspect center bearing (19) for roughness or damage. Replace coupling shaft (24) (para. 6-3) if center bearing (19) is rough or damaged.



6-2. FRONT PROPELLER SHAFT ASSEMBLY MAINTENANCE (Cont'd)



M1097
"A1" series
"A2" series



6-2. FRONT PROPELLER SHAFT ASSEMBLY MAINTENANCE (Cont'd)

c. Installation

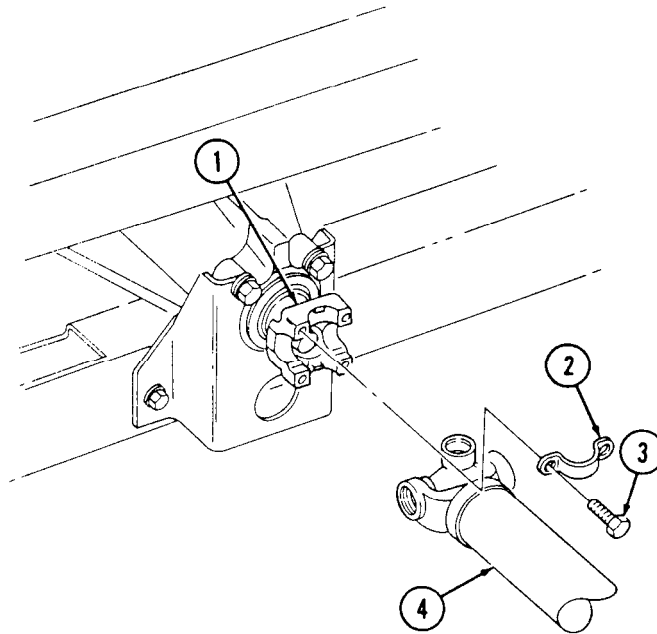
1. Install front propeller shaft assembly (4) over exhaust pipe (8) and over top of transfer case (5).
2. Install front propeller shaft assembly (4) on differential pinion yoke (1) with two bearing straps (2) and four capscrews (3). Tighten capscrews (3) to 13-18 lb-ft (18-24 N•m).
3. Install center bearing (19) on engine mount (21) with two washers (18), capscrews (20), washers (18), and nuts (17). Tighten capscrews (20) to 60 lb-ft (81 N•m).
4. Install transfer case shift rod (11) on transfer case shift lever (6) with washer (12) and cotter pin (13).

NOTE

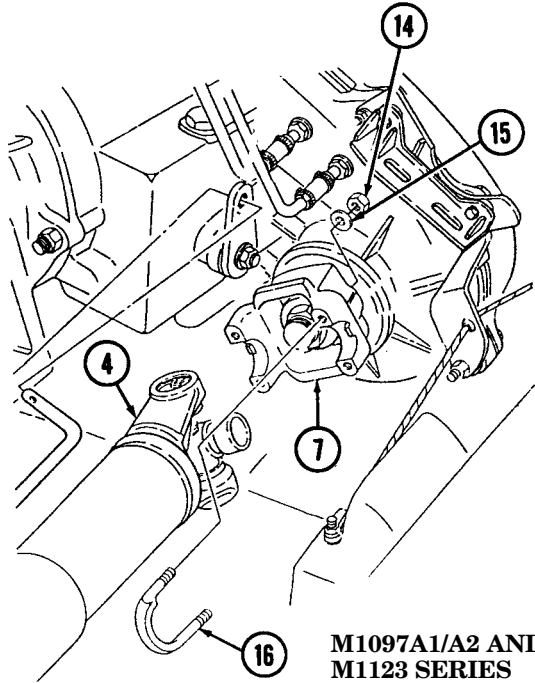
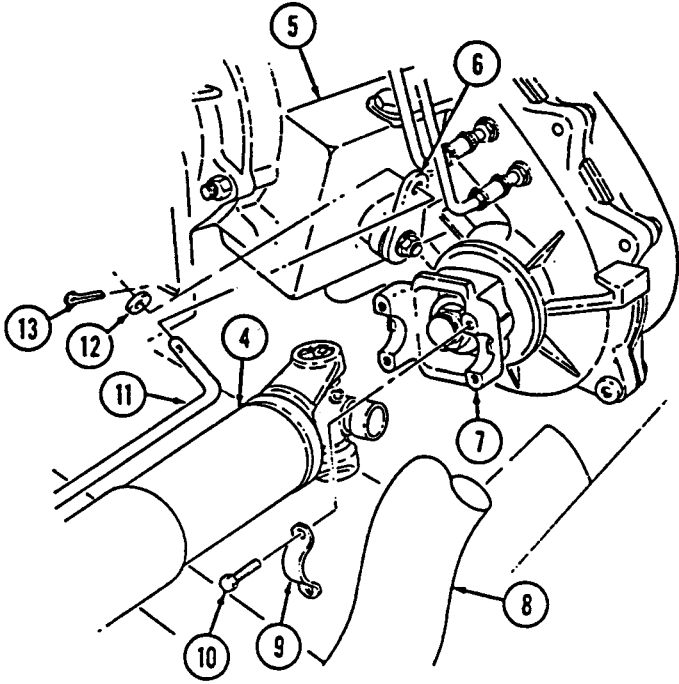
Step 5 applies to all vehicles except M1097, "A1" and "A2" series.

Step 6 applies to M1097, "A1" and "A2" series.

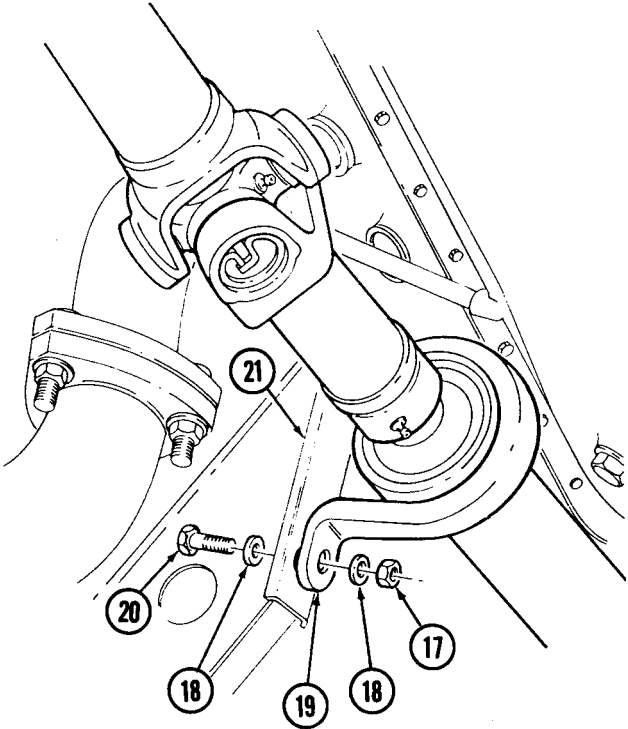
5. Install front propeller shaft assembly (4) on transfer case output yoke (7) with two bearing straps (9) and four capscrews (10). Tighten capscrews (10) to 13-18 lb-ft (18-24 N•m).
6. Install front propeller shaft assembly (4) on transfer case output yoke (7) with two U-bolts (16), four washers (15), and nuts (14). Tighten nuts (14) to 13-18, lb-ft (18-24 N•m).



6-2. FRONT PROPELLER SHAFT ASSEMBLY MAINTENANCE (Cont'd)



**M1097A1/A2 AND
M1123 SERIES**



FOLLOW-ON TASK: Lubricate propeller shaft assembly (TM 9-2320-280-10).

6-3. FRONT PROPELLER SHAFT ASSEMBLY REPAIR

This task covers:

- a. Disassembly
- c. Assembly
- b. Cleaning and Inspection

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

Front propeller shaft assembly removed
(para. 6-2).

Materials/Parts

Dust cap (Appendix G, Item 29)
Grease (Appendix C, Item 22)
Drycleaning solvent (Appendix C, Item 18)

General Safety Instructions

Cleaning will be done in a well-ventilated area and a fire extinguisher will be kept nearby when drycleaning solvent is used.

Manual References

TM 9-2320-280-24P

a. Disassembly

NOTE

Prior to disassembly, mark slip yoke and coupling shaft for assembly.

1. Place slip yoke (2) in vise.
2. Pull coupling shaft (4) apart from slip yoke (2).
3. Pry dust cap (3) off slippyoke (2). Discard dust cap (3).

b. Cleaning and Inspection

WARNING

Drycleaning solvent is flammable and will not be used near an open flame. A fire extinguisher will be kept nearby when the solvent is used. Use only in well-ventilated places. Failure to do this may result in injury to personnel and/or damage to equipment.

CAUTION

Do not allow drycleaning solvent to come into contact with U-joint. Damage to equipment will result.

1. Use drycleaning solvent to clean all metallic parts.
2. Inspect drive shaft (1), coupling shaft (4), and slip yoke (2) for cracks or dents. Replace if cracked or dented.
3. Inspect splined end of coupling shaft (4) and slip yoke (2) for damage. Replace either if damaged.
4. Inspect center bearing (5) for looseness, vibration damage, rubber separation from bearing surface, and abnormal wear. If damaged, replace coupling shaft (4).

6-3. FRONT PROPELLER SHAFT ASSEMBLY REPAIR (Cont'd)**c. Assembly**

NOTE

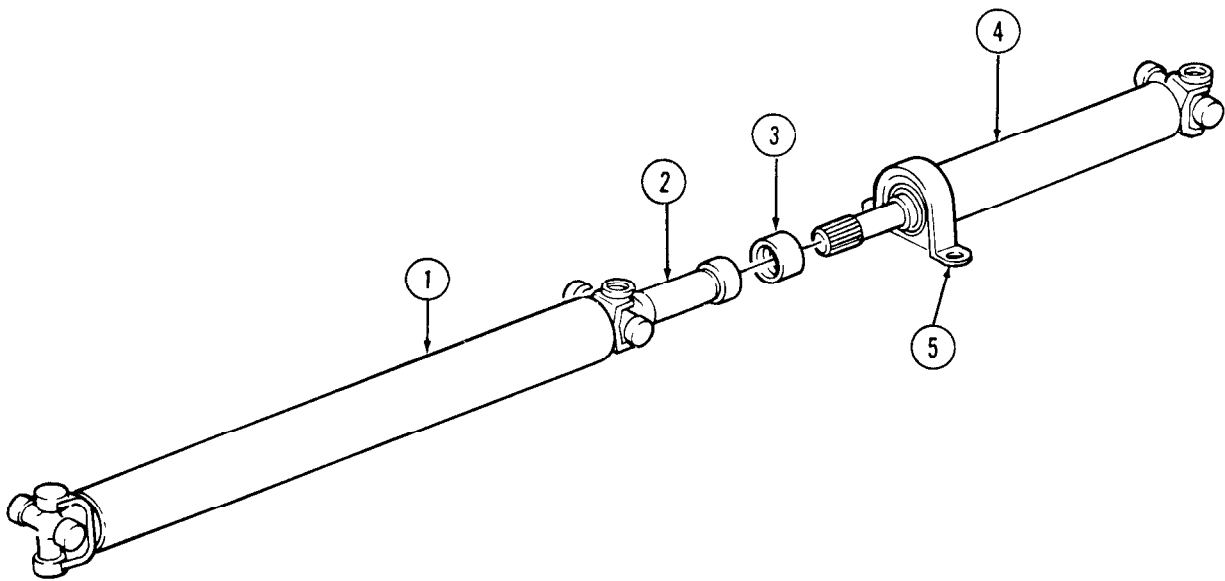
Ensure grease fitting on dust cap is aligned with wide spline in slip yoke.

1. Install dust cap (3) on coupling shaft (4).
2. Coat splines on coupling shaft (4) and slip yoke (2) with grease.

NOTE

Ensure wide spline on coupling shaft is aligned with grease fitting on slip yoke.

3. Install coupling shaft (4) and dust cap (3) into slip yoke (2).



FOLLOW-ON TASK: Install front propeller shaft assembly (para. 6-2).

6-4. REAR PROPELLER SHAFT MAINTENANCE

This task covers:

- | | |
|---|---|
| <ul style="list-style-type: none"> a. Removal b. Inspection | <ul style="list-style-type: none"> c. Installation |
|---|---|

INITIAL SETUP:

Applicable Models

All except M1097, "A1" and "A2" series

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Four lockwashers (Appendix G, Item 134)
Four lockwashers (Appendix G, Item 170)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

CAUTION

Prior to towing vehicle, parking brake rotor must be removed.

a. Removal

NOTE

On vehicles with serial numbers USBL Eff. 44825 and above, the propeller shaft is attached to the differential yoke instead of the parking brake rotor. Lockwashers and U-bolts are not used.

1. Chock wheels and release parking brake (TM 9-2320-280-10).
2. Remove four nuts (1), lockwashers (2), and two U-bolts (4) from rear propeller shaft (5) and transfer case output yoke (3). Discard lockwashers (2).
3. Remove four capscrews (8), lockwashers (7), and rear propeller shaft (5) from parking brake rotor (6). Discard lockwashers (7).

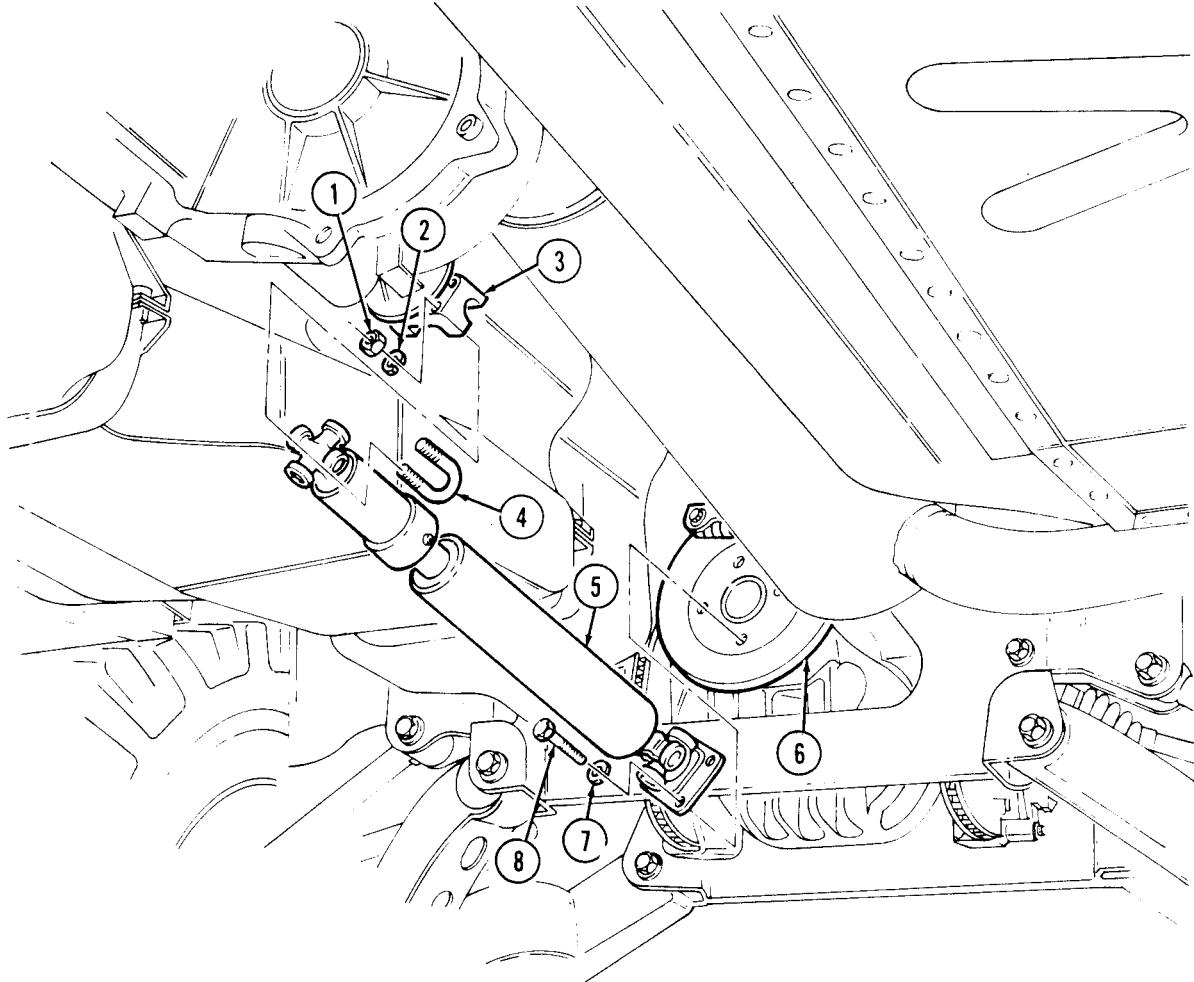
b. Inspection

1. Inspect propeller shaft (5) for cracks and dents. Replace if cracked or dented.
2. Inspect grease fittings and universal joints for serviceability. Replace universal joints (para. 6-7) or grease fittings if unserviceable.

c. Installation

1. Install rear propeller shaft (5) on parking brake rotor (6) with four lockwashers (7) and capscrews (8). Tighten capscrews (8) to 60 lb-ft (81 N•m).
2. Install rear propeller shaft (5) on transfer case output yoke (3) with two U-bolts (4), four lockwashers (2), and nuts (1). Tighten nuts (1) to 21 lb-ft (28 N•m).
3. Apply parking brake (TM 9-2320-280-10) and remove wheel chocks.

6-4. REAR PROPELLER SHAFT MAINTENANCE (Cont'd)



FOLLOW-ON TASK: Lubricate propeller shaft (TM 9-2320-280-10).

6-5. REAR PROPELLER SHAFT MAINTENANCE (1330 SERIES)

This task covers:

- a. Removal
- b. Inspection

c. Installation

INITIAL SETUP:

Applicable Models

M1097, "A1" and "A2" series

Manual References

TM 9-2320-280-10

TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

a. Removal

1. Chock wheels and release parking brake (TM 9-2320-280-10).
2. Remove four capscrews (6), two straps (5), and disconnect propeller shaft (3) from differential pinion yoke (4).
3. Slide propeller shaft end yoke (1) out of transfer case extension (2) and remove propeller shaft (3).

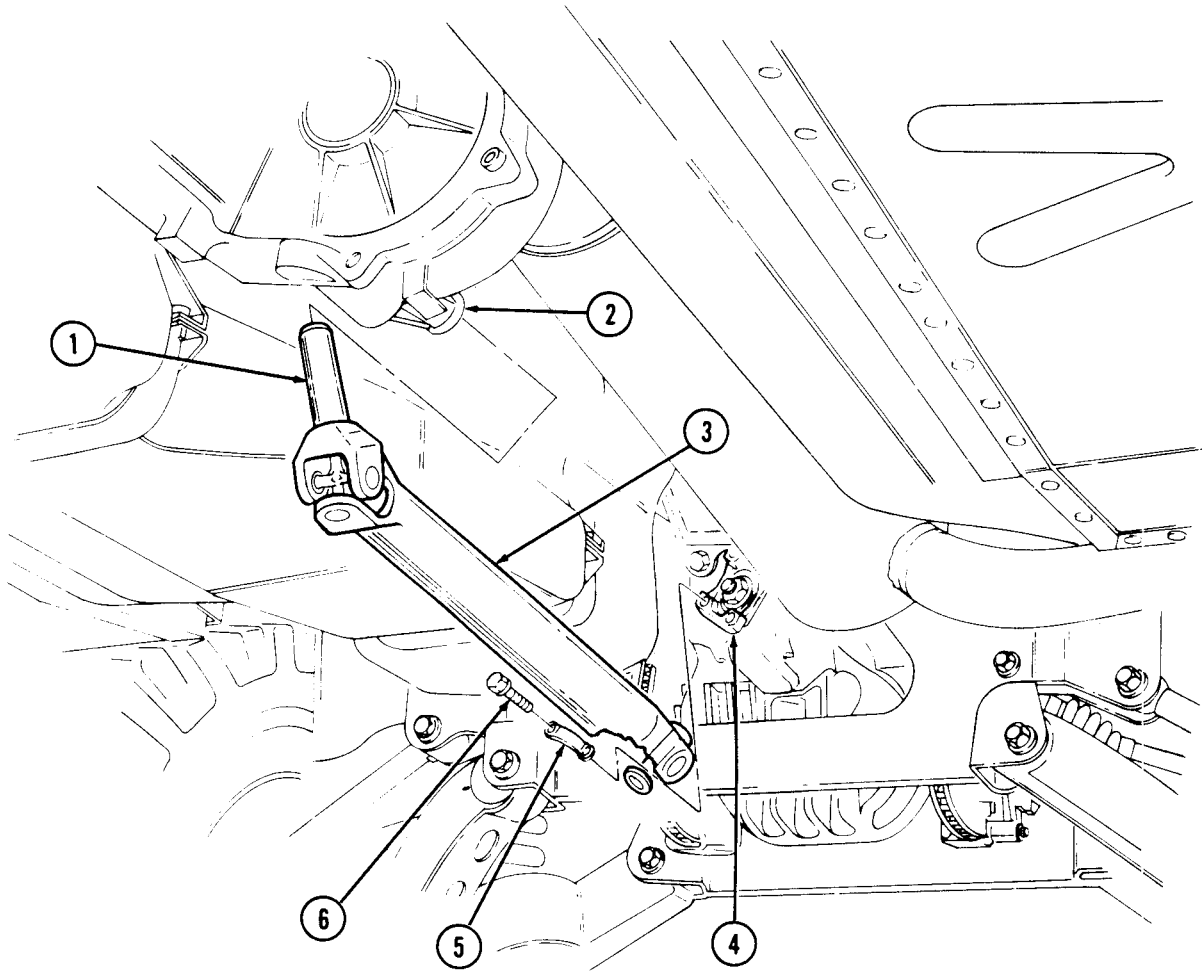
b. Inspection

1. Inspect propeller shaft (3) for cracks and dents. Replace if cracked or dented.
2. Inspect grease fittings and universal joints for serviceability. Replace universal joints (para. 6-6) or grease fittings if unserviceable.
3. Inspect splined end of end yoke (1) for damage. Replace end yoke (1) if damaged (para. 6-6).

c. Installation

1. Slide propeller shaft end yoke (1) on transfer case extension (2) and install propeller shaft (3).
2. Connect propeller shaft (3) to differential pinion yoke (4) with two straps (5) and four capscrews (6). Tighten capscrews (6) to 13-18 lb-ft (18-24 N•m).
3. Apply parking brake (TM 9-2320-280-10) and remove wheel chocks.

6-5. REAR PROPELLER SHAFT MAINTENANCE (1330 SERIES) (Cont'd)



FOLLOW-ON TASK: Lubricate propeller shaft (TM 9-2320-280-10).

6-6. REAR PROPELLER SHAFT REPAIR

This task covers:

- | | |
|--|---|
| <ul style="list-style-type: none"> a. Disassembly b. Cleaning and Inspection | <ul style="list-style-type: none"> c. Assembly |
|--|---|

INITIAL SETUP:

Tools

General mechanic's tool kit:
 automotive (Appendix B, item 1)
 Universal joint bearing kit
 (Appendix B, Item 171)

Materials/Parts

Dust cap (Appendix G, Item 29)
 Grease (Appendix C, Item 22)
 Drycleaning solvent (Appendix C, Item 18)

Manual References

TM 9-2320-280-24P

Equipment Condition

Rear propeller shaft removed (para. 6-4 or 6-5).

General Safety Instructions

Cleaning will be done in well-ventilated area and a fire extinguisher will be kept nearby when solvent is used.

a. Disassembly

NOTE

Prior to disassembly, mark slip yoke and propeller shaft for assembly.

1. Pull slip yoke (3) from propeller shaft (1).
2. Place slip yoke (3) into vise.
3. Pry dust cap (2) off of slip yoke (3). Discard dust cap (2).

b. Cleaning and Inspection

WARNING

Drycleaning solvent is flammable and will not be used near an open flame. A fire extinguisher will be kept nearby when solvent is used. Use only in well-ventilated area. Failure to do this may result in injury to personnel and/or damage to equipment.

CAUTION

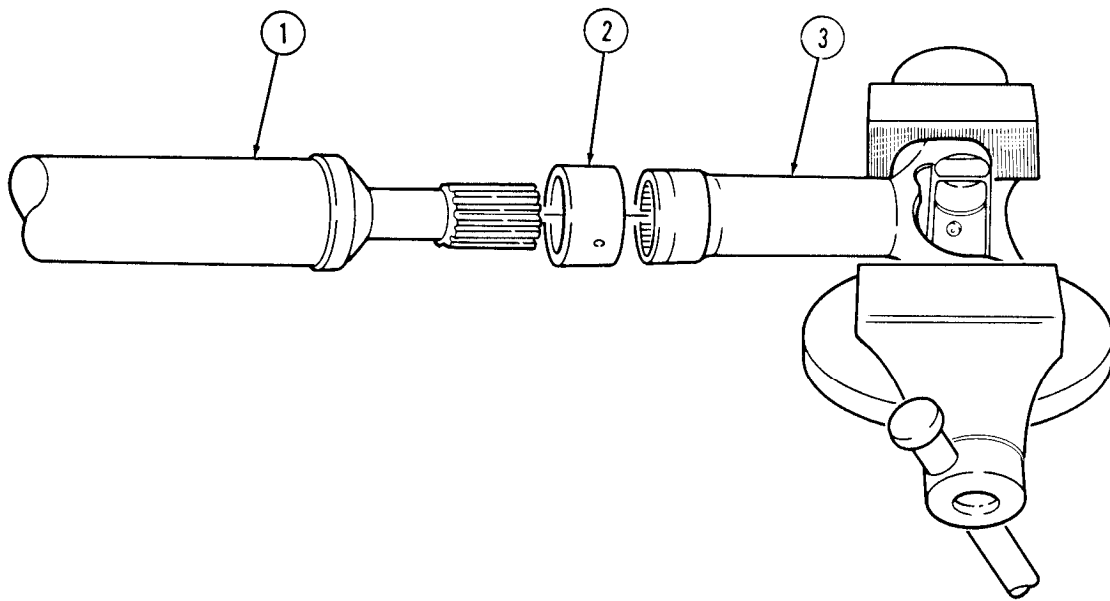
Do not allow drycleaning solvent to come into contact with U-joint. Damage to equipment will result.

1. Use drycleaning solvent to clean all metallic parts.
2. Inspect propeller shaft (1) and slip yoke (3) for cracks and damage. Replace if cracked or damaged.
3. Inspect splined end of propeller shaft (1) and splined end of slip yoke (3) for damage. Replace either if damaged.

c. Assembly

1. Install dust cap (2) on propeller shaft (1).
2. Coat spline on propeller shaft (1) and slip yoke (3) with grease.
3. Insert propeller shaft (1) into slip yoke (3) and install dust cap (2).

6-6. REAR PROPELLER SHAFT REPAIR (Cont'd)



FOLLOW-ON TASK: Install rear propeller shaft (para. 6-4).

6-7. UNIVERSAL JOINT REPAIR

This task covers:

a. Disassembly

b. Assembly

INITIAL SETUP:

Tools

General mechanic's tool kit:
 automotive (Appendix B, Item 1)
 Universal joint bearing kit
 (Appendix B, Item 171)

Materials/Parts

Universal parts kit (Appendix G, Item 66)

Personnel Required

One mechanic
 One assistant

Manual References

TM 9-2320-280-24P

Equipment Condition

Propeller shaft removed (para. 6-2 or 6-4).

NOTE

All universal joint replacement procedures are basically the same.
 This procedure covers the rear universal joint.

a. Disassembly

CAUTION

Do not drop bearing cups. Needle bearings can be easily lost.

1. Remove grease fitting (6) from cross (4).
2. Remove two bearing cups (1) from cross (4).
3. Remove two snaprings (2) from yoke (5).
4. Position propeller shaft (3) in vise with 1-1/8 in. socket between vise jaw and bearing cup (1) being removed. Ensure open end of socket is facing bearing cup (1).
5. Place 11/16 in. socket between opposite bearing cup (1) and vise jaw. Ensure open end of socket is facing vise jaw.
6. Press bearing cup (1) out of yoke (5) and remove bearing cup (1) from cross (4).
7. Reverse position of sockets and press remaining bearing cup (1) out of yoke (5).
8. Remove cross (4) from yoke (5).

b. Assembly

CAUTION

Ensure grease fitting on cross faces yoke. Damage to equipment will result if improperly installed.

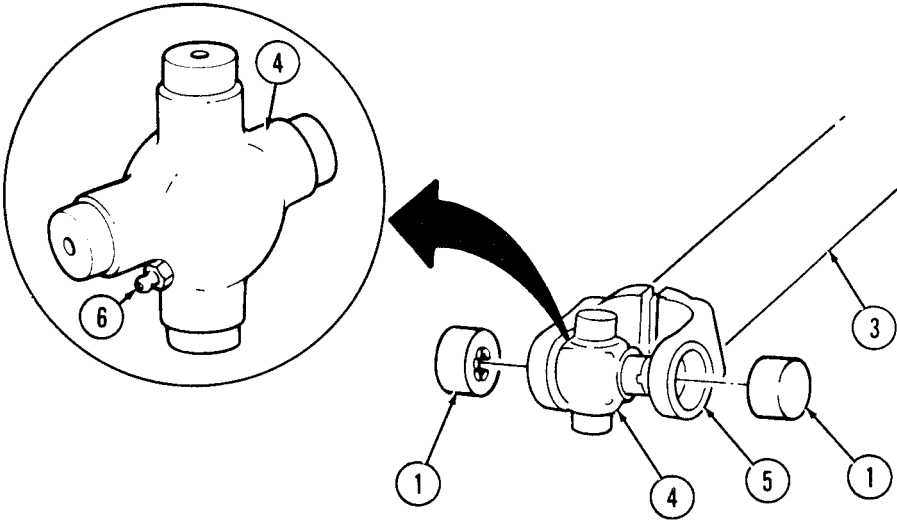
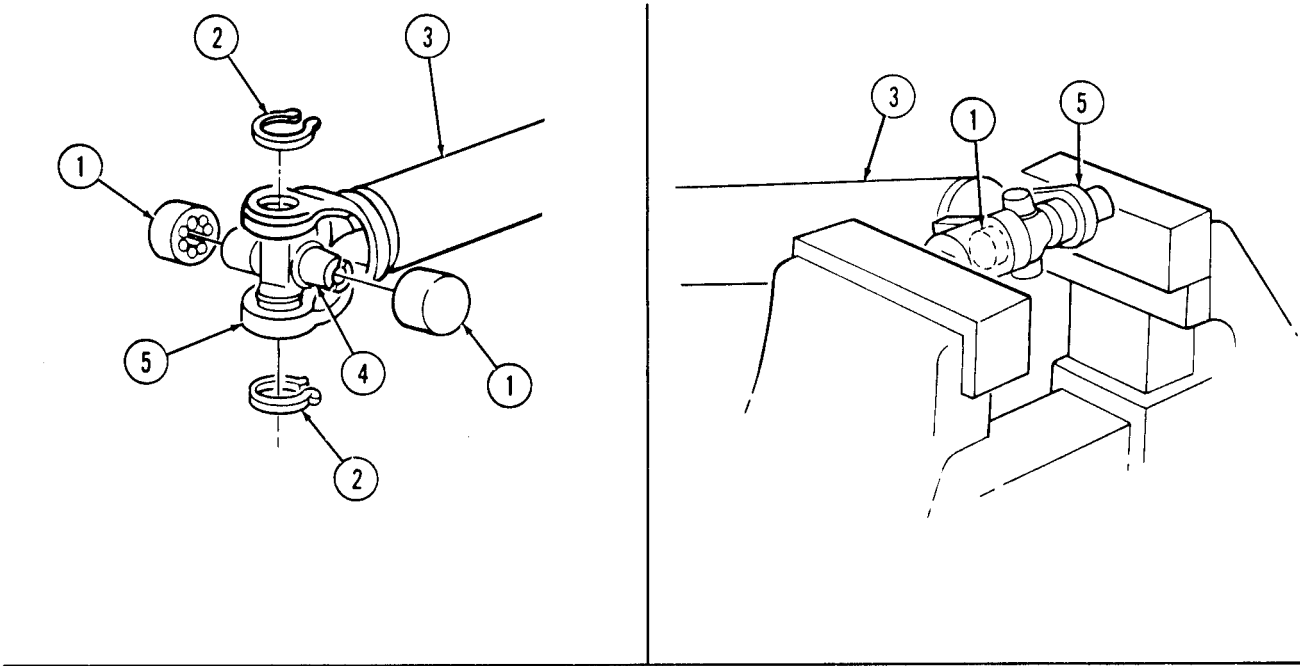
1. Install cross (4) into yoke (5).
2. Install bearing cup (1) into yoke (5).

CAUTION

Ensure bearing cup is aligned with yoke before pressing in with vise. Damage to cross and bearing cups will result if forced into yoke.

3. Place yoke (5) in vise with 11/16 in. socket between vise jaw and bearing cup (1).
4. Press bearing cup (1) into yoke (5) far enough to install snapring (2) and install snapring (2) into yoke (5).
5. Install bearing cup (1) into yoke (5).
6. Place yoke (5) in vise with 11/16 in. socket between bearing cup (1) and vise jaw.
7. Press bearing cup (1) into yoke (5) far enough to install snapring (2) and install snapring (2) into yoke (5).
8. Install two bearing cups (1) on cross (4).
9. Install grease fitting (6) into cross (4).

6-7. UNIVERSAL JOINT REPAIR (Cont'd)



FOLLOW-ON TASK: Install propeller shaft (para. 6-2 or 6-4).

Section II. FRONT AND REAR AXLES MAINTENANCE

6-8. FRONT AND REAR AXLES MAINTENANCE TASK SUMMARY

TASK PARA.	PROCEDURES	PAGE NO.
6-9.	Halfshaft Maintenance	6-17
6-10.	Geared Hub Side Cover Replacement	6-24
6-11.	Geared Hub Replacement	6-26
6-12.	Geared Hub Input Seal Replacement	6-32
6-13.	Geared Hub Spindle Seal Replacement	6-34
6-14.	Geared Hub Spindle Bearing Adjustment	6-38
6-15.	Wheel Stud Replacement	6-40
6-16.	Differential Vent Line Replacement	6-41
6-17.	Rear Geared Hub Vent Line Replacement	6-42
6-18.	Front Geared Hub Vent Line Replacement	6-44
6-19.	Steering Stop Maintenance	6-48
6-20.	Air Lifting Bracket Replacement	6-50
6-21.	Differential Cover Maintenance	6-52

6-9. HALFSHAFT MAINTENANCE

This task covers:

- | | |
|----------------------------|-----------------|
| a. Removal | d. Assembly |
| b. Disassembly | e. Installation |
| c. Cleaning and Inspection | |

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Boot service kit (fixed) (Appendix G, Item 7)
Boot service kit (plunged) (Appendix G, Item 7)
Retaining ring (Appendix G, Item 231)
Cotter pin (Appendix G, Item 12)
Six lockwashers (Appendix G, Item 145)
Lockwasher (Appendix G, Item 146)
Drycleaning solvent (Appendix C, Item 18)
Lithium grease (Appendix C, Item 25)
Sealing compound (Appendix C, Item 41)

Manual References

TM 9-2320-280-24P

Equipment Condition

Wheel removed (para. 8-3).

General Safety Instructions

Drycleaning solvent is flammable and will not be used near an open flame.

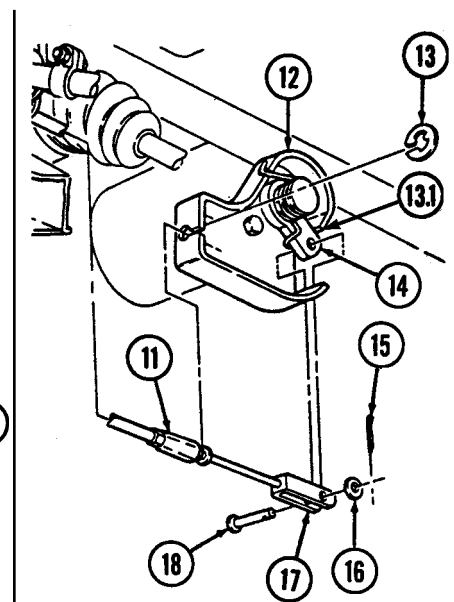
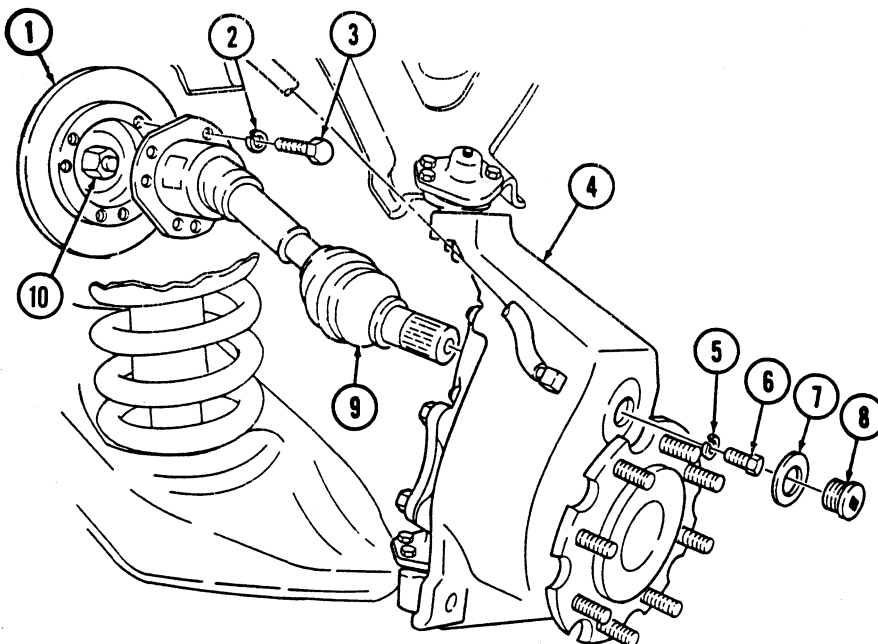
a. Removal

1. Remove access plug (8) and washer (7) from geared hub (4).
2. Remove halfshaft retaining capscrew (6) and lockwasher (5) from halfshaft (9) and geared hub (4). Discard lockwasher (5).
3. Remove six capscrews (3), lockwashers (2), and halfshaft (9) from rotor (1) and output flange (10). Discard lockwashers (2).

NOTE

Perform steps 4 and 5 for rear halfshafts only.

4. Remove cotter pin (15), washer (16), and clevis pin (18) from parking brake clevis (17) and lever (14). Discard cotter pin (15).
5. Remove retaining ring (13) and disconnect cable (11) from caliper cable bracket (12). Discard retaining ring (13).



6-9. HALFSHAFT MAINTENANCE (Cont'd)

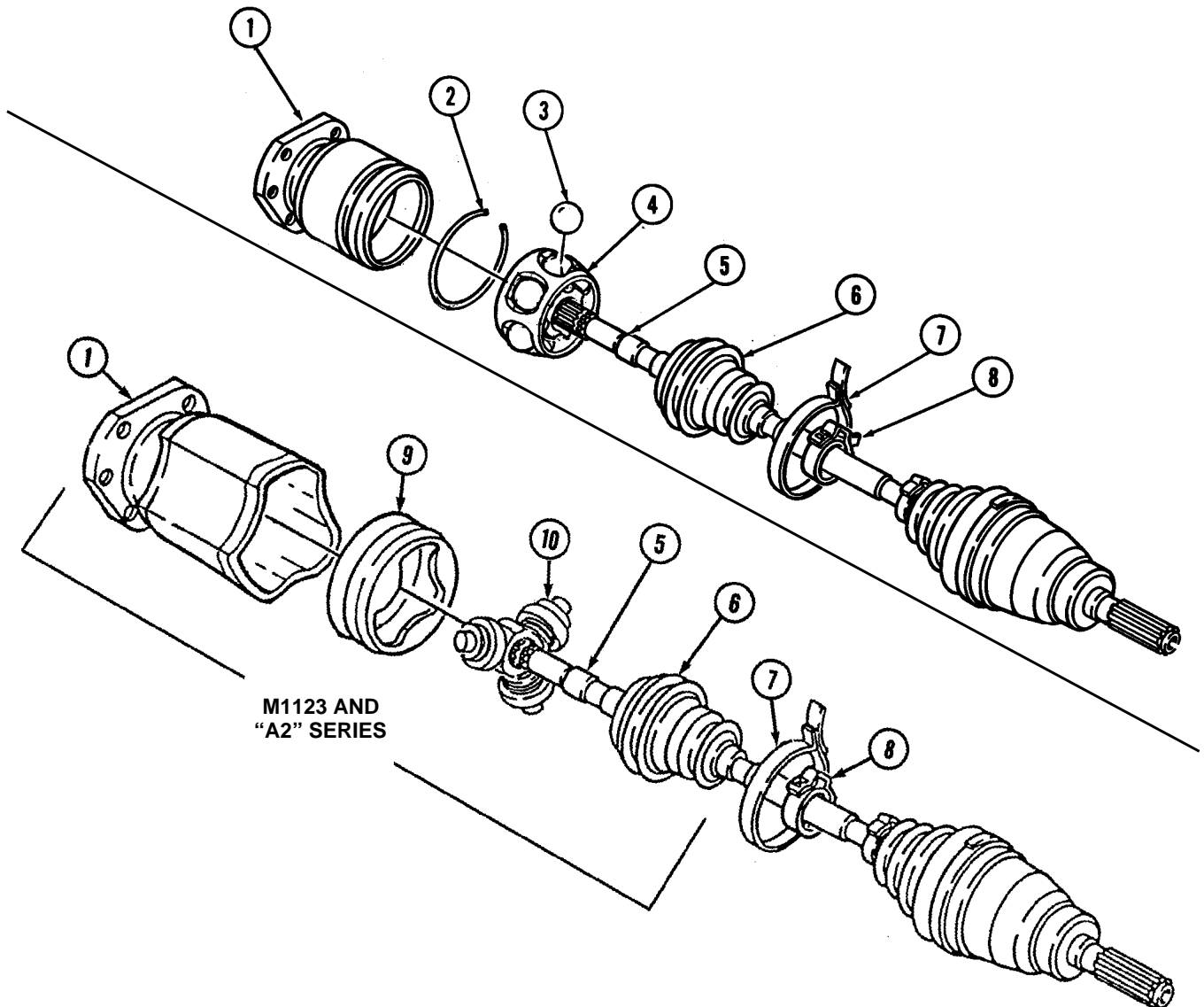
b. Disassembly

1. Loosen two clamps (7) and (8) securing inner boot (6) to inner joint (1) and shaft (5).
2. Clamp shaft (5) in soft-jawed vise.
3. Remove inner boot (6) from inner joint (1) and slide up on shaft (5).
4. Remove retainer clip (2) from inner joint (1).
5. Remove inner joint (1), retainer clip (2), and six ball bearings (3) from bearing assembly (4).

NOTE

Perform steps 5.1 through 5.3 for M1123 and "A2" series vehicles.

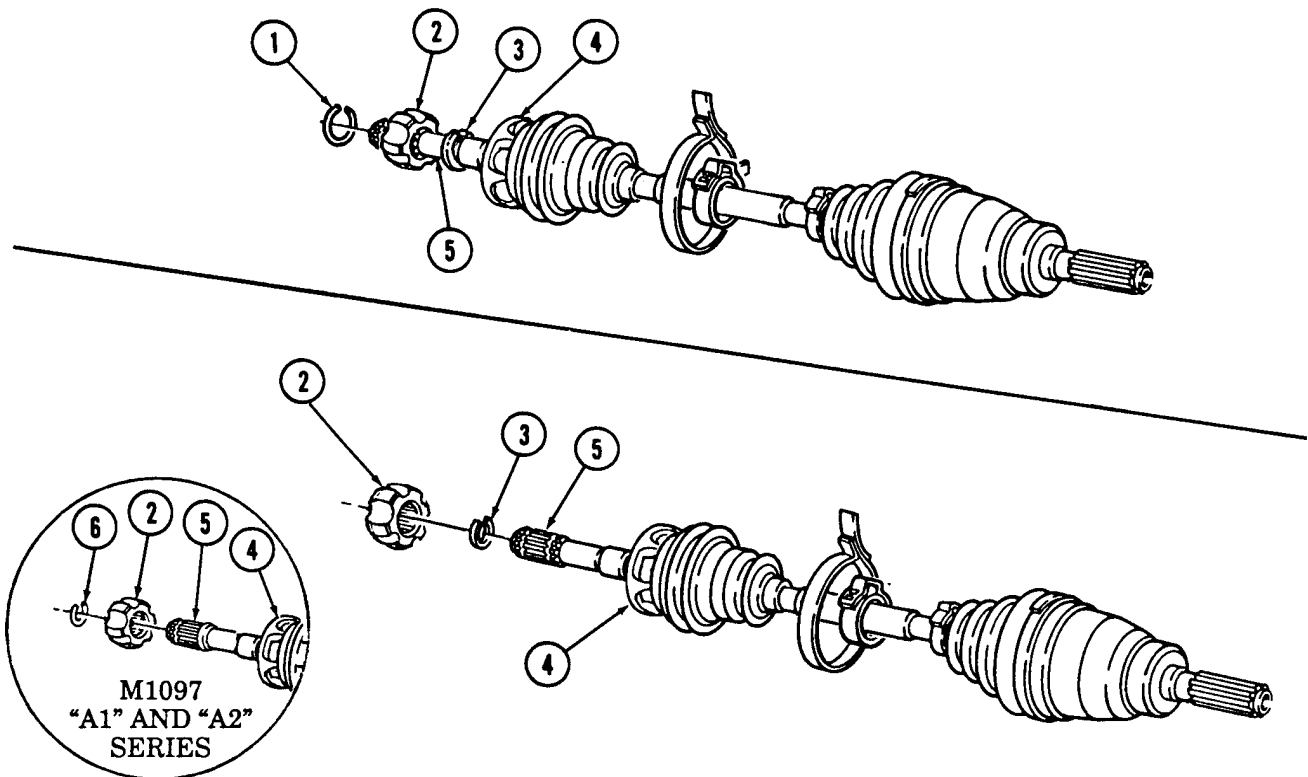
- 5.1. Remove inner boot (6) from insert (9) and slide up on shaft (5).
- 5.2. Remove inner joint (1) and insert (9) from spider assembly (10) and shaft (5).
- 5.3. Remove insert (9) from inner joint (1). Discard insert (9).



6-9. HALFSHAFT MAINTENANCE (Cont'd)

NOTE

- Remove excess grease from bearing assembly and separate ball race from inner race.
 - Perform steps 6 through 8 for all models except the M1097, "A1" and "A2" vehicles.
 - Perform steps 9 and 10 for M1097, "A1" and "A2" series vehicles.
6. Pry spacer (3) from groove on shaft (5) and slide spacer (3) and inner race (2) up on shaft (5).
 7. Remove retainer ring (1) from shaft (5). Discard retainer ring (1).
 8. Remove inner race (2), spacer (3), and ball race (4) from shaft (5). Discard spacer (3).
 9. Remove retainer ring (6) from shaft (5). Discard retainer ring (6).
 10. Remove inner race (2) and ball race (4) from shaft (5).



6-9. HALFSHAFT MAINTENANCE (Cont'd)

11. Remove inner boot (1) and clamps (2) and (3) from shaft (7). Discard boot (1) and clamps (2) and (3).
12. Remove shaft (7) from soft-jawed vise.
13. Loosen two boot clamps (4) and (5) securing outer boot (6) to outer joint (8) and shaft (7).
14. Remove outer boot (6) and clamps (5) and (4) from shaft (7). Discard boot (6) and clamps (5) and (4).

NOTE

Perform steps 15 through 17 for all models except the M1097 and "A1" and "A2" series vehicles.

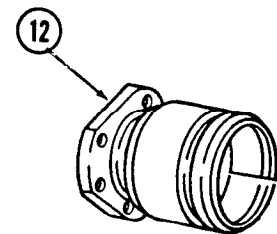
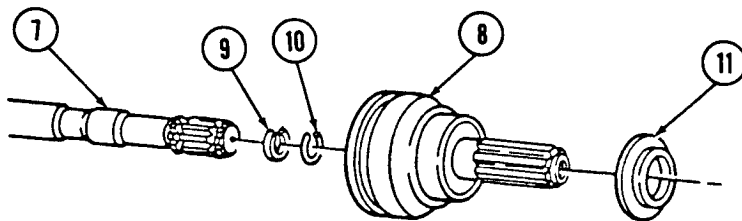
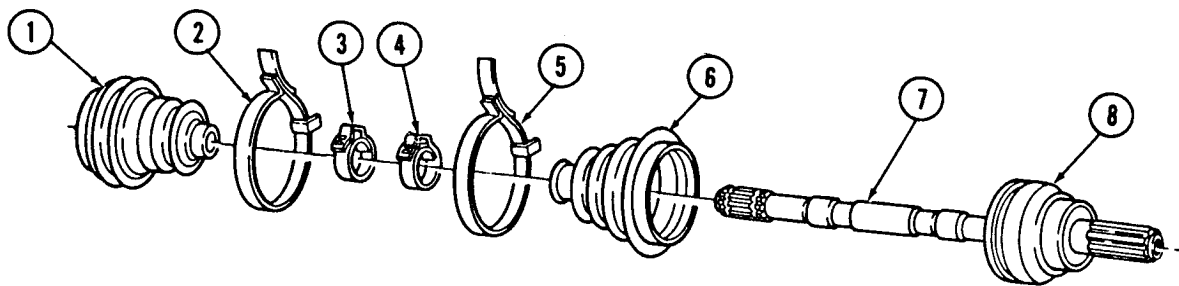
15. Remove slinger (11) from outer joint (8).
16. Remove outer joint (8) from shaft (7) using slide hammer.
17. Remove retainer ring (10) and spacer (9) from shaft (7). Discard retainer ring (10).

c. Cleaning and Inspection

WARNING

Drycleaning solvent is flammable and will not be used near an open flame. A fire extinguisher will be kept nearby when the solvent is used. Use only in well-ventilated places. Failure to do this may result in injury to personnel and/or damage to equipment.

1. Clean all metallic parts with drycleaning solvent.
2. Inspect shaft (7) for cracks and distortion. Replace shaft (7) if cracked or distorted.
3. Inspect splined end of shaft (7) for damage. Replace shaft (7) if damaged.
4. Inspect inner joint (12) for pitting or rough joint operation. Replace inner joint (12) if pitted or unserviceable.



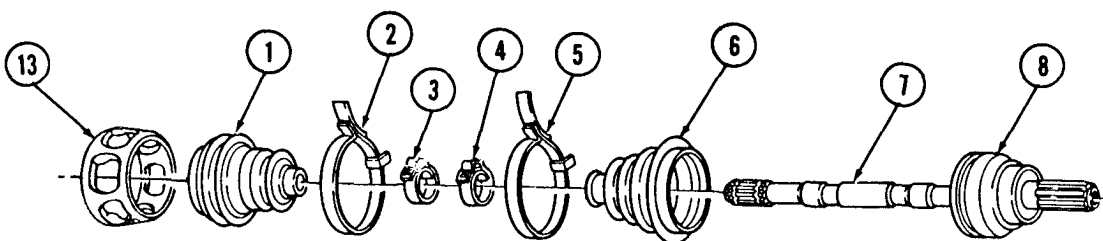
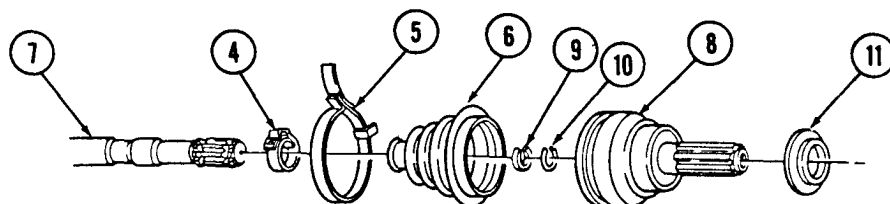
6-9. HALFSHAFT MAINTENANCE (Cont'd)

d. Assembly

NOTE

Perform steps 1 through 3 for all models except the M1097 and "A1" and "A2" series vehicles.

1. Install spacer (9) and retainer ring (10) on shaft (7).
2. Align splines on shaft (7) to outer joint (8) and push outer joint (8) onto shaft (7) until it snaps in place.
3. Install slinger (11) on outer joint (8).
4. Pack outer joint (8) with lithium grease.
5. Install outer boot (6) on shaft (7). Ensure boot (6) seats in groove of shaft (7).
6. Secure outer boot (6) on shaft (7) with clamp (4).
7. Install outer boot (6) on joint (8). Ensure boot (6) seats in groove of joint (8).
8. Secure outer boot (6) on joint (8) with clamp (5).
9. Clamp shaft (7) in soft-jawed vise.
10. Position clamps (3) and (2) on shaft (7).
11. Install inner boot (1) on shaft (7). Push boot (1) past groove on shaft (7).
12. Position ball race (13) on shaft (7).

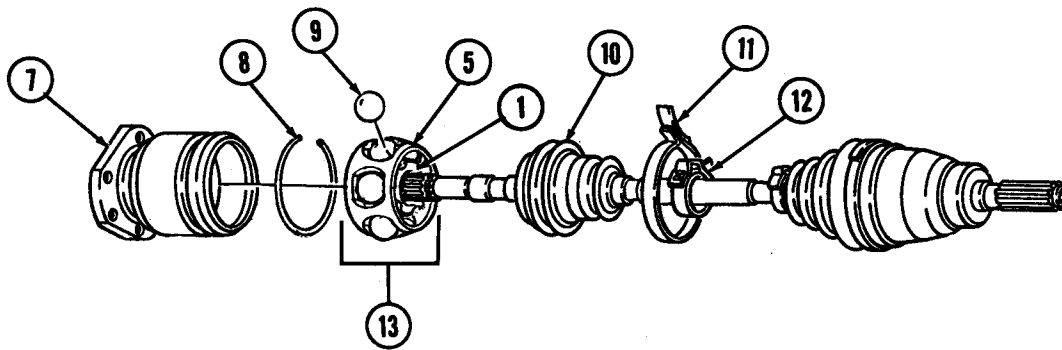
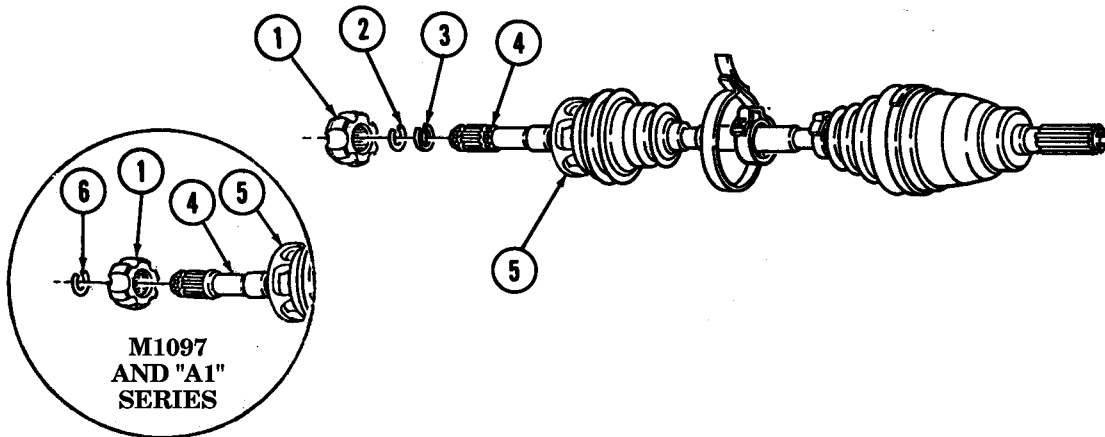


6-9. HALFSHAFT MAINTENANCE (Cont'd)

NOTE

- Perform steps 13 and 14 for all models except M1097, M1123, and "A1" and "A2" series vehicles.
- Perform steps 15 and 16 for M1097 and "A1" series vehicles.
- Perform steps 16.1 through 16.5 for M1123 and "A2" series vehicles.

13. Install spacer (3) and retainer ring (2) on shaft (4).
14. Align splines of inner race (1) with open spline of shaft (4). Use press to install inner race (1) until it snaps in place.
15. Align splines of inner race (1) with open spline on shaft (4). Use press to install inner race (1) on shaft (4) until inner race (1) seats into place.
16. Install retainer ring (6) in upper groove of shaft (4) behind inner race (1).



6-9. HALFSHAFT MAINTENANCE (Cont'd)

NOTE

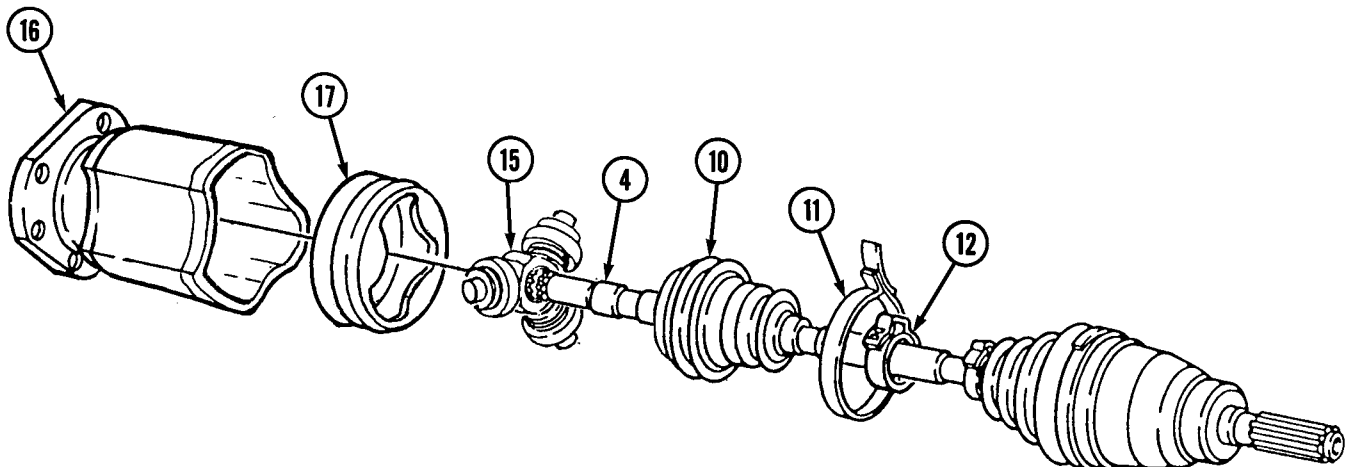
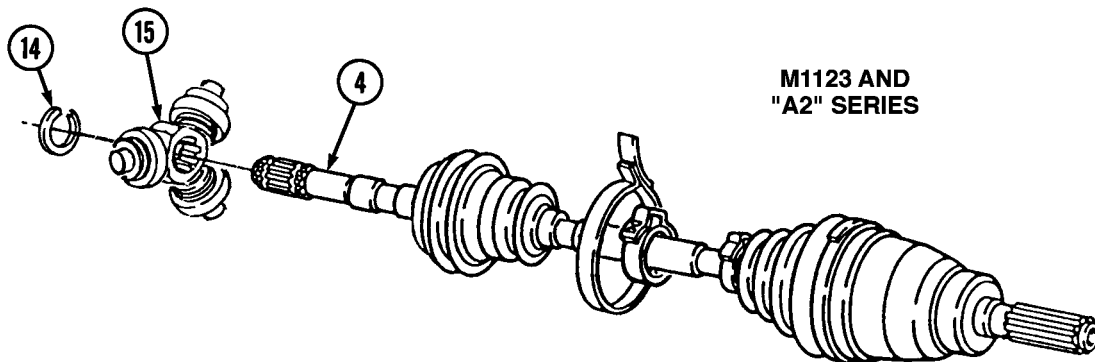
Coat spider assembly with lithium grease before installing on shaft.

- 16.1. Align splines of spider assembly (15) with open spline on shaft (4). Use press to install spider assembly (15) on shaft (4) until spider assembly (15) seats into place.
- 16.2. Install retainer ring (14) in pupper groove of shaft (4) behind spider assembly (15).
- 16.3. Pack inner joint (16) with lithium grease.
- 16.4. Install insert (17) on inner joint (15).
- 16.5. Install inner joint (16) and insert (17) on spider assembly (15) and shaft (4).
17. Position ball race (5) and six ball bearings (9) on inner race (1) and retain with lithium grease.
18. Position retainer clip (8) and inner joint (7) over bearing assembly (13).

NOTE

Ensure ball bearings are retained in ball race.

19. Secure retainer clip (8) in groove of inner joint (7).
20. Pack inner joint (7) with lithium grease.
21. Move inner boot (10) on shaft (4) until boot (10) seats in groove of shaft (4).
22. Secure inner boot (10) on shaft (4) with clamp (12).
23. Install inner boot (10) on inner joint (7). Ensure boot (10) seats in groove of joint (7).
24. Secure inner boot (10) on inner joint (7) with clamp (11).



6-9. HALFSHAFT MAINTENANCE (Cont'd)

e. Installation

1. Install halfshaft (9) into geared hub (4).
2. Apply sealing compound to halfshaft retaining capscrew (6) and install halfshaft (9) to geared hub (4) with lockwasher (5) and halfshaft retaining capscrew (6). Tighten halfshaft retaining capscrew (6) to 37 lb-ft (50 N•m).
3. Install washer (7) and access plug (8) into geared hub (4). Tighten access plug (8) to 8-13 lb-ft (11-18 N•m).

NOTE

Ensure all six capscrew holes in the rotor align with holes in output flange.

4. Apply sealing compound to six capscrews (3). Install halfshaft (9) to rotor (1) and output flange (10), with six lockwashers (2) and capscrews (3). Tighten capscrews (3) to 48 lb-ft (65 N•m).

NOTE

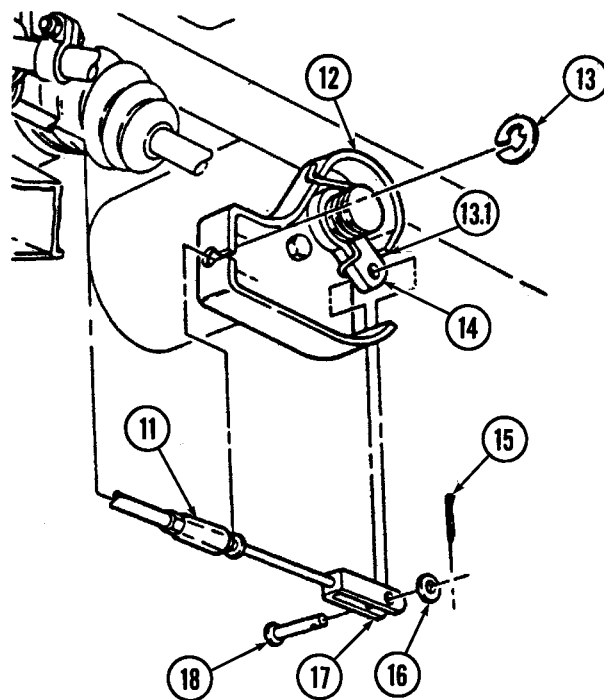
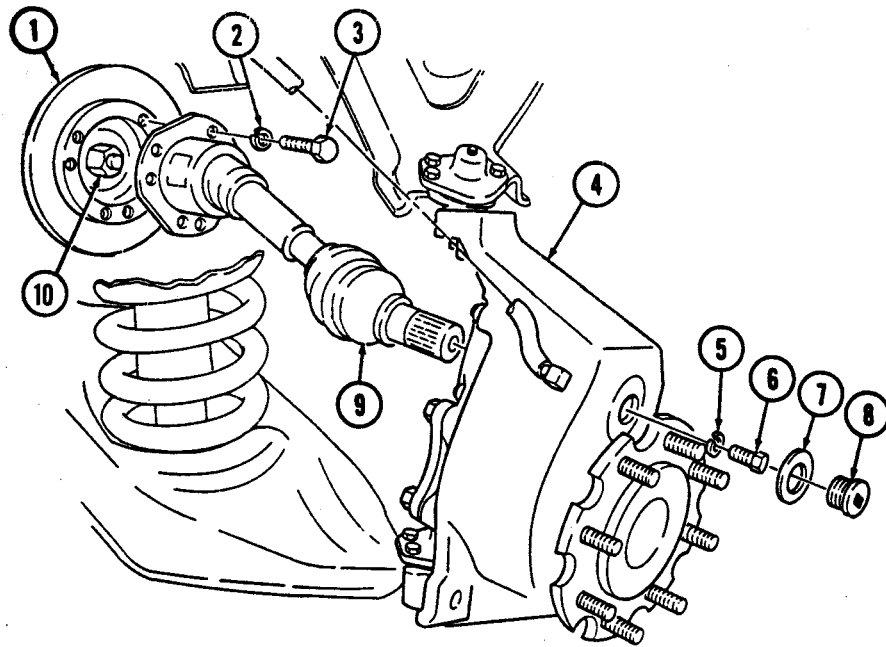
Perform steps 5 through 7 for rear halfshafts only.

5. Install parking brake cable (11) to caliper cable bracket (12) with retaining ring (13).

CAUTION

- Ensure lever is in contact with caliper cable bracket stop. Damage to equipment and poor performance will result if not aligned properly.
 - Ensure that the clevis and clevis pin are aligned in the lever. Do not move the lever to accommodate misadjusted clevis. Damage to equipment and poor performance may result.
6. Install parking brake clevis (17) to lever (14) with clevis pin (18), washer (16), and cotter pin (15). Check position of lever (13) and ensure it is in contact with caliper cable bracket stop (13.1).
 7. If lever (14) is not in contact with caliper cable bracket stop (13.1), adjust rear dual service parking brake (para. 7-26).

6-9. HALFSHAFT MAINTENANCE (Cont'd)



FOLLOW-ON TASK: Install wheel (para. 8-3).

6-10. GEARED HUB SIDE COVER REPLACEMENT

This task covers:

- a. Removal
- b. Cleaning and Inspection

- c. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Sealing compound (Appendix C, Item 46)
Sealant (Appendix C, Item 38)
Drycleaning solvent, (Appendix C, Item 18)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

Wheel removed (para. 8-3).

General Safety Instructions

Drycleaning solvent is flammable and will not be used near an open flame. A fire extinguisher will be kept nearby when the solvent is used. Use only in well-ventilated places.

NOTE

- Have drainage container ready to catch oil.
- Geared hub side cover replacement procedures are basically the same for front and rear covers. This procedure deals with the front side cover.

a. Removal

1. Remove drainplug (5) from geared hub (1) and drain geared hub (1).
2. Install drainplug (5) in geared hub (1).
3. Remove eight capscrews (4), washers (3), and side cover (2) from geared hub (1).

b. Cleaning and Inspection

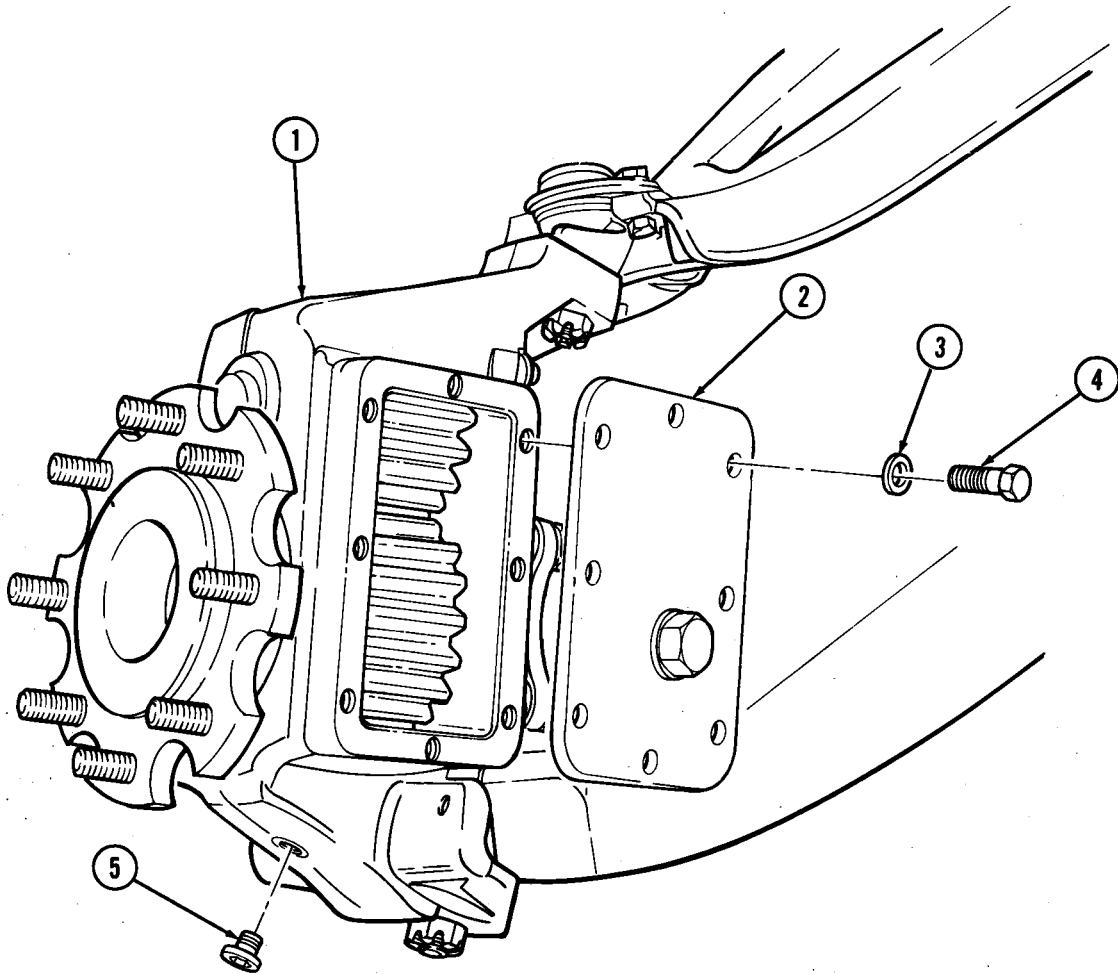
WARNING

Drycleaning solvent is flammable and will not be used near an open flame. A fire extinguisher will be kept nearby when the solvent is used. Use only in well-ventilated places. Failure to do this may result in injury to personnel and/or damage to equipment.

1. Using drycleaning solvent, clean side cover (2).
2. Inspect side cover (2) for damage. If damaged replace.

c. Installation

1. Apply sealant (RTV) to side cover (2) and install side cover (2) on geared hub (1).
2. Apply sealing compound to capscrews (4) and install eight washers (3) and capscrews (4) on side cover (2). Tighten capscrews (4) to 15 lb-ft (20 N·m).

6-10. GEARED HUB SIDE COVER REPLACEMENT (Cont'd)

FOLLOW-ON TASKS: • Fill geared hub to proper level (para. 2-11).
• Install wheel (para. 8-3).

6-11. GEARED HUB REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

- General mechanic's tool kit:
automotive (Appendix B, Item 1)
- Puller kit (Appendix B, Item 167)

Materials/Parts

- Three cotter pins (Appendix G, Item 14)
- Lockwasher (Appendix G, Item 146)
- Four locknuts (Appendix G, Item 79)
(Basic/A1 Series)
- Four locknuts (Appendix G, Item 128)
(Basic/A1 Series)
- Four locknuts (Appendix G, Item 104)
(A2 Series)
- Four locknuts (Appendix G, Item 105)
(A2 Series)
- Sealing compound (Appendix C, Item 45)
- Sealer (Appendix C, Item 39)

Personnel Required

- One mechanic
- One assistant

Manual References

- TM 9-2320-280-10
- TM 9-2320-280-24P

Equipment Condition

- Wheel removed (para. 8-3).
- Steering stop removed (para. 6-19).
- Air lifting bracket removed, rear only
(para. 6-20).

General Safety Instructions

Geared hub must be supported during removal and installation.

CAUTION

Use of a pickle fork in lieu of the puller kit may damage serviceable components (boots).

NOTE

- Have drainage container ready to catch drained fluid.
- Removal and installation procedures are basically the same for front and rear geared hubs. This procedure covers the front geared hub.

a. Removal

1. Remove drainplug (29) from geared hub (9) and drain geared hub (9).
2. Install drainplug (29) in geared hub (9).
3. Remove capscrew (22), washer (23), vent line bracket and clamp (24) from geared hub (9).
4. Loosen clamp (10) and disconnect vent line (1) from geared hub fitting (11).
5. Remove cotter pin (25), slotted nut (26), and washer (27) from tie rod end (28) and geared hub (9). Discard cotter pin (25).
6. Using puller, disconnect tie rod end (28) from geared hub (9).
7. Remove access plug (14), washer (15), axle halfshaft retaining capscrew (13), lockwasher (12) and disconnect halfshaft (20) from geared hub (9). Discard lockwasher (12).

WARNING

Geared hub must be supported during removal and installation. Failure to support geared hub may cause injury to personnel or damage to equipment.

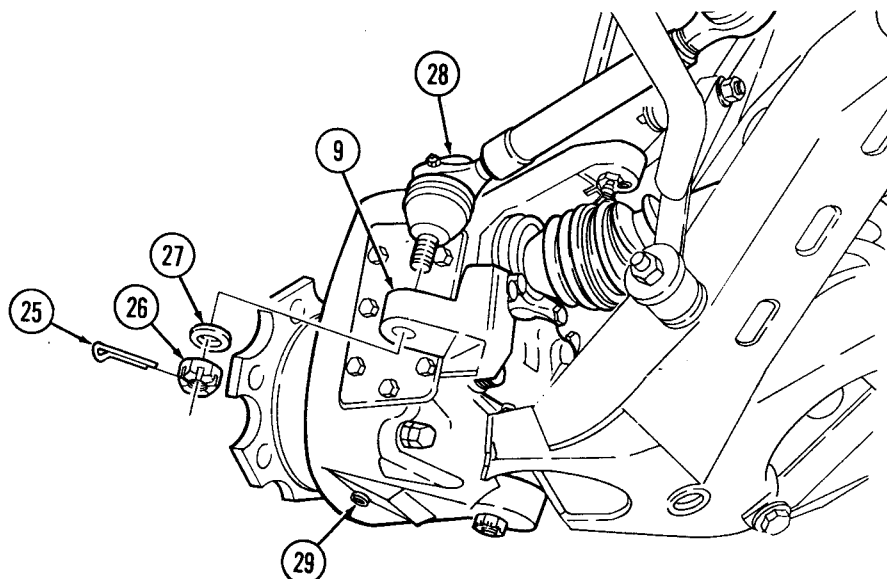
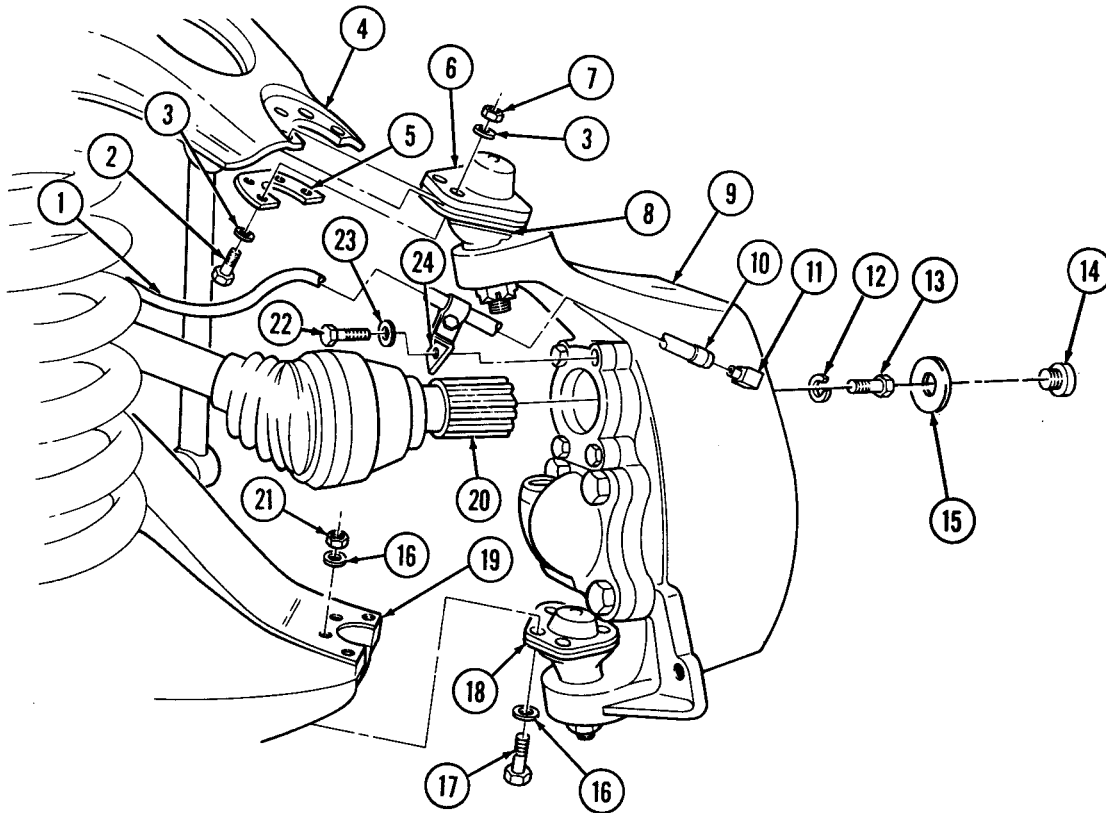
NOTE

Note direction of outer capscrew for installation.

8. Remove four locknuts (21), washers (16), capscrews (17), and washers (16) from lower ball joint (18) and lower control arm (19). Discard locknuts (21).

6-11. GEARED HUB REPLACEMENT (Cont'd)

9. Remove four locknuts (7), washers (3), capscrews (2), and washers (3) from boot retainer (8), ball joint retainer (5), upper ball joint (6) and upper control arm (4). Discard locknuts (7).
10. Lower support and remove geared hub (9).



6-11. GEARED HUB REPLACEMENT (Cont'd)

11. Place geared hub (3) in vise.
12. Remove cotter pin (8), slotted nut (9), and upper ball joint (10) from geared hub (3). Discard cotter pin (8).
13. Remove cotter pin (1), slotted nut (2), and lower ball joint (4) from geared hub (3). Discard cotter pin (1).

b. Installation

NOTE

Upper ball joint has grease fitting.

1. Install upper ball joint (10) to geared hub (3) with slotted nut (9), but do not tighten.
2. Install lower ball joint (4) to geared hub (3) with slotted nut (2), but do not tighten.

NOTE

- If geared hub received is P/N 5598766 and left front or right rear installation is required, replace steering arm cover P/N 5591279 with P/N 5591280 for basic and A1 vehicles and P/N 6005121 for M1123 and A2 vehicles.
 - If geared hub received is P/N 5598767 and right front or left rear installation is required, replace steering arm cover P/N 5591280 with P/N 5591279 for basic and A1 vehicles and P/N 6005120 for M1123 and A2 vehicles.
 - Use existing steering arm cover if serviceable.
 - Perform steps 3 through 5 for replacement of steering arm cover. Proceed to step 6 for geared hub installation.
3. Remove four capscrews (7), washers (6), and steering arm cover (5) from geared hub (3).

NOTE

Immediately install steering arm cover after application of sealant.

4. Clean sealing surfaces on geared hub (3) and steering arm cover (5). Apply anaerobic sealant to steering arm cover (5).
5. Apply sealing compound to threads on capscrews (7) and install steering arm cover (5) to geared hub (3) with four washers (6) and capscrews (7). Tighten capscrews (7) to 65 lb-ft (88 N•m).

WARNING

Geared hub must be supported during removal and installation. Failure to support geared hub may cause injury to personnel or damage to equipment.

6. Install geared hub (3) and upper ball joint (10) on upper control arm (13) ensuring upper ball joint (10) is placed above upper control arm (13), and boot (16) and ball joint retainer (14) are placed below upper control arm (13).

NOTE

Ensure outer capscrews on front ball joints are installed from top down, and inner capscrews are installed from bottom up for M1123 and "A2" series vehicles only.

7. Install upper ball joint (10) and ball joint retainer (14) to upper control arm (13) with four washers (12), capscrews (11), washers (12), and locknuts (15). Tighten locknuts (15) to 252 lb-in. (28 N•m).

CAUTION

Do not loosen slotted nut to install cotter pin. Doing this may result in damage to equipment.

8. Tighten slotted nut (9) on upper ball joint (10) to 65 lb-ft (88 N•m). Install cotter pin (8).
9. Apply sealing compound to halfshaft retaining capscrew (18) and install halfshaft (24) to geared hub (3) with lockwasher (17) and halfshaft retaining capscrew (18). Tighten halfshaft retaining capscrew (18) to 37 lb-ft (50 N•m).

6-11. GEARED HUB REPLACEMENT (Cont'd)

- 10. Install washer (20) and access plug (19) to geared hub (3). Tighten access plug (19) to 8-13 lb-ft (11-18 N•m).
- 11. Install lower ball joint (4) and geared hub (3) on lower control arm (23). Ensure lower ball joint (4) is below lower control arm (23).

NOTE

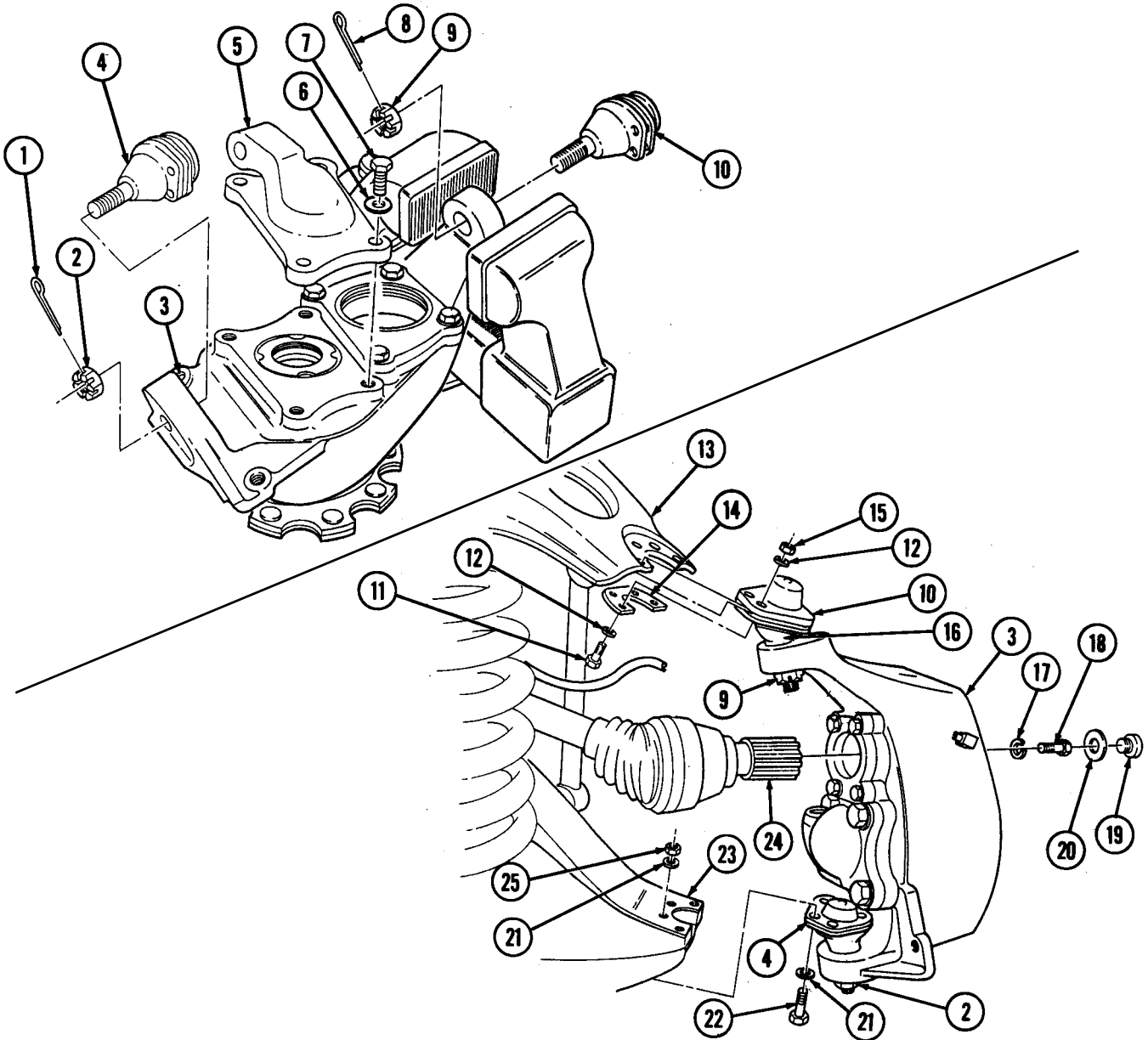
Ensure outer capscrews on front ball joints are installed from top down, and inner capscrews are installed from bottom up for M1123 and "A2" series vehicles only.

- 12. Secure lower ball joint (4) to lower control arm (23) with four washers (21), capscrews (22), washers (21), and locknuts (25). Tighten locknuts (25) to 35 lb-ft (47 N•m).

CAUTION

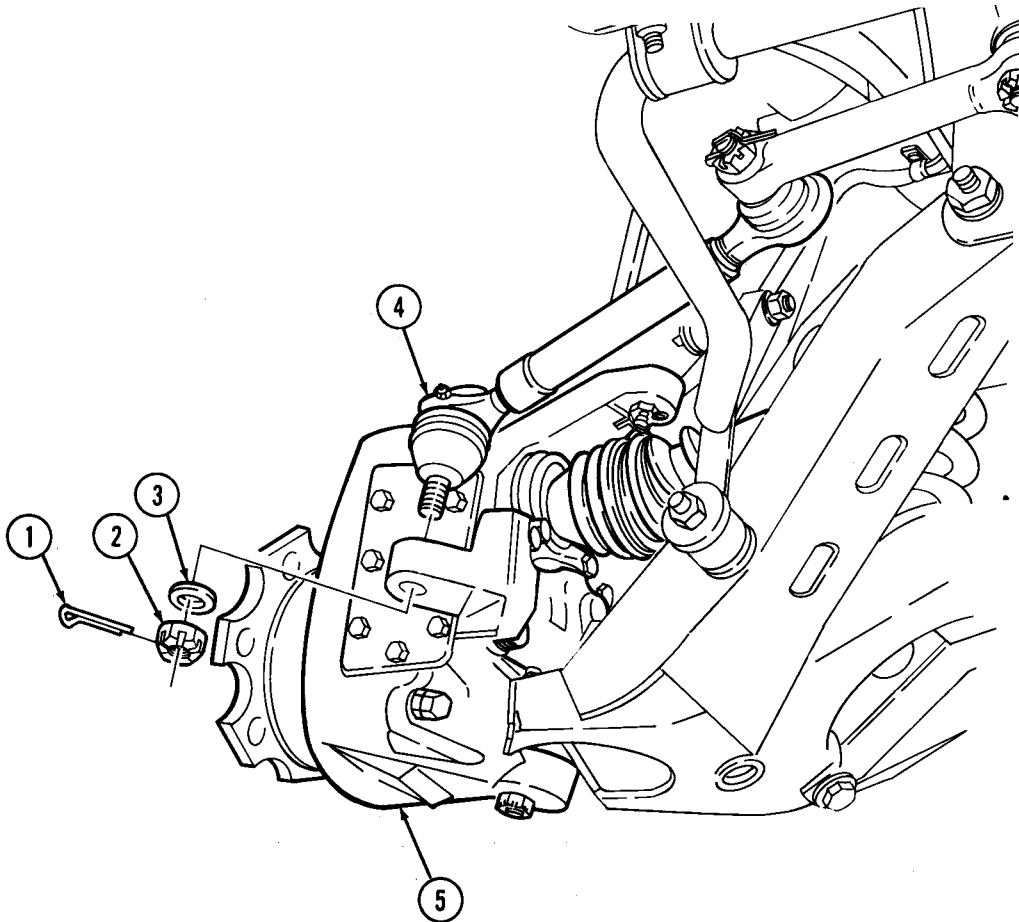
Do not loosen slotted nut to install cotter pin. Doing this may result in damage to equipment.

- 13. Tighten slotted nut (2) on lower ball joint (4) to 73 lb-ft (99 N•m). Install cotter pin (1).

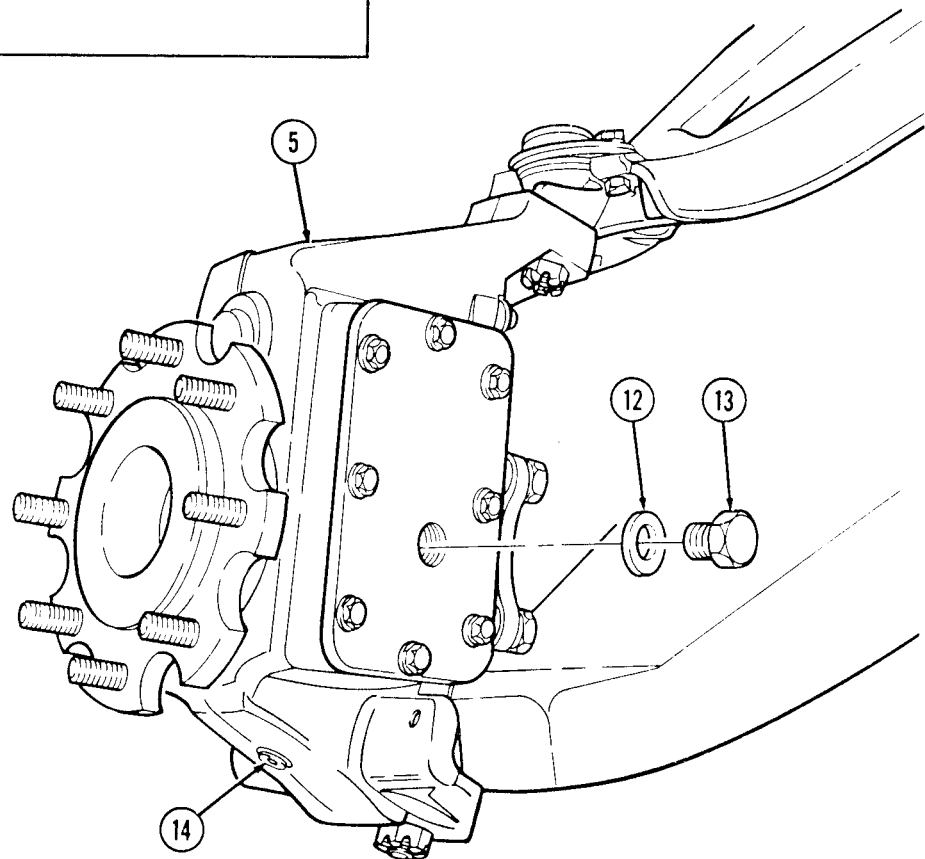
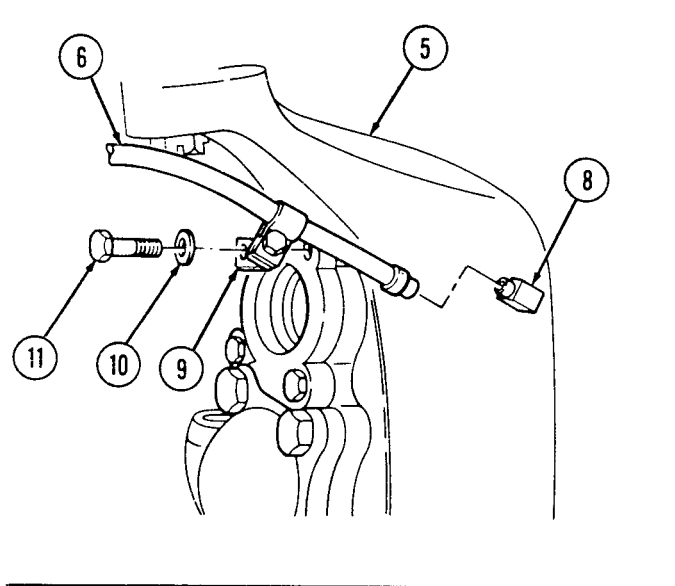


6-11. GEARED HUB REPLACEMENT (Cont'd)

14. Install tie rod end (4) into geared hub (5) with washer (3) and slotted nut (2). Tighten slotted nut (2) to 70 lb-ft (95 N•m). Install cotter pin (1).
15. Connect vent line (6) to geared hub fitting (8) with clamp (7).
16. Install vent line (6) and clamp (9) to geared hub (5) with washer (10) and capscrew (11). Tighten capscrew (11) to 38 lb-ft (52 N•m).
17. Tighten drainplug (14) to 8-13 lb-ft (18-18 N•m).
18. Remove fill plug (13) and washer (12) from geared hub (5).
19. Fill geared hub (5) to proper level (para. 2-11).
20. Install washer (12) and fill plug (13) to geared hub (5). Tighten fill plug (13) to 8-13 lb-ft (11-18 N•m).



6-11. GEARED HUB REPLACEMENT (Cont'd)



- FOLLOW-ON TASKS:**
- Install steering stop (para. 6-19).
 - Install wheel (para. 8-3).
 - Install air lifting bracket, rear only (para. 6-20).
 - Check alignment (paras. 8-10 and 8-11).

6-12. GEARED HUB INPUT SEAL REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

- General mechanic’s tool kit:
 - automotive (Appendix B, Item 1)
 - Vise insert (Appendix B, Item 170)

Special Tools

- Installer (Appendix B, Item 126)
- Driver handle (Appendix B, Item 75)

Materials/Parts

- Plain seal (Appendix G, Item 290)
- Lubricating oil (Appendix C, Item 26)

Manual References

- TM 9-2320-280-24P

Equipment Condition

- Halfshaft removed (para. 6-9).

a. Removal

NOTE

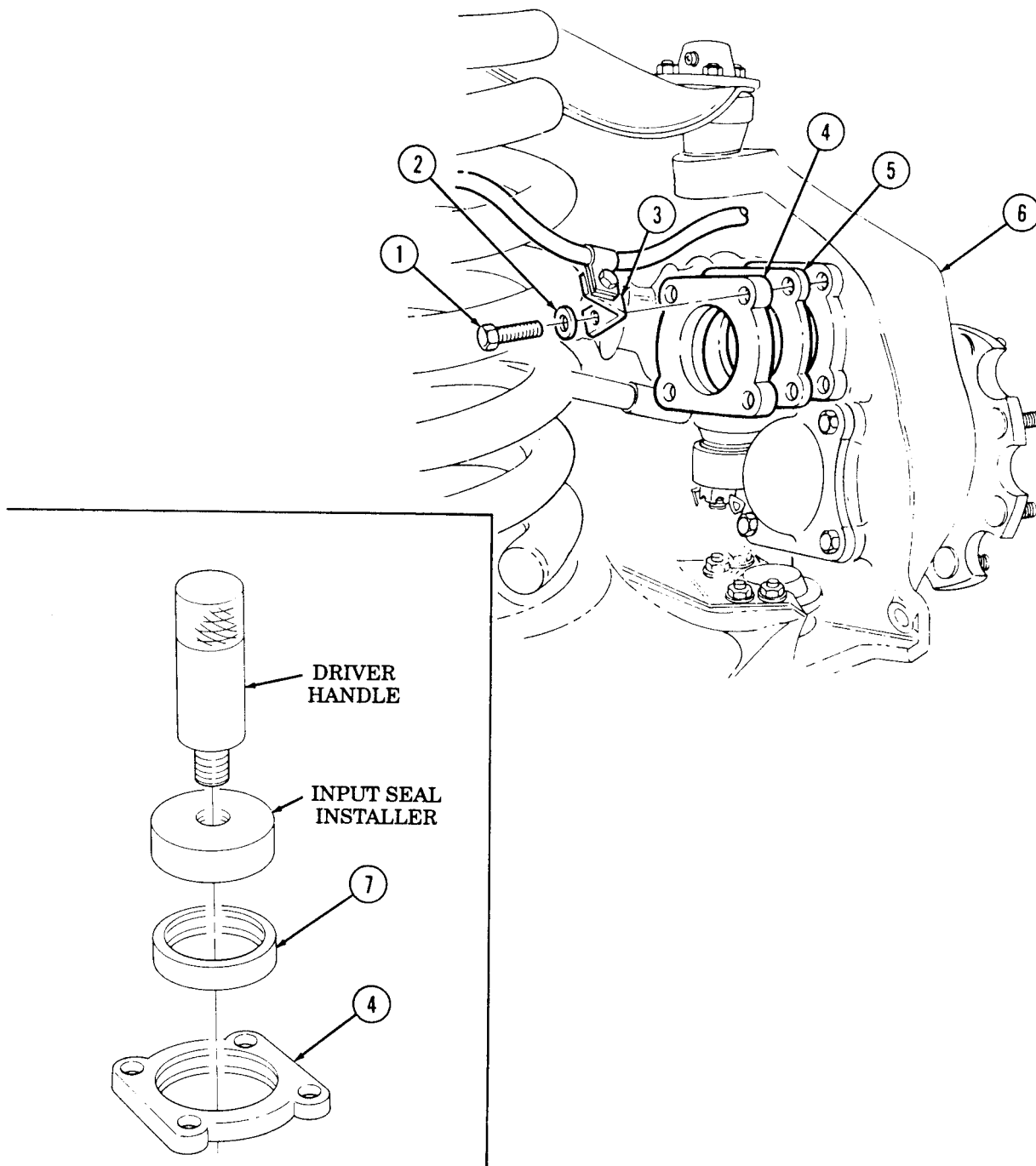
Shim gaskets must be reused to maintain proper drive gear bearing adjustment.

1. Remove capscrew (1), washer (2), and vent line bracket (3) from drive gear retainer (4).
2. Remove three capscrews (1), washers (2), drive gear retainer (4), and shim gasket(s) (5) from geared hub (6).
- 3. Install drive gear retainer (4) in vise with inserts and remove seal (7). Discard seal (7).

b. Installation

- 1. Using driver handle and input seal installer, install seal (7) in drive gear retainer (4). Ensure radius on outer diameter of seal (7) faces toward inside of geared hub (6).
2. Install shim gasket(s) (5) and drive gear retainer (4) to geared hub (6) with three washers (2) and capscrews (1). Tighten capscrews (1) to 38 lb-ft (52 N.m).
3. Install vent line bracket (3) to drive gear retainer (4) with washer (2) and capscrew (1). Tighten capscrew (1) to 38 lb-ft (52 N.m).
- 4. Coat lip of seal (7) with lubricating oil.

6-12. GEARED HUB INPUT SEAL REPLACEMENT (Cont'd)



FOLLOW-ON TASK: Install halfshaft (para. 6-9).

6-13. GEARED HUB SPINDLE SEAL REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Special Tools

Wrench (Appendix B, Item 127)
Installer (Appendix B, Item 128)
Driver handle (Appendix B, Item 75)

Equipment Condition

Wheel removed (para. 8-3).

Materials/Parts

Key washer (Appendix G, Item 65)
Plain encased seal (Appendix G, Item 291)
Grease (Appendix C, Item 22)
Sealer (Appendix C, Item 39)
Lubricating oil (Appendix C, Item 29)
Sealing compound (Appendix C, Item 45)

General Safety Instructions

Ensure locktab on key washer is bent completely into slot on retaining nut.

a. Removal

NOTE

Have drainage container ready to catch oil.

1. Remove drainplug (2) from geared hub (1) and drain geared hub (1). Install drainplug (2) in geared hub (1). Tighten drainplug (2) to 8-13 lb-ft (11-18 N•m).
2. Remove four capscrews (5), washers (4), and steering arm cover (3) from geared hub (1).

NOTE

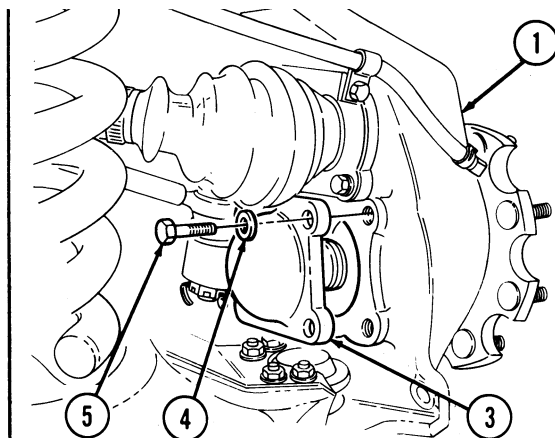
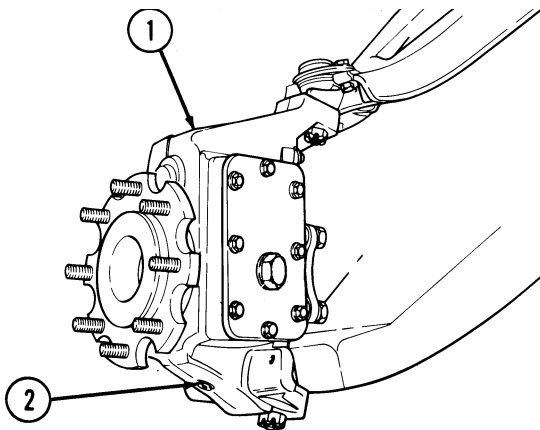
For new configuration, two locktabs on key washer must be bent away from retaining nut for removal.

3. Bend locktab on key washer (13) away from retaining nut (14).

NOTE

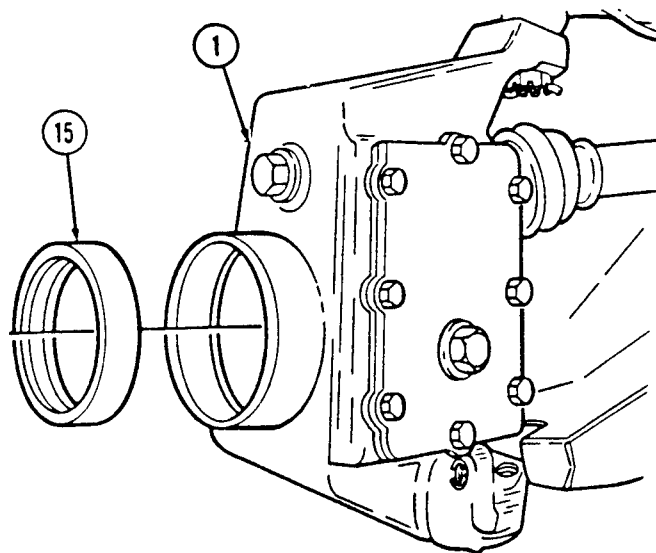
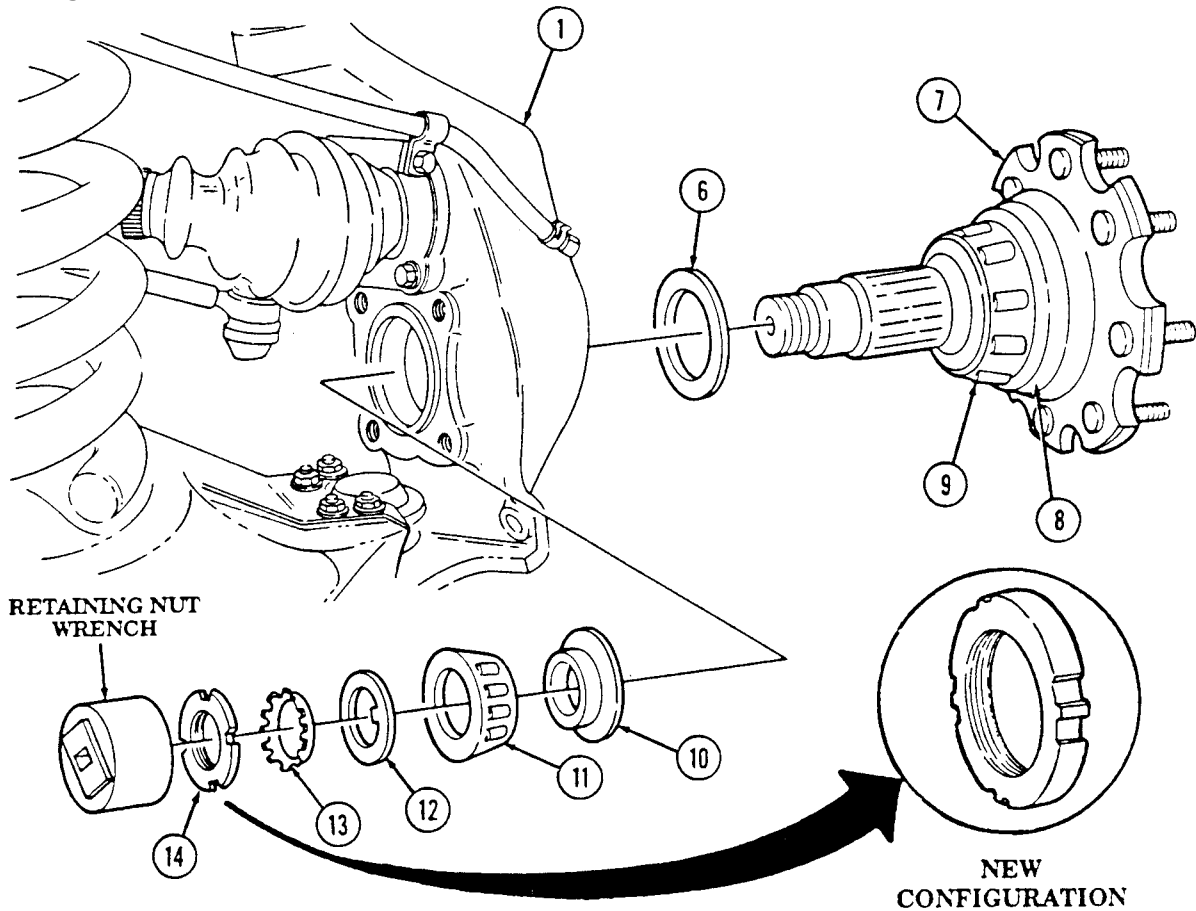
If four-slotted retaining nut TN-07 is present, it is recommended to replace it with eight-slotted retaining nut 12342680.

4. Using retaining nut wrench, remove retaining nut (14), key washer (13), and keyed washer (12) from spindle (7). Discard key washer (13).



6-13. GEARED HUB SPINDLE SEAL REPLACEMENT (Cont'd)

5. Remove spindle (7), spacer (6), bearing(11), and spacer (10) from geared hub (1).
6. Remove spindle seal (15) from geared hub (1). Discard spindle seal (15).
7. Inspect spindle (7) for rough or corroded sealing surface (8). Replace geared hub (1) (para. 6-11) if spindle (7) is damaged.
8. Inspect bearings (9) and (11) for damage. Replace geared hub (1) (para. 6-11) if bearing (9) or (11) is damaged.



6-13. GEARED HUB SPINDLE SEAL REPLACEMENT (Cont'd)

b. Installation

1. Using driver handle and spindle seal installer, install spindle seal (1) in geared hub (2).
2. Coat spindle seal (1) with lubricating oil.
3. Install spacer (3) and spindle (4) in geared hub (2).
4. Apply grease to face of retaining nut (9).

NOTE

- If four-slotted retaining nut TN-07 is present, it is recommended to replace it with eight-slotted retaining nut 12342680.
- Ensure lip of spacer faces the bearing for a proper fit.

5. Install spacer (5), bearing (6), keyed washer (7), key washer (8), and retaining nut (9) on spindle (4).
6. Using retaining nut wrench, tighten retaining nut (9) to 35-45 lb-ft (47-61 N•m).
7. Rotate spindle (4) five full rotations clockwise and five full rotations counter clockwise to properly seat bearings.
8. Loosen retaining nut (9) until it is finger tight, then retighten nut to 23-27 lb-ft (31-37 N•m).

WARNING

Ensure locktab on key washer is bent completely into slot on retaining nut. Eight-slotted retaining nut provides additional security by enabling two locktabs on key washer to be bent into slots on retaining nut. Failure to do this may cause injury to personnel or damage to equipment.

NOTE

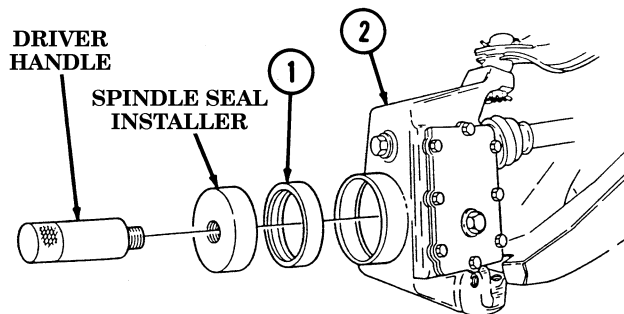
- For new configuration, two locktabs on key washer must be bent into slots on retaining nut.
- It may be necessary to slightly loosen or tighten retaining nut to gain proper alignment with locktabs.

9. Determine which locktab (10) on key washer (8) aligns with slot (11) in retaining nut (9). Bend locktab (10) into slot (11) on retaining nut (9).

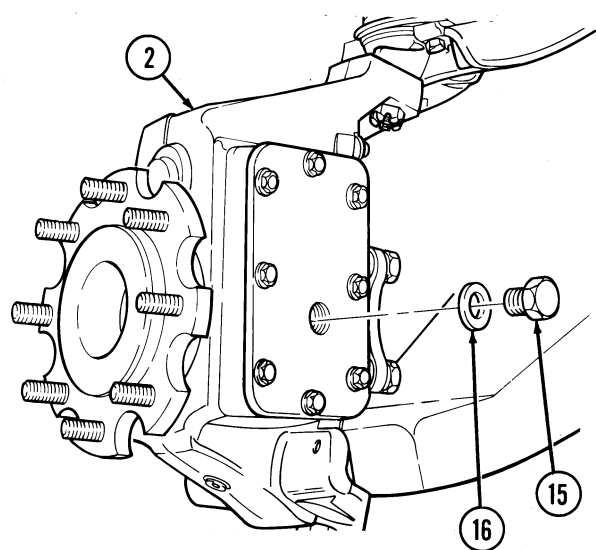
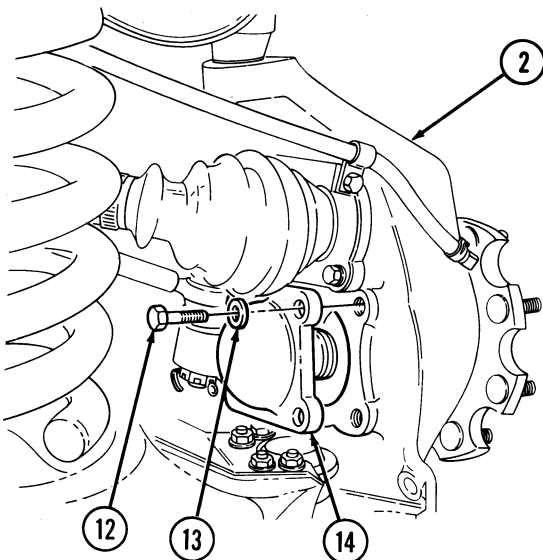
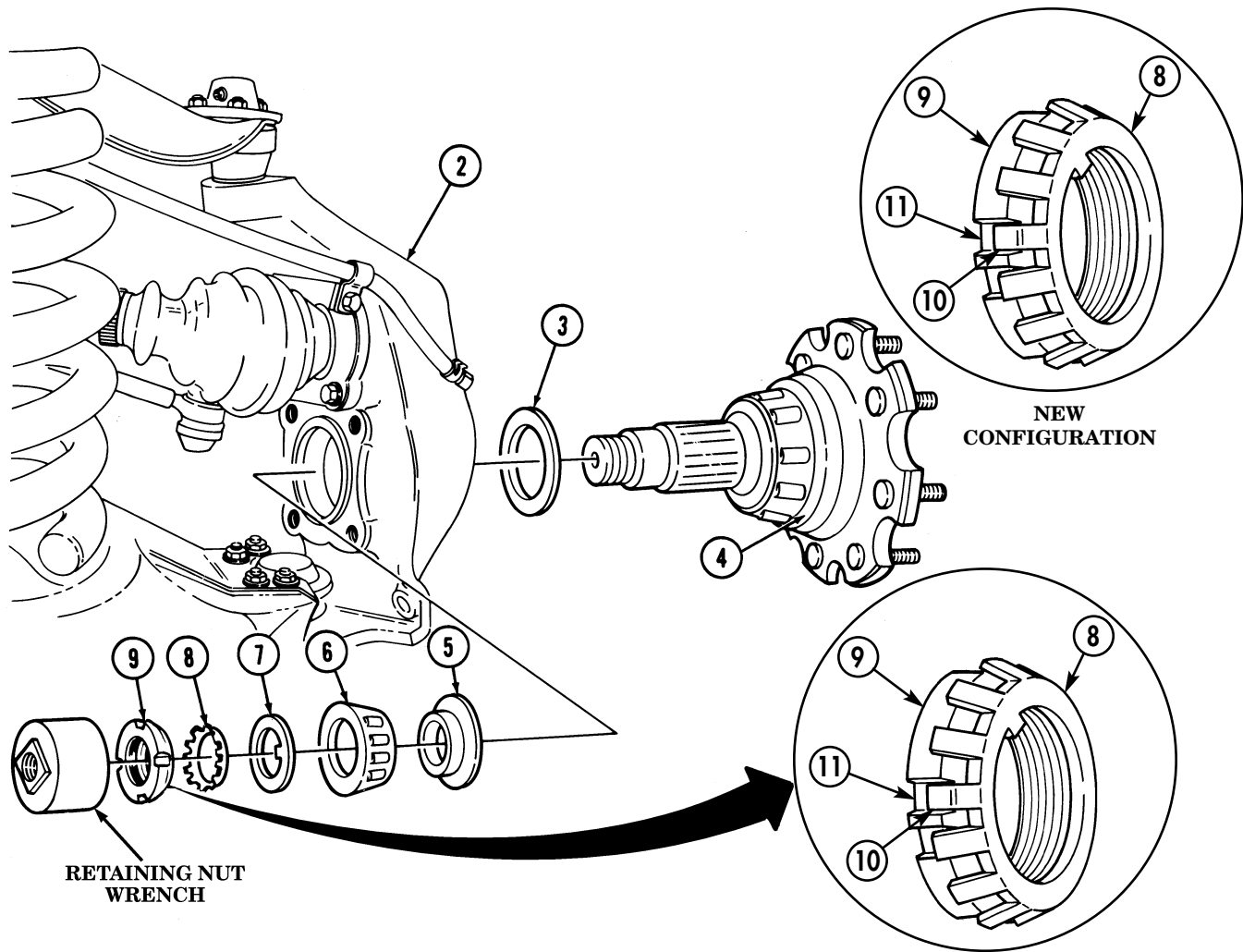
NOTE

Immediately install steering arm cover after application of sealant.

10. Clean sealing surfaces on geared hub (2) and steering arm cover (14). Apply anaerobic sealant to steering arm cover (14) and install steering arm cover (14) on geared hub (2).
11. Apply sealing compound to threads of capscrews (12) and install steering arm cover (14) on geared hub (2) with four washers (13) and capscrews (12). Tighten capscrews (12) to 65 lb-ft (88 N•m).
12. Remove fill plug (15) and washer (16) from geared hub (2).
13. Fill geared hub (2) to proper oil level (para. 2-11).
14. Install washer (16) and fill plug (15) on geared hub (2). Tighten fill plug (15) to 8-13 lb-ft (11-18 N•m).



6-13. GEARED HUB SPINDLE SEAL REPLACEMENT (Cont'd)



FOLLOW-ON TASK: Install wheel (para. 8-3).

6-14. GEARED HUB SPINDLE BEARING ADJUSTMENT

This task covers:

Adjustment

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Special Tools

Wrench (Appendix B, Item 127)

Materials/Parts

Key washer (Appendix G, Item 65)
Sealer (Appendix C, Item 39)
Sealing compound (Appendix C, Item 45)
Grease (Appendix C, Item 22)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

Wheel removed (para. 8-3).

General Safety Instructions

Ensure locktab on key washer is bent completely into slot on retaining nut.

Adjustment

NOTE

Have drainage container ready to catch oil.

1. Remove drainplug (4), and drain geared hub (1). Install drainplug (4) into geared hub (1). Tighten drainplug (4) to 8-13 lb-ft (11-18 N•m).
2. Remove four capscrews (7), washers (6), and steering arm cover (5) from geared hub (1).

NOTE

For new configuration, two locktabs must be bent away from retaining nut for removal.

3. Bend locktab (12) on key washer (9) away from retaining nut (10).
4. Using retaining nut wrench, remove retaining nut (10) and key washer (9) from spindle (8). Discard key washer (9).

NOTE

If four-slotted retaining nut TN-07 is present, it is recommended to replace it with eight-slotted retaining nut 12342680.

5. Apply grease to face of retaining nut (10) and install key washer (9) and retaining nut (10) on spindle (8).
6. Using retaining nut wrench, tighten retaining nut (10) to 35-45 lb-ft (47-61 N•m).
7. Rotate spindle (8) five full rotations clockwise and five full rotations counter clockwise to properly seat bearings.
8. Loosen retaining nut (10) until it is finger tight, then retighten nut to 23-27 lb-ft (31-37 N•m).

WARNING

Ensure locktab on key washer is bent completely into slot on retaining nut. Eight-slotted retaining nut provides additional security by enabling two locktabs on key washer to be bent into slots on retaining nut. Failure to do this may cause injury to personnel or damage to equipment.

NOTE

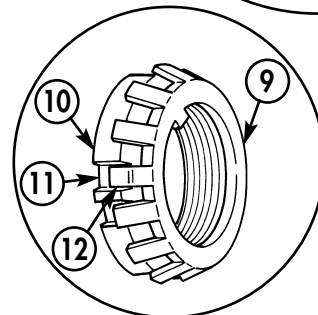
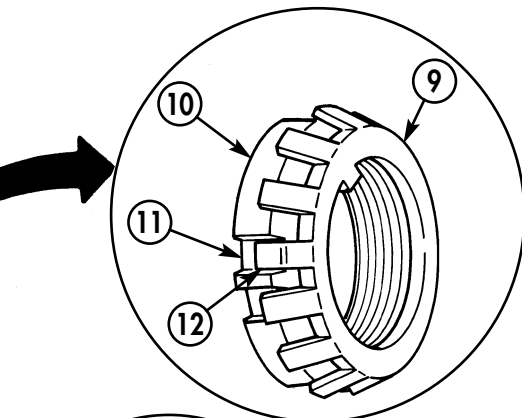
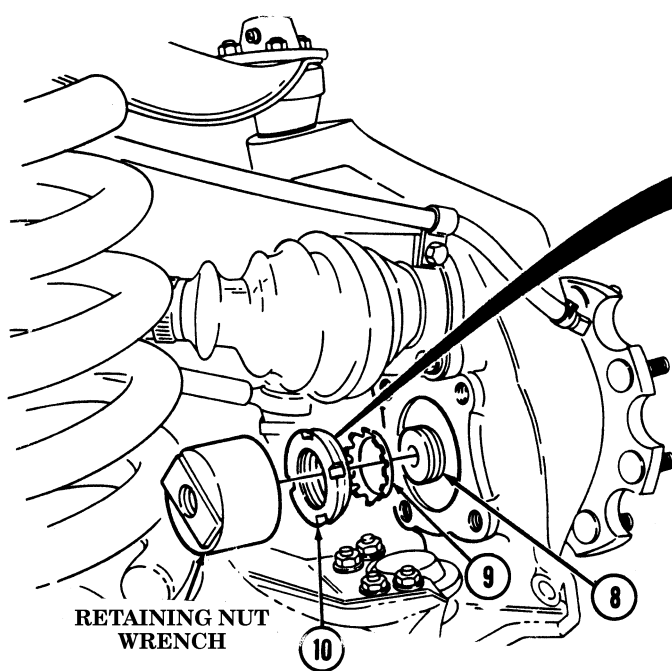
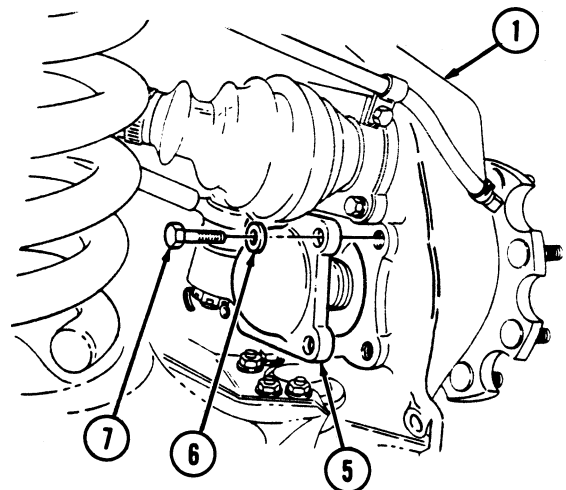
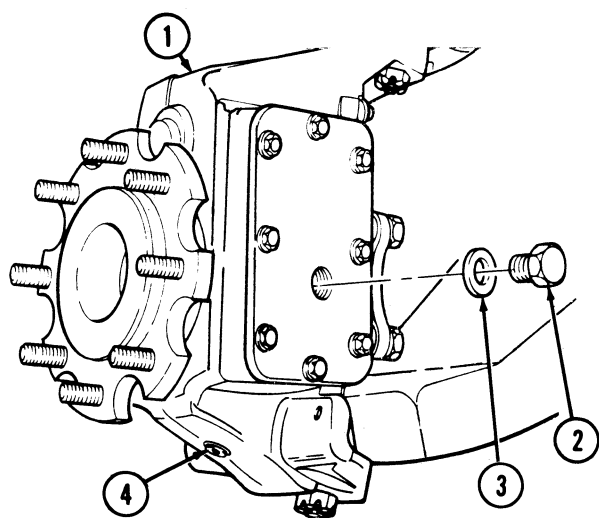
- For new configuration, two locktabs must be bent into slots on retaining nut.
 - It may be necessary to slightly loosen or tighten retaining nut to gain proper alignment with locktabs.
9. Determine which locktab (12) on key washer (9) aligns with slot (11) in retaining nut (10). Bend locktab (12) into slot (11) on retaining nut (10).

6-14. GEARED HUB SPINDLE BEARING ADJUSTMENT (Cont'd)

NOTE

Immediately install steering arm cover after application of sealant.

10. Clean sealing surfaces on geared hub (1) and steering arm cover (5). Apply anaerobic sealant to steering arm cover (5) and install steering arm cover (5) on geared hub (1).
11. Apply sealing compound to threads of capscrew (7) and install steering arm cover (5) on geared hub (1) with four washers (6) and capscrews (7). Tighten capscrews (7) to 65 lb-ft (88 N•m).
12. Remove fill plug (2) and washer (3) from geared hub (1).
13. Fill geared hub (1) to proper oil level (TM 9-2320-280-10).
14. Install washer (3) and fill plug (2) on geared hub (1). Tighten fill plug (2) to 8-13 lb-ft (11-18 N•m).



NEW CONFIGURATION

FOLLOW-ON TASK: Install wheel (para. 8-3.)

6-15. WHEEL STUD REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1))

Equipment Condition

Wheel removed (para. 8-3).

Materials/Parts

Three washers (Appendix G, Item 35)
Hex nut (Appendix G, Item 64)

General Safety Instructions

Always wear eye protection when replacing wheel studs.

Manual References

TM 9-2320-280-24P

CAUTION

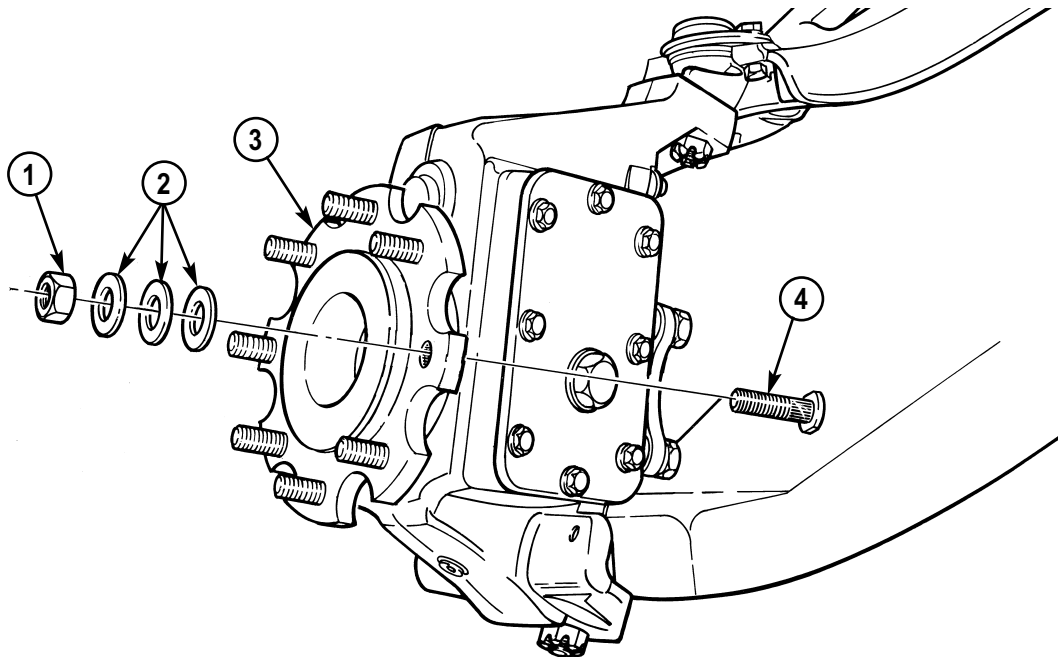
Always wear eye protection when replacing wheel studs. Severe eye injury may result if metal chips contact eyes.

a. Removal

1. Rotate spindle (3) to allow clearance for removal of stud (4) from spindle (3).
2. Drive stud (4) from spindle (3). Discard stud (4).

b. Assembly

1. Align splines on stud (4) with splines in spindle (3) and install stud (4) in spindle (3).
2. Install three flat washers (2) and hex nut (1) on stud (4).
3. Tighten hex nut (1) until head on stud (4) seats against spindle (3).
4. Remove and discard hex nut (1) and three flat washers (2).



FOLLOW-ON TASK: Install wheel (para. 8-3).

6-16. DIFFERENTIAL VENT LINE REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-24P

NOTE

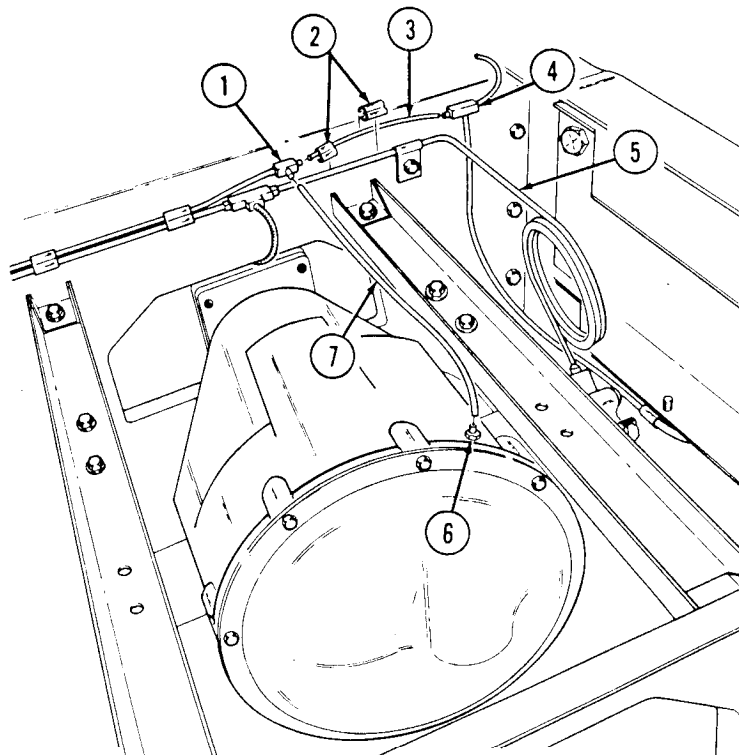
Differential vent line replacement procedures are basically the same. This procedure covers the rear differential vent line.

a. Removal

1. Remove vent line (7) from differential fitting (6) and tee fitting (1).
2. Remove two line clips (2) from vent line (3) and brake line (5).
3. Remove vent line (3) from two tee fittings (1) and (4).

b. Installation

1. Install vent line (3) on tee fittings (1) and (4).
2. Install two line clips (2) on vent line (3) and brake line (5).
3. Install vent line (7) on differential fitting (6) and tee fitting (1).



6-17. REAR GEARED HUB VENT LINE REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-24P

NOTE

Rear geared hub vent line replacement procedures are basically the same. This procedure covers the right rear geared hub vent line.

a. Removal

1. Disconnect vent line (4) from geared hub fitting (3).
2. Remove capscrew (7), clamp (6), and vent line (4) from bracket (5).
3. Remove capscrew (8), clamp (1), and vent line (4) from control arm (2).
4. Remove capscrew (10), clamp (9), and vent line (4) from bracket (11).
5. Remove capscrew (15), clamp (14), and vent line (4) from frame (13).
6. Remove vent line (4) from tee fitting (12).

b. Installation

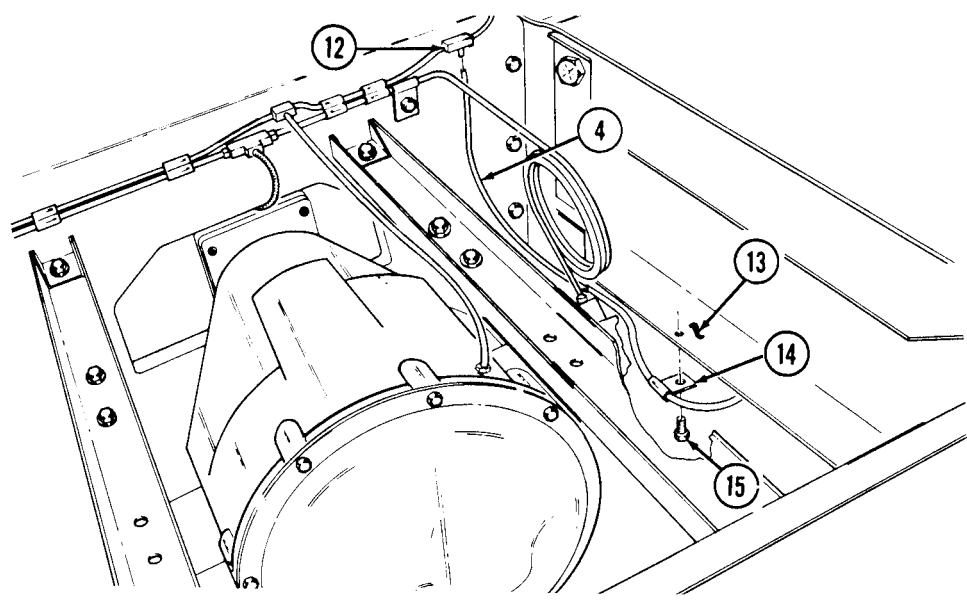
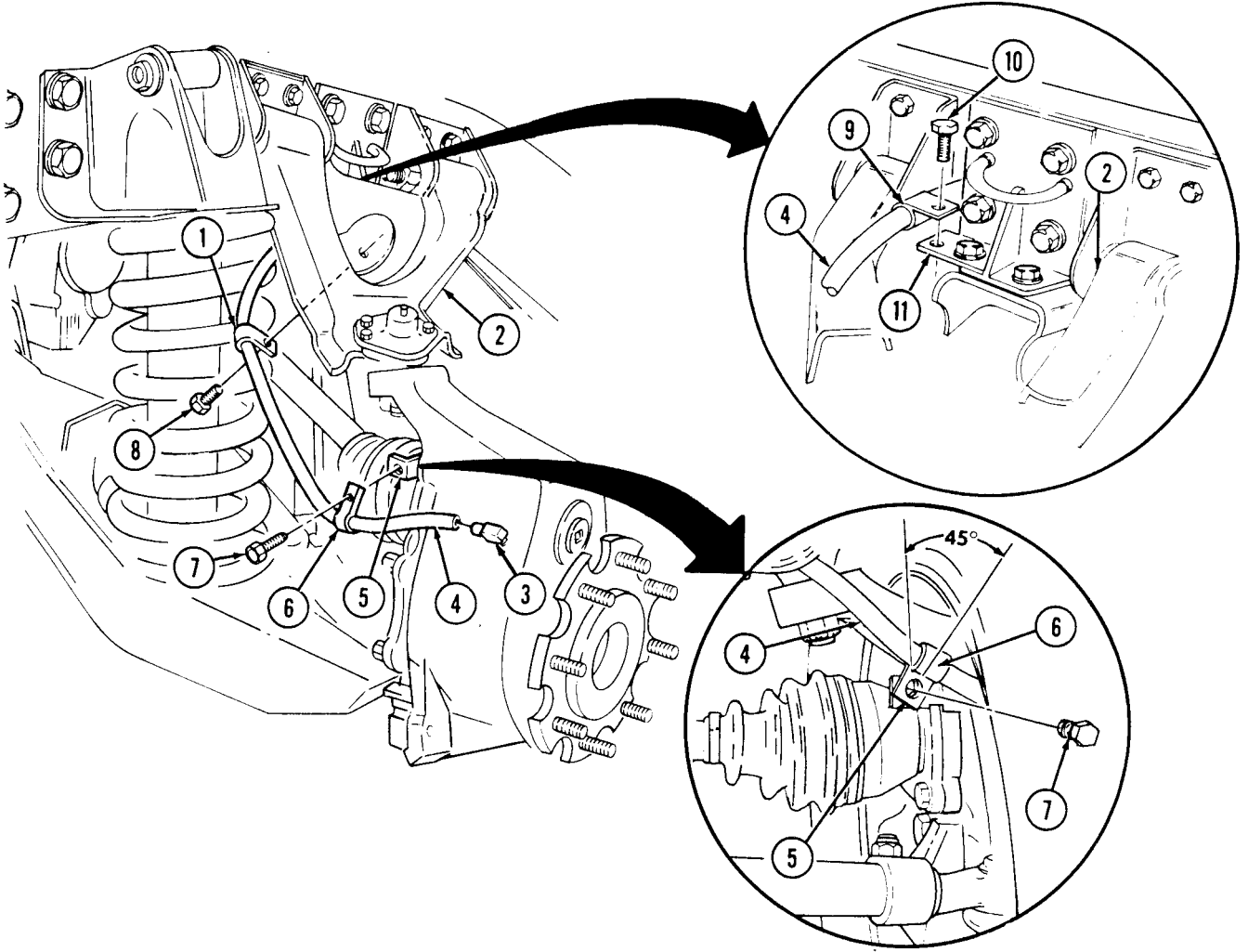
1. Install vent line (4) to tee fitting (12) and geared hub fitting (3).
2. Install vent line (4) to frame (13) with clamp (14) and capscrew (15).
3. Install vent line (4) to bracket (11) with clamp (9) and capscrew (10).
4. Install vent line (4) to control arm (2) with clamp (1) and capscrew (8).

NOTE

Position clamp at a 45° angle toward the wheel before securing with capscrew.

5. Install vent line (4) to bracket (5) with clamp (6) and capscrew (7).

6-17. REAR GEARED HUB VENT LINE REPLACEMENT (Cont'd)



6-18. FRONT GEARED HUB VENT LINE REPLACEMENT

This task covers:

- a. Right Side Removal
- b. Right Side Installation

- c. Left Side Removal
- d. Left Side Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

Wheel removed (para. 8-3).

Manual References

TM 9-2320-280-24P

a. Right Side Removal

NOTE

Mark clamp position before loosening to ensure clamps are properly positioned during installation.

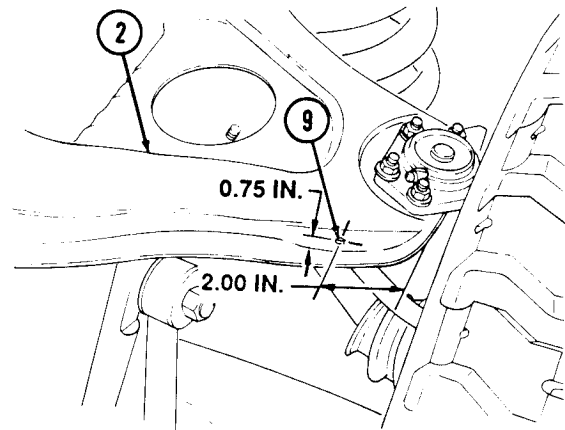
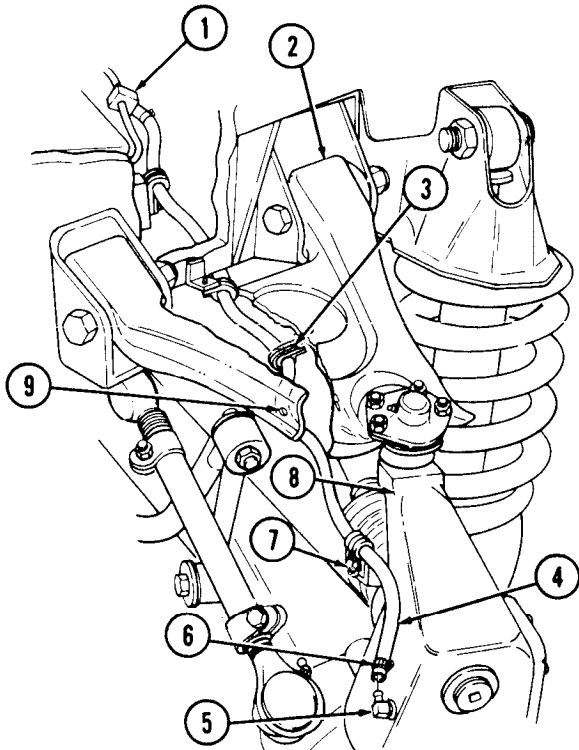
1. Loosen four screws (7) and clamps (3) from front control arm (2) and geared hub (8).
2. Remove two hose clamps (6) and front vent line hose (4) from elbow (5) and tee fitting (1).

b. Right Side Installation

NOTE

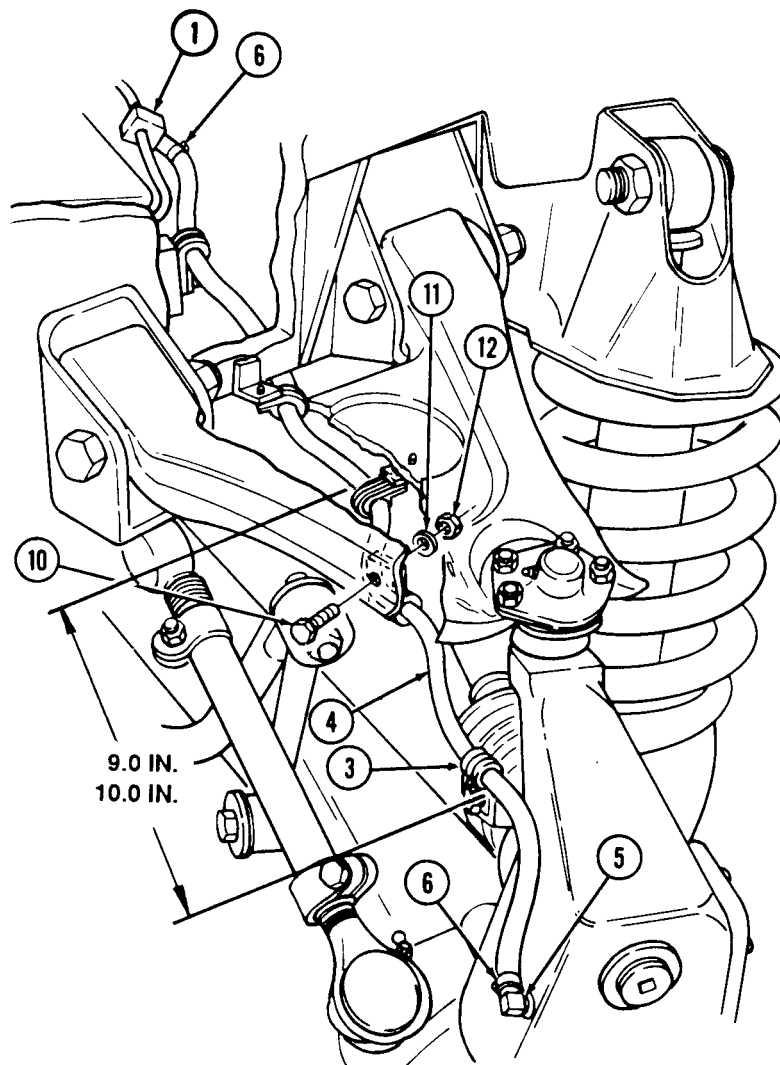
Step 1 is necessary to prevent vent line damage. If new clamp has been previously installed, perform steps 3 through 5.

1. Locate, mark, and drill 0.266 in. (6.76 mm) diameter hole (9) in front control arm (2).



6-18. FRONT GEARED HUB VENT LINE REPLACEMENT (Cont'd)

2. To fabricate front vent line hose (4), cut 33.63 in. (85.42 cm) piece of hose from bulk.
3. Route front vent line hose (4) through four existing clamps (3), and secure with two hose clamps (6) to tee fitting (1) and elbow (5).
4. Position 9.0 to 10.0 in. (22.9 to 25.4 cm) of hose (4) between two existing clamps (3). Secure existing clamps (3), as noted in removal, with screws (7).
5. Install new clamp (3) on front vent line (4), and control arm (2) at hole (9) with screw (10), washer (11), and nut (12).



6-18. FRONT GEARED HUB VENT LINE REPLACEMENT (Cont'd)

c. Left Side Removal

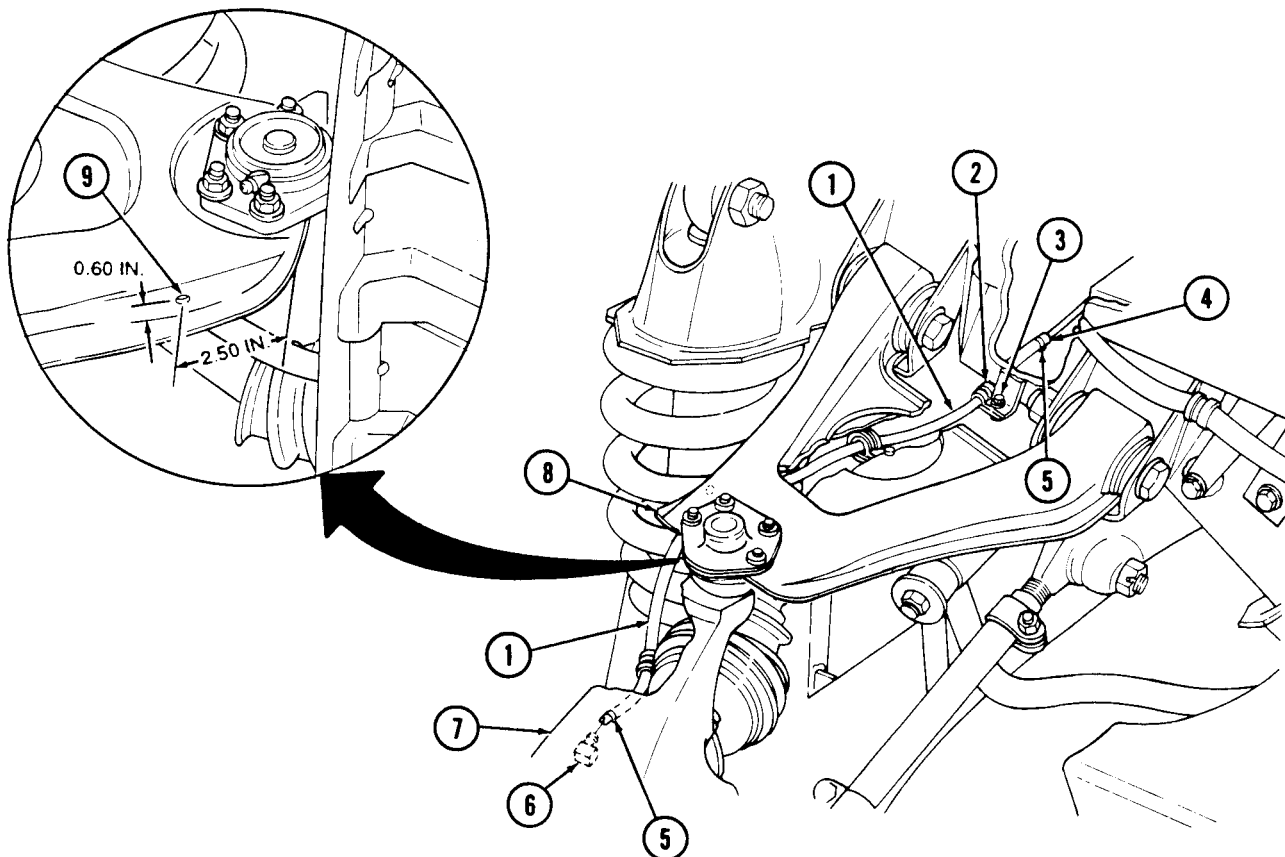
1. Loosen three screws (3) and clamps (2) from front control arm (8) and geared hub (7).
2. Remove two hose clamps (5) and vent line hose (1) from elbow (6) and union on tube (4).

d. Left Side Installation

NOTE

Step 1 is necessary to prevent vent line damage. If new clamp has been previously installed, perform steps 3 through 5.

1. Locate, mark, and drill 0.266 in. (6.75 mm) diameter hole (9) in left front control arm (8).
2. To fabricate front side vent line hose (1), cut a 28.2 in. (71.6 cm) piece from hose (1) removed in para. c, step 2. If hose (1) is unserviceable cut anew piece from bulk-
3. Route vent line hose (1), fabricated in step 2 through three existing clamps (2), and secure hose (1) with two hose clamps (5) to union on tube (4) and elbow (6) on geared hub (7).



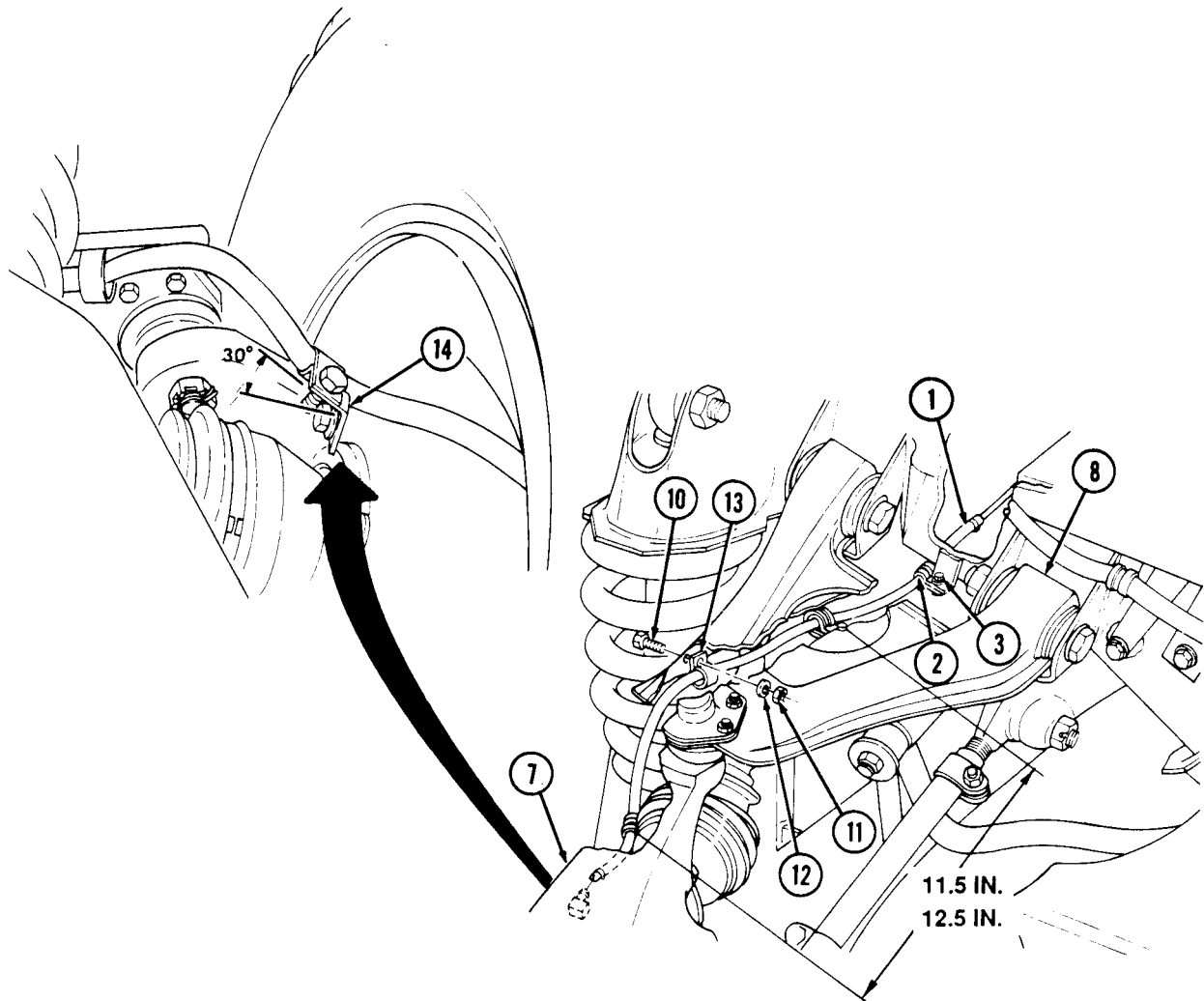
6-18. FRONT GEARED HUB VENT LINE REPLACEMENT (Cont'd)

4. Position 11.5 to 12.5 inches (29.2 to 31.8 cm) of hose (1) between two existing outer clamps (2) and secure existing clamps (2) with screws (3). Ensure center clamp (2) is positioned as shown.
5. Bend 90° bracket (14) on geared hub (7) 30° outward as shown.

NOTE

Do not close loop on clamps installed on control arms. Hose lines should move freely through control arm clamp loops.

6. Install new clamp (13) on vent line hose (1), and control arm (8) with screw (10), washer (12), and nut (11).



FOLLOW-ON TASK: Install wheel (para. 8-3).

6-19. STEERING STOP MAINTENANCE

This task covers:

a. Removal

b. Installation

c. Adjustment

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Personnel Required

One mechanic
One assistant

Materials/Parts

Sealing compound (Appendix C, Item 45)
Chalk (Appendix C, Item 15)

Manual References

TM 9-2320-280-24P

a. Removal

1. Loosen jamnut (2) and remove steering stop capscrew (3) and jamnut (2) from geared hub (1).
2. Remove jamnut (2) from capscrew (3).

b. Installation

1. Apply sealing compound to capscrew (3).
2. Install jamnut (2) on capscrew (3).
3. Install capscrew (3) and jamnut (2) on geared hub (1). Tighten capscrew (3) finger tight.

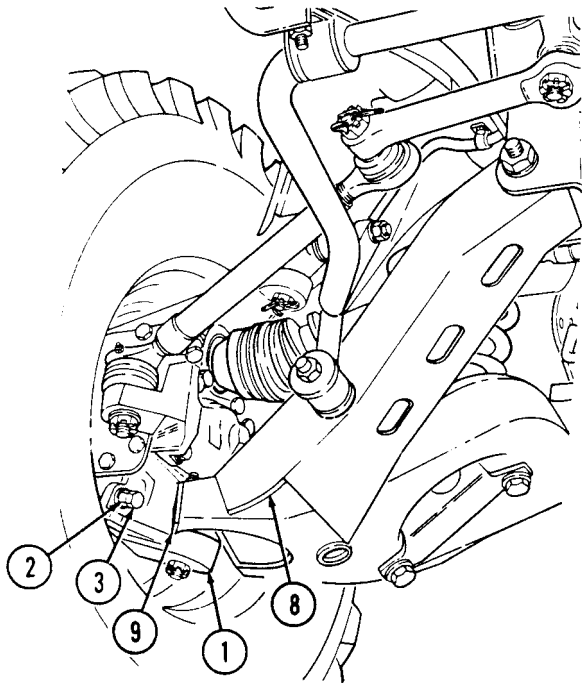
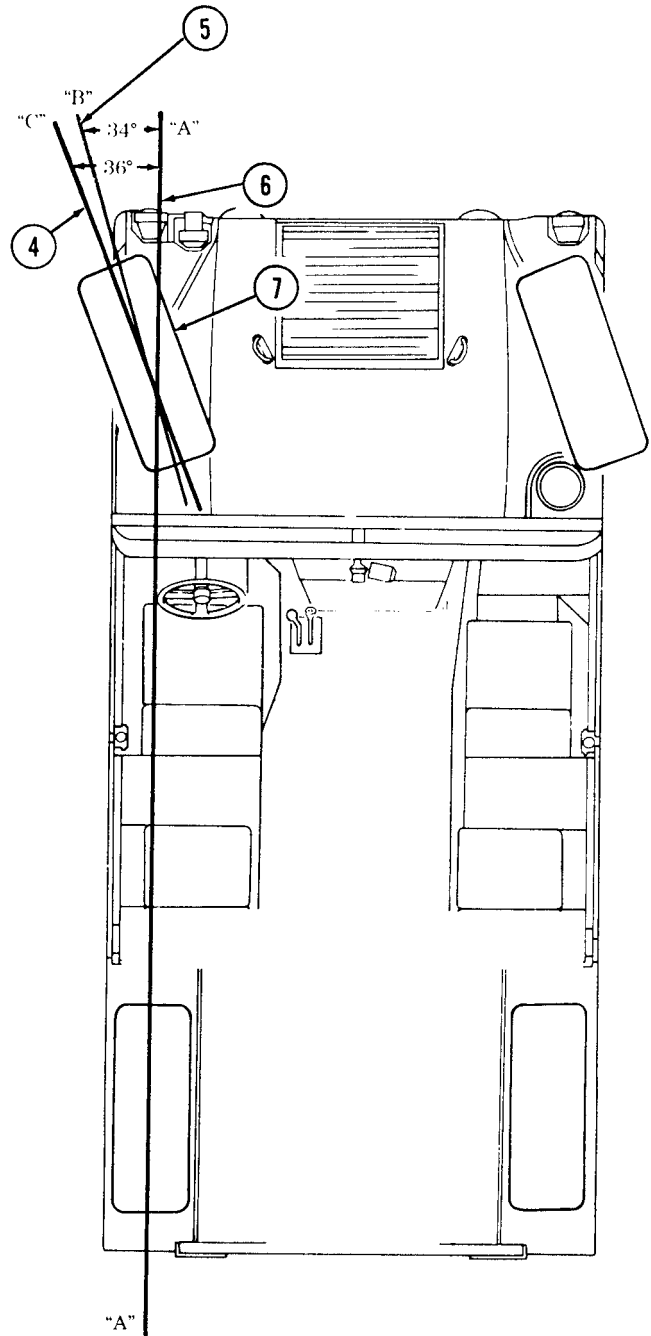
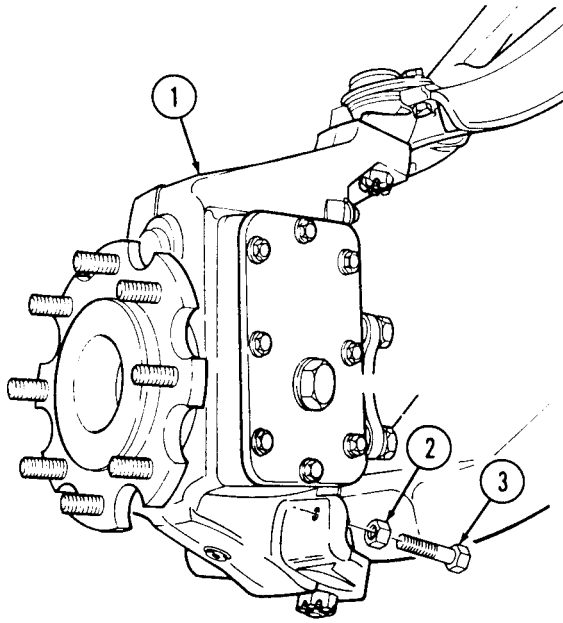
c. Adjustment

NOTE

Prior to adjustment ensure length of each tie rod is the same. If tie rod lengths are not the same $\pm 1/8$ in. (3 mm), check toe-in alignment (para. 8-10).

1. Draw a reference chalk line (6)30 feet long. Mark this line "A".
2. Position vehicle so that center of left rear and left front tires are positioned directly on reference line "A" (6).
3. Using a protractor, draw a second reference line "B" (5) at 34°. Mark this line "B".
4. Again, using a protractor, draw a third reference line "C" (4) at 36°. Mark this line "C".
5. Roll vehicle forward until center of left front tire is over intersection of lines "A", "B", and "C".
6. Turn steering wheel full left.
7. If the centerline of front and rear of left front tire (7) is over area between lines "B" and "C", no adjustment is necessary.
8. If centerline of front and rear of left front is not over area between lines "B" and "C", loosen jamnut (2) and turn capscrew (3) all the way in.
9. Turn steering wheel until centerline of front and rear of tire (7) is over area between lines "B" and "C".
10. Unscrew capscrew (3) until head makes contact with wheel stop (9) on lower control arm (8).
11. Secure capscrew (3) with jamnut (2).
12. Repeat adjustment procedure for opposite side.

6-19. STEERING STOP MAINTENANCE (Cont'd)



6-20. AIR LIFTING BRACKET REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-24P

Materials/Parts

Four lockwashers (Appendix G, Item 188)

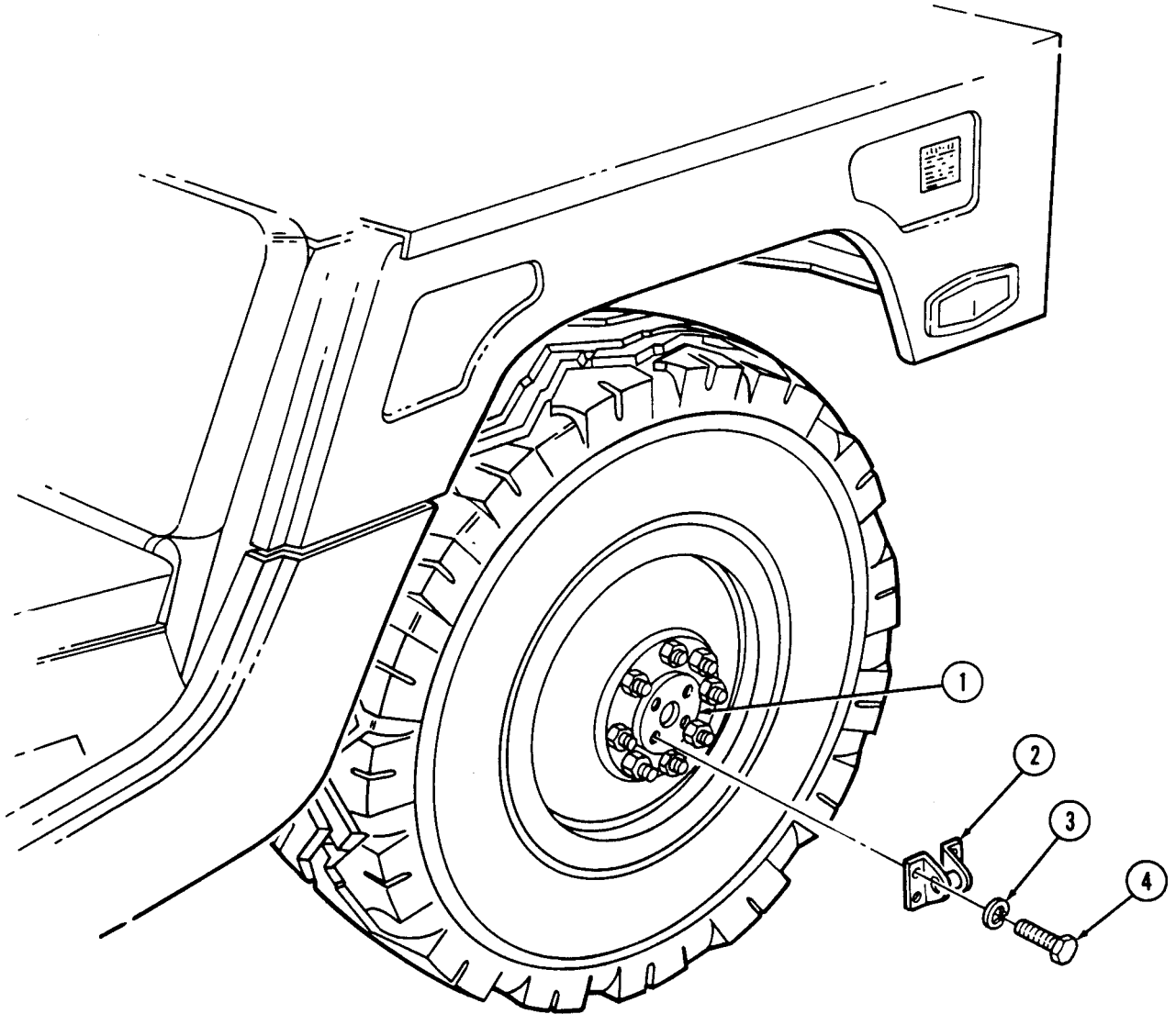
a. Removal

Remove four capscrews (4), lockwashers (3), and lifting bracket (2) from geared hub (1). Discard lockwashers (3).

b. Installation

Install lifting bracket (2) to geared hub (1) with four lockwashers (3) and capscrews (4). Tighten capscrews (4) to 43 lb-ft (58 N•m).

6-20. AIR LIFTING BRACKET REPLACEMENT (Cont'd)



6-21. DIFFERENTIAL COVER MAINTENANCE

This task covers:

a. Removal

b. Cleaning and Inspection

c. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Materials/Parts

Sealant (Appendix C, Item 38)
Drycleaning solvent (Appendix C, Item 18)

General Safety Instructions

Drycleaning solvent is flammable and will not be used near an open flame.

NOTE

- The following procedure applies to vehicles with new brake adapters, P/N 10453002. These brakes are cut away, which allows access to left center capscrews.
- Have drainage container ready to catch fluid.

a. Removal

1. Remove drainplug (3) from differential assembly (4) and drain differential.
2. Remove twelve capscrews (2) and cover (1) from differential assembly (4).

b. Cleaning and Inspection

WARNING

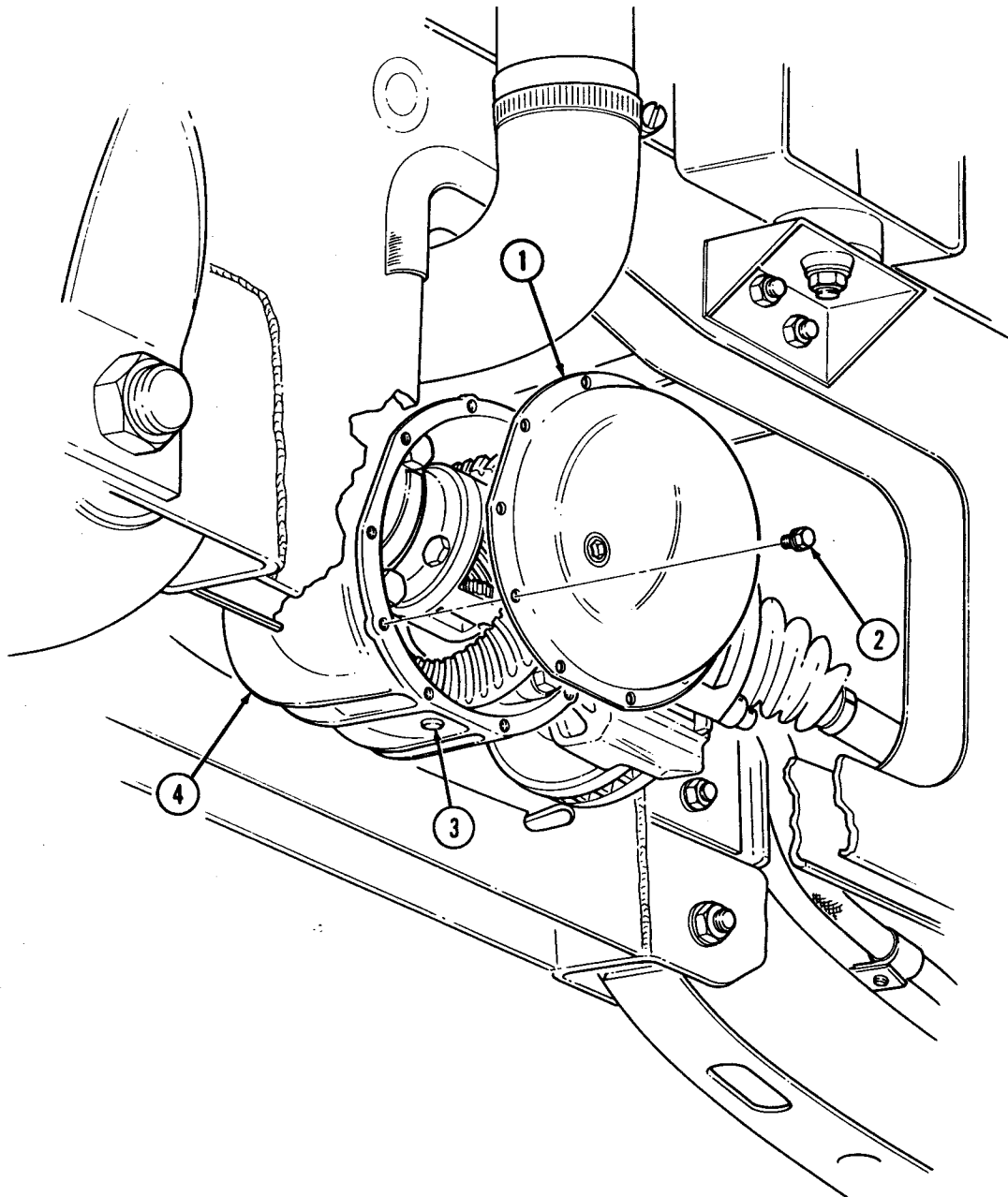
Drycleaning solvent is flammable and will not be used near an open flame. A fire extinguisher will be kept nearby when the solvent is used. Use only in well-ventilated places. Failure to do this may result in injury to personnel and/or damage to equipment.

1. Use drycleaning solvent to clean differential cover (1), capscrews (2), and differential assembly (4).
2. Inspect differential cover (1) for cracks, wear, or breaks. Replace cover (1) if cracked, worn, or broken.

c. Installation

1. Apply RTV sealant to cover (1) sealing surface and install cover (1) on housing (4) with twelve capscrews (2). Tighten capscrews (2) to 16 lb-ft (22 N·m).
2. Install drain plug (3) into differential assembly (4) and tighten to 13-18 lb-ft (18-25 N·m).

6-21. DIFFERENTIAL COVER MAINTENANCE (Cont'd)



FOLLOW-ON TASK: Fill differential to proper level (para. 2-11).

Section III. SUSPENSION MAINTENANCE

6-22. SUSPENSION MAINTENANCE TASK SUMMARY

TASK PARA.	PROCEDURES	PAGE NO.
6-23.	Stabilizer Bar Replacement	6-55
6-24.	Stabilizer Bar Link Replacement	6-56
6-25.	Radius Rod Replacement	6-57
6-26.	Upper Ball Joint Replacement	6-58
6-27.	Lower Ball Joint Replacement	6-60
6-28.	Upper Control Arm Replacement	6-62
6-29.	Lower Control Arm Replacement	6-64
6-30.	Coil Spring Replacement	6-66
6-31.	Shock Absorber Replacement	6-68

6-23. STABILIZER BAR REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-24P

Materials/Parts

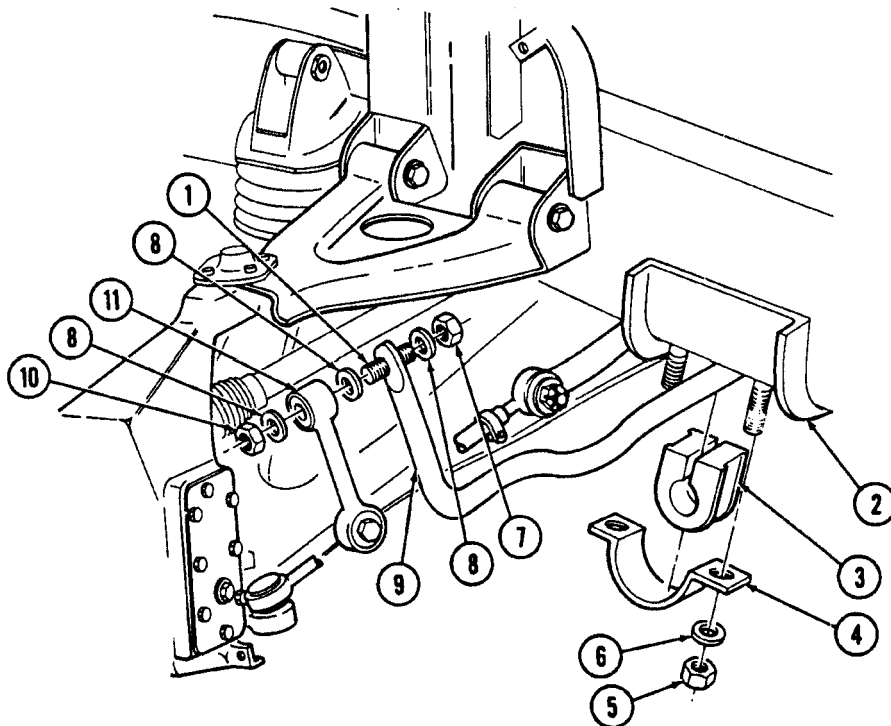
Two locknuts (Appendix G, Item 80)

a. Removal

1. Remove two locknuts (10), nuts (7), and six washers (8) from bar links (11) and stabilizer bar (9). Discard locknuts (10). Remove bar links (11) and pins (1) from stabilizer bar (9).
2. Remove four nuts (5), washers (6), two clamps (4), and stabilizer bar (9) from frame brackets (2).
3. Remove stabilizer bar bushings (3) from stabilizer bar (9).

b. Installation

1. Install stabilizer bar bushings (3) on stabilizer bar (9).
2. Install stabilizer bar (9) on frame brackets (2) with two clamps (4), four washers (6), and nuts (5). Tighten nuts (5) to 60 lb-ft (81 N·m).
3. Install pins (1) in bar links (11).
4. Install bar links (11) to stabilizer bar (9) with six washers (8), two nuts (7), and locknuts (10). Tighten locknuts (10) to 75 lb-ft (102 N·m).



6-24. STABILIZER BAR LINK REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-24P

Materials/Parts

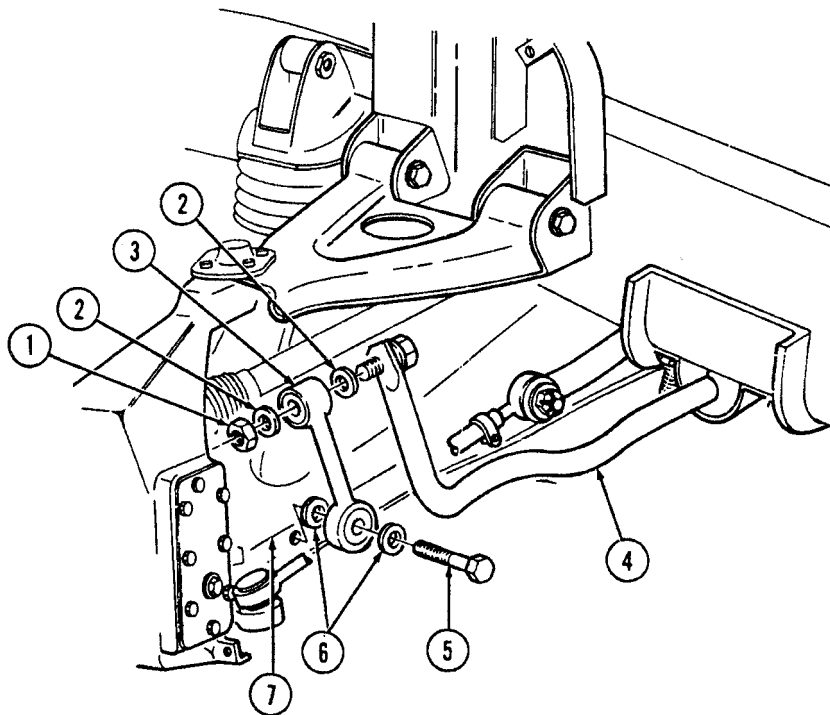
Locknut (Appendix G, Item 80)
Sealing compound (Appendix C, Item 46)

a. Removal

1. Remove locknut (1) and two washers (2) from bar link (3) and stabilizer bar (4). Discard locknut (1).
2. Remove capscrew (5), two washers (6), and bar link (3) from lower control arm (7).

b. Installation

1. Apply sealing compound to threads of capscrew (5). Install bar link (3) to lower control arm (7) with two washers (6) and capscrew (5). Tighten capscrew (5) to 70 lb-ft (95 N•m).
2. Install bar link (3) to stabilizer bar (4) with two washers (2) and locknut (1). Tighten locknut (1) to 75 lb-ft (102 N•m).



6-25. RADIUS ROD REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Materials/Parts

Cotter pin (Appendix G, Item 14)
Locknut (Appendix G, Item 89)

Equipment Condition

Wheel removed (para. 8-3).

a. Removal

1. Remove cotter pin (7), slotted nut (6), and washer (5) from radius rod (4) and geared hub (8). Discard cotter pin (7).
2. Remove locknut (9), washer (2), capscrew (1), washer (2), and radius rod (4) from bracket (3) and geared hub (8). Discard locknut (9).

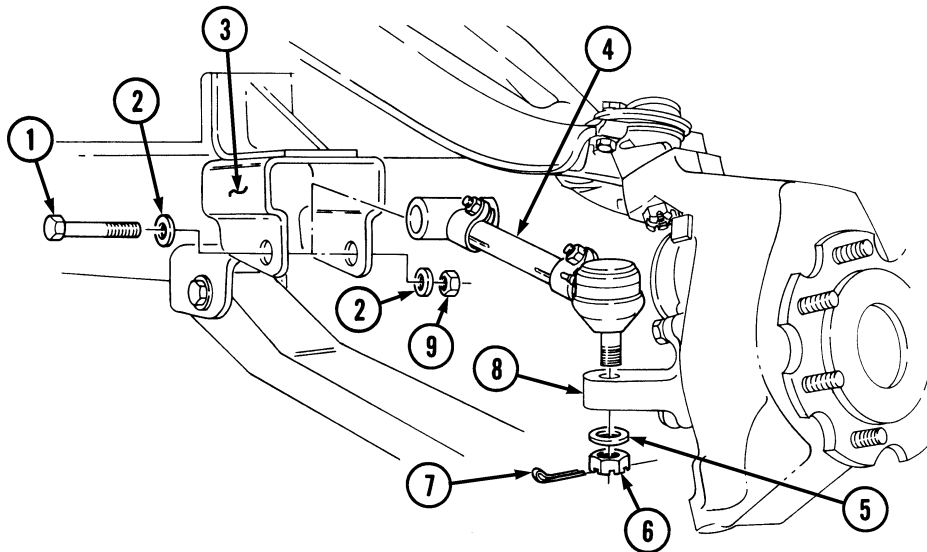
b. Installation

1. Install radius rod (4) to bracket (3) with washer (2), capscrew (1), washer (2), and locknut (9).

CAUTION

Do not loosen slotted nut to install cotter pin. Doing this may result in damage to equipment.

2. Install radius rod (4) to geared hub (8) with washer (5) and slotted nut (6). Tighten slotted nut (6) to 70 lb-ft (95 N•m). Install cotter pin (7).
3. Tighten locknut (9) to 260 lb-ft (353 N•m).



- FOLLOW-ON TASKS:
- Lubricate radius rod (TM 9-2320-280-10).
 - Install wheel (para. 8-3).
 - Adjust rear wheel toe-out alignment (para. 8-11).

6-26. UPPER BALL JOINT REPLACEMENT

This task covers:

- a. Inspection
- b. Removal

c. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
 automotive (Appendix B, Item 1)
 Pickle fork (Appendix B, Item 129)

Special Tools

Socket adapter (Appendix B, Item 146)
 Crowfoot 15/16 in. (Appendix B, Item 151)

Materials/Parts

Cotter pin (Appendix G, Item 14)
 Four locknuts (Appendix G, Item 79)
 (Basic/A1 Series)
 Four locknuts (Appendix G, Item 104)
 (A2 Series)

Personnel Required

One mechanic
 One assistant

Manual References

TM 9-2320-280-10
 TM 9-2320-280-24P

Equipment Condition

Wheel removed (para. 8-3)

a. Inspection

1. Chock rear wheels.
2. Raise and support front wheels 2 in. (5.1 cm) off ground.
3. Grasp top of tire and attempt to move tire in and out.
4. Measure any movement at top outer edge of tire. Replace the upper ball joint (4) if tire movement is 3/8 in. (10 mm) or more.

b. Removal

1. Raise and support lower control arm.
2. Remove cotter pin (8) and slotted nut (7) from upper ball joint (4) and geared hub (6). Discard cotter pin (8).
3. Remove four locknuts (3), washers (2), capscrews (9), washers (2), and upper ball joint (4) from boot retainer (5), ball joint retainer (10), and upper control arm (1). Discard locknuts (3).
4. Using puller, remove ball joint (4) from geared hub (6).

c. Installation

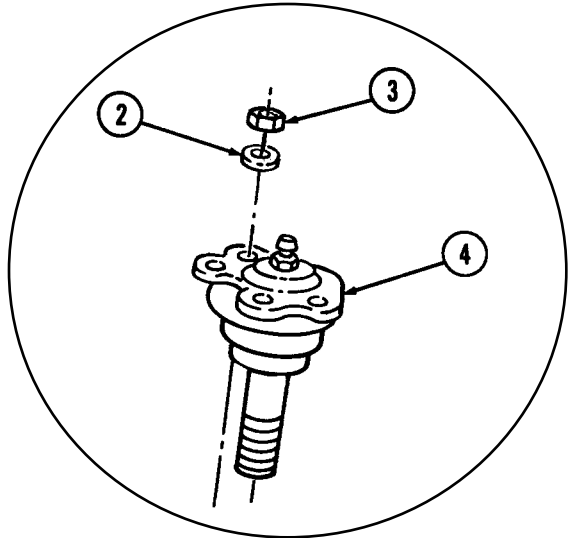
1. Install ball joint (4) to upper control arm (1), ensuring upper ball joint (4) is placed above upper control arm (1), and boot retainer (5) and ball joint retainer (10) are placed below upper control arm (1).
2. Secure upper ball joint (4) to upper control arm (1) with four washers (2), capscrews (9), washers (2), and locknuts (3). Tighten locknuts (3) to 37 lb-ft (50 N·m).

CAUTION

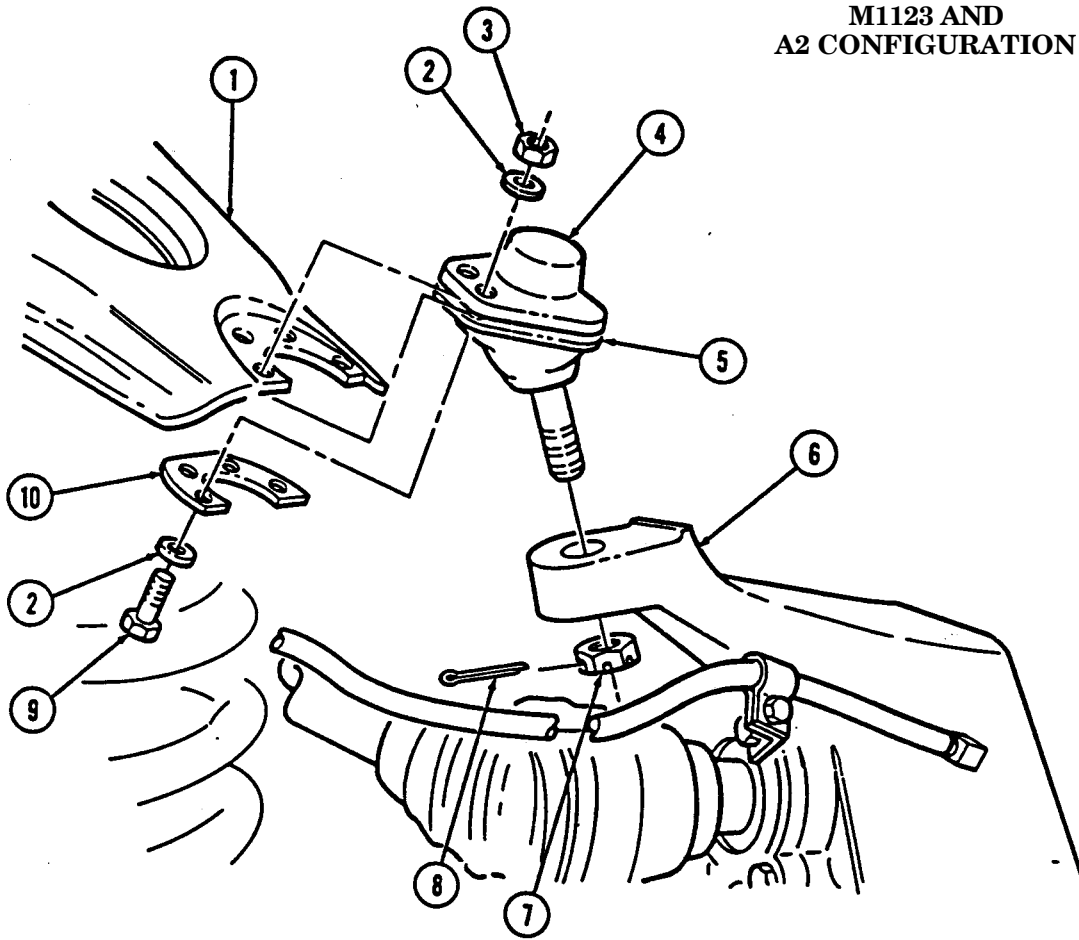
Do not loosen slotted nut to install cotter pin. Doing this may result in damage to equipment.

3. Install ball joint (4) to geared hub (6) with slotted nut (7). Using crowfoot and adapter, tighten slotted nut (7) to 73 lb-ft (99 N·m). Install cotter pin (8) in slotted nut (7).

6-26. UPPER BALL JOINT REPLACEMENT (Cont'd)



**M1123 AND
A2 CONFIGURATION**



- FOLLOW-ON TASKS:**
- Lubricate upper ball joint (M1123 and A2 only) (TM 9-2320-280-10).
 - Install wheel (para. 8-3).

6-27. LOWER BALL JOINT REPLACEMENT

This task covers:

- | | |
|---|---|
| <ul style="list-style-type: none"> a. Inspection b. Removal | <ul style="list-style-type: none"> c. Installation |
|---|---|

INITIAL SETUP:

Tools

General mechanic's tool kit:
 automotive (Appendix B, Item 1)
 Pickle fork (Appendix B, Item 129)

Materials/Parts

Cotter pin (Appendix G, Item 14)
 Four locknuts (Appendix G, Item 128)
 (Basic/A1 Series)
 Four locknuts (Appendix G, Item 105)
 (A2 Series)

Personnel Required

One mechanic
 One assistant

Manual References

TM 9-2320-280-10
 TM 9-2320-280-24P

Equipment Condition

Wheel removed (para. 8-3)

a. Inspection

1. Chock rear wheels.
2. Raise and support front wheels 2 in. (5.1 cm) off ground.
3. Mark a line across the top screw (11) of steering arm cover (10). Mark should be parallel with lower control arm (9).
4. Set a 6-in. (15.3 cm) ruler upright between lower control arm (9) and marked screw (11).
5. Install prybar between lower control arm (9) and geared hub (5). Push down on prybar and try to move geared hub (5).
6. Measure any movement in the geared hub (5). Replace lower ball joint (3) if any movement is more than 1/8 in. (3.2 mm).

b. Removal

1. Raise and support lower control arm (9).
2. Remove cotter pin (7) and slotted nut (6) from lower ball joint (3) and geared hub (5). Discard cotter pin (7).

NOTE

Note direction of outer capscrews for installation.

3. Remove four locknuts (2), washers (1), capscrews (8), and washers (1) from lower ball joint (3) and lower control arm (9). Discard locknuts (2).
4. Using puller, remove ball joint (3) with boot retainer (4) from geared hub (5).

c. Installation

NOTE

- Lower ball joint replacement procedures are the same for all models, except M996, M997, M1037, M1042, M1097, M1123, and "A1" and "A2" series vehicles. These have heavy duty rear lower ball joints and the locknuts securing ball joints to rear lower control arms on these vehicles must be tightened to 60 lb-ft (81 N•m).
- Ensure outer capscrews on front ball joints are installed from top down and inner capscrews are installed from bottom up for M1123 and "A2" series vehicles only.

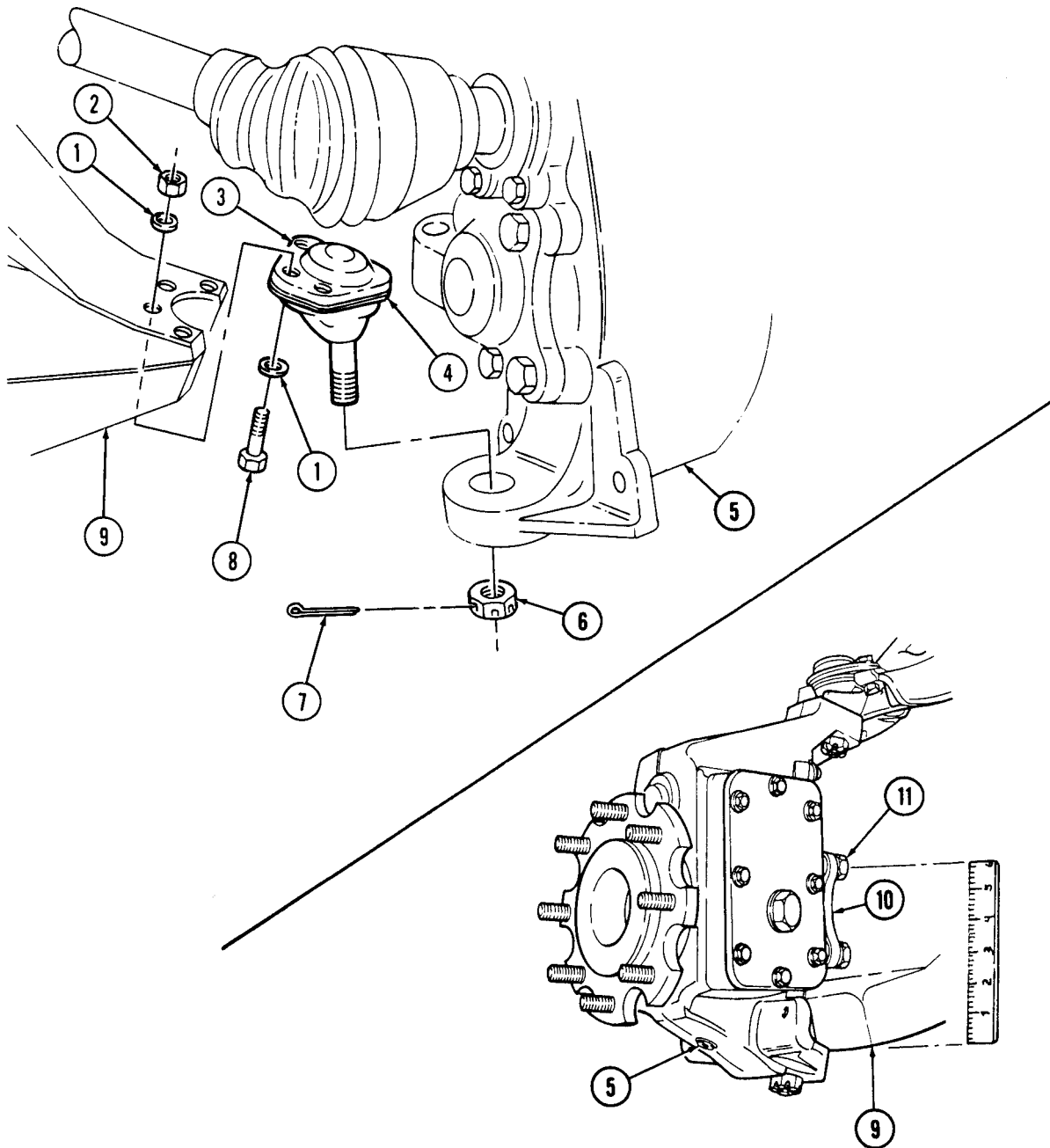
1. Install ball joint (3) with boot retainer (4) to lower control arm (9), ensuring ball joint (3) is placed below lower control arm (9) with four washers (1), capscrews (8), washers (1), and locknuts (2). Tighten locknuts (2) to 35 lb-ft (47 N•m).

6-27. LOWER BALL JOINT REPLACEMENT (Cont'd)

CAUTION

Do not loosen slotted nut to install cotter pin. Doing this may result in damage to equipment.

2. Install ball joint (3) to geared hub (5) with slotted nut (6). Tighten slotted nut (6) to 73 lb-ft (99 N·m). Install cotter pin (7) in slotted nut (6).



- FOLLOW-ON TASKS:**
- Lubricate lower ball joint (TM 9-2320-280-10).
 - Install wheel (para. 8-3).

6-28. UPPER CONTROL ARM REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Four locknuts (Appendix G, Item 79)
(Basic/A1 Series)
Four locknuts (Appendix G, Item 104)
(A2 Series)
Two locknuts (Appendix G, Item 89)
Cotter pin (Appendix G, Item 14)
Lockwasher (Appendix G, Item 146)
Sealing compound (Appendix C, Item 40)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

- Wheel removed (para. 8-3).
- Hood raised and secured (TM 9-2320-280-10), (front upper control arms only).

NOTE

The procedures for removing and installing the front and rear upper control arms are basically the same. This procedure covers the left front upper control arm.

a. Removal

1. Remove capscrew (1), washer (2), and vent line bracket (3) from geared hub (4).
2. Loosen clamp (6) and disconnect vent line (5) from fitting (7).
3. Remove capscrew (23), clamp (21), and vent line (5) from upper control arm (16).
4. Remove capscrew (24), washer (25), nut (27), clamp (26), and vent line (5) from upper control arm (16).
5. Remove cotter pin (31), slotted nut (32), washer (30), and disconnect tie rod end (29) from geared hub (4). Discard cotter pin (31).
6. Remove access plug (8), washer (33), halfshaft retaining capscrew (9), and lockwasher (10) from halfshaft (28) and geared hub (4). Discard lockwasher (10).

NOTE

Not direction of outer capscrews for installation.

7. Remove four locknuts (15), washers (14), capscrews (11), and washers (14) from upper ball joint (13), boot retainer (12), ball joint retainer (22), and upper control arm (16). Discard locknuts (15).
8. Remove two locknuts (17), washers (18), capscrews (20), washers (18), and upper control arm (16) from brackets (19). Discard locknuts (17).

b. Installation

NOTE

On front control arms, capscrew head is toward rear of vehicle.
On rear control arms, capscrew head is toward front of vehicle.

1. Install upper control arm (16) to brackets (19) with two washers (18), capscrews (20), washers (18), and locknuts (17).

NOTE

Ensure outer capscrews on front ball joints are installed from top down and inner capscrews are installed from bottom up for M1123 and "A2" vehicles only.

2. Install upper ball joint (13) to upper control arm (16) ensuring upper ball joint (13) is placed above upper control arm (16), and boot retainer (12) and ball joint retainer (22) are placed below upper control arm (16). Secure with four washers (14), capscrews (11), washers (14), and locknuts (15). Tighten locknuts (15) to 21 lb-ft (28 N•m).
3. Tighten locknuts (17) to 260 lb-ft (353 N•m).
4. Apply sealing compound to halfshaft retaining capscrew (9) and install halfshaft (28) to geared hub (4) with lockwasher (10) and halfshaft retaining capscrew (9). Tighten capscrew (9) to 37 lb-ft (50 N•m).

6-28. UPPER CONTROL ARM REPLACEMENT (Cont'd)

5. Install washer (33) and access plug (8) to geared hub (4). Tighten access plug (8) to 8-13 lb-ft (11-18 N·m).

CAUTION

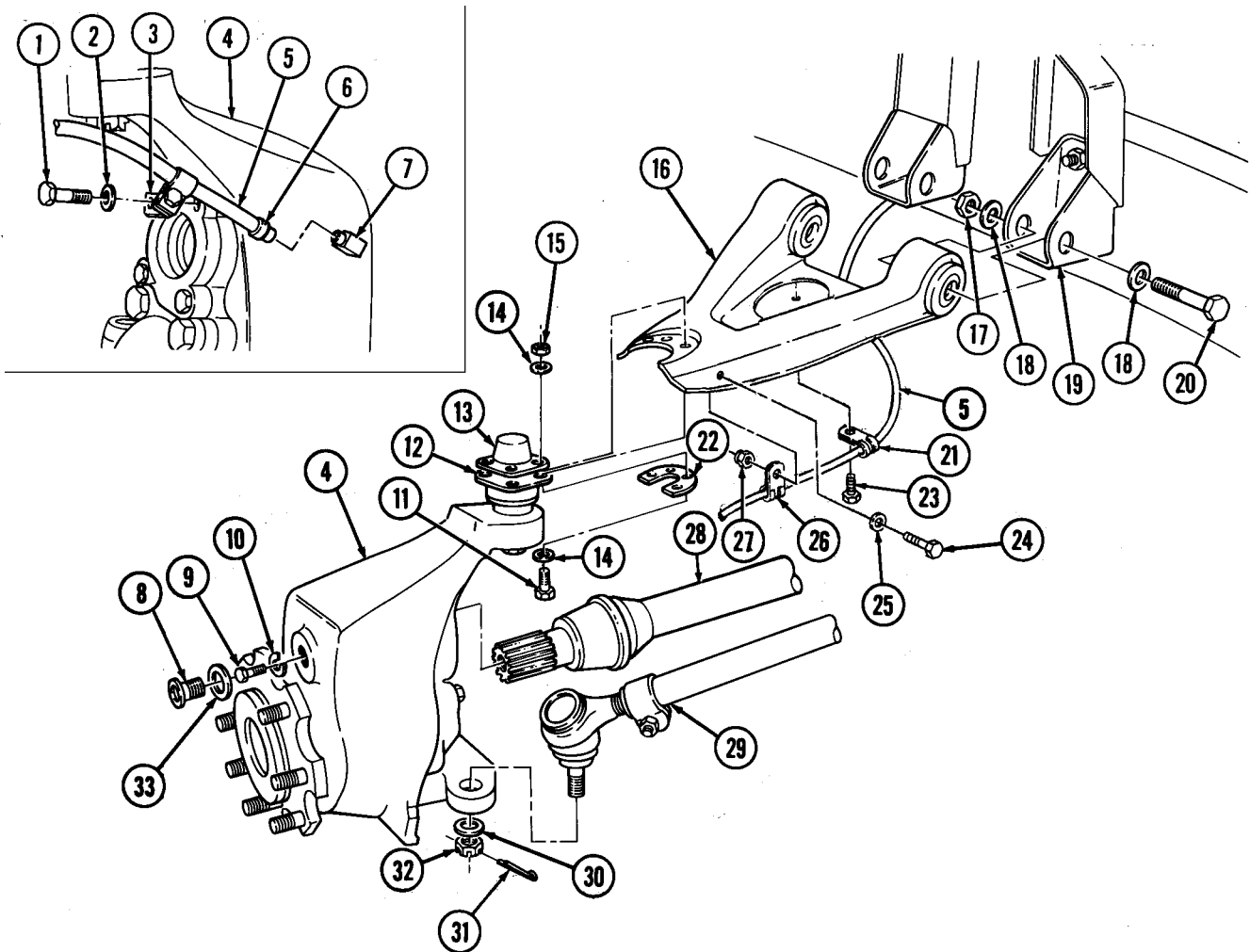
Do not loosen slotted nut to install cotter pin. Doing this may result in damage to equipment.

6. Install tie rod end (29) into geared hub (4) with washer (30) and slotted nut (32). Tighten slotted nut (32) to 70 lb-ft (95 N·m). Install cotter pin (31).
7. Connect vent line (5) to fitting (7) with clamp (6).

NOTE

If installing new vent line bracket on left front geared hub, bend bracket 30° (from standard 90° angle to 120°) before installation.

8. Install vent line bracket (3) to geared hub (4) with washer (2) and capscrew (1). Tighten capscrew (1) to 38 lb-ft (52 N·m).
9. Install clamp (21) and vent line (5) to control arm (16) with capscrew (23).
10. Install clamp (26) and vent line (5) to upper control arm (16) with screw (24), washer (25), and nut (27).



- FOLLOW-ON TASKS:
- Install wheel (para. 8-3).
 - Lower and secure hood (TM 9-2320-280-10), (front upper control arm only).
 - Check wheel alignment (paras. 8-10 and 8-11).

6-29. LOWER CONTROL ARM REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Four locknuts (Appendix G, Item 128)
(Basic/A1 Series)
Four locknuts (Appendix G, Item 105) (A2 Series)
Two locknuts (Appendix G, Item 89)
Sealing compound (Appendix C, Item 40)

Personnel Required

One mechanic
One assistant

Manual References

TM 9-2320-280-24P

Equipment Condition

- Wheel removed (para. 8-3).
- Shock absorber removed (para. 6-31).

General Safety Instructions

Lower control arm must be supported during removal and installation.

NOTE

The procedures for removing and installing the front and rear lower control arms are basically the same. This procedure covers the left front lower control arm.

a. Removal

WARNING

Lower control arm must be supported during removal and installation. Failure to support lower control arm may cause injury to personnel or damage to equipment.

NOTE

Note direction of outer capscrews for installation.

1. Remove four locknuts (7), washers (6), capscrews (9), and washers (6) from lower ball joint (5), geared hub (4) and lower control arm (8). Discard locknuts (7).
2. Remove capscrew (14), two washers (12), and bar link (13) from lower control arm (8).
3. Raise and support lower control arm (8) and pull geared hub (4) away.
4. Lower the lower control arm (8) and remove coil spring (10).
5. Remove two locknuts (3), washers (2), capscrews (1), washers (2), and lower control arm (8) from brackets (11). Discard locknuts (3).

b. Installation

NOTE

On lower control arms, capscrew heads are toward front of vehicle.

1. Install lower control arm (8) on brackets (11) with two washers (2), capscrews (1), washers (2), and locknuts (3).
2. Install coil spring (10) on lower control arm (8) ensuring end of coil spring (10) fits in spring pocket of lower control arm (8).

WARNING

Lower control arm must be supported during removal and installation. Failure to support lower control arm may cause injury to personnel or damage to equipment.

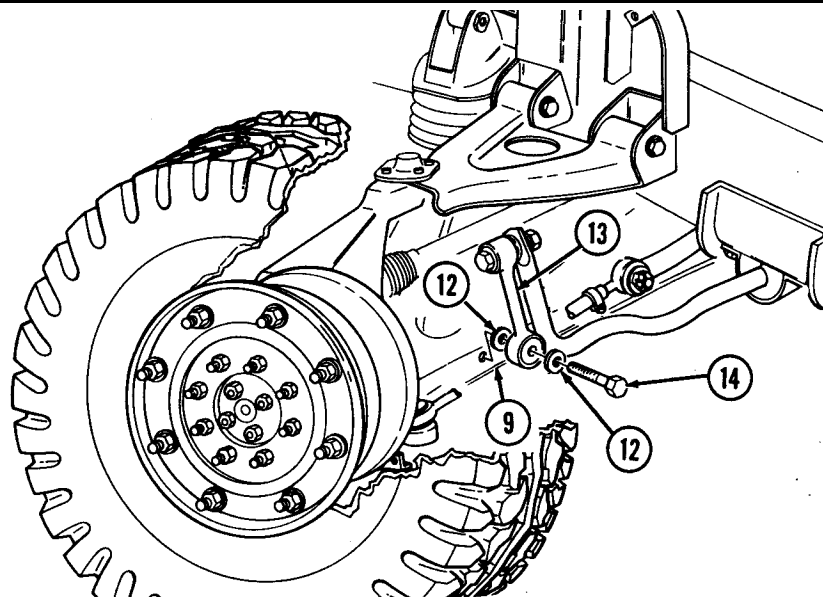
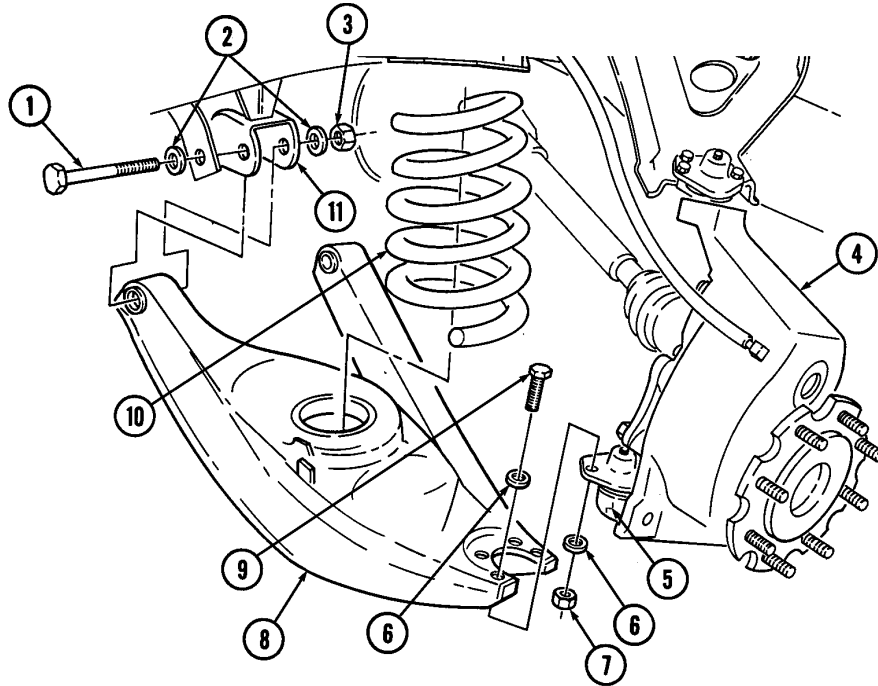
3. Raise lower control arm (8) to align with geared hub (4) and ball joint (5) ensuring lower ball joint (5) is placed below lower control arm (8).

6-29. LOWER CONTROL ARM REPLACEMENT(Cont'd)

NOTE

Ensure outer capscrews on front ball joints are installed from top down and inner capscrews are installed from bottom up for M1123 and "A2" series.

4. Install geared hub (4) and ball joint (5) on lower control arm (8) with four washers (6), capscrews (9), washers (6), and locknuts (7). Tighten locknuts (7) to 35 lb-ft (47 N•m).
5. Tighten locknuts (3) to 260 lb-ft (352 N•m).
6. Install wheel (para. 8-3).
7. Apply sealing compound to threads of capscrew (14). Install bar link (13) to lower control arm (8), with two washers (12) and capscrew (14). Tighten capscrew (14) to 70 lb-ft (95 N•m).



- FOLLOW-ON TASKS:**
- Install shock absorber (para. 6-31).
 - Check wheel alignment (paras. 8-10 and 8-11).

6-30. COIL SPRING REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Four locknuts (Appendix G, Item 128)
(Basic/A1 Series)
Four locknuts (Appendix G, Item 105)
(A2 Series)
Locknut (Appendix G, Item 106)
Sealing compound (Appendix C, Item 40)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

- Hood raised and secured (TM 9-2320-280-20-10) (front springs only). M1037 and M1042 only:
- Shelter removed (para. 11-120) (rear shock absorbers only).
- Lower control arm supported (para. 6-29) (rear shock absorbers only).

NOTE

The procedure for removing and installing all four coil springs are basically the same. This procedure covers the left front coil spring.

a. Removal

NOTE

For rear coil spring replacement on M1037 and M1042 models, it may be necessary to spread frame from body by positioning prybar between hinge mount bracket and rear bumper to gain access to shock absorber retaining pin nut.

1. Remove capscrew (13), two washers (14), and stabilizer bar link (15) from lower control arm (12).
2. Remove wheel (para. 8-3).

NOTE

Note direction of outer capscrews for installation.

3. Remove four locknuts (9), washers (8), capscrews (10), and washers (8) from lower ball joint (7), geared hub (6) and lower control arm (12). Discard locknuts (9).
4. Place jack under lower control arm (12) and raise lower control arm (12) slightly to relieve tension on shock pin (2).
5. Remove locknut (5), pin (2), washer (3), and shock absorber (11) from spring seat (4) and collapse shock absorber (11). Discard locknut (5).

NOTE

It may be necessary to loosen lower control arm capscrews to allow lower control arm to be lowered.

6. Pull geared hub (6) and ball joint (7) away from control arm (12), lower control arm (12), and remove coil spring (1) from lower control arm (12) and shock absorber (11).

b. Installation

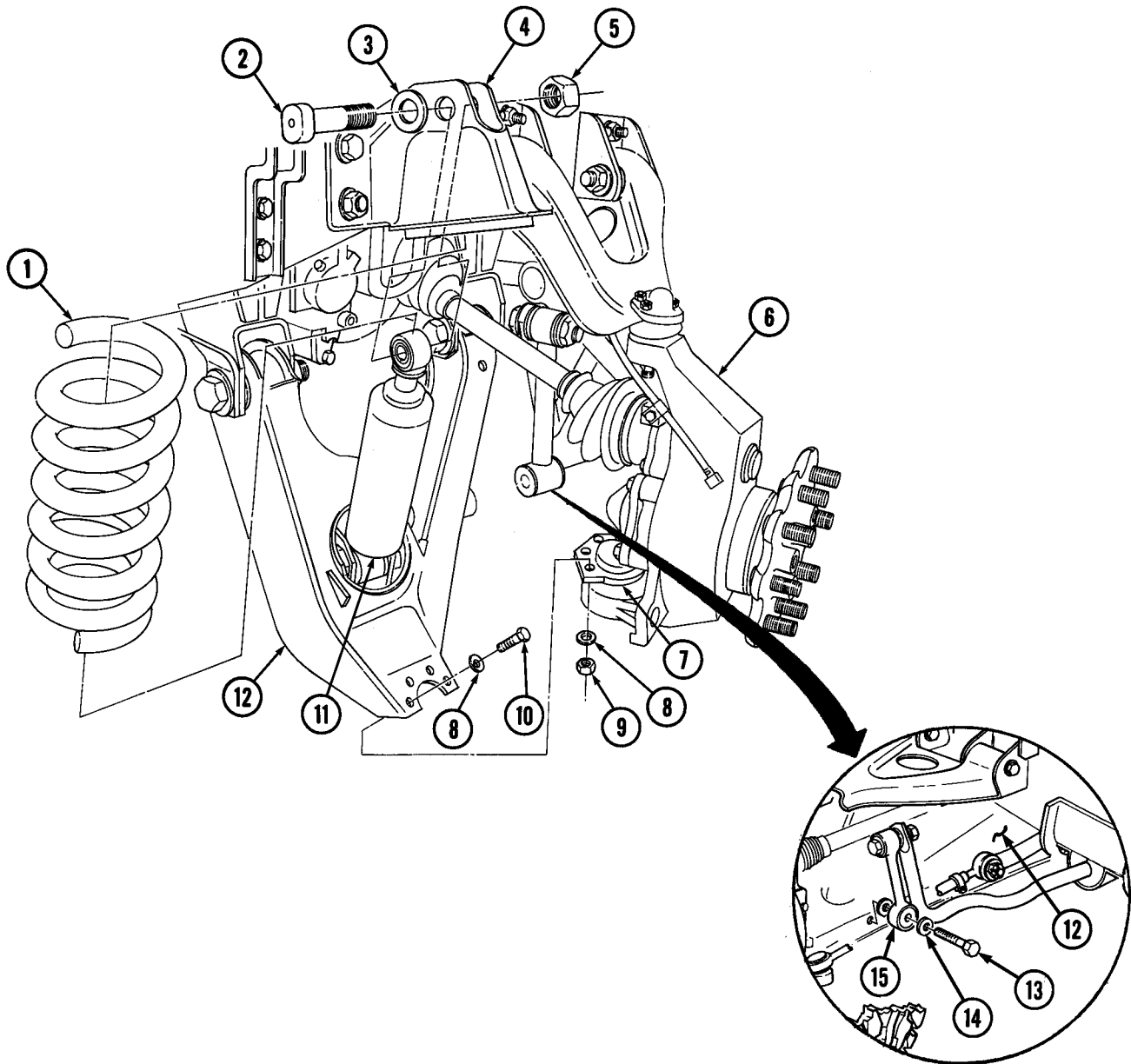
1. Install coil spring (1) over shock absorber (11) and onto lower control arm (12) ensuring end of coil spring (1) fits in spring pocket of lower control arm (12).
2. Ensure coil spring (1) is aligned with spring seat (4) flange, and raise lower control arm (12).
3. Extend shock absorber (11) into spring seat (4) and install washer (3), pin (2), and locknut (5). Tighten locknut (5) to 300 lb-ft (407 N·m).

6-30. COIL SPRING REPLACEMENT (Cont'd)

NOTE

Ensure outer capscrews on front ball joints are installed from top down for M1123 and "A2" series vehicles only.

4. Install lower ball joint (7) and geared hub (6) to lower control arm (12) ensuring lower ball joint (7) is placed below lower control arm (12). Secure with four washers (8), capscrews (10), washers (8), and locknuts (9). Tighten locknuts (10) to 35 lb-ft (47 N·m).
5. Install wheel (para. 8-3).
6. Apply sealing compound to threads of capscrew (13). Install stabilizer bar link (15) to lower control arm (12) with two washers (14) and capscrew (13). Tighten capscrew (13) to 70 lb-ft (95 N.m).



- FOLLOW-ON TASKS:**
- Lower and secure hood (TM 9-2320-280-10).
 - M1037 and M1042 only:
 - Install shelter (if removed) (para. 11-120).
 - Remove lower control arm supports (para. 6-29).

6-31. SHOCK ABSORBER REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

- General mechanic's tool kit:
automotive (Appendix B, Item 1)
- Drive socket (Appendix B, Item 168)

Materials/Parts

- Two locknuts (Appendix G, Item 106)
- Eight locknuts (Appendix G, Item 81)
- Two lockwashers (Appendix G, Item 147)

Personnel Required

- One mechanic
- One assistant

Manual References

- TM 9-2320-280-10
- TM 9-2320-280-24P

Equipment Condition

- Hood raised and secured (TM 9-2320-280-10) (front shock absorbers only).
- M1037 and M1042 only:
- Shelter removed (para. 11-120) (rear shock absorbers only).
- Lower control arm supported (para. 6-29) (rear shock absorbers only).

NOTE

The procedures for removing and installing all shock absorbers are the same except rear lower shock pins must be installed with head of pin facing rearward. This procedure covers the left front shock absorber.

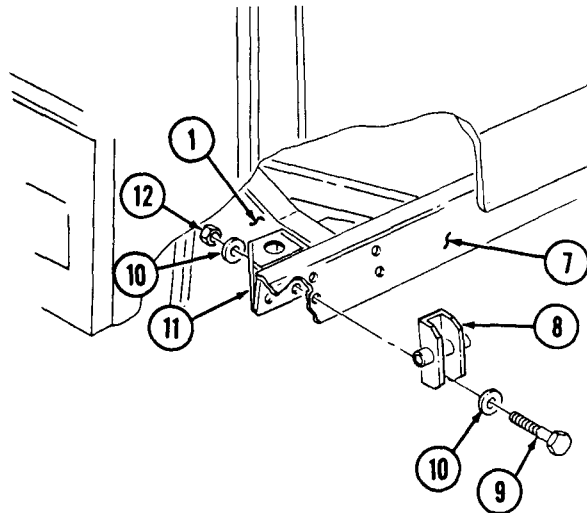
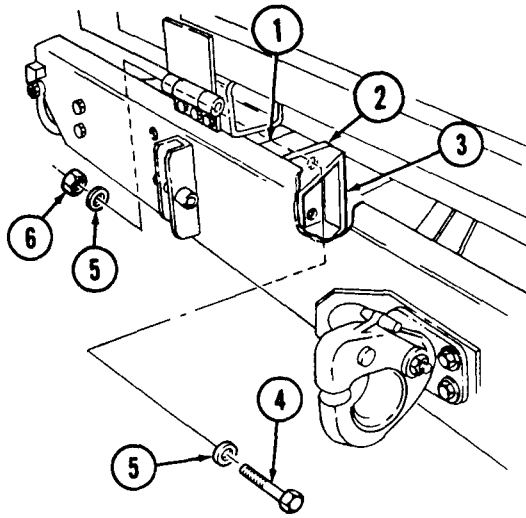
a. Removal

NOTE

For rear shock absorber replacement on M1037 and M1042 models, it may be necessary to spread frame from body by positioning prybar between hinge mount bracket and rear bumper to gain access to shock absorber retaining pin nut. Perform steps 1 through 3 only if required.

1. Remove four locknuts (6), washers (5), capscrews (4), and washers (5) from bumper bracket (3), plate (2), and frame (1). Discard locknuts (6).
2. Remove two locknuts (12), washers (10), capscrews (9), washers (10), and tiedown bracket (8) from body mount bracket (11) and rear bumper (7). Discard locknuts (12).
3. Remove two locknuts (12), washers (10), capscrews (9), and washers (10) from body mount bracket (11) and rear bumper (7). Discard locknuts (12).

6-31. SHOCK ABSORBER REPLACEMENT (Cont'd)



6-31. SHOCK ABSORBER REPLACEMENT (Cont'd)

4. Remove two capscrews (10), lockwashers (9), and washers (8) from bracket (11) and lower control arm (6). Discard lockwashers (9).
5. Remove locknut (5), pin (2), and washer (3) from shock absorber (1) and spring seat (4). Note position of pin (2) for installation. Discard locknut (5).
6. Compress shock absorber (1) and remove shock absorber (1) and bracket (11).

NOTE

Note alignment of shock absorber and bracket for installation reference.

7. Position shock absorber (1) in vice, and remove locknut (7), pin (13), washer (12), and bracket (11) from shock absorber (1). Discard locknut (7).

b. Installation

NOTE

- It may be necessary to spread spring seat to allow installation of shock absorber.
- Shock absorbers are marked "FRONT" or "REAR" to aid identification.

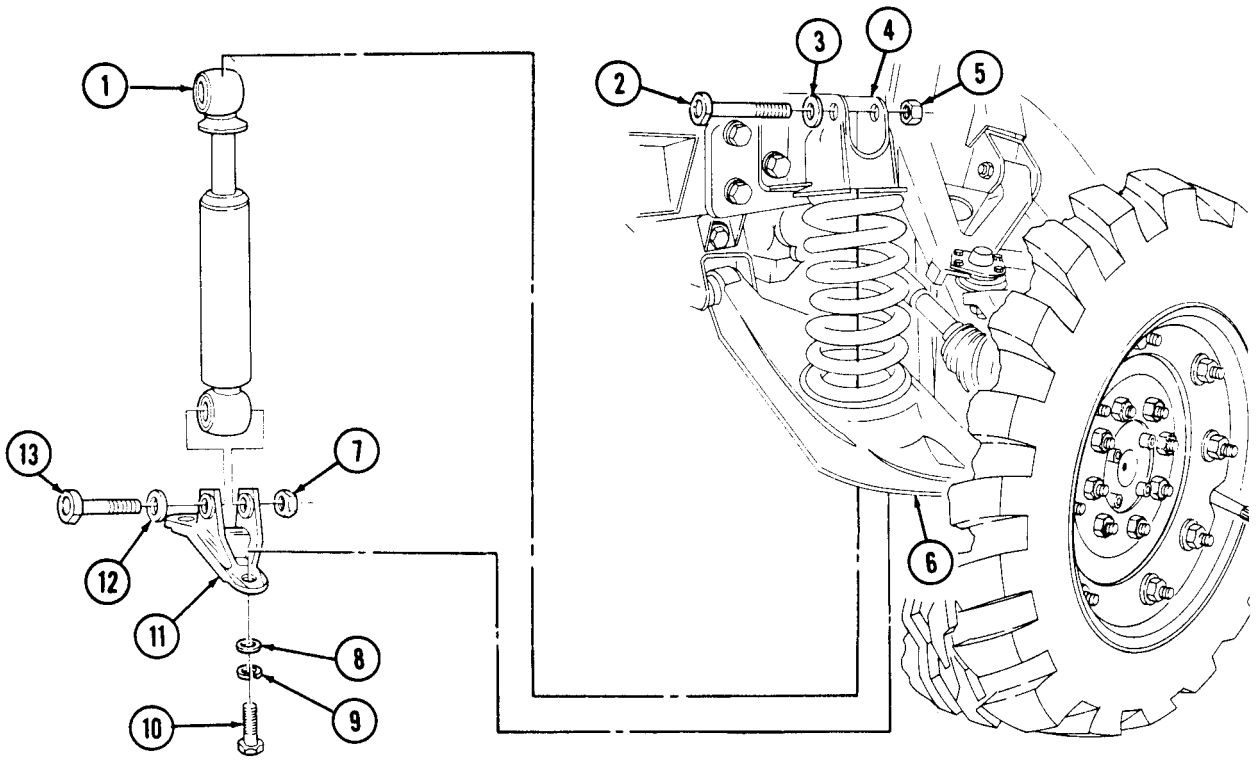
1. Position shock absorber (1) in vice, and install bracket (11) to shock absorber (1), with washer (12), pin (13), and locknut (7). Tighten locknut (7) to 300 lb-ft (407 **N•m**).

CAUTION

Do not pry or use sharp tools on shock absorber position rod. A damaged rod will cause shock failure.

2. Install shock absorber (1) and bracket (11) through lower control arm (6).
3. Extend shock absorber (1) and install piston rod end of shock absorber (1) on spring seat (4) with washer (3), pin (2), and locknut (5). Tighten locknut (5) to 300 lb-ft (407 **N•m**).
4. Install bracket (11) to lower control arm (6) with two washers (8), lockwashers (9), and capscrews (10). Tighten capscrews (10) to 178 lb-ft (241 **N•m**).

6-31. SHOCK ABSORBER REPLACEMENT (Cont'd)

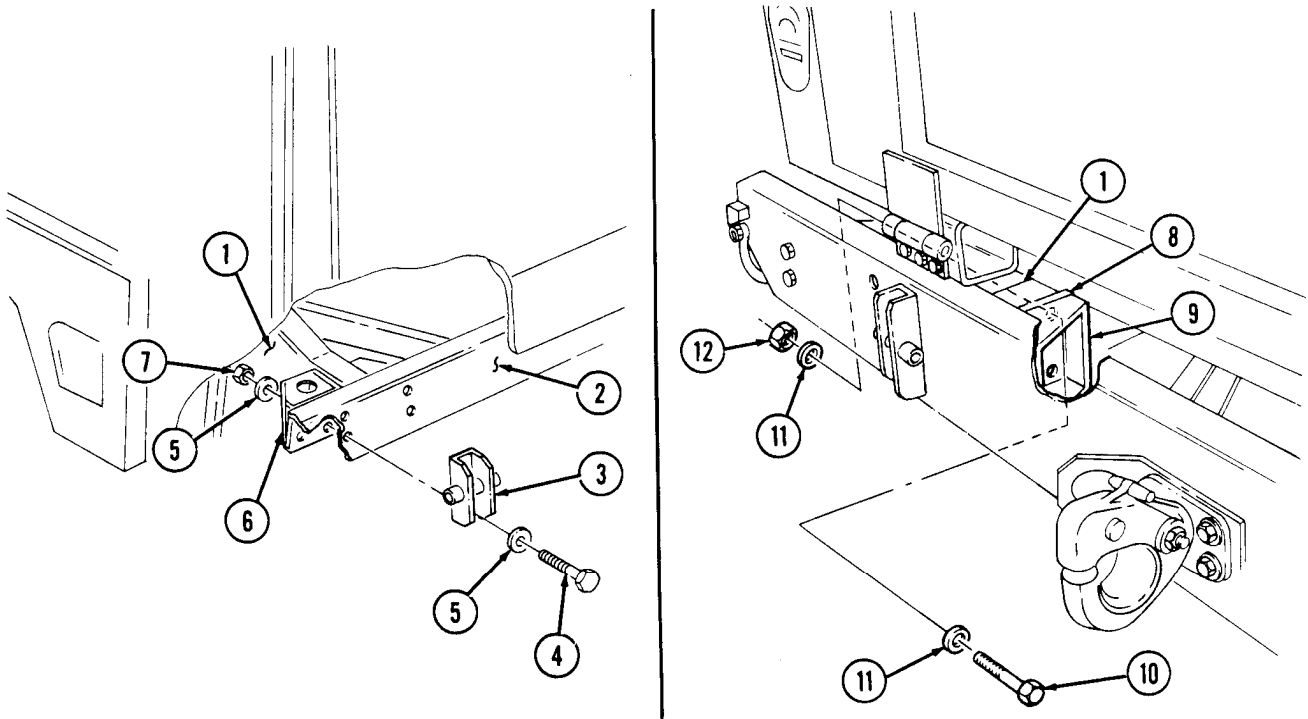


6-31. SHOCK ABSORBER REPLACEMENT (Cont'd)

NOTE

Perform steps 5 through 8 if necessary to reassemble body mount bracket to frame and rear bumper.

5. Install tiedown bracket (3) and body mount bracket (6) on rear bumper (2) with two washers (5), capscrews (4), washers (5), and locknuts (7).
6. Secure body mount bracket (6) to rear bumper (2) with two washers (5), capscrews (4), washers (5), and locknuts (7).
7. Secure bumper bracket (9) and plate (8) to frame (1) with four washers (11), capscrews (10), washers (11), and locknuts (12).
8. Tighten capscrews (10) and locknuts (7) to 90 lb-ft (122 N•m).



- FOLLOW-ON TASKS:**
- Lower and secure hood (TM 9-2320-280-10), (front shock absorbers only)
 - M1037 and M1042 only:
 - Install shelter (para. 11-120), (rear shock absorbers only).
 - Remove support from lower control arm (para. 6-29).
 - Install rear wheel (para. 8-3), (rear shock absorbers only).

CHAPTER 7 BRAKE SYSTEM MAINTENANCE

Section I. PARKING BRAKE SYSTEM MAINTENANCE

7-1. PARKING BRAKE SYSTEM MAINTENANCE TASK SUMMARY

TASK PARA.	PROCEDURES	PAGE NO.
7-2.	Parking Brake Adjustment	7-2
7-3.	Parking Brake Caliper and Rotor Maintenance	7-4
7-4.	Parking Brake Lever Replacement	7-10
7-5.	Parking Brake Cable Replacement	7-12
7-6.	Parking Brake Rod Replacement	7-14
7-7.	Parking Brake Heat Shield Replacement	7-16
7-8.	Parking Brake Heat Shield and Heat Shield Extension Replacement	7-17
7-8.1.	Brake Protection Guards Replacement	7-18.2 ■

7-2. PARKING BRAKE ADJUSTMENT

This task covers:

Brake Adjustment

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Materials/Parts

Cotter pin (Appendix G, Item 12)
Cotter pin (Appendix G, Item 21)

Equipment Condition

Wheels chocked and parking brake released
(TM 9-2320-280-10).

Personnel Required

One mechanic
One assistant

NOTE

The following procedure applies to vehicles with serial numbers USBL Eff. 1 through 44824.

Brake Adjustment

1. Remove clip (5) and open boot (6) to allow access to clevis pin (7). Remove cotter pin (4), washer (9), and clevis pin (7) securing clevis (8) to bellcrank (1). Discard cotter pin (4).
2. Remove cotter pin (13) from slotted nut (14). Discard cotter pin (13).

NOTE

Total gauge thickness should not exceed 0.020 in. (0.508 mm).

3. Place 0.020 in. (0.508 mm) thickness gauge between rotor (12) and brake pad (11).
4. Adjust slotted nut (14) until thickness gauge is snug, and cam (10) is at 11 o'clock position. Install cotter pin (13) in slotted nut (14).
5. Repeatedly apply and adjust parking brake lever until bellcrank (1) linear travel is 0.75 in. (19 mm).

NOTE

Ensure slack is removed from parking brake linkage.

6. Release parking brake lever and adjust clevis (8) so clevis pin (7) slides easily into bellcrank (1) and secure with washer (9) and cotter pin (4). If alignment cannot be made at clevis (8), adjust rod (3) in or out of rear clevis (2) to obtain proper alignment.
7. Remove thickness gauge.
8. Close boot (6) and secure with clip (5).

CAUTION

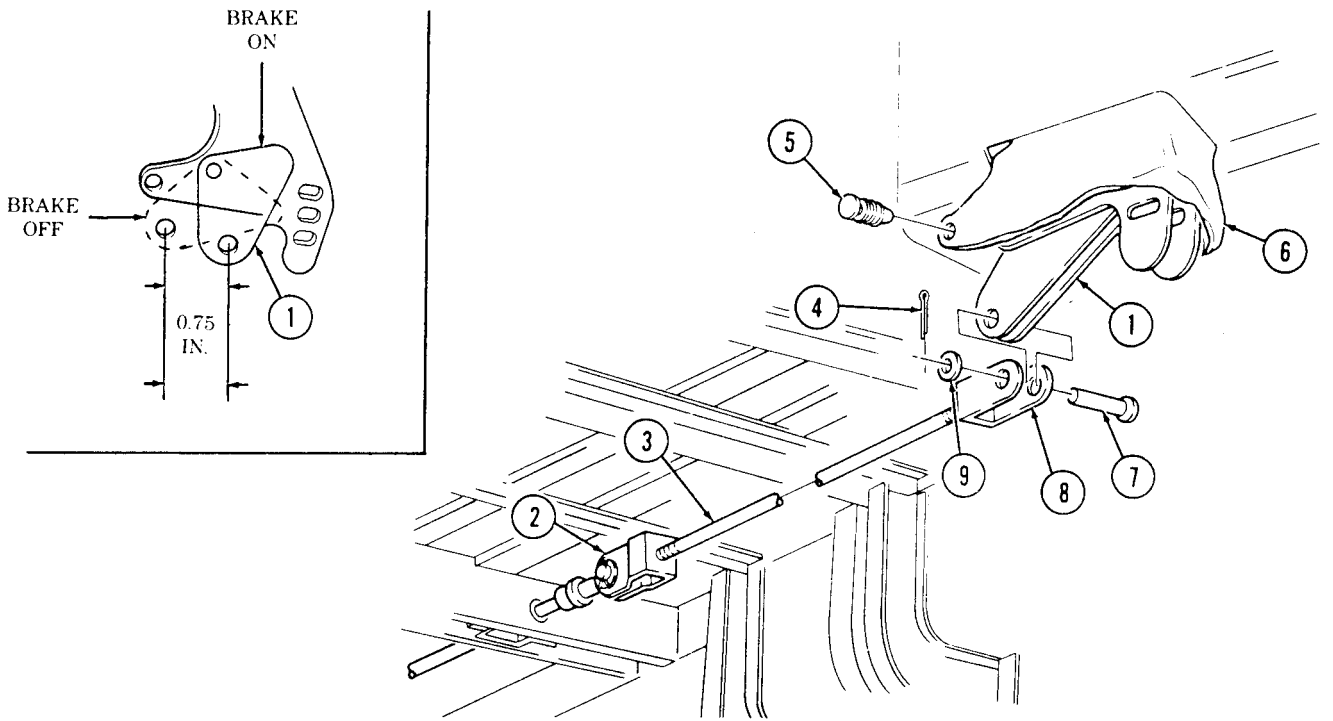
Apply parking brake lever gradually, while burnishing brakes, to bring vehicle to a gradual stop. Sudden or quick application of brake lever can damage parking brake rotor.

NOTE

Perform steps 9-11 only if parking brake pads were replaced.

9. Burnish parking brake pads (11) by operating vehicle at 10 mph (16 kph) and, using the parking brake, slow down and bring the vehicle to a gradual stop. Allow parking brake rotor (12) to cool by operating vehicle 2.5 miles (4 km) at 20 mph (32 kph). Repeat this step ten times.
10. Remove parking brake rotor (12) (para. 7-3.a) and inspect brake pads (11) for a large contact pattern across the surface of the brake pads (11). If contact pattern is not a minimum of 90%, install parking brake rotor (12) (para. 7-3.c) and repeat step 9. If contact pattern is satisfactory, install parking brake rotor (para. 7-3.c) and go to step 11.
11. Readjust, following steps 1 through 8.

7-2. PARKING BRAKE ADJUSTMENT (Cont'd)



FOLLOW-ON TASK: Check parking brake for proper operation (TM 9-2320-280-10).

7-3. PARKING BRAKE CALIPER AND ROTOR MAINTENANCE

This task covers:

- | | |
|---|---|
| <ul style="list-style-type: none"> a. Removal b. Inspection | <ul style="list-style-type: none"> c. Installation |
|---|---|

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Personnel Required

One mechanic
One assistant

Materials/Parts

Four lockwashers (Appendix G, Item 134)
Two lockwashers (Appendix G, Item 178)
Cotter pin (Appendix G, Item 12)
Cotter pin (Appendix G, Item 21)
Four gaskets (Appendix G, Item 59)
Two locknuts (Appendix G, Item 70)
Sealing compound (Appendix C, Item 45)
Grease (Appendix C, Item 22)

Manual References

TM-9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

Wheels chocked and parking brake released
(TM 9-2320-280-10)

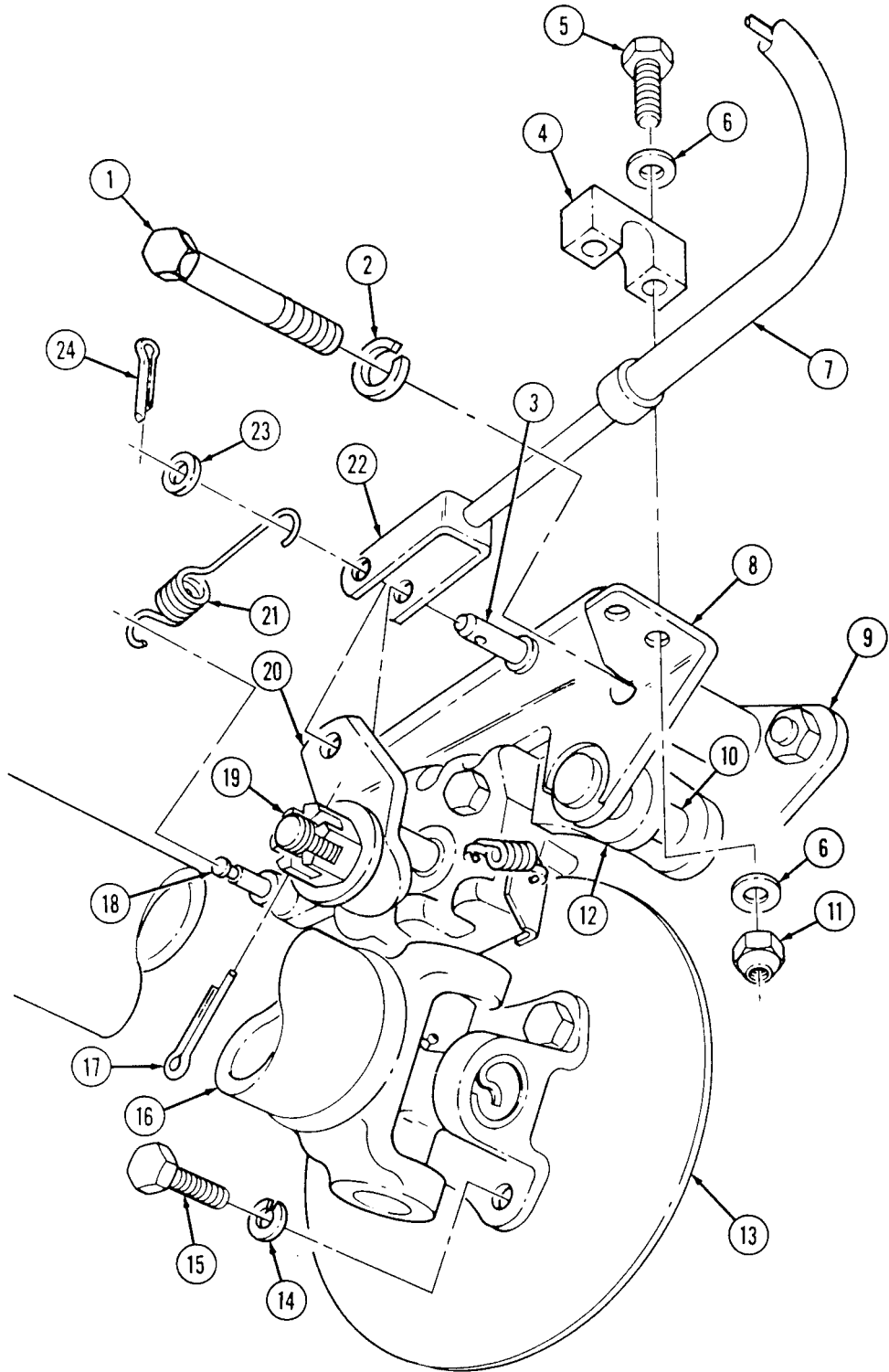
NOTE

The following procedure applies to vehicles with serial numbers
USBL Eff. 1 through 44824.

a. Removal

1. Remove four capscrews (15) and lockwashers (14) from rear propeller shaft (16) and parking brake rotor (13). Disconnect rear propeller shaft (16) and remove rotor (13). Discard lockwashers (14).
2. Remove cotter pin (17) from slotted nut (19), and loosen slotted nut (19). Discard cotter pin (17).
3. Remove cotter pin (24), washer (23), spring (21), clevis pin (3), and clevis (22) from cam (20). Remove spring (21) from pin post (18). Discard cotter pin (24).
4. Remove two locknuts (11), washers (6), capscrews (5), washers (6), and clamp (4) from parking brake cable (7) and plate and guide pin assembly (8). Discard locknuts (11).
5. Remove two capscrews (1) and lockwashers (2) from plate and guide pin assembly (8) and caliper mounting bracket (9). Discard lockwashers (2).
6. Slide plate and guide pin assembly (8) towards front of vehicle until pins (10) come out of bracket (9).
7. Remove plate and guide pin assembly (8) and caliper assembly (12).

7-3. PARKING BRAKE CALIPER AND ROTOR MAINTENANCE (Cont'd)



7-3. PARKING BRAKE CALIPER AND ROTOR MAINTENANCE (Cont'd)

8. Remove slotted nut (1), washer (2), and cam (3) from caliper (50).
9. Remove plate and guide pin assembly (4) from caliper (5).
10. Remove two push pins (12) and two gaskets (6) from caliper (5). Discard gaskets (6).
11. Remove spring (7) and rear brake pad (8) from caliper half (14).
12. Remove two springs (10), front brake pad (9), and two gaskets (11) from caliper half (13). Discard gaskets (11).
13. If caliper (5) requires disassembly, remove two long capscrews (17), washers (18), short capscrew (16), and washer (15). Separate caliper halves (13) and (14).

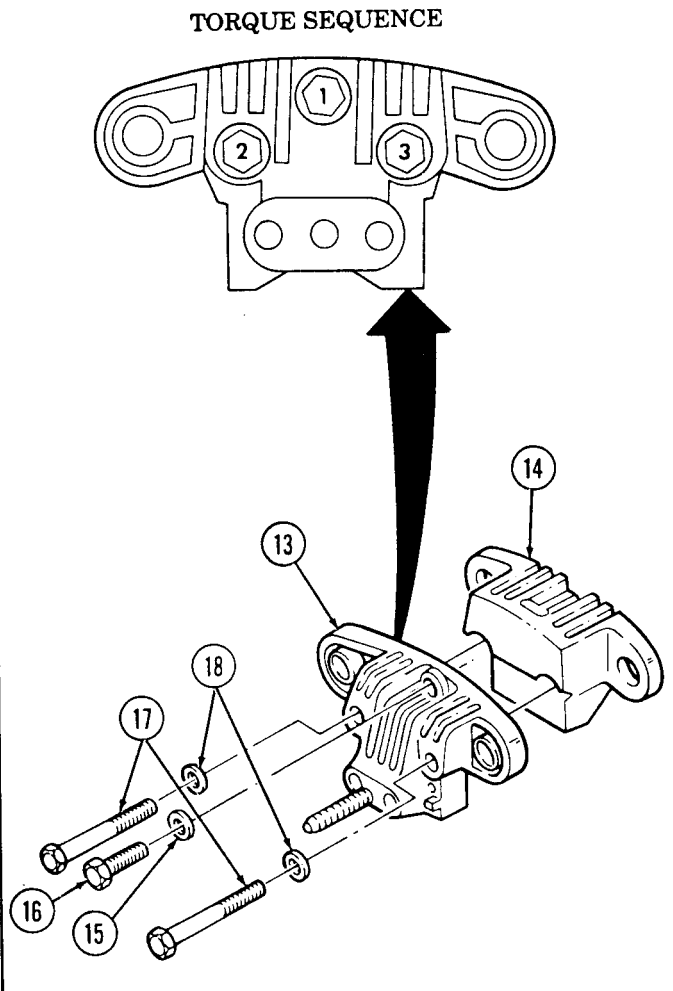
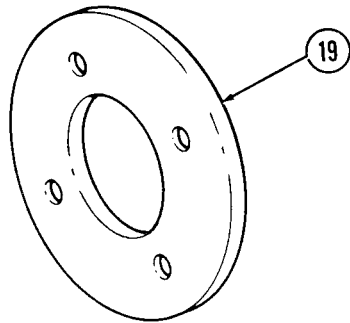
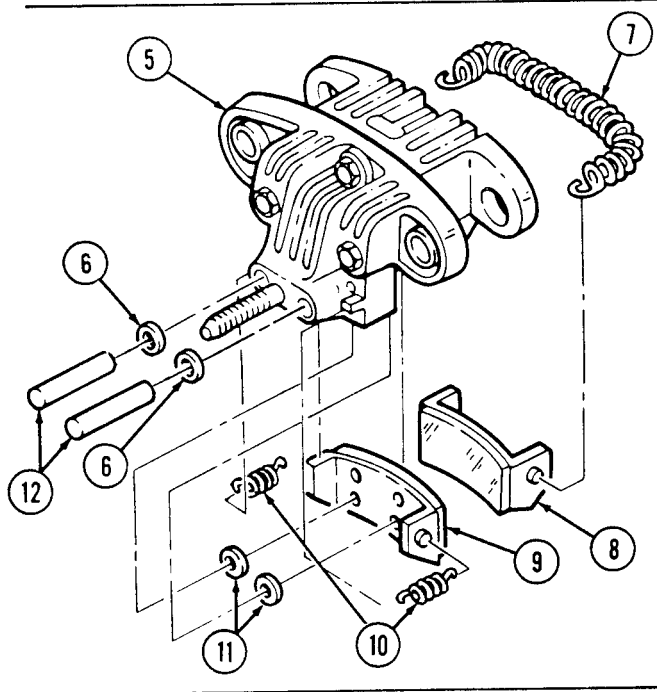
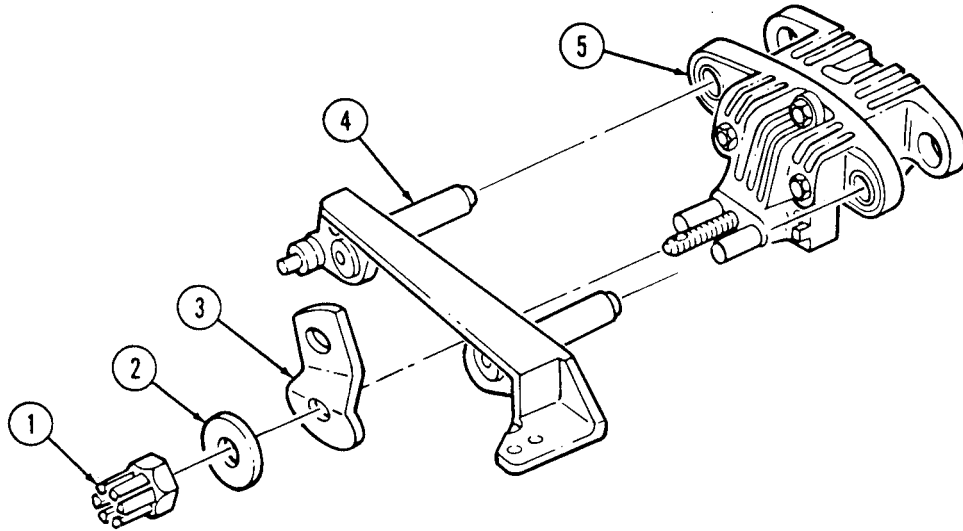
b. Inspection

1. Inspect caliper halves (13) and (14) for cracks, wear, elongated holes, and bends. Replace as necessary.
2. Inspect rotor (19) for cracks, wear, elongated holes, and warping. Replace if defective, or rotor thickness is less than 5/32 in. (4 mm).
3. Inspect brake pads (9) and (8) for wear. If brake pad thickness is less than 1/8 in. (3.2 mm), replace both pads (9) and (8). Replace both pads (9) and (8) if rotor (19) was replaced.

c. Installation

1. If caliper halves (13) and (14) require assembly, apply sealing compound to threads of capscrews (17) and (16). Install caliper halves (13) and (14) with washer (15), short capscrew (16), two washers (18), and two long capscrews (17). Tighten capscrews (17) and (16) in sequence shown, to 30-35 lb-ft (41-47 N•m).
2. Install two gaskets (11) and front brake pad (9) on caliper (5) with two springs (10).
3. Install long spring (7) on rear brake pad (8).
4. Install rear brake pad (8) on caliper (5) with spring (7).
5. Clean and lubricate push pins (12), cam-to-push pin contact area, and push pin openings in caliper (5) with grease.
6. Install two gaskets (6) and push pins (12) in caliper (5) with rounded ends of push pins (12) facing outward.
7. Install plate and guide pin assembly (4) on caliper (5).
8. Install cam (3) on caliper (5) with washer (2) and slotted nut (1). Do not tighten slotted nut (1).

7-3. PARKING BRAKE CALIPER AND ROTOR MAINTENANCE (Cont'd)



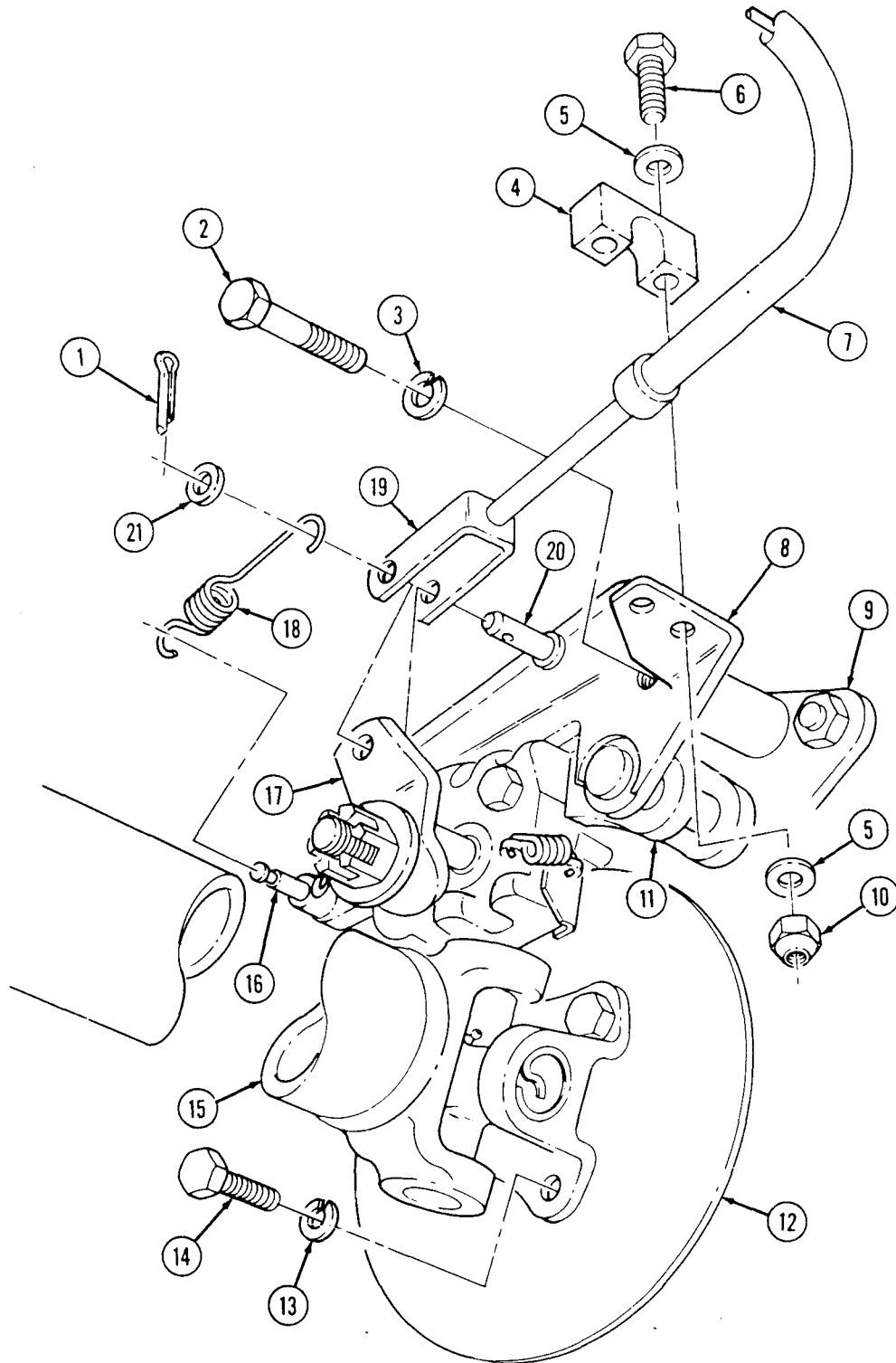
7-3. PARKING BRAKE CALIPER AND ROTOR MAINTENANCE (Cont'd)

NOTE

Avoid placing parking brake cable behind mounting bracket when performing step 9.

9. Install caliper (11) and plate and guide-pin assembly (8) on caliper mounting bracket (9).
10. Apply sealing compound to threads of capscrews (2). Install plate and guide pin assembly (8) to caliper mounting bracket (9) with two lockwashers (3) and capscrews (2). Tighten capscrews (2) to 90 lb-ft (122 **N•m**).
11. Install parking brake cable (7) on plate and guide pin assembly (8) with clamp (4), two washers (5), capscrews (6), washers (5), and locknuts (10). Tighten locknuts (10) to 5 lb-ft (7 **N•m**).
12. Position rotor (12) to caliper (11).
13. Install clevis (19) to cam (17) with clevis pin (20), long end of spring (18), washer (21), and cotter pin (1).
14. Install short end of spring (18) on pin post (16) and crimp short end of spring (18) with pliers.
15. Install rear propeller shaft (15) to rotor (12) with four lockwashers (13) and capscrews (14). Tighten capscrews (14) to 60 lb-ft (81 **N•m**).

7-3. PARKING BRAKE CALIPER AND ROTOR MAINTENANCE (Cont'd)



FOLLOW-ON TASK: Adjust parking brake (para. 7-2).

7-4. PARKING BRAKE LEVER REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM-9-2320-280-10
TM 9-2320-280-24P

Materials/Parts

Two assembled locknuts
(Appendix G, Item 131)
Five locknuts (Appendix G, Item 71)
Cotter pin (Appendix G, Item 12)

Equipment Condition

- Wheels chocked and parking brake released (TM 9-2320-280-10).
- Parking brake switch removed (para. 4-19).

Personnel Required

One mechanic
One assistant

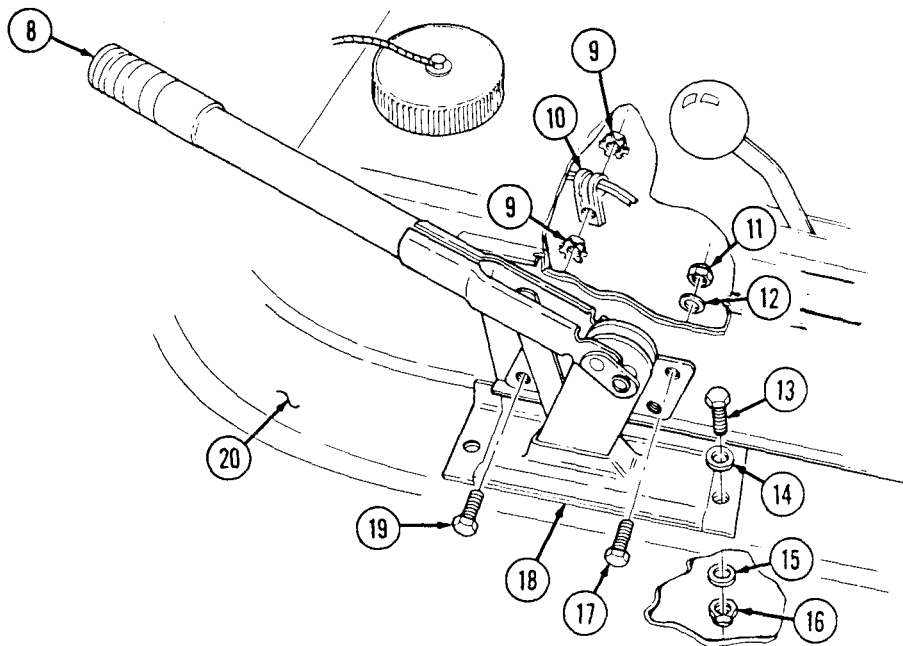
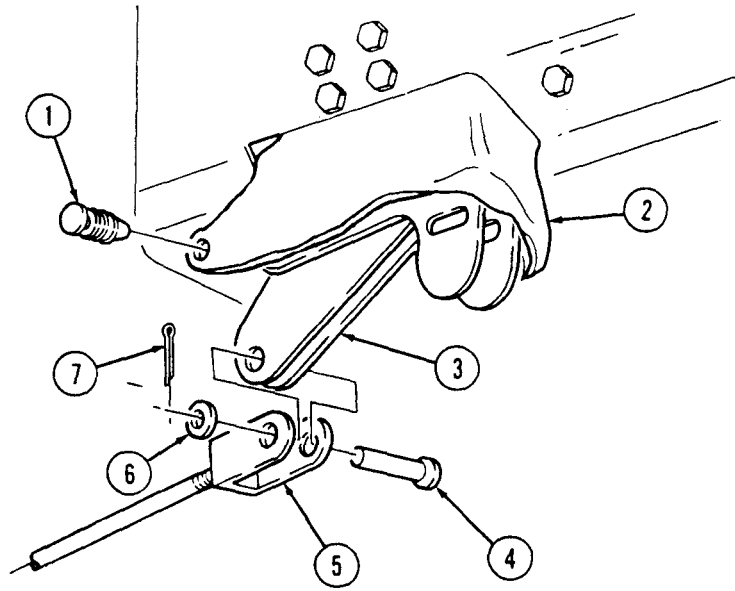
a. Removal

1. Remove clip (1) and open boot (2) to allow access to clevis pin (4).
2. Remove cotter pin (7), washer (6), and clevis pin (4) from clevis (5) and bellcrank (3). Discard cotter pin (7).
3. Remove assembled locknut (9), wiring harness clamp (10), assembled locknut (9) and capscrew (19) from parking brake lever (8). Discard assembled locknut (9).
4. Remove three locknuts (11), washers (12), and capscrews (17) from parking brake lever (8) and body (20). Discard locknuts (11).
5. Remove two locknuts (16), washers (15), capscrews (13), washers (14), and parking brake lever (8) from body (20). Discard locknuts (16).
6. Remove upper boot (18) from parking brake lever (8).
7. Remove lower boot (2) from body (20).

b. Installation

1. Install lower boot (2) on body (20).
2. Install upper boot (18) on parking brake lever (8).
3. Install parking brake lever (8) on body (20) with two washers (14), capscrews (13), washers (15), and locknuts (16).
4. Secure parking brake lever (8) on body (20) with capscrew (19), assembled locknut (9), wiring harness clamp (10), and assembled locknut (9).
5. Secure parking brake lever (8) on body (20) with three capscrews (17), washers (12), and locknuts (11).
6. Install clevis (5) on bellcrank (3) with clevis pin (4), washer (6), and cotter pin (7).
7. Apply parking brake lever (8) and tighten capscrews (13), (17), and (19) to 8 lb-ft (11 N·m).

7-4. PARKING BRAKE LEVER REPLACEMENT (Cont'd)



- FOLLOW-ON TASKS:**
- Install parking brake switch (para. 4-19).
 - Adjust parking brake (para. 7-2).

7-5. PARKING BRAKE CABLE REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Two cotter pins (Appendix G, Item 12)
Cotter pin (Appendix G, Item 21)
Two locknuts (Appendix G, Item 70)
Four lockwashers
(Appendix G, Item 143)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

- Wheels chocked and parking brake released (TM 9-2320-280-10).
- Muffler and insulator removed (para. 3-48).

NOTE

The following procedure applies to vehicles with serial numbers USBL Eff. 1 through 44824.

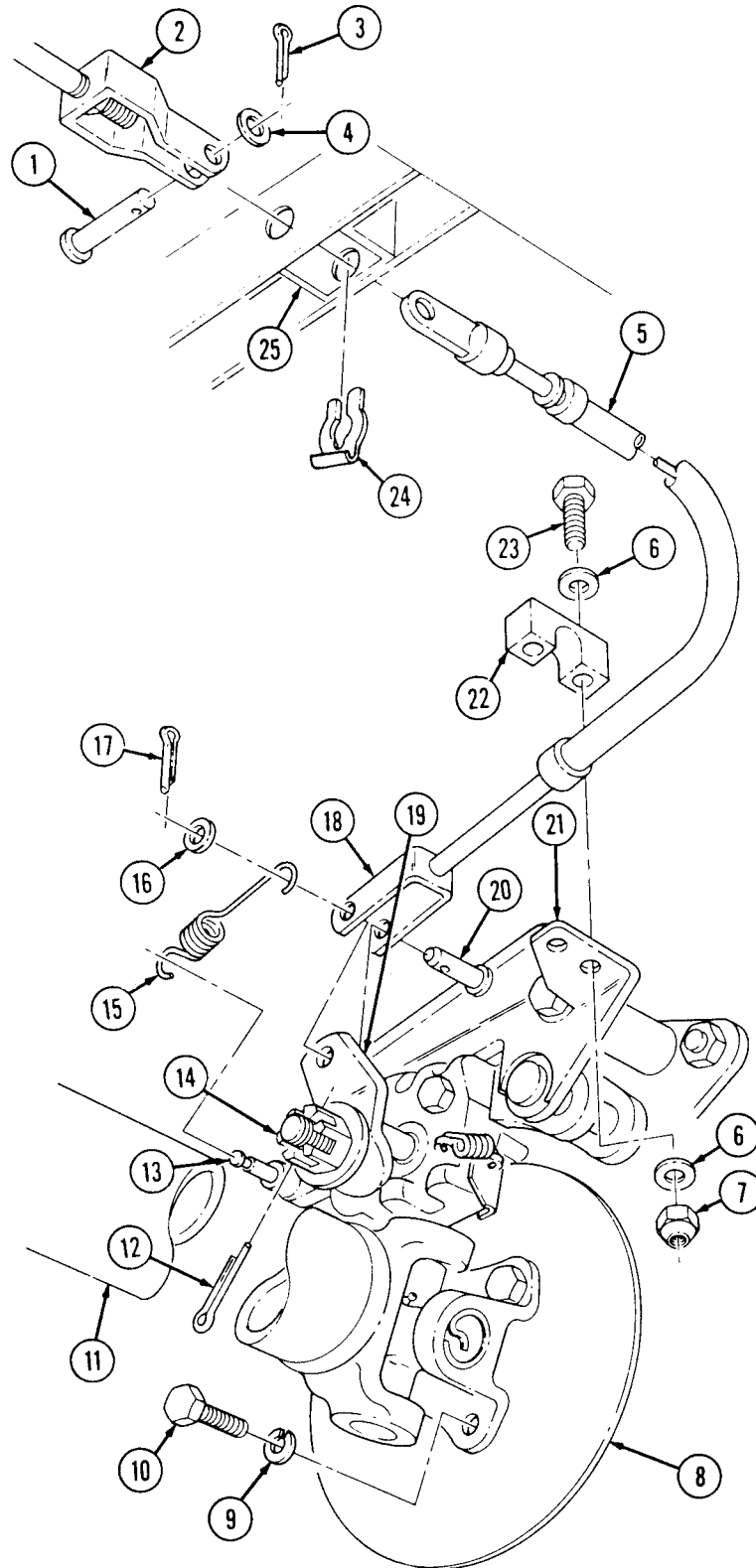
a. Removal

1. Remove four capscrews (10) and lockwashers (9) and disconnect rear propeller shaft (11) from parking brake rotor (8). Discard lockwashers (9).
2. Remove cotter pin (12) and loosen slotted nut (14). Discard cotter pin (12).
3. Remove cotter pin (17), washer (16), spring (15), clevis pin (20), and clevis (18) from cam (19). Remove spring (15) from pin post (13). Discard cotter pin (17).
4. Remove two locknuts (7), washers (6), capscrews (23), washers (6), and clamp (22) from brake cable (5) and plate and guide pin assembly (21). Discard locknuts (7).
5. Remove cotter pin (3), washer (4), and clevis pin (1) from brake cable (5) and brake rod clevis (2). Discard cotter pin (3).
6. Remove clip (24) and brake cable (5) from bracket (25).

b. Installation

1. Install brake cable (5) in bracket (25) with clip (24).
2. Install brake rod clevis (2) on brake cable (5) with clevis pin (1) washer (4), and cotter pin (3).
3. Install brake cable (5) on plate and guide pin assembly (21) with clamp (22), two washers (6), capscrews (23), washers (6), and locknuts (7). Tighten locknuts (7) to 5 lb-ft (7 N•m).
4. Install short end of spring (15) onto pin post (13) and crimp short end of spring (15).
5. Install cable clevis (18) to cam (19) with clevis pin (20), long end of spring (15), washer (16), and cotter pin (17).
6. Connect rear propeller shaft (11) to rotor (8) with four lockwashers (9) and capscrews (10). Tighten capscrews (10) to 60 lb-ft (81 N•m).

7-5. PARKING BRAKE CABLE REPLACEMENT (Cont'd)



- FOLLOW-ON TASKS:
- Install muffler and insulator (para. 3-48).
 - Adjust parking brake (para. 7-2).

7-6. PARKING BRAKE ROD REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

- Wheels chocked and parking brake released (TM 9-2320-280-10).
- Muffler and insulator removed (para. 3-48).

Materials/Parts

Two cotter pins (Appendix G, Item 12)
Locknut (Appendix G, Item 79)

Manuals/References

TM 9-2320-280-10
TM 9-2320-280-24P

NOTE

The following procedure applies to vehicles with serial numbers USBL Eff. 1 through 44824.

a. Removal

1. Remove clip (1) and open boot (2) to allow access to clevis pin (4).
2. Remove cotter pin (9), washer (8), and clevis pin (4) from clevis (5) and bellcrank (3). Discard cotter pin (9).
3. Disconnect spring (7) from brake rod (6).
4. Remove cotter pin (17), washer (16), clevis pin (15), and brake rod (6) from brake cable (18). Discard cotter pin (17).
5. Remove clevis (5) and clevis (19) from brake rod (6).

NOTE

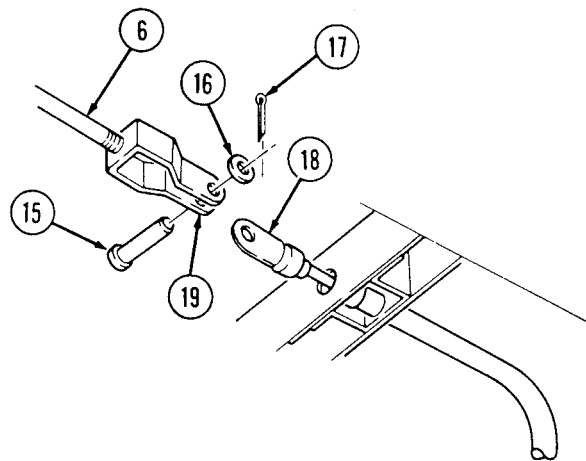
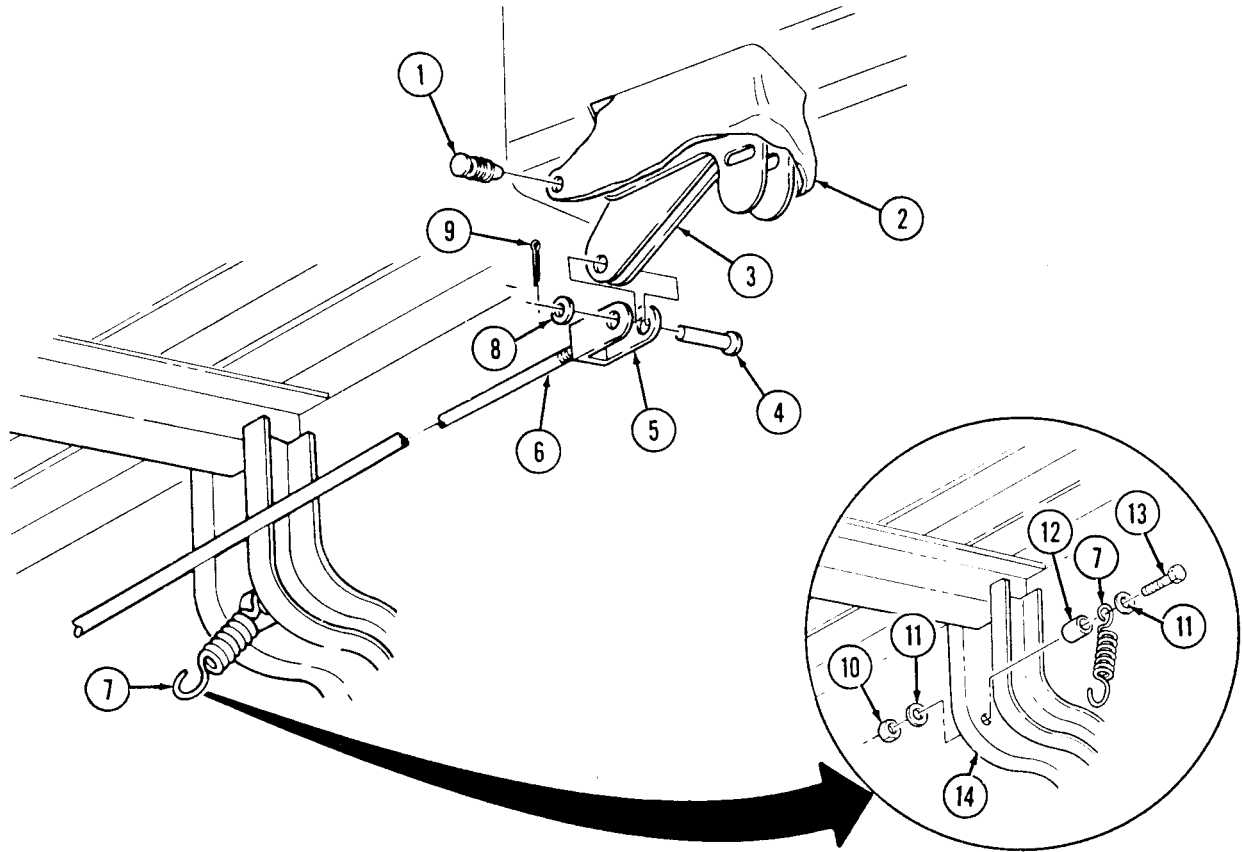
Perform steps 6 and 7 if replacing spring. If not replacing spring, go to b., installation.

6. Remove locknut (10), washer (11), capscrew (13), washer (11), spring (7), and spacer (12) from body (14). Discard locknut (10).
7. Install spacer (12) and spring (7) to body (14) with washer (11), capscrew (13), washer (11), and locknut (10).

b. Installation

1. Install clevis (5) and clevis (19) on brake rod (6).
2. Install brake rod (6) to brake cable (18) with clevis pin (15), washer (16), and cotter pin (17).
3. Install clevis (5) on bellcrank (3) with clevis pin (4), washer (8), and cotter pin (9).
4. Connect spring (7) to brake rod (6).
5. Close boot (2) and install clip (1).

7-6. PARKING BRAKE ROD REPLACEMENT (Cont'd)



- FOLLOW-ON TASKS:**
- Install muffler and insulator (para. 3-48).
 - Adjust parking brake (para. 7-2).

7-7. PARKING BRAKE HEAT SHIELD REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual Refernces

TM 9-2320-280-24P

Materials/Parts

Two lockwashers (Appendix G, Item 135)

NOTE

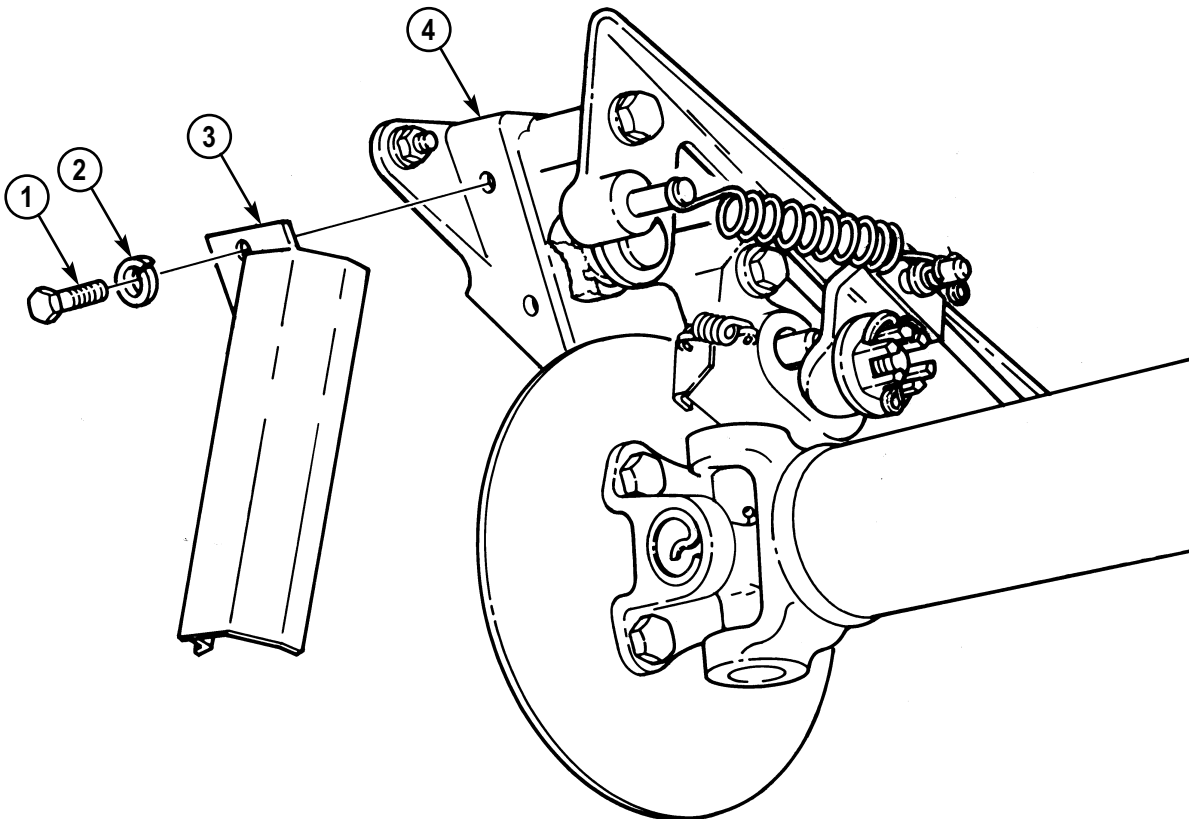
The following procedure applies to vehicles with serial numbers USBL Eff. 1 through 44824.

a. Removal

Remove two capscrews (1), lockwashers (2), and heat shield (3) from parking brake bracket (4). Discard lockwashers (2).

b. Installation

Install heat shield (3) to parking brake bracket (4) with two lockwashers (2) and capscrews (1). Tighten capscrews (1) to 6 lb-ft (8 N•m).



7-8. PARKING BRAKE HEAT SHIELD AND HEAT SHIELD EXTENSION REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-24P

Materials/Parts

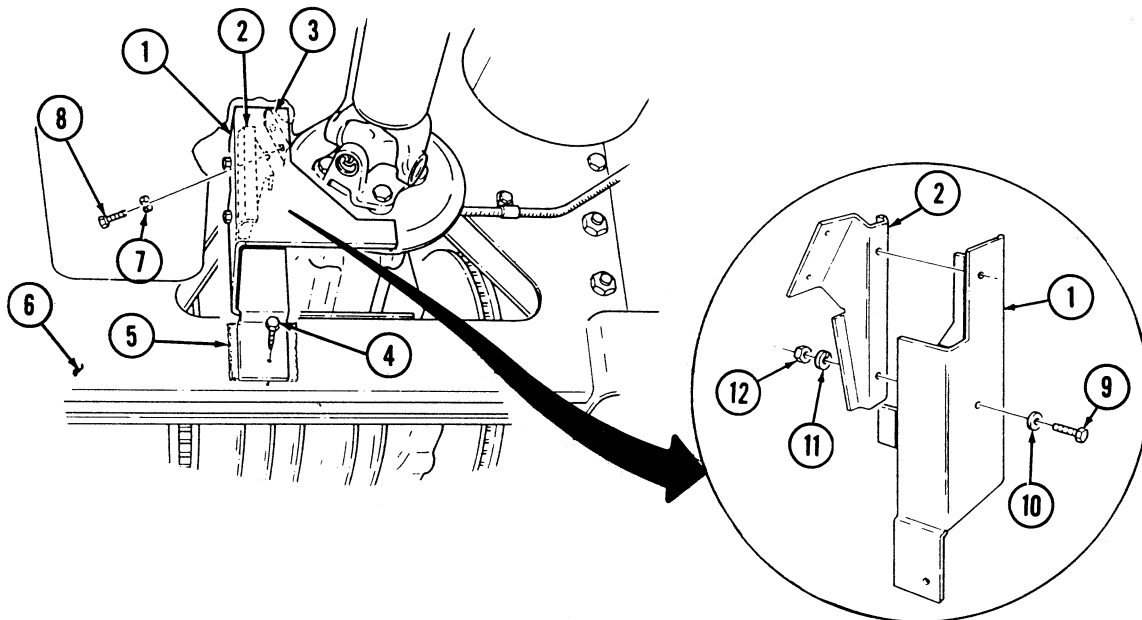
Four lockwashers (Appendix G, Item 138)
Felt sheet (Appendix D, Fig. 84)
Heat shield extension (Appendix D, Fig. 85)

NOTE

- The heat shield extension is used for extra protection of the parking brake. The replacement of it can be left up to the discretion of the commander.
- The following procedure applies to vehicles with serial numbers USBL Eff. 1 through 44824.

a. Removal

1. Remove two capscrews (8) and lockwashers (7) from heat shield extension (1), heat shield (2) and parking brake bracket (3). Discard lockwashers (7).
2. Remove capscrew (4), heat shield extension (1), and felt sheet (5) from crossmember (6). Discard felt sheet (5).
3. Remove two nuts (12), lockwashers (11), heat shield (2), capscrews (9), and washers (10) from heat shield extension (1). Discard lockwashers (11).

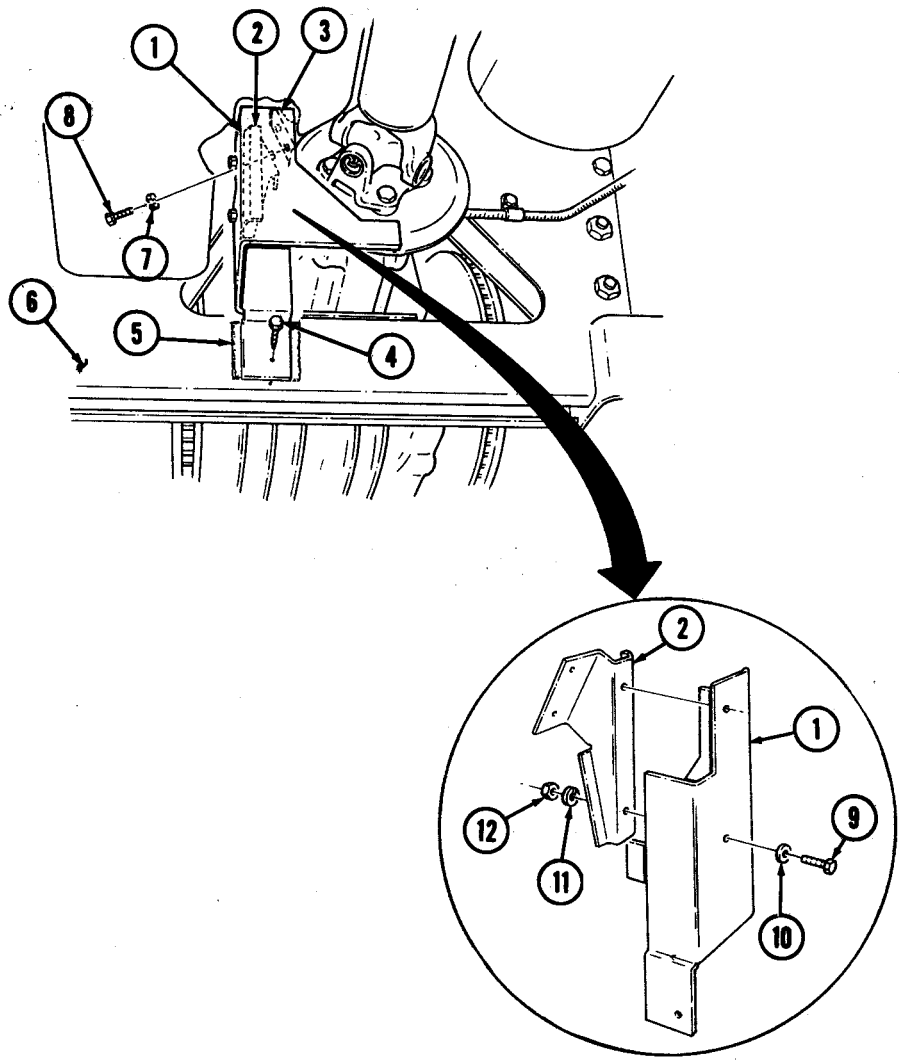


7-8. PARKING BRAKE HEAT SHIELD AND HEAT SHIELD EXTENSION REPLACEMENT (Contd)

b. Installation

1. Install heat shield (2) to heat shield extension (1) with two washers (10), capscrews (9), lockwashers (11), and nuts (12).
2. Install felt sheet (5) and heat shield extension (1) to crossmember (6) with capscrew (4).
3. Install heat shield extension (1) and heat shield (2) on parking brake bracket (3) with two lockwashers (7) and capscrews (8).

7-8. PARKING BRAKE HEAT SHIELD AND HEAT SHIELD EXTENSION REPLACEMENT (Contd)



7-8.1. BRAKE PROTECTION GUARDS REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

All M1123 and "A2" series vehicles

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Six locknuts (without 10,500 lb hydraulic winch) (Appendix G, Item 128)
Three locknuts (with 10,500 lb hydraulic winch) (Appendix G, Item 128)
Six locknuts (Appendix G, Item 79)

Manual References

TM 9-2320-280-24P

Equipment Condition

Vehicle raised and supported (para. 8-2).

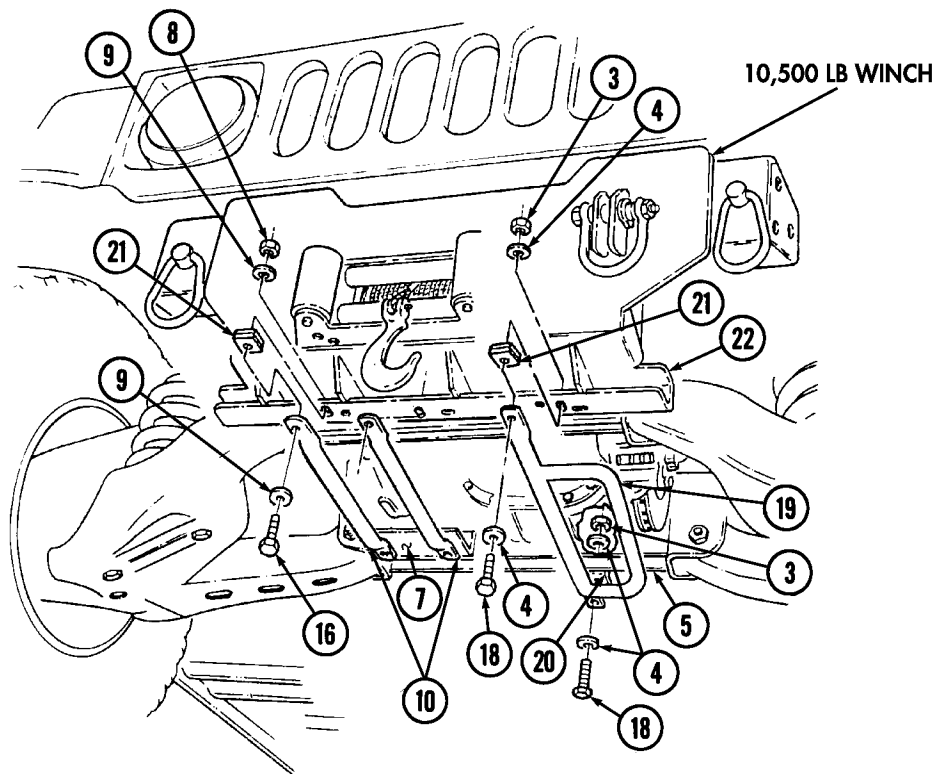
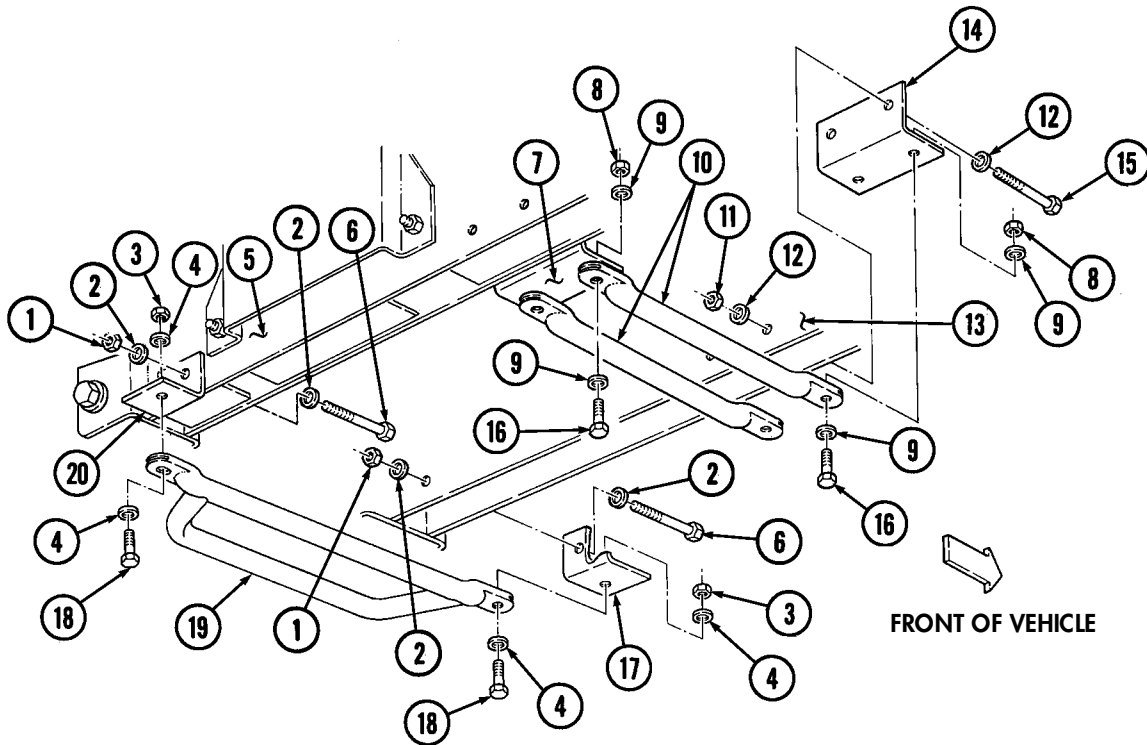
a. Removal

NOTE

Perform steps 1 through 4 for vehicles equipped with 10,500 lb hydraulic winch only.

1. Remove two locknuts (3), washers (4), capscrews (18), washers (4), spacer (21), and left front brake protection guard (19) from bracket (20) and bumper (22). Discard locknuts (3).
2. Remove four locknuts (8), washers (9), capscrews (16), washers (9), two spacers (21), and right front brake protection guards (10) from bracket (7) and bumper (13). Discard locknuts (8).
3. Remove locknut (1), washer (2), capscrow (6), washer (2), and bracket (20) from front rear crossmember (5). Discard locknut (1)
4. Remove two locknuts (11), washers (12), capscrews (15), washers (12), and bracket (7) from front crossmember (5). Discard locknuts (11).
5. Remove two locknuts (3), washers (4), capscrews (18), washers (4), and left front brake protection guard (19) from brackets (17) and (20). Discard locknuts (3).
6. Remove four locknuts (8), washers (9), capscrews (16), washers (9), and right front brake protection guards (10) from brackets (7) and (14). Discard locknuts (8).
7. Remove two locknuts (1), washers (2), capscrews (6), washers (2), and brackets (17) and (20) from front rear crossmember (5) and front crossmember (13). Discard locknuts (1).
8. Remove four locknuts (11), washers (12), capscrews (15), washers (12), and brackets (7) and (14) from front rear crossmember (5) and front crossmember (13). Discard locknuts (11).

7-8.1. BRAKE PROTECTION GUARDS REPLACEMENT (Cont'd)

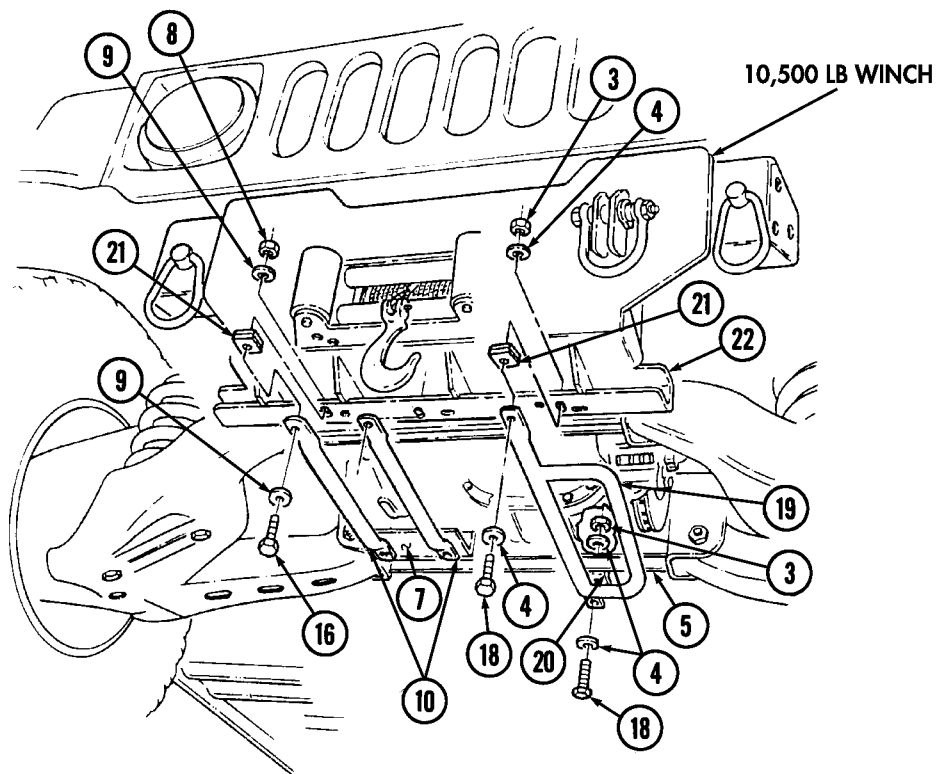
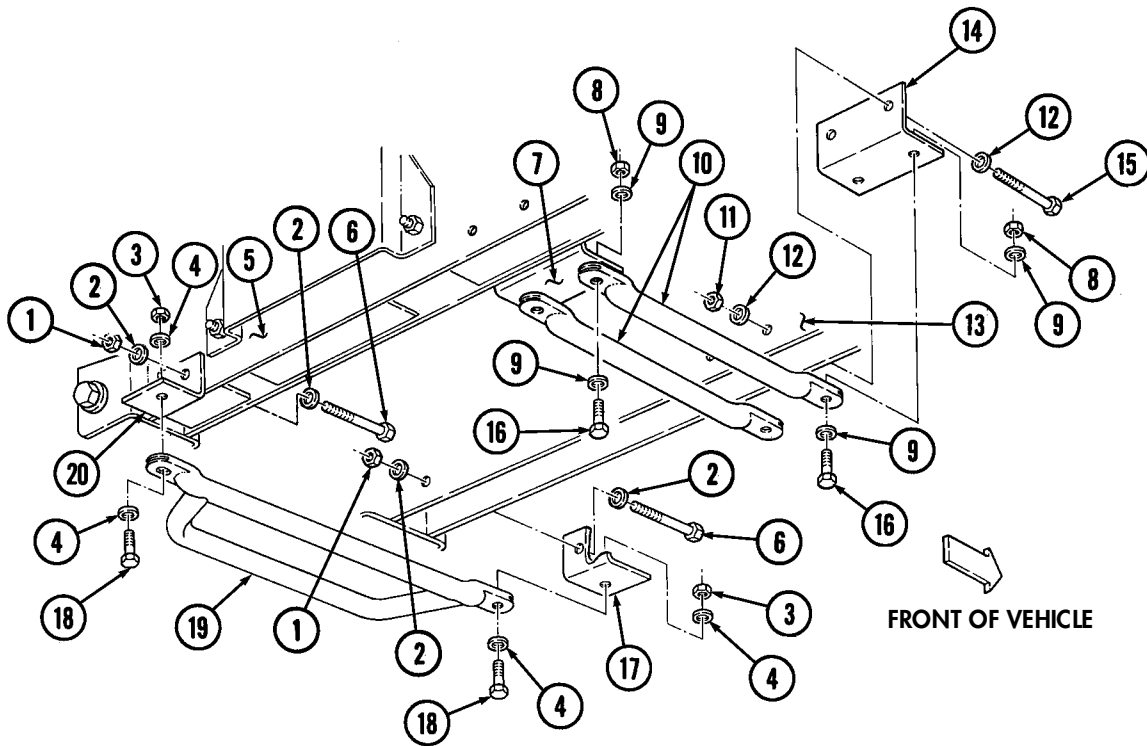


7-8.1. BRAKE PROTECTION GUARDS REPLACEMENT (Cont'd)**b. Installation****NOTE**

Perform steps 1 through 4 for vehicles with 10,500 lb hydraulic winch only.

1. Install bracket (20) on front rear crossmember (5) with washer (2), capscrew (6), washer (2), and locknut (1). Tighten capscrew (6) to 378 lb ft (513 N•m).
2. Install bracket (7) on front rear crossmember (5) with two washers (12), capscrews (15), washers (12), and locknuts (11). Tighten capscrews (15) to 378 lb-ft (513 N•m).
3. Install spacer (21) and left front brake protection guard (19) on bumper (22) and bracket (20) with two washers (4), capscrews (18), washers (4), and locknuts (3). Tighten capscrews (18) to 378 lb-ft (513 N•m).
4. Install two spacers (21) and right front brake protection guards (10) on bumper (22) and bracket (7) with four washers (9), capscrews (16), washers (9), and locknuts (8). Tighten capscrews (16) to 378 lb-ft (513 N•m).
5. Install brackets (17) and (20) on front rear crossmember (5) and front crossmember (13) with two washers (2), capscrews (6), washers (2), and locknuts (1). Tighten capscrews (6) to 378 lb-ft (513 N•m).
6. Install brackets (7) and (14) on front rear crossmember (5) and front crossmember (13) with four washers (12), capscrews (15), washers (12), and locknuts (11). Tighten capscrew (15) to 378 lb-ft (513 N•m).
7. Install right front brake protection guards (10) on brackets (7) and (14) with four washers (9), capscrews (16), washers (9), and locknuts (8). Tighten capscrews (16) to 378 lb-ft (513 N•m).
8. Install left front brake protection guard (19) on brackets (17) and (20) with two washers (4), capscrews (18), washers (4), and locknuts (3). Tighten capscrews (18) to 378 lb-ft (513 N•m).

7-8.1. BRAKE PROTECTION GUARDS REPLACEMENT (Cont'd)



Section II. SERVICE BRAKE SYSTEM MAINTENANCE

7-9. SERVICE BRAKE SYSTEM MAINTENANCE TASK SUMMARY

TASK PARA.	PROCEDURES	PAGE NO.
7-10.	Service Brake System Bleeding Instructions	7-19
7-11.	Service Brake Pad Maintenance	7-24
7-12.	Service Brake Caliper Maintenance	7-26
7-13.	Master Cylinder Maintenance	7-28
7-14.	Hydro-Boost Replacement	7-30
7-15.	Brake Lines Replacement	7-32
7-16.	Service Brake Pedal (12338394) Replacement	7-40
7-17.	Service Brake Pedal (EX 5935037) Replacement	7-42
7-18.	Proportioning Valve Replacement	7-44
7-19.	Service Brake Rotor Replacement	7-46

7-10. SERVICE BRAKE SYSTEM BLEEDING INSTRUCTIONS

This task covers:

- a. Pressure Bleeding
b. Manual Bleeding

- c. Master Cylinder Bleeding

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Brake fluid (Appendix C, Item 14)

Personnel Required

One mechanic
One assistant (task b. only)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

- Hood raised and secured (TM 9-2320-280-10).
- Master cylinder filled to proper level (para. 2-11, pg 2-12, Item 11).

General Safety Instructions

Always wear eye protection when bleeding brakes.

WARNING

Always wear eye protection when bleeding brakes. Failure to do this may cause injury if brake fluid comes in contact with eyes.

NOTE

- If only the front or rear half of the system has been serviced, it is usually necessary to bleed only that half of the system. However, if a firm brake pedal cannot be obtained after bleeding, it will be necessary to bleed the entire system. The brake hydraulic system can be bled manually or by using a pressure tank and adapters. Each method is outlined in the following procedures.
- Bleed brakes in the following order: right rear, left rear, right front, left front.

7-10. SERVICE BRAKE SYSTEM BLEEDING INSTRUCTIONS (Cont'd)

a. Pressure Bleeding

CAUTION

- When using a pressure bleeding tank, follow the manufacturer's instructions for its use. Do not exceed the recommended working pressure when pressurizing the tank. A tank pressure of 15-20 psi (103, 138 kPa) is sufficient to bleed the brake hydraulic system. Release all air pressure from the tank after using it.
- After refilling pressure bleeding tank with silicone brake fluid, let tank sit undisturbed for 30 minutes minimum to ensure all visible as well as minute air bubbles are gone.

NOTE

This procedure covers bleeding at one wheel. Repeat bleeding task for remaining wheels.

1. Remove cover from master cylinder (1).
2. Install pressure tank bleeder adapter (2) to master cylinder (1).
3. Connect line (3) from pressure tank to adapter (2).
4. Remove protective cap (5) from bleeder screw (6) on caliper assembly (7).
5. Connect short piece of hose (8) to bleeder screw (6), and place other end of hose (8) in container 3/4 full of brake fluid.
6. Open valve (4) on line from pressure tank to master cylinder (1), allowing pressurized brake fluid to enter system.
7. Open bleeder screw (6) 3/4 turn and observe brake fluid in container. Close bleeder screw (6) when brake fluid flows free of air bubbles.
8. Disconnect hose (8) from bleeder screw (6) and install protective cap (5) on bleeder screw (6).
9. Close valve (4) on line (3) from pressure tank to master cylinder (1).
10. Disconnect line (3) from adapter (2).
11. Remove adapter (2) from master cylinder (1) and install master cylinder cover.

b. Manual Bleeding

NOTE

- This procedure covers bleeding at one wheel. Repeat bleeding task for remaining wheels.
- Assistant is required to depress the brake pedal when manually bleeding brakes while mechanic opens and closes bleeder screw.

1. Remove protective cap (5) from bleeder screw (6) on caliper assembly (7).
2. Connect short piece of hose (8) to bleeder screw (6), and place other end of hose (8) in container 3/4 full brake fluid.

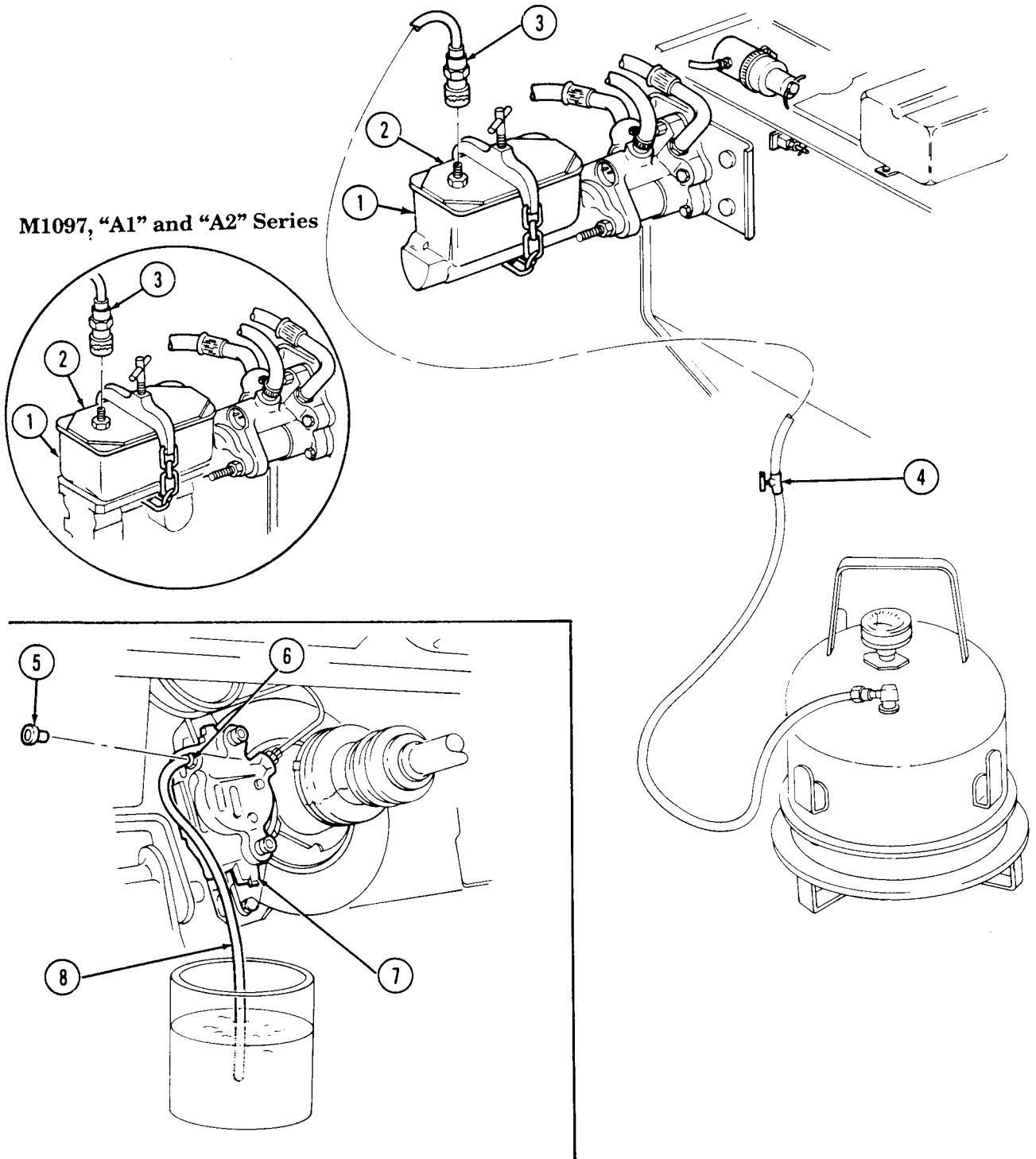
CAUTION

- Check the master cylinder fluid level frequently during the bleeding operation and refill the reservoirs as necessary. Do not allow the master cylinder to run out of fluid at any time, or additional air will be drawn into the system.
- After adding silicone brake fluid to master cylinder, let cylinder sit undisturbed for 30 minutes minimum to ensure all visible as well as minute air bubbles are gone.

7-10. SERVICE BRAKE SYSTEM BLEEDING INSTRUCTIONS (Cont'd)

3. Have assistant pump brake pedal toward floor and hold it there. Open bleeder screw (6) 3/4 turn.
4. When pedal reaches floor, tighten bleeder screw (6) and have assistant slowly release brake pedal.
5. Repeat steps 3 and 4 until fluid flows clear and free of air bubbles.
6. Disconnect hose (8) from bleeder screw (6) and install protective cap (5) on bleeder screw (6).

M1097, "A1" and "A2" Series



7-10. SERVICE BRAKE SYSTEM BLEEDING INSTRUCTIONS (Cont'd)

c. Master Cylinder Bleeding

NOTE

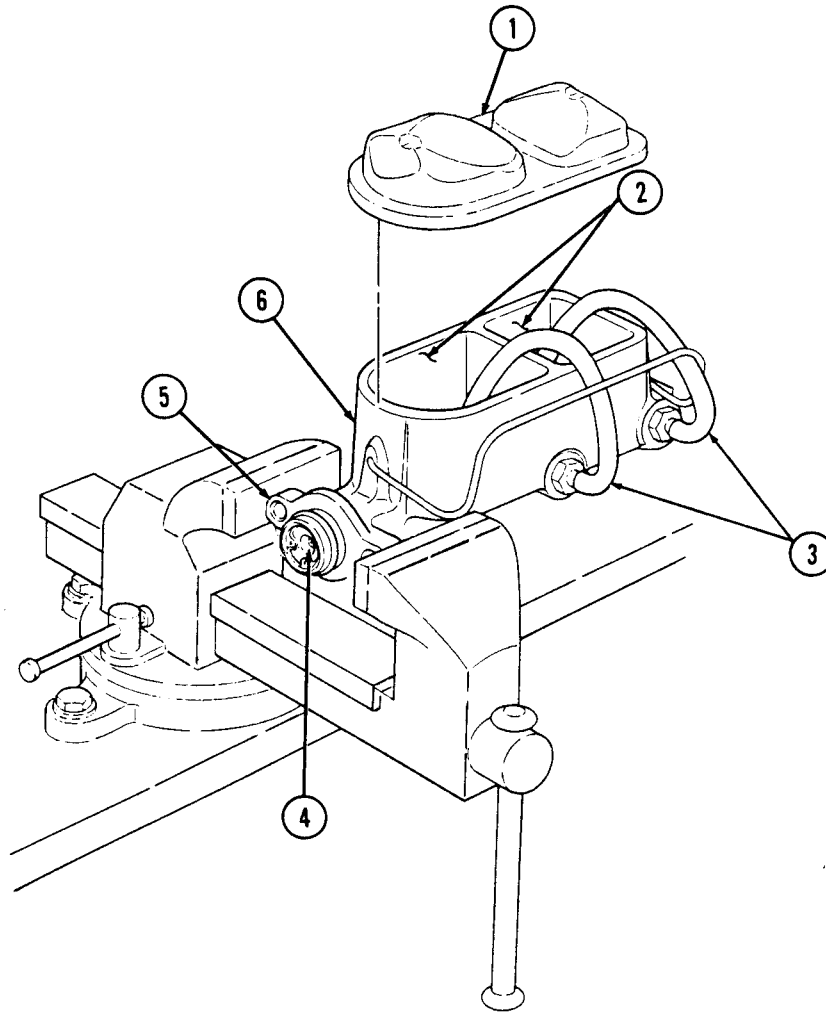
Perform this procedure prior to installing master cylinder on vehicle.

1. Secure master cylinder flange (5) in vise.
2. Remove cover (1) and fill reservoirs (2) with silicone brake fluid.
3. Screw threaded end of bleeder hose (3) into brake line port on master cylinder (6) and insert opposite end into reservoir (2). Repeat step for other bleeder hose (3).
4. Slowly push piston (4) into master cylinder (6). Do not release piston (4). While holding piston (4), pinch bleeder hoses (3) off and release piston (4). Piston (4) will return automatically.

CAUTION

Whenever the master cylinder is filled with silicone brake fluid, let cylinder sit undisturbed for 30 minutes minimum to ensure that all visible as well as minute air bubbles are gone.

5. Refill reservoirs (2) with silicone brake fluid and repeat step 4 until no air bubbles remain in brake fluid.
6. Remove two bleeder hoses (3) from brake line ports on master cylinder (6).
7. Install cover (1) on master cylinder (6) and remove from vise.
8. Install master cylinder (para. 7-13).

7-10. SERVICE BRAKE SYSTEM BLEEDING INSTRUCTIONS (Cont'd)

- FOLLOW-ON TASKS:**
- Lower and secure hood (TM 9-2320-280-10).
 - Operate vehicle (TM 9-2320-280-10) and check for proper operation.

7-11. SERVICE BRAKE PAD MAINTENANCE

This task covers:

- | | |
|---|------------------------|
| <p>a. Removal</p> <p>b. Cleaning and Inspection</p> | <p>c. Installation</p> |
|---|------------------------|

INITIAL SETUP:

Applicable Models

All "A2" series vehicles

Tools

General mechanic's tool kit:
 automotive (Appendix B, Item 1)
 "C" clamp (Appendix B, Item 164)

Special Tools

Crowfoot, 14 mm (Appendix B, Item 152)

Materials/Parts

Grease (Appendix C, Item 22)
 Sealing compound (Appendix C, Item 45)

Manual References

TM 9-2320-280-10
 TM 9-2320-280-24P

Equipment Condition

Brake protection guards removed (para. 7-8.1)
 (M998A2 vehicle only).

General Safety Instructions

Make sure brake pads are installed with linings facing rotor.

NOTE

- The following procedure applies to the front brake system on all vehicles and to the rear brake system on vehicles with serial numbers USBL Eff. 1 through 44824.
- For replacement of rear dual service/parking brake pad on vehicles with serial numbers USBL Eff. 44825 and above, refer to para. 7-21)
- If removing left front brake pads, halfshaft must be removed (para. 6-9).

a. Removal

CAUTION

Caliper must be supported during removal to prevent damage to brake line.

1. Using crowfoot, remove two capscrews (7), washers (6), caliper (4), and yoke (5) from adapter (3).

NOTE

Note positioning of brake pad surfaces for installation.

2. Remove two brake pads (1) from adapter (3).

b. Cleaning and Inspection

1. Clean mating surfaces of caliper (4) and adapter (3) and lubricate with grease.
2. Inspect caliper (4) and caliper piston (8) for cracks, pitting, or damage. Replace caliper (4) if cracked, pitted, or damaged (para. 7-12).
3. Inspect dust boot (9) for tears or deterioration. Replace caliper (4) if dust boot (9) is torn or deteriorated (para. 7-12).
4. Inspect rotor (2) for heat cracks, discoloration, pitting, or scoring. Replace rotor (2) if cracked, pitted, or scored (para. 7-19).

7-11. SERVICE BRAKE PAD MAINTENANCE (Cont'd)

NOTE

- To ensure proper brake function, replace brake pads in pairs on both sides of axle.
 - Replace brake pads if thickness is less than 3/16 in. (4.8 mm) and operation in wet and muddy conditions is expected.
5. Inspect brake pads (1) for glazing, oil saturation, or wear. If glazed, oil saturated, or if brake pad thickness is less than 1/8 in. (3.2 mm), replace both pads (1) and pads from opposite caliper.

c. Installation

WARNING

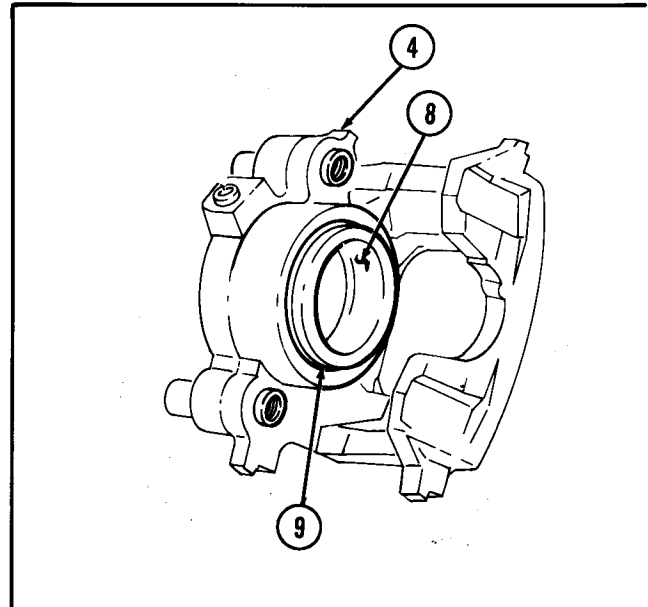
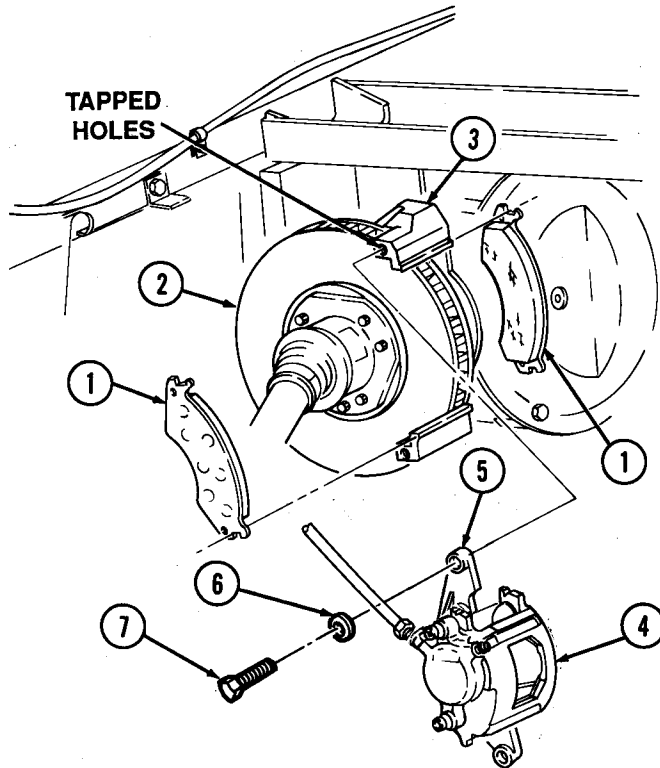
Ensure brake pads are installed with linings facing rotor. Failure to do this may cause injury to personnel or damage to equipment.

1. Position brake pads (1) to adapter (3).

NOTE

When installing yoke and caliper, use a "C" clamp and a block of wood to bottom out position in caliper if needed.

2. Apply sealing compound to threads of capscrews (7). Using crowfoot, install yoke (5) and caliper (4) to adapter (3) with two washers (6) and capscrews (7). Tighten two capscrews (7) to 30-40 lb-ft (41-54 N·m).



FOLLOW-ON TASK: Install brake protection guards (para. 7-8.1) (M998A2 vehicle only).

7-12. SERVICE BRAKE CALIPER MAINTENANCE

This task covers:

- | | |
|---|------------------------|
| <p>a. Removal</p> <p>b. Cleaning and Inspection</p> | <p>c. Installation</p> |
|---|------------------------|

INITIAL SETUP:

Tools

General mechanic's tool kit:
 automotive (Appendix B, Item 1)
 "C" clamp (Appendix B, Item 164)

Special Tools

Hex-head driver, 7-mm (Appendix B, Item 162)
 Crowfoot, 14-mm (Appendix B, Item 152)

Materials/Parts

Flat washer (Appendix G, Item 38)
 Grease (Appendix C, Item 22)
 Sealing compound (Appendix C, Item 45)

Manual References

TM 9-2320-280-10
 TM 9-2320-280-24P

Equipment Condition

Brake protection guards removed (para. 7-8.1)
 (M998A2 vehicle only).

General Safety Instructions

Make sure brake pads are installed with linings facing rotor.

NOTE

- The following procedure applies to the front brake system on all vehicles and to the rear brake system on vehicles with serial numbers USBL Eff. 1 through 44824.
- For replacement of rear dual service/parking brake pad on vehicles with serial numbers USBL Eff. 44825 and above, refer to para. 7-22.

a. Removal

CAUTION

Cover or plug all open lines and connections immediately after disconnection to prevent contamination. Remove all plugs prior to connection.

1. Disconnect brake line (1) from coupling (10).
2. Remove coupling (10) and flat washer (11) from caliper (9). Discard flat washer (11).
3. Using crowfoot, remove two capscrews (7), washers (6), yoke (5), and caliper (9) from adapter (4).

NOTE

Note positioning of brake pad surfaces for installation.

4. Remove two brake pads (2) from adapter (4).
5. Slide yoke (5) and locating pins (8) out from caliper (9).

b. Cleaning and Inspection

1. Clean mating surfaces of caliper (9) and adapter (4) and lubricate with grease.
2. Clean cooling fins of rotor (3).
3. Inspect caliper (9) and caliper piston (12) for cracks, pitting, or damage. Replace caliper (9) if cracked, pitted, or damaged.
4. Inspect locating pin bearings and bushings (14) for tears or deterioration. Replace bearings and bushings (14) if torn or deteriorated.
5. Inspect dust boot (13) for tears or deterioration. Replace caliper (9) if dust boot (13) is torn or deteriorated.
6. Inspect yoke locating pins (8) for cracks or corrosion. Perform step 7 if pins (8) are cracked or corroded.
7. Using 7-mm hex-head driver, remove locating pins (8) from yoke (5). Discard locating pins (8).

7-12. SERVICE BRAKE CALIPER MAINTENANCE (Cont'd)

- Inspect rotor (3) for heat cracks, discoloration, pitting, or scoring. Replace rotor (3) if cracked, pitted, or scored (para. 7-19).

NOTE

- Replace brake pads in sets only.
 - Replace brake pads if thickness is less than 3/16 in. (4.8 mm) and operation in wet and muddy conditions is expected.
- Inspect brake pads (2) for glazing, oil saturation, or wear. If glazed, oil saturated, or if brake pad thickness is less than 1/8 in. (3.2 mm), replace both pads (2) and pads from opposite caliper (para. 7-11).

c. Installation

WARNING

Ensure brake pads are installed with linings facing rotor. Failure to do this may cause injury to personnel or damage to equipment.

- Install brake pads (2) on adapter (4).

NOTE

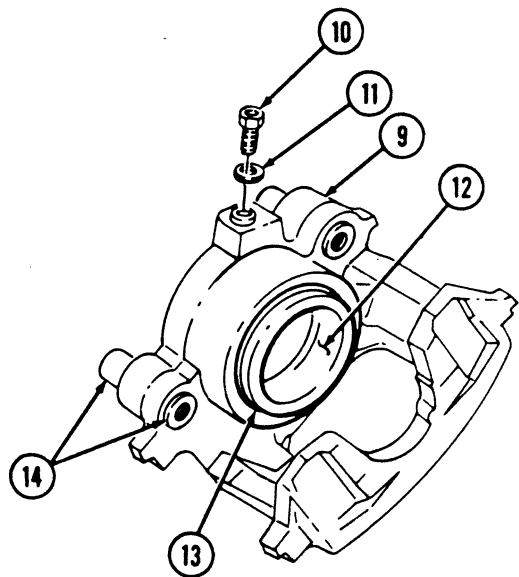
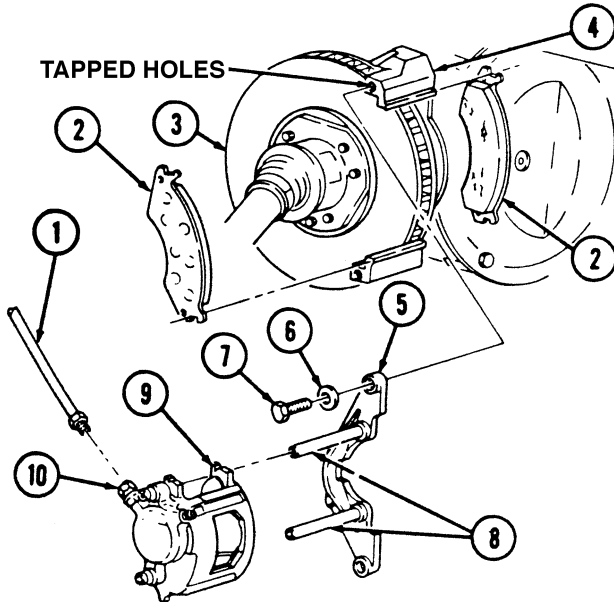
Perform step 2 only if yoke locating pins were replaced.

- Apply sealing compound to threads of locating pins (8) and install locating pins (8) in yoke (5). Tighten locating pins (8) to 25-35 lb-ft (34-47 N•m).
- Install caliper (9) on yoke (5).

NOTE

When installing caliper, use a "C" clamp and a block of wood to bottom out piston in caliper if needed.

- Apply sealing compound to tapped holes of adapter (4). Using crowfoot, install yoke (5) and caliper (9) to adapter (4) with two washers (6) and capscrews (7). Tighten two capscrews (7) to 30-40 lb-ft (41-54 N•m).
- Install flat washer (11) and coupling (10) on caliper (9).
- Connect brake line (1) to coupling (10).



- FOLLOW-ON TASKS**
- Bleed brake system (para. 7-10).
 - Install brake protection guards (para. 7-8.1) (M998A2 vehicles only).

7-13. MASTER CYLINDER MAINTENANCE

This task covers:

- | | |
|---|---|
| <ul style="list-style-type: none"> a. Removal b. Installation | <ul style="list-style-type: none"> c. Bleeding |
|---|---|

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Materials Parts

Five locknuts (Appendix G, Item 128)

Equipment Condition

Hood raised and secured (TM 9-2320-280-10).

Personnel Required

One mechanic
One assistant

a. Removal

CAUTION

Cover or plug all open lines and connections immediately after disconnection to prevent contamination. Remove all plugs prior to connection.

NOTE

Have drainage container ready to catch brake fluid.

1. Disconnect brake lines (5) and (6) from master cylinder (2).
2. Remove locknut (3), washer (4), and proportioning valve bracket (8) from right master cylinder mounting stud (10). Discard locknut (3).
3. Remove locknut (14), washer (11), capscrew (12), and washer (11) from bracket (17) and splash shield (13).
4. Remove locknut (15), washer (16), and bracket (17) from hydro-boost (1). Discard locknut (15).

CAUTION

Do not lean on master cylinder.

5. Remove two locknuts (9) and master cylinder (2) from hydro-boost (1). Discard locknuts (9).

b. Installation

CAUTION

Ensure O-ring is properly seated on master cylinder prior to installation. Damage to master cylinder may result if O-ring is not properly seated.

1. Install master cylinder (2) on hydro-boost (1) with two locknuts (9). Tighten locknuts (9) to 22 lb-ft (30 N•m).
2. Install bracket (17) on hydro-boost (1) with washer (16) and locknut (15). Tighten locknut (15) to 22 lb-ft (30 N•m).
3. Install bracket (17) on splash shield (13) with washer (11), capscrew (12), washer (11), and locknut (14). Tighten locknut (14) to 26 lb-ft (35 N•m).
4. Install proportioning valve bracket (8) on stud (10) with washer (4) and locknut (3). Tighten locknut (3) to 22 lb-ft (30 N•m).
5. Connect brake lines (5) and (6) to master cylinder (2).

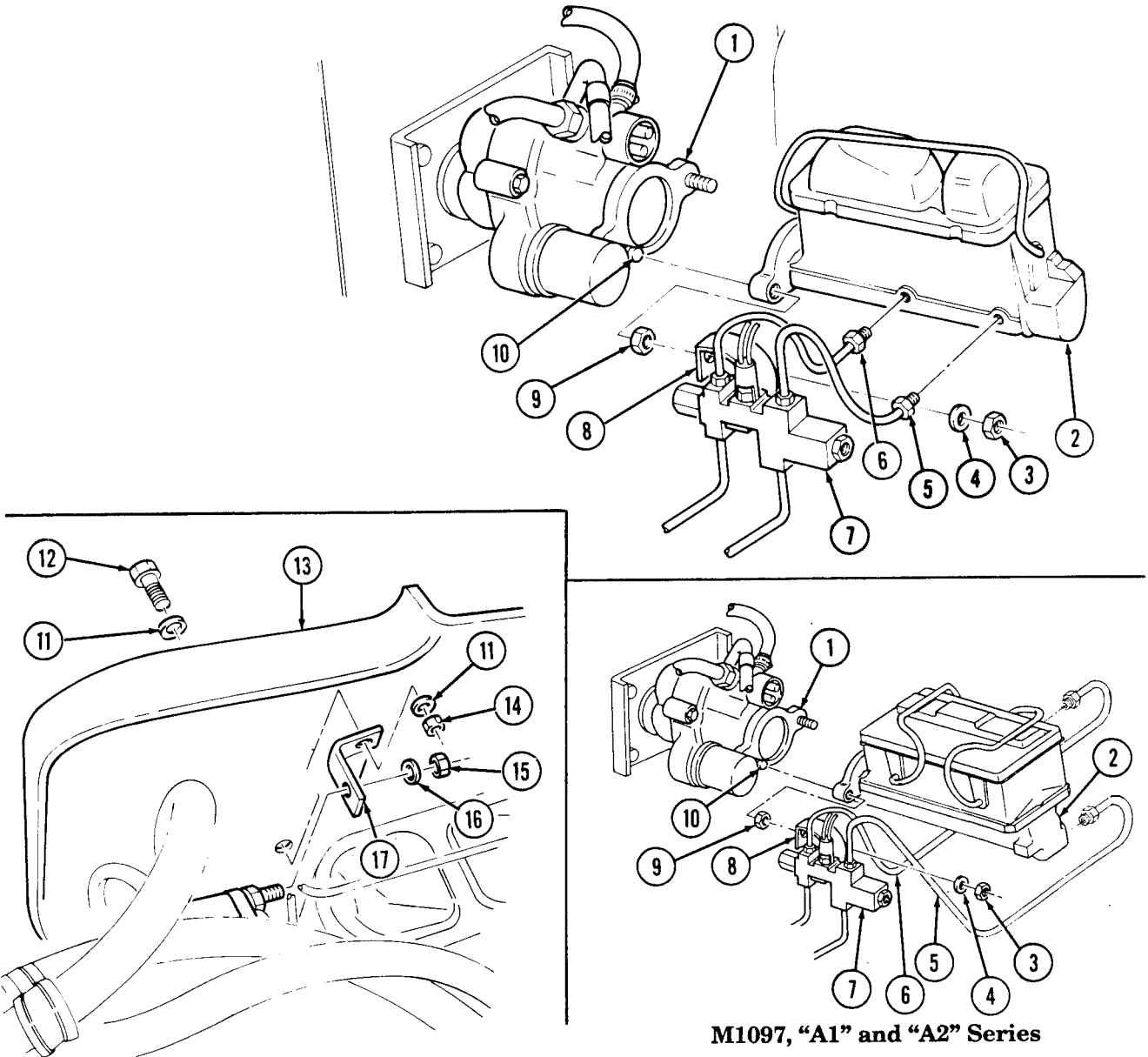
7-13. MASTER CYLINDER MAINTENANCE (Cont'd)

c. Bleeding

NOTE

Master cylinder must be filled (para. 2-11, pg 2-12, Item 11) and kept at least half full during bleeding operation.

1. Depress brake pedal slowly and hold. Loosen brake line (5) to purge air from the front reservoir,
2. Tighten brake line (5) and release brake pedal.
3. Repeat steps 1 and 2 until front reservoir is purged of air.
4. Repeat steps 1 through 3 for rear reservoir with brake line (6)



FOLLOW-ON TASK: Bleed brake system (para. 7-10).

7-14. HYDRO-BOOST REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Personnel Required

One mechanic
One assistant

Materials/Parts

Cotter pin (Appendix G, Item 15)
Spring tension washer (Appendix G, Item 317)
Four lockwashers (Appendix G, Item 146)
(Basic/A1 Series)
Four lockwashers (Appendix G, Item 133)
(A2 Series)

Manual References

TM 9-2320-280-24P

Equipment Condition

Master cylinder removed (para. 7-13).

a. Removal

CAUTION

Cover or plug all open lines and connections immediately after disconnection to prevent contamination. Remove all plugs prior to connection.

NOTE

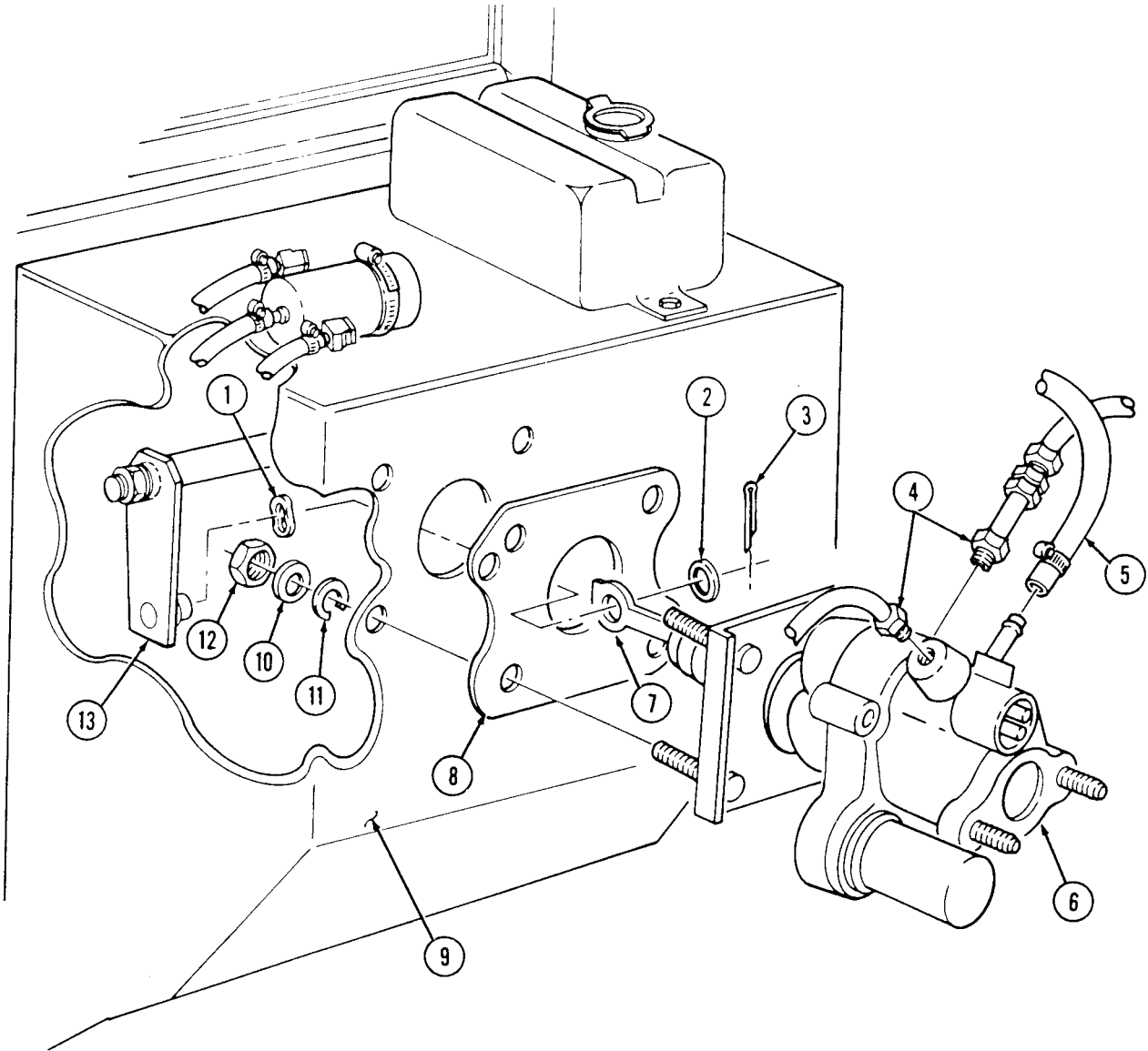
Have drainage container ready to catch brake fluid.

1. Mark and disconnect two high pressure lines (4) and one return line (5) from hydro-boost (6).
2. Remove cotter pin (3), washer (2), and disconnect pushrod (7) from brake pedal bellcrank (13). Remove spring tension washer (1) from brake pedal bellcrank (13) and discard cotter pin (3) and spring tension washer (1).
3. Remove four nuts (12), lockwashers (11), washers (10), hydro-boost (6), and gasket (8) from cowl (9). Discard lockwashers (11).

b. Installation

1. Install gasket (8) and hydro-boost (6) on cowl (9) with four washers (10), lockwashers (11), and nuts (12).
2. Install spring tension washer (1) on brake pedal bellcrank (13). Connect hydro-boost pushrod (7) to brake pedal bellcrank (13). Install washer (2) and cotter pin (3).
3. Tighten nuts (12) to 21 lb-ft (28 N•m).
4. Connect two high pressure lines (4) and one return line (5) to hydro-boost (6).

7-14. HYDRO-BOOST REPLACEMENT (Cont'd)



- FOLLOW-ON TASKS:
- Install master cylinder (para. 7-13).
 - Bleed power steering system (para. 8-29).

7-15. BRAKE LINES REPLACEMENT

This task covers:

- | | |
|---|---|
| <ul style="list-style-type: none"> a. Caliper to Tee Brake Line Removal b. Caliper to Tee Brake Line Installation c. Rear Brake Line Removal d. Rear Brake Line Installation e. Intermediate Brake Line Removal f. Intermediate Brake Line Installation g. Proportioning Valve to Union Brake Line Removal | <ul style="list-style-type: none"> h. Proportioning Valve to Union Brake Line Installation i. Proportioning Valve to Front Tee Brake Line Removal j. Proportioning Valve to Front Tee Brake Line Installation k. Caliper to Tee Support Brackets Removal l. Caliper to Tee Support Brackets Installation |
|---|---|

INITIAL SETUP:

Tools

General mechanic’s tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Materials/Parts

Four tiedown straps (Appendix G, Item 310)
Locknut (Appendix G, Item 81)

Equipment Condition

- Hood raised and secured (TM 9-2320-280-10).
- Brake protection guards removed (para. 7-8.1).

CAUTION

Cover or plug all open lines and connections immediately after disconnection to prevent contamination. Remove all plugs prior to connection.

NOTE

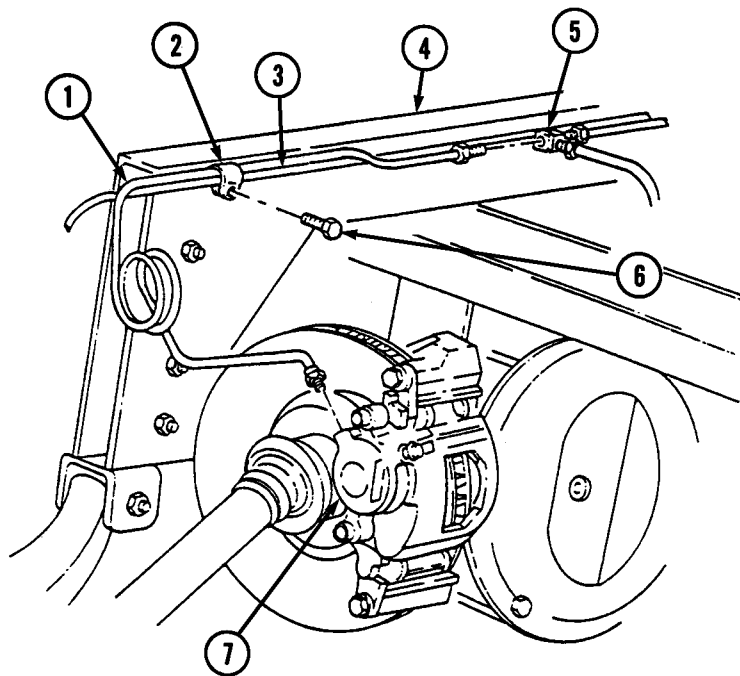
- Have drainage container ready to catch brake fluid.
- Brake line replacement procedures for the service brake system and the rear dual service/parking brake system are basically the same. (Service brake system shown).

a. Caliper to Tee Brake Line Removal

NOTE

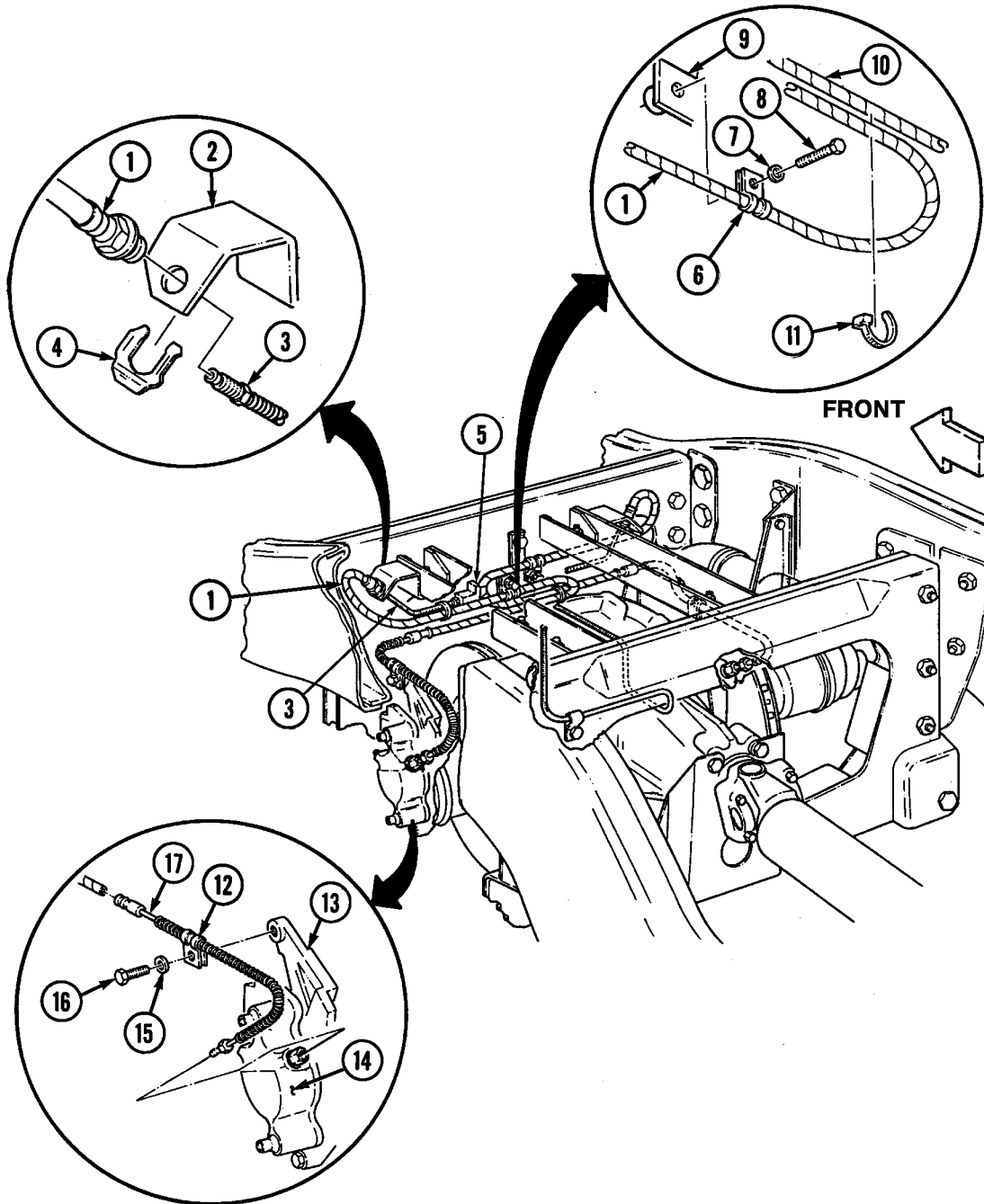
- Removal procedures are basically the same for all caliper to tee brake lines except M1123 and “A2” vehicles.
 - Brake lines on M1123 and “A2” series vehicles are not disconnected at tee line.
 - Steps 1 through 3 cover the right rear caliper to tee line (M998/A1).
 - Perform steps 4 through 9 for the left front caliper to tee line (M998A2).
 - Perform steps 10 through 14 for the left rear caliper to tee line (M998A2).
1. Disconnect brake line (1) from caliper (7).
 2. Disconnect brake line (1) from rear tee (5) at forward rear crossmember (4).
 3. Remove capscrew (6) and clamp (2) securing brake line (1) and vent line (3) to forward rear crossmember (4) and remove brake line (1) from clamp (2).

7-15. BRAKE LINES REPLACEMENT (Cont'd)



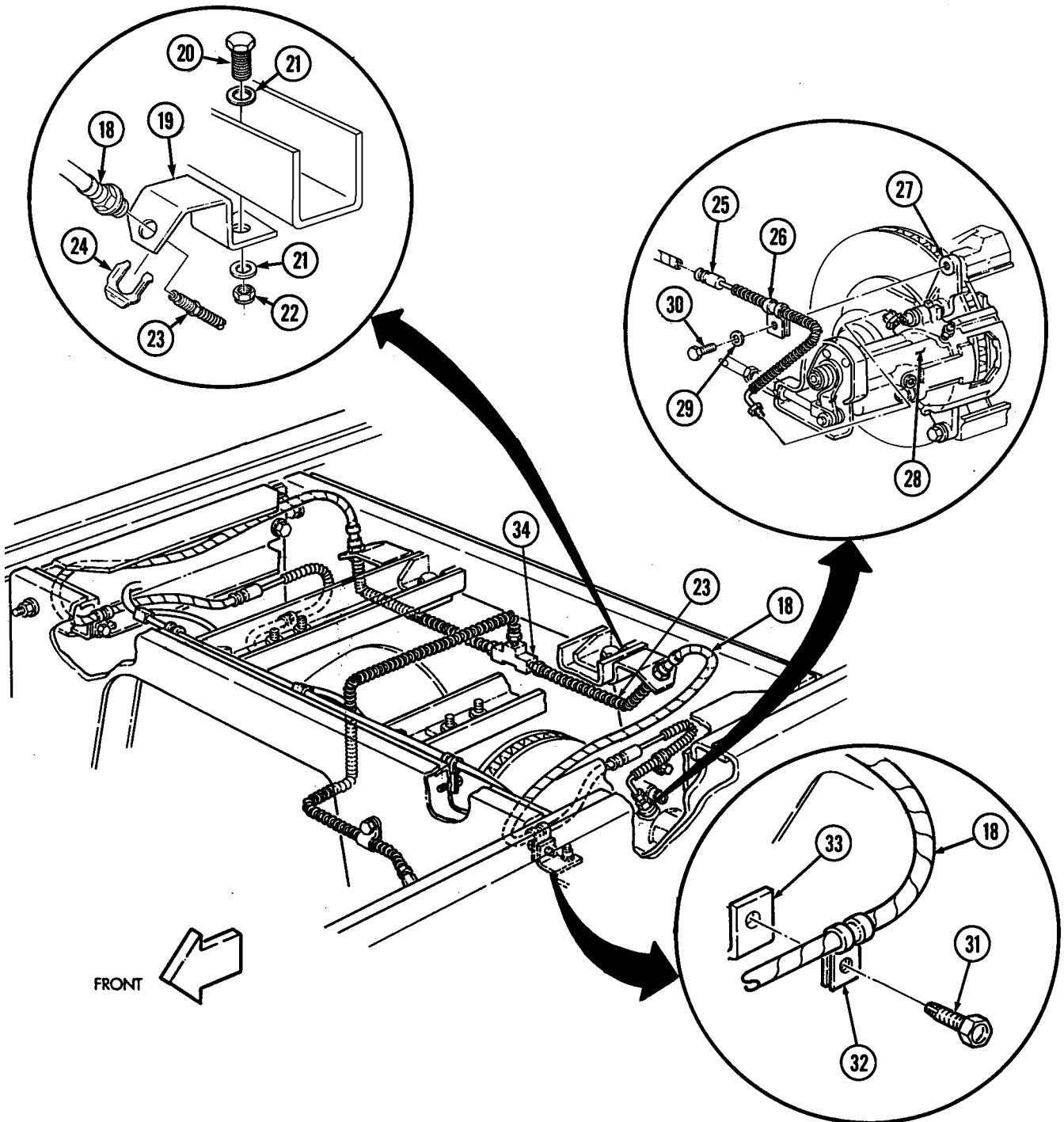
7-15. BRAKE LINES REPLACEMENT (Con't'd)

4. Disconnect left front brake line (17) from caliper (14).
5. Remove capscrew (16), washer (15), and clamp (12) from yoke (13).
6. Remove capscrew (8), washer (7), and clamp (6) from bracket (9).
7. Remove two tiedown straps (11) from brake lines (1) and (10). Discard tiedown straps (11).
8. Remove clip (4) and left front brake line (1) from bracket (2) and intermediate brake line (3).
9. Remove intermediate brake line (3) from tee (5).



7-15. BRAKE LINES REPLACEMENT (Cont'd)

10. Disconnect left rear brake line (25) from caliper (28).
11. Remove capscrew (30), washer (29), and clamp (26) from yoke (27).
12. Remove capscrew (31), clamp (32), and left rear brake line (18) from bracket (33).
13. Remove clip (24) and left rear brake line (18) from bracket (19) and intermediate brake line (23).
14. Remove locknut (22), two washers (21), screw (20), and bracket (19). Discard locknut (22).
15. Remove intermediate brake line (23) from tee (34).

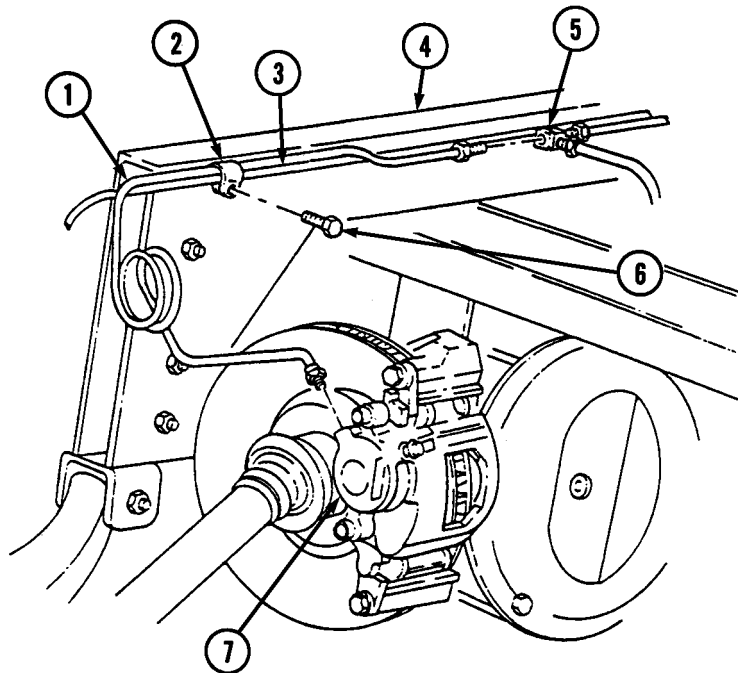


7-15. BRAKE LINES REPLACEMENT (Cont'd)

b. Caliper to Tee Brake Line Installation

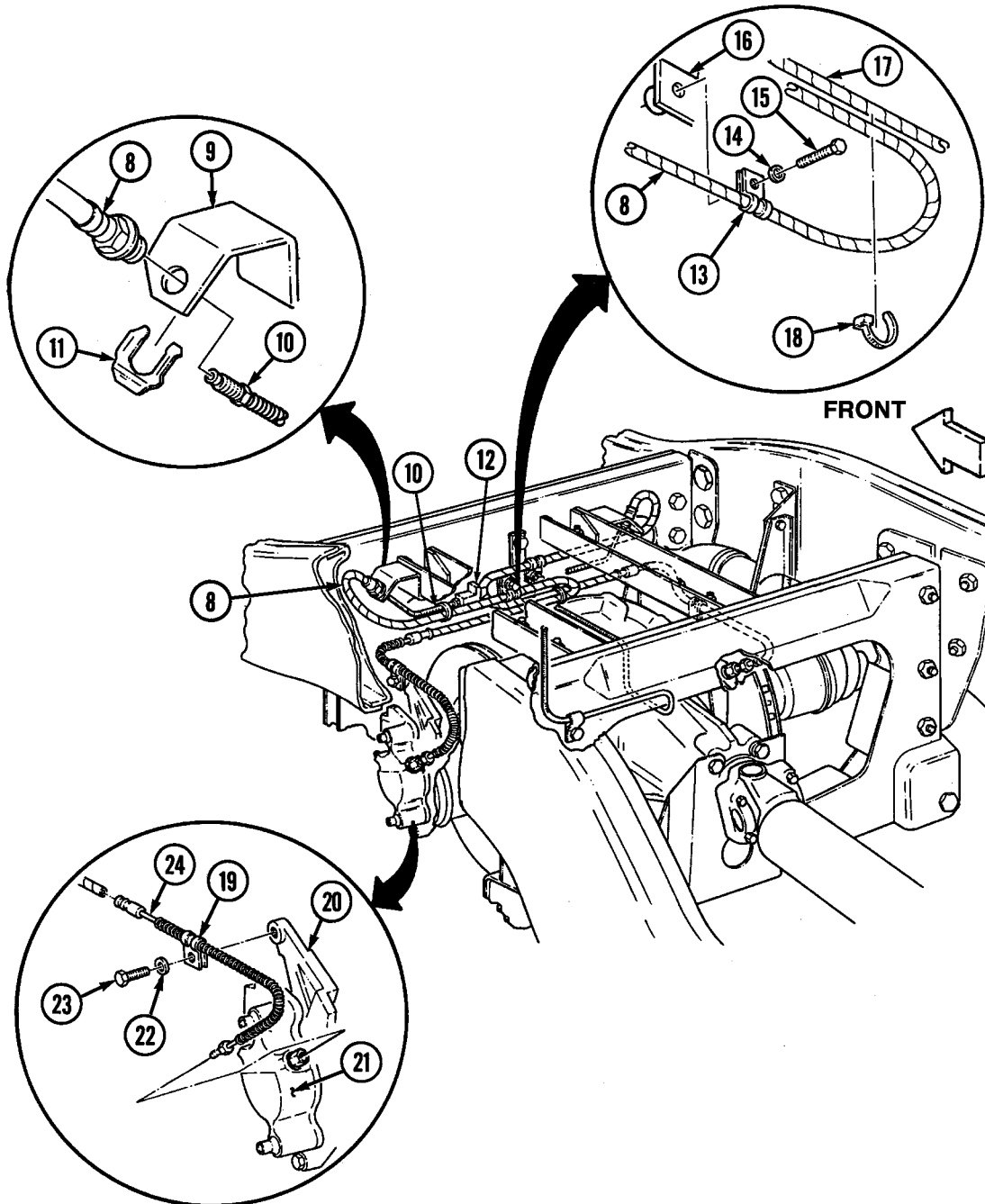
NOTE

- Installation procedures are basically the same for all caliper to tee brake lines except M1123 and "A2" vehicles.
 - Steps 1 through 4 covers the right rear caliper to tee line (basic and A1).
 - Perform steps 5 through 9 for the left front caliper to tee line (M1123 and "A2").
 - Perform steps 10 through 15 for the left rear caliper to tee line (M1123 and "A2").
1. Connect brake line (1) to rear tee (5) at forward rear crossmember (4).
 2. Connect brake line (1) to caliper (7).
 3. Install brake line (1) and vent line (3) in clamp (2).
 4. Install brake line (1), vent line (3), and clamp (2) to forward rear crossmember (4) with capscrew (6).



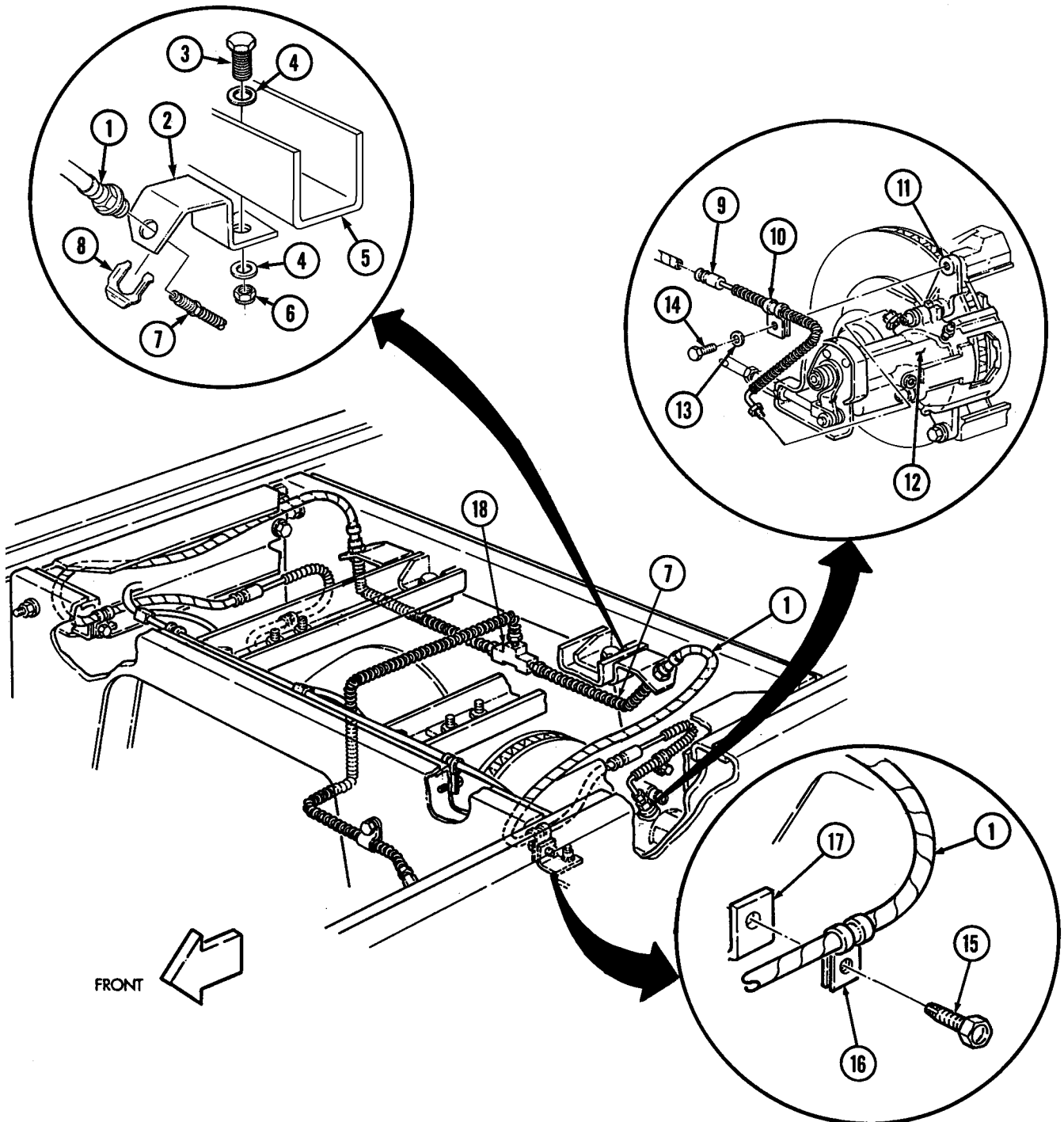
7-15. BRAKE LINES REPLACEMENT (Cont'd)

5. Install left front brake line (8) on intermediate brake line (10) and bracket (9) with clip (11).
6. Connect left front brake line (24) to caliper (21)
7. Install clamp (13) and left front brake line (8) on bracket (16) with washer (14) and capscrew (15). Secure brake lines (8) and (17) with two tiedown straps (18).
8. Install clamp (19) and brake line (24) on yoke (20) with washer (22) and capscrew (23).
9. Install intermediate brake line (10) to tee (12).



7-15. BRAKE LINES REPLACEMENT (Cont'd)

10. Install bracket (2) to crossmember (5) with washer (4), screw (3), washer (4), and locknut (6).
11. Install left rear brake line (1) on intermediate brake line (7) and bracket (2) with clip (8).
12. Connect left rear brake line (9) to caliper (12).
13. Install clamp (16) and brake line (1) on bracket (17) with capscrew (15).
14. Install clamp (10) and brake line (9) on yoke (11) with washer (13) and capscrew (14).
15. Connect intermediate brake line (7) to tee (18).



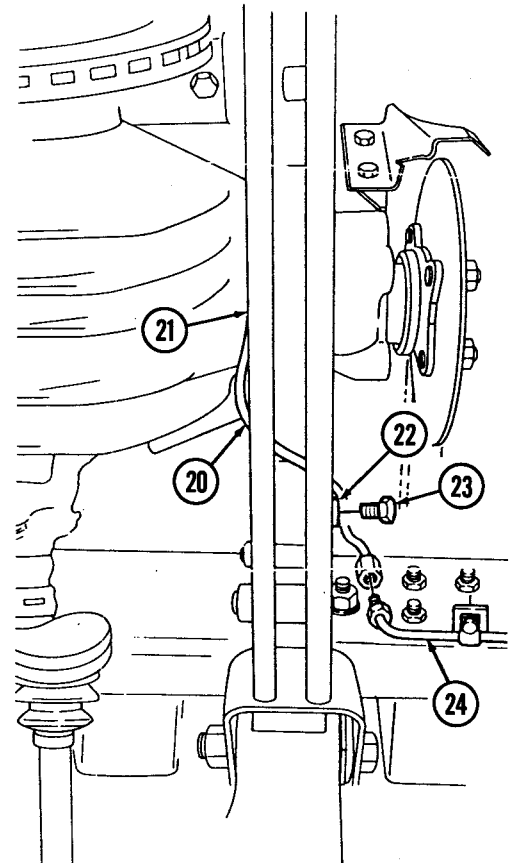
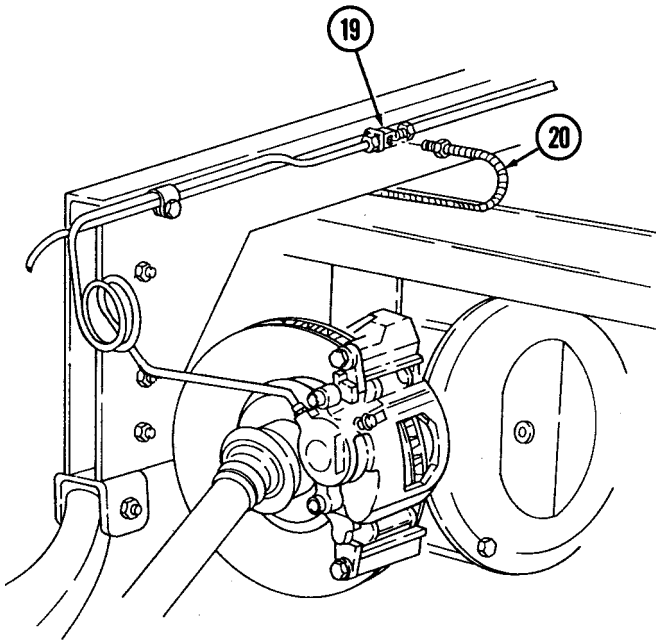
7-15. BRAKE LINES REPLACEMENT (Cont'd)

c. Rear Brake Line Removal

1. Disconnect rear brake line (20) from rear tee (19).
2. Remove capscrew (23) and clamp (22) from rear brake line (20) and forward rear crossmember (21).
3. Remove rear brake line (20) from intermediate brake line (24).

d. Rear Brake Line Installation

1. Install rear brake line (20) to intermediate brake line (24).
2. Install rear brake line (20) and clamp (22) to forward rear crossmember (21) with capscrew (23).
3. Connect rear brake line (20) to rear tee (19).



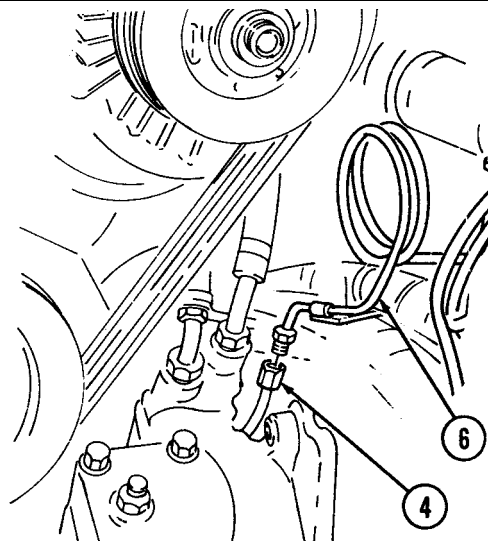
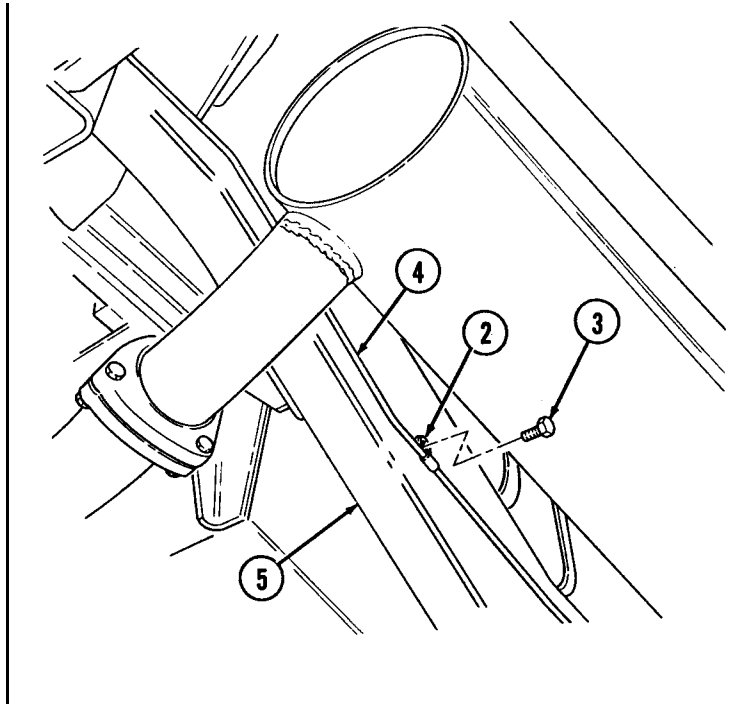
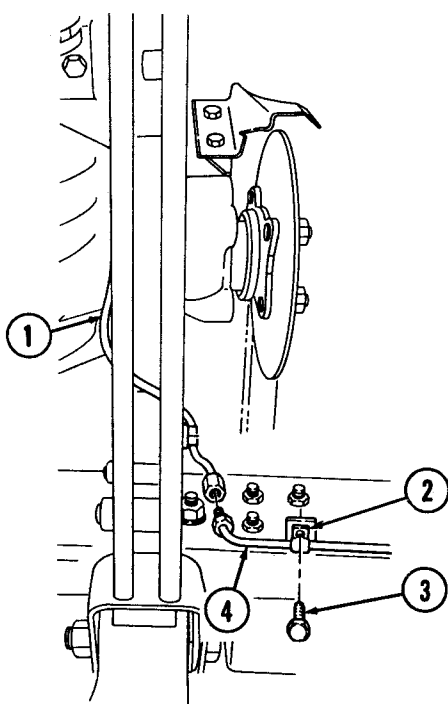
7-15. BRAKE LINES REPLACEMENT (Cont'd)

e. Intermediate Brake Line Removal

1. Disconnect intermediate brake line (4) from rear brake line (1).
2. Remove five capscrews (3) and clamps (2) securing intermediate brake line (4) to frame (5).
3. Remove intermediate brake line (4) from proportioning valve to union brake line (6).

f. Intermediate Brake Line Installation

1. Install intermediate brake line (4) to proportioning valve to union brake line (6).
2. Connect intermediate brake line (4) to rear brake line (1).
3. Install intermediate brake line (4) and five clamps (2) to frame (5) with five capscrews (3).



7-15. BRAKE LINES REPLACEMENT (Cont'd)

g. Proportioning Valve to Union Brake Line Removal

1. Disconnect brake line (7) from proportioning valve (11).
2. Remove nut (14), washer (13), capscrew (9), and clamp (8) from brake line (7) and bracket (15).
3. Remove brake line (7) from union (16).

h. Proportioning Valve to Union Brake Line Installation

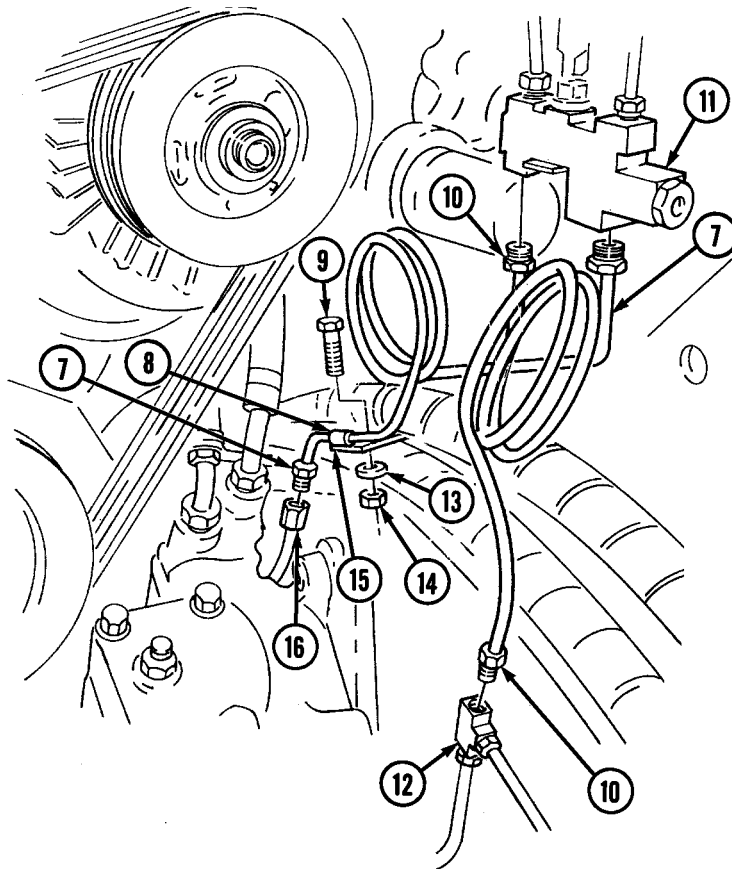
1. Connect brake line (7) to union (16).
2. Install brake line (7) and clamp (8) to bracket (15) with capscrew (9), washer (13), and nut (14).
3. Connect brake line (7) to proportioning valve (11).

i. Proportioning Valve to Front Tee Brake Line Removal

1. Disconnect brake line (10) from proportioning valve (11).
2. Remove brake line (10) from front tee (12).

j. Proportioning Valve to Front Tee Brake Line Installation

1. Connect brake line (10) to front tee (12).
2. Connect brake line (10) to proportioning valve (11).



7-15. BRAKE LINES REPLACEMENT (Cont'd)

k. Caliper to Tee Support Brackets Removal

NOTE

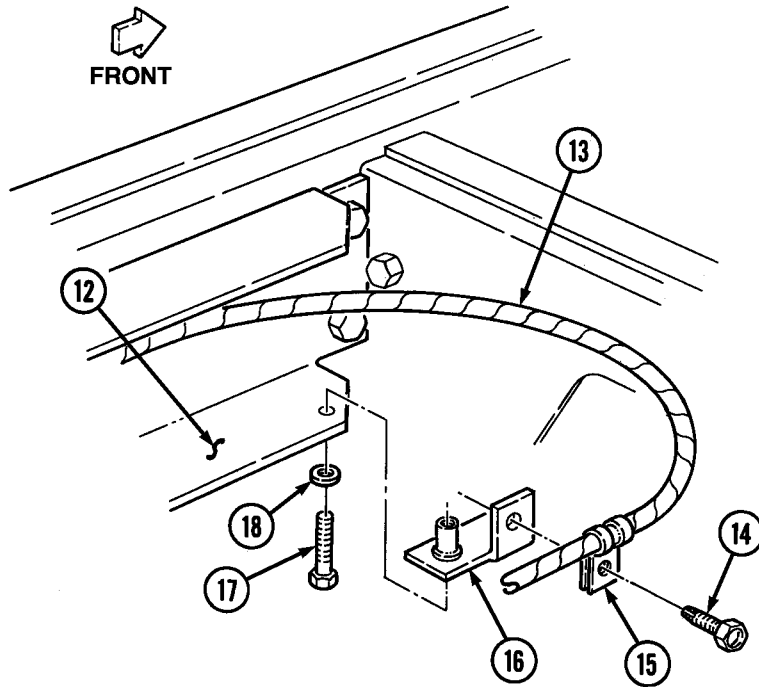
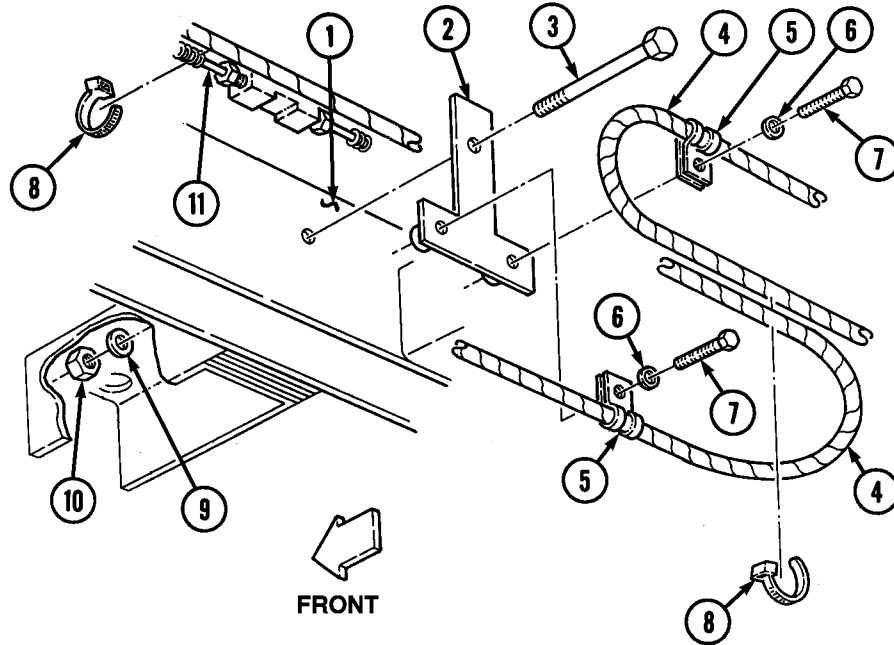
- Perform steps 1 through 3 for front support bracket.
 - Perform steps 4 through 6 for rear support bracket.
1. Remove two tiedown straps (8) from front brake lines (4) and intermediate brake line (11). Discard tiedown straps (8).
 2. Remove two capscrews (7), washers (6), and clamps (5) from bracket (2).
 3. Remove nut (10), washer (9), capscrew (3), and support bracket (2) from crossmember (1).
 4. Remove capscrew (14), clamp (15), and brake line (13) from left support bracket (16).
 5. Remove capscrew (17), washer (18), and left support bracket (16) from frame bracket (12).
 6. Repeat steps 4 and 5 for right support bracket.

l. Caliper to Tee Support Brackets Installation

NOTE

- Perform steps 1 through 3 for front support bracket.
 - Perform steps 4 through 6 for rear support bracket.
1. Install support bracket (2) on crossmember (1) with capscrew (3), washer (9), and nut (10).
 2. Install two clamps (5) on support bracket (2) with two washers (6) and capscrews (7).
 3. Secure front brake lines (4) and intermediate brake line (11) with two tiedown straps (8).
 4. Install left support bracket (16) on frame bracket (12) with washer (18) and capscrew (17).
 5. Install brake line (13) and clamp (15) on support bracket (16) with capscrew (14).
 6. Repeat steps 4 and 5 for right support bracket.

7-15. BRAKE LINES REPLACEMENT (Cont'd)



FOLLOW-ON TASK: Install brake protection guards (para. 7-8.1).

7-16. SERVICE BRAKE PEDAL (12338394) REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

All vehicles except: M997A2, M1025A2, M1035A2, M1043A2, M1045A2, M1097A2, M1123

Tools

General mechanic's tool kit: automotive (Appendix B, Item 1)

Special Tools

Crowfoot, 7/8 in. (Appendix B, Item 153)
Socket adapter (Appendix B, Item 146)

Materials/Parts

Cotter pin (Appendix G, Item 15)
Spring tension washer (Appendix G, Item 317)
Push on nut (Appendix G, Item 226)
Two sleeve bearings (Appendix G, Item 3)
Grease (Appendix C, Item 22)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

Protective control box removed (para. 4-5).

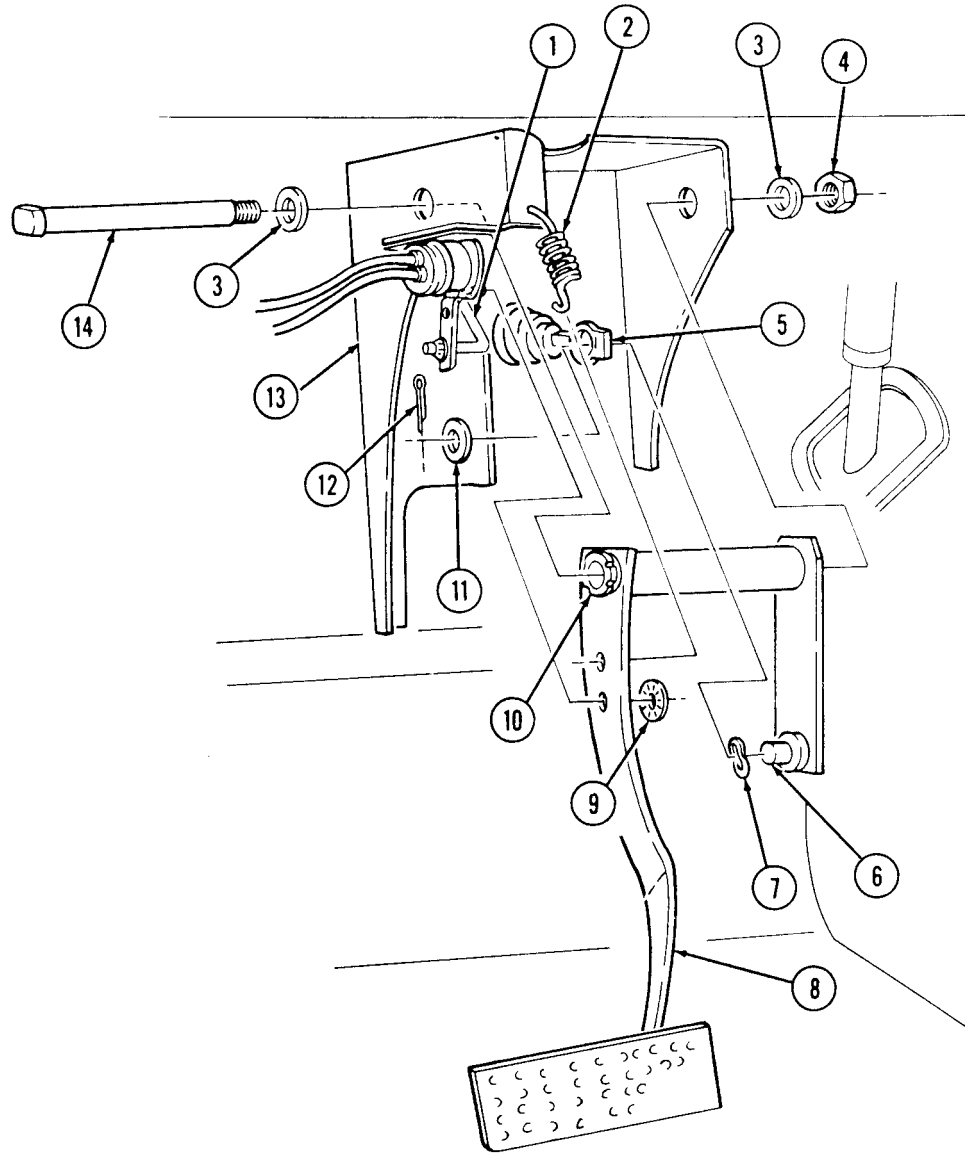
a. Removal

1. Remove push on nut (9) and disconnect stoplight switch rod (1) from brake pedal assembly (8). Discard push on nut (9).
2. Disconnect return spring (2) from brake pedal assembly (8).
3. Remove cotter pin (12), washer (11), and hydro-boost pushrod (5) from brake pedal bellcrank (6). Remove spring tension washer (7). Discard cotter pin (12) and spring tension washer (7).
4. Remove nut (4), two washers (3), pivot pin (14), and brake pedal assembly (8) from bracket (13).
5. Remove two sleeve bearings (10) from brake pedal assembly (8). Discard sleeve bearings (10).

b. Installation

1. Apply grease to inside of two sleeve bearings (10). Install two sleeve bearings (10) in brake pedal assembly (8).
2. Install brake pedal assembly (8) to bracket (13) with pivot pin (14), two washers (3), and nut (4). Using adapter and crowfoot, tighten nut (4) to 60 lb-ft (81 N·m).
3. Install spring tension washer (7) to brake pedal bellcrank (6). Connect hydro-boost pushrod (5) to brake pedal bellcrank (6) with washer (11) and cotter pin (12).
4. Connect return spring (2) to brake pedal assembly (8).
5. Connect stoplight switch rod (1) to brake pedal assembly (8) with push on nut (9).

7-16. SERVICE BRAKE PEDAL (12338394) REPLACEMENT (Cont'd)



- FOLLOW-ON TASKS:**
- Install protective control box (para. 4-5).
 - Operate vehicle (TM 9-2320-280-10) and check brakes for proper operation.

7-17. SERVICE BRAKE PEDAL (EX 5935037) REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M997A2, M1025A2, M1035A2, M1043A2, M1045A2, M1097A2

Tools

General mechanic's tool kit: automotive (Appendix B, Item 1)

Special Tools

Crowfoot, 7/8 in. (Appendix B, Item 153)
Socket adapter (Appendix B, Item 146)

Materials/Parts

Cotter pin (Appendix G, Item 15)
Spring tension washer (Appendix G, Item 319)
Two sleeve bearings (Appendix G, Item 3)
Grease (Appendix C, Item 22)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

- Protective control box removed (para. 4-5).
- Stoplight switch removed (para. 4-61)

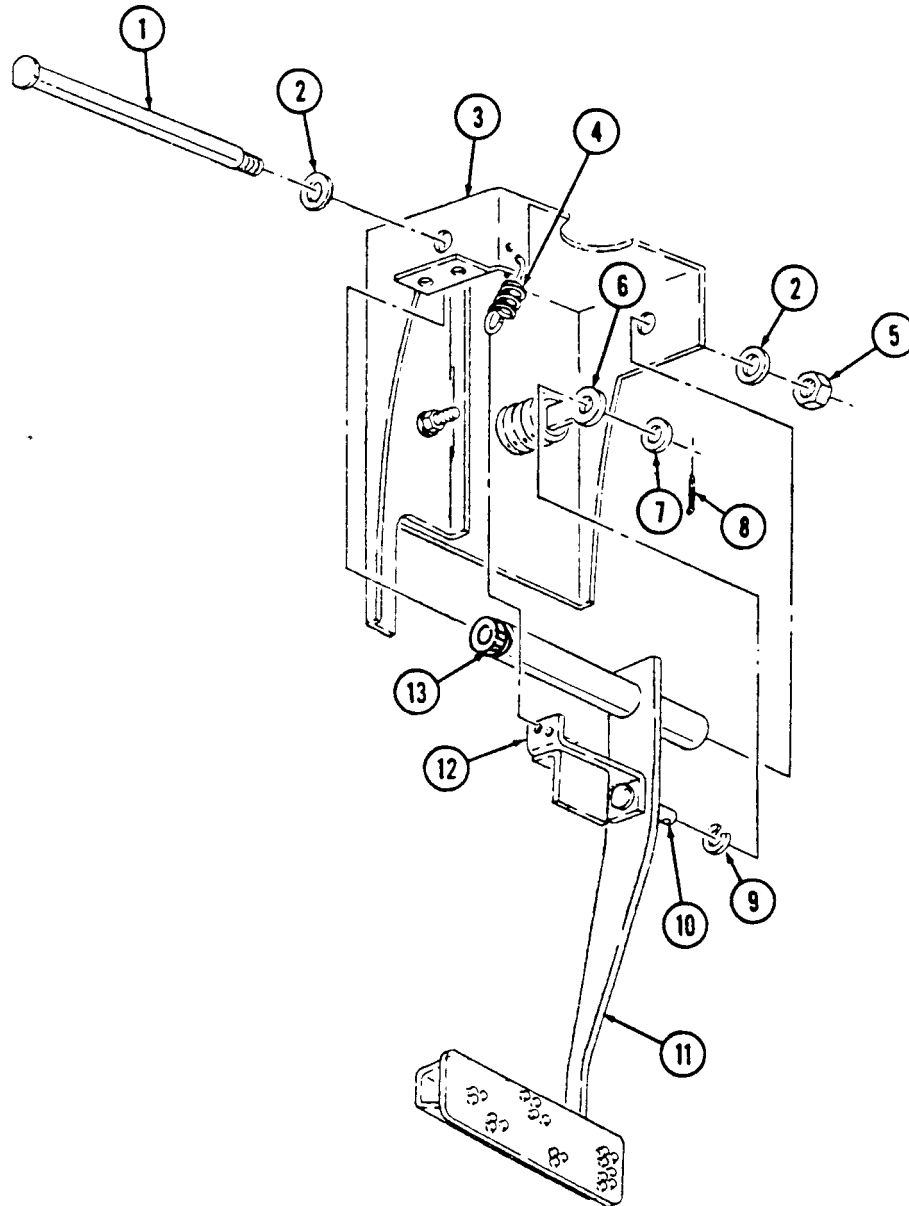
a. Removal

1. Disconnect return spring (4) from brake pedal bracket (12).
2. Remove cotter pin (8) and washer (7) securing hydro-boost pushrod (6) to brake pedal bellcrank (10), and disconnect hydro-boost pushrod (6) from brake pedal bellcrank (10). Remove spring tension washer (9) from bellcrank (10). Discard cotter pin (8) and spring tension washer (9).
3. Remove nut (5), washer (2), pivot pin (1), and washer (2) securing brake pedal assembly (11) to bracket (3) and remove brake pedal assembly (11).
4. Remove two sleeve bearings (13) from brake pedal assembly (11). Discard sleeve bearings (13).

b. Installation

1. Apply grease to inside of two sleeve bearings (13). Install two sleeve bearings (13) in brake pedal assembly (11).
2. Install brake pedal assembly (11) on bracket (3) with washer (2), pivot pin (1), washer (2), and nut (5). Using adapter and crowfoot, tighten nut (5) to 60 lb-ft (81 N•m).
3. Install spring tension washer (9) on brake pedal bellcrank (10). Connect hydro-boost pushrod (6) to brake pedal bellcrank (10) with washer (7) and cotter pin (8).
4. Connect return spring (4) to brake pedal bracket (12).

7-17. SERVICE BRAKE PEDAL (EX 5935037) REPLACEMENT (Cont'd)



- FOLLOW-ON TASKS:**
- Install stoplight switch (para. 4-61).
 - Install protective control box (para. 4-5).
 - Operate vehicle (TM 9-2320-280-10) and check brakes for proper operation.

7-18. PROPORTIONING VALVE REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Materials/Parts

Locknut (Appendix G, Item 128)
Lubricating oil (Appendix C, Item 33)

Equipment Condition

- Battery ground cable disconnected (para. 4-73).
- Hood raised and secured (TM 9-2320-280-10).

a. Removal

CAUTION

- Prior to removal, tag brake lines for installation.
- Cover or plug all open lines and connections immediately after disconnection to prevent contamination. Remove all plugs prior to connection.
- Do not attempt to disassemble proportioning valve. Damage to equipment will result.

NOTE

Have drainage container ready to catch brake fluid.

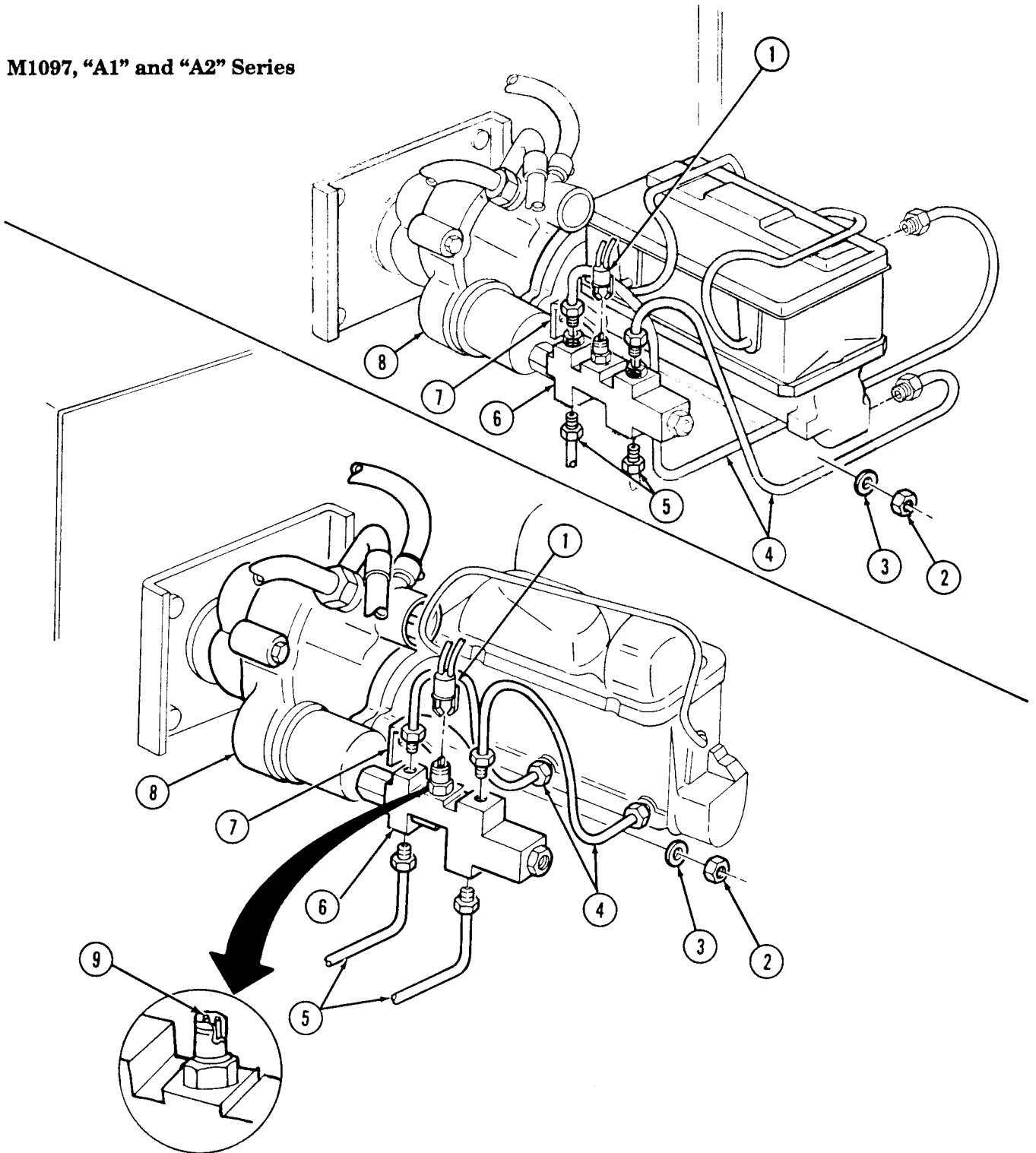
1. Disconnect electrical connector (1) from proportioning valve (6).
2. Disconnect two brake lines (5) from proportioning valve (6).
3. Disconnect two brake lines (4) from proportioning valve (6).
4. Remove locknut (2), washer (3), and proportioning valve (6) from hydro-boost (8) and proportioning valve bracket (7). Discard locknut (2).

b. Installation

1. Install proportioning valve (6) to proportioning valve bracket (7) and hydro-boost (8) with washer (3) and locknut (2). Tighten locknut (2) to 22 lb-ft (30 N•m).
2. Connect two brake lines (5) to proportioning valve (6).
3. Connect two brake lines (4) to proportioning valve (6).
4. Apply lubricating oil to pins (9) of proportioning valve (6).
5. Connect electrical connector (1) to proportioning valve (6).

7-18. PROPORTIONING VALVE REPLACEMENT (Cont'd)

M1097, "A1" and "A2" Series



FOLLOW-ON TASKS:

- Connect battery ground cable (para. 4-73).
- Bleed brake system (para. 7-10).

7-19. SERVICE BRAKE ROTOR REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-24P

Materials/Parts

Six lockwashers (Appendix G, Item 145)
Sealing compound (Appendix C, Item 43)

Equipment Condition

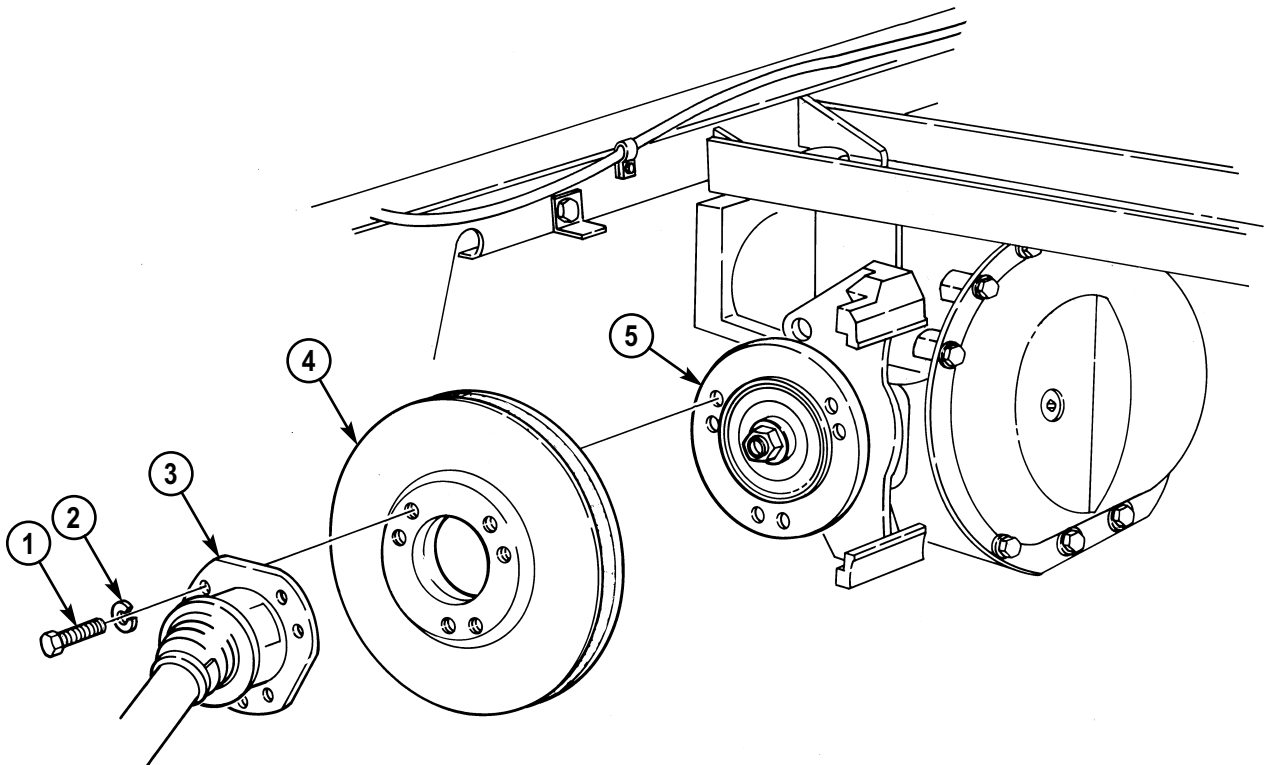
Service brake pad removed (para. 7-11).

a. Removal

1. Remove six capscrews (1) and lockwashers (2) from halfshaft (3), rotor (4), and output flange (5). Discard lockwashers (2).
2. Disconnect halfshaft (3) and remove rotor (4) from output flange (5).

b. Installation

1. Apply sealing compound to threads of capscrews (1).
2. Install rotor (4) on output flange (5).
3. Connect halfshaft (3) to rotor (4) and install six lockwashers (2) and capscrews (1). Tighten capscrews (1) to 48 lb-ft (65 N•m).



FOLLOW-ON TASK: Install service brake pad (para. 7-11).

Section III. REAR DUAL SERVICE/PARKING BRAKE SYSTEM MAINTENANCE

7-20. REAR DUAL SERVICE/PARKING BRAKE SYSTEM MAINTENANCE TASK SUMMARY

TASK PARA.	PROCEDURES	PAGE NO.
7-21.	Rear Dual Service/Parking Brake Pad Maintenance	7-48
7-22.	Rear Dual Service/Parking Brake Caliper Maintenance	7-52
7-23.	Right Parking Brake Cable Replacement	7-56
7-24.	Left Parking Brake Cable/Mounting Bracket Replacement	7-58
7-25.	Rear Dual Service/Parking Brake Rod Replacement	7-62
7-26.	Rear Dual Service/Parking Brake Adjustment	7-64

7-21. REAR DUAL SERVICE/PARKING BRAKE PAD MAINTENANCE

This task covers:

- | | |
|---|------------------------|
| <p>a. Removal</p> <p>b. Cleaning and Inspection</p> | <p>c. Installation</p> |
|---|------------------------|

INITIAL SETUP:

Tools

- General mechanic's tool kit:
 - automotive (Appendix B, Item 1)
- Hex wrench (Appendix D, Fig. D 115)
- Open end wrench (Appendix D, Fig. D 116)

Special Tools

- Crowfoot, 14 mm (Appendix B, Item 152)

Materials/Parts

- Retaining ring (Appendix G, Item 231)
- Cotter pin (Appendix G, Item 12)
- Sealing compound (Appendix C, Item 45)
- Grease (Appendix C, Item 22)
- Tiedown strap (Appendix G, Item 312)

Manual References

- TM 9-2320-280-10
- TM 9-2320-280-24P

Equipment Condition

- Wheels chocked and parking brake released (TM 9-2320-280-10).
- Pioneer tool stowage rack removed (TM 9-2320-280-10).

General Safety Instructions

Make sure brake pads are installed with linings facing rotor.

NOTE

The following procedure applies to vehicles with serial numbers USBL, Eff, 44825 and above.

a. Removal

1. Remove cotter pin (4), washer (5), and clevis pin (7) from parking brake clevis (6) and lever (3). Discard cotter pin (4).
2. Remove retaining ring (2) and disconnect parking brake cable (8) from caliper cable bracket (1). Discard retaining ring (2)

CAUTION

Use tiedown strap to support caliper during removal to prevent damage to brake line.

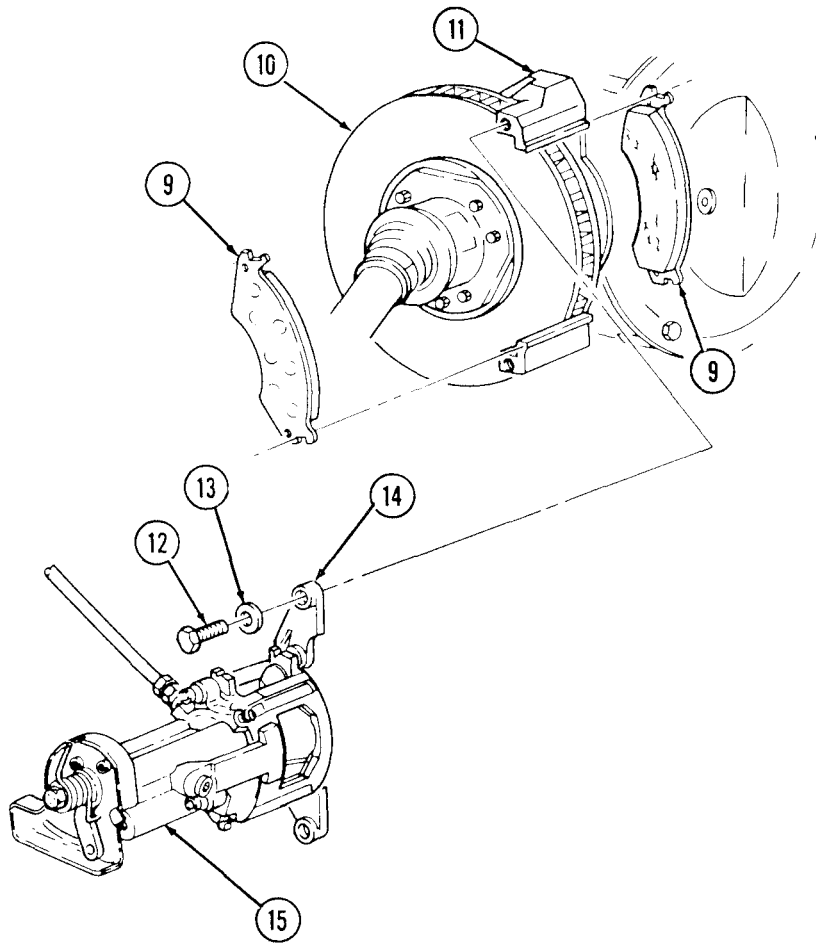
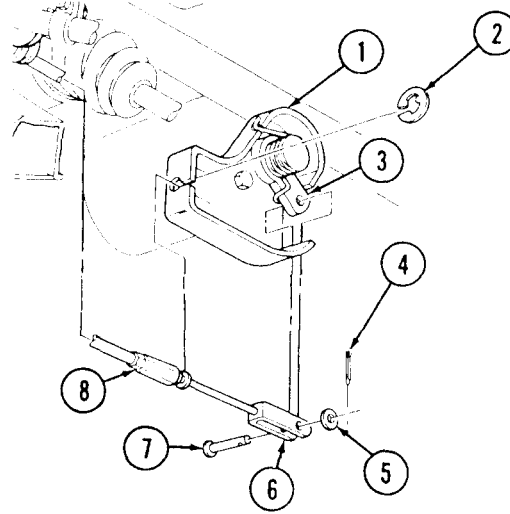
3. Remove two capscrews (12), washers (13), and pull yoke (14) and caliper (15) away from rotor (10).

NOTE

Note positioning of brake pad surfaces for installation.

4. Remove two brake pads (9) from adapter (11) and rotor (10).

7-21. REAR DUAL SERVICE/PARKING BRAKE PAD MAINTENANCE (Cont'd)



7-21. REAR DUAL SERVICE/PARKING BRAKE PAD MAINTENANCE (Cont'd)

b. Cleaning and Inspection

NOTE

Apply a light coat of grease on adapter slides.

1. Clean mating surfaces of caliper (1) and adapter (7) and lubricate adapter slides (7.1) with grease.
2. Inspect caliper (1) and caliper piston face (3) for cracks, pitting, or damage. Replace caliper assembly if cracked, pitted, or damaged (para. 7-22).
3. Inspect dust boot (2) for tears or deterioration. Replace caliper assembly (1) if dust boot (2) is torn or deteriorated (para. 7-22).
4. Inspect caliper cable bracket (4) for looseness, damage, and rotation. If loose, damaged, or repositioned, replace caliper assembly (1).
5. Thoroughly clean and inspect rotor (6) for heat cracks, discoloration, pitting, or scoring. Replace rotor (6) if cracked, pitted, or scored (para. 7-19).

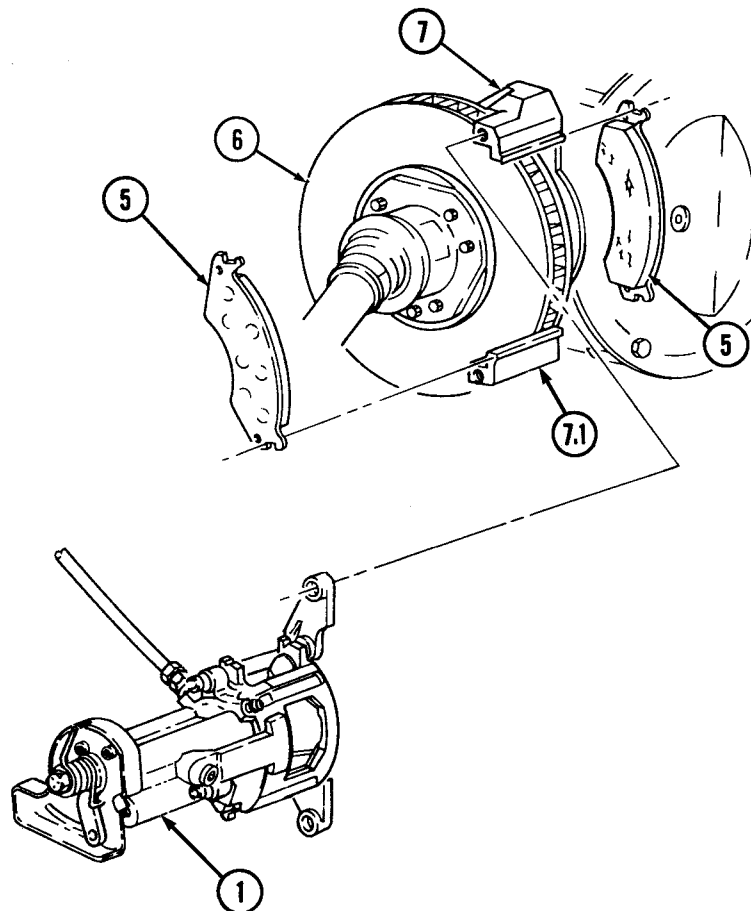
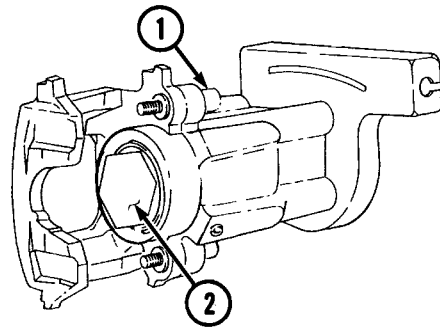
CAUTION

Ensure that grease and oil are not in contact with rotor and/or shoe and lining friction surface. Failure to do so will result in damage to equipment and poor performance.

NOTE

- Replace brake pads in axle sets only.
 - Replace brake pads if thickness is less than 3/16 in. (4.8 mm) and operation in wet and muddy conditions is expected.
6. Inspect brake pads (5) for glazing, oil saturation, or wear. If glazed, oil saturated, or if brake pad thickness is less than 1/8 in. (3.2 mm), replace both pads (5) and pads on opposite caliper.

7-21. REAR DUAL SERVICE/PARKING BRAKE PAD MAINTENANCE (Cont'd)



7-21. REAR DUAL SERVICE/PARKING BRAKE PAD MAINTENANCE (Cont'd)

c. Installation

WARNING

Ensure brake pads are installed with linings facing rotor. Failure to do this may cause injury to personnel or damage to equipment and poor performance.

1. Position brake pads (3) facing rotor (4) in adapter (5).
2. Apply sealing compound to tapped holes of adapter (5).

CAUTION

Applying force to piston cap will result in piston cap damage.

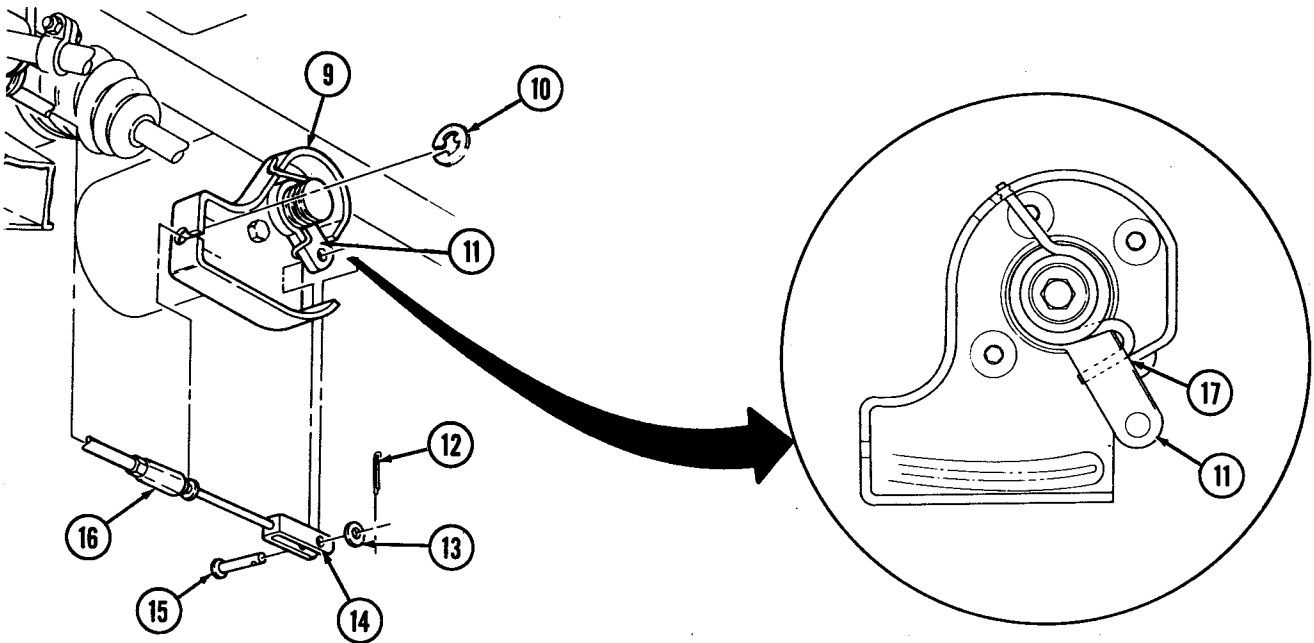
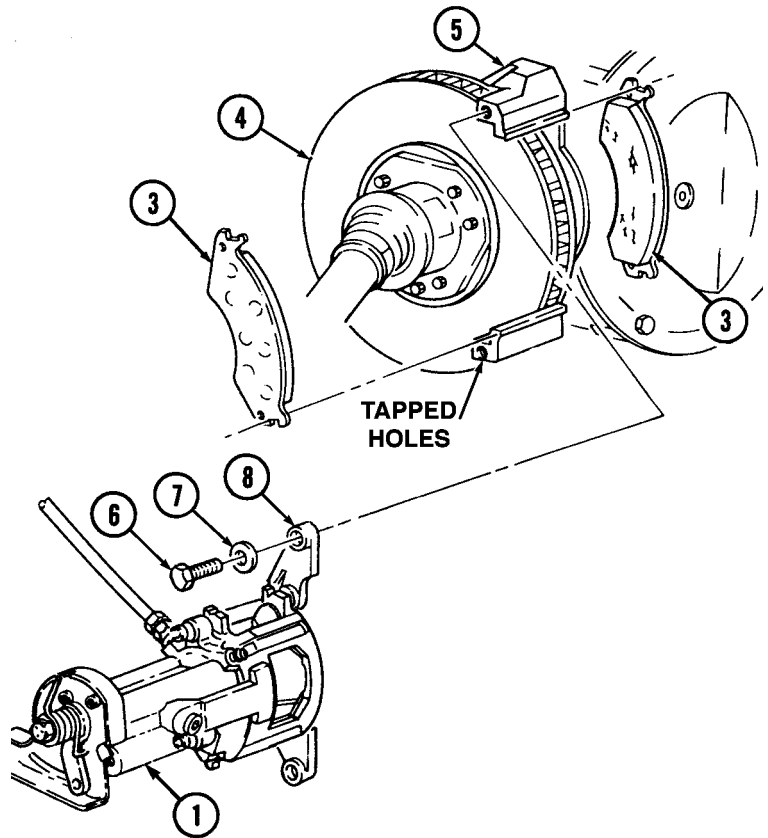
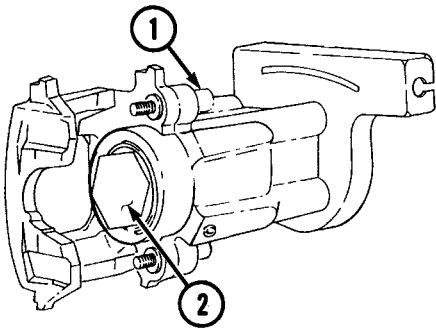
NOTE

- When installing yoke and caliper, use a “C” clamp and block of wood to bottom out piston in caliper if needed.
 - With caliper secured, use either hex wrench or open end wrench to rotate caliper piston in a clockwise direction and, at the same time, apply force on outer piston hex until caliper piston is seated in caliper bore.
3. Rotate caliper piston (2) in a clockwise direction and at the same time apply force on outer piston hex until caliper piston (2) is seated in piston bore.
 4. Install caliper (1) and yoke (8) on adapter (5) and rotor (4) with two washers (7) and capscrews (6). Using crowfoot, tighten capscrews (6) to 30-40 lb-ft (41-54 N•m).
 5. Install parking brake cable (16) on caliper cable bracket (9) with retaining ring (10).

CAUTION

- Ensure lever is in contact with caliper cable bracket stop. Damage to equipment and poor performance will result if not aligned properly.
 - Ensure that the clevis and clevis pin are aligned to the lever. Do not move the lever to accommodate a misadjusted clevis. Damage to equipment and poor performance will result.
6. Install parking brake clevis (14) on lever (11) with clevis pin (15), washer (13), and cotter pin (12). Check position of lever (11) and make sure it is in contact with caliper cable bracket stop (17).

7-21. REAR DUAL SERVICE/PARKING BRAKE PAD MAINTENANCE (Cont'd)



FOLLOW-ON TASKS: • Adjust rear dual service/parking brake (para. 7-26).
 • Install pioneer tool stowage rack (TM 9-2320-280-10).

7-22. REAR DUAL SERVICE/PARKING BRAKE CALIPER MAINTENANCE

This task covers:

- | | |
|---|------------------------|
| <p>a. Removal</p> <p>b. Cleaning and Inspection</p> | <p>c. Installation</p> |
|---|------------------------|

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Special Tools

Crowfoot, 14 mm (Appendix B, Item 152)
Hex head driver, 7 mm
(Appendix B, Item 162)

Materials/Parts

Cotter pin (Appendix G, Item 12)
Flat washer (Appendix G, Item 38)
Retaining ring (Appendix G, Item 231)
Sealing compound (Appendix C, Item 45)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

- Wheels chocked and parking brake released (TM 9-2320-280-10).
- Pioneer tool stowage rack removed (TM 9-2320-280-10).

General Safety Instructions

Make sure brake pads are installed with linings facing rotor.

a. Removal

CAUTION

Cover or plug all open lines and connections immediately after disconnection to prevent contamination. Remove all plugs prior to connection.

NOTE

The following procedure applies to vehicles with serial numbers USBL, Eff, 44825 and above.

1. Remove cotter pin (4), washer (5), and clevis pin (7) from parking brake clevis (6) and lever (3). Discard cotter pin (4).
2. Remove retaining ring (2) and disconnect parking brake cable (8) from caliper cable bracket (1). Discard retaining ring (2).

NOTE

Have drainage container ready to catch brake fluid.

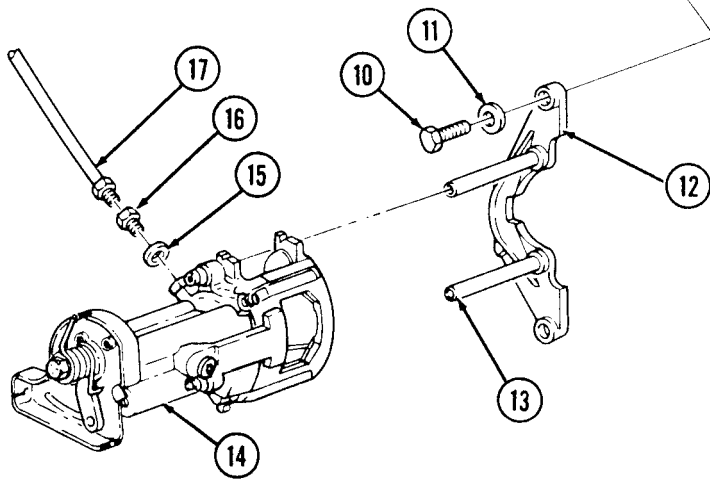
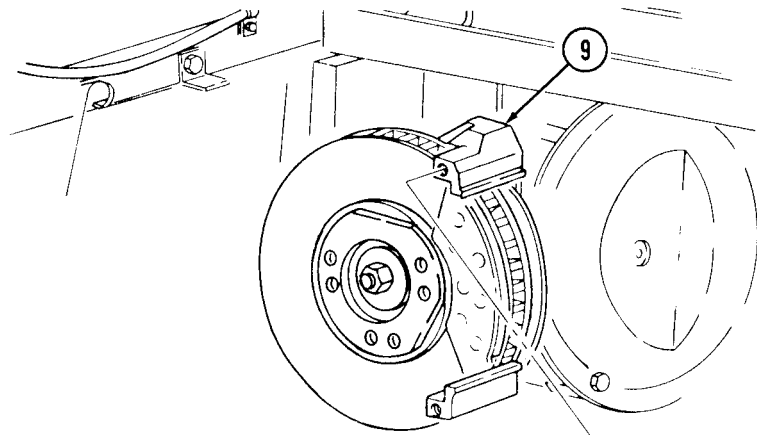
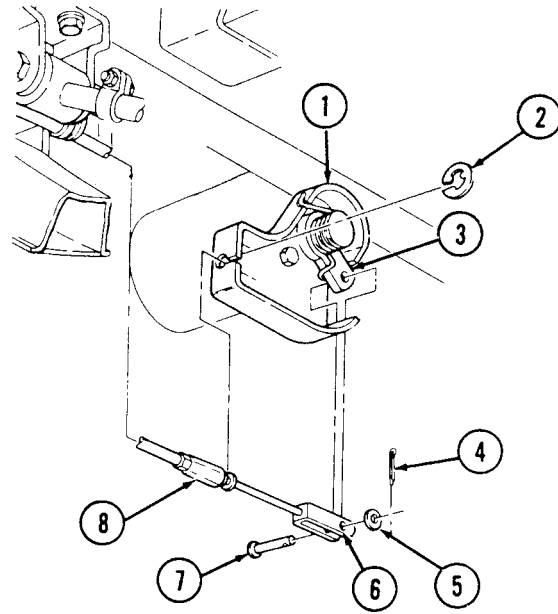
3. Disconnect brake line (17) from coupling (16).
4. Remove coupling (16) and flat washer (15) from caliper (14). Discard flat washer (15).

CAUTION

Caliper must be supported during removal to prevent damage to brake line.

5. Remove two capscrews (10), washers (11), yoke (12), and caliper (14) from adapter (9).
6. Slide yoke (12) and location pins (13) out from caliper (14).

7-22. REAR DUAL SERVICE/PARKING BRAKE CALIPER MAINTENANCE (Cont'd)



7-22. REAR DUAL SERVICE/PARKING BRAKE CALIPER MAINTENANCE (Cont'd)

b. Cleaning and Inspection

NOTE

Apply a light coat of grease on adapter slides.

1. Clean mating surfaces of caliper (1) and adapter (7) and lubricate adapter slides with grease.
2. Clean cooling fins of rotor (6).
3. Inspect caliper (1) and caliper piston face (4) for cracks, pitting, or damage. Replace caliper assembly if cracked, pitted, or damaged.
4. Inspect caliper cable bracket (5) for looseness, damage, and rotation. If loose, damaged, or repositioned, replace caliper assembly (1).
5. Inspect dust boot (3) for tears or deterioration. Replace caliper assembly if dust boot (3) is torn or deteriorated.
6. Inspect rotor (6) for heat cracks, discoloration, pitting, or damage. Replace rotor (6) if cracked, pitted, or scored (para. 7-19).
7. Inspect yoke locating pins (12) for cracks or corrosion. Perform step 8 if cracked or corroded. If not, perform step 9.
8. Using 7 mm hex driver, remove locating pins (12) from yoke (11). Discard locating pins (12).
9. Inspect brake pads (8) for glazing, oil saturation, or wear. If glazed, oil saturated, or if brake pad thickness is less than 1/8 in. (3.2 mm), replace both pads (8) and pads on opposite caliper (para. 7-21).

CAUTION

Ensure that grease and oil are not in contact with rotor and/or brake shoe friction surfaces. Failure to do so will result in damage to equipment and poor performance.

c. Installation

1. Open bleeder valve (2) and depress piston (4) into caliper (1) while rotating piston (4) in a clockwise direction, and at the same time apply pressure until piston (4) is seated in piston bore.

NOTE

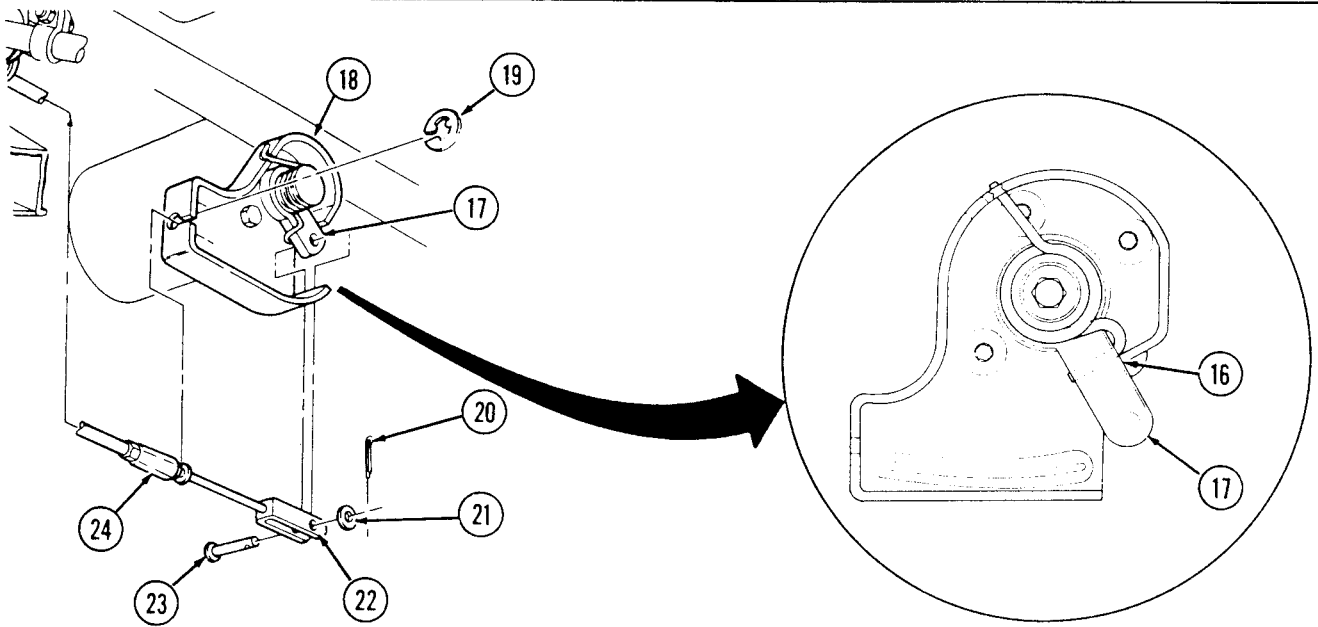
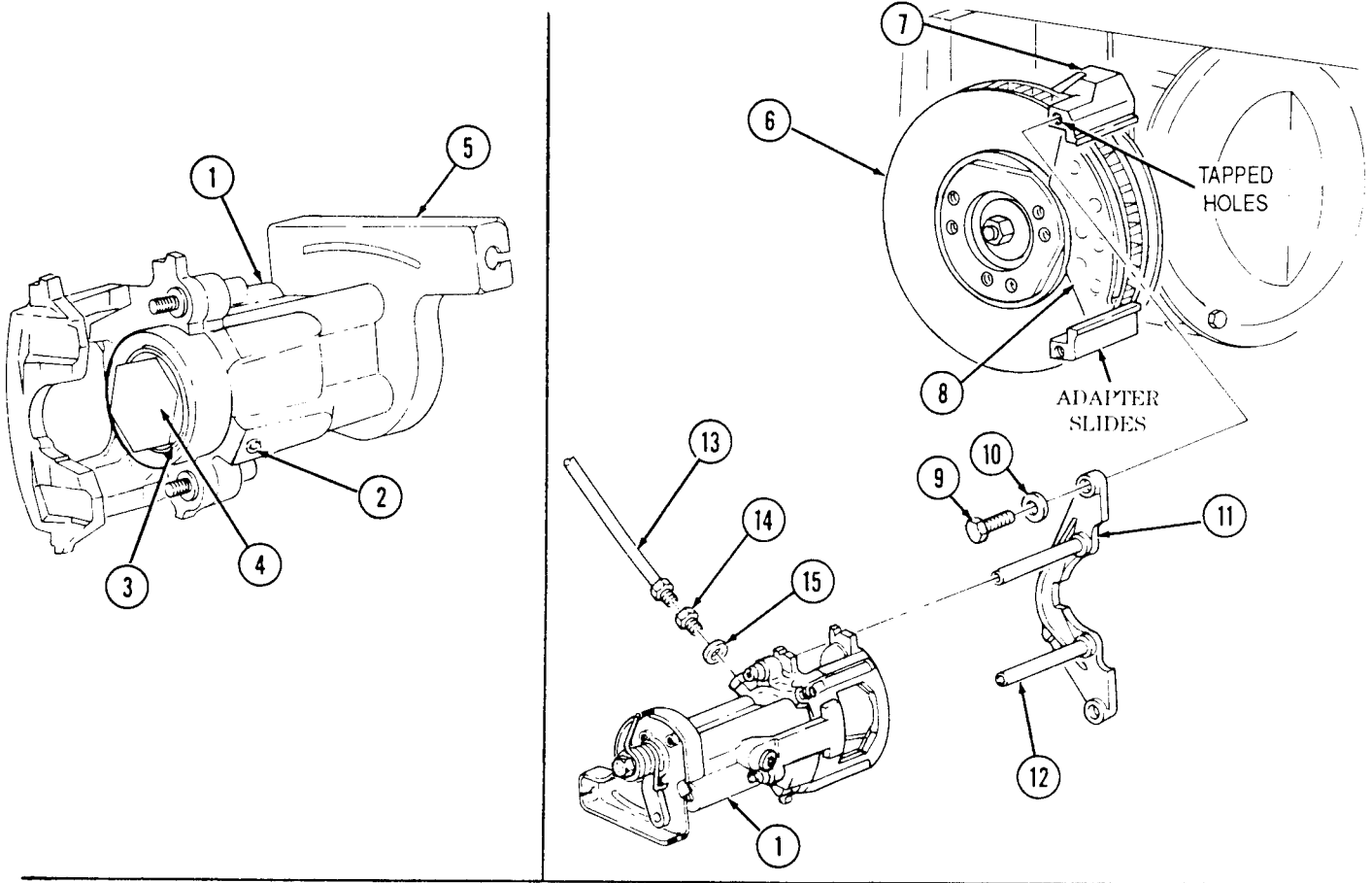
Perform step 2 only if yoke locating pins were removed.

2. Apply sealing compound to threads of locating pins (12) and install locating pins (12) in yoke (11) using 7 mm hex head driver. Tighten locating pins (12) to 25-35 lb-ft (34-47 N•m).
3. Slide yoke (11) and locating pins (12) into caliper (1).
4. Apply sealing compound to tapped holes of adapter (7).
5. Install caliper (1) and yoke (11) on adapter (7) with two washers (10) and capscrews (9). Using crowfoot, tighten capscrews (9) to 30-40 lb-ft (41-54 N•m).
6. Install flat washer (15) and coupling (14) on caliper (1) and connect brake line (13) to coupling (14).
7. Install parking brake cable (24) on caliper cable bracket (18) with retaining ring (19).

CAUTION

- Ensure lever is in contact with caliper cable bracket stop. Damage to equipment and poor performance will result if not alined properly.
 - Ensure that the clevis and clevis pin are alined to lever. Do not move the lever to accommodate a misadjusted clevis, or damage to equipment and poor performance will result.
8. Check position of lever (17) and ensure it is in contact with caliper cable bracket stop (16).
 9. Install parking brake clevis (22) to lever (17) with clevis pin (23), washer (21), and cotter pin (20).

7-22. REAR DUAL SERVICE/PARKING BRAKE CALIPER MAINTENANCE (Cont'd)



- FOLLOW-ON TASKS:**
- Install service brake rotor (para. 7-19).
 - Bleed brake system (para. 7-10).
 - Adjust rear dual service/parking brake (para. 7-26).
 - Install pioneer tool stowage rack (TM 9-2320-280-10).

7-23. RIGHT PARKING BRAKE CABLE REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Materials/Parts

Cotter pins (Appendix G, Item 12)
Two lockwashers (Appendix G, Item 163)
Two retaining rings (Appendix G, Item 231)
Two locknuts (Appendix G, Item 71)
Lockwasher (Appendix G, Item 135)

Equipment Condition

- Muffler and insulator removed (all models except M1123 and "A2" vehicles) (para. 3-48).
- Muffler and catalytic converter removed (M1123 and "A2" vehicles only) (para. 3-49).
- Wheels chocked and parking brake released (TM 9-2320-280-10).

NOTE

- The following procedure applies to vehicles with serial numbers USBL Eff. 44825 and above.
- If cables are chafing or crushed, use new cable clamp bracket.

a. Removal

1. Remove cotter pin (21), washer (20), clevis pin (18), and brake clevis (19) from rear caliper lever (22). Discard cotter pin (21).
2. Remove brake cable retaining ring (1) and parking brake cable sleeve (17) from rear caliper cable bracket (2) and remove cable assembly (4) from caliper cable bracket (2). Discard cable retaining ring (1).
3. Slide parking brake cable (11) through parking brake cable assembly (4). Remove parking brake cable retaining ring (8) from parking brake cable sleeve (7) and "C" beam (10). Disconnect parking brake cable (4) from parking brake equalizer bar (9). Discard cable retaining ring (8).
4. Remove two capscrews (5), parking brake cable clamps (6), and parking brake cable assembly (4) from body (12).

NOTE

Perform steps 5 and 6 for vehicles with old parking brake cable bracket. Perform steps 7 through 9 for vehicles with new parking brake cable bracket configuration.

5. Remove capscrew (15), lockwasher (16), and parking brake cable clamp (14) from bracket (23). Discard lockwasher (16).
6. Remove two capscrews (13) and clamp bracket (23) from support bracket (3). Discard clamp bracket (23).
7. Remove locknut (27), capscrew (29), lockwasher (28), and parking brake cable clamp (30) from clamp bracket (34). Discard locknut (27) and lockwasher (28).
8. Remove capscrew (31), lockwasher (32), and parking brake cable clamp (33) from bracket (34). Discard lockwasher (32).

NOTE

Perform step 9 if clamp bracket is damaged. If not replacing bracket proceed to b., installation.

9. Remove locknut (24), washer (35), capscrew (26), washer (25), and clamp bracket (34) from support bracket (3). Discard locknut (24).

b. Installation

NOTE

Ensure clamp bracket (P/N 12342965) is installed on vehicle.

1. Install clamp bracket (34) on support bracket (3) with washer (25), capscrew (26), washer (35), and locknut (24).

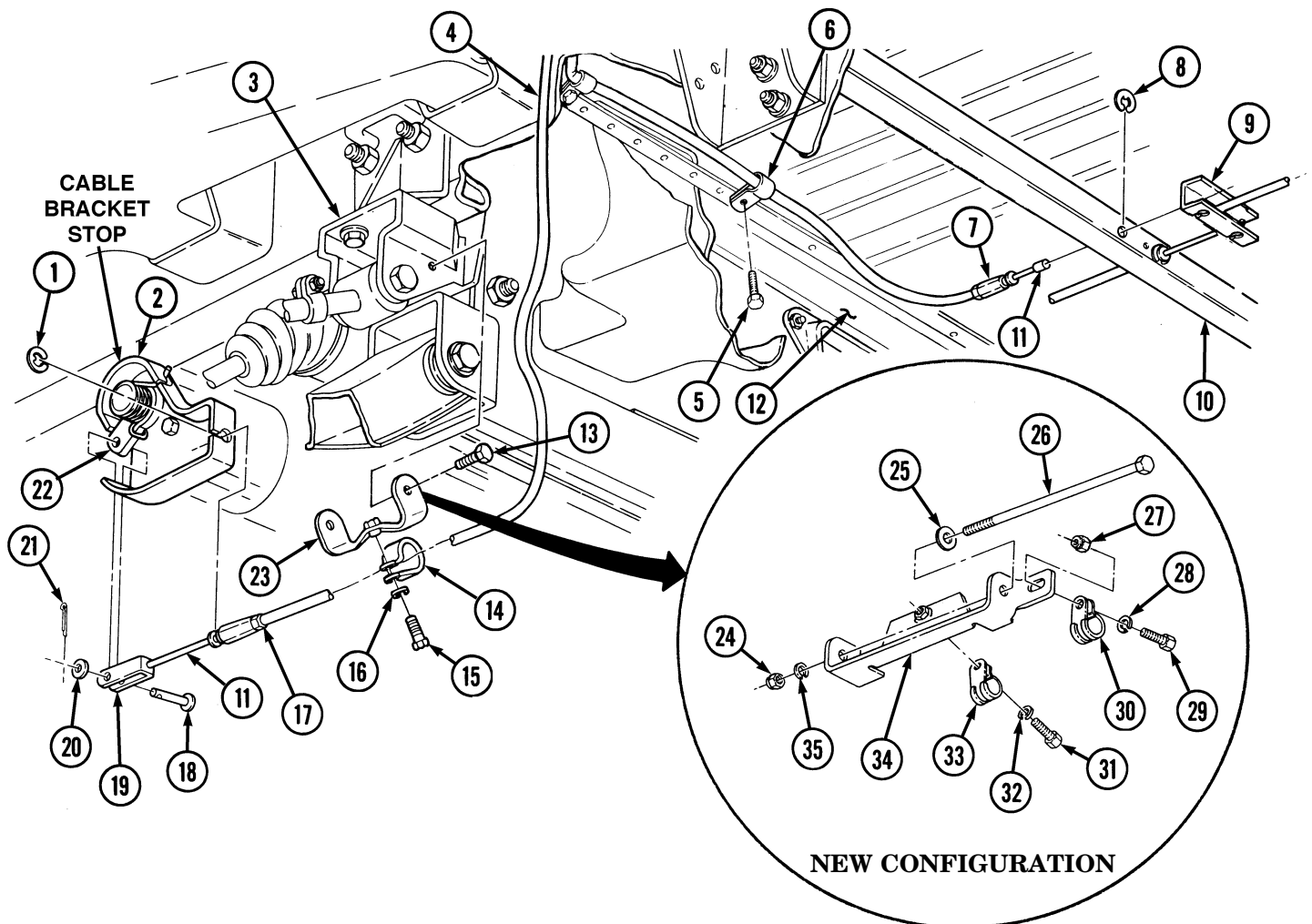
7-23. RIGHT PARKING BRAKE CABLE REPLACEMENT (Cont'd)

2. Slide parking brake cable clamp (33) onto parking brake cable assembly (4) and install on clamp bracket (34) with lockwasher (32) and capscrew (31).
3. Slide parking brake cable clamp (30) on parking brake cable assembly (4) and install on clamp bracket (34) with capscrew (29), lockwasher (28), and locknut (27).
4. Install two parking brake cable clamps (6) on parking brake cable assembly (4) and install parking brake cable clamps (6) on underbody (12) with two capscrews (5).
5. Install parking brake cable sleeve (7) to "C" beam (10) and parking brake cable (11) to equalizer bar (9) with retaining ring (8).

CAUTION

Ensure that the caliper cable bracket is secure with no signs of looseness and the lever is in contact with the caliper cable bracket stop. Damage to equipment and poor performance will result if not aligned properly.

6. Install parking brake cable sleeve (17) to caliper cable bracket (2) with cable retaining ring (1).
7. Install bracket clevis (19) on rear caliper lever (22) with clevis pin (18), washer (20), and cotter pin (21).



- FOLLOW-ON TASKS:
- Adjust parking brake lever (TM 9-2320-280-10).
 - Install muffler and catalytic converter (M1123 and "A2" vehicles only) (para. 3-49).
 - Install muffler and insulator (all models except M1123 and "A2" vehicles) (para. 3-48).

7-24. LEFT PARKING BRAKE CABLE/MOUNTING BRACKET REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Materials/Parts

Assembled locknut (Appendix G, Item 130)
Two lockwashers (Appendix G, Item 135)
Cotter pin (Appendix G, Item 12)
Two retaining rings (Appendix G, Item 231)
Two locknuts (Appendix G, Item 71)

Equipment Condition

- Muffler and insulator removed (all models except M1123 and "A2" vehicles) (para. 3-48).
- Muffler and catalytic converter removed (M1123 and "A2" vehicles only) (para. 3-49).
- Wheels chocked and parking brake released (TM 9-2320-280-10).

NOTE

- The following procedure applies to vehicles with serial numbers USBL Eff. 44825 and above.
- If cables are chafing or crushed, use new cable clamp bracket.

a. Removal

1. Remove cotter pin (11), washer (12), clevis pin (14), and brake clevis (13) from rear caliper lever (10). Discard cotter pin (11).
2. Remove brake cable retaining ring (9) and parking brake cable sleeve (2) from rear caliper cable bracket (8). Discard cable retaining ring (9).
3. Slide parking brake cable (1) through parking brake cable assembly (15). Remove parking brake cable retaining ring (24) and parking brake cable sleeve (2) from "C" beam (22). Disconnect parking brake cable (1) from parking brake equalizer bar (23). Discard cable retaining ring (24).
4. Remove capscrew (6), washer (4), and assembled locknut (3) from brake cable clamp (5), mounting bracket (21) and parking brake cable assembly (15). Discard assembled locknut (3).

NOTE

Perform steps 5 and 6 for vehicles with old parking brake cable bracket. Perform steps 7 through 9 for vehicles with new parking brake cable bracket configuration.

5. Remove capscrew (17), lockwasher (16), parking brake cable clamp (18), and parking brake cable assembly (15) from bracket (19). Discard lockwasher (16).
6. Remove two capscrews (20) and bracket (19) from support bracket (7). Discard bracket (19).
7. Remove locknut (36), capscrew (34), washer (33), and parking brake cable clamp (32) from bracket (28). Discard locknut (36).
8. Remove capscrew (31), lockwasher (30), and parking brake cable clamp (29) from bracket (28). Discard lockwasher (30).

NOTE

Perform step 9 if clamp bracket is damaged. If not replacing bracket, proceed to b., installation.

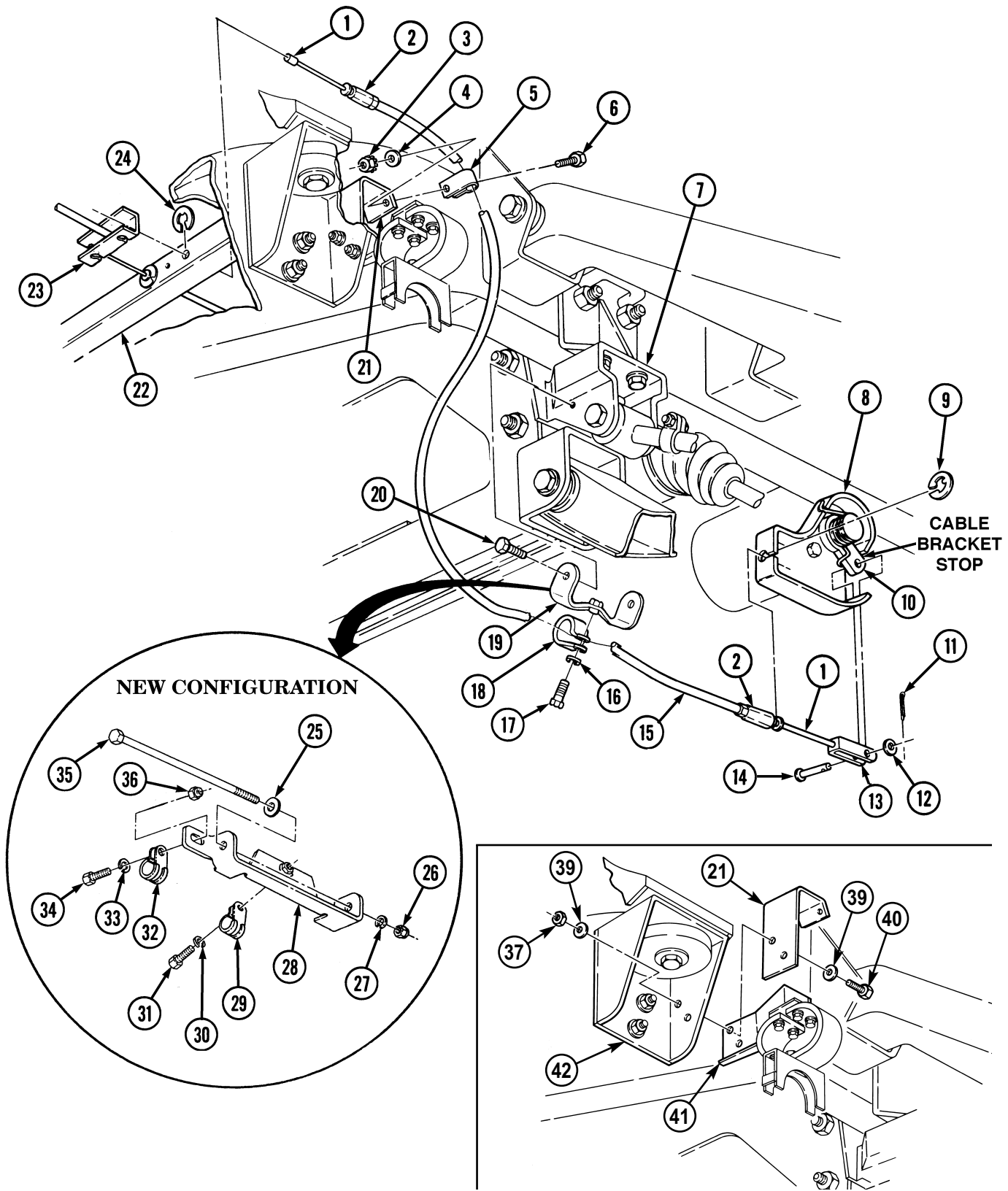
9. Remove locknut (26), washer (27), capscrew (35), washer (25), and clamp bracket (28) from support bracket (7). Discard locknut (26).

NOTE

Perform step 10 if replacing parking cable mounting bracket. If not replacing bracket, proceed to b., installation.

10. Remove two nuts (37), washers (39), capscrews (40), washers (39), mounting bracket (21), and tailpipe hanger (41) from rear body mount (42).

7-24. LEFT PARKING BRAKE CABLE/MOUNTING BRACKET REPLACEMENT (Cont'd)



7-24. LEFT PARKING BRAKE CABLE/MOUNTING BRACKET REPLACEMENT (Cont'd)

b. Installation

NOTE

Perform step 1 if replacing parking brake cable mounting bracket.
If not, proceed to step 2.

1. Install parking brake cable mounting bracket (4) and tailpipe hanger (6) on rear body mount (7) with two capscrews (5), four washers (3), and two nuts (1).

NOTE

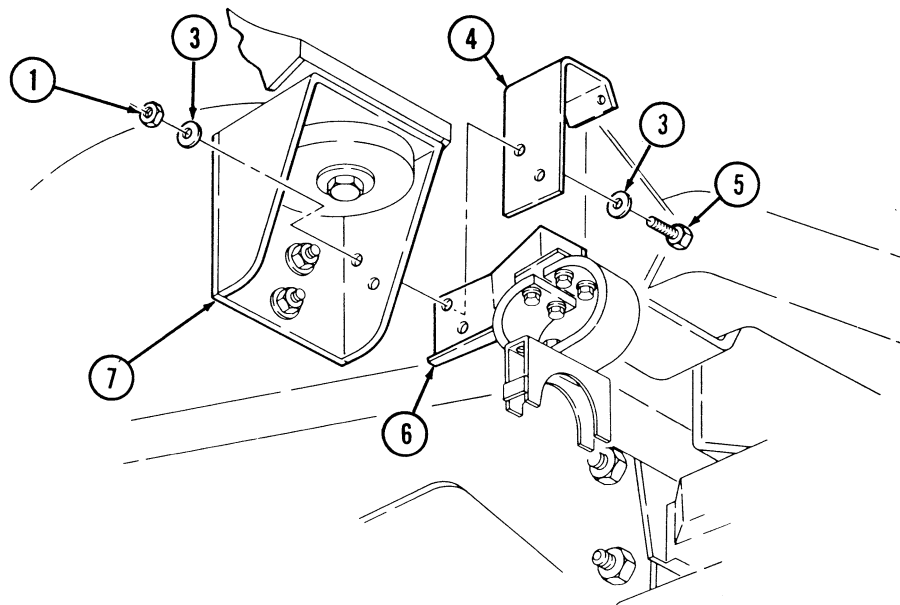
Ensure clamp bracket (P/N 12342966) is installed on vehicle.

2. Install clamp bracket (34) on support bracket (14) with washer (31), capscrew (41), washer (33), and locknut (32).
3. Slide parking brake cable clamp (35) onto parking bracket cable assembly (22) and install cable clamp (35) on clamp bracket (34) with lockwasher (36) and capscrew (37).
4. Slide parking brake cable clamp (38) onto parking brake cable assembly (22) and install cable clamp (38) on clamp bracket (34) with capscrew (40), washer (39), and locknut (42).
5. Install parking brake cable clamp (12) on parking brake cable assembly (22) and install cable clamp (12) on parking brake cable mounting bracket (4) with washer (11), capscrew (13), and assembled locknut (10).
6. Install parking brake cable sleeve (9) on "C" beam (28) and parking brake cable (8) on equalizer bar (29) with retaining ring (30).

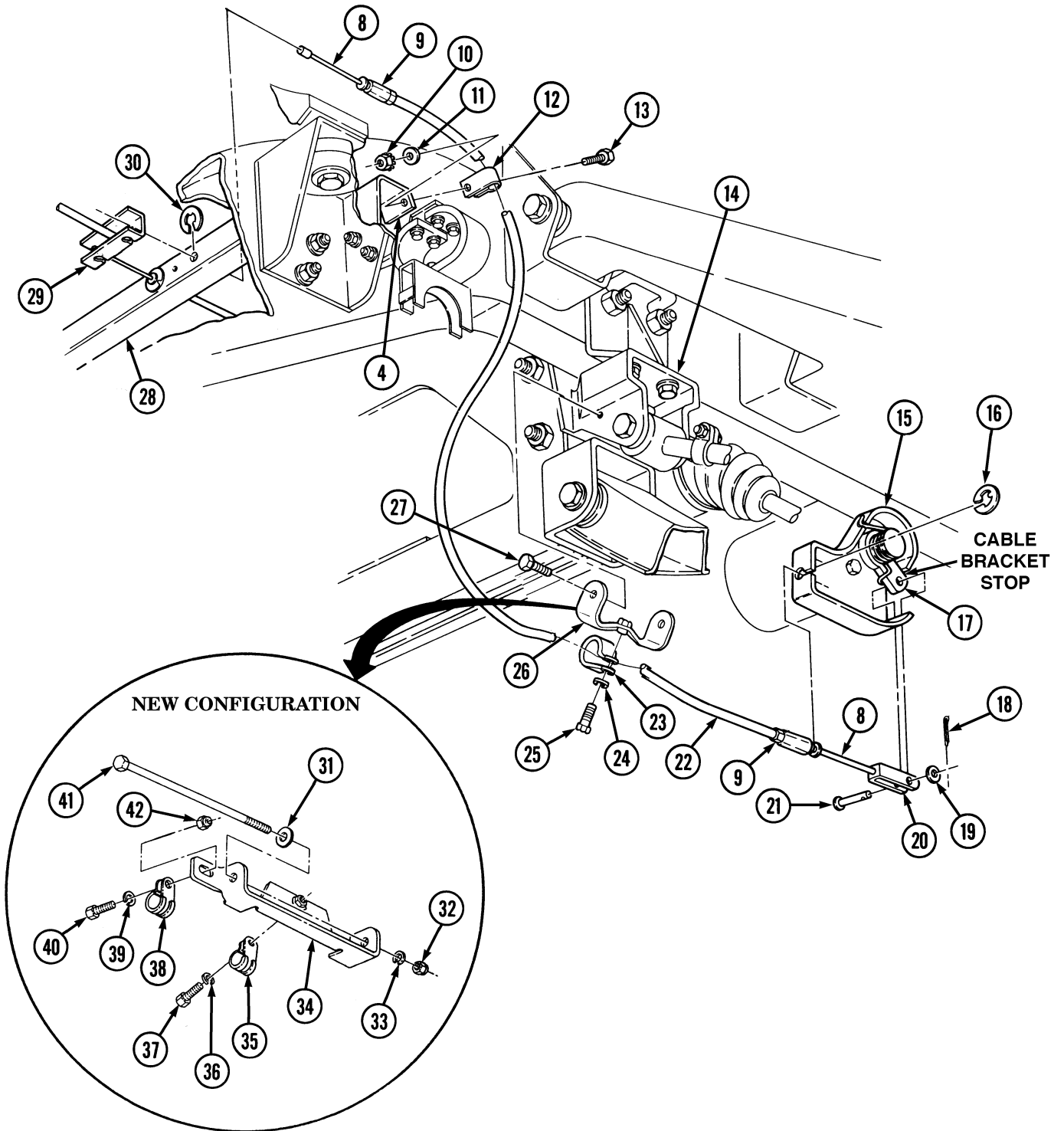
CAUTION

Ensure that the caliper cable bracket is secure with no signs of looseness and the lever is in contact with the caliper cable bracket stop. Damage to equipment and poor performance will result if not aligned properly.

7. Install parking brake cable sleeve (9) on rear caliper cable bracket (15) with cable retaining ring (16).
8. Install brake clevis (20) on rear caliper lever (17) with clevis pin (21), washer (19), and cotter pin (18).
9. Install parking brake cable assembly (22) on bracket (26) with clamp (23), capscrew (25), and lockwasher (24).
10. Install bracket (26) on bracket (14) with two capscrews (27).



7-24. LEFT PARKING BRAKE CABLE/MOUNTING BRACKET REPLACEMENT (Cont'd)



- FOLLOW-ON TASKS:**
- Adjust parking brake lever (TM 9-2320-280-10).
 - Install muffler and catalytic converter (M1123 and "A2" vehicles only) (para. 3-49).
 - Install muffler and insulator (all models except M1123 and "A2" vehicles) (para. 3-48).

7-25. REAR DUAL SERVICE/PARKING BRAKE ROD REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Three cotter pins (Appendix G, Item 12)
Locknut (Appendix G, Item 79)
Locknut (Appendix G, Item 86)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

- Muffler and insulator removed (all models except M1123 and "A2" vehicles) (para. 3-48).
- Muffler and catalytic converter removed (M1123 and "A2" vehicles only) (para. 3-49).
- Wheels chocked and parking brake released (TM 9-2320-280-10).

CAUTION

The following procedure applies to vehicles with serial numbers USBL Eff. 44825 and above.

a. Removal

1. Remove two cotter pins (left and right) (23), washers (22), clevis pins (20), and brake clevis (21) from caliper levers (24). Discard cotter pins (23).
2. Remove clip (5) and spread boot (6) to allow access to cotter pin (12).
3. Remove cotter pin (12), washer (11), clevis pin (8), and clevis (9) from brake rod (14) and bellcrank (7). Discard cotter pin (12).
4. Remove locknut (17), washer (16), spacer (15), washer (3), capscrew (4), and spring (2) from body (13). Discard locknut (17).
5. Remove locknut (19) and conical washer (18) from brake rod (14) and brake cable equalizer bar (1). Discard locknut (19).
6. Remove brake rod (14) by sliding brake rod (14) forward.
7. Remove clevis (9) and nut (10) from brake rod (14).

b. Installation

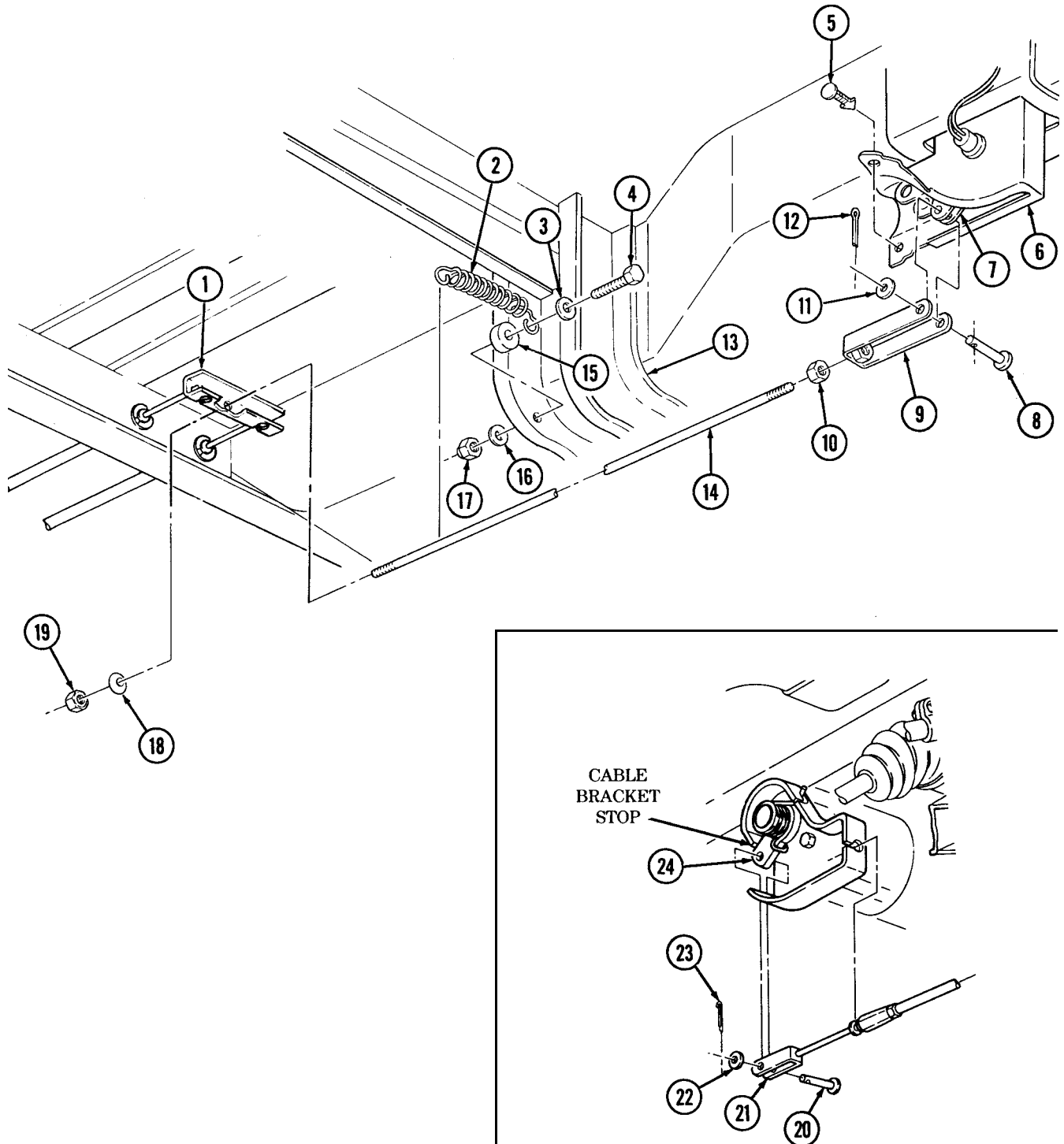
1. Install spring (2) and spacer (15) on body (13) with washer (3), capscrew (4), washer (16), and locknut (17).
2. Install nut (10) and clevis (9) on brake rod (14).
3. Slide brake rod (14) rearward through spring (2).
4. Install brake rod (14) on brake cable equalizer bar (1) with conical washer (18) and locknut (19). Tighten locknut (19) far enough to expose 3-5 threads on the end of brake rod (14).
5. Spread boot (6) and install clevis (9) on bellcrank (7) with clevis pin (8), washer (11), and cotter pin (12).
6. Install clip (5) on boot (6).

CAUTION

Ensure that the caliper cable bracket is secure with no signs of looseness and the lever is in contact with the caliper cable bracket stop. Damage to equipment and poor performance will result if not aligned properly.

7. Install brake clevis (21) on rear caliper levers (24) with clevis pins (20), washers (22), and cotter pins (23).

7-25. REAR DUAL SERVICE/PARKING BRAKE ROD REPLACEMENT (Cont'd)



- FOLLOW-ON TASKS:**
- Adjust rear dual service/parking brake (para. 7-26).
 - Install muffler and catalytic converter (M1123 and "A2" vehicles only) (para. 3-49).
 - Install muffler and insulator (all models except M1123 and "A2" vehicles) (para. 3-48).

7-26. REAR DUAL SERVICE/PARKING BRAKE ADJUSTMENT

This task covers:

Adjustment

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Materials/Parts

Cotter pin (Appendix G, Item 12)

Equipment Condition

Wheels chocked and parking brake released
(TM 9-2320-280-10).

Personnel Required

One mechanic
One assistant

NOTE

- The Kelsey-Hayes parking brake mechanism has an automatic adjusting feature and does not require periodic manual adjustment. When parking brake components or rear brake pads are replaced, the parking brake linkage must be initially positioned to ensure proper parking brake system operation. The only additional adjustment necessary is accomplished with the parking brake hand lever. Refer to TM 9-2320-280-10.
- The following procedure applies to vehicles with serial numbers USBL Eff. 44825 and above.

Adjustment

1. Remove clip (1) and spread boot (2) to allow access to cotter pin (9).
2. Remove cotter pin (9), washer (8) and clevis pin (4) from clevis (5) and bellcrank (3). Discard cotter pin (9).
3. Repeatedly apply and adjust parking brake hand lever until bellcrank (3) linear travel is 0.75 in. (19 mm).

CAUTION

Holes in parking brake clevis must align to the holes in the adjusting bellcrank without force for proper parking brake adjustment. Failure to do this may result in damage to equipment and poor performance.

4. Release parking brake. Loosen nut (6) and adjust clevis (5) so holes in clevis (5) align to holes in bellcrank (3). Install clevis (5) on bellcrank (3) with clevis pin (4), washer (8), and cotter pin (9).

CAUTION

Do not overtighten brake rod. Overtightening brake rod may result in dragging brakes.

5. If necessary, remove excess slack in parking brake cables by turning the parking brake rod (7) clockwise or counterclockwise into the clevis (5).

7-26. REAR DUAL SERVICE/PARKING BRAKE ADJUSTMENT (Cont'd)

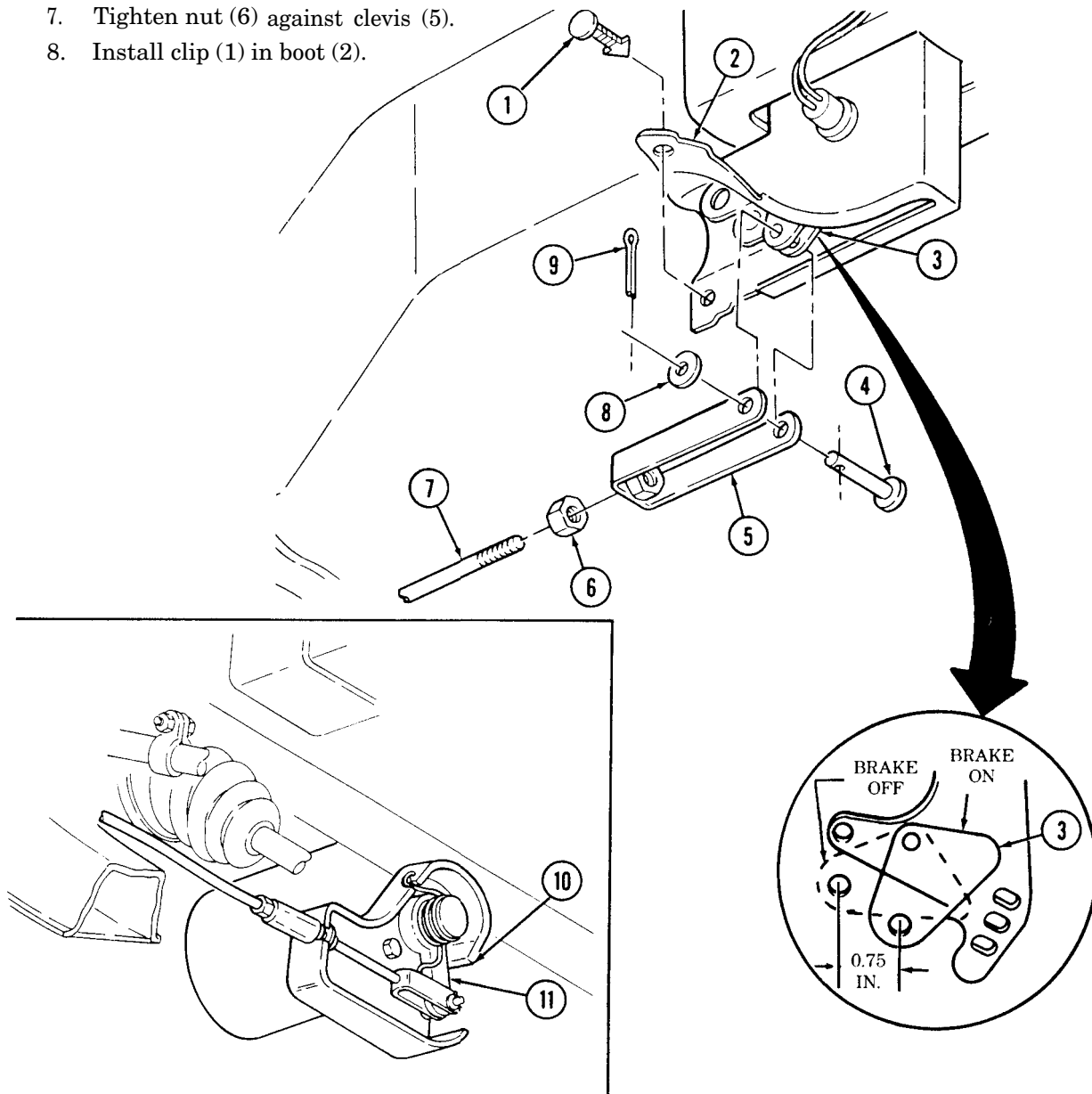
CAUTION

Ensure that the caliper cable bracket is secure with no signs of looseness and the lever is in contact with the caliper cable bracket stop. Damage to equipment and poor performance will result if not aligned properly.

NOTE

Perform step 6 on both sides.

6. Parking brake rod (7) is properly adjusted if lever (11) is in contact with caliper cable bracket stop (10).
7. Tighten nut (6) against clevis (5).
8. Install clip (1) in boot (2).



FOLLOW-ON TASK: Adjust parking brake lever (TM 9-2320-280-10).

CHAPTER 8
WHEELS AND STEERING MAINTENANCE
Section I. WHEEL AND RUNFLAT SYSTEM MAINTENANCE

8-1. WHEEL AND RUNFLAT SYSTEM MAINTENANCE TASK SUMMARY

TASK PARA.	PROCEDURES	PAGE NO.
8-2.	Jacking Instructions	8-2
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8-4.	Tire, Wheel, and Runflat Maintenance	8-8
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8-5.	Radial Tire, Wheel, and Rubber Runflat Maintenance (All Except M1123 and "A2" Vehicles)	8-16
8-5.1.	Radial Tire, Wheel, and Rubber Runflat Maintenance (M1123 and "A2" Vehicles)	8-24.2
8-6.	Runflat Compressor (P/N J39250) Belt Replacement	8-25
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8-8.	Inner Rim Stud Maintenance	8-27
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8-10.	Front Wheel Toe-in Alignment	8-32
8-11.	Rear Wheel Toe-out Alignment	8-38

8-2. JACKING INSTRUCTIONS

This task covers:

- | | |
|--|--|
| <ul style="list-style-type: none"> a. Raising Corner of Vehicle b. Lowering Corner of Vehicle c. Raising Front of Vehicle d. Lowering Front of Vehicle | <ul style="list-style-type: none"> e. Raising Rear of Vehicle f. Lowering Rear of Vehicle g. Raising Entire Vehicle h. Lowering Entire Vehicle |
|--|--|

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

General Safety Instructions

Never work under vehicle unless wheels are blocked and it is properly supported.

WARNING

Hydraulic jacks are used for raising and lowering, and are not used to support vehicle. Never work under vehicle unless wheels are blocked and it is properly supported. Injury or damage to equipment may result if vehicle suddenly shifts or moves.

a. Raising Corner of Vehicle

1. Block wheels (2) or (4).
2. Place jack under lower control arm (5) on corner to be raised.
3. Raise vehicle (1) high enough to place trestle (3).
4. Place trestle (3) under flat portion of frame rail (7) and lower jack until weight is supported by trestle (3).

b. Lowering Corner of Vehicle

1. Raise vehicle (1) and remove trestle (3).
2. Lower vehicle (1).
3. Remove blocks from wheels (2) or (4).

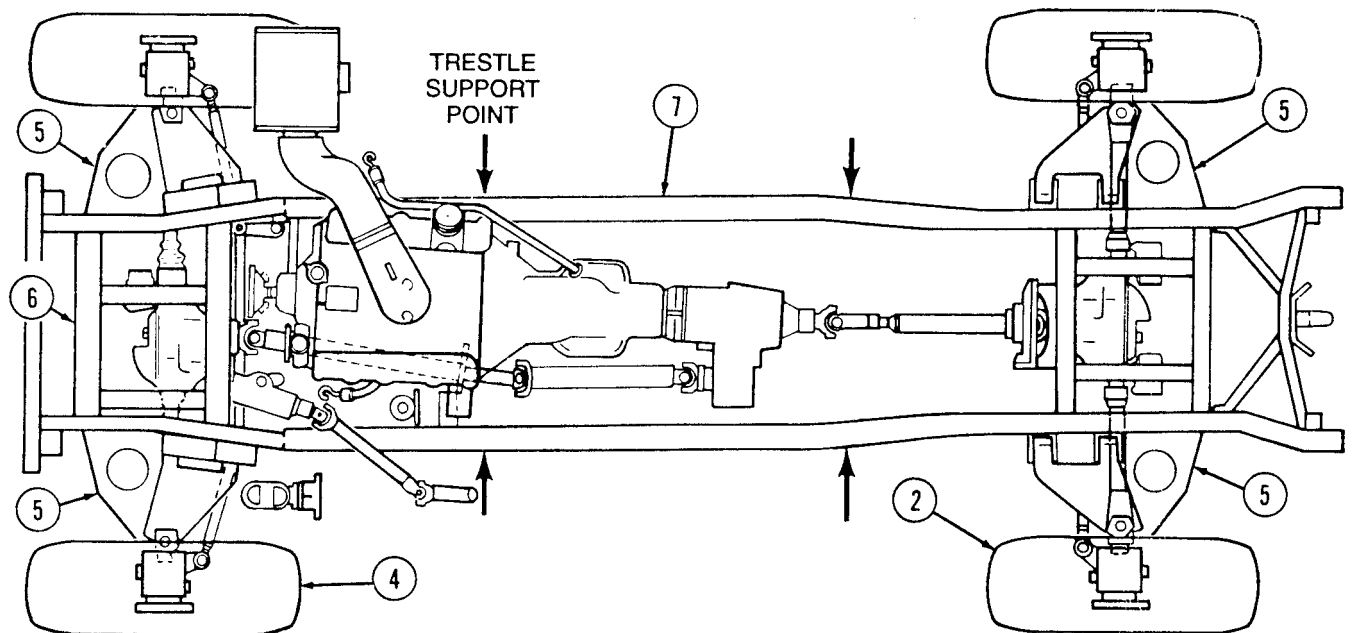
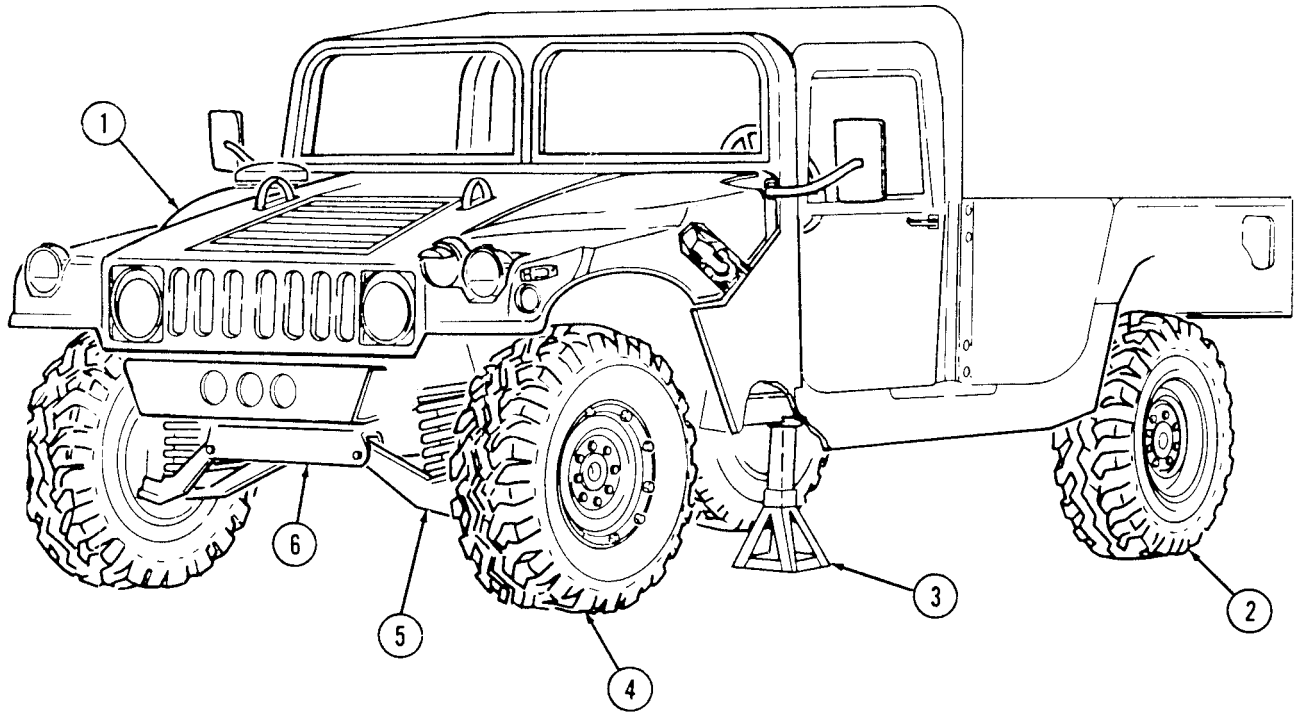
c. Raising Front of Vehicle

1. Block rear wheels (2).
2. Center jack under front suspension front crossmember (6). Use a wood block between jack and crossmember (6).
3. Raise vehicle (1) high enough to place trestles (3).
4. Place trestles (3) under flat portion of frame rails (7) and lower jack until weight is supported by trestles (3).

d. Lowering Front of Vehicle

1. Raise vehicle (1) and remove trestles (3).
2. Lower vehicle (1).
3. Remove blocks from rear wheels (2).

8-2. JACKING INSTRUCTIONS (Cont'd)



8-2. JACKING INSTRUCTIONS (Cont'd)

e. Raising Rear of Vehicle

1. Block front wheels (4).
2. Center jack under rear suspension rear crossmember (6). Use a wood block between jack and crossmember (6).
3. Raise vehicle (1) high enough to place trestles (3).

WARNING

For vehicles with a heavy load such as S250 shelter carrier, an additional trestle should be placed in the rear for added stability.

4. Place trestles (3) under flat portion of frame rails (5) and lower jack until weight is supported by trestles (3).

f. Lowering Rear of Vehicle

1. Raise vehicle (1) and remove trestles (3).
2. Lower vehicle (1).
3. Remove blocks from front wheels (4).

g. Raising Entire Vehicle

1. Raise front of vehicle (task c).
2. Center jack under rear suspension rear crossmember (6). Use a wood block between jack and crossmember (6).

WARNING

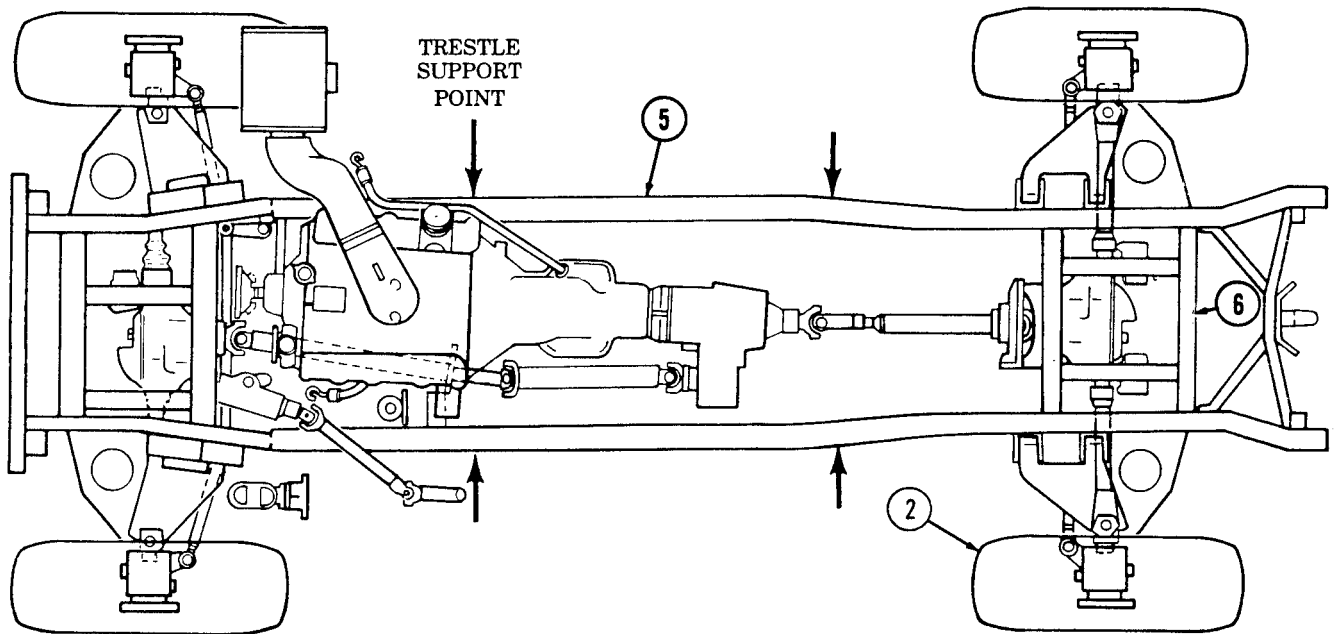
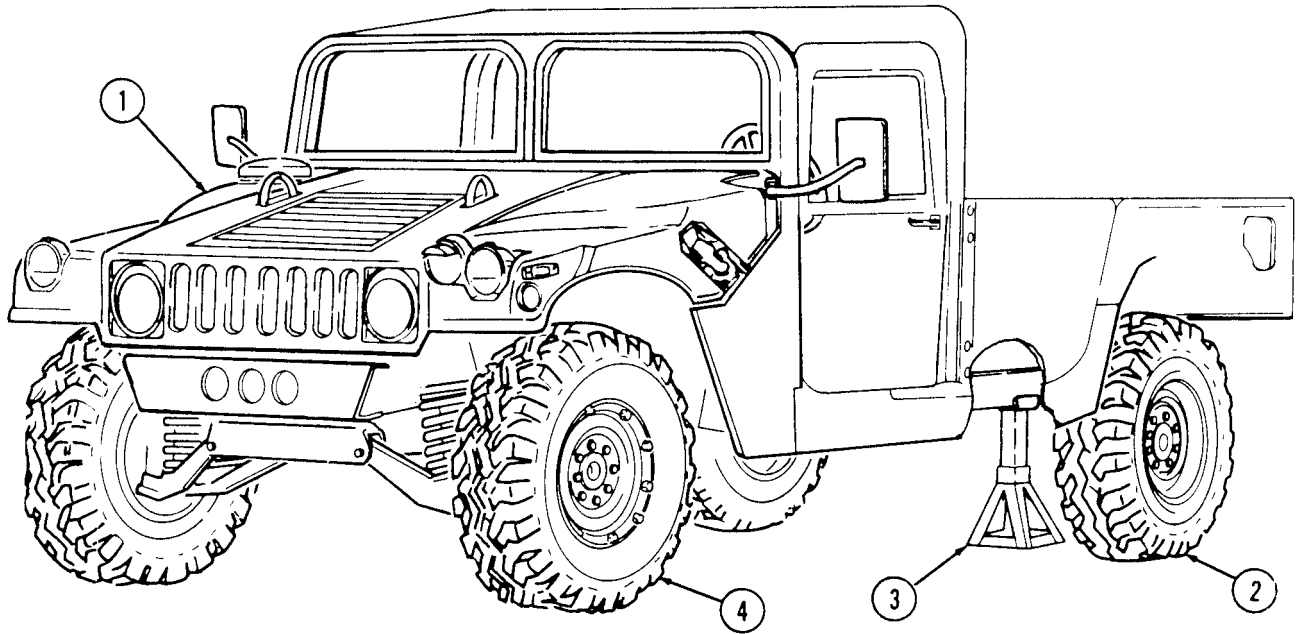
For vehicles with a heavy load such as S250 shelter carrier, an additional trestle should be placed in the rear for added stability.

3. Raise vehicle (1) high enough to place trestles (3).
4. Place trestles (3) under flat portion of frame rails (5) and lower jack until weight is supported by trestles (3).
5. Move blocks aside.

h. Lowering Entire Vehicle

1. Raise rear of vehicle (1) and remove trestles (3).
2. Lower rear of vehicle (1) and block rear wheels (2).
3. Lower front of vehicle (task d).

8-2. JACKING INSTRUCTIONS (Cont'd)



8-3. WHEEL REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, item 1)

Manual References

TM 9-2320-280-24P

General Safety Instructions

- Always apply parking brake and chock opposite wheel before removing wheel.
- Remove only the inner group of nuts when removing a wheel from the vehicle.
- Never mix radial tires and bias ply tires.

WARNING

- Always apply parking brake and chock opposite wheel before removing wheel. Avoid removing wheel when vehicle is on sloping terrain. Injury to personnel or damage to equipment may result.
- Remove only the inner group of nuts when removing a wheel from the vehicle. Removing the outer nuts which hold the rim together while the assembly is inflated could result in serious injury or death.
- Radial and Bias ply tires should not be mixed on the same vehicle. Injury to personnel or damage to equipment may result.

NOTE

Check tire size designator on sidewall for tire construction identification:

36 X 12.50-16 .5 LT-Bias ply
37 X 12.50R16.5LT-Radial

a. Removal

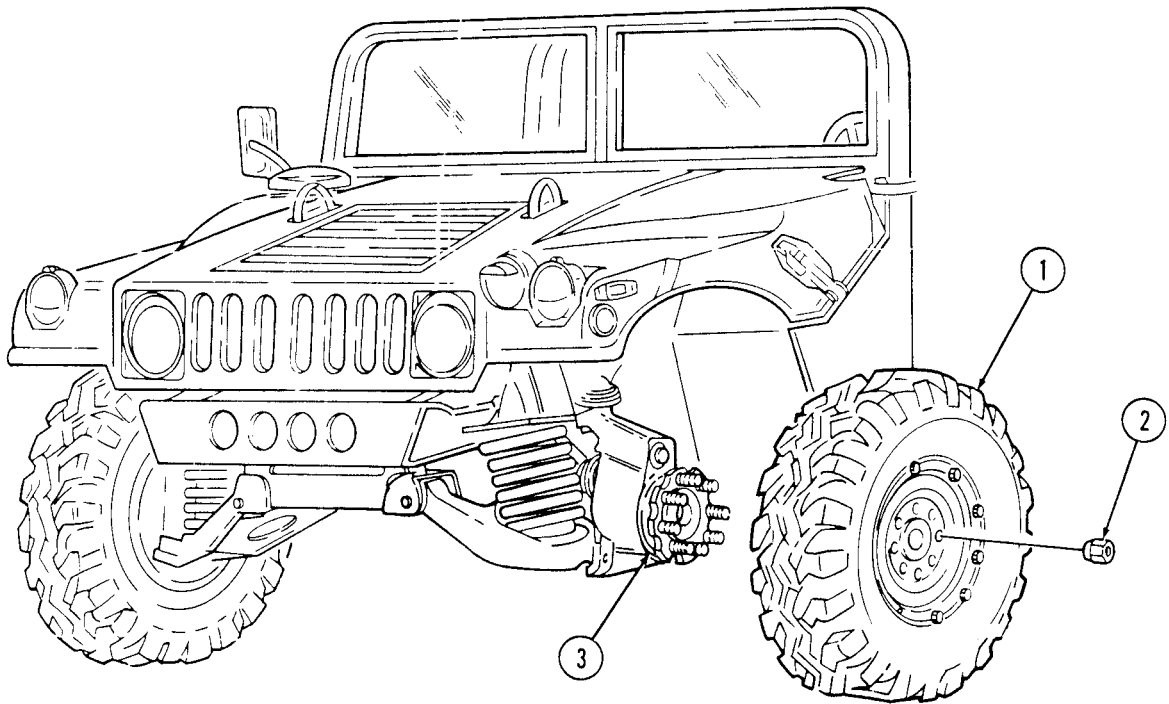
1. Lumen eight lug nuts (2), but do not remove.
2. Raise and support corner of vehicle (para. 8-2).
3. Remove eight lug nuts (2) securing wheel (1) to geared hub (3) and remove wheel (1).

b. Installation

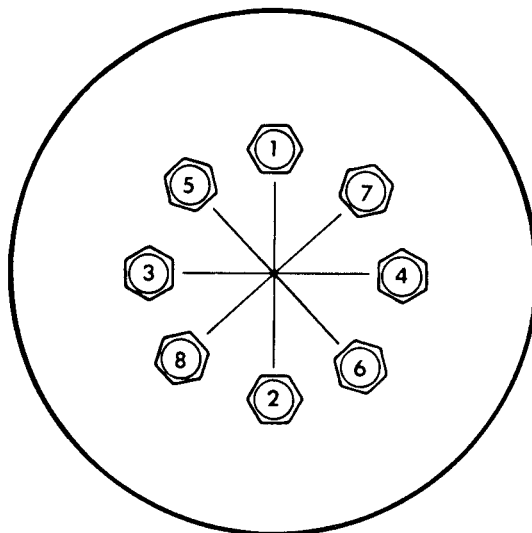
NOTE

- Install lug nuts with fingers to full engagement. If nuts resist finger tightening, discard nuts. Examine studs for damage and replace if damaged (para. 6-14).
 - The radial tire is nondirectional and can be used in either position.
1. Install wheel (1) on geared hub (3) with eight lug nuts (2).
 2. Remove support and lower corner of vehicle (para. 8-2).
 3. Tighten eight lug nuts (2) to 90-110 lb-ft. (122-149 N•m) in tightening sequence shown.

8-3. WHEEL REPLACEMENT (Cont'd)



TIGHTENING
SEQUENCE



8-4. TIRE, WHEEL, AND RUNFLAT MAINTENANCE

This task covers:

- | | |
|--|----------------------------------|
| <p>a. Disassembly
b. Inspection and Cleaning</p> | <p>c. Repair
d. Assembly</p> |
|--|----------------------------------|

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)
General mechanic's tool kit:
automotive, common No. 2
(Appendix B, Item 4)

Special Tools

Torque adapter, 9/16 in.
(Appendix B, Item 144)
Socket adapter (Appendix B, Item 146)

Materials/Parts

Eight locknuts (Appendix G, Item 115)
Four locknuts (Appendix G, Item 116)
Lubricant (Appendix G, Item 196)
O-ring (Appendix G, Item 214)
Detergent (Appendix C, Item 17)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P
TM 9-2610-200-14

Equipment Condition

Wheel removed (para. 8-3).

General Safety Instructions

- Do not use tire machine.
- Ensure tire is totally deflated before removing wheel locknuts.
- Never use tubes in wheel assemblies.
- Rim surfaces must be kept clean and free of rust and dirt.
- Never use wheel assemblies with damaged studs.
- Never inflate a wheel assembly with the wheel locknuts removed.
- Never inflate a wheel assembly without first checking wheel locknut torques.
- Use only replacement parts specified in TM 9-2320-280-24P.
- Do not exceed recommended tire inflation pressure.
- Always use a tire inflation cage and a clip-on air chuck for tire inflation.

WARNING

Do not use tire machine. Injury to personnel or damage to equipment may result.

NOTE

The following maintenance procedure applies to vehicles using bias ply tires and two-piece magnesium runflats. Refer to paras. 8-4.1, 8-5, and 8-5.1 for maintenance instructions on radial tires and rubber runflats.

a. Disassembly

1. Place wheel assembly in a tire inflation cage.

WARNING

In all disassembly operations, ensure the tire is totally deflated before removing wheel locknuts. Failure to follow proper safety precautions could cause serious injury or death.

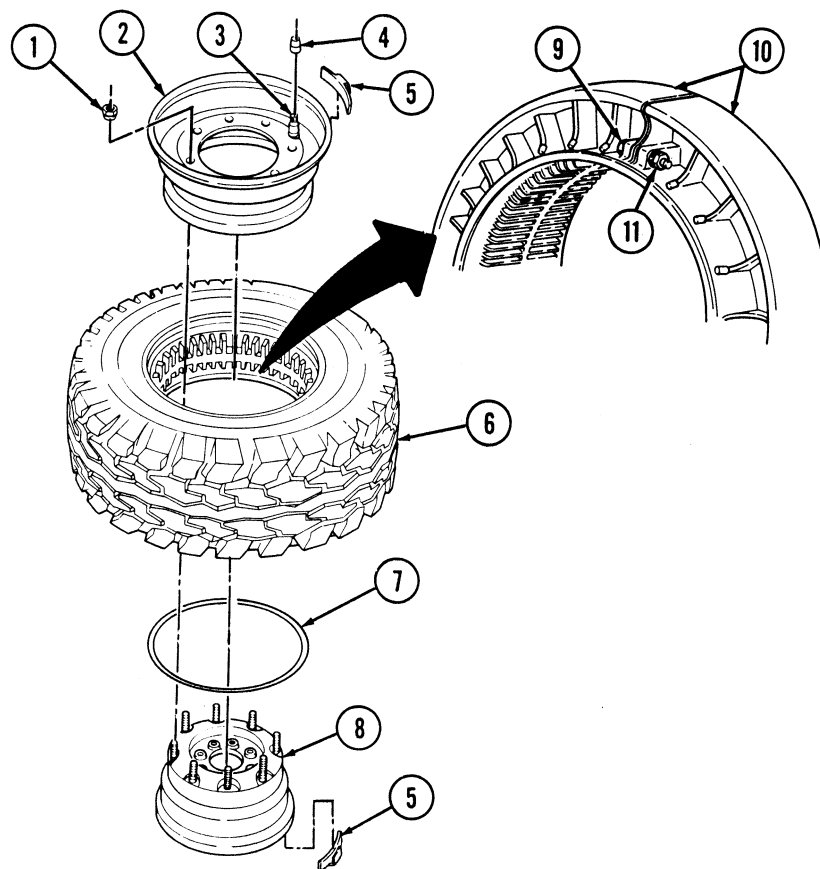
2. Remove valve core (4) from valve stem (3) and deflate tire (6). Run a piece of wire through valve stem (3) to make sure it is not plugged.
3. When tire (6) is fully deflated, remove wheel assembly from tire inflation cage and place flat on floor with valve stem (3) facing up.
4. Using a circular pattern, loosen eight wheel locknuts (1) securing rim halves (2) and (8) together. If you hear escaping air, do not proceed. Wait until the sound stops and recheck valve stem (3). When you are certain the tire (6) is fully deflated, proceed to remove wheel locknuts (1). Discard locknuts (1).

8-4. TIRE, WHEEL, AND RUNFLAT MAINTENANCE (Cont'd)

WARNING

Never inflate a wheel assembly with the wheel locknuts removed in an attempt to separate inner and outer rim halves. The assembly will separate under pressure, resulting in serious injury or death.

5. Remove rim half (2) from tire (6).
6. Remove tire (6) from rim half (8).
7. Remove O-ring (7) from rim half (8). Cut O-ring (7) in two, to make sure that it cannot be reused. Discard O-ring (7).
8. Remove four locknuts (11), flange bolts (9), and runflat halves (10) from tire (6). Discard locknuts (11).
9. Remove balance weights (5) from rim halves (2) and (8) (if present). Discard balance weights (5).



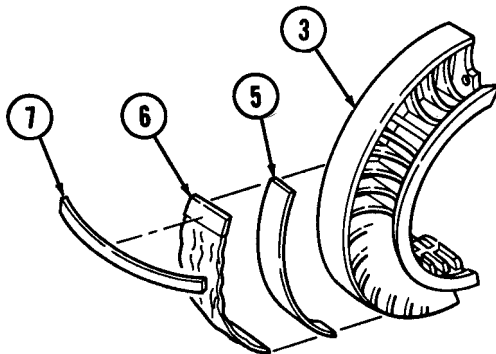
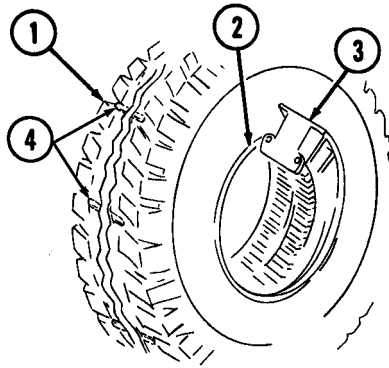
8-4. TIRE, WHEEL, AND RUNFLAT MAINTENANCE (Cont'd)

b. Inspection and Cleaning

WARNING

Do not reuse a tire which has been run flat without thoroughly inspecting for damage. Failure to follow these instructions may result in injury to personnel or damage to equipment.

1. Inspect inside of tire (1) for cord or belt separation, and inner liner damage. Replace tire (1) if damaged.
2. Inspect tire bead (2) for abrasions caused from runflat halves (3). Replace tire (1) if damaged.
3. Check for protruding objects inside tire (1) which may not be visible from outside. Repair tire (1) if damaged.
4. Check tread depth on tire (1). Tread should not be worn below level of wear bars (4). Replace tire (1) if tread is worn below wear bars (4).
5. Remove filament tape (7), lubricant packet (6), and adhesive tape (5) from runflat halves (3) if installed. Discard lubricant packet (6), filament tape (7), and adhesive tape (5).
6. Clean lubricant from tire (1) and runflat halves (3) with soap and water and allow to air dry.



8-4. TIRE, WHEEL, AND RUNFLAT MAINTENANCE (Cont'd)

7. Inspect inside diameter fins (9) and center section fins (10) of runflat halves (8) for cracks or broken sections. Replace runflat halves (8) if cracked or broken.
8. Inspect outside diameter (11) of runflat halves (8) for total penetration cracks. Replace runflat halves (8) if cracked.

WARNING

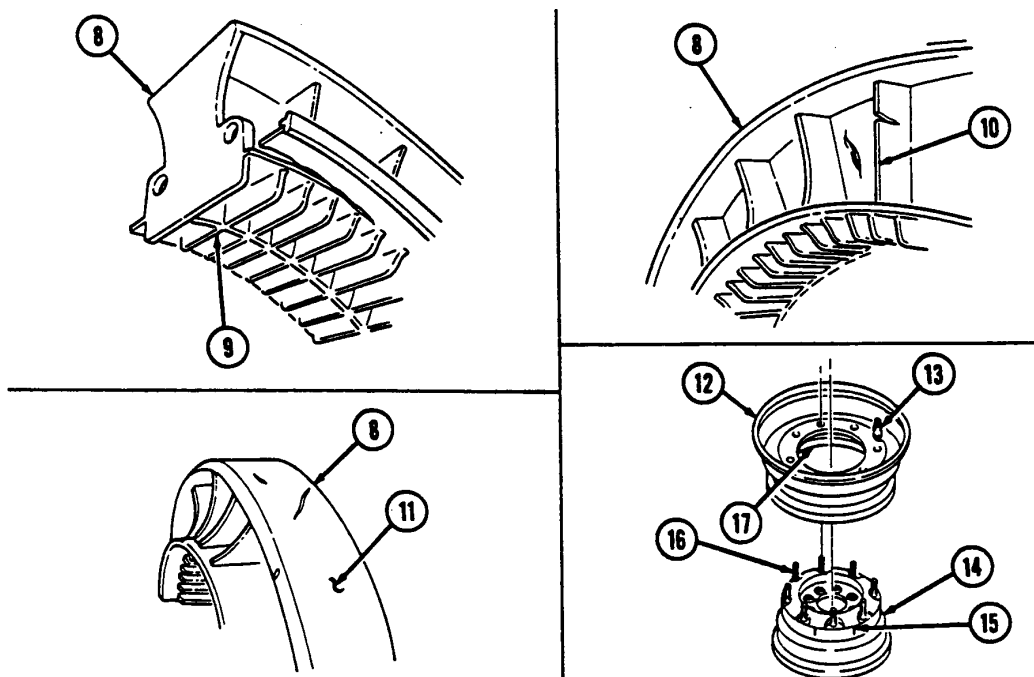
O-ring sealing surfaces and pressure relief grooves must be kept clean and free of rust and dirt. Failure to do so could cause the wheel assembly to separate under pressure if improperly disassembled, causing serious injury or death.

9. Using wire brush, clean studs (16). Clean all dirt and foreign material from rim halves (12) and (14) with soap and water and allow to air dry. Ensure O-ring sealing surfaces (17) and pressure relief grooves (15) on rim halves (12) and (14) are not cracked, bent, and do not have oversized mounting holes.
10. Inspect rim halves (12) and (14) for cracks, bent sealing surfaces, or oversized mounting holes. Replace rim halves (12) or (14) if cracked, bent, or if mounting holes are oversized.

WARNING

Never use wheel assemblies with studs which are damaged, loose, or have damaged threads. Damaged studs can cause improper assembly, which could cause individual fasteners to fail. Any of these situations could cause serious injury or death.

11. Inspect rim half (14) for cracked, broken, rusted, pitted, bent, or loose studs (16).
- 11.1. Inspect studs (16) for damaged or deformed threads. Replace studs (16) if threads are damaged or if studs (16) are damaged or loose (para. 8-8).
12. Inspect valve stem (13) for cracks or deterioration. Replace valve stem (13) if cracked or deteriorated.



8-4. TIRE, WHEEL, AND RUNFLAT MAINTENANCE (Cont'd)

c. Repair

Refer to TM 9-2610-200-14 for maintenance and repair of tires.

d. Assembly

WARNING

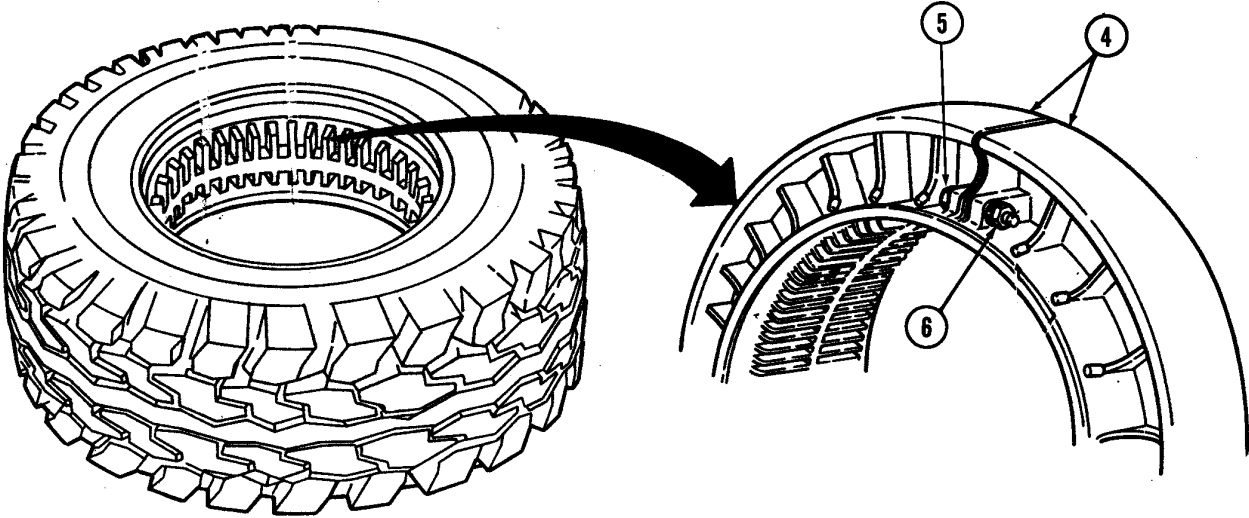
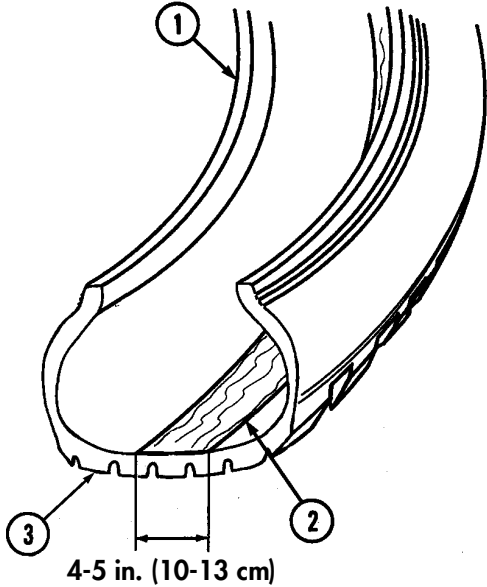
- Never use tubes in wheel assemblies. Use of a tube defeats built-in safety features, and could allow the wheel to come apart under pressure, resulting in serious injury or death.
- Use only replacement parts specified in TM 9-2320-280-24P for bias tires. Eight bolt rims were designed for use with bias tire components only. Wheels assembled with components not specified for bias tires could cause the assembly to separate under pressure, resulting in serious injury or death.

NOTE

Magnesium runflats are going to be phased out of the military supply system. They will be replaced by a rubber runflat kit. If rubber runflat kit is received for use with bias tires, follow assembly instructions in para. 8-5.

1. Apply one 11-ounce tube of gel lubricant (2) around inside of tire (1) at crown area (3).
2. Evenly spread gel lubricant (2) 4-5 in. (10-13 cm) wide on tire crown (3).
3. Install two runflat halves (4) inside tire (1) with four flange bolts (5) and locknuts (6). Using torque adapter, tighten locknuts (6) to 18-22 lb-ft (24-30 N•m).

8-4. TIRE, WHEEL, AND RUNFLAT MAINTENANCE (Cont'd)



8-4. TIRE, WHEEL, AND RUNFLAT MAINTENANCE (Cont'd)

4. Lubricate O-ring (8) with tire soap and install O-ring (8) on first ledge of rim half (9). Make sure O-ring (8) is not twisted and is uniformly positioned 1 in. (25.4 mm) below studs (10). Do not overstretch O-ring (8).
5. Position inner rim half (9) on a raised stand (or another inner rim half) to ensure tire (6) sidewall will not contact floor when installed.
6. Lubricate tire bead (7) and rim bead seat areas with tire soap.

NOTE

Before installing tire on inner rim half, inspect tire sidewalls for a "paint dot". Paint dots are often painted on tires to indicate the tire's light spot, for balancing purposes. If paint dot is present, position tire on rim halves so that paint dot is 180° from valve stem on outer rim half.

7. Center runflat (5) in tire (6). Carefully lower tire (6) over rim half (9). Check to ensure O-ring (8) has not been disturbed.
8. Ensure runflat (5) is not binding flat portion of rim half (9). Runflat (5) should clear inner rim half (9).
9. Install rim half (2) in tire (6).

CAUTION

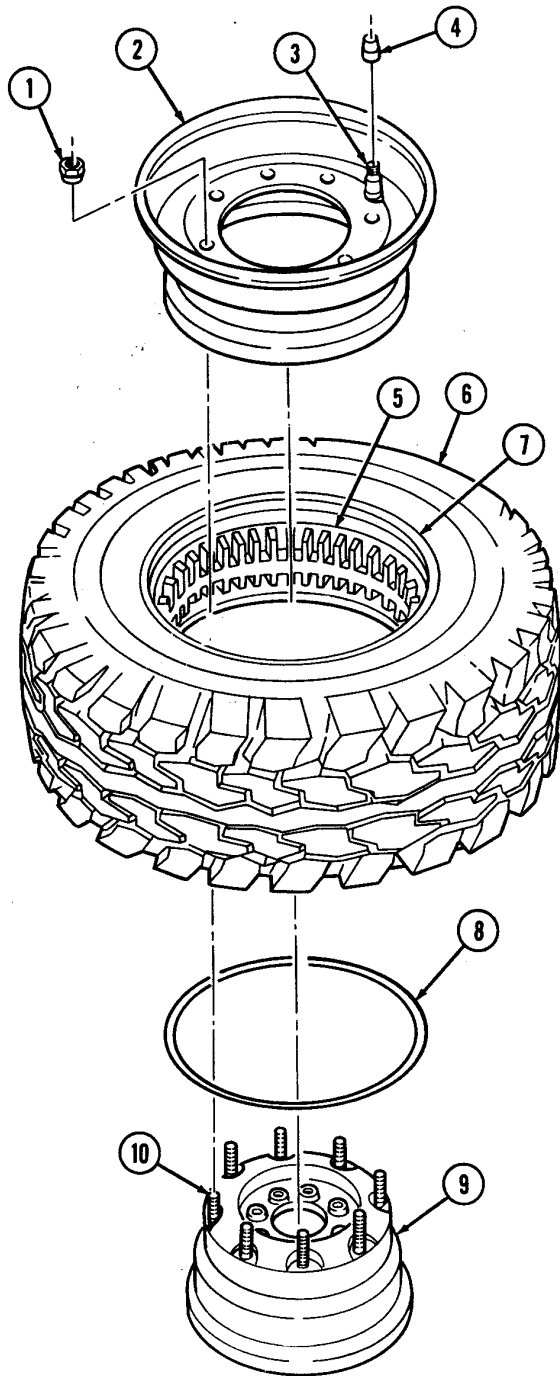
Tighten locknuts gradually to avoid bent and broken studs, or damage to wheel components.

10. Install rim half (2) to rim half (9) with eight locknuts (1). Tighten locknuts (1) in sequence shown until rim half (2) is nearly touching rim half (9).
11. Tighten locknuts (1) to 55 lb-ft (75 N•m) in sequence shown.
12. Tighten locknuts (1) to 65 lb-ft (88 N•m) in sequence shown.
13. Check wheel assembly for gaps at each stud (10) between rim half (2) and rim half (9). Use a 0.0015 in. (0.038 mm) thickness gauge to detect gaps. If gaps are detected, disassemble and reassemble wheel assembly and recheck for gaps. If gaps are still detected, replace rim half (2).
14. Install valve core (4) in valve stem (3).

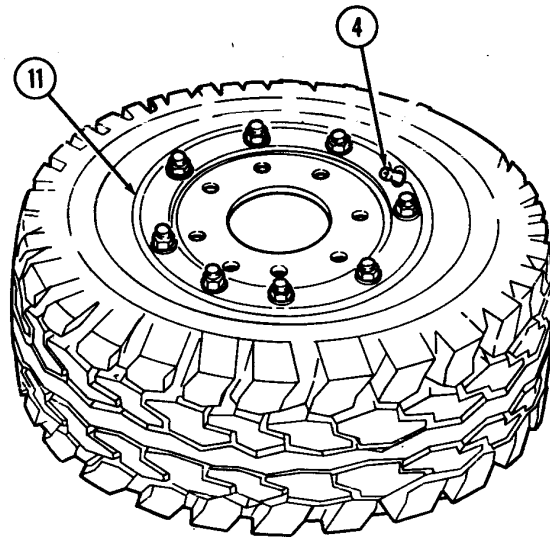
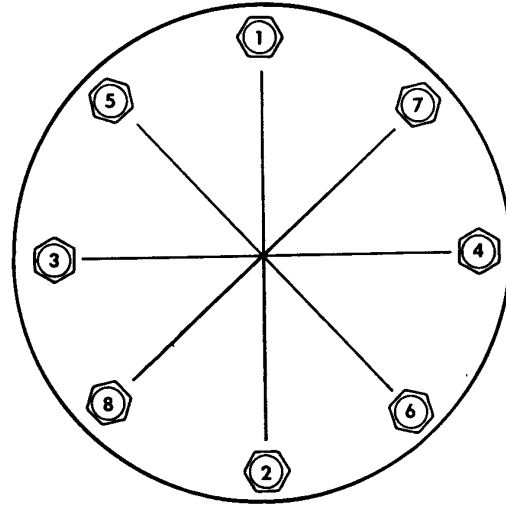
WARNING

- Never inflate a wheel assembly without having checked wheel locknut torques to ensure the wheel locknuts are tightened to specifications. An assembly with improperly tightened locknuts could separate under pressure resulting in serious injury or death.
 - Always use a tire inflation cage for inflation purposes. Stand on one side of cage, during inflation, never directly in front. Keep hands out of the cage during inflation. Inflate assembly to recommended pressure, using a clip-on air chuck. Do not exceed 30 psi (207 kPa) cold inflation pressure. Failure to follow these instructions may result in serious injury or death.
15. Place assembly in safety cage and inflate tire (6) to 30 psi (207 kPa) to seat tire bead.
 16. Deflate tire (6) to recommended tire pressure (TM 9-2320-280-10).
 17. Check for leaks around rim edges (11) and valve stem (4) with soapy solution.

8-4. TIRE, WHEEL, AND RUNFLAT MAINTENANCE (Cont'd)



TIGHTENING SEQUENCE



FOLLOW-ON TASK: Balance tire (para. 8-9).

8-4.1. BIAS TIRE, WHEEL, AND RUBBER RUNFLAT MAINTENANCE

This task covers:

- | | |
|---|-------------------------------------|
| <p>a. Disassembly</p> <p>b. Inspection and cleaning</p> | <p>c. Repair</p> <p>d. Assembly</p> |
|---|-------------------------------------|

INITIAL SETUP:

Applicable Models

All except M997A2, M1025A2, M1035A2, M1043A2, M1045A2, M1097A2, and M1123

Tools

General mechanic's tool kit: automotive (Appendix B, Item 1)
 General mechanic's tool kit: automotive, common No. 2 (Appendix B, Item 4)

Special Tools

Runflat compressor (Appendix B, Item 131)
 Torque adapter, 9/16 in. (Appendix B, Item 144)

Materials/Parts

Twelve locknuts (Appendix G, Item 115)
 O-ring (Appendix G, Item 214)
 Detergent (Appendix C, Item 17)
 Lubricant (Appendix G, Item 196)
 Locknut (Appendix G, Item 82)
 O-ring (Appendix G, Item 219)
 Sealing compound, if required (Appendix C, Item 44)

Personnel Required

One mechanic

Manual References

TM 9-2320-280-10
 TM 9-2320-280-24P
 TM 9-2610-200-14

Equipment Condition

Wheel removed (para. 8-3).

General Safety Instructions

- Do not use tire machine.
- Ensure tire is totally deflated before removing wheel locknuts.
- Never use tubes in wheel assemblies.
- Rim surfaces must be kept clean and free of rust and dirt.
- Never use wheel assemblies with damaged studs.
- Never inflate a wheel assembly with the wheel locknuts removed.
- Never inflate a wheel assembly without first checking wheel locknut torques.
- Do not exceed recommended tire inflation pressure.
- Always use a tire inflation cage and a clip-on air chuck for tire inflation.
- Ensure runflat compressor strap is centered around runflat.
- Never intermix bias and radial tires on the same vehicle.
- Use only replacement parts specified in TM 9-2320-280-24P.
- Do not use runflat compressor if compressor strap is frayed or damaged.

WARNING

Do not use tire machine. Injury to personnel or damage to equipment may result.

NOTE

The following maintenance procedure applies to vehicles using bias ply tires and one-piece rubber runflats. Refer to para. 8-4 for maintenance instructions on bias tires and magnesium runflats, and paras. 8-5 and 8-5.1 for maintenance instructions on radial tires and rubber runflats.

a. Disassembly

1. Place wheel assembly in a tire inflation cage.

8-4.1. BIAS TIRE, WHEEL, AND RUBBER RUNFLAT MAINTENANCE (Cont'd)

WARNING

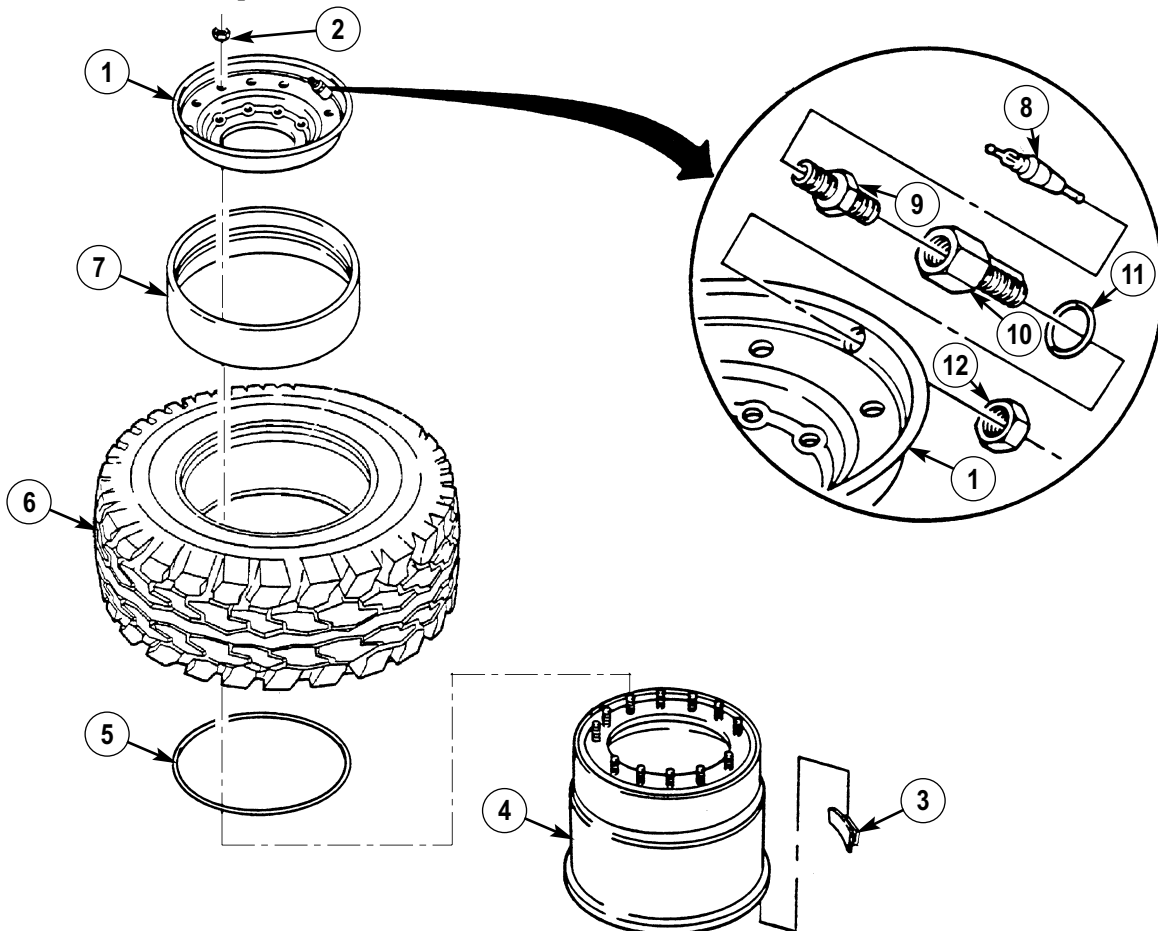
In all disassembly operations, ensure the tire is totally deflated before removing wheel locknuts. Failure to follow proper safety precautions could cause serious injury or death.

2. Remove valve core (8) from valve bore (9) and deflate tire (6). Run a piece of wire through valve bore (9) to make sure it is not plugged.
3. When tire (6) is fully deflated, use a circular pattern and loosen twelve wheel locknuts (2) securing rim halves (1) and (4) together. If you hear escaping air, do not proceed. Wait until the sound stops and recheck valve bore (9). When you are certain the tire (6) is fully deflated, proceed to remove wheel locknuts (2). Discard locknuts (2).
4. Remove outer rim half (1) from tire (6).

NOTE

Perform steps 5 and 6 only if damage to valve bore, insert, or O-ring is evident.

5. Remove valve bore (9) from insert (10). Remove insert (10) and locknut (12) from outer rim (1). Discard locknut (12).
6. Remove O-ring (11) from insert (10). Discard O-ring (11).
7. Remove O-ring (5) from inner rim half (4). Cut O-ring (5) in two, to make sure it cannot be reused. Discard O-ring (5).
8. Remove tire (6) from inner rim half (4).
9. Remove balance weights (3) from rim halves (1) and (4), if present. Discard balance weights (3).
10. Remove runflat spacer (7) from tire (6).



8-4.1. BIAS TIRE, WHEEL, AND RUBBER RUNFLAT MAINTENANCE (Cont'd)

- 11. Lay tire (1) flat.

WARNING

Do not use runflat compressor if compressor strap is frayed or damaged. Inspect the tool's pivot points and bearings and ensure runflat is free of grease and runflat compressor strap is centered around runflat. Failure to do so could cause injury to personnel.

NOTE

- Perform steps 10 and 11 when using runflat compressor P/N J39250.
- Perform steps 12 and 13 when using runflat compressor P/N 528236.

- 12. Position runflat compressor (3) on runflat (2) so that runflat compressor hex drive (4) is facing up and strap (5) is centered around runflat (2).

NOTE

Compress runflat by rotating hex drive in either direction. Rotate hex drive opposite to loosen.

- 13. Using runflat compressor (3), compress runflat (2).

- 14. Position runflat compressor (6) on an outer edge of runflat (2) with handle assembly (7) facing up and strap (8) centered around runflat (2).

NOTE

Compress runflat by rotating the handle assembly in a clockwise direction. Rotate handle assembly counterclockwise to loosen.

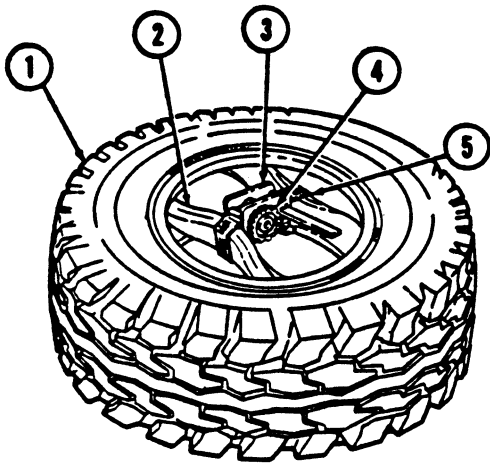
- 15. Using runflat compressor (6), compress runflat (2).

NOTE

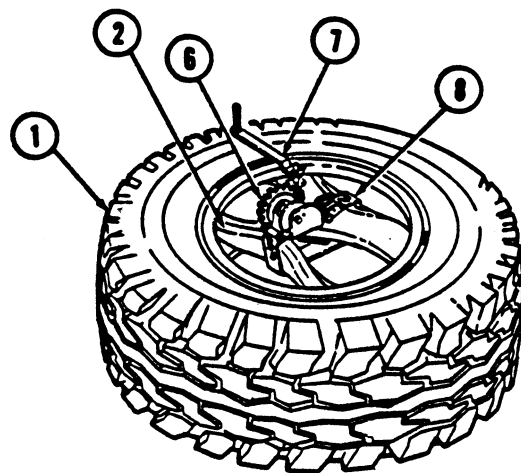
- It may be necessary to use a tire spoon and tire soap to remove runflat from tire.
- When using runflat compressor P/N 528236, handle may need to be removed before removing runflat.

- 16. Remove runflat (2) from tire (1) and remove runflat compressor (3) or (6) from runflat (2).

- 17. Remove two lubricant packets (9) and adhesive tape (10) from runflat (2) if installed. Discard lubricant packets (9) and adhesive tape (10).



RUNFLAT COMPRESSOR (P/N J39250)



RUNFLAT COMPRESSOR (P/N 528236)

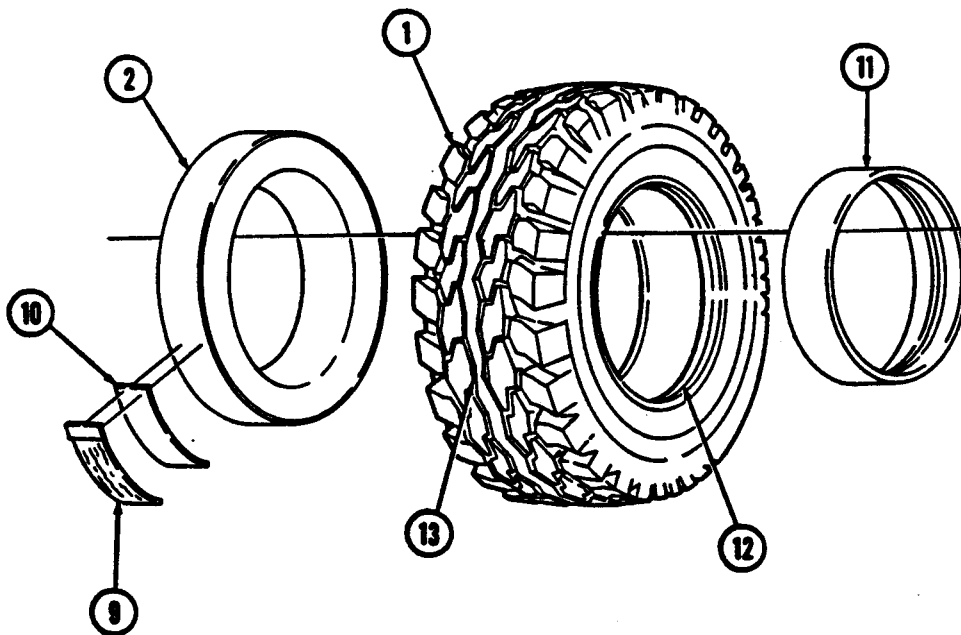
8-4.1. BIAS TIRE, WHEEL, AND RUBBER RUNFLAT MAINTENANCE (Cont'd)

b. Inspection and Cleaning

WARNING

Do not reuse a tire which has been run flat without thoroughly inspecting for damage. Failure to follow these instructions may result in injury to personnel or damage to equipment.

1. Inspect inside of tire (1) for cord or belt separation, and inner liner damage. Replace tire (1) if damaged.
2. Inspect tire bead (12) for abrasions caused from runflat (2). Replace tire (1) if damaged.
3. Check for protruding objects inside tire (1) which may not be visible from outside. Repair tire (1) if damaged.
4. Check tread depth on tire (1). Tread should not be worn below level of wear bars (13). Replace tire (1) if tread is worn below wear bars (13) or 3/32 in. (2.38 mm).
5. Inspect runflat spacer (11) for splitting, wear, or excessive chafing. Replace runflat spacer (11) if damaged.
6. Inspect runflat (2) for splitting, wear, or excessive chafing. Replace runflat (2) if damaged.



8-4.1. BIAS TIRE, WHEEL, AND RUBBER RUNFLAT MAINTENANCE (Cont'd)

WARNING

O-ringing surfaces and pressure relief grooves must be kept clean and free of rust and dirt. Failure to do so could cause the wheel assembly to separate under pressure, causing serious injury or death.

7. Using wire brush, clean studs (4). Clean all dirt and foreign material from rim halves (1) and (2) with soap and water and allow to air dry. Ensure O-ringing surfaces (5) and pressure relief grooves (3) on rim halves (1) and (2) are smooth and clean.
8. Inspect rim halves (1) and (2) for cracks, bent sealing surfaces (5), or oversized mounting holes. Replace rim halves (1) or (2) if cracked, bent, or if mounting holes are oversized.

WARNING

Never use wheel assemblies with studs which are damaged, loose, or have damaged threads. Damaged studs can cause improper assembly, which could cause individual fasteners to fail. Any of these situations could cause serious injury or death.

9. Inspect inner rim half (2) for cracked, broken, rusted, pitted, bent, or loose studs (4).
10. Inspect valve core (6) for cracks or deterioration. Replace valve core (6) if cracked or deteriorated.
11. Inspect studs (4) for damaged or deformed threads. Replace studs (4) if threads are damaged or if studs (4) are damaged or loose (para. 8-8).

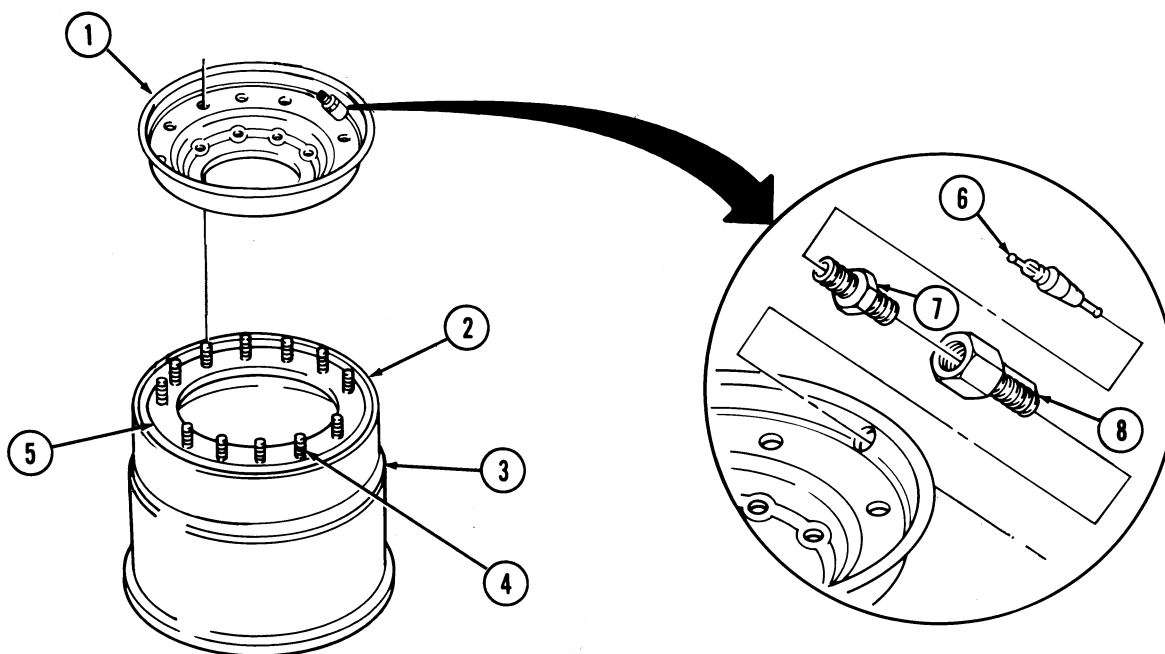
NOTE

Perform steps 11 and 12 only if valve core and insert were removed.

12. Inspect valve bore (7) for cracks or deterioration. Replace valve bore (7) if cracked or deteriorated.
13. Inspect insert (8) for damage. Replace insert (8) if damaged.

c. Repair

Refer to TM 9-2610-200-14 for maintenance and repair of tires.



8-4.1. BIAS TIRE, WHEEL, AND RUBBER RUNFLAT MAINTENANCE (Cont'd)

d. Assembly

WARNING

- Never use tubes in wheel assemblies. Use of a tube defeats built-in safety features, and could allow the wheel to come apart under pressure, resulting in serious injury or death.
- Use only replacement parts specified in TM 9-2320-280-24P. Wheels assembled with components which do not meet specifications could cause the assembly to separate under pressure, resulting in serious injury or death.
- Do not use runflat compressor if compressor strap is frayed or damaged. Ensure runflat is free of grease and runflat compressor strap is centered on runflat. Failure to do so could cause injury to personnel.
- Any oil on runflat compressor belt could result in personnel injury or damage to equipment. Wipe any oil off from belt or handle.

NOTE

Perform steps 1 and 2 when using runflat compressor P/N J39250.
Perform steps 3 and 4 when using runflat compressor P/N 528236.

1. Position runflat compressor (9) on runflat (8) so that runflat compressor hex drive (10) is facing up and strap (11) is centered around runflat (8).

NOTE

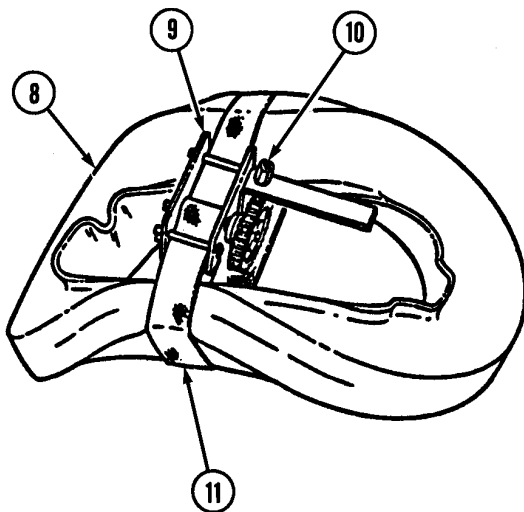
Compress runflat by rotating hex drive in either direction. Rotate hex drive opposite to loosen.

2. Using runflat compressor (9), compress runflat (8).
3. Position runflat compressor (12) on an outer edge of runflat (8) with handle assembly (13) facing up and strap (14) centered around runflat (8).

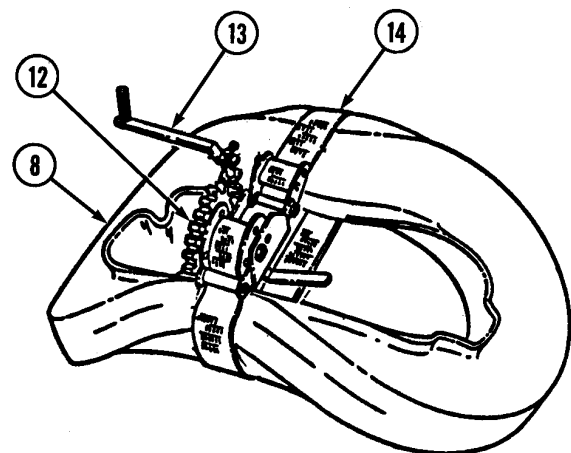
NOTE

Compress runflat by rotating the handle assembly in a clockwise direction. Rotate handle assembly counterclockwise to loosen.

4. Using runflat compressor (12), compress runflat (8).



RUNFLAT COMPRESSOR (P/N J39250)



RUNFLAT COMPRESSOR (P/N 528236)

8-4.1. BIAS TIRE, WHEEL, AND RUBBER RUNFLAT MAINTENANCE (Cont'd)

5. Stand tire (1) up and lubricate tire bead (3) with tire soap.

NOTE

It may be necessary to remove the handle assembly on runflat compressor P/N 528236 before inserting runflat into tire.

6. Insert runflat (2), compressor side first, as far as possible into tire (1).
7. Lay tire (1) flat on protruding runflat side. Loosen compressor (4). Runflat (2) should insert itself inside tire (1). If not, repeat steps 5 through 7 and/or use a tire spoon to assist in installation.

NOTE

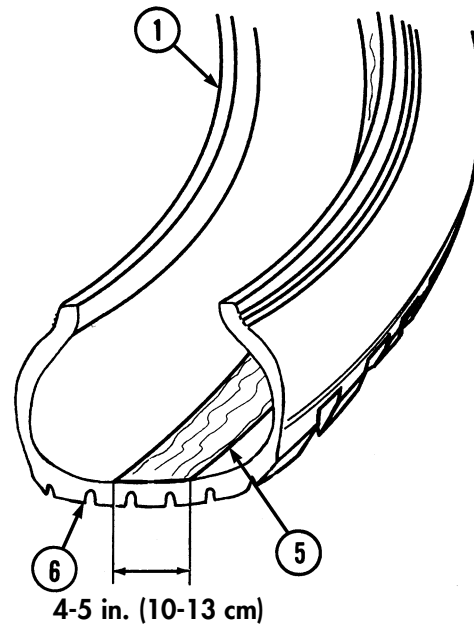
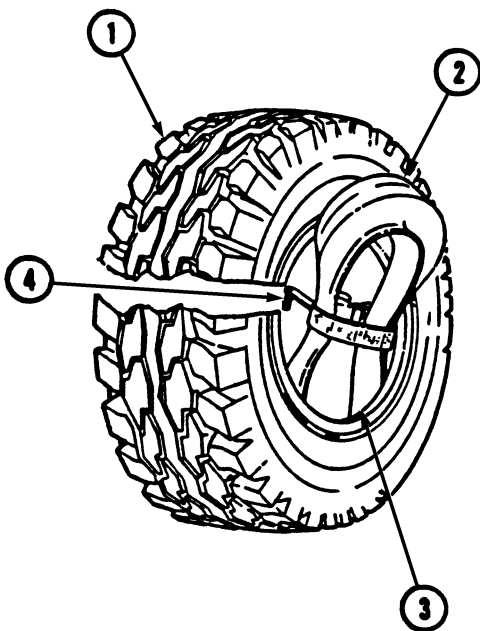
If required, clean and lubricate bearing assembly on runflat compressor P/N 528236 after removal.

8. Loosen runflat compressor (4) and remove from tire (1).
9. Apply one 11-ounce tube of gel lubricant (5) around inside of tire (1) at crown area (6).
10. Evenly spread gel lubricant (5) 4-5 in. (10-13 cm) wide on the tire crown (6).

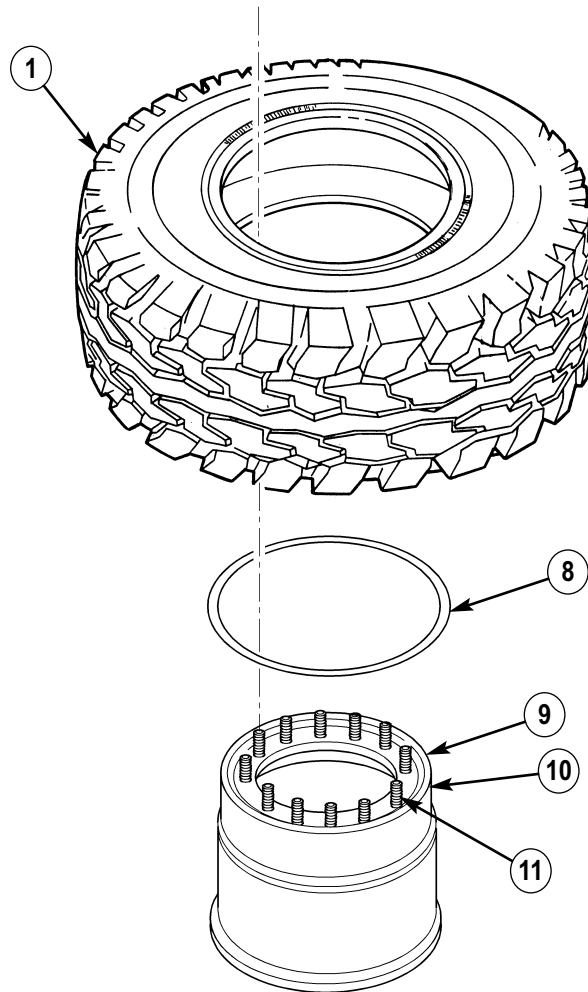
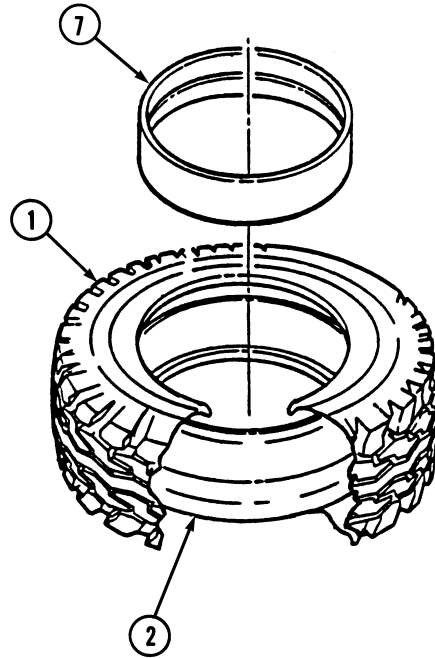
NOTE

- Ensure longer lip of runflat faces inner rim of tire.
- Ensure runflat spacer butts up against flat side of runflat.

11. Install runflat spacer (7) inside tire (1) and position on valve side of tire (1).
12. Lubricate O-ring (8) with tire soap and install O-ring (8) in groove (10) on top of inner rim (9), around studs (11). Ensure O-ring (8) is not twisted and that it is uniformly positioned in groove (10). Do not overstretch O-ring (8).
13. Lubricate tire bead (3) and rim bead seat areas with tire soap.



8-4.1. BIAS TIRE, WHEEL, AND RUBBER RUNFLAT MAINTENANCE (Cont'd)



8-4.1. BIAS TIRE, WHEEL, AND RUBBER RUNFLAT MAINTENANCE (Cont'd)

WARNING

Never intermix bias and radial rim assemblies. Damage to equipment may result causing injury to personnel.

NOTE

Before installing tire on inner rim half, inspect tire sidewalls for a "paint dot". Paint dots are often painted on tires to indicate the tire's light spot, for balancing purposes. If paint dot is present, position tire on rim halves so that paint dot is aligned with insert hole on outer rim half.

14. Center runflat (6) and runflat spacer (5) in tire (1). Carefully lower tire (1) over inner rim half (8). Check to ensure O-ring (7) has not been disturbed.
15. Ensure runflat (6) and runflat spacer (5) are not binding on flat portion of inner rim half (8). Runflat (6) and runflat spacer (5) should clear inner rim half (8).
16. Install valve core (9) in valve bore (10).

NOTE

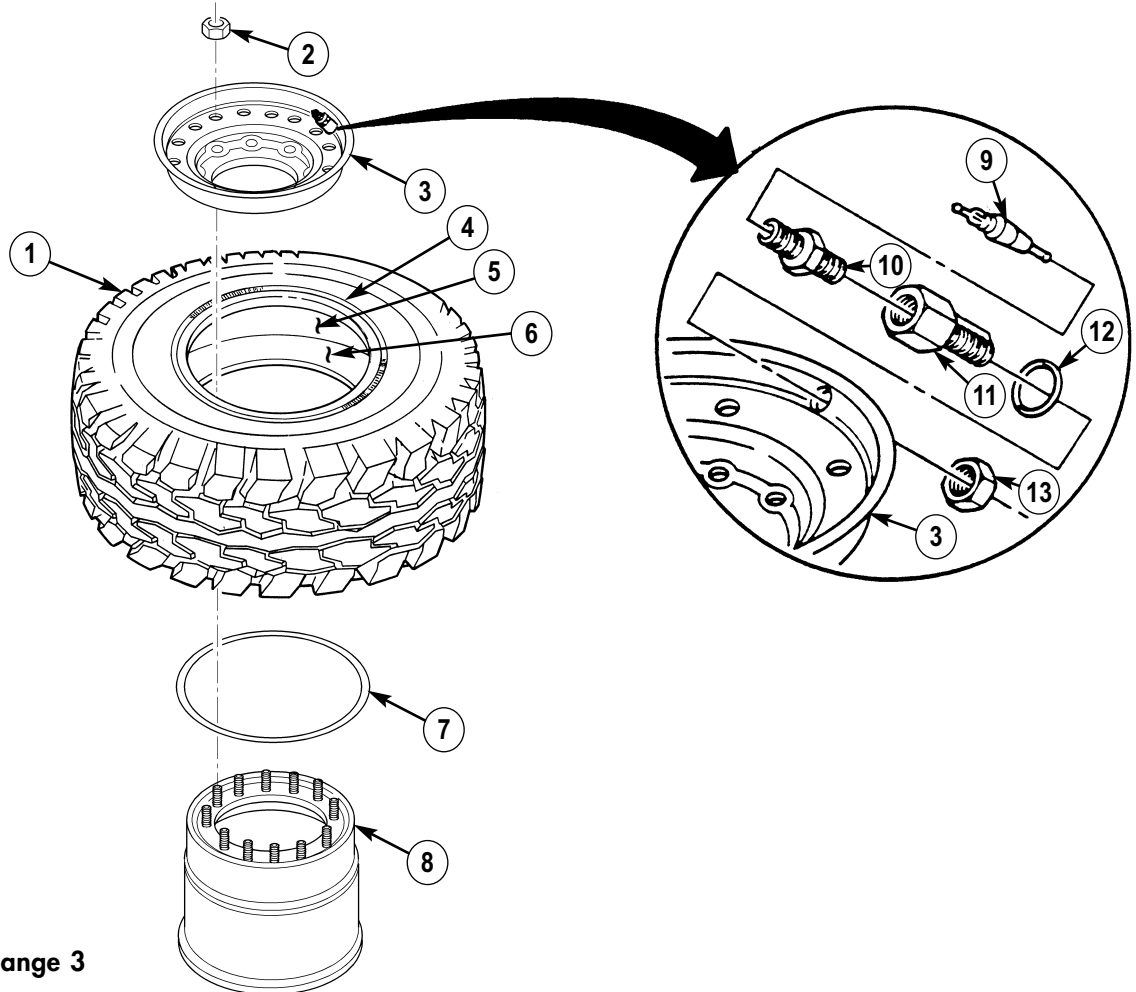
Perform step 17 only if valve bore and insert were removed.

17. Install insert (11), O-ring (12), and locknut (13) on outer rim (3). Apply sealing compound to valve bore (10) and install valve bore (10) on insert (11). Tighten locknut (13) to 40-60 lb-in. (5-7 N·m). Tighten valve bore (10) to 25-30 lb-ft (34-41 N·m).
18. Install outer rim half (3) on inner rim half (8).

CAUTION

Tighten locknuts gradually to avoid bent and broken studs, or damage to wheel components.

19. Install outer rim half (3) to inner rim half (8) with twelve locknuts (2).

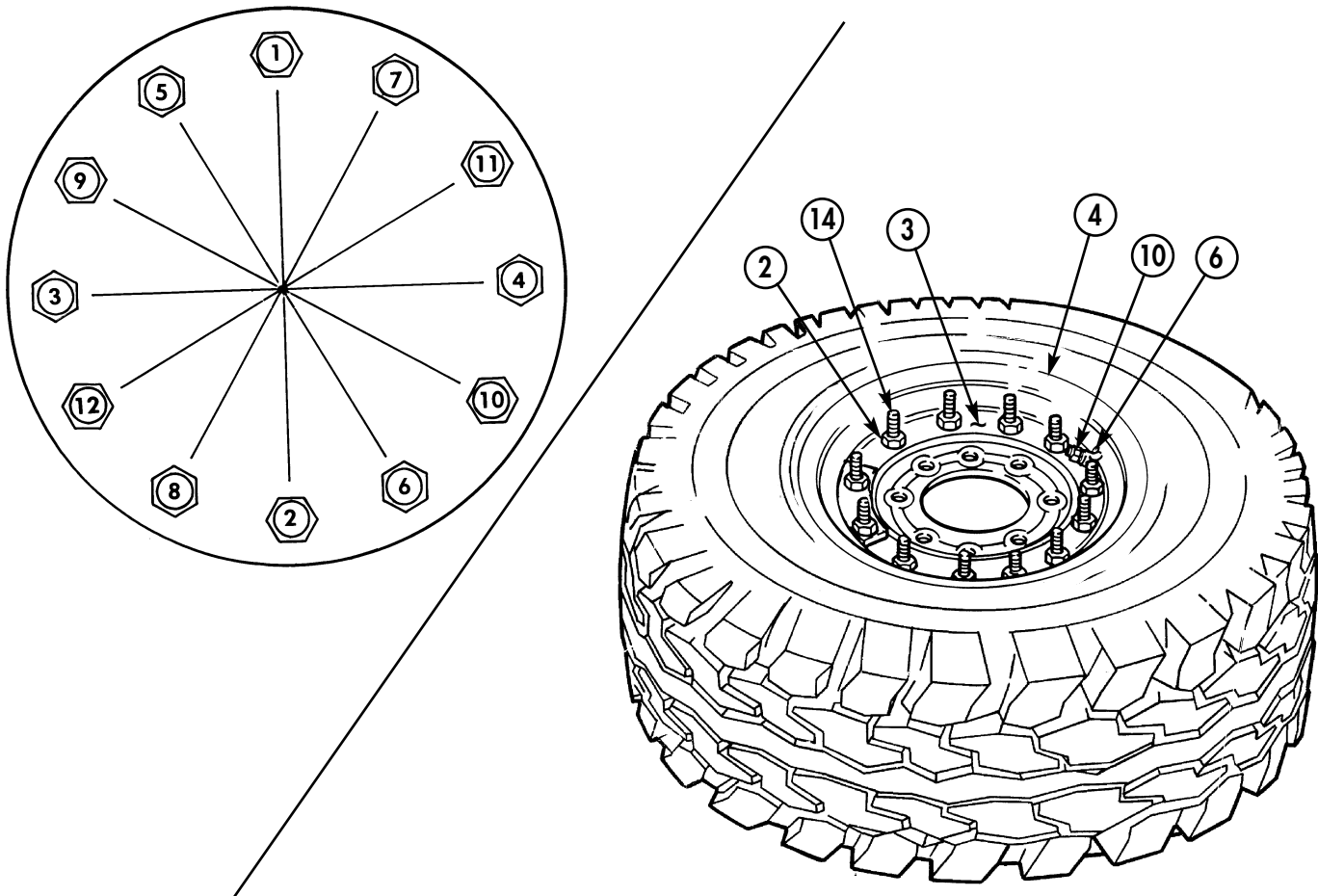


8-4.1. BIAS TIRE, WHEEL, AND RUBBER RUNFLAT MAINTENANCE (Cont'd)

20. Tighten locknuts (2) to 85 lb-ft (115 N·m) in tightening sequence shown.
21. Tighten locknuts (2) to 125 lb-ft (170 N·m) in tightening sequence shown.
22. Check wheel assembly for gaps at each stud (14). Use a 0.0015 in. (0.038 mm) thickness gauge to detect gaps. If gaps are detected, disassemble and reassemble wheel assembly and recheck for gaps. If gaps are still detected, replace outer rim half (3).

WARNING

- Never inflate a wheel assembly without having checked wheel locknut torques to ensure the wheel locknuts are tightened to specifications. An assembly with improperly tightened locknuts could separate under pressure, resulting in serious injury or death.
 - Always use a tire inflation cage for inflation purposes. Stand on one side of the cage, during inflation, never directly in front. Keep hands out of the cage during inflation. Inflate assembly to recommended pressure, using a clip-on air chuck. Do not exceed 50 psi (345 kPa) cold inflation pressure. Failure to follow these instructions may result in serious injury or death.
23. Place assembly in safety cage and inflate front and rear tires to recommended tire pressure (TM 9-2320-280-10).
 24. Check for leaks around rim edges (4), insert (6), and valve bore (10) with soapy solution.



FOLLOW-ON TASK: Balance tire (para. 8-9).

8-5. RADIAL TIRE, WHEEL, AND RUBBER RUNFLAT MAINTENANCE (ALL EXCEPT M1123 AND "A2" VEHICLES)

This task covers:

- | | |
|---|-------------------------------------|
| <p>a. Disassembly</p> <p>b. Inspection and Cleaning</p> | <p>c. Repair</p> <p>d. Assembly</p> |
|---|-------------------------------------|

INITIAL SETUP:

Tools

General mechanic's tool kit:
 automotive, (Appendix B, Item 1)
 General mechanic's tool kit:
 automotive, common No. 2
 (Appendix B, Item 4)

Special Tools

Runflat compressor (Appendix B, Item 131)
 Torque adapter, 9/16 in. (Appendix B, Item 144)
 Socket adapter (Appendix B, Item 146)

Materials/Parts

Lubricant (Appendix G, Item 196)
 Twelve locknuts (Appendix G, Item 115)
 Locknut (Appendix G, Item 82)
 O-ring (Appendix G, Item 217)
 O-ring (Appendix G, Item 219)
 Detergent (Appendix C, Item 17)
 Sealing compound, if required
 (Appendix C, Item 44)
 Lubricating oil (Appendix C, Item 33)

Manual References

TM 9-2320-280-10
 TM 9-2320-280-24P
 TM 9-2610-200-14

Equipment Condition

Wheel removed (para. 8-3).

General Safety Instructions

- Do not use tire machine.
- Ensure tire is totally deflated before removing wheel locknuts.
- Never use tubes in wheel assemblies.
- Rim surfaces must be kept clean and free of rust and dirt.
- Never use wheel assemblies with damaged studs.
- Never inflate a wheel assembly with the wheel locknuts removed.
- Never inflate a wheel assembly without first checking wheel locknut torques.
- Do not exceed recommended tire inflation pressure.
- Always use a tire inflation cage and a clip-on air chuck for tire inflation.
- Ensure runflat compressor strap is centered around runflat.
- Never install radial tire on eight bolt wheel.
- Do not mix radial and bias tires.
- Ensure that during assembly indexing hole on inner and outer rim halves is aligned.

WARNING

Do not use tire machine. Injury to personnel or damage to equipment may result.

NOTE

The following maintenance procedure applies to vehicles using load range "D" tires and one-piece rubber runflats. Refer to paras. 8-4 and 8-4.1 for maintenance instructions on bias tires and magnesium runflats.

a. Disassembly

1. Place wheel assembly in a tire inflation cage.

WARNING

In all disassembly operations, ensure the tire is totally deflated before removing wheel locknuts. Failure to follow proper safety precautions could cause serious injury or death.

2. Remove valve core (8) from valve bore (9) and deflate tire (6). Run a piece of wire through valve bore (9) to make sure it is not plugged.
3. When tire (6) is fully deflated, use a circular pattern and loosen twelve wheel locknuts (2) securing rim halves (1) and (4) together. If you hear escaping air, do not proceed. Wait until the sound stops and recheck valve bore (9). When you are certain the tire (6) is fully deflated, proceed to remove wheel locknuts (2). Discard locknuts (2).

8-5. RADIAL TIRE, WHEEL, AND RUBBER RUNFLAT MAINTENANCE (ALL EXCEPT M1123 AND "A2" VEHICLES) (Cont'd)

WARNING

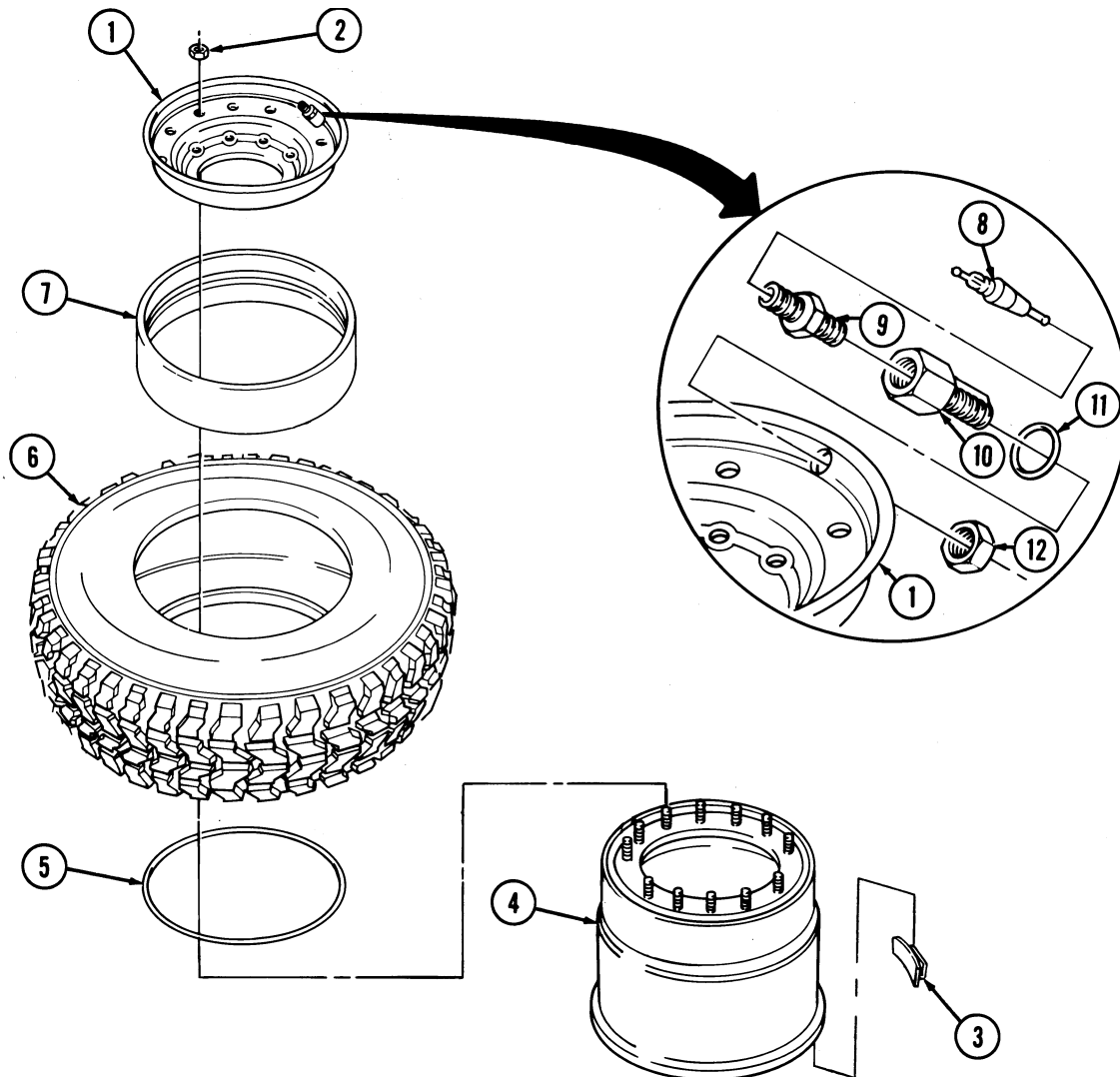
Never inflate a wheel assembly with the wheel locknuts removed in an attempt to separate inner and outer rim halves. The assembly will separate under pressure resulting in serious injury or death.

4. Remove outer rim half (1) from tire (6).

NOTE

Perform steps 5 and 6 only if damage to valve bore, insert, or O-ring is evident.

5. Remove valve bore (9) from insert (10). Remove insert (10) and locknut (12) from outer rim (1). Discard locknut (12).
6. Remove O-ring (11) from insert (10). Discard O-ring (11).
7. Remove O-ring (5) from inner rim half (4). Cut O-ring (5) in two, to make sure it cannot be reused. Discard O-ring (5).
8. Remove tire (6) from inner rim half (4).
9. Remove balance weights (3) from rim halves (1) and (4), if present. Discard balance weights (3).
10. Remove runflat spacer (7) from tire (6).



8-5. RADIAL TIRE, WHEEL, AND RUBBER RUNFLAT MAINTENANCE (ALL EXCEPT M1123 AND "A2" VEHICLES) (Cont'd)

11. Lay tire (1) flat.

WARNING

- Do not use runflat compressor if compressor strap is frayed or damaged. Inspect the tool's pivot points and bearings and ensure runflat is free of grease and runflat compressor strap is centered around runflat. Failure to do so could cause injury to personnel.
- Any oil on runflat compressor belt or handle could result in personnel injury or damage to equipment. Wipe any oil off from belt or handle.

NOTE

Perform steps 12 and 13 when using runflat compressor P/N J39250.
Perform steps 14 and 15 when using runflat compressor P/N 528236.

11.1. Make sure gears and pivot points on runflat compressor (3) or (6) have a light coat of oil to ensure ease of operation and prevent from rust.

12. Position runflat compressor (3) on runflat (2) so that runflat compressor hex drive (4) is facing up and strap (5) is centered around runflat (2).

NOTE

Compress runflat by rotating hex drive in either direction. Rotate hex drive opposite to loosen.

13. Using runflat compressor (3), compress runflat (2).

14. Position runflat compressor (6) on an outer edge of runflat (2) with handle assembly (7) facing up and strap (8) centered around runflat (2).

NOTE

Compress runflat by rotating the handle assembly in a clockwise direction. Rotate handle assembly counterclockwise to loosen.

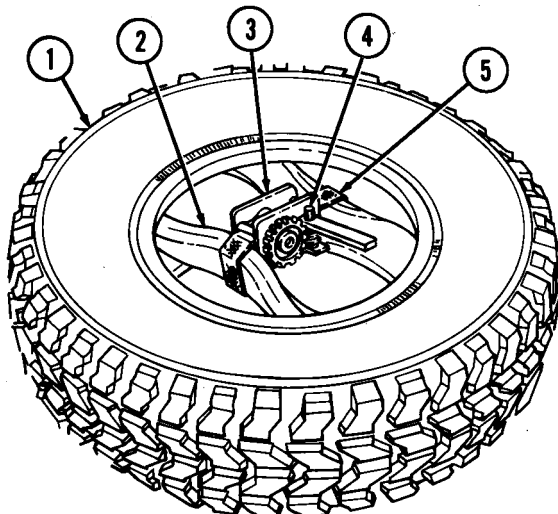
15. Using runflat compressor (6), compress runflat (2).

NOTE

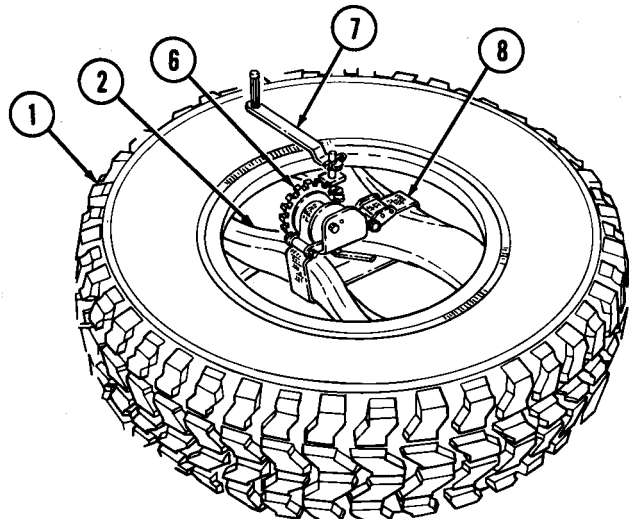
- It may be necessary to use a tire spoon and tire soap to remove runflat from tire.
- When using runflat compressor P/N 528236, handle may need to be removed before removing runflat.

16. Remove runflat (2) from tire (1) and remove runflat compressor (3) or (6) from runflat (2).

17. Remove two lubricant packets (9) and adhesive tape (10) from runflat (2) if installed.



RUNFLAT COMPRESSOR (P/N J39250)



RUNFLAT COMPRESSOR (P/N 528236)

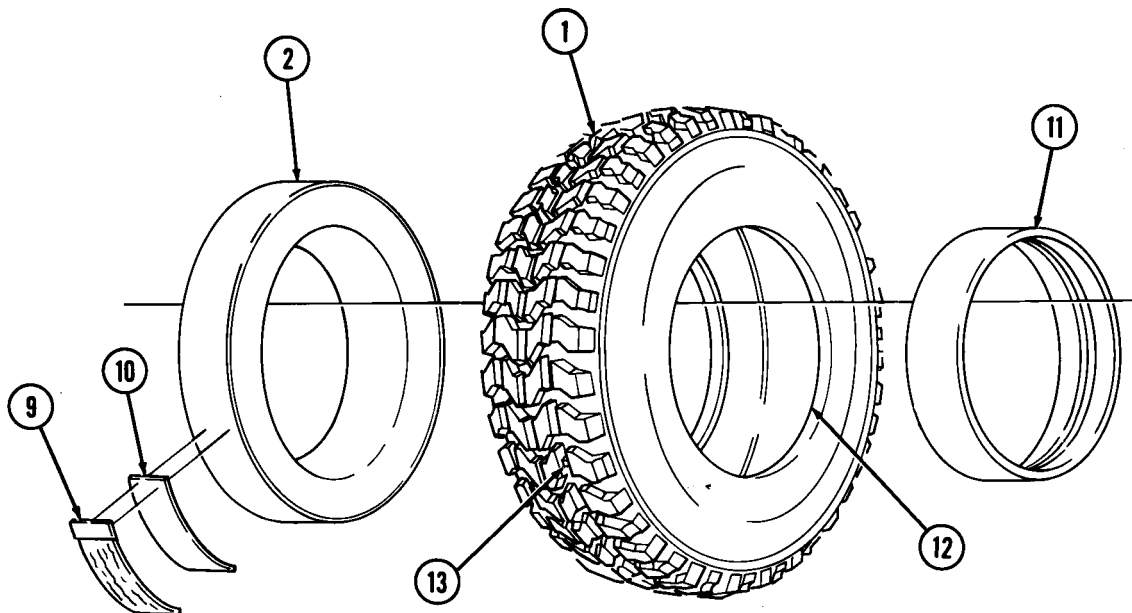
8-5. RADIAL TIRE, WHEEL, AND RUBBER RUNFLAT MAINTENANCE (ALL EXCEPT M1123 AND "A2" VEHICLES) (Cont'd)

b. Inspection and Cleaning

WARNING

Do not reuse a tire which has been run flat without thoroughly inspecting for damage. Failure to follow these instructions may result in injury to personnel or damage to equipment.

1. Inspect inside of tire (1) for cord or belt separation, and inner liner damage. Replace tire (1) if damaged.
2. Inspect tire bead (12) for abrasions caused from runflat (2). Replace tire (1) if damaged.
3. Check for protruding objects inside tire (1) which may not be visible from outside. Repair tire (1) if damaged.
4. Check tread depth on tire (1). Tread should not be worn below level of wear bars (13). Replace tire (1) if tread is worn below wear bars (13) or 3/32 in. (2.38 mm).
5. Inspect runflat spacer (11) for splitting, wear, or excessive chafing. Replace runflat spacer (11) if damaged.
6. Clean all grease, dirt, and foreign material from the runflat (2) with soap and water and allow to air dry. Inspect runflat (2) for splitting, wear, or excessive chafing. Replace runflat (2) if damaged.



8-5. RADIAL TIRE, WHEEL, AND RUBBER RUNFLAT MAINTENANCE (ALL EXCEPT M1123 AND "A2" VEHICLES) (Cont'd)

WARNING

O-ring sealing surfaces and pressure relief grooves must be kept clean and free of rust and dirt. Failure to do so could cause the wheel assembly to separate under pressure, causing serious injury or death.

7. Using wire brush, clean studs (4). Clean all dirt and foreign material from rim halves (1) and (2) with soap and water and allow to air dry. Ensure O-ring sealing surfaces (5) and pressure relief grooves (3) on rim halves (1) and (2) are smooth and clean.
8. Inspect rim halves (1) and (2) for cracks, bent sealing surfaces (5), or oversized mounting holes. Replace rim halves (1) or (2) if cracked, bent, or if mounting holes are oversized.

WARNING

Never use wheel assemblies with studs which are damaged, loose, or have damaged threads. Damaged studs can cause improper assembly, which could cause individual fasteners to fail. Any of these situations could cause serious injury or death.

9. Inspect inner rim half (2) for cracked, broken, rusted, pitted, bent, or loose studs (4).
10. Inspect valve core (6) for cracks or deterioration. Replace valve core (6) if cracked or deteriorated.
- 10.1. Inspect studs (4) for damaged or deformed threads. Replace studs (4) if threads are damaged or if studs (4) are damaged or loose (para. 8-8).

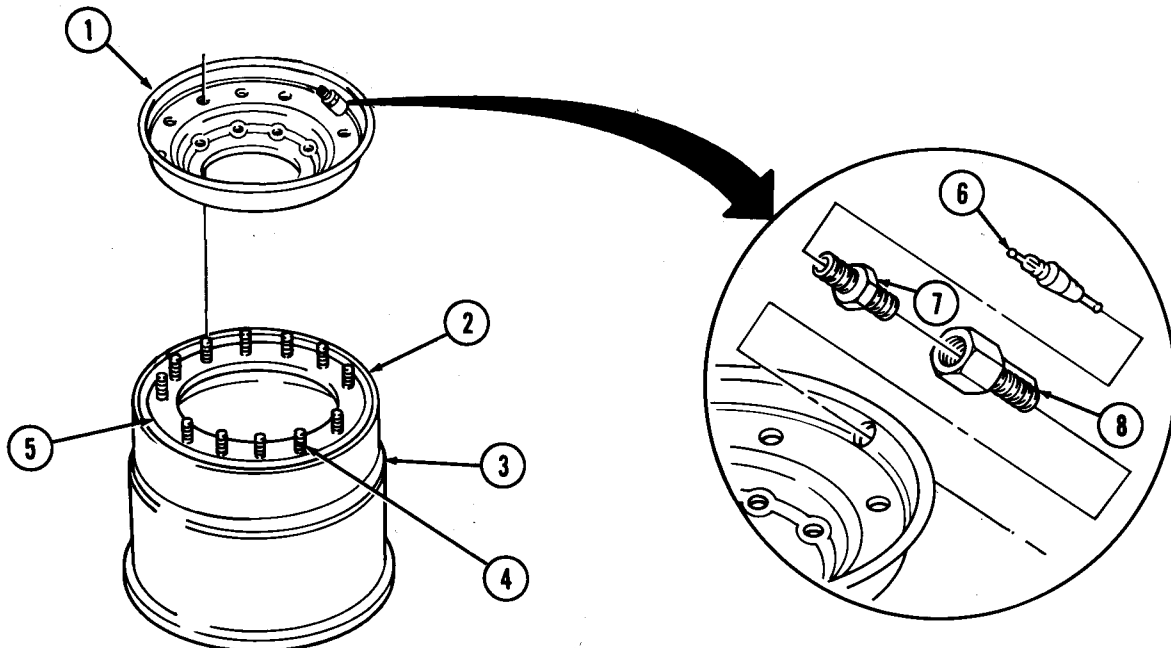
NOTE

Perform steps 11 and 12 only if valve core and insert were removed.

11. Inspect valve bore (7) for cracks or deterioration. Replace valve bore (7) if cracked or deteriorated.
12. Inspect insert (8) for damage. Replace insert (8) if damaged.

c. Repair

Refer to TM 9-2610-200-14 for maintenance and repair of tires.



8-5. RADIAL TIRE, WHEEL, AND RUBBER RUNFLAT MAINTENANCE (ALL EXCEPT M1123 AND "A2" VEHICLES) (Cont'd)

d. Assembly

WARNING

- Never use tubes in wheel assemblies. Use of a tube defeats built-in safety features, and could allow the wheel to come apart under pressure, resulting in serious injury or death.
- Use only replacement parts specified in TM 9-2320-280-24P for radial tires. Never install radial tire components on eight bolt rims. Wheels assembled with components not specified for radial tires could cause the assembly to separate under pressure, resulting in serious injury or death.
- Radial and bias tires should not be mixed on the same vehicle. Injury to personnel or damage to equipment may result.
- Do not use if compressor strap is frayed or damaged. Ensure runflat is free of grease and runflat compressor strap is centered on runflat. Failure to do so could cause injury to personnel.
- Any oil on runflat compressor belt or handle could result in personnel injury or damage to equipment. Wipe any oil off from belt or handle.

NOTE

Perform steps 1 and 2 when using runflat compressor P/N J39250.
Perform steps 3 and 4 when using runflat compressor P/N 528236.

1. Make sure gears and pivot points on runflat compressor (10) or (13) have a light coat of oil to ensure ease of operation and prevent from rust.
- 1.1. Position runflat compressor (10) on runflat (9) so that runflat compressor hex drive (11) is facing up and strap (12) is centered around runflat (9).

NOTE

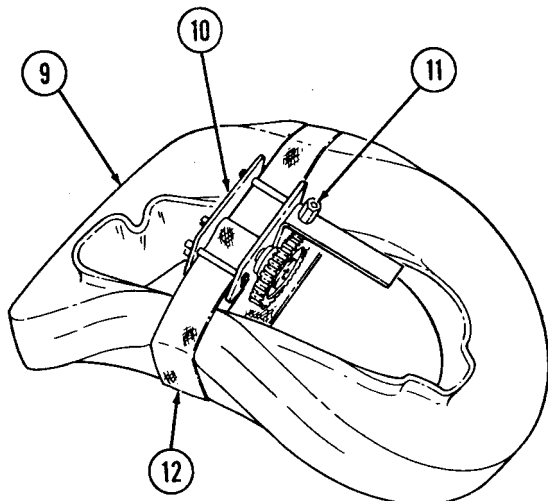
Compress runflat by rotating hex drive in either direction. Rotate hex drive opposite to loosen.

2. Using runflat compressor (10), compress runflat (9).
3. Position runflat compressor (13) on an outer edge of runflat (9) with handle assembly (14) facing up and strap (15) centered around runflat (9).

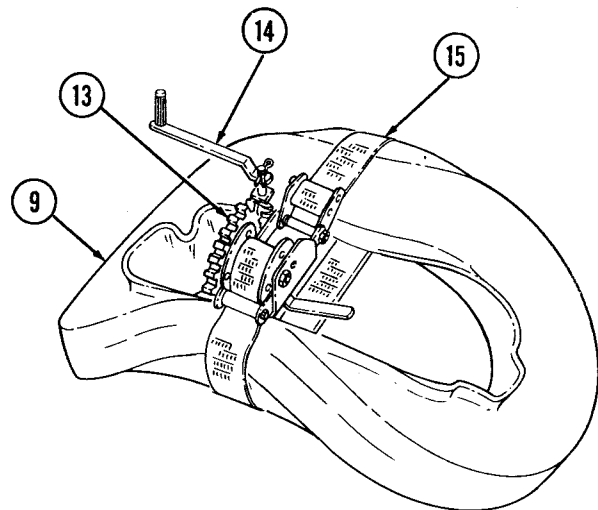
NOTE

Compress runflat by rotating the handle assembly in a clockwise direction. Rotate handle assembly counterclockwise to loosen.

4. Using runflat compressor (13), compress runflat (9).



RUNFLAT COMPRESSOR (P/N J39250)



RUNFLAT COMPRESSOR (P/N 528236)

8-5. RADIAL TIRE, WHEEL, AND RUBBER RUNFLAT MAINTENANCE (ALL EXCEPT M1123 AND "A2" VEHICLES) (Cont'd)

NOTE

The radial tire is a bidirectional tire and the tread may be positioned in either direction.

5. Stand tire (1) up and lubricate tire bead (3) with tire soap.

NOTE

It may be necessary to remove the handle assembly on runflat compressor (P/N 528236) before inserting runflat into tire.

6. Insert runflat (2), compressor side first, as far as possible into tire (1).
7. Lay tire (1) flat on protruding runflat side. Loosen compressor (4). Runflat (2) should insert itself inside tire (1). If not, repeat steps 5 through 7 and/or use a tire spoon to assist in installation.

NOTE

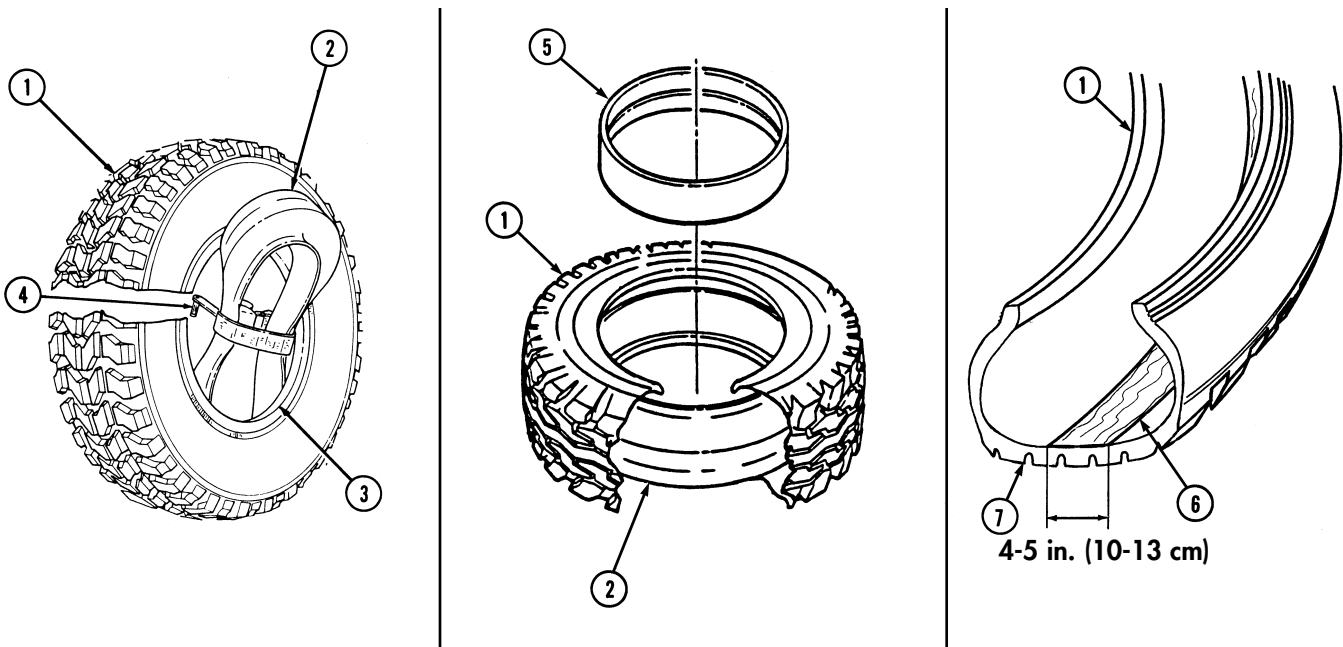
If required, clean and lubricate bearing assembly on runflat compressor P/N 528236 after removal.

8. Loosen runflat compressor (4) and remove from tire (1).
9. Apply one 11-ounce tube of gel lubricant (6) around inside of tire (1) at crown area (7).
10. Evenly spread gel lubricant (6) 4-5 in. (10-13 cm) wide on tire crown (7).

NOTE

- Ensure longer lip of runflat faces inner rim of tire.
- Ensure square cut edge of runflat spacer butts up against flat side of runflat.

11. Install flat spacer (5) inside tire (1) and position on valve side of tire (1).
12. Lubricate O-ring (10) with tire soap. Install O-ring (10) in groove (11.1) on top of inner rim (11), around studs (12). Ensure O-ring (10) is not twisted and that it is uniformly positioned in groove (11.1). Do not overstretch O-ring (10).
13. Lubricate tire bead (3) and rim bead seat areas with tire soap.



8-5. RADIAL TIRE, WHEEL, AND RUBBER RUNFLAT MAINTENANCE (ALL EXCEPT M1123 AND "A2" VEHICLES) (Cont'd)

WARNING

- Never install radial tire on eight bolt wheel. Damage to equipment may result causing injury to personnel.
- Ensure that during assembly indexing hole on inner and outer rim halves is aligned. Failure to do so may cause damage to equipment or injury to personnel.

NOTE

Before installing tire on inner rim half, inspect tire sidewalls for a "paint dot". Paint dots are often painted on tires to indicate the tire's light spot, for balancing purposes. If paint dot is present, position tire on rim halves so that paint dot is aligned with insert hole on outer rim half.

- Center runflat (2) and runflat spacer (5) in tire (1). Carefully lower tire (1) over inner rim half (11). Check to ensure O-ring (10) has not been disturbed.
- Ensure runflat (2) and runflat spacer (5) are not binding on flat portion of inner rim half (11). Runflat (2) and runflat spacer (5) should clear inner rim half (11).
- Install valve core (13) in valve bore (14).

NOTE

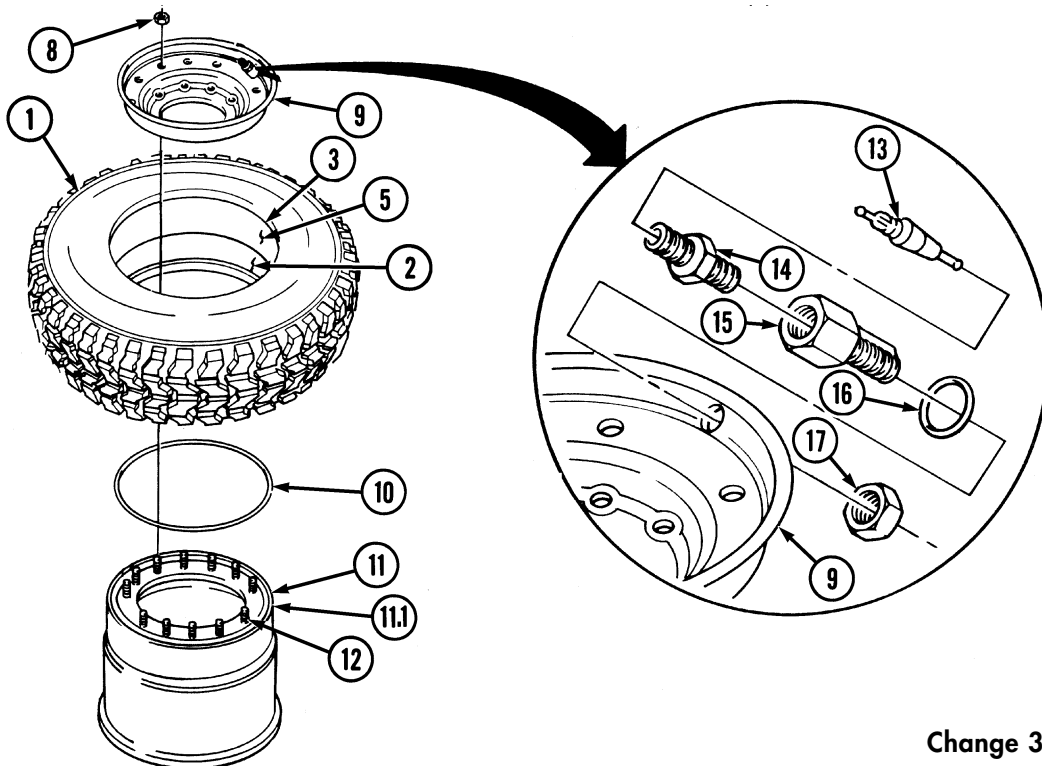
Perform step 17 only if valve bore and insert were removed.

- Install insert (15), O-ring (16), and locknut (17) on outer rim (9). Apply sealing compound to valve bore (14) and install valve bore (14) on insert (15). Tighten locknut (17) to 40-60 lb-in. (5-7 N•m). Tighten valve bore (14) to 25-30 lb-ft (34-41 N•m).
- Install outer rim half (9) on inner rim half (11).

CAUTION

Tighten locknuts gradually to avoid bent and broken studs, or damage to wheel components.

- Install outer rim half (9) to inner rim half (11) with twelve locknuts (8).



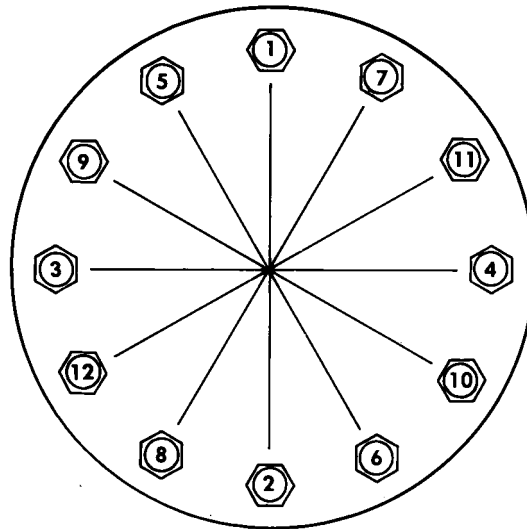
8-5. RADIAL TIRE, WHEEL, AND RUBBER RUNFLAT MAINTENANCE (ALL EXCEPT M1123 AND "A2" VEHICLES) (Cont'd)

20. Tighten locknuts (1) to 85 lb-ft (115 N·m) in tightening sequence shown.
21. Tighten locknuts (1) to 125 lb-ft (170 N·m) in tightening sequence shown.
22. Check wheel assembly for gaps at each stud (2). Use a 0.0015 in. (0.038 mm) thickness gauge to detect gaps. If gaps are detected, disassemble and reassemble wheel assembly and recheck for gaps. If gaps are still detected, replace outer rim half (3).

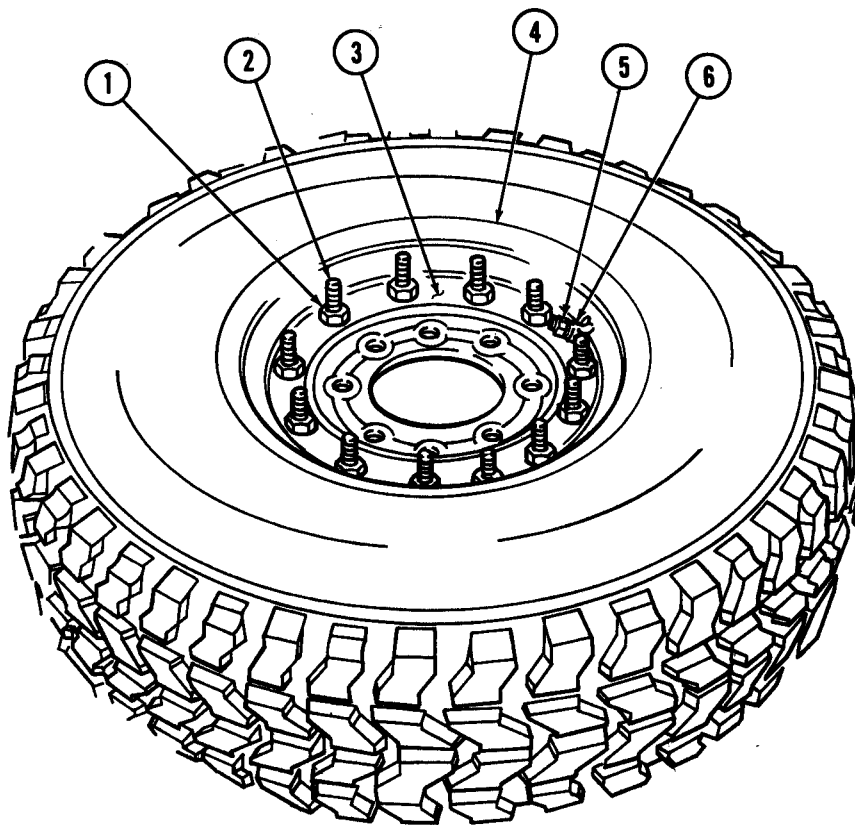
WARNING

- Never inflate a wheel assembly without having checked wheel locknut torques to ensure the wheel locknuts are tightened to specifications. An assembly with improperly tightened locknuts could separate under pressure, resulting in serious injury or death.
 - Always use a tire inflation cage for inflation purposes. Stand on one side of the cage, during inflation, never directly in front. Keep hands out of the cage during inflation. Inflate assembly to recommended pressure, using a clip-on air chuck. Do not exceed 50 psi (345 kPa) cold inflation pressure. Failure to follow these instructions may result in serious injury or death.
23. Place assembly in safety cage and inflate front and rear tires to recommended tire pressure (TM 9-2320-280-10).
 24. Check for leaks around rim edges (4), insert (6), and valve bore (5) with soapy solution.

TIGHTENING SEQUENCE



8-5. RADIAL TIRE, WHEEL, AND RUBBER RUNFLAT MAINTENANCE (ALL EXCEPT M1123 AND "A2" VEHICLES) (Cont'd)



FOLLOW-ON TASK: Balance tire (para. 8-9).

8-5.1. RADIAL TIRE, WHEEL, AND RUBBER RUNFLAT MAINTENANCE (M1123 AND "A2" VEHICLES)

This task covers:

- | | |
|--|--|
| <ul style="list-style-type: none"> a. Disassembly b. Inspection and Cleaning | <ul style="list-style-type: none"> c. Repair d. Assembly |
|--|--|

INITIAL SETUP:

Tools

General mechanic's tool kit:
 automotive, common No. 2
 (Appendix B, Items 1 and 4)

Special Tools

Runflat compressor (Appendix B, Item 131)
 Torque adapter, 9/16 in. (Appendix B, Item 144)
 Socket adapter (Appendix B, Item 146)

Materials/Parts

Lubricant (Appendix C, Item 196)
 Twelve locknuts (Appendix G, Item 115)
 Locknut (Appendix G, Item 82)
 O-ring (Appendix G, Item 217)
 O-ring (Appendix G, Item 219)
 Detergent (Appendix C, Item 17)
 Sealing compound, if required
 (Appendix C, Item 44)

Manual References

TM 9-2320-280-10
 TM 9-2320-280-24P
 TM 9-2610-200-14

Equipment Condition

Wheel removed (para. 8-3).

General Safety Instructions

- Do not use tire machine.
- Ensure tire is totally deflated before removing wheel locknuts.
- Never use tubes in wheel assemblies.
- Rim surfaces must be kept clean and free of rust and dirt.
- Never use wheel assemblies with damaged studs.
- Never inflate a wheel assembly with the wheel locknuts removed.
- Never inflate a wheel assembly without first checking wheel locknut torques.
- Do not exceed recommended tire inflation pressure.
- Always use a tire inflation cage and a clip-on air chuck for tire inflation.
- Ensure runflat compressor strap is centered around runflat.
- Never install radial tire on eight bolt wheel.
- Do not mix radial and bias tires.

WARNING

Do not use tire machine. Injury to personnel or damage to equipment may result.

NOTE

The following maintenance procedure applies to vehicles using load range "D" tires and one-piece rubber runflats. Refer to paras. 8-4 and 8-4.1 for maintenance instructions on bias tires and magnesium runflats.

a. Disassembly

1. Place wheel assembly in a tire inflation cage.

WARNING

In all disassembly operations, ensure the tire is totally deflated before removing wheel locknuts. Failure to follow proper safety precautions could cause serious injury or death.

2. Remove valve core (8) from valve bore (7) and deflate tire (6). Run a piece of wire through valve bore (7) to make sure it is not plugged.
3. When tire (6) is fully deflated, use a circular pattern and loosen twelve wheel locknuts (2) securing rim halves (1) and (4) together. If you hear escaping air, do not proceed. Wait until the sound stops and recheck valve bore (7). When you are certain the tire (6) is fully deflated, proceed to remove wheel locknuts (2). Discard locknuts (2).

8-5.1. RADIAL TIRE, WHEEL, AND RUBBER RUNFLAT MAINTENANCE (M1123 AND "A2" VEHICLES) (Cont'd)

WARNING

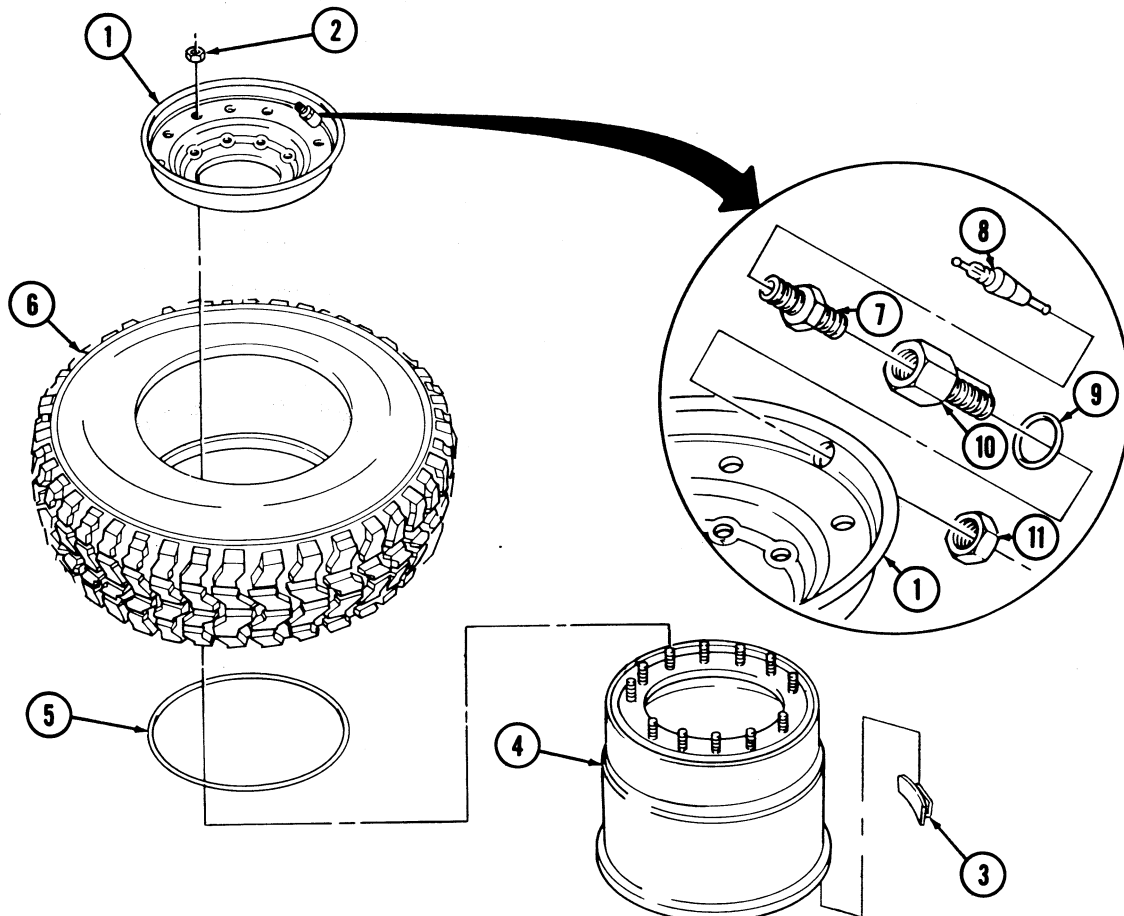
Never inflate a wheel assembly with the wheel locknuts removed in an attempt to separate inner and outer rim halves. The assembly will separate under pressure resulting in serious injury or death.

4. Remove outer rim half (1) from tire (6).

NOTE

Perform steps 5 and 6 only if damage to valve bore, insert, or O-ring is evident.

5. Remove valve bore (7) from insert (10). Remove insert (10) and locknut (11) from outer rim (1). Discard locknut (11).
6. Remove O-ring (9) from insert (10). Discard O-ring (9).
7. Remove O-ring (5) from inner rim half (4). Cut O-ring (5) in two, to make sure it cannot be reused. Discard O-ring (5).
8. Remove tire (6) from inner rim half (4).
9. Remove balance weights (3) from rim halves (1) and (4), if present. Discard balance weights (3).



8-5.1. RADIAL TIRE, WHEEL, AND RUBBER RUNFLAT MAINTENANCE (M1123 AND "A2" VEHICLES) (Cont'd)

10. Lay tire (1) flat.

WARNING

- Do not use runflat compressor if compressor strap is frayed or damaged. Inspect tool's pivot points and bearings and ensure runflat is free of grease and runflat compressor strap is centered around runflat. Failure to do so could cause injury to personnel.
- Any oil on runflat compressor belt or handle could result in personnel injury or damage to equipment. Wipe any oil off from belt or handle.

NOTE

Perform steps 11 and 12 when using runflat compressor P/N J39250.
Perform steps 13 and 14 when using runflat compressor P/N 528236.

10.1. Make sure gear and pivot points on runflat compressor (6) or (3) have a light coat of oil to ensure ease of operation and protect from rust.

11. Position runflat compressor (3) on runflat (2) so that runflat compressor hex drive (4) is facing up and strap (5) is centered around runflat (2).

NOTE

Compress runflat by rotating hex drive in either direction. Rotate hex drive opposite to loosen.

12. Using runflat compressor (3), compress runflat (2).

13. Position runflat compressor (6) on an outer edge of runflat (2) with handle assembly (7) facing up and strap (8) centered around runflat (2).

NOTE

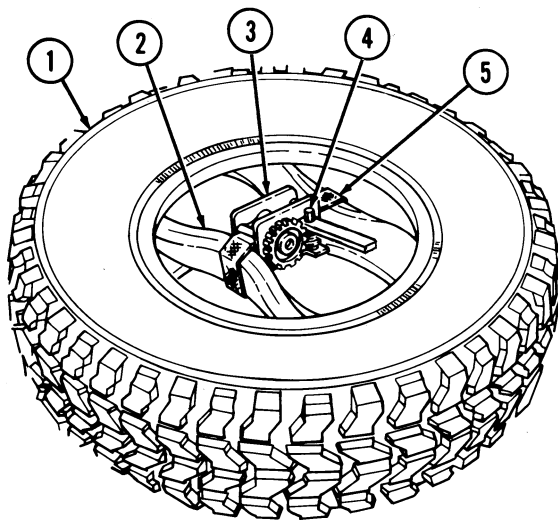
Compress runflat by rotating the handle assembly in a clockwise direction. Rotate handle assembly counterclockwise to loosen.

14. Using runflat compressor (6), compress runflat (2).

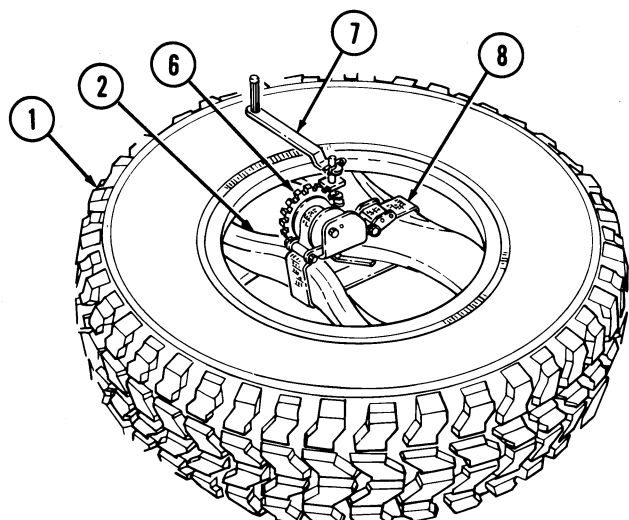
NOTE

- It may be necessary to use a tire spoon and tire soap to remove runflat from tire.
- When using runflat compressor P/N 528236, handle may need to be removed before removing runflat.

15. Remove runflat (2) from tire (1) and remove runflat compressor (3) or (6) from runflat (2).



RUNFLAT COMPRESSOR (P/N J39250)



RUNFLAT COMPRESSOR (P/N 528236)

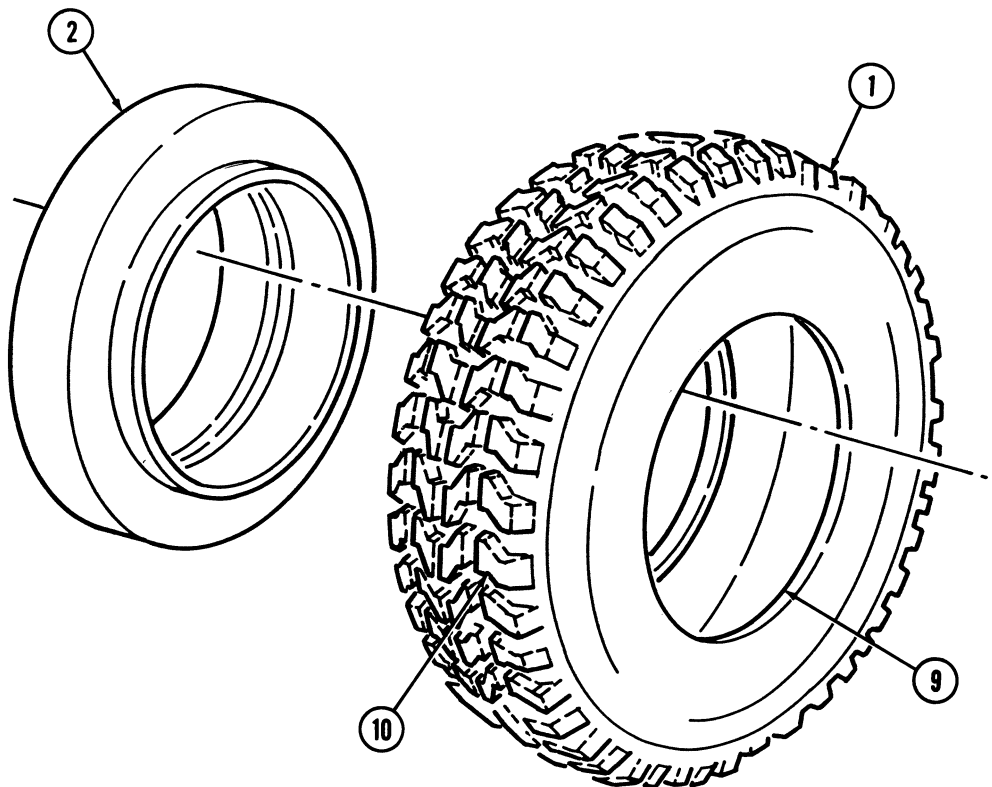
8-5.1. RADIAL TIRE, WHEEL, AND RUBBER RUNFLAT MAINTENANCE (M1123 AND "A2" VEHICLES) (Cont'd)

b. Inspection and Cleaning

WARNING

Do not reuse a tire which has been run flat without thoroughly inspecting for damage. Failure to follow these instructions may result in injury to personnel or damage to equipment.

1. Inspect inside of tire (1) for cord or belt separation, and inner liner damage. Replace tire (1) if damaged.
2. Inspect tire bead (9) for abrasions caused from runflat (2). Replace tire (1) if damaged.
3. Check for protruding objects inside tire (1) which may not be visible from outside. Repair tire (1) if damaged.
4. Check tread depth on tire (1). Tread should not be worn below level of wear bars (10). Replace tire (1) if tread is worn below wear bars (10) or 3/32 in. (2.38 mm).
5. Clean all grease, dirt, and foreign material from the runflat (2) with soap and water and allow to air dry. Inspect runflat (2) for splitting, wear, or excessive chafing. Replace runflat (2) if damaged.



8-5.1. RADIAL TIRE, WHEEL, AND RUBBER RUNFLAT MAINTENANCE (M1123 AND "A2" VEHICLES) (Cont'd)

WARNING

O-ring sealing surfaces and pressure relief grooves must be kept clean and free of rust and dirt. Failure to do so could cause the wheel assembly to separate under pressure, causing serious injury or death.

6. Using wire brush, clean studs (4). Clean all dirt and foreign material from rim halves (1) and (2) with soap and water and allow to air dry. Ensure O-ring sealing surfaces (5) and pressure relief grooves (3) on rim halves (1) and (2) are smooth and clean.
7. Inspect rim halves (1) and (2) for cracks, bent sealing surfaces (5), or oversized mounting holes. Replace rim halves (1) or (2) if cracked, bent, or if mounting holes are oversized.

WARNING

Never use wheel assemblies with studs which are damaged, loose, or have damaged threads. Damaged studs can cause improper assembly, which could cause individual fasteners to fail. Any of these situations could cause serious injury or death.

8. Inspect inner rim half (2) for cracked, broken, rusted, pitted, bent, or loose studs (4).
- 8.1. Inspect studs (4) for damaged or deformed threads. Replace studs (4) if threads are damaged or if studs (4) are damaged or loose (para. 8-8).
9. Inspect valve core (6) for cracks or deterioration. Replace valve core (6) if cracked or deteriorated.

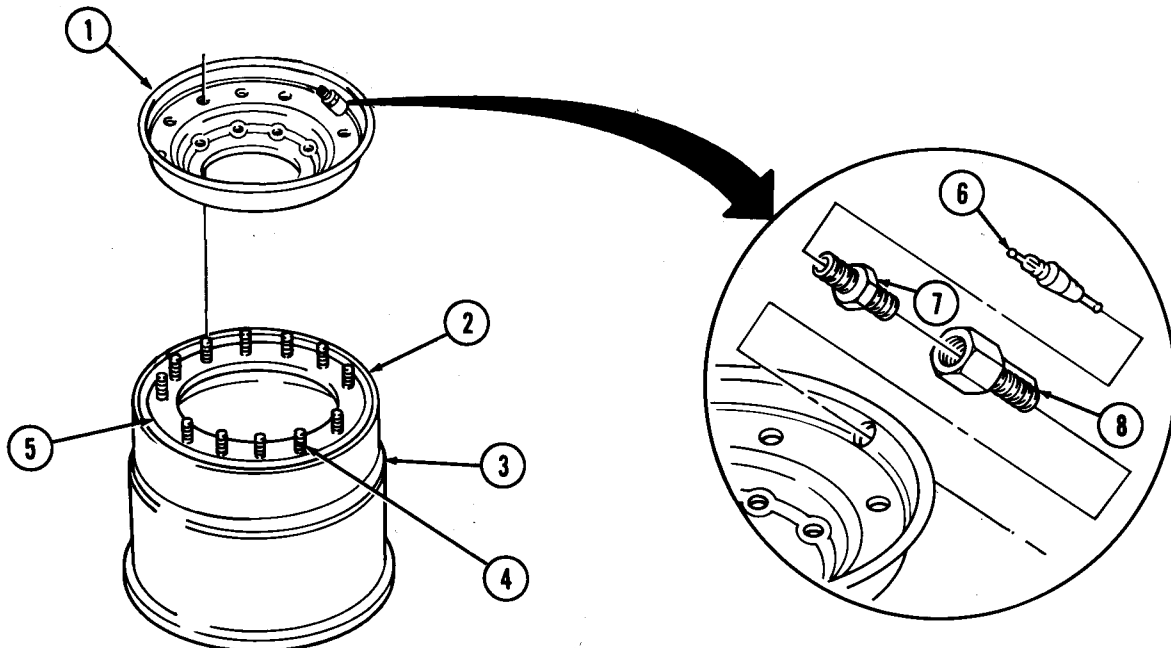
NOTE

Perform steps 10 and 11 only if valve bore and insert were removed.

10. Inspect valve bore (7) for cracks or deterioration. Replace valve bore (7) if cracked or deteriorated.
11. Inspect insert (8) for damage. Replace insert (8) if damaged.

c. Repair

Refer to TM 9-2610-200-14 for maintenance and repair of tires.



8-5.1. RADIAL TIRE, WHEEL, AND RUBBER RUNFLAT MAINTENANCE (M1123 AND "A2" VEHICLES) (Cont'd)

d. Assembly

WARNING

- Never use tubes in wheel assemblies. Use of a tube defeats built-in safety features, and could allow the wheel to come apart under pressure, resulting in serious injury or death.
- Use only replacement parts specified in TM 9-2320-280-24P for radial tires. Never install radial tire components on eight bolt rims. Wheels assembled with components not specified for radial tires could cause the assembly to separate under pressure, resulting in serious injury or death.
- Radial and bias tires should not be mixed on the same vehicle. Injury to personnel or damage to equipment may result.
- Do not use if compressor strap is frayed or damaged. Ensure runflat is free of grease and runflat compressor strap is centered on runflat. Failure to do so could cause injury to personnel.
- Any oil on runflat compressor belt or handle could result in personnel injury or damage to equipment. Wipe any oil off from belt or handle.

NOTE

Perform steps 1 and 2 when using runflat compressor P/N J39250.
Perform steps 3 and 4 when using runflat compressor P/N 528236.

1. Make sure gears and pivot points on runflat compressor (13) or (10) have a light coat of oil to ensure ease of operation and prevent from rust.
- 1.1. Position runflat compressor (10) on runflat (9) so that runflat compressor hex drive (11) is facing up and strap (12) is centered around runflat (9).

NOTE

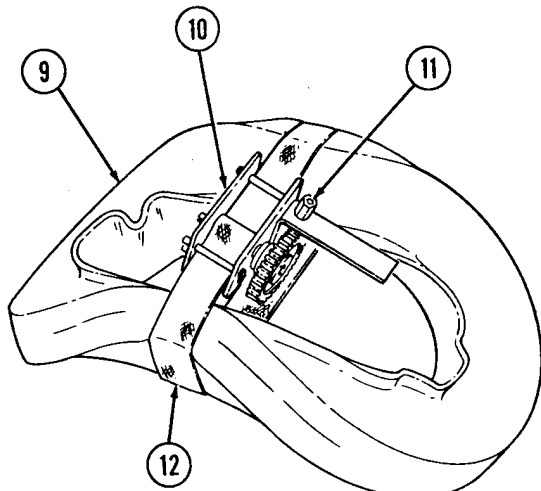
Compress runflat by rotating hex drive in either direction. Rotate hex drive opposite to loosen.

2. Using runflat compressor (10), compress runflat (9).
3. Position runflat compressor (13) on an outer edge of runflat (9) with handle assembly (14) facing up and strap (15) centered around runflat (9).

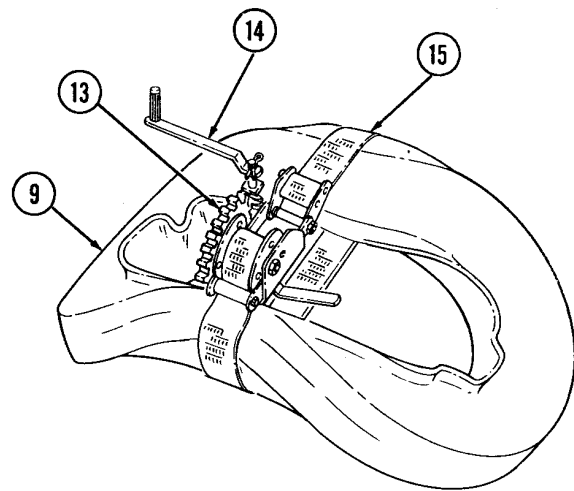
NOTE

Compress runflat by rotating the handle assembly in a clockwise direction. Rotate handle assembly counterclockwise to loosen.

4. Using runflat compressor (13), compress runflat (9).



RUNFLAT COMPRESSOR (P/N J39250)



RUNFLAT COMPRESSOR (P/N 528236)

8-5.1. RADIAL TIRE, WHEEL, AND RUBBER RUNFLAT MAINTENANCE (M1123 AND "A2" VEHICLES) (Cont'd)

- 4.1. Apply one 11-ounce tube of gel lubricant (5.1) around inside of tire (1) at crown area (5.2).
- 4.2. Evenly spread gel lubricant (5.1) 4-5 in. (10-13 cm) wide on tire crown (5.2).

NOTE

The radial tire is a bidirectional tire and the tread may be positioned in either direction.

5. Stand tire (1) up and lubricate tire bead (4) with tire soap.

NOTE

It may be necessary to remove the handle assembly on runflat compressor (P/N 528236) before inserting runflat into tire.

6. Insert runflat (3), compressor side first, as far as possible into tire (1).
7. Lay tire (1) flat on protruding runflat side. Loosen compressor (5). Runflat (3) should insert itself inside tire (1). If not, repeat steps 5 through 7 and/or use a tire spoon to assist in installation.

NOTE

If required, clean and lubricate bearing assembly on runflat compressor P/N 528236 after removal.

8. Loosen runflat compressor (5) and remove from tire (1).

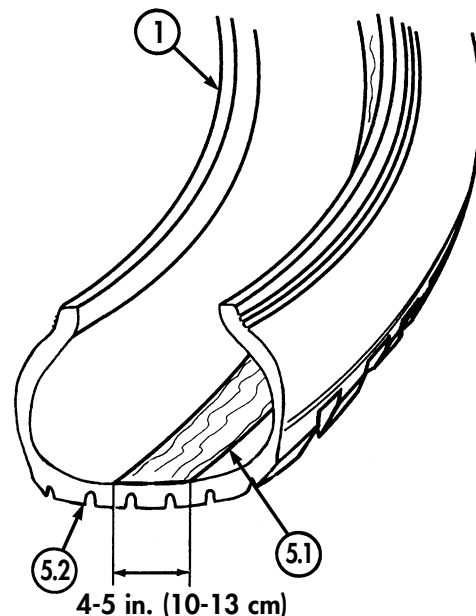
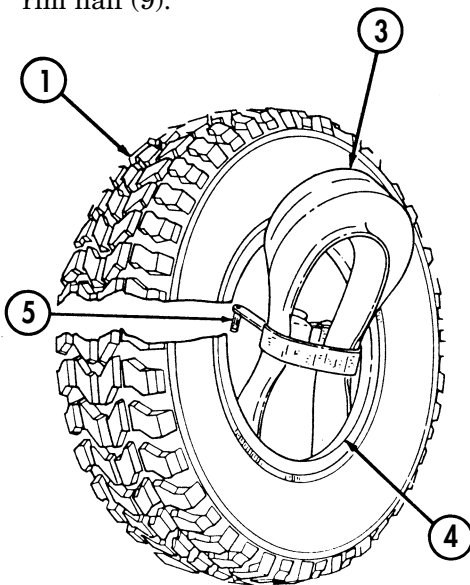
WARNING

- Never install radial tire on eight bolt wheel. Damage to equipment may result causing injury to personnel.
- Ensure that during assembly indexing hole on inner and outer rim halves is aligned. Failure to do so may cause damage to equipment or injury to personnel.

NOTE

Before installing tire on inner rim half, inspect tire sidewalls for a "paint dot". Paint dots are often painted on tires to indicate the tire's light spot, for balancing purposes. If paint dot is present, position tire on rim halves so that paint dot is aligned with insert hole on outer rim half.

9. Lubricate tire bead (4) and rim bead seat areas with tire soap.
10. Center runflat (3) in tire (1). Carefully lower tire (1) over inner rim half (9).
11. Ensure runflat (3) is not binding on flat portion of inner rim half (9). Runflat (3) should clear inner rim half (9).



8-5.1. RADIAL TIRE, WHEEL, AND RUBBER RUNFLAT MAINTENANCE (M1123 AND "A2" VEHICLES) (Cont'd)

NOTE

Ensure longer lip of runflat faces outer rim half.

12. Lubricate O-ring (8) with tire soap. Install O-ring (8) in groove (10) on top of inner rim (9), around studs (11). Ensure O-ring (8) is not twisted and that it is uniformly positioned in groove (10). Do not overstretch O-ring (8).
13. Install valve core (12) in valve bore (13).

NOTE

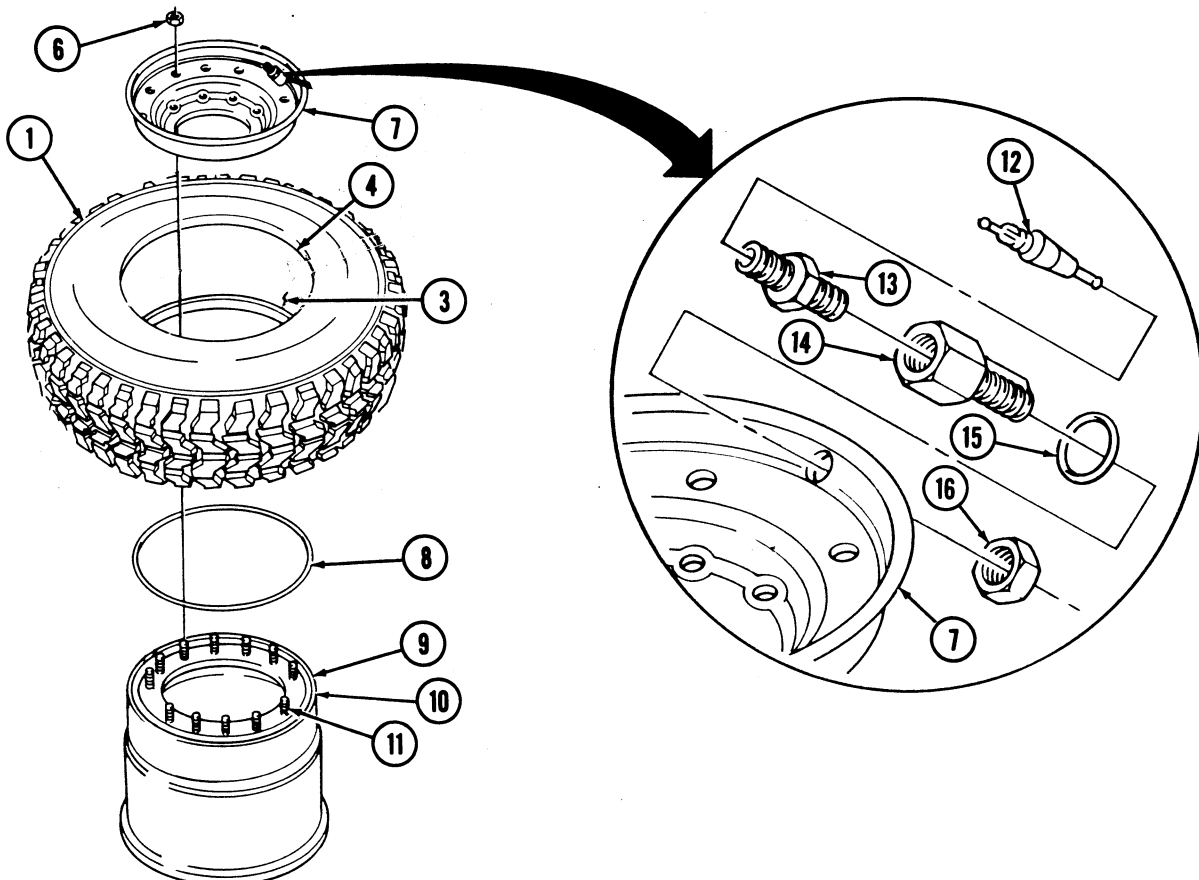
Perform step 14 only if valve bore and insert were removed.

14. Install insert (14), O-ring (15), and locknut (16) on outer rim (7). Apply sealing compound to valve bore (13) and install valve bore (13) on insert (14). Tighten locknut (16) to 40-60 lb-in. (5-7 N•m). Tighten valve bore (13) to 25-30 lb-ft (34-41 N•m).
15. Install outer rim half (7) on inner rim half (9).

CAUTION

Tighten locknuts gradually to avoid bent and broken studs, or damage to wheel components.

16. Install outer rim half (7) on inner rim half (9) with twelve locknuts (6).



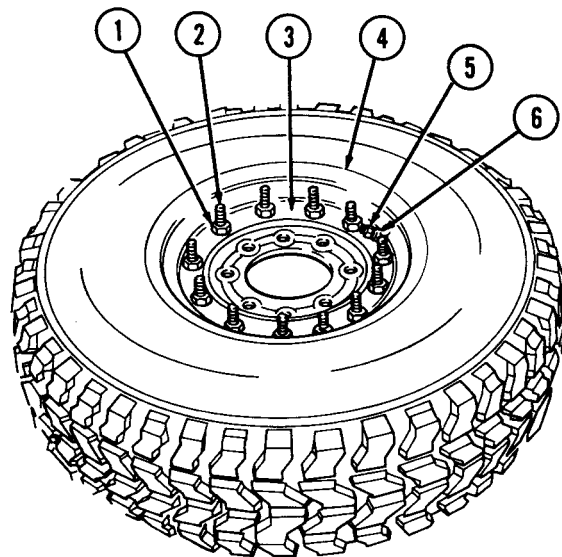
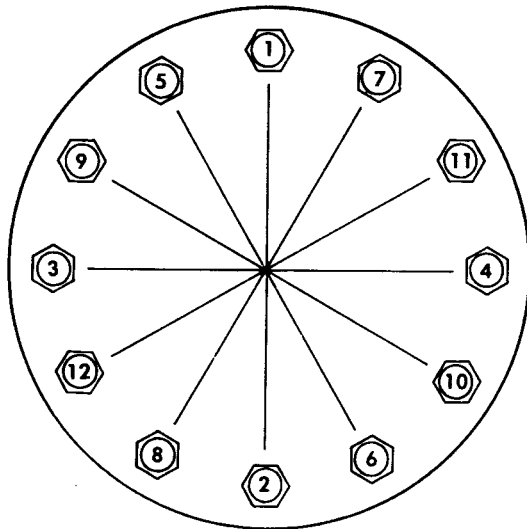
8-5.1. RADIAL TIRE, WHEEL, AND RUBBER RUNFLAT MAINTENANCE (M1123 AND "A2" VEHICLES) (Cont'd)

17. Tighten locknuts (1) to 85 lb-ft (115 N·m) in tightening sequence shown.
18. Tighten locknuts (1) to 125 lb-ft (170 N·m) in sequence shown.
19. Check wheel assembly for gaps at each stud (2). Use a 0.0015 in. (0.038 mm) thickness gauge to detect gaps. If gaps are detected, disassemble and reassemble wheel assembly and recheck for gaps. If gaps are still detected, replace outer rim half (3).

WARNING

- Never inflate a wheel assembly without having checked wheel locknut torques to ensure the wheel locknuts are tightened to specifications. An assembly with improperly tightened locknuts could separate under pressure, resulting in serious injury or death.
 - Always use a tire inflation cage for inflation purposes. Stand on one side of the cage, during inflation, never directly in front. Keep hands out of the cage during inflation. Inflate assembly to recommended pressure, using a clip-on air chuck. Do not exceed 50 psi (345 kPa) cold inflation pressure. Failure to follow these instructions may result in serious injury or death.
20. Place assembly in safety cage and inflate front and rear tires to recommended tire pressure (TM 9-2320-280-10).
 21. Check for leaks around rim edges (4), insert (6), and valve bore (5) with soapy solution.

TIGHTENING SEQUENCE



FOLLOW-ON TASK: Balance tire (para. 8-9).

8-6. RUNFLAT COMPRESSOR (P/N J39250) BELT REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-24P

Materials/Parts

Runflat belt repair kit
(Appendix G, Item 276)

a. Removal

NOTE

Note position of belt for installation.

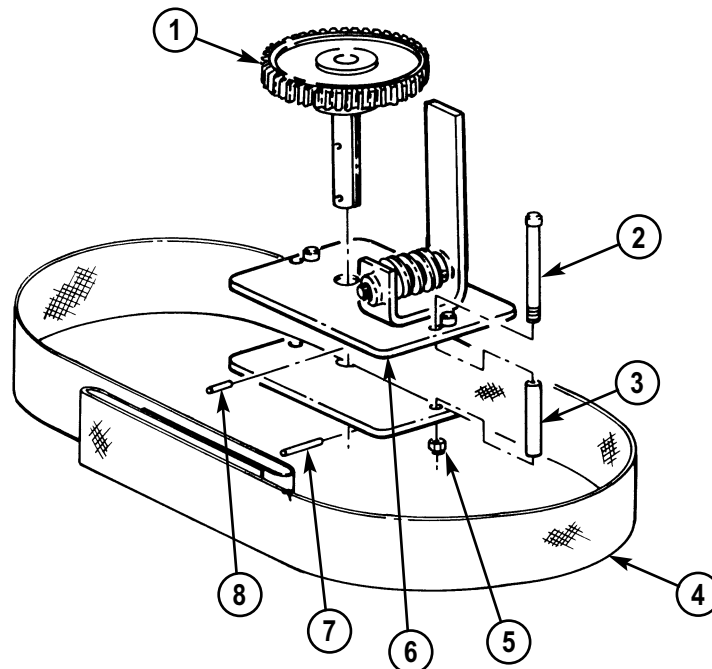
1. Remove small pin (8) from belt (4) and worm gear shaft assembly (1). Discard small pin (8).
2. Remove shaft pin (7) and worm gear shaft assembly (1) from compressor assembly (6). Discard shaft pin (7).
3. Remove two locknuts (5), sockethead screws (2), spacers (3), and belt (4) from compressor assembly (6). Discard locknuts (5).

b. Installation

NOTE

Belt overlap is to be positioned so that you have equal amount of belt on each side of worm gear shaft assembly.

1. Install belt (4) on compressor assembly (6) with two spacers (3), sockethead screws (2), and locknuts (5).
2. Install worm gear shaft assembly (1) on compressor assembly (6) with shaft pin (7).
3. Install belt (4) to worm gear shaft assembly (1) with small pin (8).



8-7. RUNFLAT COMPRESSOR (P/N 528236) BELT REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-24P

Materials/Parts

Runflat belt repair kit
(Appendix G, Item 277)

a. Removal

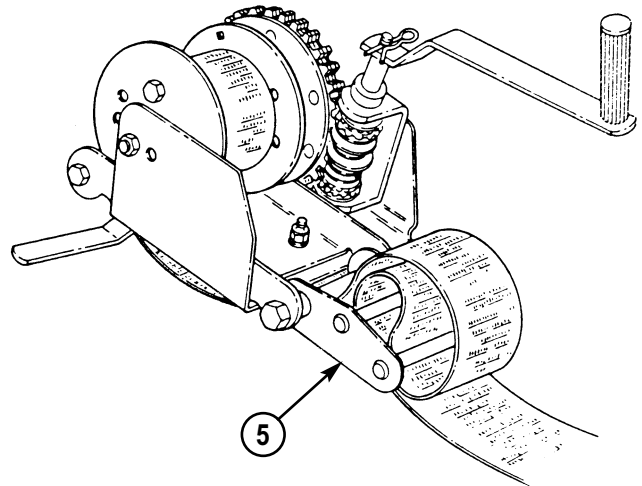
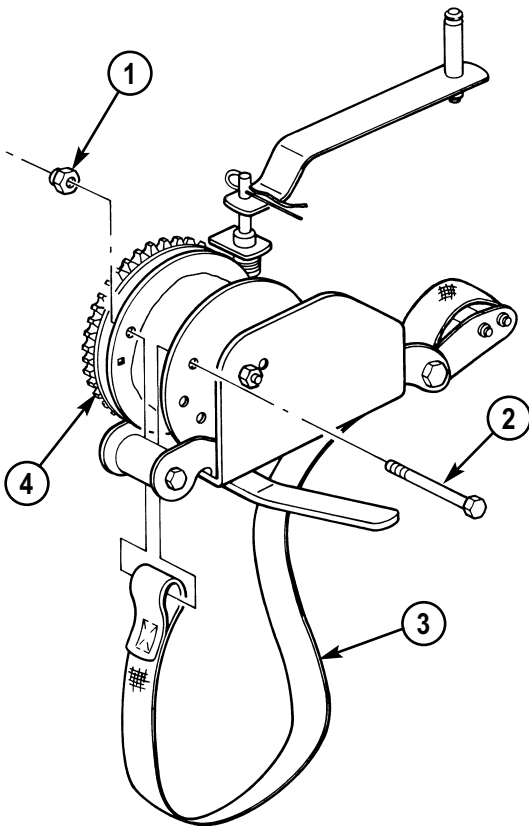
NOTE

Note position of belt for installation.

Remove locknut (1), capscrew (2) and belt (3) from compressor (4). Discard locknut (1).

b. Installation

1. Install belt (3) on compressor (4) with capscrew (2) and locknut (1).
2. Loop free end of belt (3) around retaining bracket (5) as shown.



8-8. INNER RIM STUD MAINTENANCE

This task covers:

- a. Removal
- b. Cleaning and Inspection

- c. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-24P

Equipment Condition

Wheel removed (para. 8-3).

General Safety Instructions

- Always wear eye protection when replacing wheel studs.
- Ensure tire is totally deflated before removing wheel locknuts.
- Never use wheel assemblies with damaged studs.
- Never inflate a wheel assembly without first checking wheel locknut torques.
- Always use a tire inflation cage and a clip-on air chuck for tire inflation.

WARNING

Always wear eye protection when replacing wheel studs. Severe eye injury may result if metal chips contact eyes.

a. Removal

NOTE

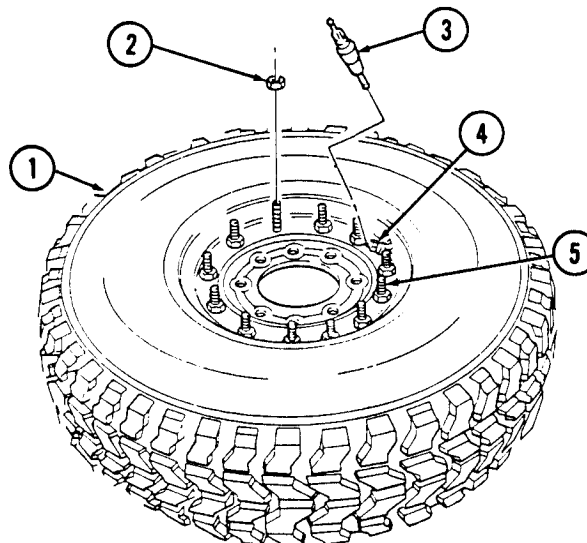
Perform steps 1 through 4 for stud removal without disassembly of wheel. Perform steps 5 and 6 for stud removal with disassembled wheel.

1. Place wheel assembly in tire inflation cage.

WARNING

In all assembly operations, ensure the tire is totally deflated before removing wheel locknuts. Failure to follow proper safety precautions may result in serious injury or death.

2. Remove valve core (3) from valve bore (4) and deflate tire (1). Run a wire through valve bore (4) to ensure it is not plugged.
3. When tire (1) is fully deflated, loosen wheel locknut (2) from each side of the broken stud(s) (5). If you hear escaping air, do not proceed. Wait until the sound stops and recheck valve bore (4). When you are certain tire is fully deflated, proceed to remove wheel locknut (2). Discard locknut (2).



8-8. INNER RIM STUD MAINTENANCE (Cont'd)

NOTE

When replacing broken rim stud(s), replace studs on both sides of the broken stud(s).

4. Drive studs (1) out of inner rim (2). Discard studs (1).
5. Disassemble wheel and runflat (para. 8-4 or 8-5.)
6. Drive stud (3) out of inner rim half (4). Discard stud (3).

b. Cleaning and Inspection

1. Using wire brush, clean studs. Clean all dirt and foreign material from rim with soap and water and allow to air dry.

WARNING

Never use wheel assemblies with studs which are damaged, loose, or have damaged threads. Damaged studs can cause improper assembly, which could cause individual fasteners to fail. Any of these situations may result in serious injury or death.

2. Inspect inner rim (4) for cracked, broken, rusted, pitted, bent, or loose studs (3), and studs (3) with damaged, mutilated, or deformed threads.

c. Installation

NOTE

Perform steps 1 and 2 for stud installation with disassembled wheel. Perform steps 3 through 11 for stud installation without disassembly of wheel.

1. Align splines on stud (3) with splines in inner rim (4) and drive stud (3) into inner rim (4) until stud shoulder seats against inner rim (4).
2. Assemble wheel and runflat (para. 8-4 or 8-5.).
3. Align splines on stud (1) with splines in inner rim (2) and drive stud (1) into rim (2) until shoulder of stud (1) seats against inner rim (2).
4. Repeat step 3 for all studs (1) being replaced.

CAUTION

Tighten locknuts gradually to avoid bent and broken studs, or damage to wheel components will result.

5. Install locknuts (6) on studs (1).

NOTE

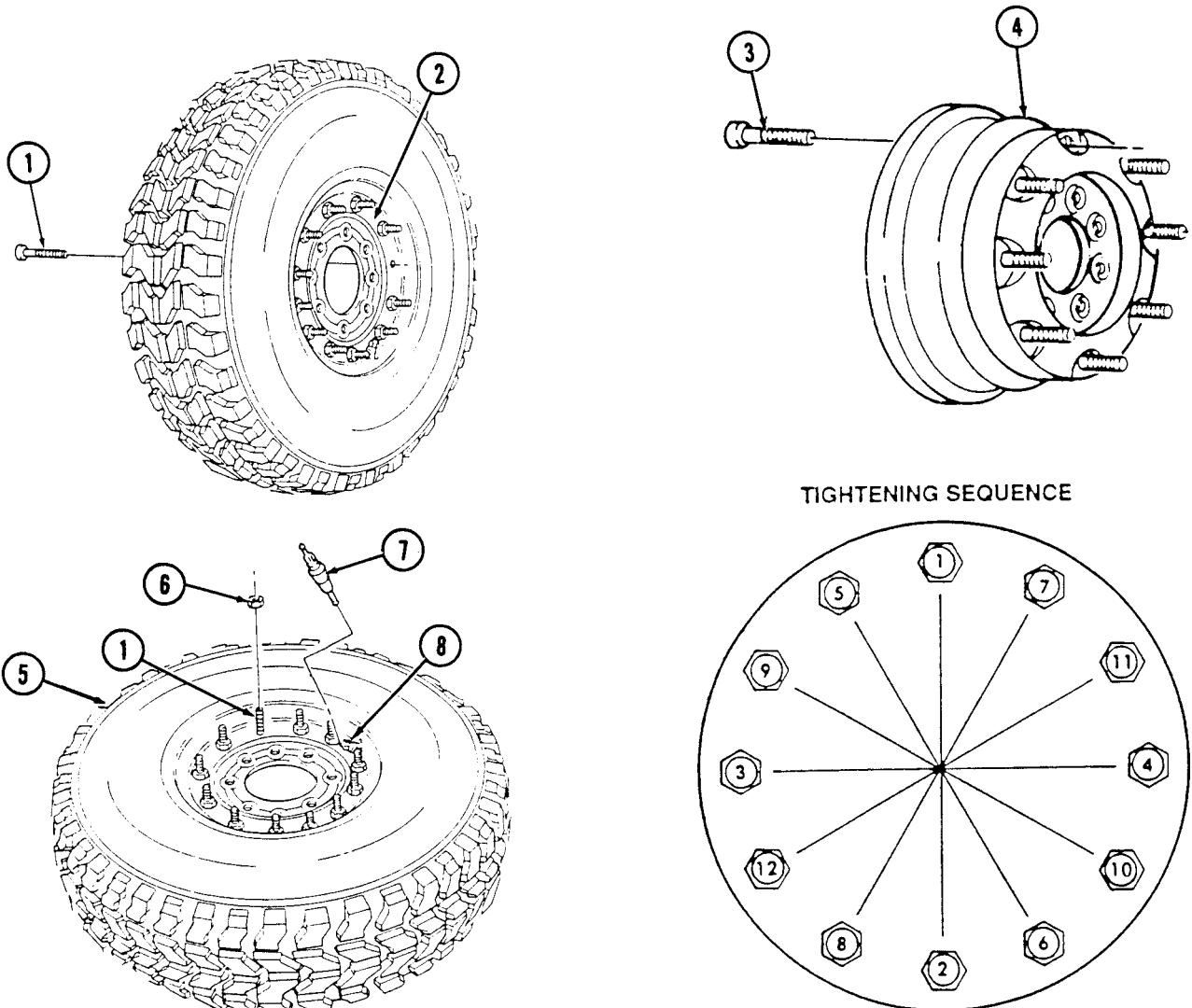
After replacing broken stud(s), all rim nuts must be retorqued.

6. Tighten locknuts (6) to 85 lb-ft (115 N_m) in sequence shown.
7. Tighten locknuts (6) to 125 lb-ft (170 N_m) in sequence shown.
8. Check wheel assembly for gaps at each stud. Use a 0.0015 in. (0.038 mm) thickness gauge to detect gaps. If gaps are detected, disassemble and reassemble wheel assembly and recheck for gaps. If gaps are still detected, replace outer rim half (para. 8-4 or 8-5).
9. Install valve core (7) in valve bore (8).

8-8. INNER RIM STUD MAINTENANCE (Cont'd)

WARNING

- Never inflate a wheel assembly before checking wheel locknut torques to ensure the wheel locknuts are tightened to specifications. An assembly with improperly tightened locknuts could separate under pressure, resulting in serious injury or death.
 - Always use a tire inflation cage for inflation purposes. Stand on one side of the cage during inflation, never directly in front. Keep hands out of cage during inflation. Inflate assembly to recommended pressure, using a clip-on air chuck. Do not exceed 50 psi (345 kPa) cold inflation pressure. Failure to follow these instructions may result in serious injury or death.
10. Place tire assembly (5) in safety cage and inflate front and rear tires to recommended tire pressure (TM 9-2320-280-10).
 11. Check for leaks around rim edges, insert, and valve bore (8) with soapy solution.



FOLLOW-ON TASK: Install wheel (para. 8-3).

8-9. TIRE BALANCING

This task covers:

Balancing

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, item 1)

Personnel Required

One mechanic
One assistant

Test Equipment

Bubble balancer (Appendix B, Item 130)

Manual References

TM 9-2320-280-24P

Materials/Parts

Wheel balance weights (as required)
(Appendix G, Item 2)
Chalk (Appendix C, Item 15)

Equipment Condition

Wheel removed (para. 8-3).

Balancing

NOTE

- Wheel and tire must be clean and free of foreign material.
 - Wheel must be centered on balancer utilizing lug nut mounting holes.
1. Mount tire (1) and wheel (2) on balancer, curb side up.
 2. Locate and mark light spot (5) on tire (1).

NOTE

- If more than 29 oz. of weight is required to balance tire, wheel and runflat must be disassembled and tire rotated 180° on wheel.
 - Tires can be balanced using either adhesive backed or clip on type weights. Follow steps 3 through 10 if using adhesive backed weights, or steps 11 through 15 for clip on type weights.
3. Add 6 oz. of weight (4) to center of light spot (5) between wheel (2) and clamp ring (3) until weight required to balance tire (1) is met or exceeded. Do not permanently attach weights (4) at this time.
 4. If weight requirement is exceeded, evenly remove weights (4) in 1/2 oz. increments from each side of light spot (5) until tire (1) and wheel (2) are properly balanced.
 5. Record amount of weights (4) used, and remove tire (1) and wheel (2) from balancer.
 6. Working from light spot (5) on front side of tire (1), mark rear side of tire (1) and inside of wheel (2) for light spot (5) identification.
 7. Temporarily attach weights (4) with tape to inside of wheel (2), in a radial direction, following weight placement diagram.
 8. Repeat step 1 and add or subtract weights (4) until tire (1) is properly balanced.

NOTE

Wheel must be smooth and clean before attaching wheel weights.

9. Remove adhesive backing from weights (4) and attach to inside of wheel (2) following weight placement diagram.
10. Repeat step 1 to ensure tire (1) is properly balanced.
11. Place a 6 oz. weight (6) on edge of wheel (2) with clip (7) centered on light spot (5). Do not permanently attach weight (6) at this time.
12. Check wheel (2) and tire (1) for proper balance. If necessary, add weights (6), or replace 6 oz. weight (6) with a lighter weight (6), making sure weight clips (7) are centered on light spot (5) and weight (6) are not permanently attached.

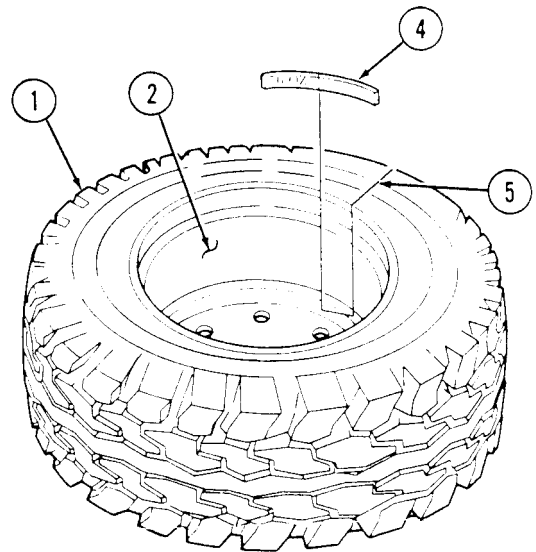
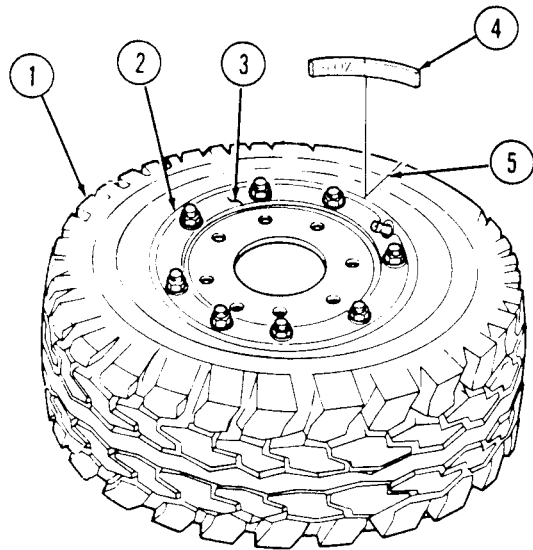
8-9. TIRE BALANCING (Cont'd)

13. Repeat step 12 until wheel (2) and tire (1) are properly balanced.
14. Record total amount of weight (6) on wheel (2), and remove weight(s) from wheel (2) and wheel (2) from balancer.

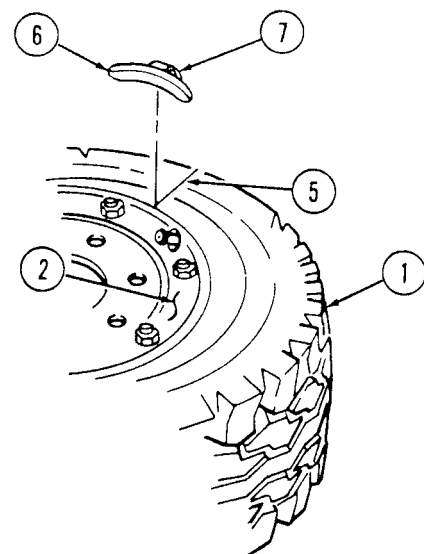
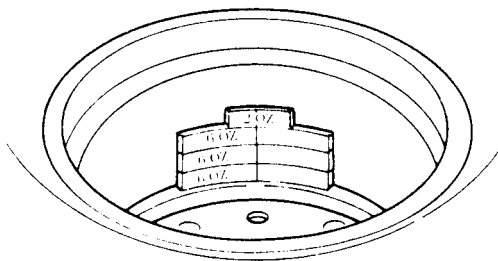
NOTE

Total amount of weight must be split "50/50" between inner and outer edges of wheel rim. For example, if 6 oz. of total weight was required to balance wheel, attach 3 oz. to outer edge of rim and 3 oz. to inner edge of rim.

15. Attach weights (6) to inner and outer edges of wheel (2), ensuring weight clips (7) are centered on light spot (5), or weights (6) are placed evenly to sides of light spot (5) if more than one weight (6) is used. Using small hammer or clip claw-hammer tool, tap weights to conform to wheel (2) edge contour.



WEIGHT PLACEMENT DIAGRAM



FOLLOW-ON TASK: Install wheel (para. 8-3).

8-10. FRONT WHEEL TOE-IN ALIGNMENT

This task covers:

- | | |
|---|-----------------------------|
| <p>a. Preliminary Inspection</p> <p>b. Toe-in Check</p> | <p>c. Toe-in Adjustment</p> |
|---|-----------------------------|

INITIAL SETUP:

Tools

General mechanic's tool kit:
 automotive (Appendix B, Item 1)
 General mechanic's tool kit:
 automotive, common No. 2
 (Appendix B, Item 4)

Manual References

TM 9-2320-280-10
 TM 9-2320-280-24P

Equipment Condition

- Tires inflated to proper pressure (TM 9-2320-280-10).
- Vehicle on level ground.

Materials/Parts

Chalk (Appendix C, Item 15)

Personnel Required

One mechanic
 One assistant

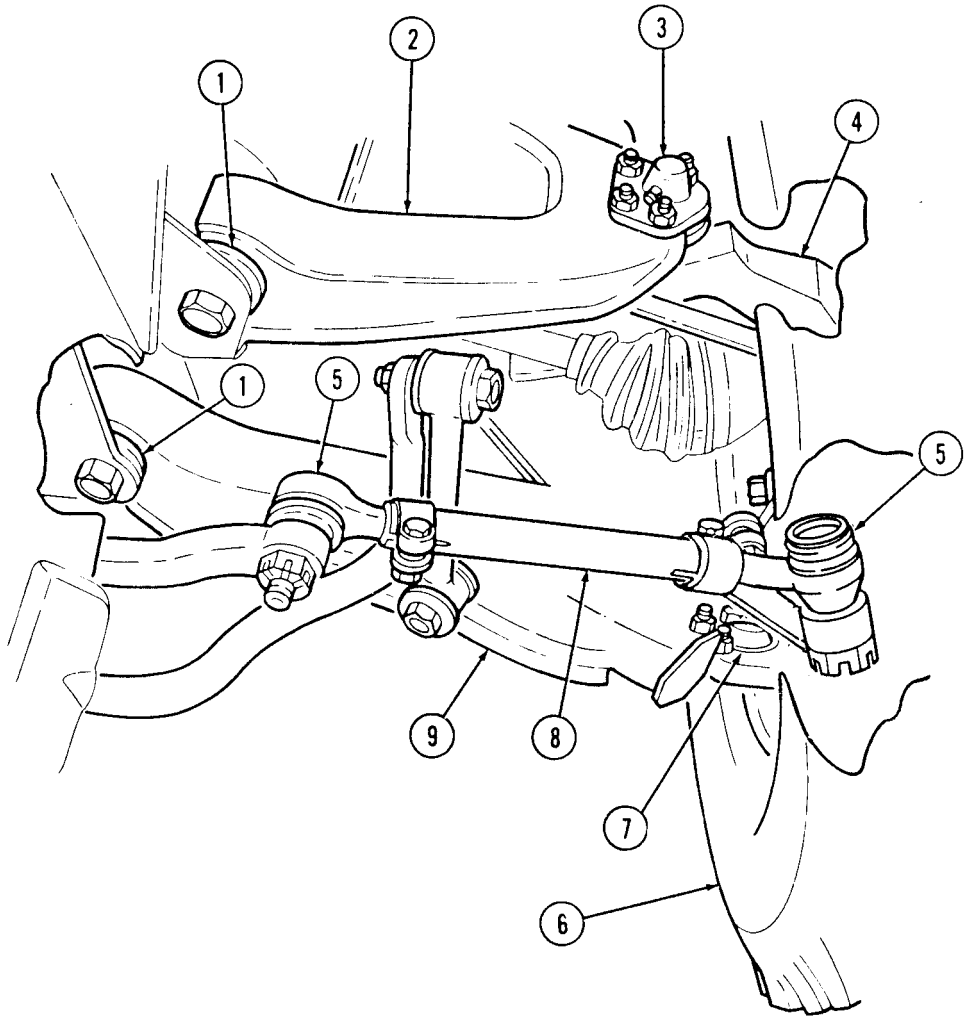
NOTE

- It is not necessary to perform front wheel toe-in alignment prior to the scheduled semiannual or 3,000 mile (4,827 km) maintenance interval unless abnormal vehicle handling or control is reported, or it is directed by another maintenance task.
- Front wheel alignment adjustments other than toe-in are performed by DS maintenance.
- Make sure models M1037 and M1042 have S250 shelter installed before performing front wheel toe-in alignment.

a. Preliminary Inspection

1. Check all tires (6) for uniform tread wear.
2. Raise vehicle and place support under lower control arms (9).
3. Check geared hubs (4) for output spindle end play by grasping edges of tires (6) and attempting to move tires (6) up and down. Adjust spindle bearings if any spindle movement is apparent (para. 6-14).
4. Check for looseness of upper ball joints (3) by grasping top of tires (6), and attempting to move tires (6) in and out. Replace upper ball joints (3) if tire (6) movement at top outer edge of tires (6) is 3/8 in. (9 mm) or more (para. 6-26).
5. Check for looseness of lower ball joints (7) by grasping bottom of tires (6), and attempting to move tires (6) in and out. Replace lower ball joints (7) if tire (6) movement at bottom outer edge of tires (6) is 1/2 in. (13 mm) or more (para. 6-27).
6. Lower vehicle.
7. Check for looseness of tie rod ends (5) by attempting to move tie rods (8) vertically and horizontally. Replace tie rod end(s) (5) if any movement is apparent (para. 8-16).
8. Check for damaged control arm bushings (1). Replace upper control arms (2) (para. 6-28) or lower control arms (9) if bushings (1) are damaged (para. 6-29).

8-10. FRONT WHEEL TOE-IN ALIGNMENT (Cont'd)



8-10. FRONT WHEEL TOE-IN ALIGNMENT (Cont'd)

b. Toe-in Check

NOTE

- Vehicle must be on level ground with wheels set straight ahead.
- Steps 1 through 3 will determine centerline of tire.
- “Point of Measurement” for checking toe-in will be where lines marked in steps 1 and 3 intersect.

1. Mark line (4) on center tread (1) of tire (2) 16-1/2 in. (42 cm) from ground.
2. Measure total width of tire tread (3) and record.
3. Mark line (5) on center tread (1) at one-half total tread width (3).
4. Repeat steps 1 through 3 for opposite tire.
5. Measure distance between “Points of Measurement” on front side of tires (2) and record.
6. Rotate tires (2) by moving vehicle forward until “Points of Measurement” are 16-1/2 in. (42 cm) above the ground at rear side of tires (2).
7. Measure distance between “Points of Measurement” on rear side of tires (2) and record.

NOTE

- If measurement is larger on front side of tires than measurement on rear side of tires, tires have toe-out.
 - If toe-in alignment does not meet specifications, repeat checking procedures to eliminate any possible reading errors.
8. Subtract measurement from front side of tires (2), obtained in step 5, from measurement from rear side of tires (2), obtained in step 7. The result of this subtraction represents inches of toe-in. Refer to table 8-1 for toe-in specifications. If toe-in does not meet specifications, adjust toe-in (task c). Refer to table 8-1 for toe-in adjustment specifications.
 9. If toe-in is within specifications, refer to task c and perform step 5.

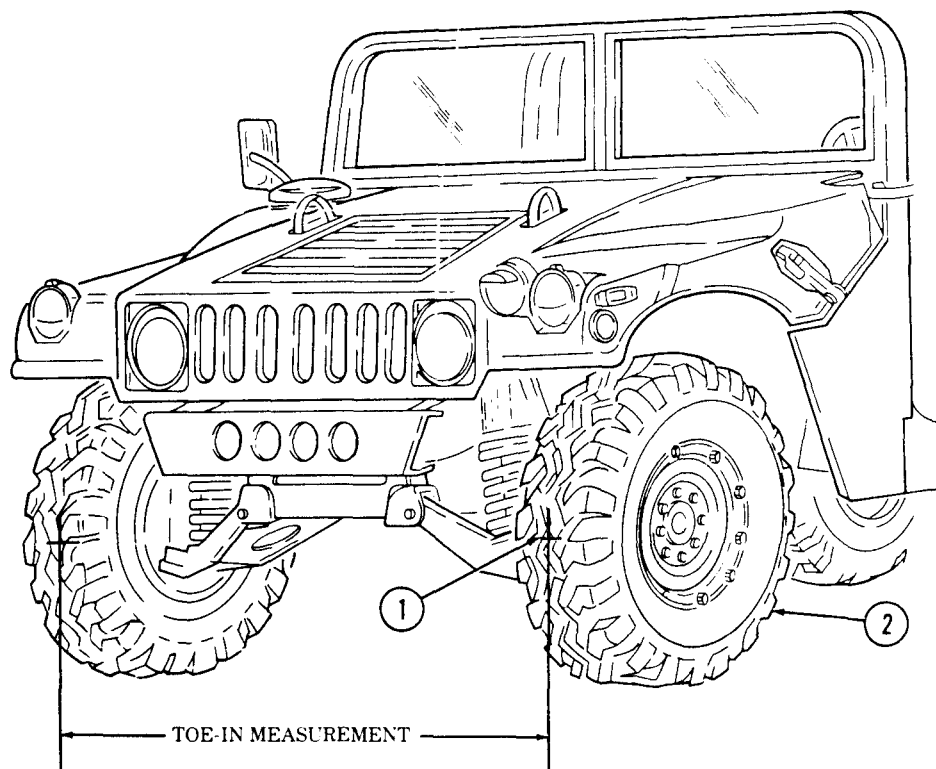
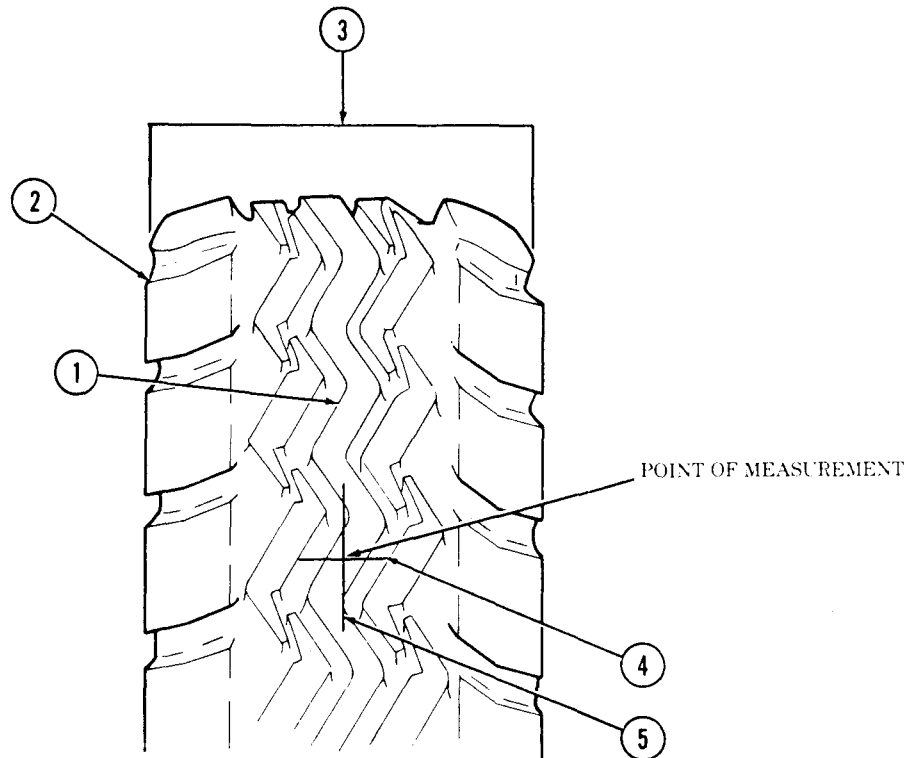
NOTE

- Vehicles should be at curb weight to ensure proper alignment. Refer to table 8-1(a.) for adjustment specifications.
- Table 8-1(b.) is optional and can be used when the vehicle’s average operation is at less than gross vehicle weight. Vehicle is to be loaded to its average operating weight when using this table.

Table 8-1. Toe-In Alignment Adjustment Specifications.

TOE-IN (FRONT) ADJUSTMENT SPECIFICATIONS					
VEHICLE PAYLOAD	BIAS TIRE		RADIAL TIRE		
	MODELS: M998, M1025, M1026, M1035, M1038, M1043, M1044	MODELS: M966, M996, M997, M1036, M1037, M1042, M1045, M1046	MODELS: M996, M996A1, M998, M998A1, M1025, M1025A1, M1025A2, M1026, M1026A1, M1035, M1035A2, M1035A1, M1036, M1038, M1038A1, M1043, M1043A1, M1043A2, M1044, M1044A1, M1045, M1045A1, M1045A2, M1046, M1046A1	MODELS M997, M997A1, M997A2, M1037 M1042	MODELS: M1097, M1097A1, M1097A2
a. Vehicle @ curb weight	7/16 ± 1/8 in. (11 mm ± 3 mm)	5/16 ± 1/8 in. (8 mm ± 3mm)	1/4 ± 1/16 in. (6 mm ± 1.5 mm)	5/16 ± 1/16 in. (8 mm ± 1.5 mm)	1/8 ± 1/16 in. (9.5 mm ± 1.5 mm)
b. Vehicle @ normal operating weight (optional)	1/4 ± 1/8 in. (6mm ± 3 mm)	1/4 ± 1/8 in. (6 mm ± 3 mm)	1/16 ± 1/16 in. (1.5 mm ± 1.5 mm)	1/16 ± 1/16 in. (1.5 mm ± 1.5 mm)	1/16 ± 1/16 in. (1.5 mm ± 1.5 mm)

8-10. FRONT WHEEL TOE-IN ALIGNMENT (Cont'd)



8-10. FRONT WHEEL TOE-IN ALIGNMENT (Cont'd)

c. Toe-in Adjustment

1. Loosen two locknuts (3) from clamps (1) on each adjusting sleeve (2).

NOTE

Toe-in can be increased or decreased by changing length of tie rods. A threaded sleeve is provided for this purpose. Both tie rods must be the same length $\pm 1/8$ inch (3 mm) after adjustment.

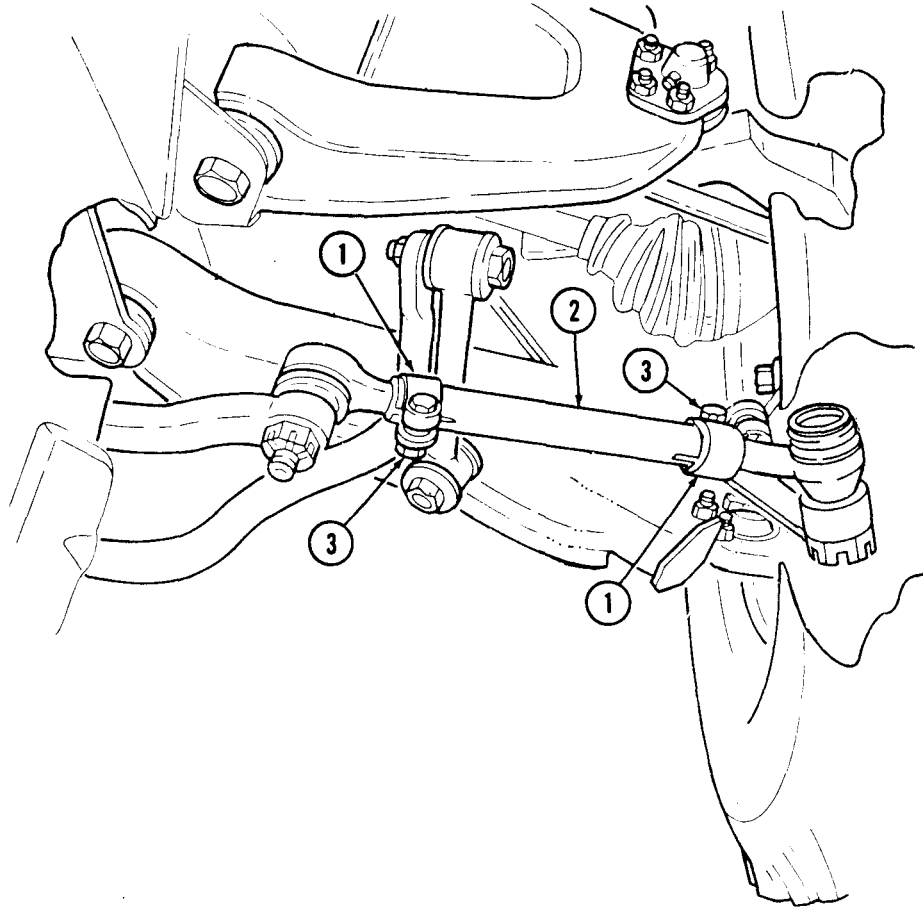
2. Turn each adjusting sleeve (2) equally but in opposite directions.
3. Roll vehicle rearward then forward to original position.
4. Repeat toe-in check and adjustment procedures until correct adjustment is indicated.

CAUTION

Ensure bolt and nut on adjusting sleeve clamp nearest to geared hub is facing halfshaft. Bolt and nut on adjusting sleeve clamp nearest to frame must be facing away (180°) from stabilizer bar, to prevent damage to equipment.

5. Secure two clamps(1) on each adjusting sleeve (2) with two locknuts (3). Tighten locknuts (3) to 30 lb-f-t (40 N·m).

8-10. FRONT WHEEL TOE-IN ALIGNMENT (Cont'd)



FOLLOW-ON TASK: Operate vehicle (TM 9-2320-280-10) and check for pull or wander.

8-11. REAR WHEEL TOE-OUT ALIGNMENT

This task covers:

- a. Preliminary Inspection
- b. Toe-in Check

c. Toe-out Adjustment

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Chalk (Appendix C, Item 15)
Tape (Appendix C, Item 50)
Twine (Appendix C, Item 53)

Personnel Required

One mechanic
One assistant

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

- Tires inflated to proper pressure (TM 9-2320-280-10).
- Vehicle on level ground.

NOTE

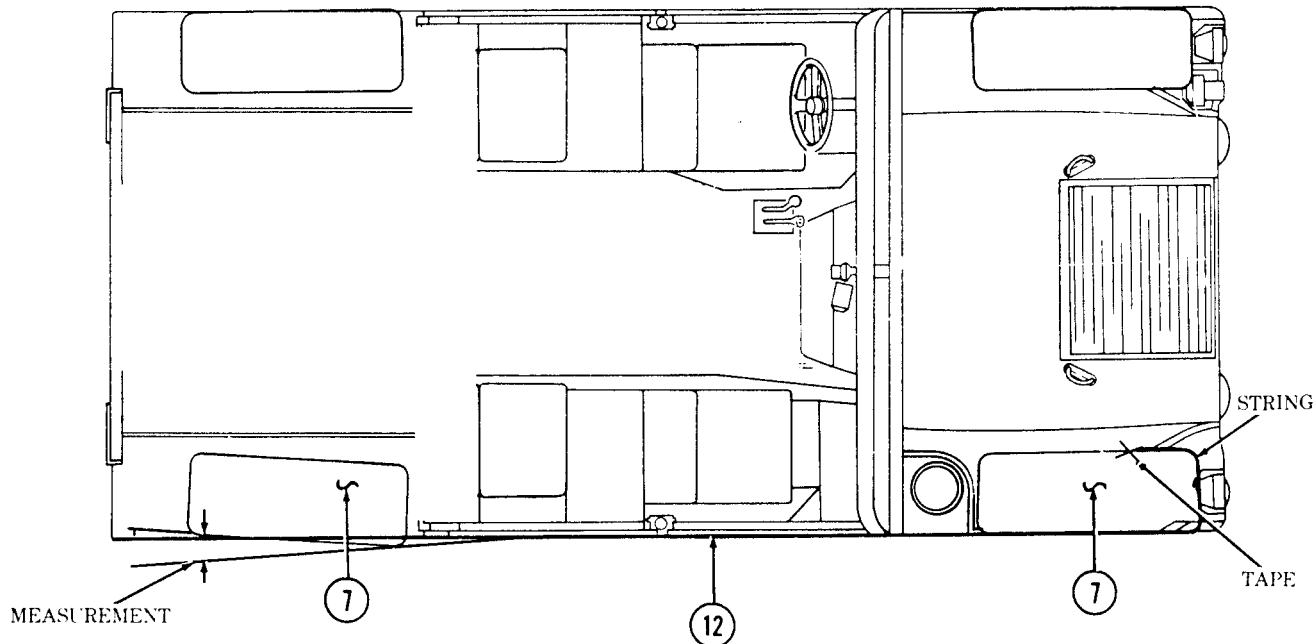
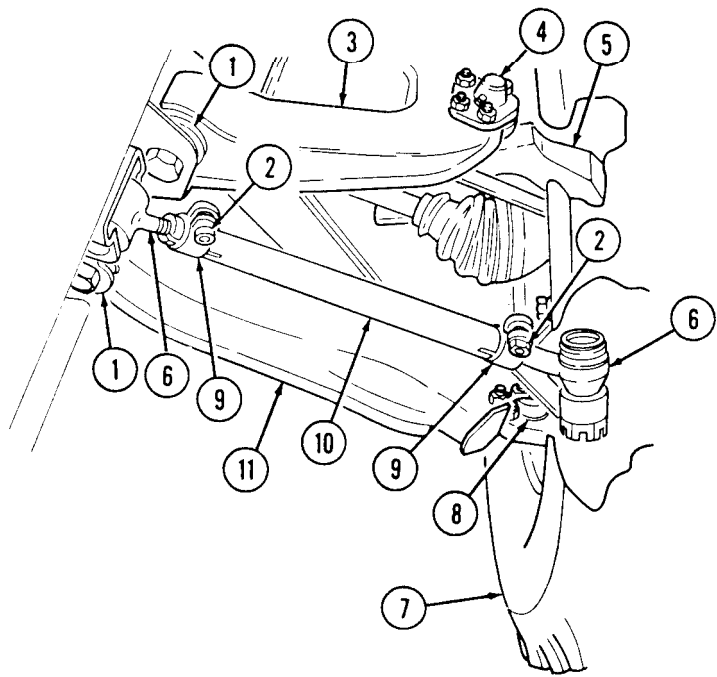
- It is not necessary to perform rear wheel toe-out alignment prior to the scheduled semiannual or 3,000 mile (4,827 km) maintenance interval unless abnormal vehicle handling or control is reported, or it is directed by another maintenance task.
- Rear wheel alignment adjustments other than toe-out are performed by DS maintenance.
- Make sure models M1037 and M1042 have S250 shelter installed before performing rear wheel toe-out alignment.

a. Preliminary Inspection

1. Check all tires (7) for uniform tread wear.
2. Raise vehicle and place support under lower control arms (11).
3. Check geared hubs (5) for output spindle end play by grasping edges of tires (7) and attempting to move tires (7) up and down. Adjust spindle bearings (para. 6-14) if any spindle movement is apparent.
4. Check for looseness of upper ball joints (4) by grasping top of tires (7), and attempting to move tires (7) in and out. Replace upper ball joints (4) (para. 6-26) if tire (7) movement at top outer edge of tires (7) is 3/8 in. (9 mm) or more.
5. Check for looseness of lower ball joints (8) by grasping bottom of tires (7), and attempting to move tires (7) in and out. Replace lower ball joints (8) (para. 6-27) if tire (7) movement at bottom outer edge of tires (7) is 1/2 in. (13 mm) or more.
6. Lower vehicle.
7. Check for looseness of radius rod ends (6) by attempting to move adjusting sleeves (10) vertically and horizontally. Replace radius rod end(s) (6) (para. 6-25) if any movement is apparent.
8. Check for damaged control arm bushings (1). Replace upper control arms (3) (para. 6-28) or lower control arms (11) (para. 6-29) if bushings (1) are damaged.
9. Set front wheels in straight ahead position. This can be checked by driving vehicle a short distance on a flat surface to determine steering wheel position at which vehicle follows a straight path.
10. Tape one end of a piece of string (12) to inner wall of front tire (7).
11. Ensure front tire (7) is straight. Pull string (12) to rear tire (7) until string (12) touches front of rear tire (7). Measure distance between string (12) and rear side wall of rear tire (7).

8-11. REAR WHEEL TOE-OUT ALIGNMENT (Cont'd)

12. Measurement must be 0-118 in. (0-3 mm). If measurement is not within specifications, perform step 13. If measurement is within specifications, proceed to step 14.
13. Loosen two locknuts (2) securing clamps (9). Turn adjusting sleeve (10) until measurement is within specifications. Roll vehicle forward then rearward and repeat steps 10 through 12 to ensure correct adjustment.
14. Repeat steps 10 through 12 for opposite side.
15. Proceed to task b.



8-11. REAR WHEEL TOE-OUT ALIGNMENT (Cont'd)

b. Toe-out Check

NOTE

- Vehicle must be on level ground with wheels set straight ahead.
 - Steps 1 through 3 will determine centerline of tire.
 - “Point of Measurement” for checking toe-out will be where lines marked in steps 1 and 3 intersect.
1. Mark line (4) on center tread (1) of tire (2) 16-3/2 in. (42 cm) from ground.
 2. Measure total width of tire tread (3) and record.
 3. Mark line (5) on center tread (1) at one-half total tread width (3).
 4. Repeat steps 1 through 3 for opposite tire.
 5. Measure distance between “Points of Measurement” on front side of tires (2) and record.
 6. Rotate tires (2) by moving vehicle forward until “Points of Measurement” are 16-1/2 in. (42 cm) above the ground at rear side of tires (2).
 7. Measure distance between “Points of Measurement” on rear side of tires (2) and record.

NOTE

- If measurement is larger on rear side of tires than measurement on front side of tires, tires have toe-in.
 - If toe-out alignment does not meet specifications, repeat checking procedures to eliminate any possible reading errors.
8. Subtract measurement from rear side of tires (2) step 7, from measurement from front side of tires (2) step 5. The result of this subtraction represents inches of toe-out. Refer to table 8-2 for toe-out specifications. If toe-out does not meet specifications, adjust toe-out (task c). Refer to table 8-2 for toe-out adjustment specifications.
 9. If toe-out is within specifications, refer to (task c), and perform step 5.

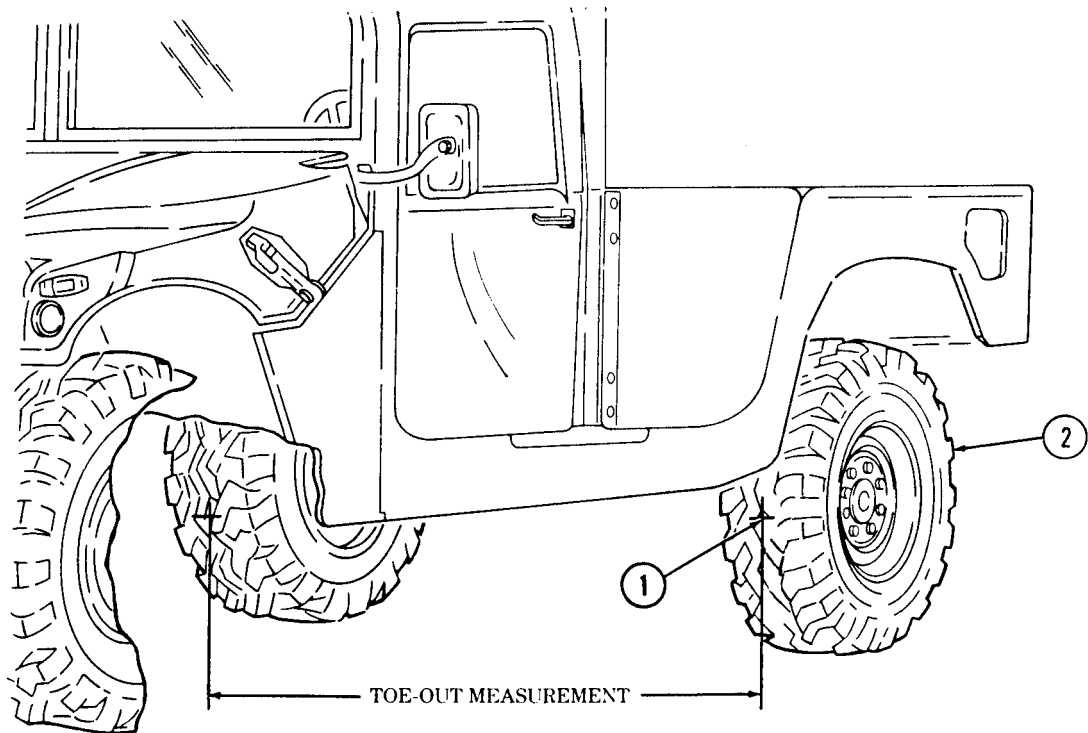
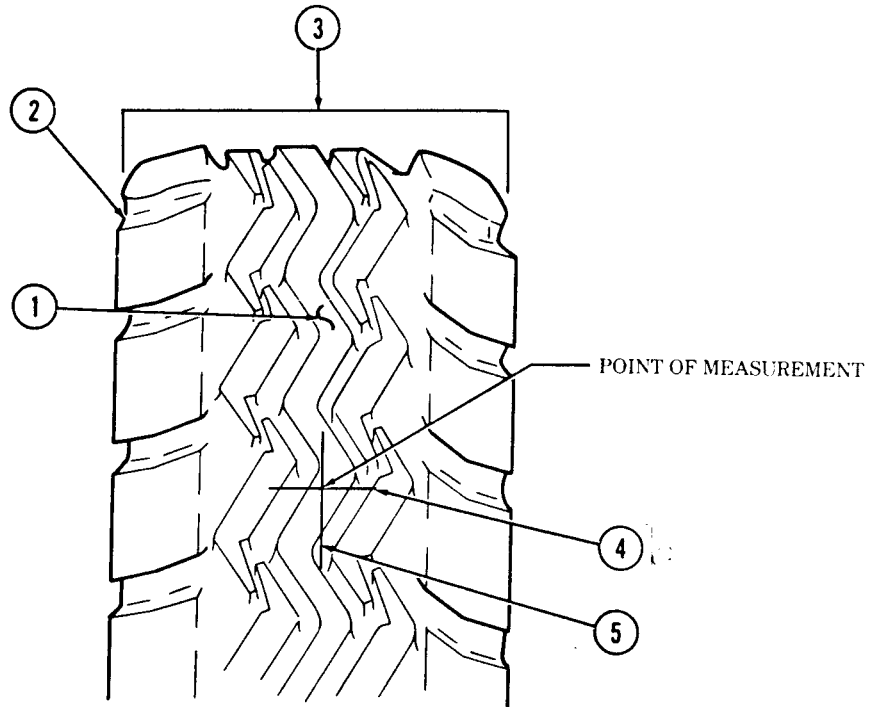
NOTE

- Vehicles should be at curb weight to ensure proper alignment. Refer to table 8-2(a.) for adjustment specifications.
- Table 8-2(b.) is optional and can be used when the vehicle’s average operation is at less than gross vehicle weight. Vehicle is to be loaded to its average operating weight when using this table.

Table 8-2. Toe-Out Alignment Adjustment Specifications.

TOE-OUT (REAR) ADJUSTMENT SPECIFICATIONS					
VEHICLE PAYLOAD	BIAS TIRE		RADIAL TIRE		
	MODELS M998, M1025, M1026, M1035, M1038, M1043, M1044	MODELS: M966, M996, M997, M1036, M1037, M1042, M1045, M1046	MODELS: M996, M996A1, M998, M998A1, M1025, M1025A1, M1025A2, M1026, M1026A1, M1035, M1035A1, M1035A2, M1036, M1038, M1038A1, M1043A2, M1043, M1043A1, M1044, M1044A1, M1045, M1045A1, M1045A2, M1046, M1046A1	MODELS: M997, M997A1, M997A2, M1037, M1042	MODELS: M1097, M1087A1, M1097A2
a. Vehicle @ curb weight	7/16 ± 1/8 in. (11 mm ± 3 mm)	5/16 ± 1/8 in. (8 mm ± 3 mm)	1/2 ± 1/16 in. (12.5 mm ± 1.5 mm)	1/2 ± 1/16 in. (12.5 mm ± 1.5 mm)	1/2 ± 1/16 in. (12.5 mm ± 1.5 mm)
b. Vehicle @ normal operating weight (optional)	1/4 ± 1/8 in. (6 mm ± 3 mm)	1/4 ± 1/8 in. (6 mm ± 3 mm)	1/16 ± 1/16 in. (1.5 mm ± 1.5 mm)	1/16 ± 1/16 in. (1.5 mm ± 1.5 mm)	1/16 ± 1/16 in. (1.5 mm ± 1.5 mm)

8-11. REAR WHEEL TOE-OUT ALIGNMENT (Cont'd)



8-11. REAR WHEEL TOE-OUT ALIGNMENT (Cont'd)

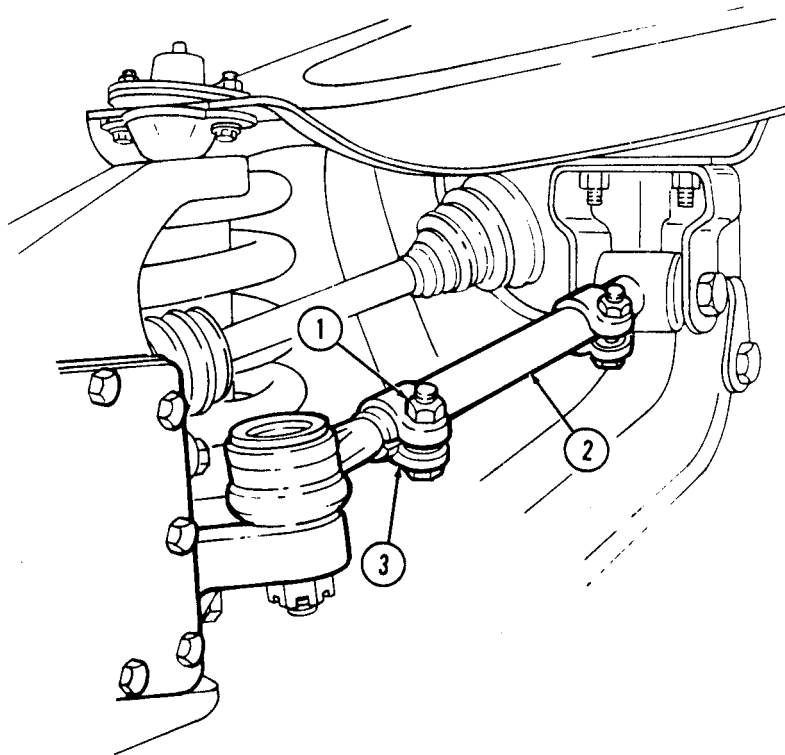
c. Toe-out Adjustment

1. Loosen two locknuts (1) securing two clamps (3) on each adjusting sleeve (2).

NOTE

Toe-out can be increased or decreased by changing length of radius rods. A threaded sleeve is provided for this purpose.

2. Turn each adjusting sleeve (2) equally but in opposite directions.
3. Roll vehicle rearward then forward to original position.
4. Repeat toe-out check and adjustment procedures until correct adjustment is indicated.
5. Secure two clamps (3) on each adjusting sleeve (2) with two locknuts (1). Tighten locknuts (1) to 30 lb-ft (40 N·m).



FOLLOW-ON TASK: Operate vehicle (TM 9-2320-280-10) and check for pull or wander.

Section II. STEERING COMPONENTS MAINTENANCE

8-12. STEERING COMPONENTS MAINTENANCE TASK SUMMARY

TASK PARA.	PROCEDURES	PAGE NO.
8-13.	Steering Wheel Replacement	8-44
8-14.	Pitman Arm Replacement	8-46
8-15.	Center Link Replacement	8-48
8-16.	Tie Rod Maintenance	8-50
8-17.	Tie Rod End Replacement	8-52
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8-24.	Power Steering Pump, Pulley, and Bracket Maintenance (6.2L)	8-72
8-24.1.	Power Steering Pump and Pulley Replacement (6.5L)	8-74.2
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8-25.	Power Steering Hydraulic System Pressure and Return Hose Replacement	8-76
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8-28.	Power Steering Cooler Replacement	8-84
8-29.	Power Steering System Bleeding	8-86
8-30.	Power Steering Relief Valve Cartridge Maintenance	8-87

8-13. STEERING WHEEL REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)
Steering wheel puller (Appendix B, Item 169)

Manual References

TM 9-2320-280-24P

Equipment Condition

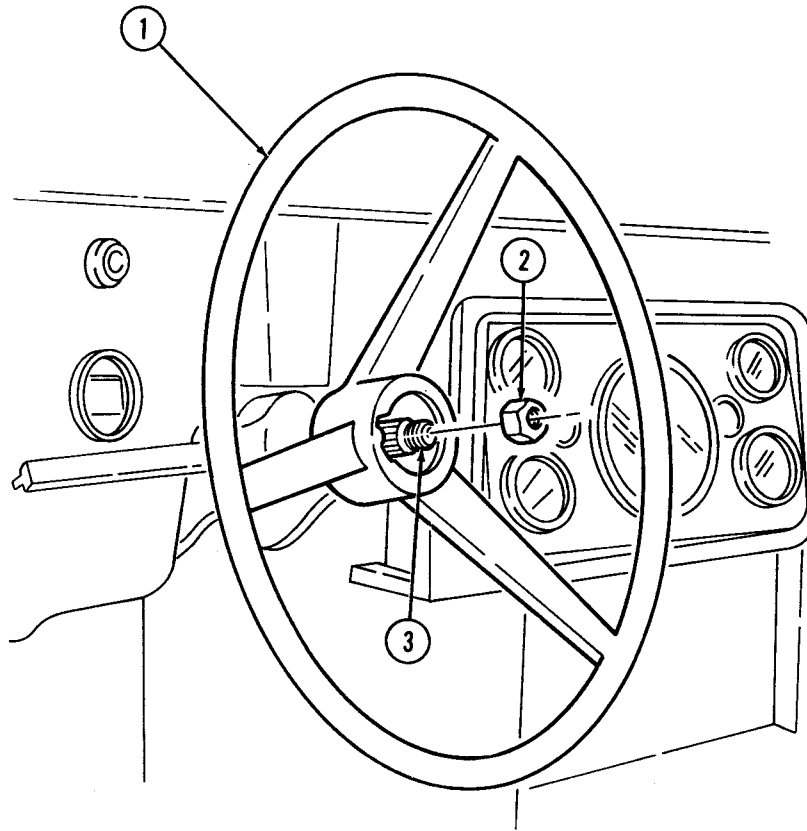
- Horn switch removed (para. 4-20).
- Directional signal control removed (para. 4-65).
- Directional signal control cancelling ring removed (para. 4-66).

a. Removal

1. Remove nut (2) from steering steering wheel (1) and shaft (3).
2. Using puller, remove steering wheel (1).

b. Installation

1. Align splines on steering wheel (1) with splines on shaft (3).
2. Install steering wheel (1) on shaft (3) with nut (2). Tighten nut (2) to 35 lb-ft (47 N•m).
3. Peen nut (2).

8-13. STEERING WHEEL REPLACEMENT (Cont'd)

- FOLLOW-ON TASKS:
- Install directional signal control cancelling ring (para. 4-66).
 - Install directional signal control (para. 4-65).
 - Install horn switch (para. 4-20).

8-14. PITMAN ARM REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
 automotive (Appendix B, Item 1)
 Puller kit (Appendix B, Item 167)

Manual References

TM 9-2320-280-10
 TM 9-2320-280-24P

Materials/Parts

Cotter pin (Appendix G, Item 14)
 Lockwasher (Appendix G, Item 192)

Equipment Condition

Front of vehicle raised and supported (para. 8-2).

NOTE

Ensure front wheels are in straight ahead position while pitman arm is removed and installed.

a. Removal

1. Remove nut (1), lockwasher (2), and pitman arm (3) from steering gear shaft (4). Discard lockwasher (2).
2. Remove cotter pin (6) and slotted nut (7) from pitman arm (3) and center link (5). Discard cotter pin (6).
3. Using puller, remove pitman arm (3) from center link (5).

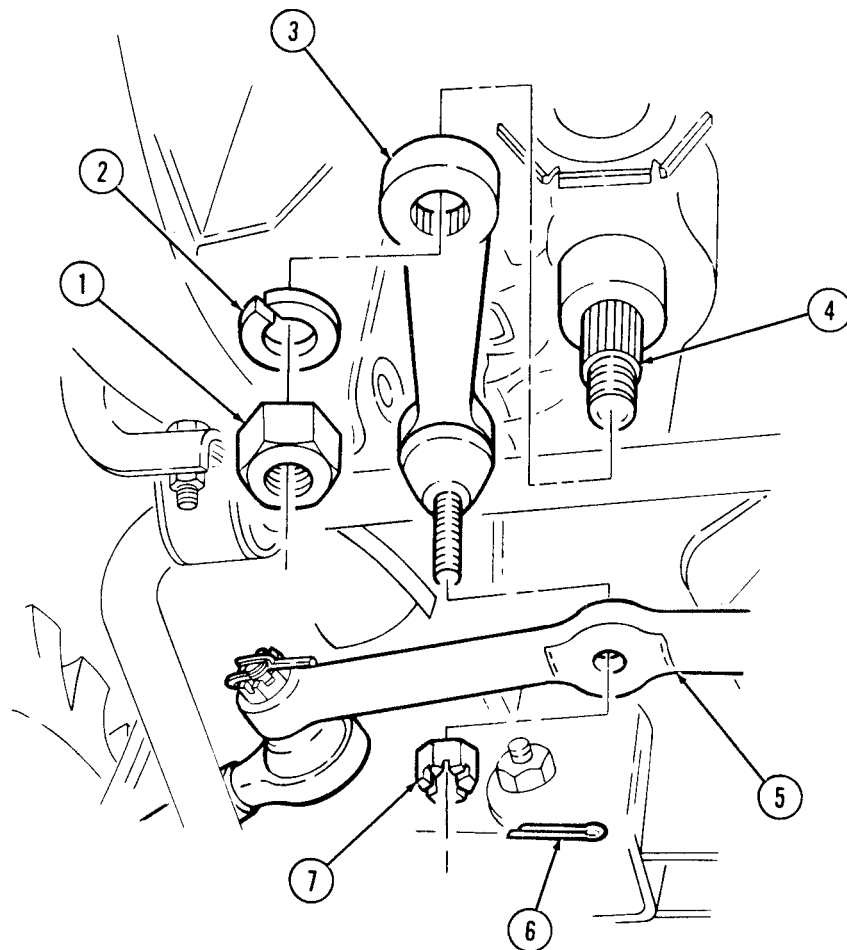
b. Installation

1. Install pitman arm (3) on steering gear shaft (4) with lockwasher (2) and nut (1).
2. Install pitman arm (3) on center link (5) with slotted nut (7). Tighten slotted nut (7) to 80 lb-ft (108 N•m).
3. Tighten nut (1) to 185 lb-ft (251 N•m).

CAUTION

Do not loosen slotted nut to install cotter pin. Doing this may result in damage to equipment.

4. Install cotter pin (6) in slotted nut (7).

8-14. PITMAN ARM REPLACEMENT (Cont'd)

- FOLLOW-ON TASKS:
- Lubricate pitman arm (TM 9-2320-280-10).
 - Remove supports and lower front of vehicle (para. 8-2).

8-15. CENTER LINK REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
 automotive (Appendix B, Item 1)
 Puller kit (Appendix B, Item 167)

Manual References

TM 9-2320-280-24P

Equipment Condition

Front of vehicle raised and supported (para. 8-2).

Materials/Parts

Four cotter pins (Appendix G, Item 14)

CAUTION

Use of a pickle fork in lieu of puller kit may damage serviceable components (boots).

a. Removal

1. Remove cotter pin (5) and slotted nut (4) from idler arm (8) and center link (3). Discard cotter pin (5).
2. Remove cotter pin (9) and slotted nut (10) from pitman arm (2) and center link (3). Discard cotter pin (9).
3. Remove two cotter pins (1) and slotted nuts (6) from two tie rods (7) and center link (3). Discard cotter pins (1).
4. Using puller, remove center link (3) from two tie rods (7), idler arm (8), and pitman arm (2).

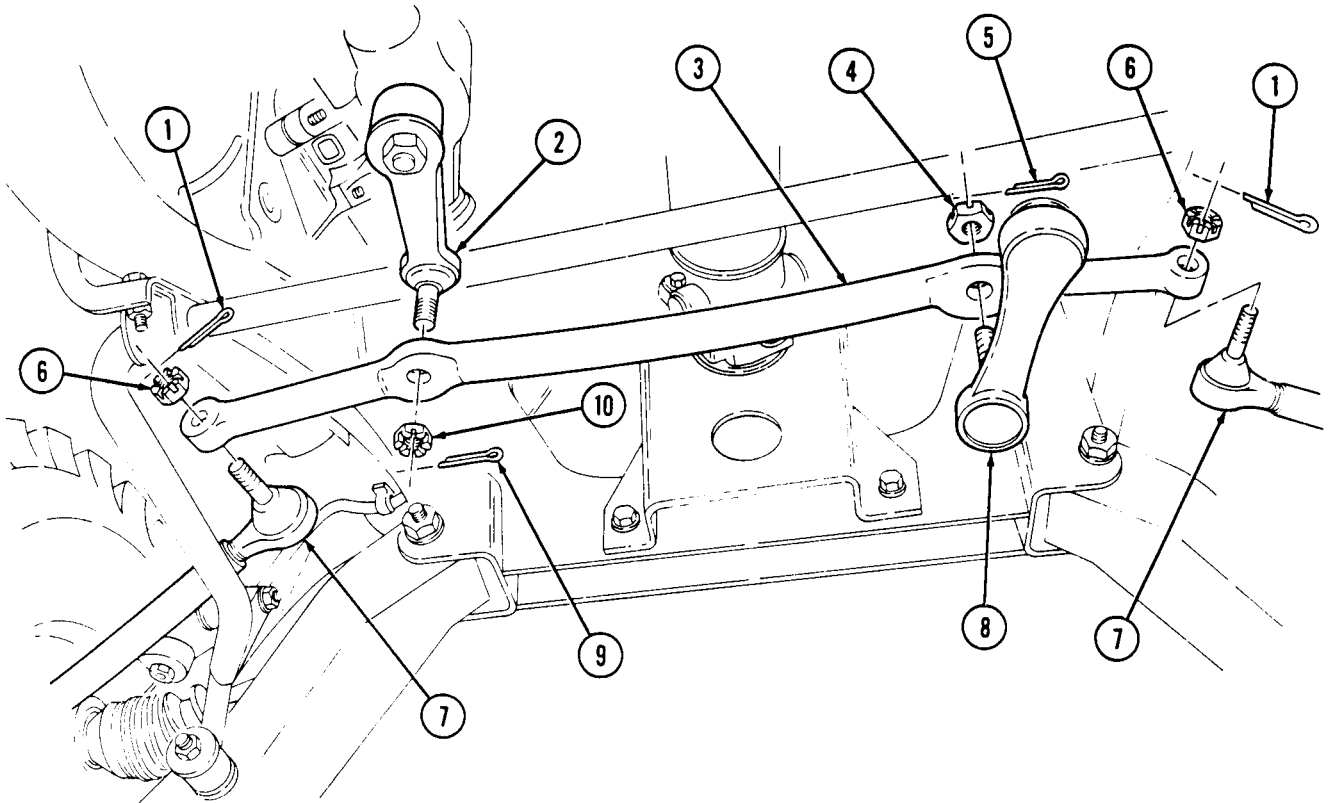
b. Installation

CAUTION

Do not loosen slotted nut to install cotter pin. Doing this may result in damage to equipment.

1. Install center link (3) on pitman arm (2) and idler arm (8) with slotted nuts (4) and (10). Tighten slotted nuts (4) and (10) to 80 lb-ft (108 N•m).
2. Install cotter pins (5) and (9) in slotted nuts (4) and (10).
3. Install two tie rods (7) to center link (3) with two slotted nuts (6). Tighten slotted nuts (6) to 70 lb-ft (95 N•m).
4. Install two cotter pins (1) in slotted nuts (6).

8-15. CENTER LINK REPLACEMENT (Cont'd)



FOLLOW-ON TASK: Remove supports and lower front of vehicle (para. 8-2).

8-16. TIE ROD MAINTENANCE

This task covers:

- | | |
|--|--|
| <ul style="list-style-type: none"> a. Removal b. Disassembly | <ul style="list-style-type: none"> c. Assembly d. Installation |
|--|--|

INITIAL SETUP:

Tools

General mechanic's tool kit:
 automotive (Appendix B, Item 1)
 Puller kit (Appendix B, Item 167)

Manual References

TM 9-2320-280-10
 TM 9-2320-280-24P

Materials/Parts

Two cotter pins (Appendix G, Item 14)

Equipment Condition

Front of vehicle raised and supported (para. 8-2).

CAUTION

Use of a pickle fork in lieu of puller kit may damage serviceable components (boots).

a. Removal

1. Remove cotter pin (8), and slotted nut (7) from tie rod (2) and center link (1). Discard cotter pin (8).
2. Remove cotter pin (6), slotted nut (5), washer (4), and tie rod (2) from geared hub (3). Discard cotter pin (6).

b. Disassembly

1. Loosen two capscrews (10), nuts (13), and clamps (11) securing tie rod ends (9) to adjusting sleeve (12).

NOTE

Note number of threads exposed on each tie rod end for installation. Approximately the same number of threads should be exposed on each tie rod end.

2. Remove two tie rod ends (9) from adjusting sleeve (12).
3. Remove two nuts (13), capscrews (10), and clamps (11) from adjusting sleeve (12).

c. Assembly

1. Install two clamps (11), capscrews (10), and nuts (13) on adjusting sleeve (12).
2. Install two tie rod ends (9) into adjusting sleeve (12), turning tie rod ends (9) equally but in opposite directions.

d. Installation

1. Install tie rod (2) to center link (1) with slotted nut (7). Tighten slotted nut (7) to 70 lb-ft (95 N·m).

CAUTION

Do not loosen slotted nut to install cotter pin. Doing this may result in damage to equipment.

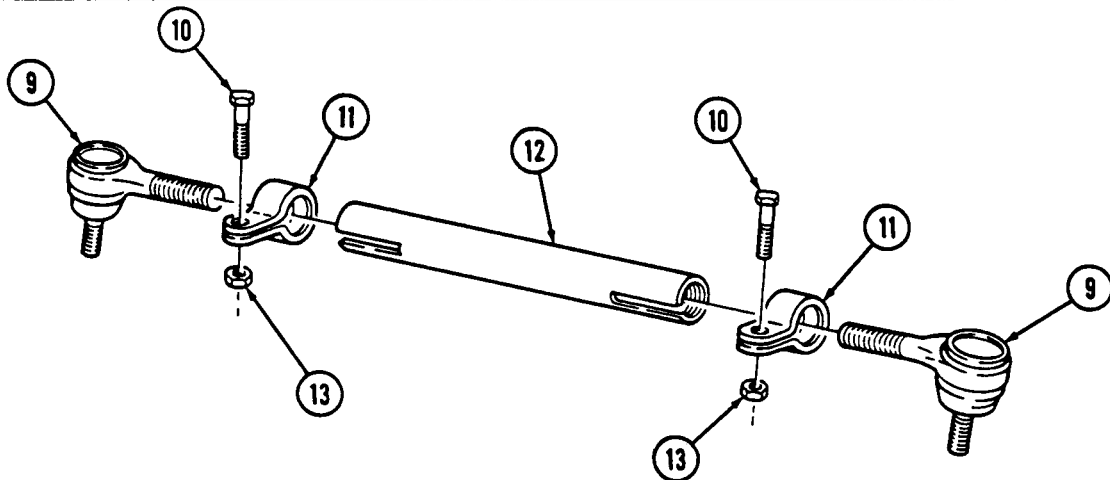
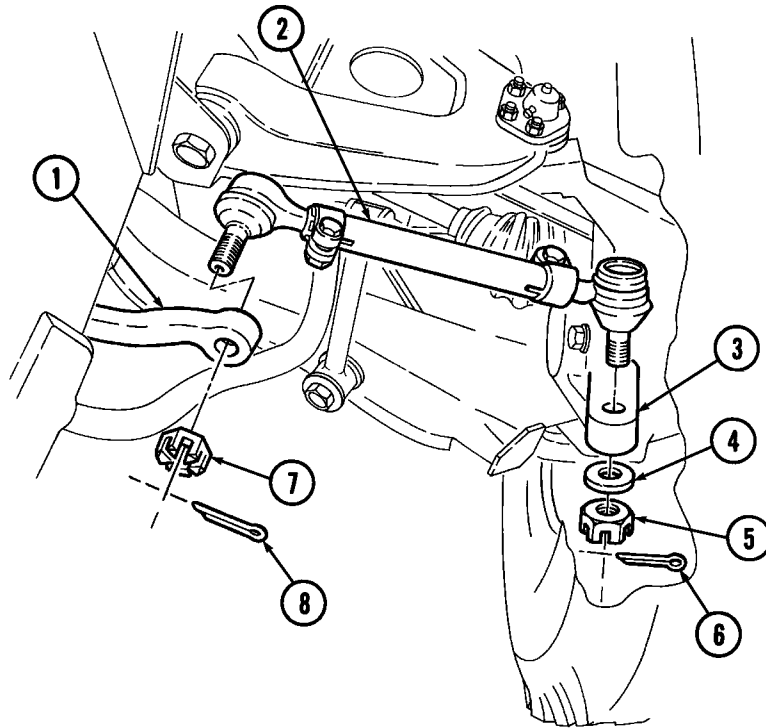
2. Install tie rod (2) to geared hub (3) with washer (4) and slotted nut (5). Tighten slotted nut (5) to 70 lb-ft (95 N·m).
3. Install cotter pin (8) in slotted nut (7).
4. Install cotter pin (6) in slotted nut (5).

8-16. TIE ROD MAINTENANCE (Cont'd)

CAUTION

Ensure the outboard clamp faces the halfshaft and the inboard clamp faces away from the stabilizer bar (front only) or damage to equipment may result.

5. Tighten two locknuts (13).



- FOLLOW-ON TASKS:
- Lubricate tie rod end (TM 9-2320-280-10).
 - Remove supports and lower front of vehicle (para. 8-2).
 - Align toe-in (para. 8-10).

8-17. TIE ROD END REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
 automotive (Appendix B, Item 1)
 Pickle fork (Appendix B, Item 129)

Manual References

TM 9-2320-280-10
 TM 9-2320-280-24P

Materials/Parts

Cotter pin (Appendix G, Item 14)

Equipment Condition

Front of vehicle raised and supported (para. 8-2).

a. Removal

1. Remove cotter pin (8), slotted nut (7), and washer (6) from tie rod end (4) and geared hub (5). Discard cotter pin (8).
2. Using puller, remove tie rod end (4) from geared hub (5).

NOTE

Note number of threads exposed on each tie rod end for installation. Approximately the same number of threads should be exposed on each tie rod end.

3. Loosen nut (9), capscrew (2), clamp (3), and tie rod end (4) from adjusting sleeve (1).

b. Installation

CAUTION

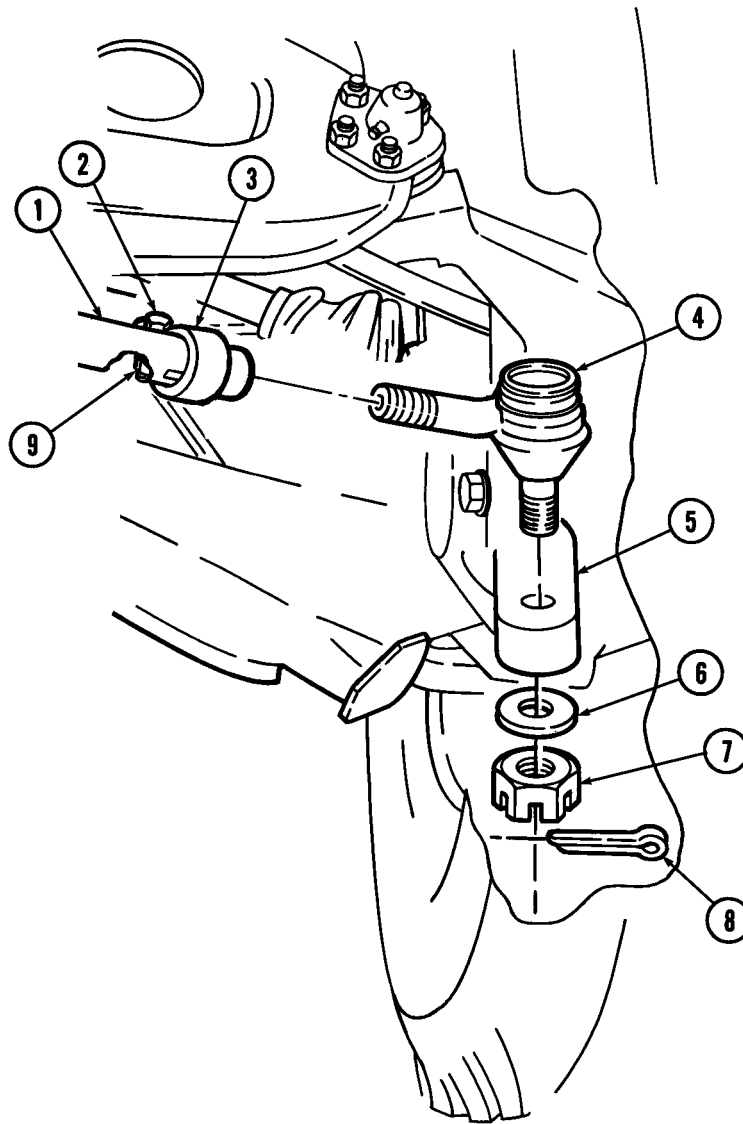
Ensure flange side of clamp faces halfshaft or damage to equipment may result.

1. Install tie rod end (4) on adjusting sleeve (1) with clamp (3), capscrew (2), and nut (9).

CAUTION

Do not loosen slotted nut to install cotter pin. Doing this may result in damage to equipment.

2. Install tie rod end (4) on geared hub (5) with washer (6) and slotted nut (7). Tighten slotted nut (7) to 70 lb-ft (95 N•m).
3. Install cotter pin (8) on tie rod end (4) and slotted nut (7).

8-17. TIE ROD END REPLACEMENT (Cont'd)

- FOLLOW-ON TASKS:
- Lubricate tie rod end (TM 9-2320-280-10).
 - Remove supports and lower front of vehicle (para. 8-2).
 - Align toe-in (para. 8-10).

8-18. IDLER ARM MAINTENANCE

This task covers:

- a. Removal
- c. Inspection
- b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
 automotive (Appendix B, Item 1)
 Pickle fork (Appendix B, Item 129)
 Spring scale, dial indicating
 (Appendix B, Item 2)

Manual References

TM 9-2320-280-10
 TM 9-2320-280-24P

Equipment Condition

Front of vehicle raised and supported
 (para. 8-2).

Materials/Parts

Cotter pin (Appendix G, Item 14)

a. Removal

1. Remove cotter pin (1) and slotted nut (8) from idler arm (7) and center link (2). Discard cotter pin (1).
2. Using puller, disconnect center link (2) from idler arm (7).
3. Remove two nuts (6), washers (4), capscrews (3), washers (4), and idler arm (7) from frame (5).

b. Installation

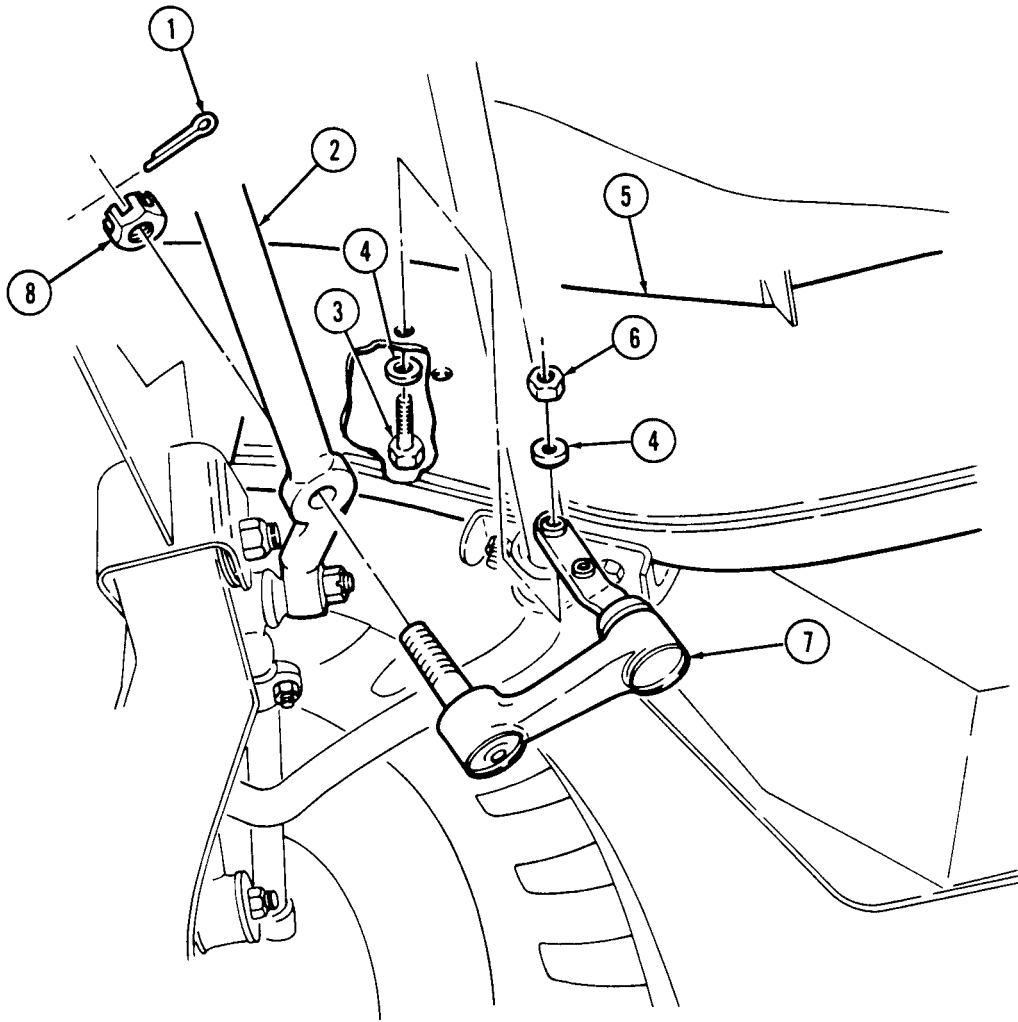
1. Install idler arm (7) to frame (5) with two washers (4), capscrews (3), washers (4), and nuts (6). Tighten nuts (6) to 60 lb-ft (81 N•m).
2. Install idler arm (7) to center link (2) with slotted nut (8). Tighten slotted nut (8) to 80 lb-ft (108 N•m).

CAUTION

Do not loosen slotted nut to install cotter pin. Doing this may result in damage to equipment.

3. Install cotter pin (1) in slotted nut (8).

8-18. IDLER ARM MAINTENANCE (Cont'd)



8-18. IDLER ARM MAINTENANCE (Cont'd)

c. Inspection

NOTE

Set front wheels in a straight ahead position.

1. Check idler arm (5) for visible damage, such as breaks and cracks. If damaged, replace idler arm (5).
2. Check capscrews (4) for looseness of idler arm bracket (3) on frame (6). Tighten capscrews (4) if loose.

NOTE

A flat steelplate or piece of scrap metal is required for step 3.

3. Secure a flat steelplate or piece of scrap metal to front crossmember (2).
4. Pull center link (1) downward to seat ball and socket of idler arm (5).
5. Using flat surface on center link (1) as a guide, mark first reference line on steelplate or scrap metal, as shown in figure A.
6. Position spring scale (7) on center link (1) and pull in an upward direction to obtain a 25 lb (11Kg) reading on spring scale (7).

NOTE

Maintain 25 lb (11 Kg) reading on spring scale (7) to perform step 7.

7. Using flat surface on center link (1) as a guide, mark second reference line on steel plate or scrap metal, as shown in figure B.
8. Remove spring scale (7) from center link (1).
9. Remove clamp and steelplate or scrap metal from front crossmember (2).
10. Measure distance between first and second reference line on steel plate or scrap metal. If measurement exceeds 0.25 inch (6mm), replace idler arm (5).

8-18. IDLER ARM MAINTENANCE (Cont'd)

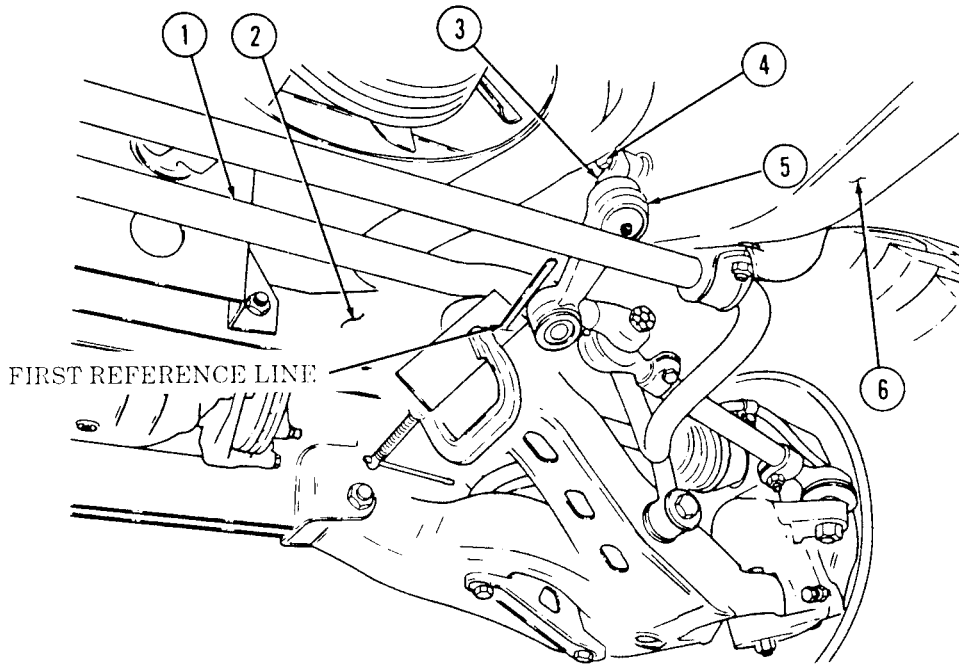


Figure A

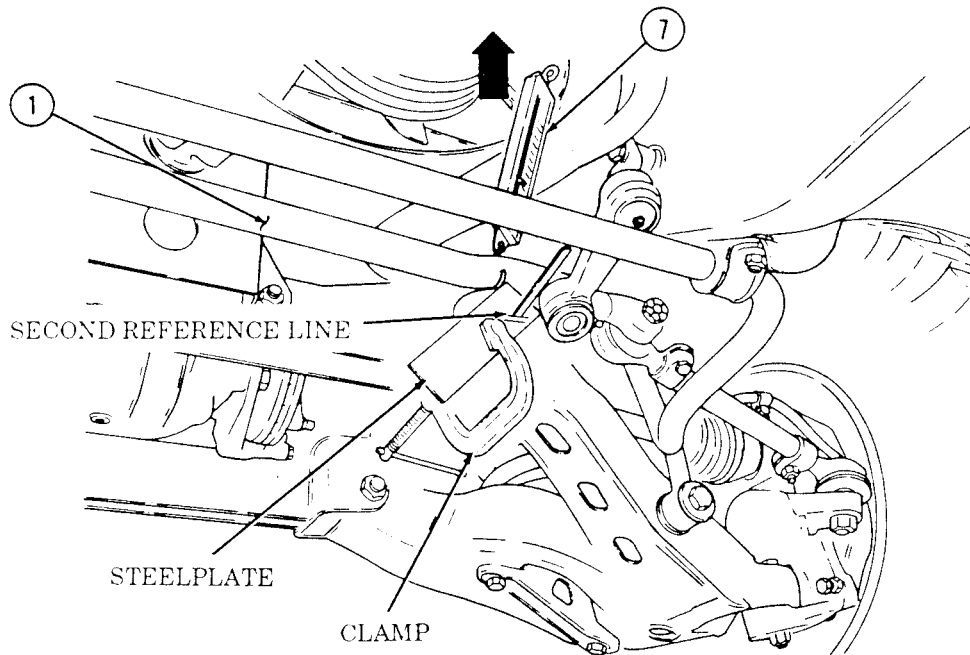


Figure B

- FOLLOW-ON TASKS:
- Lubricate idler arm (TM 9-2320-280-10).
 - Remove supports and lower front of vehicle (para. 8-2).

8-19. STEERING COLUMN REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Two locknuts (Appendix G, Item 70)
Lockwasher (Appendix G, Item 133)
Plain-assembled nut (Appendix G, Item 201)
Two locknuts (Appendix G, Item 79) (A2 Series)
Locknut (Appendix G, Item 100)
Locknut (Appendix G, Item 126)
Locknut (Appendix G, Item 128)

Manual References

TM 9-2320-280-24P

Equipment Condition

- Steering wheel removed (para. 8-13).
- Directional signal control removed (para. 4-64 or 4-65).

a. Removal

NOTE

- Only vehicles with serial number 99,999 and below, using steering column part number 1419, are equipped with spacers as indicated in step 1.
 - Steering column part number 1419 is no longer available and is being replaced with part number 1493.
1. Remove locknut (1), lockwasher (2), washer (3), pin (6), and two spacers (5) from steering column (7) and mounting bracket (4). Discard lockwasher (2) and locknut (1).
 2. Remove plain-assembled nut (18), screw (9), and ground 57C (15) from steering column (7). Discard plain-assembled nut (18).

NOTE

Perform step 3 for vehicles with serial numbers 100,000 and above only.

3. Remove locknut (10), washer (11), capscrew (12), washer (11), and two brackets (8) from steering column (7). Discard locknut (10).
4. Disconnect lead 25A (21) from steering column (7).

NOTE

When performing step 5, temporarily install steering wheel and turn steering column to gain access to steering column intermediate shaft mounting hardware.

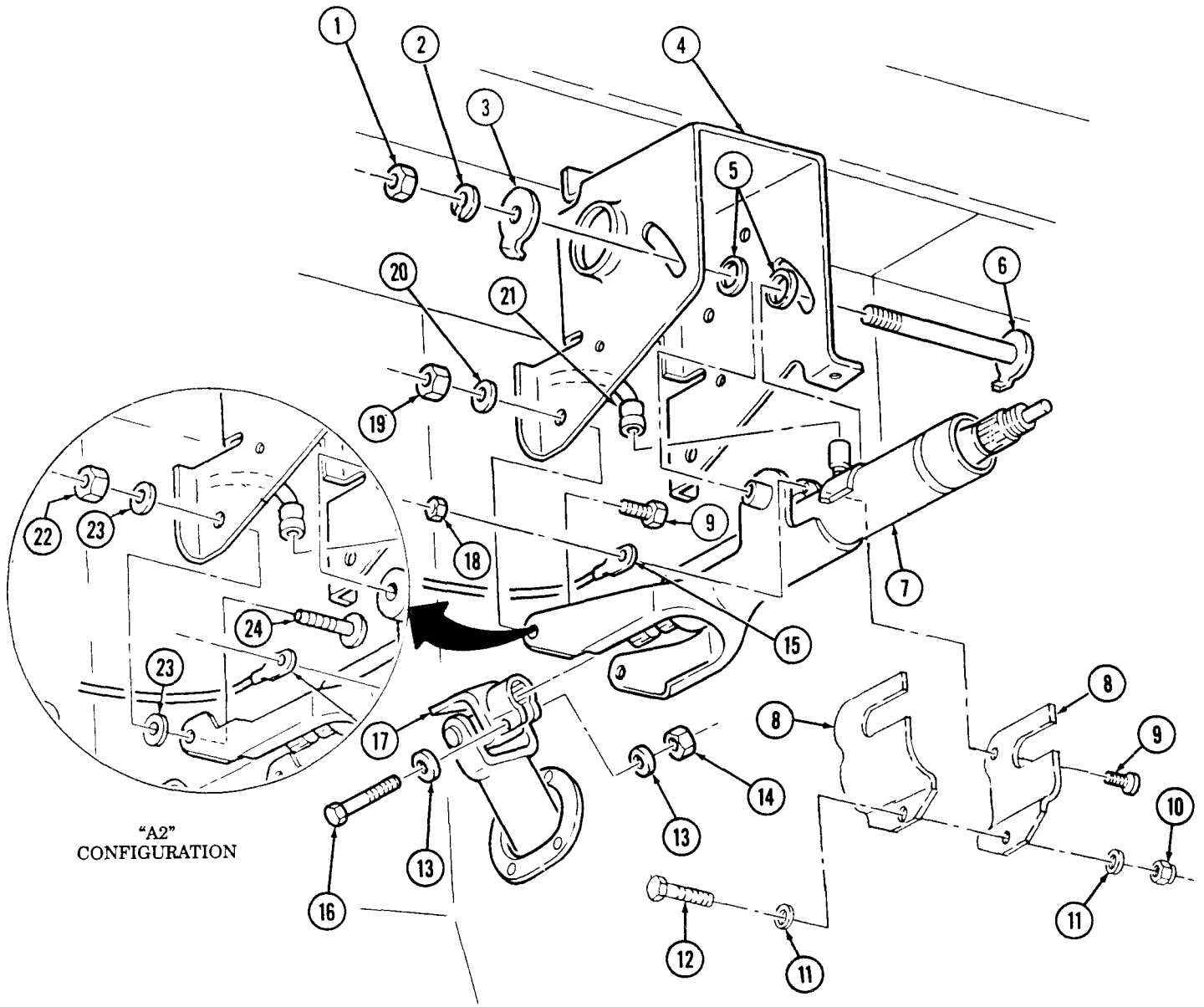
5. Remove locknut (14), washer (13), capscrew (16), and washer (13) and disconnect intermediate shaft (17) from steering column (7). Discard locknut (14).

NOTE

Perform step 6 for "A2" series vehicles only.

6. Remove two locknuts (22), washers (23), screws (24), washers (23), and steering column (7) from mounting bracket (4). Discard locknuts (22).
7. Remove two locknuts (19), washers (20), shoulder bolts (9), and steering column (7) from mounting bracket (4). Discard locknuts (19).

8-19. STEERING COLUMN REPLACEMENT (Cont'd)



8-19. STEERING COLUMN REPLACEMENT (Cont'd)

b. Installation

NOTE

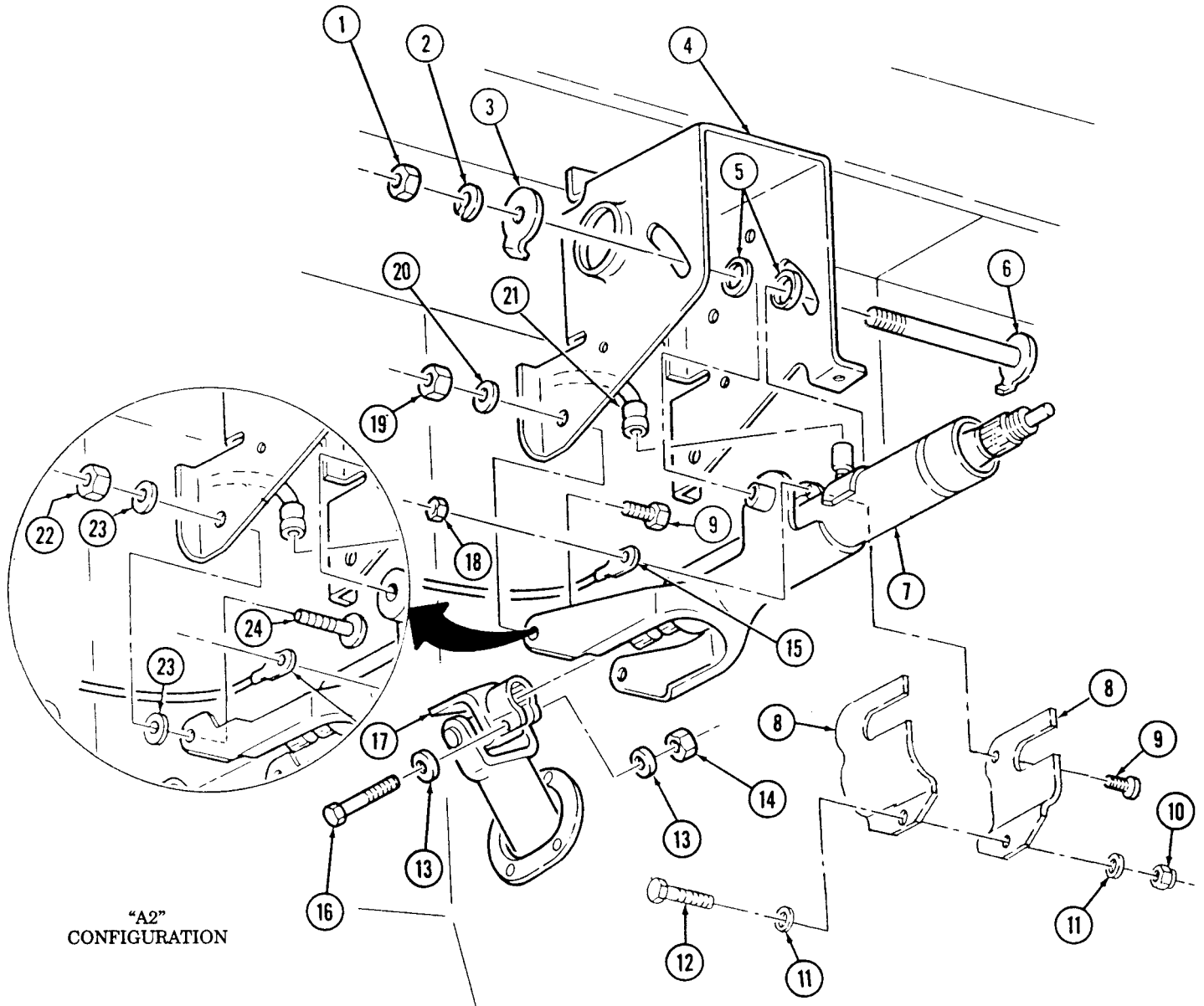
Perform step 1 for "A2" series vehicles only.

1. Install steering column (7) on mounting bracket (4) with two washers (23), screws (24), washers (23) and locknuts (22). Tighten locknuts (22) finger tight.
2. Install steering column (7) on mounting bracket (4) with two shoulder bolts (9), washers (20), and locknuts (19). Tighten locknuts (19) finger tight
3. Install intermediate shaft (17) on steering column (7) with washer (13), capscrew (16), washer (13), and locknut (14). Tighten locknut (14) to 40-50 lb-ft (54-68 N•m).
4. Connect lead 25A (21) to steering column (7).
5. Install two brackets (8) on steering column (7) with washer (11), capscrew (12), washer (11), and locknut (10).
6. Install ground 57C (15) on steering column (7) with screw (9) and plain-assembled nut (18).

NOTE

- Only vehicles with serial number 99,999 and below using steering column part number 1419, are equipped with spacers as indicated in step 7.
 - Insert washer and pin with locking tabs in the "up" position.
7. Secure steering column (7) to mounting bracket (4) with two spacers (5), pin (6), washer (3), lockwasher (2), and locknut (1). Tighten locknut (1) finger tight.
 8. Position steering column (7) in upright position and tighten locknut (1) to 12-15 lb-ft (16-20 N•m).
 9. Tighten locknuts (22) and (19) to 9-11 lb-ft (12-15 N•m).

8-19. STEERING COLUMN REPLACEMENT (Cont'd)



- FOLLOW-ON TASKS:**
- Install directional signal control (para. 4-64 or 4-65).
 - Install steering wheel (para. 8-13).

8-20. INTERMEDIATE STEERING SHAFT REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Materials/Parts

Two locknuts (Appendix G, Item 100)

NOTE

Ensure front wheels are in straight-ahead position while removing and installing intermediate steering shaft.

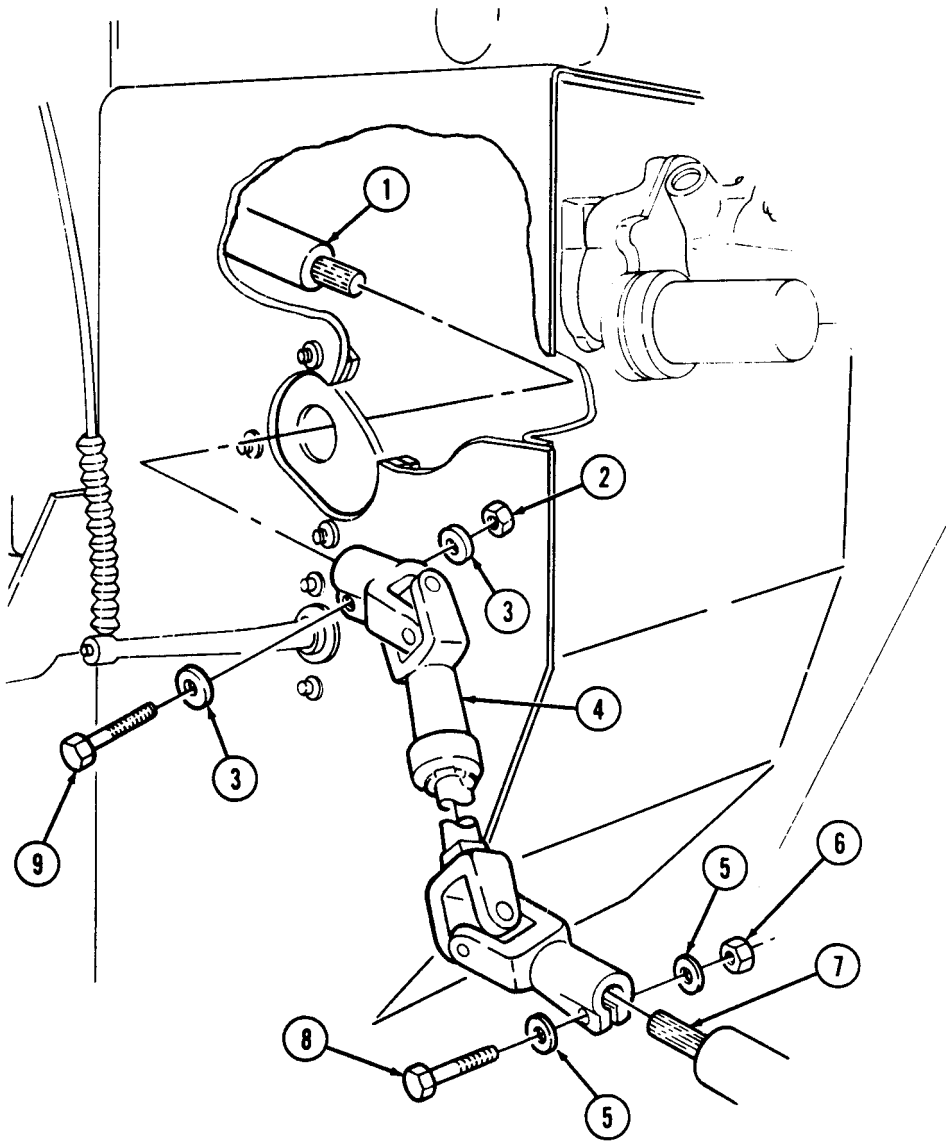
a. Removal

1. Remove locknut (6), washer (5), capscrew (8), and washer (5) from intermediate steering shaft (4) and steering gear (7). Discard locknut (6).
2. Remove locknut (2), washer (3), capscrew (9), washer (3), and steering shaft (4) from steering column (1). Discard locknut (2).

b. Installation

1. Install intermediate steering shaft (4) on steering gear (7) with washer (5), capscrew (8), washer (5), and locknut (6). Tighten locknut (6) to 40-50 lb-ft (54-68 N•m).
2. Install steering shaft (4) on steering column (1) with washer (3), capscrew (9), washer (3), and locknut (2). Tighten locknut (2) to 40-50 lb-ft (54-68 N•m).

8-20. INTERMEDIATE STEERING SHAFT REPLACEMENT (Cont'd)



FOLLOW-ON TASK: Lubricate steering shaft (TM 9-2320-280-10).

8-21. STEERING GEAR REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Materials/Parts

Locknut (Appendix G, Item 100)
Lockwasher (Appendix G, Item 192)
Three lockwashers (Appendix G, Item 188)

Equipment Condition

- Hood raised and secured (TM 9-2320-280-10).
- Battery ground cable disconnected (para. 4-73).

a. Removal

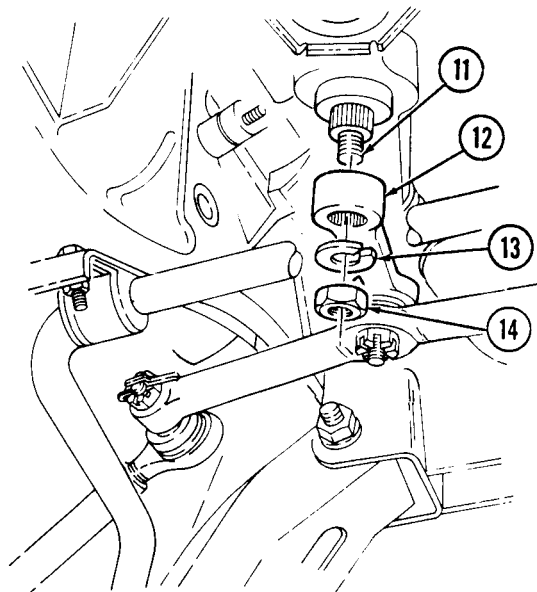
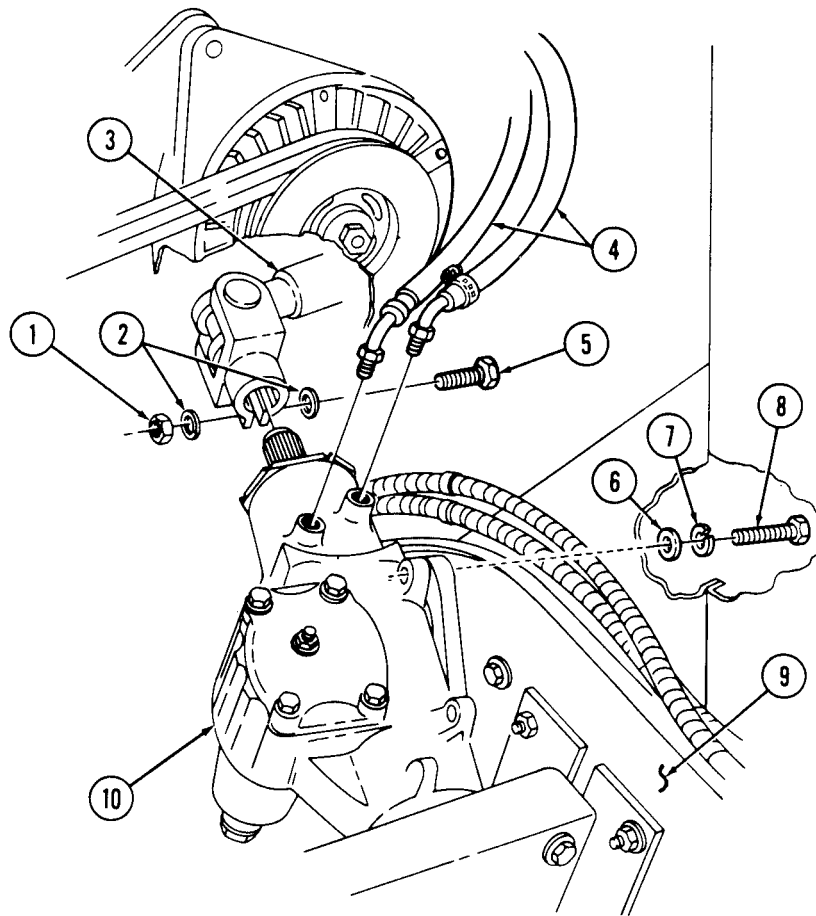
CAUTION

Cover or plug all open lines and connections immediately after disconnection to prevent contamination. Remove all plugs prior to connection.

NOTE

- Make sure front wheels are in the straight ahead position.
 - Have drainage container ready to catch fluid.
1. Disconnect two power steering lines (4) from steering gear (10).
 2. Turn steering wheel left and right several times to bleed off power steering fluid.
 3. Remove intermediate shaft locknut (1), washer (2), capscrew (5), and washer (2) and disconnect intermediate shaft (3) from steering gear (10). Discard locknut (1).
 4. Remove nut (14) and lockwasher (13) from pitman arm (12). Discard lockwasher (13).
 5. Remove pitman arm (12) from shaft (11).
 6. Remove three capscrews (8), lockwashers (7), washers (6), and steering gear (10) from frame (9). Discard lockwashers (7).

8-21. STEERING GEAR REPLACEMENT (Cont'd)



8-21. STEERING GEAR REPLACEMENT (Cont'd)

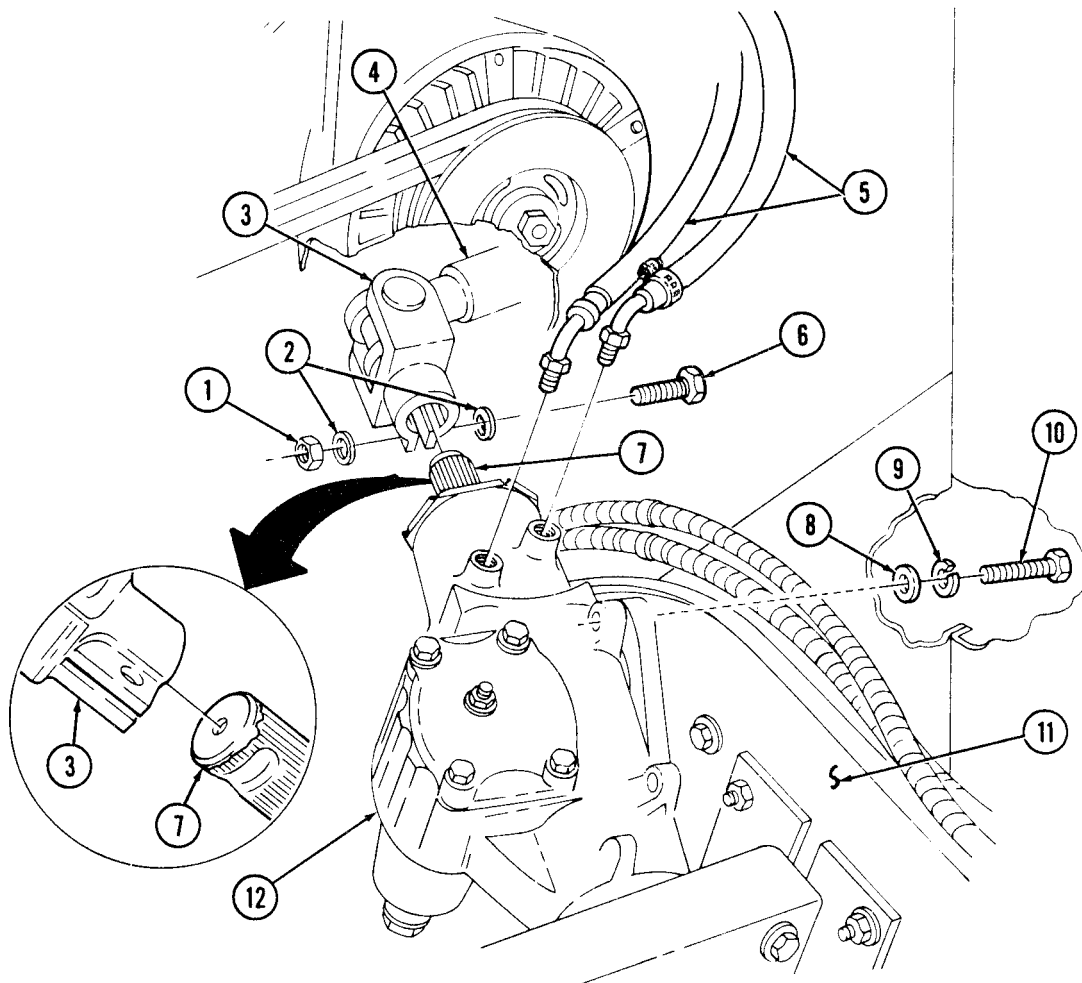
b. Installation

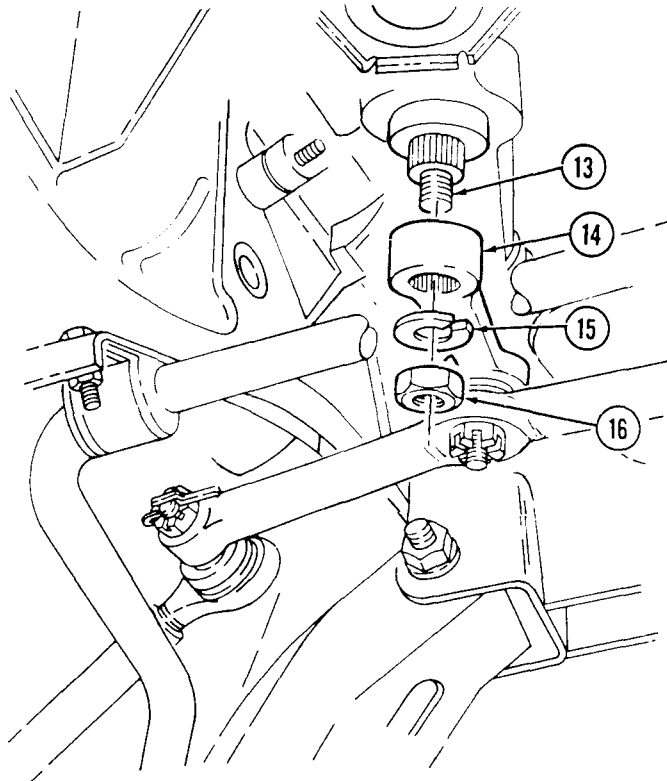
1. Install steering gear (12) on frame (11) with three washers (8), lockwashers (9), and capscrews (10). Tighten capscrews (10) to 54-66 lb-ft (73-89 N·m).
2. Align hole in yoke (3) with notch on steering gear splines (7) and slide intermediate shaft (4) on steering gear splines (7).
3. Install intermediate shaft (4) to steering gear splines (7) with washer (2), capscrew (6), washer (2), and locknut (1). Tighten locknut (1) to 40-50 lb-ft (54-68 N·m).
4. Connect two power steering lines (5) to steering gear (12).

NOTE

Make sure front wheels are in the straight-ahead position.

5. Install pitman arm (14) on shaft (13) with lockwasher (15) and nut (16). Tighten nut (16) to 167-203 lb-ft (227-275 N·m).



8-21. STEERING GEAR REPLACEMENT (Cont'd)

- FOLLOW-ON TASKS:
- Fill power steering reservoir (TM 9-2320-280-10).
 - Connect battery ground cable (para. 4-73).
 - Bleed power steering system (para. 8-29).

8-22. STEERING SHAFT U-JOINT REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)
Universal joint bearing kit
(Appendix B, Item 171)

Manual References

TM 9-2320-280-24P

Equipment Condition

Intermediate steering shaft removed (para. 8-20).

Materials/Parts

Universal joint spider (Appendix G, Item 297)

a. Removal

CAUTION

Do not drop bearing cups. Needle bearings can be easily lost.

NOTE

Removal and installation procedures are basically the same for both U-joints. This procedure covers the U-joint attached to steering gear.

1. Remove grease fitting (6) from cross (1).
2. Remove two snaprings (3) from bearing cups (4) in steering gear yoke (5).
3. Position steering gear yoke (5) in vise with 1-1/8-in. (29 mm) socket between vise jaw and bearing cup (4) being removed. Ensure open end of socket is facing bearing cup (4).
4. Place 11/16-in. (17 mm) socket between opposite bearing cup (4) and vise jaw. Ensure open end of socket is facing vise jaw.
5. Press bearing cup (4) out of steering gear yoke (5) and remove bearing cup (4) from cross (1).
6. Reverse position of sockets and press remaining bearing cup (4) out of steering gear yoke (5).
7. Remove steering gear yoke (5) from cross (1).
8. Repeat steps 2 through 6 for steering shaft yoke (2).
9. Remove cross (1) from steering shaft yoke (2).

b. Installation

1. Install cross (1) into steering shaft yoke (2).
2. Install bearing cup (4) into steering shaft yoke (2).

CAUTION

Ensure bearing cup is aligned with steering shaft yoke before pressing in with vise. Damage to cross and bearing cups will result if forced into yoke.

3. Place steering shaft yoke (2) in vise with 11/16-in. (17 mm) socket between vise jaw and bearing cup (4).
4. Press bearing cup (4) into steering shaft yoke (2) far enough to install snapring (3) and install snapring (3) on bearing cup (4).
5. Install other bearing cup (4) into steering shaft yoke (2).
6. Place steering shaft yoke (2) in vise with 11/16-in. (17 mm) socket between bearing cup (4) and vise jaw.
7. Press bearing cup (4) into steering shaft yoke (2) far enough to install snapring (3) and install snapring (3) on bearing cup (4).

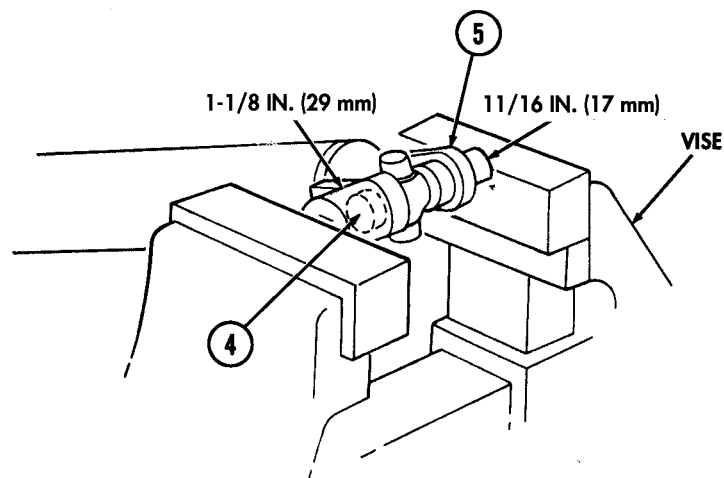
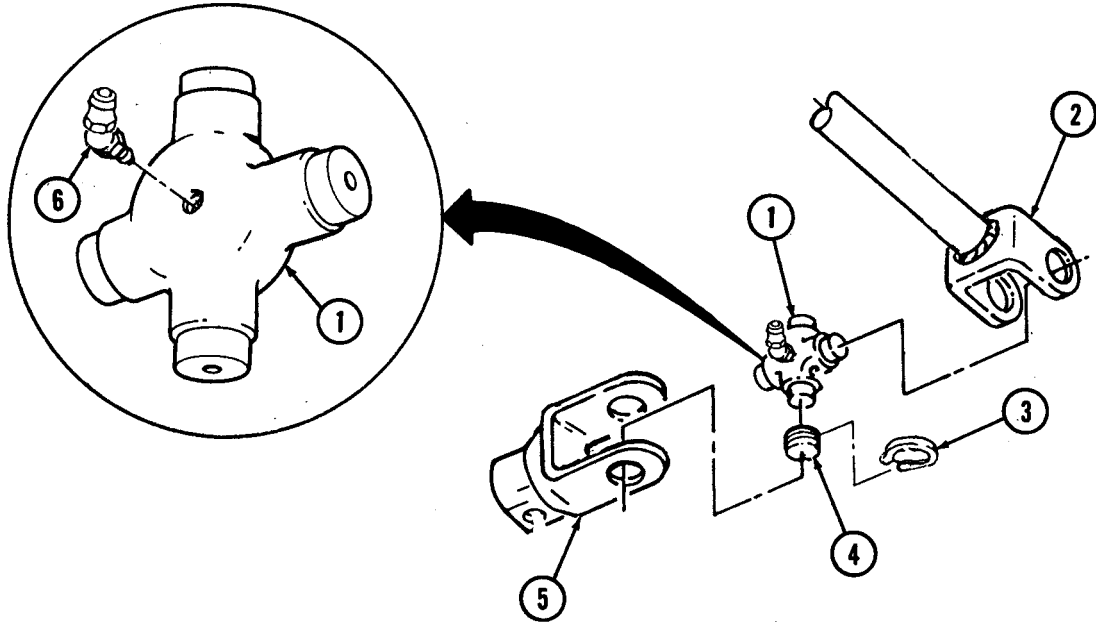
8-22. STEERING SHAFT U-JOINT REPLACEMENT (Cont'd)

8. Repeat steps 2 through 7 to install steering gear yoke (5) on cross (1).

CAUTION

Ensure grease fitting on cross faces yoke. Damage to equipment will result if improperly installed.

9. Install grease fitting (6) into cross (1).



FOLLOW-ON TASK: Install intermediate steering shaft (para. 8-20).

8-23. INTERMEDIATE STEERING SHAFT CLOSE-OFF AND RETAINER REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Personnel Required

One mechanic
One assistant

Materials/Parts

Four locknuts (Appendix G, Item 70)
Locknut (Appendix G, Item 100)

Manual References

TM 9-2320-280-24P

NOTE

Perform steps a.1 and b.2 only when replacing close-off retainer. Close-off may be replaced without disconnecting intermediate steering shaft.

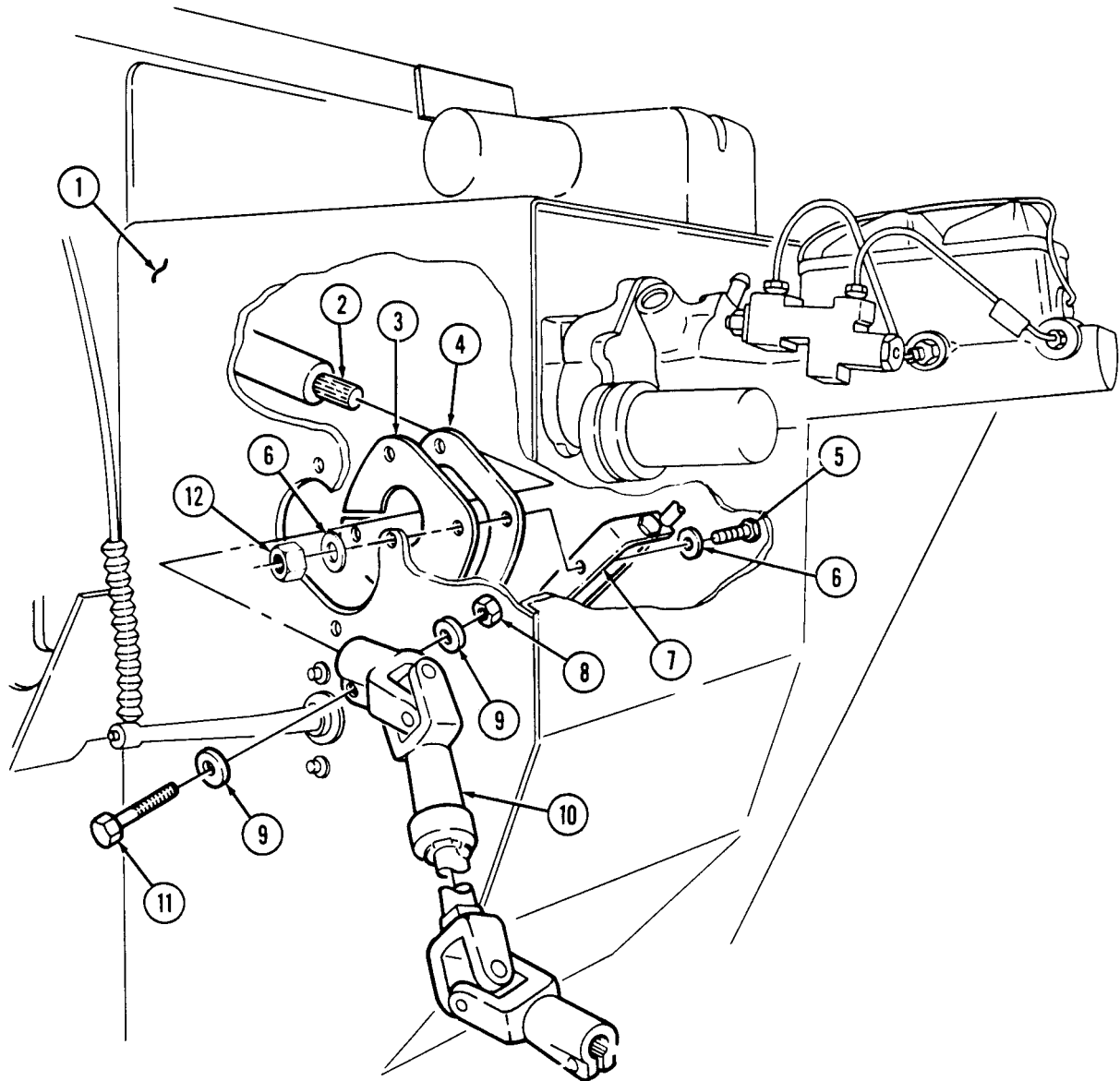
a. Removal

1. Remove locknut (8), washer (9), capscrew (11), and washer (9) and disconnect intermediate steering shaft (10) from steering column (2). Discard locknut (8).
2. Remove four locknuts (12), washers (6), capscrews (5), and washers (6) from hand throttle bracket (7), close-off retainer (4), close-off (3), and cowl panel (1). Remove close-off retainer (4) and close-off (3) from steering shaft (10). Discard locknuts (12).

b. Installation

1. Install close-off (3), close-off retainer (4) on cowl panel (1) and hand throttle bracket (7) with four washers (6), capscrews (5), washers (6), and locknuts (12). Tighten locknuts (12) to 8 lb-ft (11 N•m).
2. Install intermediate steering shaft (10) through close-off (3) on steering column (2) with washer (9), capscrew (11), washer (9), and locknut (8). Tighten locknut (8) to 40-50 lb-ft (54-68 N•m).

8-23. INTERMEDIATE STEERING SHAFT CLOSE-OFF AND RETAINER REPLACEMENT (Cont'd)



8-24. POWER STEERING PUMP, PULLEY, AND BRACKET MAINTENANCE (6.2L)

This task covers:

- | | |
|--|--|
| <ul style="list-style-type: none"> a. Removal b. Disassembly | <ul style="list-style-type: none"> c. Assembly d. Installation |
|--|--|

INITIAL SETUP:

Applicable Models

All vehicle models except M1123 and "A2" series

Tools

General mechanic's tool kit: automotive (Appendix B, Item 1)

Special Tools

Pulley installer (Appendix B, Item 137)

Materials/Parts

Lockwasher (Appendix G, Item 133)
 Lockwasher (Appendix G, Item 191)
 Lockwasher (Appendix G, Item 188)
 O-ring (Appendix G, Item 208)
 Sealing compound (Appendix C, Item 45)

Manual References

TM 9-2320-280-10
 TM 9-2320-280-24P

Equipment Condition

Hood raised and secured (TM 9-2320-280-10).

CAUTION

Cover or plug all hoses and connections immediately after disconnection to prevent contamination. Remove all plugs prior to connection.

a. Removal

NOTE

Have drainage container ready to catch fluid.

1. Loosen two clamps (2) and disconnect two return lines (1) and high pressure line (5) from power steering pump (3). Remove O-ring (4) from high pressure line (5). Discard O-ring (4).
2. Loosen alternator adjusting capscrew (6), two alternator mounting capscrews (16), and push alternator (7) toward engine. Remove two drivebelts (22) from power steering pump pulley (10).
3. Loosen adjusting capscrews (29) and (17) from front of power steering bracket (14).
4. Loosen engine mounting capscrew (11) and push power steering bracket (14) toward engine. Remove two drivebelts (21) from power steering pump pulley (10).
5. Remove capscrew (11) and lockwasher (12) from power steering bracket (14) and alternator bracket (15). Discard lockwasher (12).
6. Remove adjusting capscrew (17), lockwasher (18), and washer (19) from power steering bracket (14) and alternator bracket (15). Discard lockwasher (18).
7. Remove adjusting capscrew (29), lockwasher (28), and washer (27) from power steering bracket (14) and power steering front support bracket (23). Discard lockwasher (28).
8. Remove power steering pump (3), pulley (10), and power steering bracket (14).

NOTE

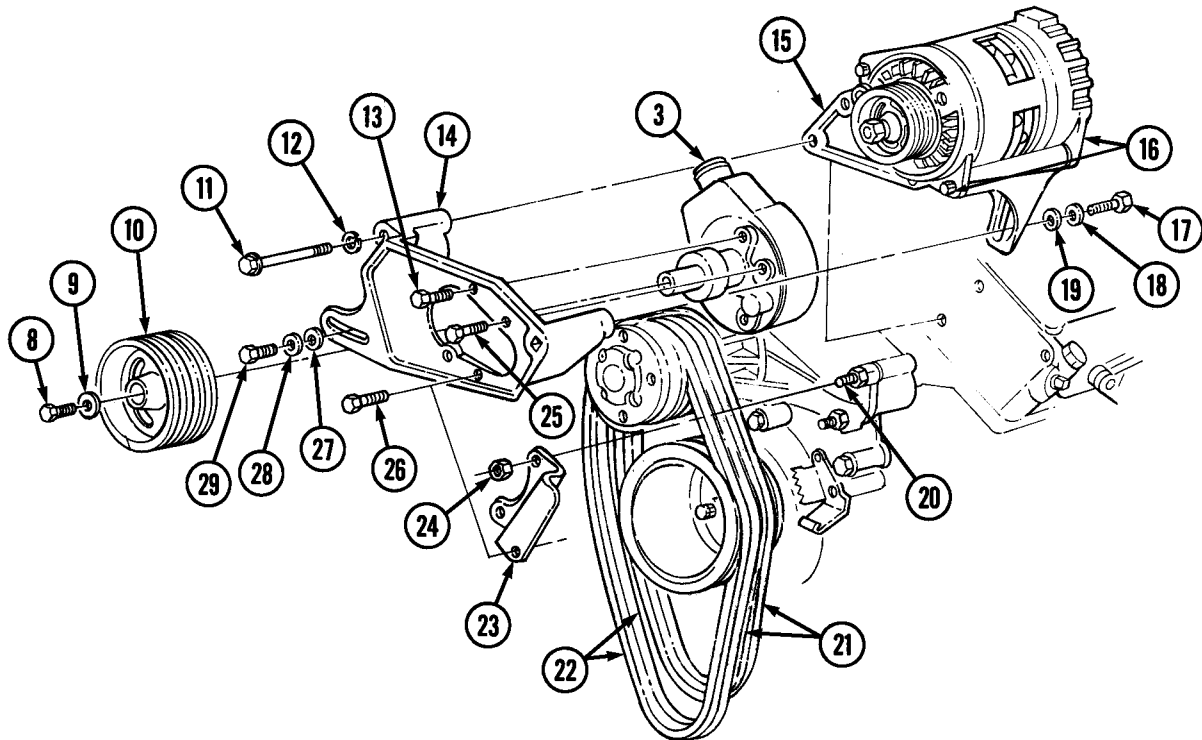
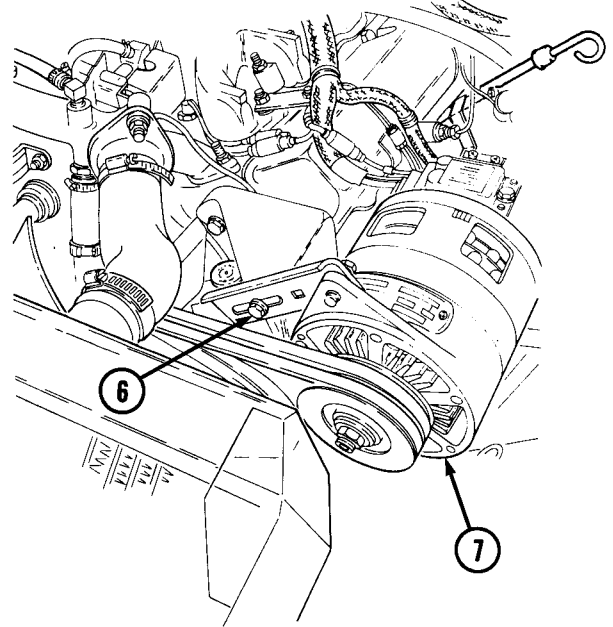
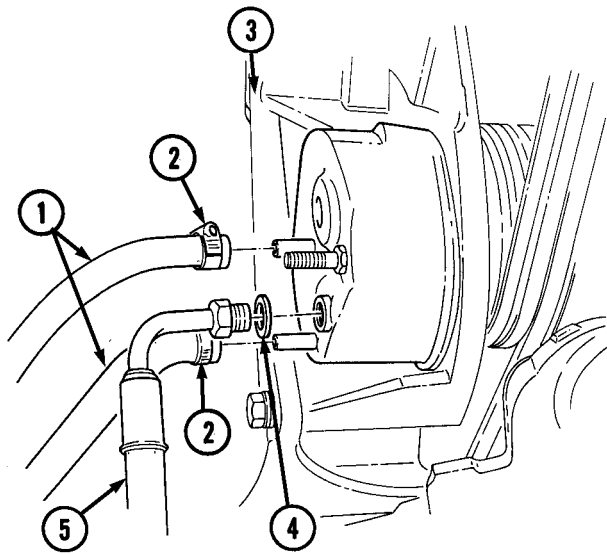
Perform step 10 if support bracket is defective.

9. Inspect support bracket (23) for breaks or cracks.
10. Remove two nuts (24) and steering support bracket (23) from studs (20).

b. Disassembly

1. Remove screw (8), washer (9), and pulley (10) from power steering pump (3).
2. Remove capscrew (25), capscrew (13), two capscrews (26), and power steering pump (3) from power steering bracket (14).

8-24. POWER STEERING PUMP, PULLEY, AND BRACKET MAINTENANCE (6.2L)(Cont'd)



8-24. POWER STEERING PUMP, PULLEY, AND BRACKET MAINTENANCE (6.2L) (Cont'd)

c. Assembly

1. Apply sealing compound adhesive to threads of capscrews (6), (20), (21), and (1).
2. Install power steering pump (8) on power steering bracket (7) with capscrew (6), short capscrew (20), and two long capscrews (21). Tighten capscrews (6), (20), and (21) to 40 lb-ft (54 N•m).
3. Using pulley installer, install pulley (3) on power steering pump (8) with washer (2) and capscrew (1). Tighten capscrew (1) to 37 lb-ft (50 N•m).

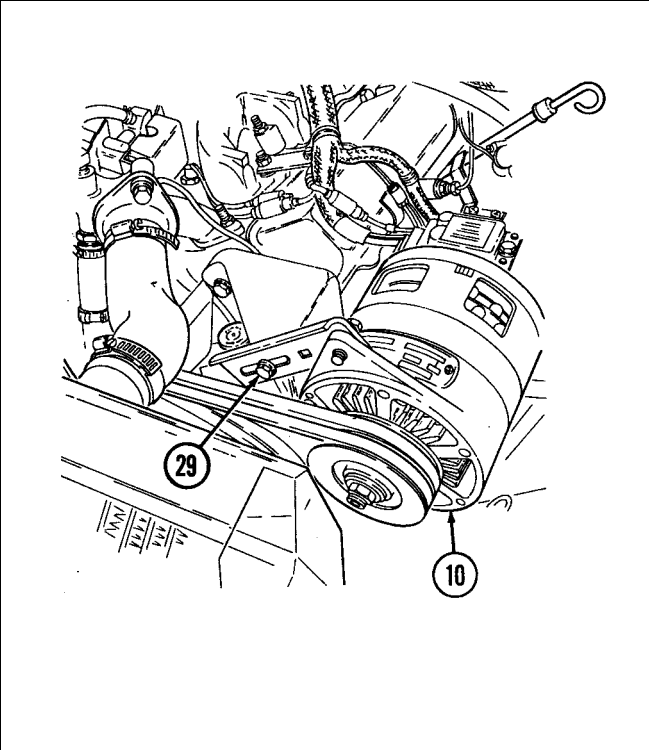
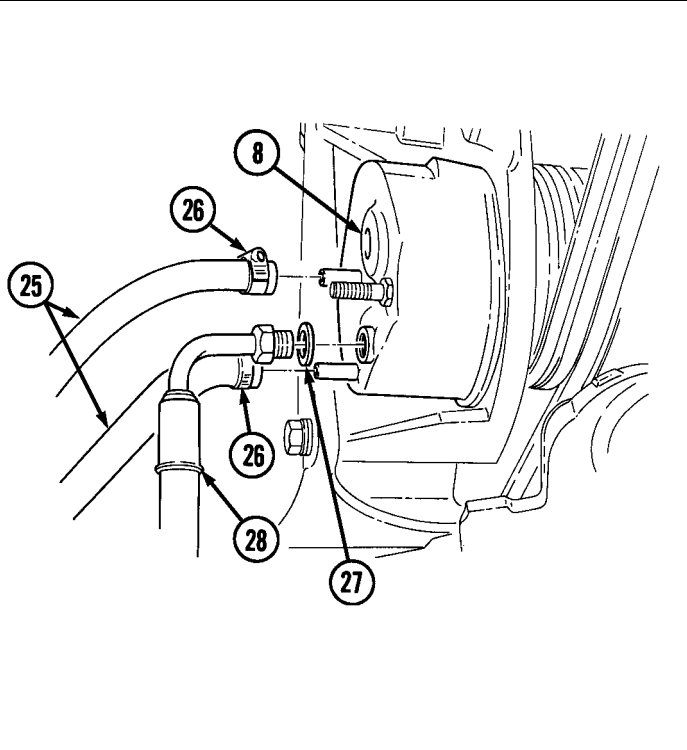
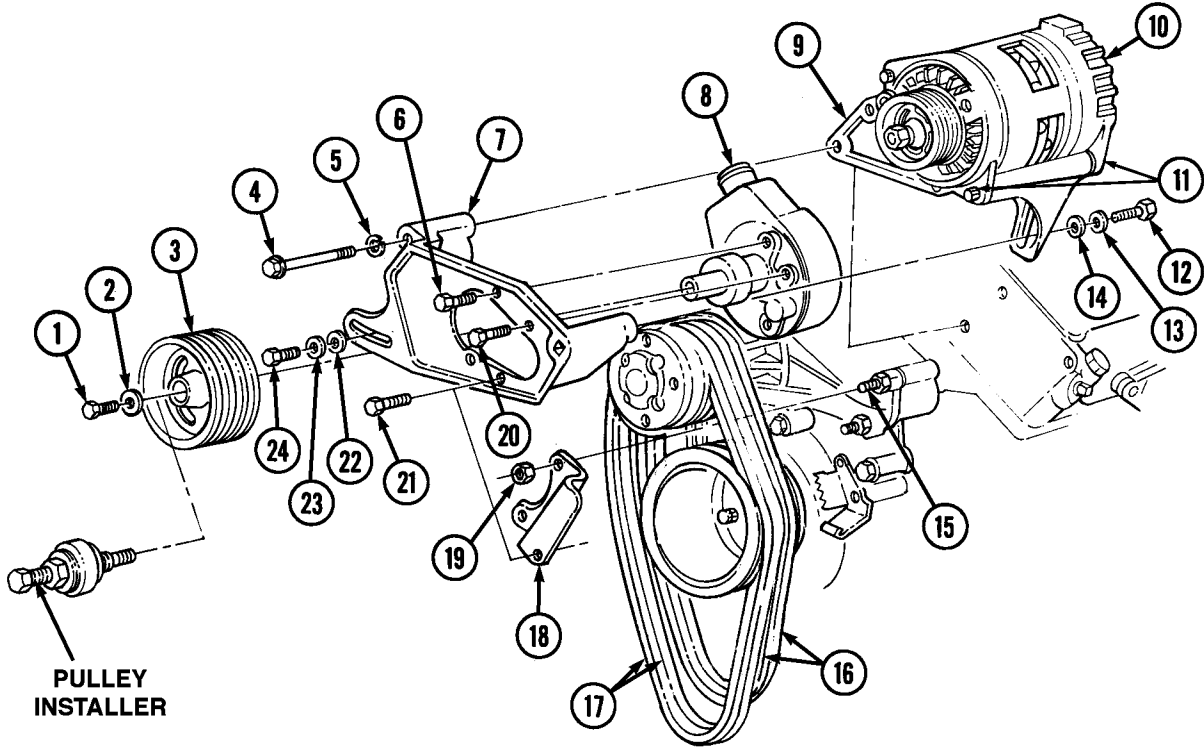
d. Installation

NOTE

Perform step 1 if support bracket was removed.

1. Apply sealing compound to studs (15) and install support bracket (18) to studs (15) with two nuts (19). Tighten nuts (19) to 45 lb-ft (61 N•m).
2. Install power steering pump (8), pulley (3), and power steering bracket (7) on alternator bracket (9) with washer (14), lockwasher (13), and capscrew (12).
3. Install power steering bracket (7) to support bracket (18) with washer (22), lockwasher (23), and capscrew (24).
4. Install four drivebelts (16) and (17) onto pulley (3).
5. Install power steering bracket (7) to alternator bracket (9) with lockwasher (5) and capscrew (4).
6. Pull alternator (10) away from engine. Tighten alternator adjusting capscrew (29) and two alternator mounting capscrews (11) finger tight.
7. Connect two return lines (25) to power steering pump (8) and secure with two clamps (26).
8. Install O-ring (27) on high pressure line (28) and connect high pressure line (28) to power steering pump (8).

8-24. POWER STEERING PUMP, PULLEY, AND BRACKET MAINTENANCE (6.2L)(Cont'd)



- FOLLOW-ON TASKS:**
- Adjust drivebelts (para. 3-82).
 - Bleed power steering system (para. 8-29).

8-24.1. POWER STEERING PUMP AND PULLEY REPLACEMENT (6.5L)

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

All M1123 and "A2" series vehicles

Tools

General mechanic's tool kit:
 automotive (Appendix B, Item 1)
 Maintenance and repair shop equipment:
 automotive (Appendix B, Item 2)

Special Tools

Pulley installer (Appendix B, Item 137)

Materials/Parts

O-ring (Appendix G, Item 208)
 Lockwasher (Appendix G, Item 190)

Manual References

TM 9-2320-280-10
 TM 9-2320-280-24P

Equipment Condition

- Hood raised and secured (TM 9-2320-280-10).
- Serpentine drivebelt removed (para. 3-83).

a. Removal

CAUTION

Cover or plug all hoses and connections immediately after disconnection to prevent contamination. Remove all plugs prior to connection.

1. Loosen two clamps (2) and disconnect return lines (1) and high-pressure line (5) from power steering pump (3). Remove O-ring (4) from high-pressure line (5). Discard O-ring (4).
2. Remove nut (7), clamp (8), and wiring harness (6) from power steering pump (3).
3. Remove nut (15), lockwasher (14), capscrew (9), washer (10), and idler pulley (11) from bracket (12). Discard lockwasher (14).
4. Remove two capscrews (17), capscrew (18), and power steering pump (3) from mounting bracket (16).
5. Remove capscrew (19), washer (20), and power steering pulley (21) from power steering pump (3).

b. Installation

NOTE

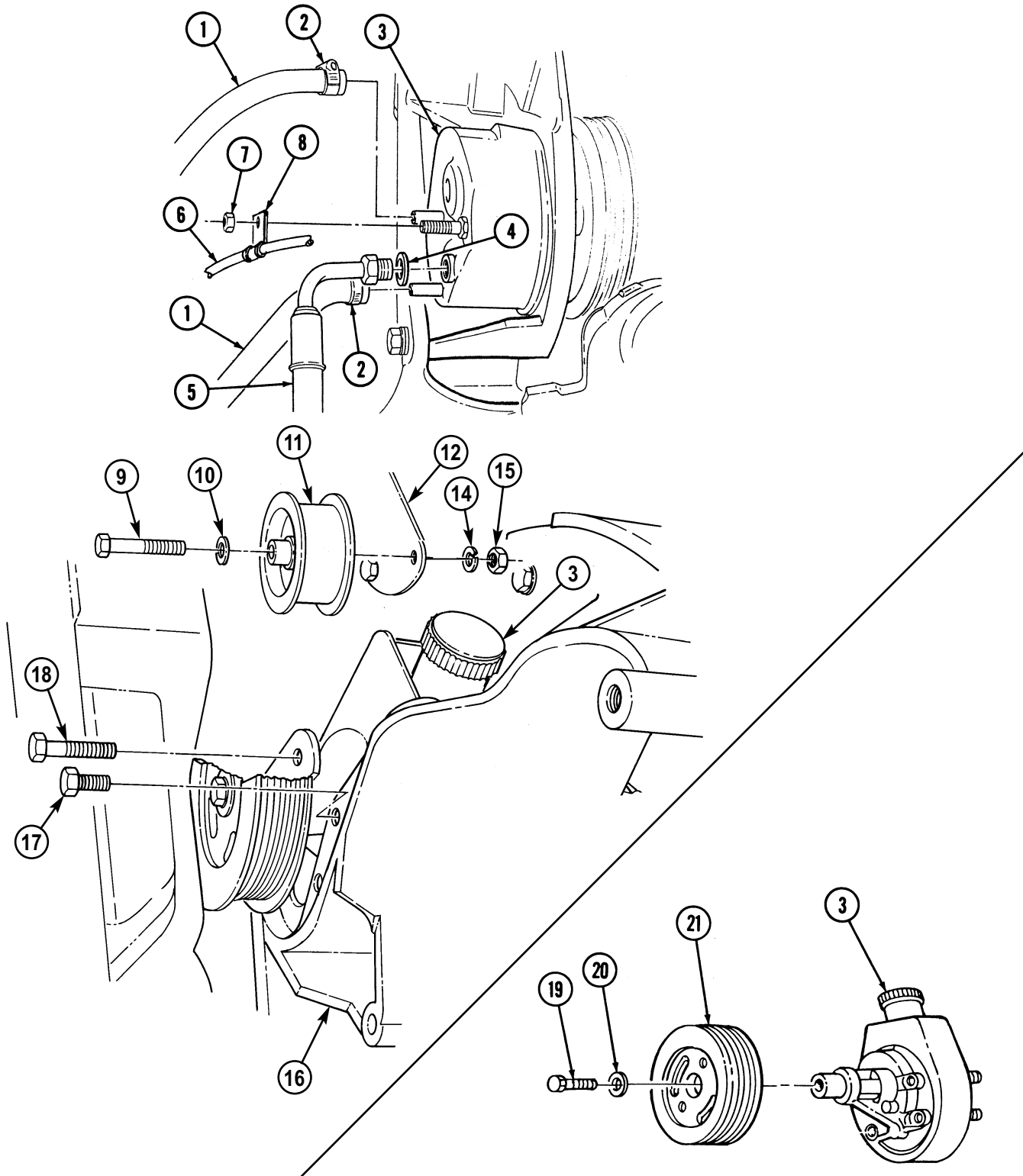
Ensure flat surface of pulley is facing out and is flush with pump shaft.

1. Using pulley installer, install pulley (21) on power steering pump (3).
2. Secure pulley (21) to power steering pump (3) with washer (20) and capscrew (19). Tighten capscrew (19) to 37 lb-ft (50 N·m).
3. Install power steering pump (3) on mounting bracket (16) with capscrew (18) and two capscrews (17).
4. Install idler pulley (11) on bracket (12) with washer (10), capscrew (9), lockwasher (14), and nut (15).
5. Install O-ring (4) on high-pressure line (5) and install high-pressure line (5) on power steering pump (3).
6. Install two return lines (1) on power steering pump (3) and tighten clamps (2).
7. Install wiring harness (6) and clamp (8) on power steering pump (3) with nut (7).

CAUTION

Serpentine belt failure (abnormal wear and belt dislodgement) can be caused by misalignment of pulleys, improper installation, or foreign objects introduced into belt path. For pulley alignment procedures, refer to para. 3-83.

8-24.1. POWER STEERING PUMP AND PULLEY REPLACEMENT (6.5L) (Cont'd)



FOLLOW-ON TASKS:

- Install serpentine drivebelt (para. 3-83).
- Bleed power steering system (para. 8-29).

8-24.2. POWER STEERING PUMP REPAIR

This task covers:

- | | |
|----------------|---------------|
| a. Disassembly | c. Inspection |
| b. Cleaning | d. Assembly |

INITIAL SETUP:

Tools

General mechanic's tool kit:
 automotive (Appendix B, Item 1)
 Maintenance and repair shop equipment:
 automotive (Appendix B, Item 2)

Materials/Parts

Seal service kit (Appendix G, Item 291.1)

Manual References

TM 9-2320-280-10
 TM 9-2320-280-24P

Equipment Condition

Power steering pump, pulley, and
 bracket removed (para 8-24 (6.2 L)),
 (para. 8-24.1 (6.5 L)).

a. Disassembly

NOTE

Have drainage container ready to catch fluid.

1. Remove reservoir filler cap (1) and drain fluid from pump assembly (8).
2. Remove two mounting studs (2) from pump assembly (8).

NOTE

Fitting assembly is spring loaded. Remove carefully to avoid losing parts.

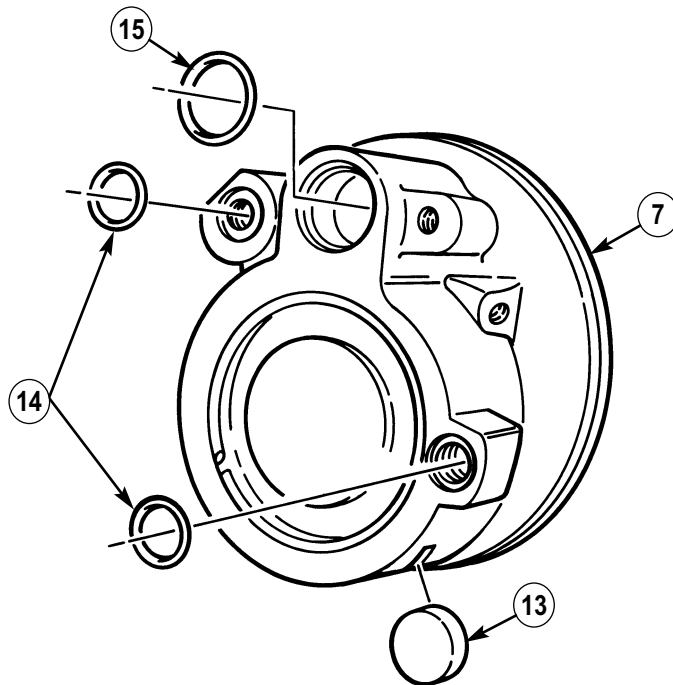
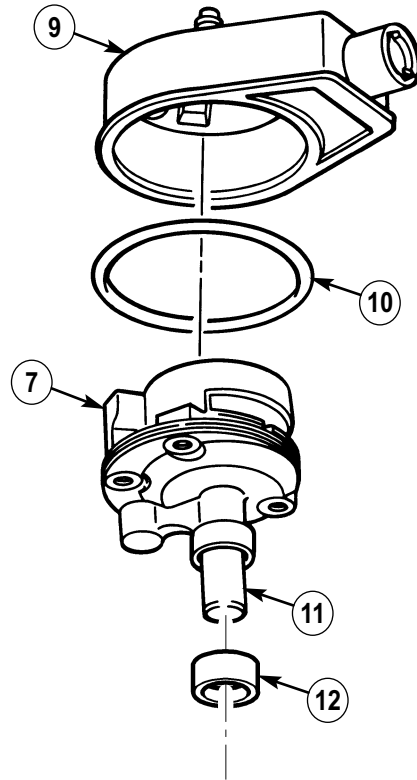
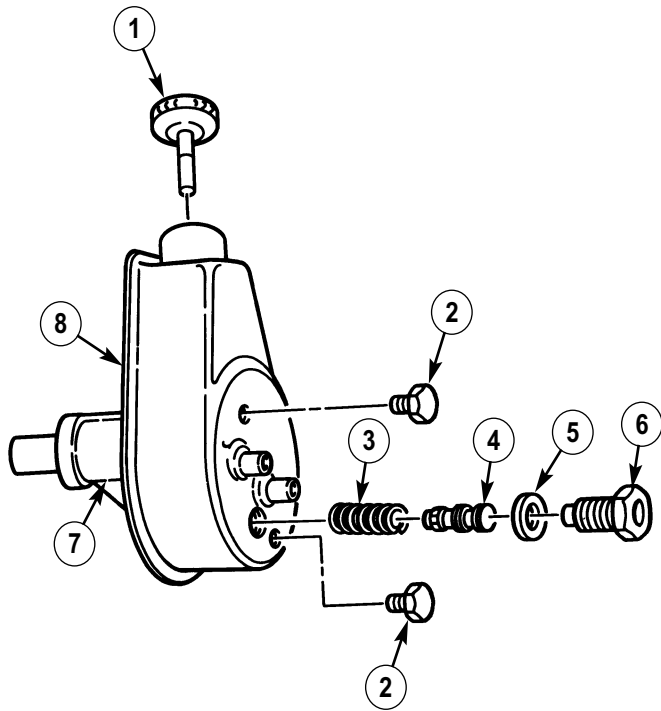
3. Remove fitting assembly (6) and O-ring seal (5) from pump body (7). Discard O-ring seal (5).
4. Remove flow control valve (4) and valve spring (3) from pump body (7).

CAUTION

Do not overtighten vise as pump body could be distorted.

5. Place pump body (7) in vise so pump shaft (11) is pointing down.
6. Tap lightly around edge of reservoir (9).
7. Remove reservoir (9) and O-ring seal (10) from pump body (7). Discard O-ring seal (10).
8. Remove two O-ring seals (14) from pump body (7). Discard O-ring seals (14).
9. Remove magnet (13) from pump body (7). Discard magnet (13).
10. Remove O-ring seal (15) from pump body (7). Discard O-ring seal (12).
11. Remove shaft seal (12) from pump body (7).

8-24.2. POWER STEERING PUMP REPAIR (Cont'd)



8-24.2. POWER STEERING PUMP REPAIR (Cont'd)

b. Cleaning

Clean all power steering pump components (refer to TM 9-2320-280-10).

c. Inspection

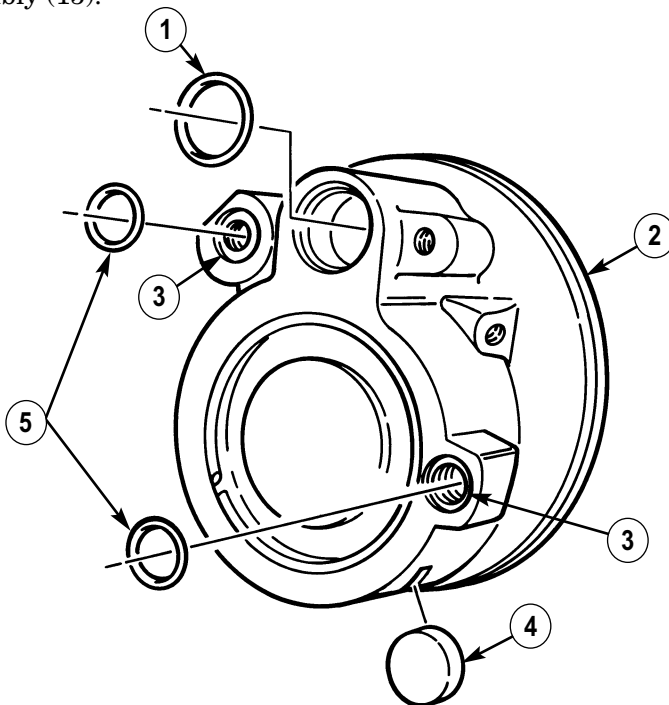
NOTE

For general inspection instructions, refer to para. 2-5.

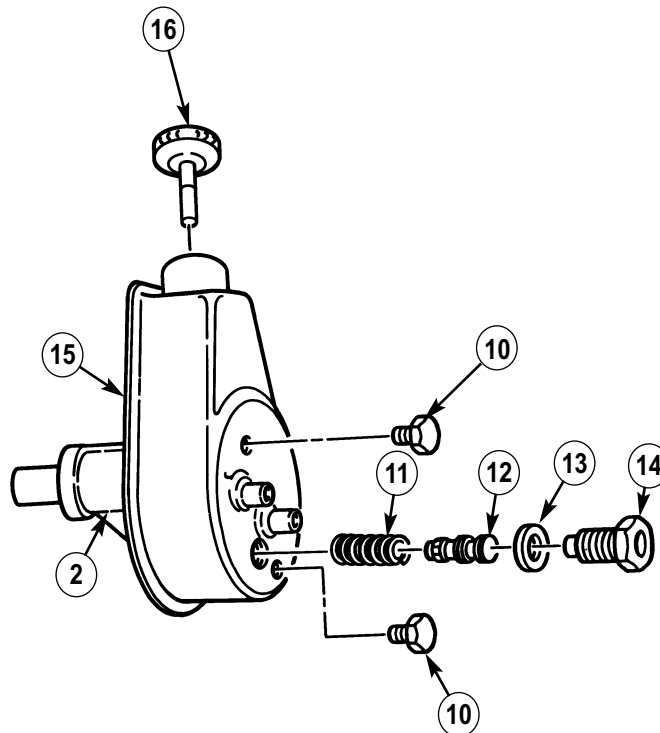
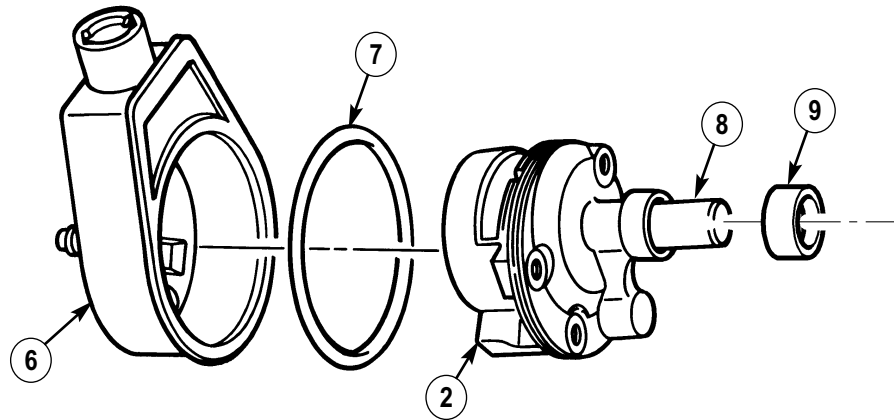
1. Inspect external surface of flow control valve (12) for burrs, nicks, or damage. Inspect flow control valve (12) bore and screen for damage or debris. Inspect valve spring (11) for damage. Replace both flow control valve (12) and valve spring (11) if either is damaged.
2. Inspect studs (10) for damage. Replace if damaged.
3. Inspect fitting (14) for damage. Replace if damaged.
4. Inspect reservoir filler cap (16) for damage. Replace if damaged.
5. Inspect pump body (2) for damage. Replace power steering pump assembly (15) if pump body (2) is damaged.
6. Inspect pump shaft (8) for burrs, nicks, or damage. Replace pump assembly (15) if damaged.

d. Assembly

1. Install shaft seal (9) on pump shaft (8) and in pump body (2). Use care not to damage pump seal (9) when installing on pump shaft (8).
2. Install magnet (4) in pump body (2).
3. Install O-ring seal (1) into control valve cavity and two O-ring seals (5) into threaded holes (3).
4. Install O-ring seal (7) on pump body (2).
5. Install reservoir (6) on pump body (2).
6. Install two studs (10) on pump assembly (15). Tighten studs (10) to 26 lb-ft (35 N•m).
7. Install valve spring (11) and flow control valve (12) in pump assembly (15).
8. Install O-ring seal (13) and fitting (14) in pump assembly (15). Tighten fitting (14) in pump assembly (15) to 37 lb-ft (50 N•m).
9. Install reservoir filler cap (16) on pump assembly (15).



8-24.2. POWER STEERING PUMP REPAIR (Cont'd)



FOLLOW-ON TASK: Install power steering pump, pulley, and bracket (para 8-24 (6.2L)), (para 8-24.1 (6.5L)).

8-25. POWER STEERING HYDRAULIC SYSTEM PRESSURE AND RETURN HOSE REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Three locknuts (Appendix G, Item 70)
Two O-rings (Appendix G, Item 218)
Tiedown strap (Appendix G, Item 308)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

- Hood raised and secured (TM 9-2320-280-10).
- Battery ground cable disconnected (para. 4-73).

General Safety Instructions

Do not drain fluid when engine is hot.

NOTE

Removal and installation procedures are basically the same for all hydraulic system pressure and return hoses. This procedure covers the power steering pump to hydro-boost return hose and the steering gear to hydro-boost pressure hose.

a. Removal

WARNING

Do not drain fluid when engine is hot. Severe injury to personnel will result

CAUTION

Cover or plug all hoses and connections immediately after disconnection to prevent contamination. Remove all plugs prior to connection.

NOTE

Have drainage container ready to catch fluid.

1. Loosen two clamps (3) and disconnect return hose (8) from power steering pump (9) and hydro-boost (19).
2. Remove two locknuts (12), washers (13), and capscrews (14) from clamps (15) and control valve hose (16). Remove two clamps (15) from return hose (8). Discard locknuts (12).

NOTE

Perform step 4 for vehicles with new alternator support bracket configuration.

3. Remove locknut (6), washer (7), capscrew (2), spacer (4), two clamps (5), clamp (10), and return hose (8) from alternator bracket (1). Remove clamp (5) from return hose (8). Discard locknut (6).
4. Remove locknut (6), two washers (7), capscrew (2), two clamps (5), harness clamp (10), and return hose (8) from power steering lines bracket (11). Remove clamp (5) and tiedown strap (11.1) from return hose (8). Discard locknut (6) and tiedown strap (11.1).
5. Remove pressure hose (17) from hydro-boost (19) and steering gear (20). Remove two O-rings (18) from pressure hose (17). Discard O-rings (18).

b. Installation

1. Install two O-rings (18) on pressure hose (17) and connect pressure hose (17) to steering gear (20) and hydro-boost (19).
2. Connect return hose (8) to power steering pump (9) and hydro-boost (19) with two clamps (3).

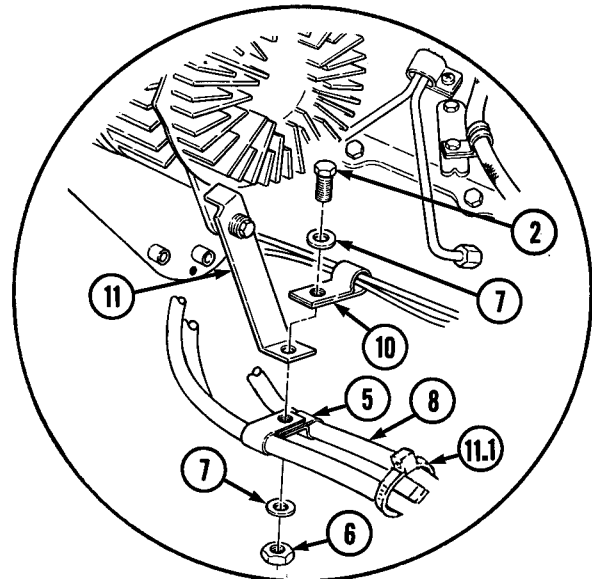
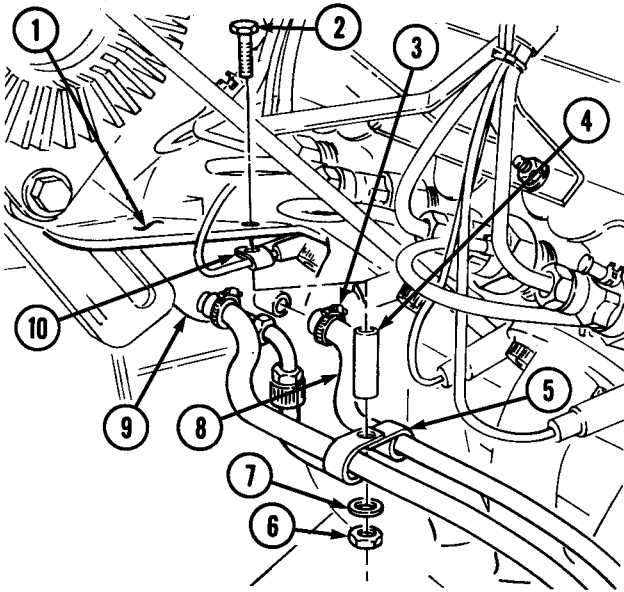
8-25. POWER STEERING HYDRAULIC SYSTEM PRESURE AND RETURN HOSE REPLACEMENT (Cont'd)

3. Position two clamps (15) and clamp (5) on return hose (8) and install control valve hose (16) and two clamps (15) with two capscrews (14), washers (13), and locknuts (12).

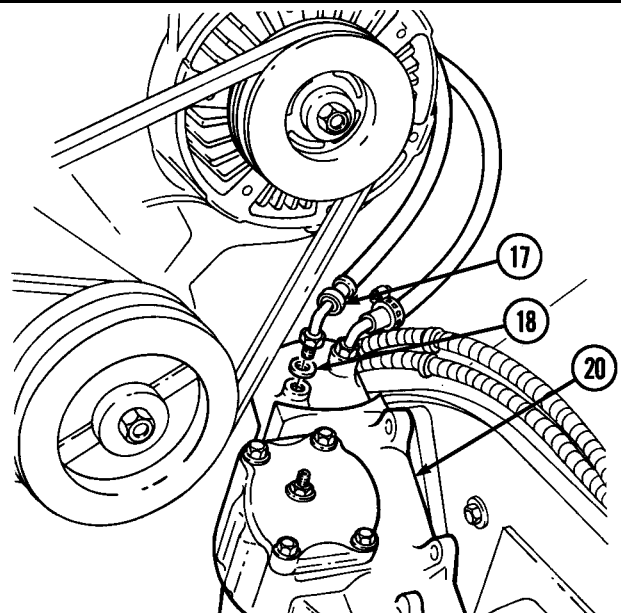
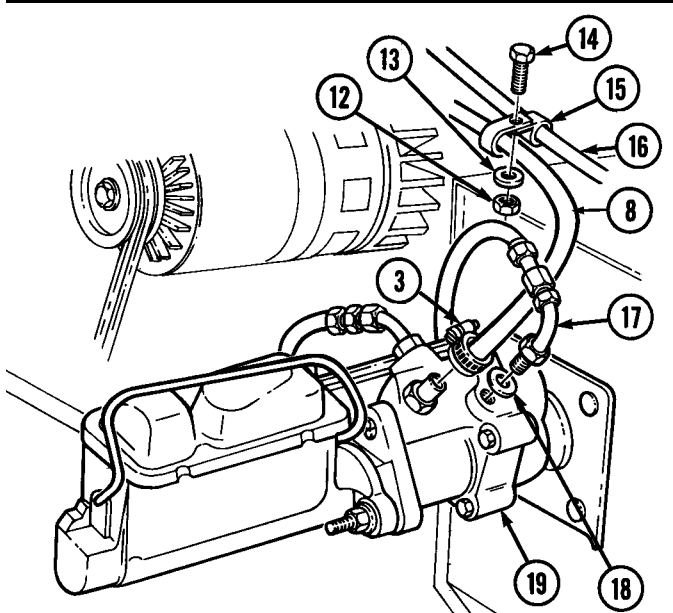
NOTE

Perform step 5 for vehicles with new alternator support bracket configuration.

4. Install clamp (10), spacer (4), and two clamps (5) to alternator bracket (1) with capscrew (2), washer (7), and locknut (6).
5. Install harness clamp (10) and two clamps (5) to power steering lines bracket (11) with capscrew (2), two washers (7), and locknut (6). Install tiedown strap (11.1) on return hose (8).



NEW CONFIGURATION



- FOLLOW-ON TASKS:**
- Connect battery ground cable (para. 4-73).
 - Bleed power steering system (para. 8-29).

8-26. POWER STEERING SYSTEM HYDRAULIC CONTROL VALVE MAINTENANCE

This task covers:

- | | |
|---|--|
| <p>a. Removal
b. Back Flush Procedure</p> | <p>c. Inspection
d. Installation</p> |
|---|--|

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

- Battery ground cable disconnected (para. 4-73).
- Hood raised and secured (TM 9-2320-280-10).

General Safety Instructions

Do not drain fluid when engine is hot.

NOTE

If referred here from TM 9-2320-280-20-1 troubleshooting instructions to perform back flush procedure, follow steps 1 through 4 and then proceed to b.

a. Removal

WARNING

Do not drain fluid when engine is hot. Severe injury to personnel will result.

CAUTION

Cover or plug all hoses and connections immediately after disconnection to prevent contamination. Remove all plugs prior to connection.

NOTE

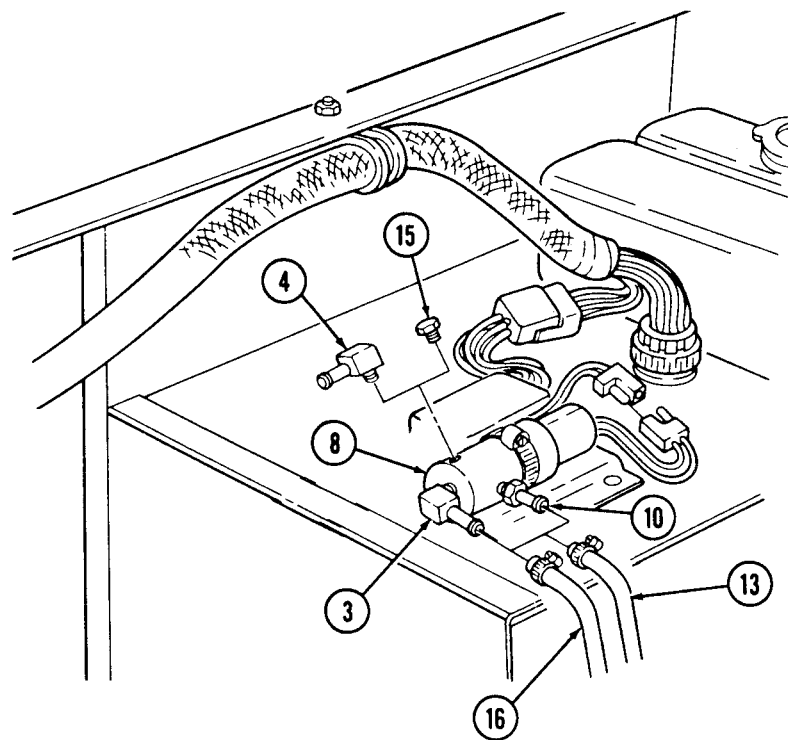
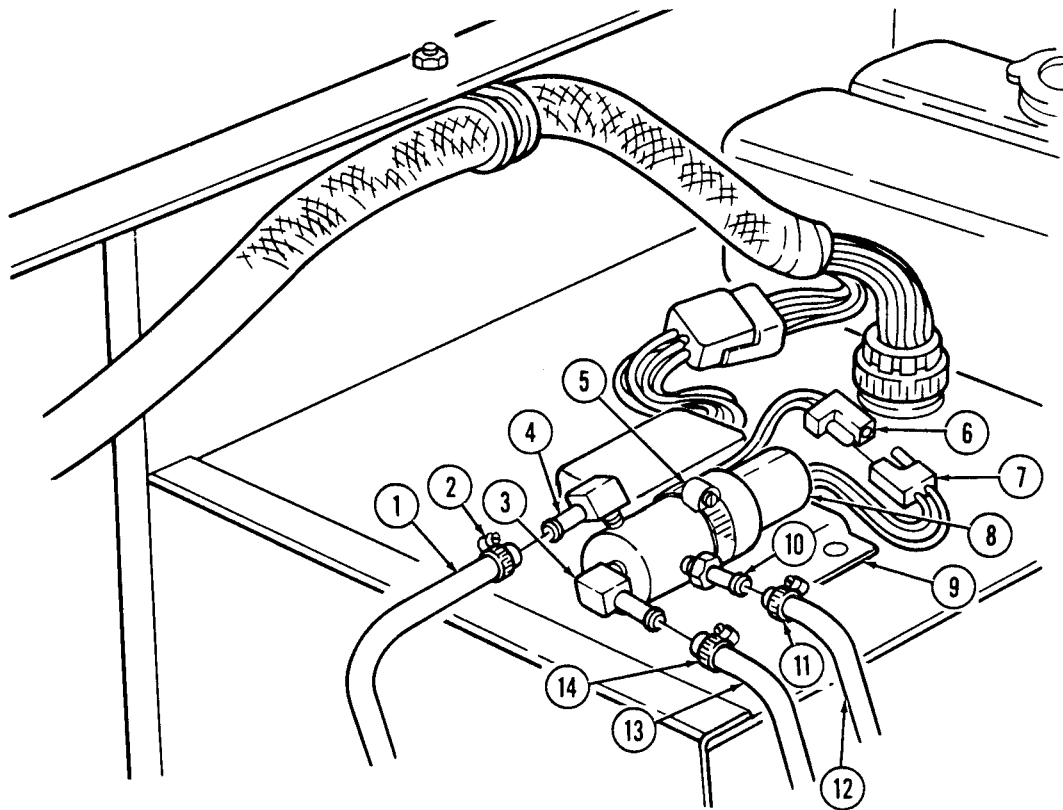
- Note location of hoses for installation.
- Have drainage container ready to catch fluid.

1. Loosen clamp (2) and disconnect power steering return line hose (1) from control valve elbow (4).
2. Loosen clamp (11) and disconnect fan clutch hose (12) from control valve fitting (10).
3. Loosen clamp (14) and disconnect steering gear hose (13) from control valve elbow (3).
4. Disconnect time delay module connector (6) from control valve connector (7).
5. Loosen clamp (5) and remove control valve (8) from bracket (9).

b. Back Flush Procedure

1. Connect battery ground cable (para. 4-73).
2. Install steering gear hose (13) on control valve fitting (10).
3. Remove control valve elbow (4) from control valve (8) and install pipe plug (15) (NSN 4730-00-011-2578) on control valve (8).
4. Install drain hose (16) (make from NSN 4720-01-186-2358, 36 in. (91.4 cm) long) on control valve elbow (3).
5. Place drainage container underneath drain hose (16) to catch fluid.

8-26. POWER STEERING SYSTEM HYDRAULIC CONTROL VALVE MAINTENANCE (Cont'd)



8-26. POWER STEERING SYSTEM HYDRAULIC CONTROL VALVE MAINTENANCE (Cont'd)

CAUTION

- To ensure there is no load on the steering gear, position front wheels straight ahead before starting engine. Failure to do this may cause damage to the control valve.
 - Maintain power steering fluid level at all times while performing back flush procedure to prevent air from entering power steering system. Failure to do this may result in damage to equipment.
6. Start engine and allow to run for about two or three seconds and stop, check, and fill power steering reservoir. Repeat the process once.
 7. Remove pipe plug (2) from control valve (7).
 8. Install control valve elbow (1) on control valve (7).
 9. Remove steering gear hose (4) from control valve fitting (3) and install on control valve elbow (1).
 10. Remove control valve fitting (3) from control valve (7) and install pipe plug (2) on control valve (7).

CAUTION

- To ensure there is no load on the steering gear, position front wheels straight ahead before starting engine. Failure to do this may cause damage to the control valve.
 - Maintain power steering fluid level at all times while performing back flush procedure to prevent air from entering power steering system. Failure to do this may result in damage to equipment.
11. Start engine and allow to run for about two to three seconds and stop, check, and fill power steering reservoir. Repeat the process once.
 12. Remove drain hose (5) from control valve elbow (6).
 13. Remove steering gear hose (4) from control valve elbow (1).
 14. Remove pipe plug (2) from control valve (7).
 15. Install control valve fitting (3) on control valve (7).
 16. Disconnect battery ground cable (para. 4-73).

c. Inspection

1. Inspect elbows (6) and (1) for damage. Replace elbows (6) or (1) if damaged.
2. Inspect valve fitting (3) for damage. Replace valve fitting (3) if damaged.

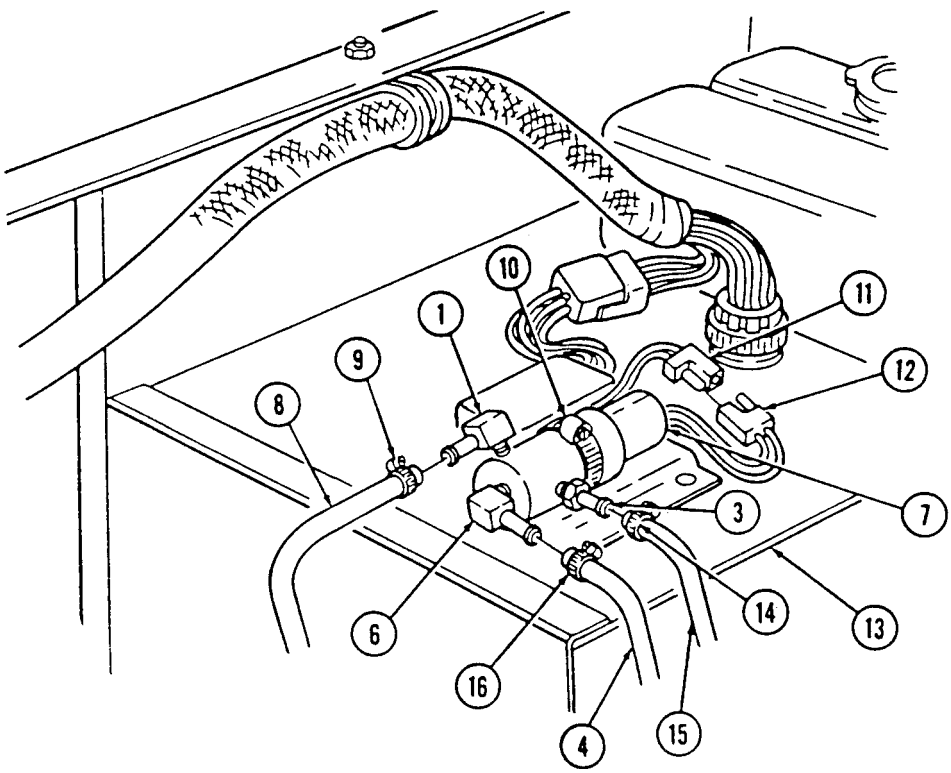
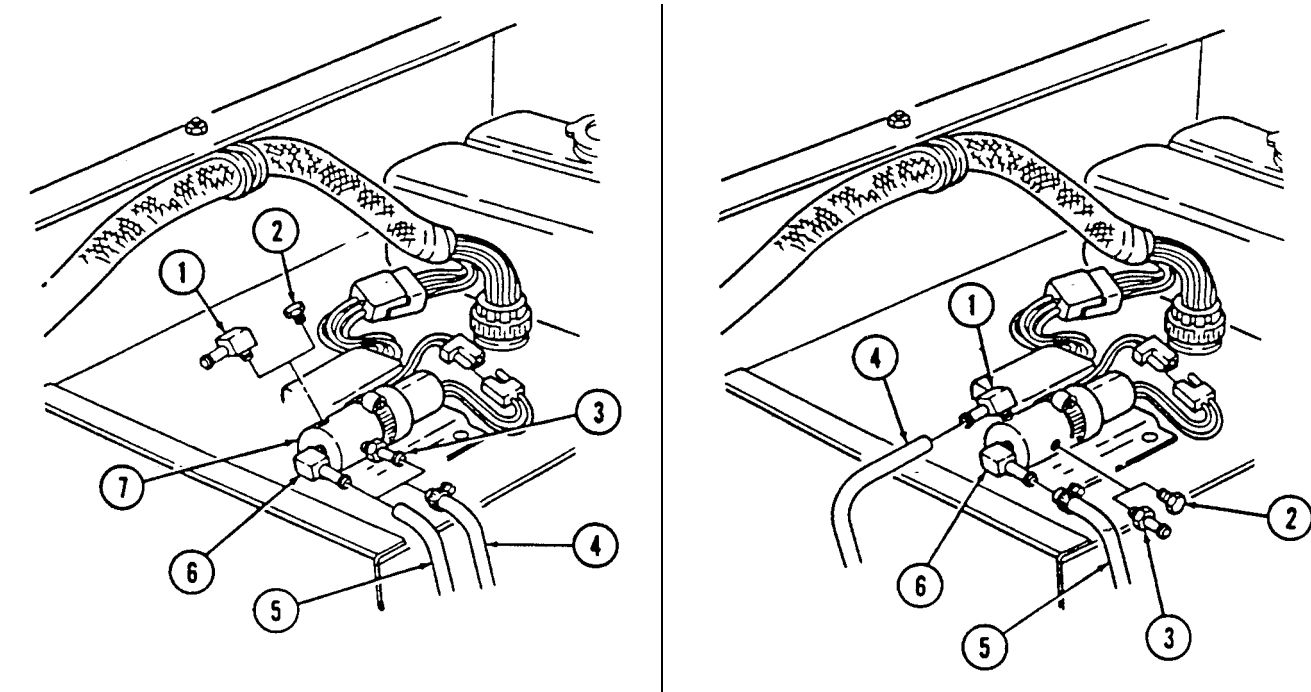
d. Installation

NOTE

Perform step 1 only if control valve was removed.

1. Install control valve (7) on bracket (13) with clamp (10).
2. Connect steering gear hose (4) to control valve elbow (6) and tighten clamp (16) to 10-20 lb-in. (1-2 N•m).
3. Connect fan clutch hose (15) to control valve fitting (3) and tighten clamp (14) to 10-20 lb-in. (1-2 N•m).
4. Connect power steering return line hose (8) to control valve elbow (1) and tighten clamp (9) to 10-20 lb-in. (1-2 N•m).
5. Connect time delay module connector (11) to control valve connector (12).

8-26. POWER STEERING SYSTEM HYDRAULIC CONTROL VALVE MAINTENANCE (Cont'd)



- FOLLOW-ON TASK:**
- Connect battery ground cable (para. 4-73).
 - Bleed power steering system (para. 8-29).

8-27. POWER STEERING COOLER HOSE REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Two locknuts (Appendix G, Item 70)
Tiedown strap (Appendix G, Item 308)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

Hood raised and secured (TM 9-2320-280-10).

General Safety Instructions

Do not drain fluid when engine is hot.

a. Removal

WARNING

Do not drain fluid when engine is hot. Severe injury to personnel will result.

CAUTION

Cover or plug all hoses and connections immediately after disconnection to prevent contamination. Remove all plugs prior to connection.

NOTE

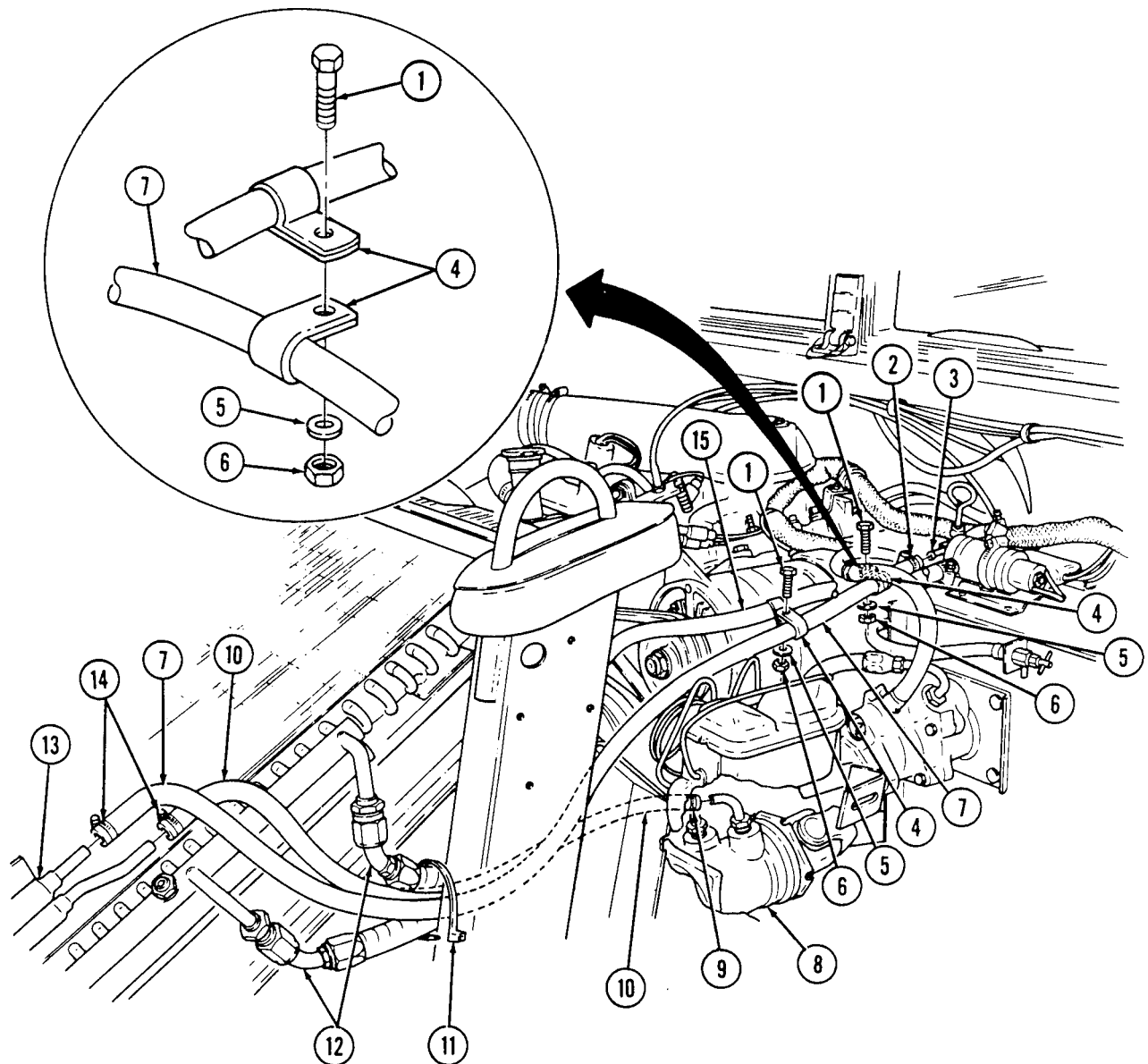
Have drainage container ready to catch fluid.

1. Loosen two clamps (14) and disconnect hoses (7) and (10) from cooler (13).
2. Remove tiedown strap (11) from oil cooler lines (12) and hoses (7) and (10). Discard tiedown strap (11).
3. Loosen clamp (9) and remove hose (10) from steering gear (8).
4. Remove two locknuts (6), washers (5), and capscrews (1) from four clamps on hoses (7) and (15). Discard locknuts (6).
5. Loosen clamp (2) and remove hose (7) from control valve elbow (3) and remove hose (7).

8-27. POWER STEERING COOLER HOSE REPLACEMENT (Cont'd)

b. Installation

1. Connect hose (7) to control elbow (3) and secure with clamp (2).
2. Position hoses (7) and (15) with four clamps (4) and install two capscrews (1), washers (5), and locknuts (6).
3. Connect hose (10) to steering gear (8) with clamp (9).
4. Connect hoses (7) and (10) to cooler (13) with two clamps (14).
5. Install tiedown strap (11) to oil cooler lines (12) and hoses (7) and (10).



FOLLOW-ON TASK: Bleed power steering system (para. 8-29).

8-28. POWER STEERING COOLER REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

Hood raised and secured (TM 9-2320-280-10).

Materials/Parts

Two lockwashers (Appendix G, Item 134)

General Safety Instructions

Do not drain fluid when engine is hot.

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

CAUTION

Do not bend power steering oil cooler fins. Damaged fins reduce cooling efficiency, which may damage power steering pump and/or gear.

a. Removal

WARNING

Do not drain fluid when engine is hot. Severe injury to personnel will result.

CAUTION

Cover or plug all hoses and connections immediately after disconnection to prevent contamination. Remove all plugs prior to connection.

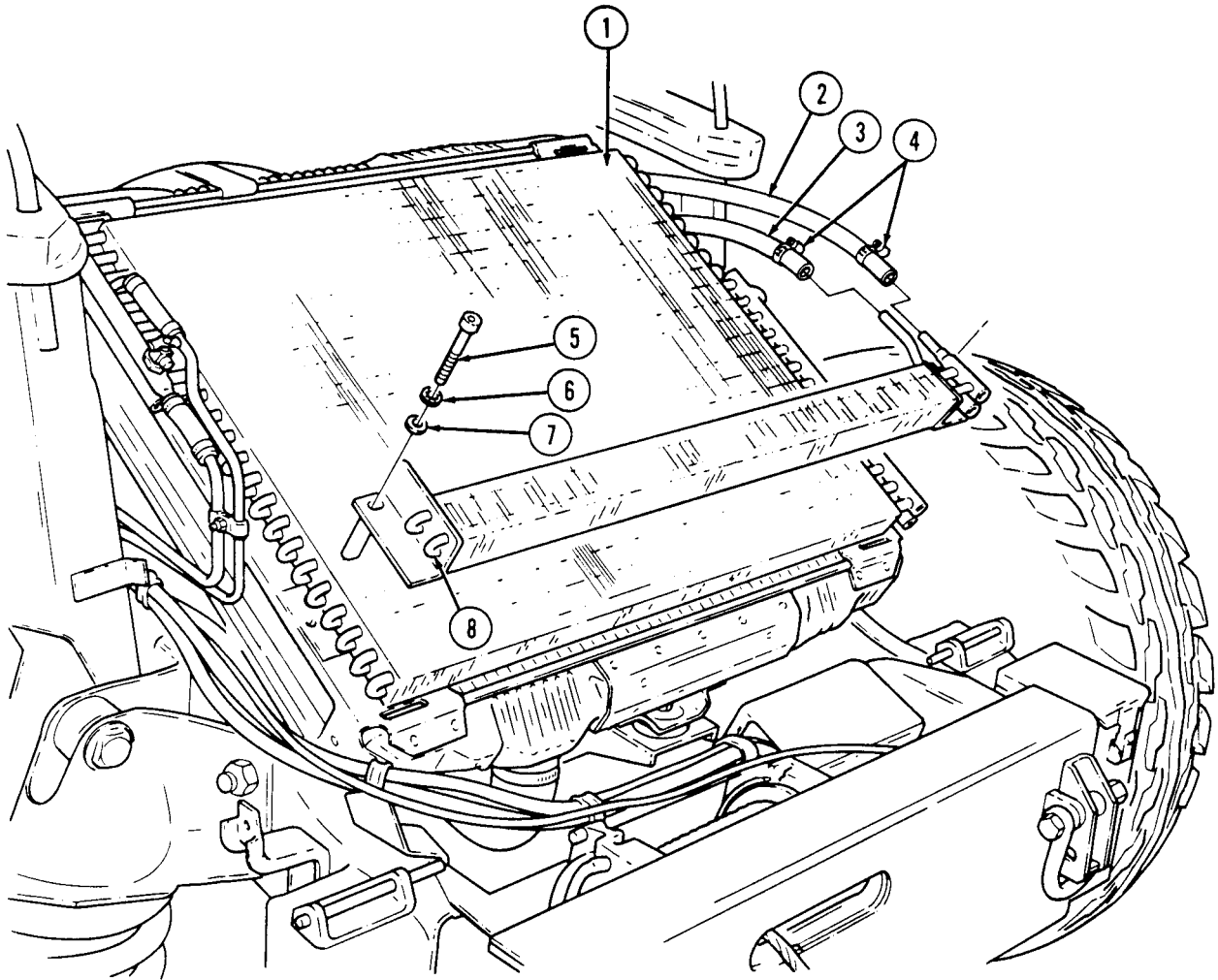
NOTE

Have drainage container ready to catch fluid.

1. Loosen two clamps (4) and disconnect hoses (2) and (3) from cooler (8).
2. Remove two screws (5), lockwashers (6), washers (7), and cooler (8) from oil cooler (1). Discard lockwashers (6).

8-28. POWER STEERING COOLER REPLACEMENT (Cont'd)**b. Installation**

1. Install cooler (8) to oil cooler (1) with two washers (7), lockwashers (6) and screws (5). Tighten screws (5) to 125-155 lb-in. (14-18 N·m).
2. Connect two hoses (2) and (3) to cooler (8) with two clamps (4). Tighten clamps (4) 35-45 lb-in. (4-5 N·m).



FOLLOW-ON TASK: Bleed power steering system (para. 8-29).

8-29. POWER STEERING SYSTEM BLEEDING

This task covers:

Bleeding

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Personnel Required

One mechanic
One assistant

Equipment Condition

Hood raised and secured (TM 9-2320-280-10).

Bleeding

1. Make sure engine is shut off (TM 9-2320-280-10) and turn wheels all the way to the left.
2. Add power steering fluid (TM 9-2320-280-10) to "FULL COLD" level on reservoir. Leave reservoir cap off.
3. Raise front wheels off ground (para. 8-2).
4. Turn steering wheel left and right, holding wheels at steering stops for five seconds for at least 40 times.

NOTE

- Power steering fluid must be free of bubbles and foam. If bubbles or foam are noted, it could be an indication of a loose connection or leaky O-ring.
- Fluid with air in it will have a milky appearance. Air must be eliminated from system before normal steering action can be obtained.

5. Check power steering fluid level (TM 9-2320-280-10). If any bubbles are seen, repeat step 4.
6. Start engine (TM 9-2320-280-10) and with engine idling, add power steering fluid (TM 9-2320-280-10) if necessary. Install reservoir cap.
7. Turn wheels to center, shut off engine, and lower front wheels to ground (para. 8-2).
8. Start engine (TM 9-2320-280-10) and run engine for two or three minutes, turning wheels left and right.

NOTE

If pump is noisy, recheck hoses for possible contact with vehicle body or engine. If no contact is found and noise continues, turn engine off and repressurize system by following steps 9 and/or 10.

9. Remove reservoir cap. Wait for system to cool. Reinstall reservoir cap. Start engine (TM 9-2320-280-10) and check pump for noise, if noise is still present continue to step 10. If noise stopped, proceed to step 11.
10. Turn engine off (TM 9-220-280-10). Remove fluid from reservoir using a suction device. Refill reservoir with clean, cool fluid. Install reservoir cap. Start engine (TM 9-2320-280-10) and check pump for noise. If noise is still present, replace power steering pump (para. 8-24 or 8-24.1).
11. Turn engine off (TM 9-2320-280-10).

- FOLLOW-ON TASKS:**
- Check power steering fluid level (TM 9-2320-280-10).
 - Lower and secure hood (TM 9-2320-280-10).
 - Operate vehicle and check for proper steering operation (TM 9-2320-280-10).

8-30. POWER STEERING RELIEF VALVE CARTRIDGE MAINTENANCE

This task covers:

- | | |
|---|---|
| <ul style="list-style-type: none"> a. Removal b. Inspection | <ul style="list-style-type: none"> c. Installation |
|---|---|

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

- Hood raised and secured (TM 9-2320-280-10).
- Battery ground cables disconnected (para. 4-73).

Materials/Parts

O-ring (Appendix G, Item 218)
Gasket (Appendix G, Item 60)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

a. Removal

CAUTION

Cover or plug all hoses and connections immediately after disconnection to prevent contamination. Remove all covers or plugs prior to connection.

NOTE

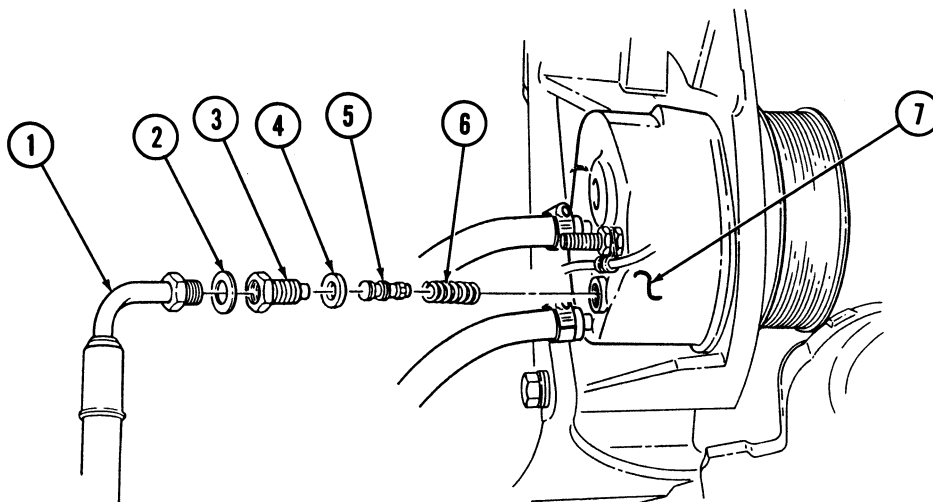
Have drainage container ready to catch fluid.

1. Disconnect high-pressure line (1) from power steering pump (7). Remove O-ring (2) from high-pressure line (1). Discard O-ring (2).

NOTE

Fitting assembly is spring-loaded. Remove carefully to avoid losing parts.

2. Remove fitting assembly (3) and gasket (4) from pump (7). Discard gasket (4).
3. Remove relief valve (5) and valve spring (6) from pump (7).



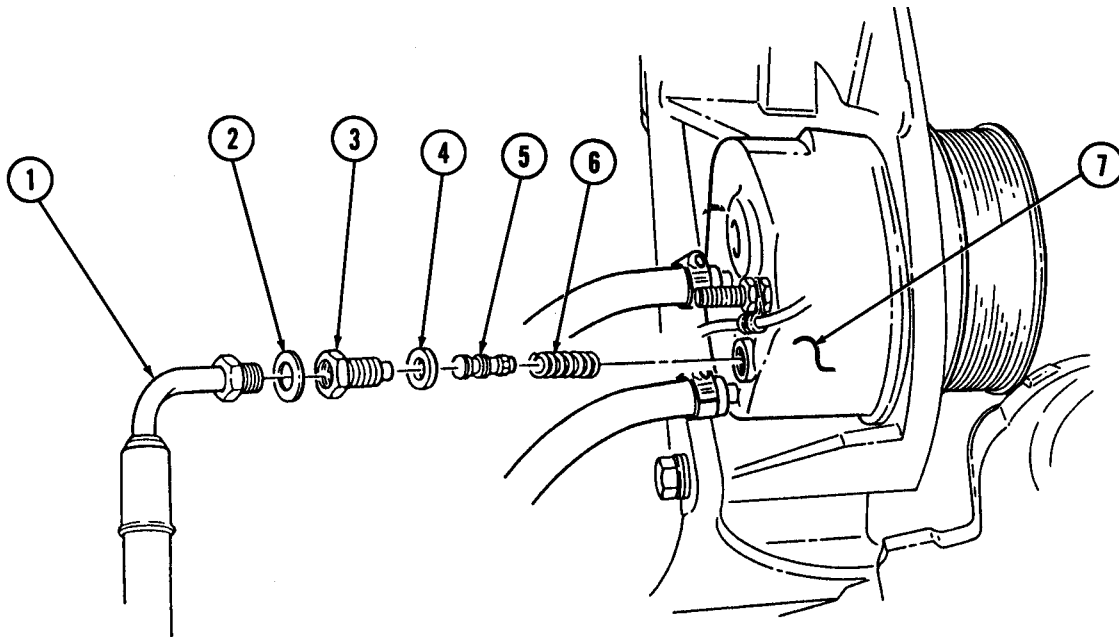
8-30. POWER STEERING RELIEF VALVE CARTRIDGE MAINTENANCE (Cont'd)

b. Inspection

Inspect external surface of relief valve (5) for burrs, nicks, or damage. Inspect relief valve (5) bore and screen for damage or debris. Inspect valve spring (6) for damage. Replace both relief valve (5) and valve spring (6) if either is damaged.

c. Installation

1. Install valve spring (6) and relief valve (5) in pump (7).
2. Install gasket (4) and fitting (3) in pump (7). Tighten fitting (3) in pump (7) to 37 lb-ft (50 N•m).
3. Install O-ring (2) on high-pressure line (1) and install high-pressure line (1) on pump (7).



- FOLLOW-ON TASKS:
- Connect battery ground cables (para. 4-73).
 - Bleed power steering system (para. 8-29).

CHAPTER 9 FRAME MAINTENANCE

9-1. FRAME MAINTENANCE TASK SUMMARY

TASK PARA.	PROCEDURES	PAGE NO.
9-2.	Front Bumper and Towing Brackets Replacement (M966, M966A1, M996, M996A1, M997, M997A1, M998, M998A1, M1025 M1025A1, M1035, M1035A1, M1037, M1043, M1043A1, M1045, M1045A1)	9-2
9-3.	Front Bumper and Towing Brackets Replacement (M1026, M1026A1, M1036, M1038, M1038A1, M1042, M1044, M1044A1, M1046, M1046A1)	9-3
9-4.	Front Bumper and Towing Brackets Replacement (M997A2, M1025A2, M1035A2, M1043A2, M1045A2, M1097A2)	9-4
9-5.	Frame Extension Replacement	9-6
9-6.	Tiedown Ring Replacement	9-8
9-7.	Radiator Front Mount Bracket Replacement	9-9
9-8.	Rear Bumper Brace Replacement	9-10
9-9.	Rear Crossmember Brace Replacement	9-11
9-10.	Rear Bumper Replacement	9-12
9-11.	Rear Bumper Inner Mounting Bracket Replacement	9-14
9-11.1.	Towing Pintle Replacement (M1123)	9-14.1
9-12.	Towing Pintle Maintenance	9-15
9-13.	Lifting Shackle Replacement	9-20
9-14.	Receptacle Mounting Bracket Replacement	9-21
9-15.	Transmission Mount Crossmember Replacement	9-22
9-16.	Rear Crossmember Replacement	9-24

9-2. FRONT BUMPER AND TOWING BRACKETS REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M966, M966A1, M996, M996A1, M997, M997A1, M998, M998A1, M1025, M1025A1, M1035, M1035A1, M1037, M1043, M1043A1, M1045, M1045A1

Materials/Parts

Four locknuts (Appendix G, Item 81)

Manual References

TM 9-2320-280-24P

Tools

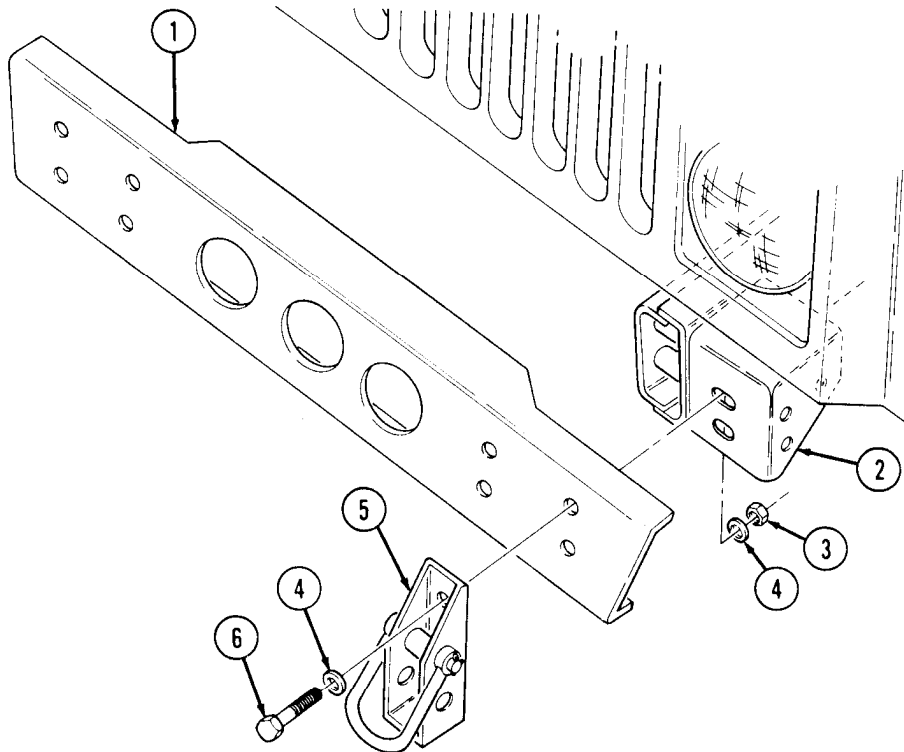
General mechanic's tool kit:
automotive (Appendix B, Item 1)

a. Removal

Remove four locknuts (3), washers (4), capscrews (6), washers (4), bumper (1), and two towing brackets (5) from mounting brackets (2). Discard locknuts (3).

b. Installation

Install bumper (1) and two towing brackets (5) on mounting brackets (2) with four washers (4), capscrews (6), washers (4), and locknuts (3). Tighten locknuts (3) to 90 lb-ft (122 N·m).



9-3. FRONT BUMPER AND TOWING BRACKETS REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M1026, M1026A1, M1036, M1038, M1038A1,
M1042, M1044, M1044A1, M1046, M1046A1

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Five locknuts (Appendix G, Item 81)

Manual References

TM 9-2320-280-24P

Equipment Condition

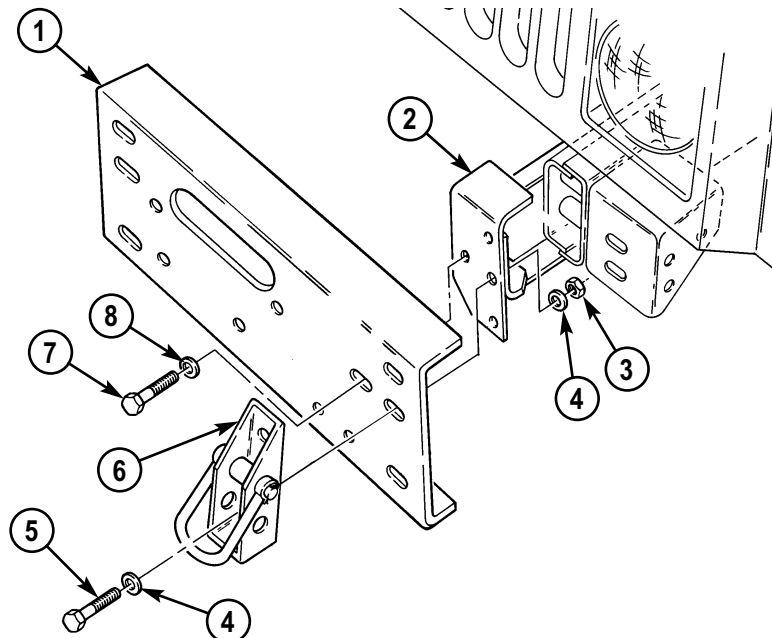
Winch removed (para. 10-107).

a. Removal

1. Remove three locknuts (3), washers (4), capscrews (5), washers (4), and two towing brackets (6) from front bumper (1) and two frame extensions (2). Discard locknuts (3).
2. Remove two locknuts (3), washers (4), capscrews (5), and washers (4) from front bumper (1) and frame extensions (2). Discard locknuts (3).
3. Remove two capscrews (7), washers (8), and front bumper (1) from frame extensions (2).

b. Installation

1. Install front bumper (1) on two frame extensions (2) with two washers (8) and capscrews (7). Tighten capscrews (7) to 90 lb-ft (122 N•m).
2. Install front bumper (1) on two frame extensions (2) with two washers (4), capscrews (5), washers (4), and locknuts (3). Tighten locknuts (3) to 90 lb-ft (122 N•m).
3. Install two towing brackets (6) on front bumper (1) with three washers (4), capscrews (5), washers (4), and locknuts (3). Tighten locknuts (3) to 90 lb-ft (122 N•m).



FOLLOW-ON TASK: Install winch (para. 10-107).

9-4. FRONT BUMPER AND TOWING BRACKETS REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M997A2, M1025A2, M1035A2, M1043A2, M1045A2, M1097A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Ten locknuts (Appendix G, Item 81)

Manual References

TM 9-2320-280-24P

Equipment Condition

Winch removed, if installed (para. 10-108).

NOTE

Perform steps 1 and 2 for bumpers with winch. Proceed to step 3 for bumpers without winch.

a. Removal

1. Remove four locknuts (5), washers (6), capscrews (8), washers (6), and two towing brackets (7) from bumper (1). Discard locknuts (5).
2. Remove six locknuts (3), washers (4), capscrews (9), washers (4), and front bumper (1) from two mounting brackets (2). Discard locknuts (3).
3. Remove four locknuts (5), washers (6), capscrews (8), washers (6), bumper (1), and two towing brackets (7) from mounting brackets (2). Discard locknuts (5).

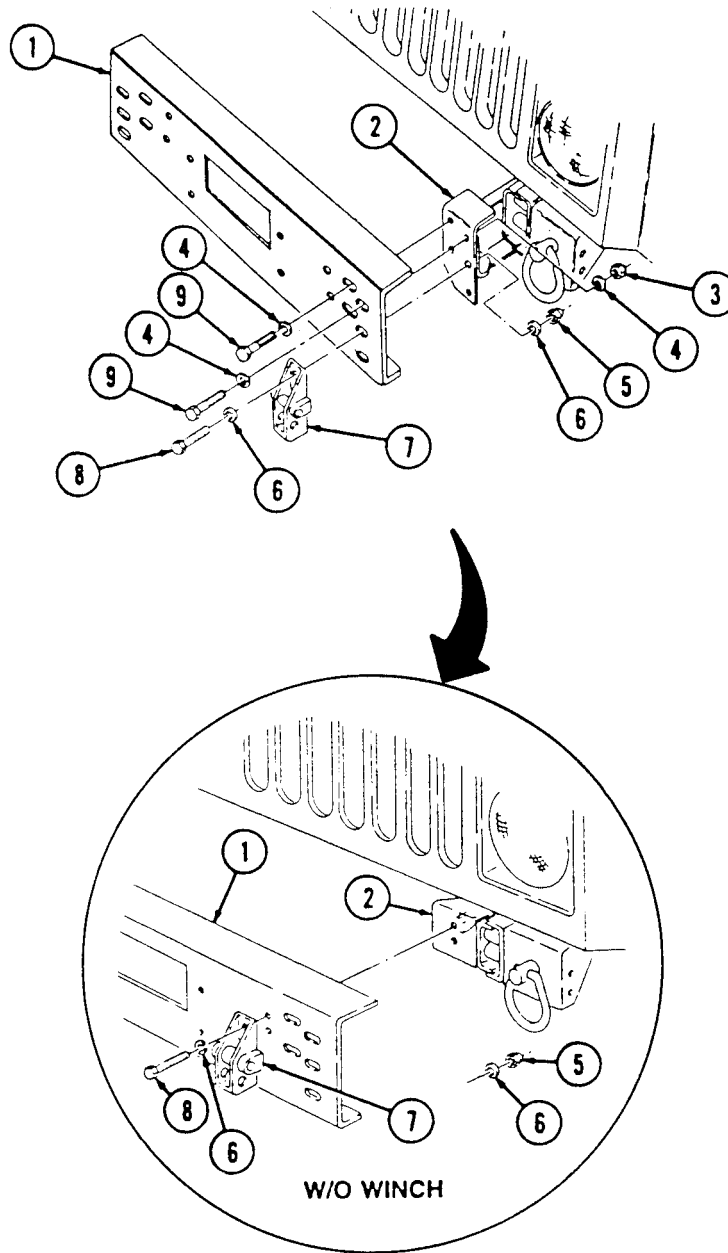
b. Installation

NOTE

Perform step 1 for bumpers without winch. Proceed to step 2 for bumpers with winch.

1. Install bumper (1) and two towing brackets (7) on two mounting brackets (2) with four washers (6), capscrews (8), washers (6), and locknuts (5). Tighten locknuts (5) to 90 lb-ft (122 N•m).
2. Install front bumper (1) on two mounting brackets (2) with six washers (4), capscrews (9), washers (4), and locknuts (3). Tighten locknuts (3) to 90 lb-ft (122 N•m).
3. Install two towing brackets (7) on bumper (1) with four washers (6), capscrews (8), washers (6) and locknuts (5). Tighten locknuts (5) to 90 lb-ft (122 N•m).

9-4. FRONT BUMPER AND TOWING BRACKETS REPLACEMENT (Cont'd)



FOLLOW-ON TASK: Install winch if removed (para. 10-108).

9-5. FRAME EXTENSION REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M997A2, M1025A2, M1026, M1026A1, M1035A1, M1035A2, M1036, M1038, M1038A1, M1042, M1043A2, M1044, M1044A1, M1045A2, M1046, M1046A1, M1097A2

Tools

General mechanic's tool kit: automotive (Appendix B, Item 1)

Materials/Parts

Three locknuts (Appendix G, Item 80)

Manual References

TM 9-2320-280-24P

Equipment Condition

- Front bumper removed (para. 9-2, 9-3, or 9-4).
- Hood and hinge removed (para. 10-5).

a. Removal

NOTE

- Note position of winch cable bracket for installation.
 - M997A2, M1025A2, M1035A2, M1043A2, M1045A2, and M1097A2 vehicles are not equipped with a winch cable bracket as indicated in step 1.
1. Remove two locknuts (2), washers (3), capscrews (5), washers (3), and winch cable bracket (6) from frame extension (8). Discard locknuts (2).
 2. Remove locknut (2), washer (3), capscrew (7), washer (3), frame extension (8), and bumper mounting bracket (1) from frame (4). Discard locknut (2).

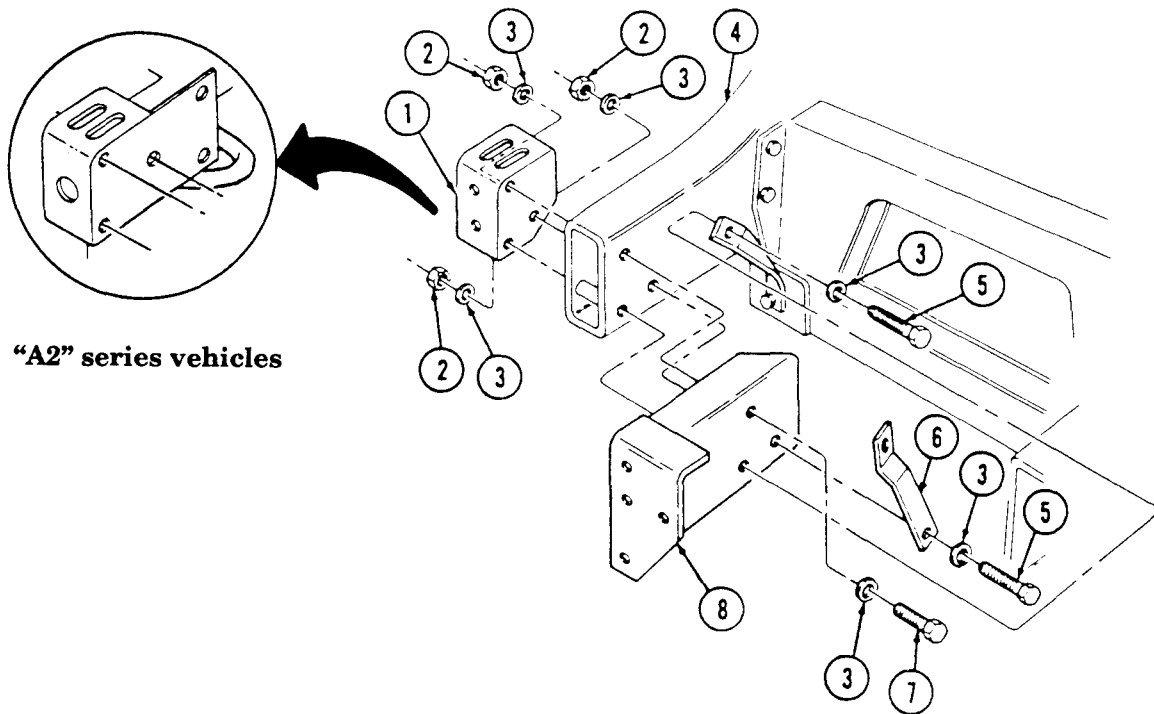
b. Installation

NOTE

M997A2, M1025A2, M1035A2, M1043A2, M1045A2, and M1097A2, vehicles are not equipped with a winch cable bracket as indicated in step 1.

1. Install bumper mounting bracket (1), frame extension (8), and winch cable bracket (6) on frame (4) with two washers (3), capscrews (5), washers (3), and locknuts (2).
2. Install mounting bracket (1) and frame extension (8) on frame (4) with washer (3), capscrew (7), washer (3), and locknut (2). Tighten locknuts (2) to 90 lb-ft (122 N•m).

9-5. FRAME EXTENSION REPLACEMENT



"A2" series vehicles

- FOLLOW-ON TASKS:
- Install hood and hinge (para. 10-5).
 - Install front bumper (para. 9-3 or 9-4).

9-6. TIEDOWN RING REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M997A, M1025A2, M1035A2, M1043A2,
M1045A2, M1097A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Cotter pin (Appendix G, Item 20)

Manual References

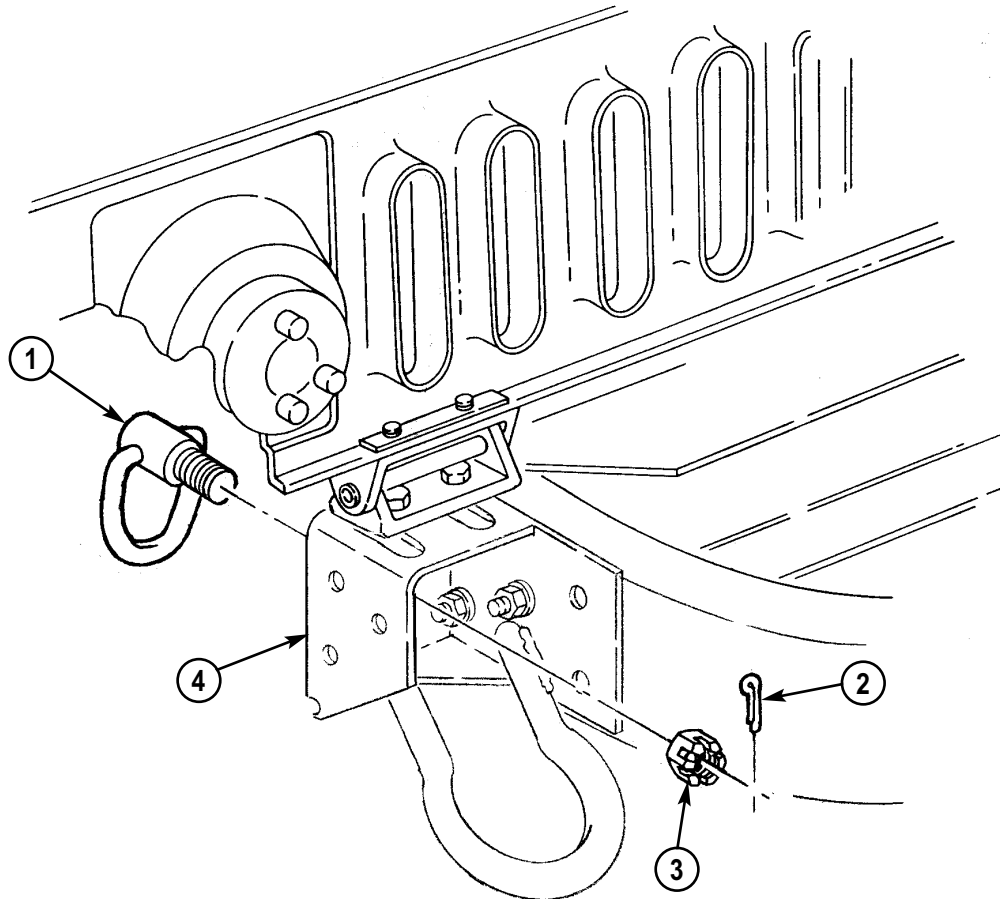
TM 9-2320-280-24P

a. Removal

Remove cotter pin (2), nut (3), and tiedown ring (1) from mounting bracket (4). Discard cotter pin (2).

b. Installation

Install tiedown ring (1) on mounting bracket (4) with nut (3). Tighten nut (3) to 16 lb-ft (22 N•m), back off to the nearest cotter pin slot, and install cotter pin (2).



9-7. RADIATOR FRONT MOUNT BRACKET REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Materials/Parts

Two locknuts (Appendix G, Item 81)
Locknut (Appendix G, Item 99)

Equipment Condition

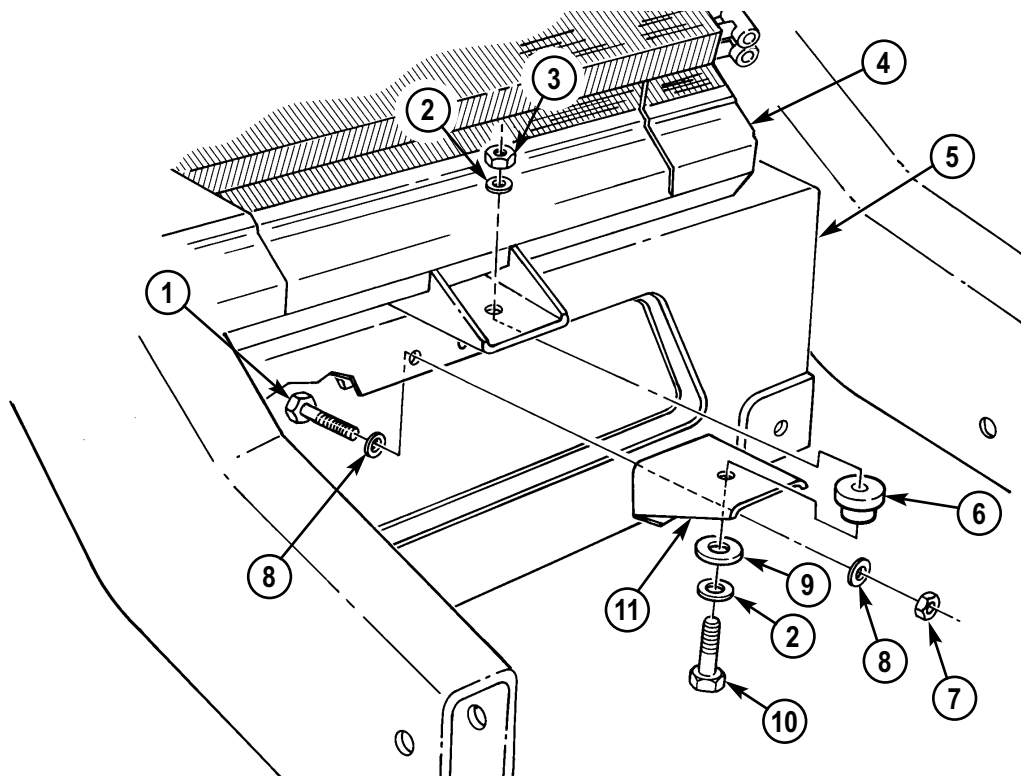
Hood raised and secured (TM 9-2320-280-10)

a. Removal

1. Remove locknut (3), washer (2), capscrew (10), washer (2), and spacer (9) from radiator (4) and front mount bracket (11). Discard locknut (3).
2. Remove two locknuts (7), washers (8), capscrews (1), washers (8), bracket (11), and mount (6) from front suspension crossmember (5). Discard locknuts (7).

b. Installation

1. Install mount (6) and bracket (11) on front suspension crossmember (5) with two washers (8), capscrews (1), washers (8), and locknuts (7). Tighten locknuts (7) to 90 lb-ft (122 N•m).
2. Install radiator (4) on bracket (11) with spacer (9), washer (2), capscrew (10), washer (2), and locknut (3). Tighten locknut (3) to 30 lb-ft (41 N•m).



FOLLOW-ON TASK: Lower and secure hood (TM 9-2320-280-10).

9-8. REAR BUMPER BRACE REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M996, M996A1, M997, M997A1, M997A2,
M1037, M1042, M1097, M1097A1, M1097A2

Materials/Parts

Three locknuts (Appendix G, Item 81)

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

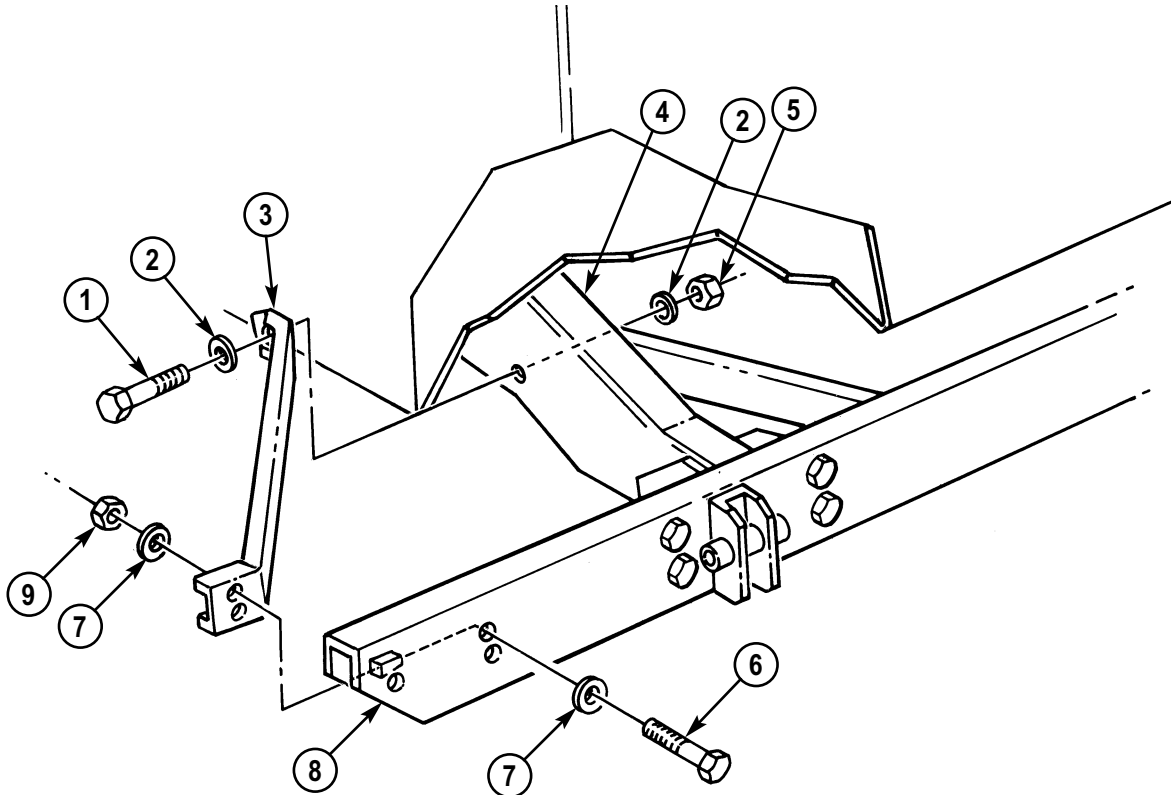
TM 9-2320-280-24P

a. Removal

1. Remove locknut (5), washer (2), capscrew (1), and washer (2), from rear bumper brace (3) and frame rail (4). Discard locknut (5).
2. Remove two locknuts (9), washers (7), capscrews (6), washers (7), and rear bumper brace (3) from rear bumper (8). Discard locknuts (9).

b. Installation

1. Install rear bumper brace (3) on rear bumper (8) with two washers (7), capscrews (6), washers (7), and locknuts (9).
2. Install rear bumper brace (3) on frame rail (4) with washer (2), capscrew (1), washer (2), and locknut (5). Tighten locknuts (5) and (9) to 90 lb-ft (122 N·m).



9-9. REAR CROSSMEMBER BRACE REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-24P

Materials/Parts

Locknut (Appendix G, Item 81)

Equipment Condition

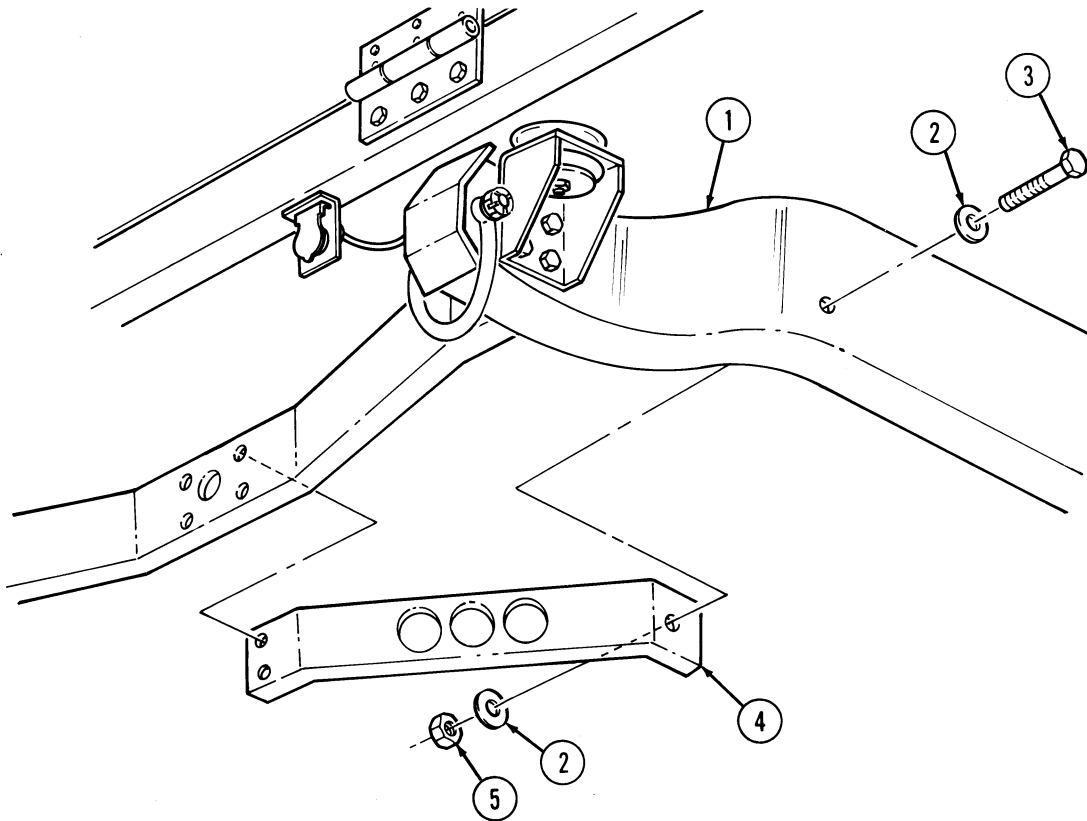
Towing pintle removed (para. 9-12).

a. Removal

Remove locknut (5), washer (2), capscrew (3), washer (2), and rear crossmember brace (4) from frame rail (1). Discard locknut (5).

b. Installation

Install rear crossmember brace (4) on frame rail (1) with washer (2), capscrew (3), washer (2), and locknut (5). Tighten locknut (5) to 90 lb-ft (122 N·m).



FOLLOW-ON TASK: Install towing pintle (para. 9-12).

9-10. REAR BUMPER REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M996, M996A1, M997, M997A1, M997A2, M1025A2, M1035A2, M1043A2, M1045A2, M1037, M1042, M1097, M1097A1, M1097A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Sixteen locknuts (Appendix G, Item 81)
Six assembled locknuts (Appendix G, Item 130)

Personnel Required

One mechanic
One assistant

Manual References

TM 9-2320-280-24P

Equipment Condition

Towing pintle removed (para. 9-12).

a. Removal

1. Remove four assembled locknuts (9), capscrew (15), and trailer receptacle cover (16) from trailer receptacle (10). Discard assembled locknuts (9).
2. Remove two assembled locknuts (11), capscrews (14), plate (13), and trailer receptacle (10) from rear bumper (12) and remove plate (13) from rear bumper (12). Discard assembled locknuts (11).
3. Remove four locknuts (1), washers (2), capscrews (20), and washers (2) from rear bumper (12) and two braces (21). Discard locknuts (1).

NOTE

Perform steps 4 and 5 for M997A2, M1025A2, M1035A2, M1043A2, M1045A2, and M1097A2 vehicles only.

4. Remove two cotter pins (22), nuts (23), and two tiedown rings (24) from rear bumper (12) and two mounting brackets (5). Discard cotter pins (22).
5. Remove eight locknuts (27), washers (26), capscrews (25), and washers (26) from rear bumper (12) and two mounting brackets (5). Discard locknuts (27).
6. Remove four locknuts (3), washers (4), capscrews (18), washers (4), and two tiedown brackets (19) from rear bumper (12) and two mounting brackets (5). Discard locknuts (3).
7. Remove four locknuts (3), washers (4), capscrews (18), and washers (4) from rear bumper (12) and mounting brackets (5). Discard locknuts (3).
8. Remove four locknuts (6), washers (7), capscrews (17), washers (7), and rear bumper (12) from two inner mounting brackets (8). Discard locknuts (6).

NOTE

Perform step 9 only if bumper is being replaced.

9. Remove lifting shackles (para. 9-13).

b. Installation

NOTE

Perform step 1 only if bumper was replaced.

1. Install lifting shackles (para. 9-13).

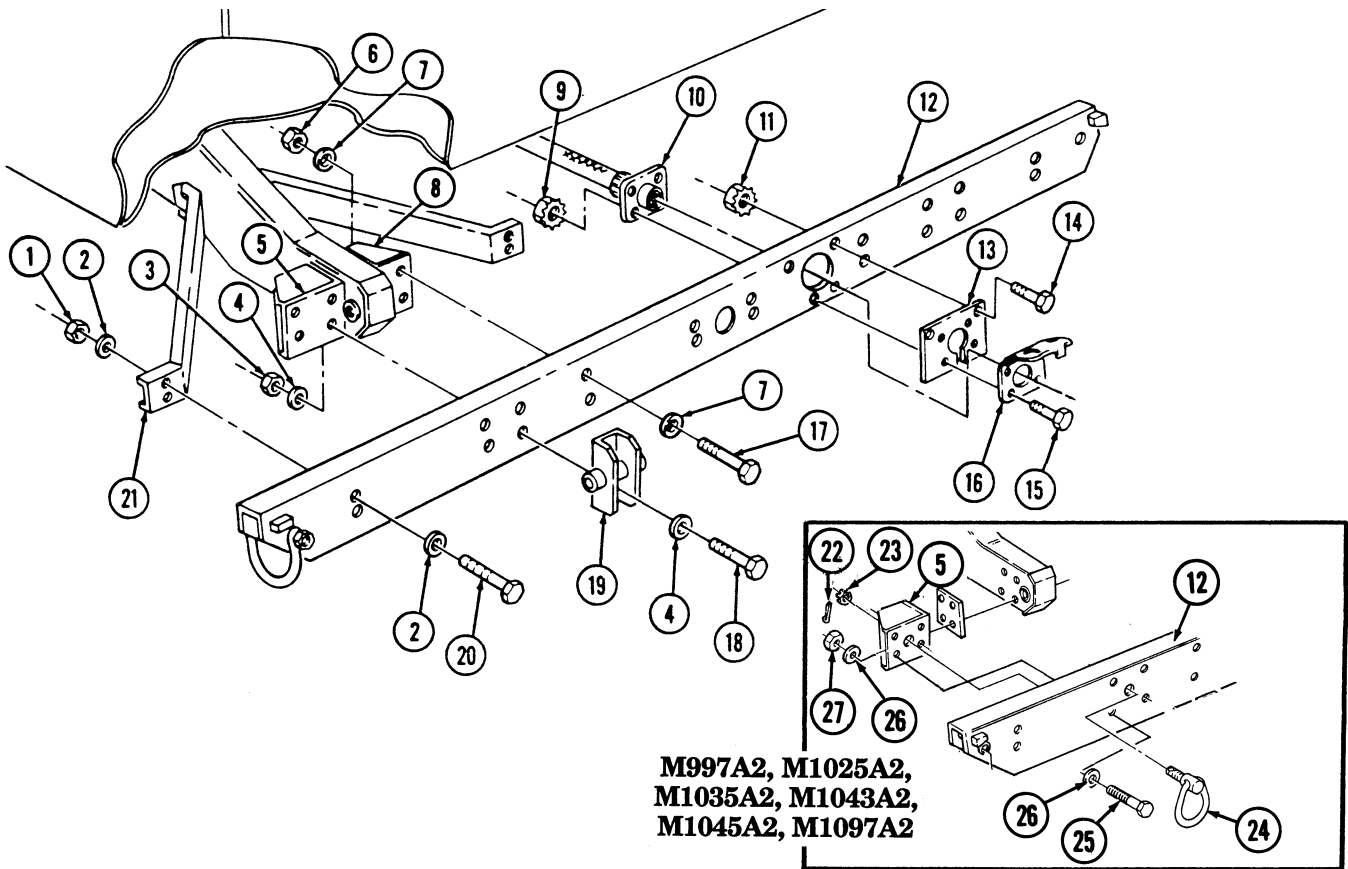
9-10. REAR BUMPER REPLACEMENT (Cont'd)

2. Install rear bumper (12) on inner mounting brackets (8) with four washers (7), capscrews (17), washers (7), and locknuts (6). Tighten locknuts (6) to 90 lb-ft (122 N·m).
3. Install rear bumper (12) on mounting brackets (5) with four washers (4), capscrews (18), washers (4), and locknuts (3). Tighten locknuts (3) to 90 lb-ft (122 N·m).

NOTE

Perform steps 4 and 5 for M997A2, M1025A2, M1035A2, M1043A2, M1045A2, and M1097A2 vehicles only.

4. Secure rear bumper (12) to two mounting brackets (5) with eight washers (26), capscrews (25), washers (26), and locknuts (27). Tighten locknuts (27) to 90 lb-ft (122 N·m).
5. Install two tiedown rings (24) on rear bumper (12) and two brackets (5) with two nuts (23). Tighten nuts (23) to 16 lb-ft (22 N·m), back off to the nearest cotter pin slot, and install two cotter pins (22).
6. Install two tiedown brackets (19) on rear bumper (12) with four washers (4), capscrews (18), washers (4), and locknuts (3). Tighten locknuts (3) to 90 lb-ft (122 N·m).
7. Install rear bumper (12) on braces (21) with four washers (2), capscrews (20), washers (2), and locknuts (1). Tighten locknuts (1) to 90 lb-ft (122 N·m).
8. Position trailer receptacle (10) through rear bumper (12) and install plate (13) and trailer receptacle (10) on rear bumper (12) with two capscrews (14) and assembled locknuts (11). Tighten assembled locknuts (11) to 8 lb-ft (11 N·m).
9. Install trailer receptacle cover (16) on plate (13) and rear bumper (12) with four capscrews (15) and assembled locknuts (9). Tighten assembled locknuts (9) to 8 lb-ft (11 N·m).



FOLLOW-ON TASK: Install towing pintle (para. 9-12).

9-11. REAR BUMPER INNER MOUNTING BRACKET REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M996, M996A1, M997, M997A1, M997A2,
M1037, M1042, M1097, M1097A1, M1097A2

Materials/Parts

Six locknuts (Appendix G, Item 81)

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-24P

a. Removal

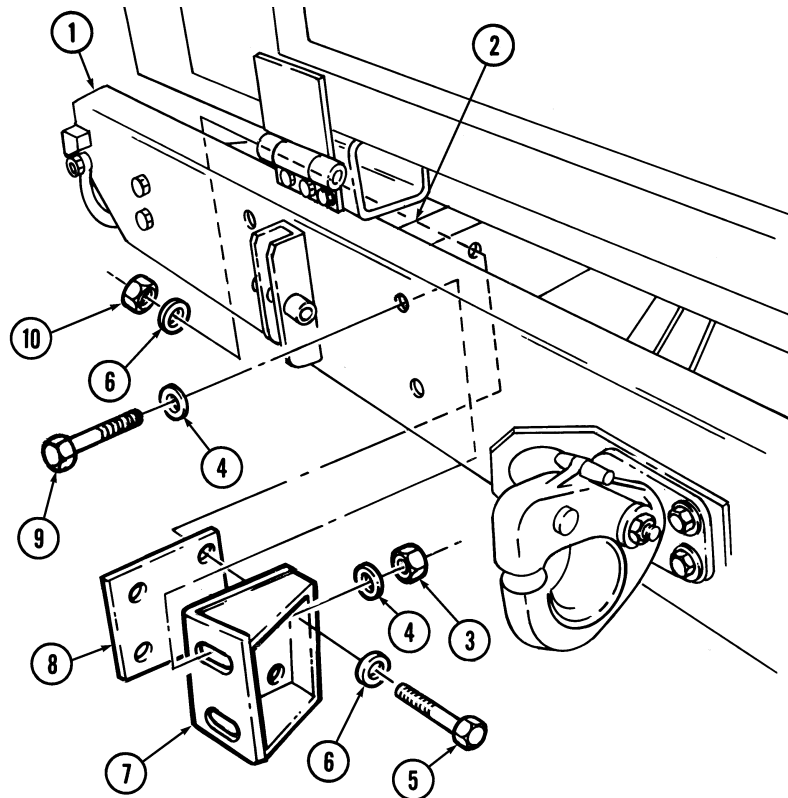
1. Remove two locknuts (3), washers (4), capscrews (9), and washers (4) from bracket (7) and rear bumper (1). Discard locknuts (3).
2. Remove four locknuts (10), washers (6), capscrews (5), washers (6), spacer (8), and bracket (7) from frame rail (2). Discard locknuts (10).

b. Installation

NOTE

Ensure spacer on outer side of frame rail is in position before installing spacer and bracket.

1. Install spacer (8) and bracket (7) on frame rail (2) with four washers (6), capscrews (5), washers (6), and locknuts (10). Tighten capscrews (5) to 90 lb-ft (122 N•m).
2. Install bracket (7) on rear bumper (1) with two washers (4), capscrews (9), washers (4), and locknuts (3). Tighten locknuts (3) to 90 lb-ft (122 N•m).



9-11.1. TOWING PINTLE REPLACEMENT (M1123)

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M1123

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Cotter pin (Appendix G, Item 22)
Four locknuts (Appendix G, Item 81)

Manual References

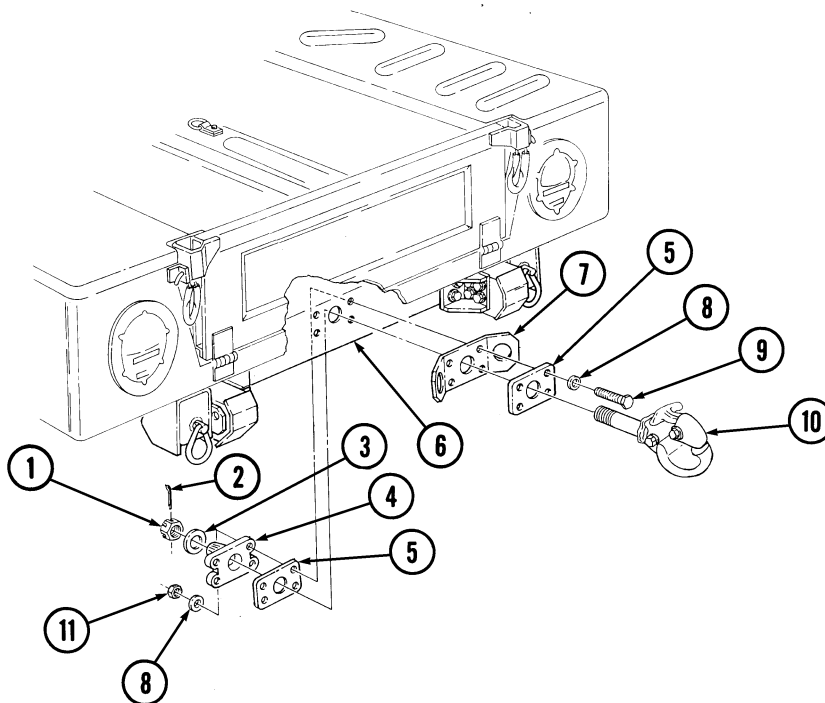
TM 9-2320-280-10
TM 9-2320-280-24P

a. Removal

1. Remove cotter pin (2), slotted nut (1), washer (3), and towing pintle (10) from rear crossmember (6). Discard cotter pin (2).
2. Remove four locknuts (11), washers (8), capscrews (9), washers (8), two support plates (5), backing plate (4), and safety chain plate (7) from rear crossmember (6). Discard locknuts (11).

b. Installation

1. Install safety chain plate (7), backing plate (4), and two support plates (5) on rear crossmember (6) with four washers (8), capscrews (9), washers (8), and locknuts (11).
2. Install towing pintle (10) on crossmember (6) with washer (3) and slotted nut (1).
3. Tighten slotted nut (1) until towing pintle (10) is tight. Back off nut (1) until towing pintle (10) rotates freely and hole in towing pintle (10) shaft aligns with slot in nut (1). Install cotter pin (2).



9-12. TOWING PINTLE MAINTENANCE

This task covers:

- | | |
|----------------|-----------------|
| a. Removal | d. Assembly |
| b. Disassembly | e. Installation |
| c. Cleaning | |

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Two cotter pins (Appendix G, Item 22)
Drive screw (Appendix G, Item 28)
Two locknuts (Appendix G, Item 82)
Four locknuts (Appendix G, Item 93.1)
Drycleaning solvent (Appendix C, Item 18)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

General Safety Instructions

Cleaning will be done in a well-ventilated area and a fire extinguisher will be kept nearby when drycleaning solvent is used.

NOTE

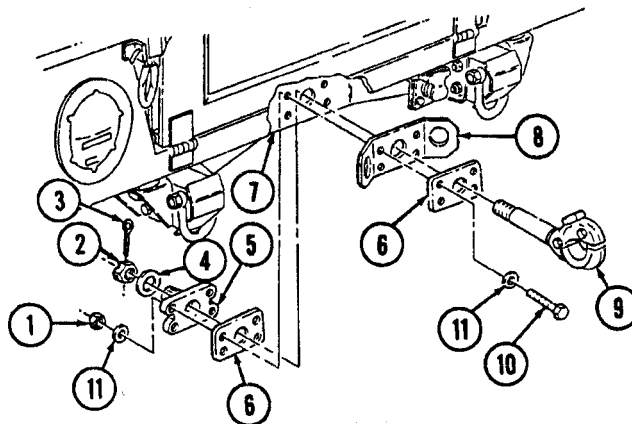
Contact DS maintenance for fabrication instructions of optional towing pintle.

a. Removal

NOTE

- Perform steps 1 and 2 for rear-mounted towing pintle.
- Perform steps 3 and 4 for optional towing pintle mounted to the front bumper.

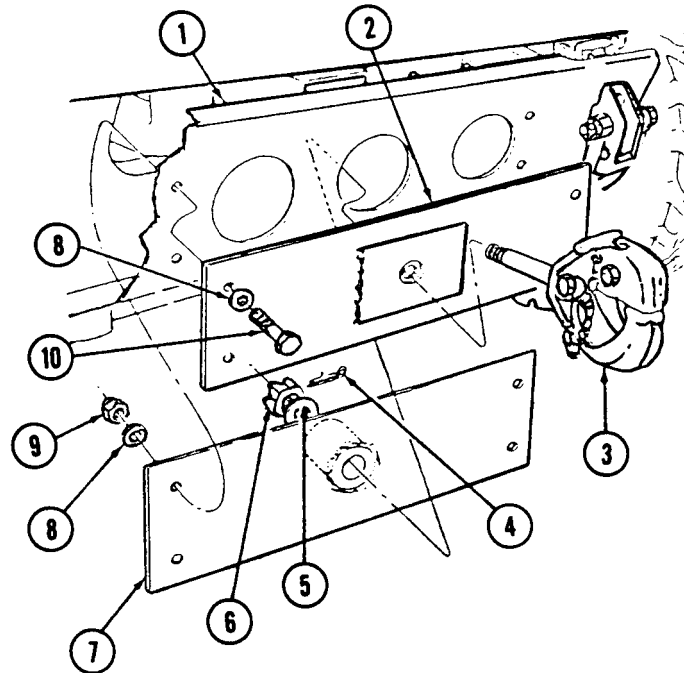
1. Remove cotter pin (3), slotted nut (2), washer (4), and towing pintle (9) from rear crossmember (7). Discard cotter pin (3).
2. Remove four nuts (1), washers (11), capscrews (10), washers (11), two support plates (6), backing plate (5), and safety chain plate (8) from rear crossmember (7).



9-12. TOWING PINTLE MAINTENANCE

3. Remove cotter pin (4), slotted nut (6), washer (5), and towing pintle (3) from front bumper (1). Discard cotter pin (4).
4. Remove four locknuts (9), washers (8), capscrews (10), washers (8), front plate (2), and back plate (7) from front bumper (1). Discard locknuts (9).

OPTIONAL



9-12. TOWING PINTLE MAINTENANCE (Cont'd)

b. Disassembly

NOTE

Perform step 1 for rear-mounted towing pintle only.

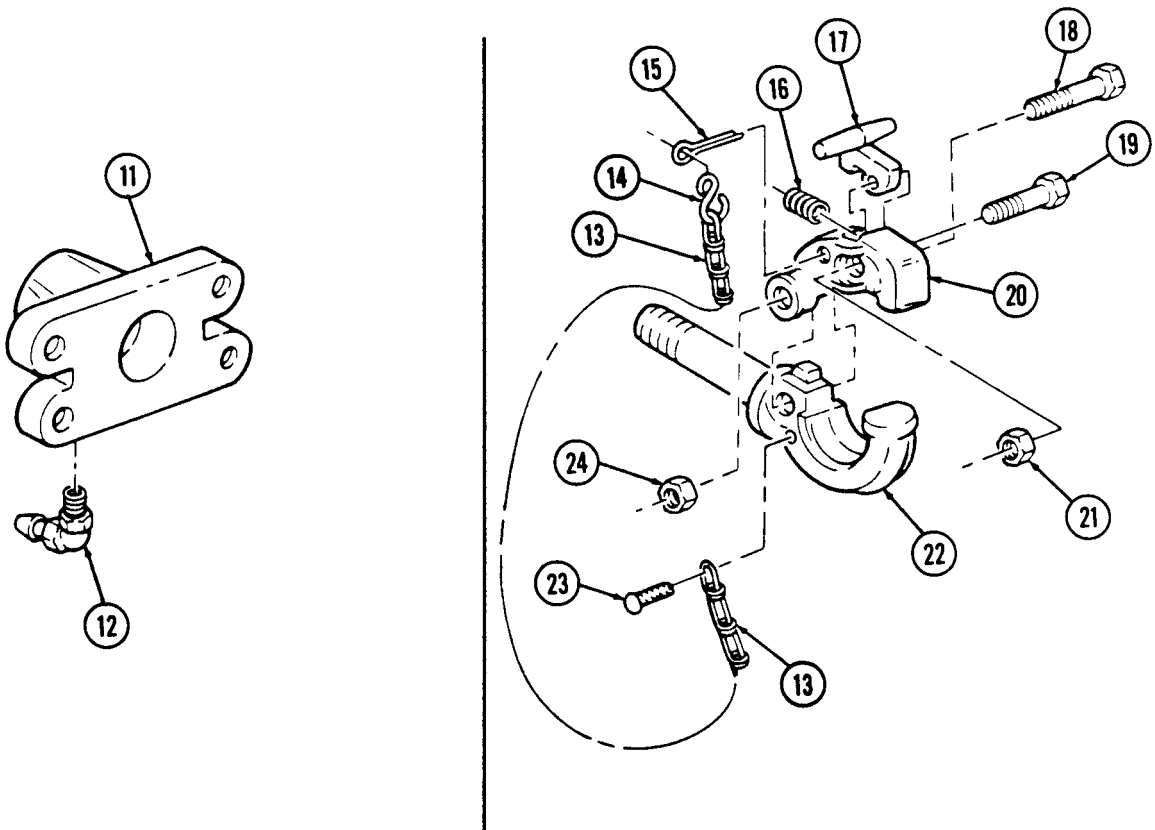
1. Remove grease fitting (12) from backing plate (11).
2. Remove cotter pin (15) from towing pintle latch (20).
3. Remove locknut (21), capscrew (19), pintle latch lock (17), and spring (16) from towing pintle latch (20). Discard locknut (21).
4. Remove locknut (24), capscrew (18), and towing pintle latch (20) from towing pintle hook (22). Discard locknut (24).
5. Remove cotter pin (15) from pintle lock chain hook (14). Discard cotter pin (15).
6. Remove drivescrew (23) and pintle lock chain (13) from towing pintle hook (22). Discard drivescrew (23).

c. Cleaning

WARNING

Drycleaning solvent is flammable and will not be used near an open flame. A fire extinguisher will be kept nearby when the solvent is used. Use only in well-ventilated places. Failure to do this may result in injury to personnel and/or damage to equipment.

Clean all metallic parts with drycleaning solvent.



9-12. TOWING PINTLE MAINTENANCE (Cont'd)

d. Assembly

1. Install pintle lock chain (1) on towing pintle hook (10) with drivescrew (11).
2. Install cotter pin (3) on pintle lock chain (1) with pintle lock chain hook (2).
3. Install towing pintle latch (8) on towing pintle hook (10) with capscrew (6) and locknut (12). Tighten locknut (12) to 15 lb-ft (20 N•m).
4. Install spring (4) and pintle latch lock (5) on towing pintle latch (8) with capscrew (7) and locknut (9). Tighten locknut (9) to 15 lb-ft (20 N•m).
5. Install cotter pin (3) in pintle latch (8).

NOTE

Perform step 6 for rear-mounted towing pintle only.

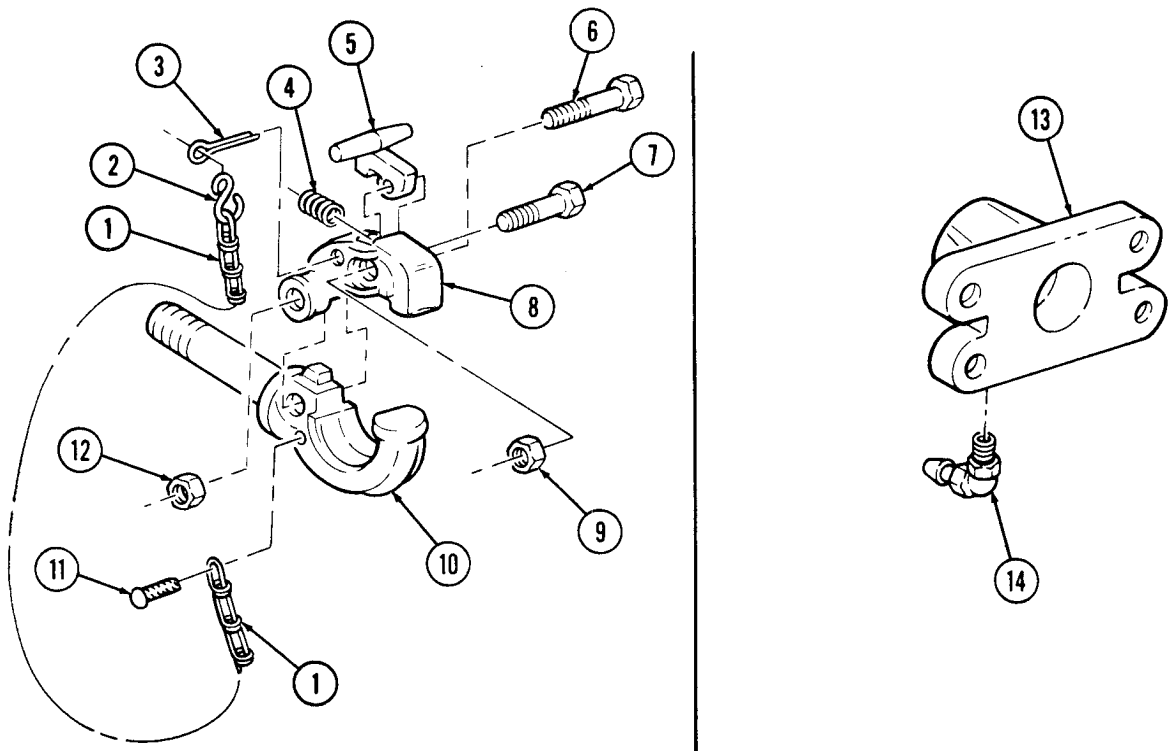
6. Install grease fitting (14) in backing plate (13).

e. Installation

NOTE

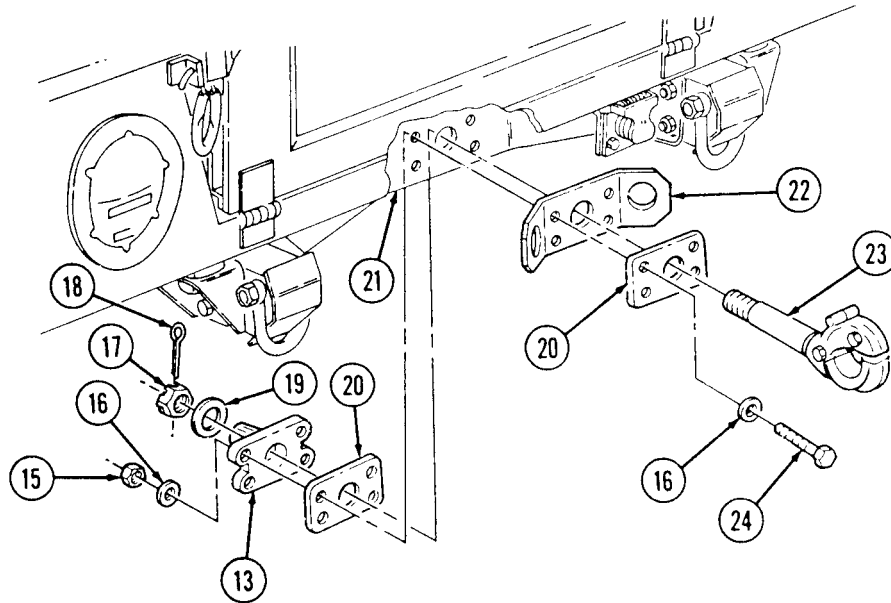
- Perform steps 1 through 3 for rear-mounted towing pintle.
- Perform steps 4 through 6 for optional towing pintle mounted to the front bumper.
- Grease fitting on backing plate must face downward.

1. Install safety chain plate (22), support plates (20), and backing plate (13) on rear crossmember (21) with four washers (16), capscrews (24), washers (16), and nuts (15).
2. Install towing pintle (23) and tighten nuts (15) to 90 lb-ft (122 N•m).
3. Install towing pintle (23) with washer (19) and slotted nut (17). Loosen slotted nut (17) slightly if towing pintle (23) will not rotate easily. Install cotter pin (18) in slotted nut (17).

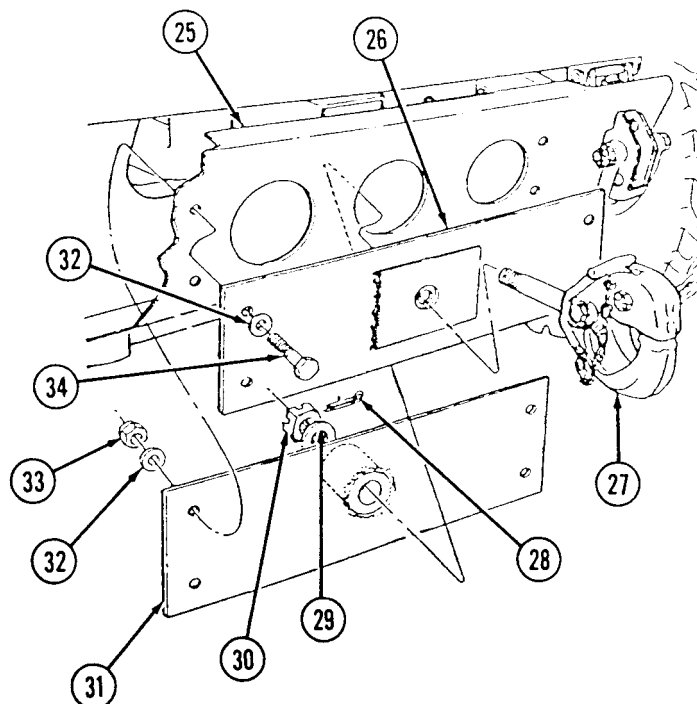


9-12. TOWING PINTLE MAINTENANCE (Cont'd)

4. Install front plate (26) and back plate (31) on front bumper (25) with four washers (32), capscrews (34), washers (32), and locknuts (33). Tighten locknuts (33) to 90 lb-ft (122 N·m).
5. Install towing pintle (27) with washer (29) and slotted nut (30).
6. Tighten slotted nut (30) until towing pintle (27) is tight. Back off nut (30) until towing pintle (27) rotates freely and hole in towing pintle (27) shaft aligns with slot in nut (30). Install cotter pin (28).



OPTIONAL



FOLLOW-ON TASKS: Lubricate rear-mounted towing pintle (TM 9-2320-280-10).

9-13. LIFTING SHACKLE REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Cotter pin (Appendix G, Item 14)

Manual References

TM 9-2320-280-24P

NOTE

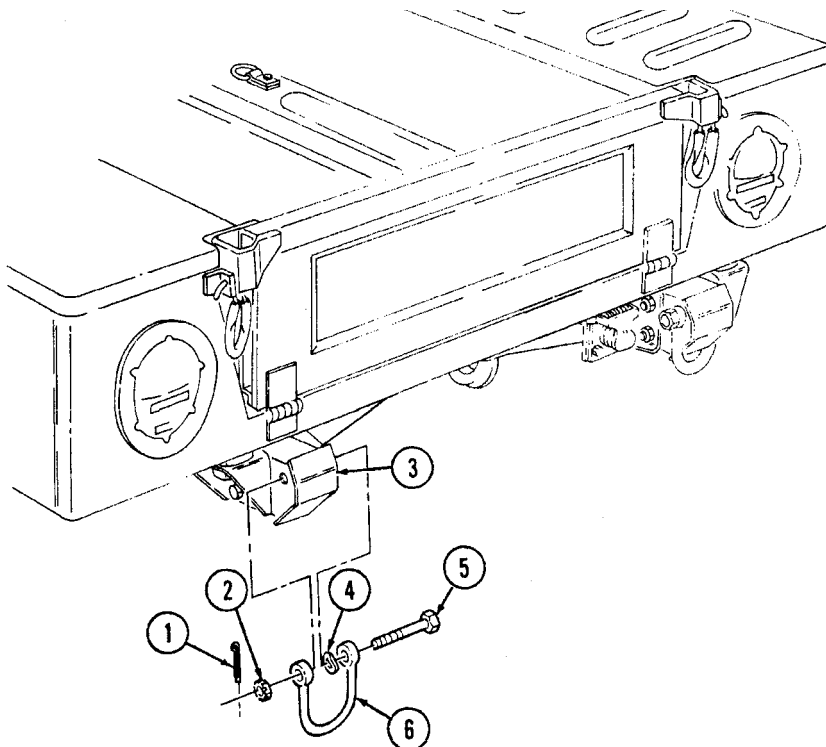
- All lifting shackles are replaced basically the same. This procedure covers the rear lifting shackle on all vehicles except M996, M996A1, M997, M997A1, M997A2, M1037, and M1042.
- Vehicles with serial numbers 100,000 and above have new, reinforced lifting shackles. Previous models lifting shackles will be used on vehicles with serial numbers 99,999 and below only. Refer to vehicle serial number before ordering replacement parts.

a. Removal

Remove cotter pin (1), slotted nut (2), capscrew (5), spring washer (4), and shackle (6) from frame (3). Discard cotter pin (1).

b. Installation

1. Install shackle (6) on frame (3) with spring washer (4), capscrew (5), and slotted nut (2). Tighten slotted nut (2) enough to allow movement of shackle (6). Torque slotted nut (2) to 15-20 lb-ft (20-27 N•m).
2. Back off slotted nut (2) to align with hole in capscrew (5) and install cotter pin (1) in slotted nut (2).



9-14. RECEPTACLE MOUNTING BRACKET REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

All vehicles except M996, M996A1, M997, M997A1, M997A2, M1037, M1042

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Two locknuts (Appendix G, Item 79)
Four assembled locknuts (Appendix G, Item 130)

Manual References

TM 9-2320-280-24P

a. Removal

1. Remove four assembled locknuts (9), capscrews (6), cover (5), and receptacle (1) from bracket (4). Discard assembled locknuts (9).

NOTE

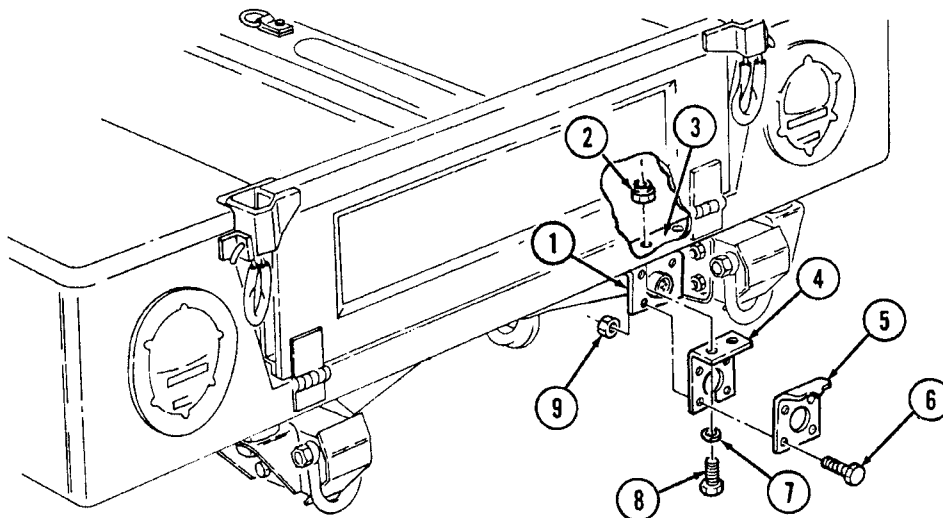
- If bracket is held on to "D" beam with rivets, proceed to step 2. If not, proceed to step 3.
 - For instructions on removal of rivets, refer to para. 10-66.
2. Remove two rivets and bracket (4) from "D" beam (3).
 3. Remove two locknuts (2) capscrews (8), washers (7), and bracket (4) from "D" beam (3). Discard locknuts (2).

b. Installation

NOTE

If bracket was held on to "D" beam with rivets, do step 1. If not, do step 2.

1. With a 0.3125-in. drill bit, enlarge existing rivet holes on bracket (4) and "D" beam (3).
2. Install bracket (4) on "D" beam (3) with two washers (7), capscrews (8), and locknuts (2).
3. Install receptacle (1) and cover (5) on bracket (4) with four capscrews (6) and assembled locknuts (9).



9-15. TRANSMISSION MOUNT CROSSMEMBER REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic’s tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-24P

Materials/Parts

Two locknuts (Appendix G, Item 128)

CAUTION

Transmission must be supported during removal and installation of transmission mount crossmember to prevent damage to equipment.

a. Removal

NOTE

Perform step 1 and 2 for all vehicles except “A2” series. Perform steps 3 and 4 for “A2” series only.

1. Place support under transmission and remove two nuts (8), washers (2), capscrews (3), and washers (2) from transmission mount crossmember (5) and two transmission support brackets (1).
2. Remove two locknuts (7), washers (6), and crossmember (5) from transmission mount (4). Discard locknuts (7).
3. Place support under transmission and remove two nuts (12), washers (11), capscrew (10), and washer (11) from crossmember (13) and two support brackets (1).
4. Remove two locknuts (15), washers (14), and crossmember (13) from transmission mount (9). Discard locknuts (15).

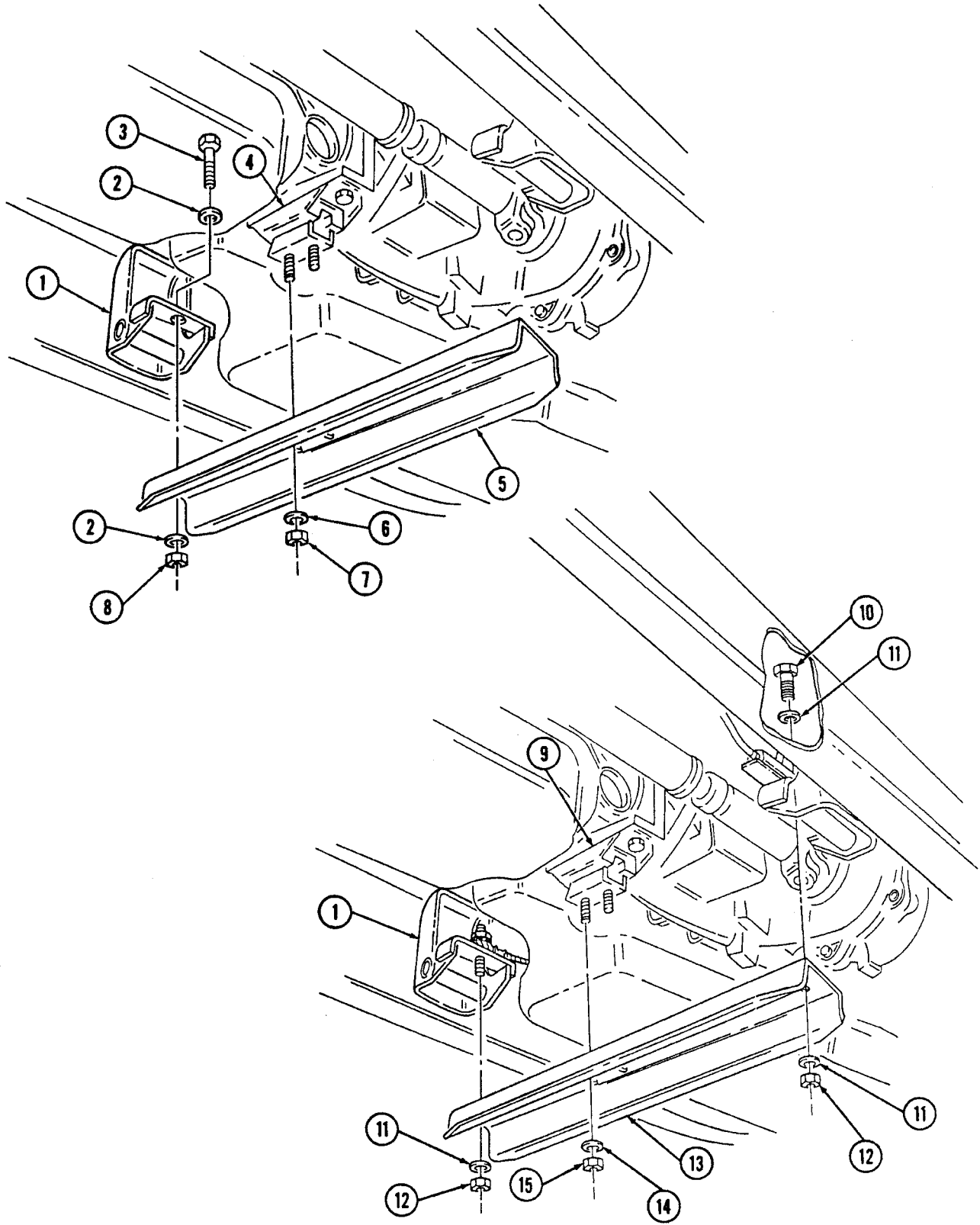
b. Installation

NOTE

Perform step 1 and 2 for all vehicles except “A2” series. Perform steps 3 and 4 for “A2” series only.

1. Install crossmember (5) on two support brackets (1) with washers (2), capscrews (3), washers (2), and nuts (8). Tighten nuts (8) to 90 lb-ft (122 N•m).
2. Install crossmember (5) on transmission mount (4) with two washers (6) and locknuts (7). Tighten locknuts (7) to 29 lb-ft (38 N•m).
3. Install crossmember (13) on two support brackets (1) with washer (11), capscrew (10), two washers (11), and nuts (12). Tighten nuts (12) to 90 lb-ft (122 N•m).
4. Install crossmember (13) on transmission mount (9) with two washers (14) and locknuts (15). Tighten locknuts (15) to 28 lb-ft (38 N•m).
5. Remove support.

9-15. TRANSMISSION MOUNT CROSSMEMBER REPLACEMENT (Cont'd)



"A2" Series

9-16. REAR CROSSMEMBER REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Four locknuts (Appendix G, Item 81)

Manual References

TM 9-2320-280-24P

Equipment Condition

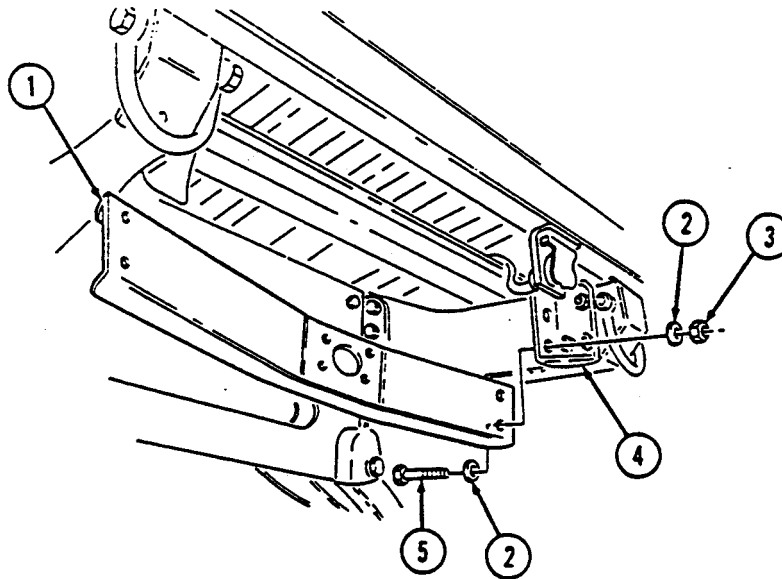
Rear crossmember braces removed
(para. 9-9).

a. Removal

Remove four locknuts (3), washers (2), capscrews (5), washers (2), and rear crossmember (1) from two rear crossmember mounting brackets (4). Discard locknuts (3).

b. Installation

Install rear crossmember (1) on two rear crossmember mounting brackets (4) with four washers (2), capscrews (5), washers (2), and locknuts (3). Tighten locknuts (3) to 90 lb-ft (122 N•m).



FOLLOW-ON TASK: Install rear crossmember braces (para. 9-9).

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HENRY VICCELLIO, JR.
General, United States Air Force
Commander, Air Force Materiel Command

By Order of the Marine Corps:

D.R. BLOOMER
Colonel, USMC
Director, Program Support
Marine Corps Systems Command

Distribution:

To be distributed in accordance with the initial distribution number (IDN) 380900, requirements for TM 9-2320-280-20-2.

RECOMMENDED CHANGES TO PUBLICATIONS AND BLANK FORMS For use of this form, see AR 25-30; the proponent agency is ODISC4.	Use Part II (reverse) for Repair Parts and Special Tools Lists (RPSTL) and Supply Catalogs/Supply Manuals (SC/SM).	DATE: 18 Mar 2003
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TO: <i>(Forward to proponent of publication or form) (include ZIP code)</i> AMSTA-LC-CI Tech Pubs, TACOM-RI 1 Rock Island Arsenal Rock Island, IL 61299-7630	FROM: <i>(Activity and location) (include ZIP code)</i> Co. C, 42nd BN, 4th Brigade Ft. Riley, CA 21308
--	---

PART I - ALL PUBLICATIONS (EXCEPT RPSTL AND SC/SM) AND BLANK FORMS

PUBLICATION/FORM NUMBER TM 9-2320-280-20-2	DATE 31 JAN 96	TITLE TECHNICAL MANUAL UNIT MAINTENANCE
--	--------------------------	---

ITEM NO.	PAGE NO.	PARA-GRAPH	LINE NO.*	FIGURE NO.	TABLE NO.	RECOMMENDED CHANGES AND REASON <i>(Provide exact wording of recommended changes, if possible).</i>
1	4-166	4-91				Rivets are of wrong size, should be 3/8" solid rivet 3/4" long.

SAMPLE

**Reference to line numbers within the paragraph or subparagraph.*

TYPED NAME, GRADE, OR TITLE Robert Adaly	TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION AV424-6678	SIGNATURE <i>Robert Adaly</i>
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TO: <i>(Forward direct to addressee listed in publication)</i> AMSTA-LC-CI Tech Pubs, TACOM-RI 1 Rock Island Arsenal Rock Island, IL 61299-7630	FROM: <i>(Activity and location)</i> <i>(include ZIP code)</i>	DATE:
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PART II - REPAIR PARTS AND SPECIAL TOOLS LISTS AND SUPPLY CATALOGS/SUPPLY MANUALS

PUBLICATION/FORM NUMBER	DATE	TITLE
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PAGE NO.	COLM NO.	LINE NO.	NATIONAL STOCK NUMBER	REFERENCE NO.	FIGURE NO.	ITEM NO.	TOTAL NO. OF MAJOR ITEMS SUPPORTED	RECOMMENDED ACTION
<h1 style="font-size: 4em; margin: 0;">SAMPLE</h1>								

PART III - REMARKS *(Any general remarks or recommendations, or suggestions for improvement of publications and blank forms. Additional blank sheets may be used if more space is needed.)*

TYPED NAME, GRADE, OR TITLE	TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION	SIGNATURE
------------------------------------	---	------------------

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<i>TO: (Forward to proponent of publication or form) (include ZIP code)</i> AMSTA-LC-CI Tech Pubs, TACOM-RI 1 Rock Island Arsenal Rock Island, IL 61299-7630	<i>FROM: (Activity and location) (include ZIP code)</i>
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PART I - ALL PUBLICATIONS (EXCEPT RPSTL AND SC/SM) AND BLANK FORMS

PUBLICATION/FORM NUMBER TM 9-2320-280-20-2	DATE 31 JAN 96	TITLE TECHNICAL MANUAL UNIT MAINTENACE
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ITEM NO.	PAGE NO.	PARA-GRAPH	LINE NO.*	FIGURE NO.	TABLE NO.	RECOMMENDED CHANGES AND REASON <i>(Provide exact wording of recommended changes, if possible).</i>

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PART II - REPAIR PARTS AND SPECIAL TOOLS LISTS AND SUPPLY CATALOGS/SUPPLY MANUALS

PUBLICATION/FORM NUMBER				DATE		TITLE		
PAGE NO.	COLM NO.	LINE NO.	NATIONAL STOCK NUMBER	REFERENCE NO.	FIGURE NO.	ITEM NO.	TOTAL NO. OF MAJOR ITEMS SUPPORTED	RECOMMENDED ACTION

PART III - REMARKS *(Any general remarks or recommendations, or suggestions for improvement of publications and blank forms. Additional blank sheets may be used if more space is needed.)*

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TYPED NAME, GRADE, OR TITLE	TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION	SIGNATURE
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THE METRIC SYSTEM AND EQUIVALENTS

LINEAR MEASURE

- 1 Centimeter = 10 Millimeters = 0.01 Meters = 0.3937 Inches
- 1 Meter = 100 Centimeters = 1,000 Millimeters = 39.37 Inches
- 1 Kilometer = 1,000 Meters = 0.621 Miles

SQUARE MEASURE

- 1 Sq Centimeter = 100 Sq Millimeters = 0.155 Sq Inches
- 1 Sq Meter = 10,000 Sq Centimeters = 10.76 Sq Feet
- 1 Sq Kilometer = 1,000,000 Sq Meters = 0.386 Sq Miles

CUBIC MEASURE

- 1 Cu Centimeter = 1,000 Cu Millimeters = 0.06 Cu Inches
- 1 Cu Meter = 1,000,000 Cu Centimeters = 35.31 Cu Feet

LIQUID MEASURE

- 1 Milliliter = 0.001 Liters = 0.0338 Fluid Ounces
- 1 Liter = 1,000 Milliliters = 33.82 Fluid Ounces

TEMPERATURE

- Degrees Fahrenheit (F) = $^{\circ}\text{C} \cdot 9 \div 5 + 32$
- Degrees Celsius (C) = $\text{F}^{\circ} - 32 \cdot 5 \div 9$
- 212° Fahrenheit is equivalent to 100° Celsius
- 90° Fahrenheit is equivalent to 32.2° Celsius
- 32° Fahrenheit is equivalent to 0° Celsius

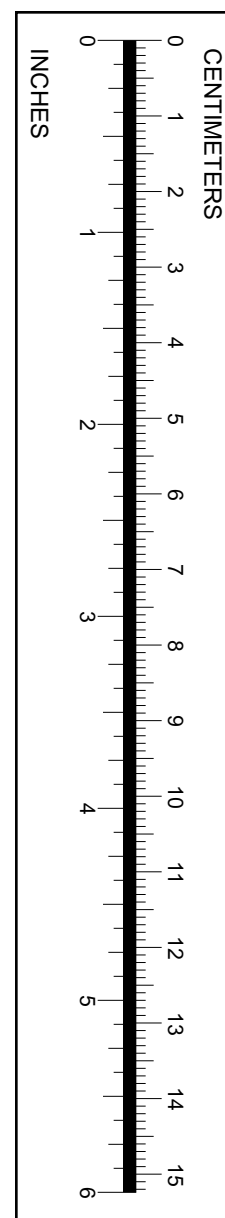
WEIGHTS

- 1 Gram = 0.001 Kilograms = 1,000 Milligrams = 0.035 Ounces
- 1 Kilogram = 1,000 Grams = 2.2 Lb
- 1 Metric Ton = 1,000 Kilograms = 1 Megagram = 1.1 Short Tons

APPROXIMATE CONVERSION FACTORS

TO CHANGE	TO	MULTIPLY BY
Inches	Millimeters	25.4
Inches	Centimeters	2.540
Feet	Meters	0.305
Yards	Meters	0.914
Miles	Kilometers	1.609
Square Inches	Square Centimeters	6.451
Square Feet	Square Meters	0.093
Square Yards	Square Meters	0.836
Square Miles	Square Kilometers	2.590
Acres	Square Hectometers	0.405
Cubic Feet	Cubic Meters	0.028
Cubic Yards	Cubic Meters	0.765
Fluid Ounces	Milliliters	29.573
Pints	Liters	0.473
Quarts	Liters	0.946
Gallons	Liters	3.785
Ounces	Grams	28.349
Pounds	Kilograms	0.4536
Short Tons	Metric Tons	0.907
Pound-Feet	Newton-Meters	1.356
Pounds Per Square Inch	Kilopascals	6.895
Miles Per Gallon	Kilometers Per Liter	0.425
Miles Per Hour	Kilometers Per Hour	1.609

TO CHANGE	TO	MULTIPLY BY
Millimeters	Inches	0.03937
Centimeters	Inches	0.3937
Meters	Feet	3.280
Meters	Yards	1.094
Kilometers	Miles	0.621
Square Centimeters	Square Inches	0.155
Square Meters	Square Feet	10.764
Square Meters	Square Yards	1.196
Square Kilometers	Square Miles	0.386
Square Hectometers	Acres	2.471
Cubic Meters	Cubic Feet	35.315
Cubic Meters	Cubic Yards	1.308
Milliliters	Fluid Ounces	0.034
Liters	Pints	2.113
Liters	Quarts	1.057
Liters	Gallons	0.264
Grams	Ounces	0.035
Kilograms	Pounds	2.2046
Metric Tons	Short Tons	1.102
Newton-Meters	Pound-Feet	0.738
Kilopascals	Pounds Per Square Inch	0.145
Kilometers Per Liter	Miles Per Gallon	2.354
Kilometers Per Hour	Miles Per Hour	0.621



TECHNICAL MANUAL UNIT MAINTENANCE

TRUCK, UTILITY: CARGO/TROOP CARRIER, 1-1/4 TON, 4X4, M998
(2320-01-107-7155) (EIC: BBD); M998A1 (2320-01-371-9577) (EIC: BBN);

TRUCK, UTILITY: CARGO/TROOP CARRIER, 1-1/4 TON, 4X4, W/WINCH,
M1038 (2320-01-107-7156) (EIC: BBE); M1038A1 (2320-01-371-9578) (EIC: BBP);

TRUCK, UTILITY: HEAVY VARIANT, 4X4, M1097 (2320-01-346-9317) (EIC: BBM);
M1097A1 (2320-01-371-9583) (EIC: BBU); M1097A2 (2320-01-380-8604) (EIC: BB6);
M1123 (2320-01-455-9593) (EIC: B6G);

TRUCK, UTILITY: TOW CARRIER, ARMORED, 1-1/4 TON, 4X4,
M966 (2320-01-107-7153) (EIC: BBC); M966A1 (2320-01-372-3932) (EIC: BBX);
M1121 (2320-01-456-1282) (EIC: B6H);

TRUCK, UTILITY: TOW CARRIER, ARMORED, 1-1/4 TON, 4X4, W/WINCH,
M1036 (2320-01-107-7154) (EIC: BBH);

TRUCK, UTILITY: TOW CARRIER, W/SUPPLEMENTAL ARMOR, 1-1/4 TON, 4X4,
M1045 (2320-01-146-7191); M1045A1 (2320-01-371-9580) (EIC: BBR);
M1045A2 (2320-01-380-8229) (EIC: BB5);

TRUCK, UTILITY: TOW CARRIER, W/SUPPLEMENTAL ARMOR, 1-1/4 TON, 4X4, W/WINCH,
M1046 (2320-01-146-7188); M1046A1 (2320-01-371-9582) (EIC: BBT);

TRUCK, UTILITY: ARMAMENT CARRIER, ARMORED, 1-1/4 TON, 4X4, M1025
(2320-01-128-9551) (EIC: BBF); M1025A1 (2320-01-371-9584) (EIC: BBV);
M1025A2 (2320-01-380-8233) (EIC: BB3);

TRUCK, UTILITY: ARMAMENT CARRIER, ARMORED, 1-1/4 TON, 4X4, W/WINCH,
M1026 (2320-01-128-9552) (EIC: BBG); M1026A1 (2320-01-371-9579) (EIC: BBQ);

TRUCK, UTILITY: ARMAMENT CARRIER, W/SUPPLEMENTAL ARMOR, 1-1/4 TON, 4X4,
M1043 (2320-01-146-7190); M1043A1 (2320-01-372-3933) (EIC: BBY);
M1043A2 (2320-01-380-8213) (EIC: BB4);

TRUCK, UTILITY: ARMAMENT CARRIER, W/SUPPLEMENTAL ARMOR, 1-1/4 TON, 4X4,
W/WINCH, M1044 (2320-01-146-7189); M1044A1 (2320-01-371-9581) (EIC: BBS);

TRUCK, UTILITY: S250 SHELTER CARRIER, 4X4, M1037 (2320-01-146-7193) (EIC: BBK);

TRUCK, UTILITY: S250 SHELTER CARRIER, 4X4, W/WINCH, M1042 (2320-01-146-7187);

TRUCK, AMBULANCE, 2-LITTER, ARMORED, 4X4, M996 (2310-01-111-2275)
(EIC: BBB); M996A1 (2310-01-372-3935) (EIC: BB2);

TRUCK, AMBULANCE, 4-LITTER, ARMORED, 4X4, M997 (2310-01-111-2274) (EIC: BBA);
M997A1 (2310-01-372-3934) (EIC: BBZ); M997A2 (2310-01-380-8225) (EIC: BB8);

TRUCK, AMBULANCE, 2-LITTER, SOFT TOP, 4X4, M1035 (2310-01-146-7194);
M1035A1 (2310-01-371-9585) (EIC: BBW); M1035A2 (2310-01-380-8290) (EIC: BB9).

BODY AND ACCESSORIES
MAINTENANCE 10-1

SPECIAL PURPOSE
BODIES MAINTENANCE 11-1

SPECIAL PURPOSE KITS
MAINTENANCE 12-1

PREPARATION FOR
STORAGE OR SHIPMENT 13-1

Approved for public release; distribution is unlimited.

HEADQUARTERS, DEPARTMENTS OF THE ARMY,
THE AIR FORCE, AND MARINE CORPS

JANUARY 1996

WARNING**EXHAUST GASES CAN KILL**

Brain damage or death can result from heavy exposure. Precautions must be followed to ensure crew safety when the personnel heater, main, or auxiliary engine of any vehicle is operated for any purpose.

1. Do not operate your vehicle engine in enclosed areas.
2. Do not idle vehicle engine with vehicle windows closed.
3. Be alert at all times for exhaust odors.
4. Be alert for exhaust poisoning symptoms. they are:
 - Headache
 - Dizziness
 - Sleepiness
 - Loss of muscular control
5. If you see another person with exhaust poisoning symptoms:
 - Remove person from area
 - Expose to open air
 - Keep person warm
 - Do not permit physical exercise
 - Administer artificial respiration, if necessary*
 - Notify a medic

*For artificial respiration, refer to FM 21-11.

6. BE AWARE, the field protective mask for nuclear, biological or chemical (NBC) protection will not protect you from carbon monoxide poisoning.

THE BEST DEFENSE AGAINST EXHAUST POISONING IS ADEQUATE VENTILATION.

WARNING SUMMARY

- Hood must be supported during removal and installation and hood prop rod and bracket replacement. Failure to support hood may cause injury to personnel or damage to equipment.
- Diesel fuel is highly flammable. Do not perform this procedure near fire, flames, or sparks. Severe injury or death will result.
- Do not touch hot exhaust system components with bare hands. Severe injury will result.
- Windshield must be supported during removal and installation. Failure to support windshield may cause injury to personnel or damage to equipment.
- Winch must be supported during removal and installation. Failure to support winch may cause severe injury to personnel or damage to equipment.
- Gloves must be worn whenever handling winch cable. Severe injury may result.
- Opening one end of cargo door before ensuring opposite end is securely closed will cause both ends to open simultaneously, resulting in injury to personnel or damage to equipment.
- Rear steps must be raised before disconnecting retractor lever from rear steps. Failure to do this may cause injury to personnel and damage to equipment.
- NBC contaminated filters must be handled and disposed of only by authorized and trained personnel. The unit commander or senior officer in charge of maintenance personnel must ensure that prescribed protective clothing (FM 3-4) is used, and prescribed safety measures and decontamination procedures (FM 3-5) are followed. The local unit SOP is responsible for final disposal of contaminated air filters. Failure to do this may cause severe injury to personnel.
- Seatbelts are to be replaced as a set. Failure to do this may cause injury to personnel or damage to equipment.
- Use eyeshields and gloves when removing and installing windshield. Glass could shatter causing injury.
- One assistant will be required to hold the cargo door open when either one or both gas springs are being removed and installed. Failure to do so may result in injury to personnel or damage to equipment.
- Direct all personnel to stand clear during any hoisting operations. A heavy, swinging load can be extremely dangerous. Failure to do so may cause injury to personnel or damage to equipment.

CHANGE
NO. 2

HEADQUARTERS,
DEPARTMENTS OF THE ARMY,
THE AIR FORCE, AND MARINE CORPS
WASHINGTON, D.C., 15 July 2004

TECHNICAL MANUAL
VOLUME 3 OF 3
UNIT MAINTENANCE

TRUCK, UTILITY: CARGO/TROOP CARRIER, 1-1/4 TON, 4X4,
M998 (2320-01-107-7155) (EIC: BBD); M998A1 (2320-01-371-9577) (EIC: BBN);
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TRUCK, AMBULANCE, 2-LITTER, SOFT TOP, 4X4,
M1035 (2310-01-146-7194); M1035A1 (2310-01-371-9585) (EIC: BBW); M1035A2 (2310-01-380-8290) (EIC: BB9).

TM 9-2320-280-20-3, 31 January 1996, is changed as follows:

1. Remove old pages and insert new pages as indicated below.
2. New or changed material is indicated by a vertical bar in the margin of the page.

Remove pages

A and B
i and ii
10-3 through 10-8
10-11 through 10-22
10-27 through 10-30
10-33 and 10-34
10-43 through 10-48
10-51 through 10-72
10-83 and 10-84
10-87 through 10-102
10-111 and 10-112
10-114.1 through 10-120
10-123 through 10-134
10-143 through 10-146
10-151 through 10-154.2
10-159 and 10-160
10-165 and 10-166
10-167 through 10-170

Insert pages

A through D
i and ii
10-3 through 10-8
10-11 through 10-22
10-27 through 10-30
10-33 and 10-34
10-43 through 10-48
10-51 through 10-72
10-83 and 10-84
10-87 through 10-102
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10-114.1 through 10-120
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10-143 through 10-146
10-151 through 10-154.2
10-159 and 10-160
10-165 and 10-166
10-167 through 10-170

Remove pages

10-175 through 10-195/(10-196 blank)
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 D-23 through D-26
 D-46.1 and D-46.2
 D-69 through D-72
 G-1 through G-9/(G-10 blank)
 Index 7 through Index 35/
 (Index 36 blank)

Insert pages

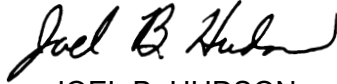
10-175 through 10-204
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 12-281 and 12-282
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 12-301 and 12-302
 12-305 and 12-306
 12-309 through 12-312
 A-1 and A-2
 B-3 through B-29/(B-30 blank)
 D-23 through D-26
 D-46.1 and D-46.2
 D-69 through D-72
 G-1 through G-12
 Index 7 through Index 35/
 (Index 36 blank)

3. File this change sheet in front of the publication for reference purposes.

By Order of the Secretary of the Army:

Peter J. Schoomaker
General, United States Army
Chief of Staff

Official:



JOEL B. HUDSON
Administrative Assistant to the
Secretary of the Army
0223406

By Order of the Secretary of the Air Force:

RONALD R. FOGLEMAN
General, United States Air Force
Chief of Staff

Official:

HENRY VICCELLIO, JR.
General, United States Air Force
Commander, Air Force Materiel Command

By Order of the Marine Corps:

R. P. SHOCKEY
Director, Program Support
Marine Corps Systems Command

Distribution:

To be distributed in accordance with the initial distribution number (IDN) 380900, requirements for TM 9-2320-280-20-3.

CHANGE

NO. 1

HEADQUARTERS,
DEPARTMENTS OF THE ARMY,
THE AIR FORCE, AND MARINE CORPS
WASHINGTON, D.C., 30 JUNE 1999

TECHNICAL MANUAL
VOLUME 3 OF 3
UNIT MAINTENANCE

TRUCK, UTILITY: CARGO/TROOP CARRIER, 1-1/4 TON, 4X4,
M998 (2320-01-107-7155) (EIC: BBD); M998A1 (2320-01-371-9577) (EIC: BBN);
TRUCK, UTILITY: CARGO/TROOP CARRIER, 1-1/4 TON, 4X4, W/WINCH,
M1038 (2320-01-107-7156) (EIC: BBE); M1038A1 (2320-01-371-9578) (EIC: BBP);
TRUCK, UTILITY: HEAVY VARIANT, 4X4, M1097 (2320-01-346-9317) (EIC: BBM);
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TRUCK, UTILITY: TOW CARRIER, ARMORED, 1-1/4 TON, 4X4,
M966 (2320-01-107-7153) (EIC: BBC); M966A1 (2320-01-372-3932) (EIC: BBX); M1121 (2320-01-456-1282) (EIC: B6H);
TRUCK, UTILITY: TOW CARRIER, ARMORED, 1-1/4 TON, 4X4, W/WINCH,
M1036 (2320-01-107-7154) (EIC: BBH);
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TRUCK, UTILITY: S250 SHELTER CARRIER, 4X4, W/WINCH, M1042 (2320-01-146-7187);
TRUCK, AMBULANCE, 2-LITTER, ARMORED, 4X4, M996 (2310-01-111-2275) (EIC: BBB); M996A1 (2310-01-372-3935) (EIC: BB2);
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TRUCK, AMBULANCE, 2-LITTER, SOFT TOP, 4X4,
M1035 (2310-01-146-7194); M1035A1 (2310-01-371-9585) (EIC: BBW); M1035A2 (2310-01-380-8290) (EIC: BB9).

TM 9-2320-280-20-3, 31 January 1996, is changed as follows:

1. Two new models have been added to the front cover. The new cover, located at the end of the change package, replaces the existing cover.
2. Remove old pages and insert new pages as indicated below.
3. New or changed material is indicated by a vertical bar in the margin of the page.

Remove pages

None
i and ii
10-1 and 10-2
10-7 through 10-10
None
10-15 and 10-16
10-33 and 10-34

Insert pages

A and B (after Warning d blank)
i and ii
10-1 and 10-2
10-7 through 10-10
10-14.1/(10-14.2 blank)
10-15 and 10-16
10-33 and 10-34

Approved for public release; distribution is unlimited.

Remove pages

10-37 and 10-38
 10-45 and 10-46
 10-57 and 10-58
 10-81 through 10-84
 10-93 and 10-94
 10-111 and 10-112
 10-115 and 10-116
 10-123 through 10-128
 10-145 and 10-146
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 10-159 through 10-168
 10-171 through 10-176
 10-179 and 10-180
 10-187 and 10-188
 10-191 through 10-193/(10-194 blank)
 11-1 through 11-4
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 11-69 and 11-70
 11-75 through 11-82
 11-131 through 11-134
 11-157 through 11-160
 11-173 and 11-174
 11-201 through 11-206
 11-213 and 11-214
 None
 11-307 and 11-308
 12-1 and 12-2
 12-7 and 12-8
 12-23 through 12-40
 12-57 and 12-58
 12-63 and 12-64
 12-69 through 12-72
 12-109 through 12-112
 12-201 and 12-206
 12-221 and 12-222
 12-281 and 12-282
 12-295/(12-296 blank)
 A-1 and A-2
 B-3 through B-27/(B-28 blank)
 C-1 through C-7/(C-8 blank)
 D-1 and D-2
 D-9 and D-10
 D-47 and D-48
 D-65 and D-66
 D-71 and D-72
 D-77 through D-106
 F-1 and F-2
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 cover

Insert pages


10-37 and 10-38
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 D-71 and D-72
 D-77 through D-116
 F-1 and F-2
 G-1 through G-9/ (G-10 blank)
 Index 1 through Index 35/(Index 36 blank)
 cover

4. File this change sheet in front of the publication for reference purposes.

By Order of the Secretary of the Army:

ERIC K. SHINSEKI
General, United States Army
Chief of Staff

Official:



JOEL B. HUDSON
Administrative Assistant to the
Secretary of the Army
05692

By Order of the Secretary of the Air Force:

RONALD R. FOGLEMAN
General, United States Air Force
Chief of Staff

Official:

HENRY VICCELLIO, JR.
General, United States Air Force
Commander, Air Force Materiel Command

By Order of the Marine Corps:

D.R. BLOOMER
Colonel, USMC
Director, Program Support
Marine Corps Systems Command

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To be distributed in accordance with the initial distribution number (IDN) 380900, requirements for TM 9-2320-280-20-3.

LIST OF EFFECTIVE PAGES

NOTE: The portion of the text affected by the changes is indicated by a vertical line in the outer margins of the page.

Dates of issue for original and changed pages of volume 3 are:

Original 031 January 1996

Change 130 June 1999

Change 2 **15 July** 2004

TOTAL NUMBER OF PAGES IN THIS PUBLICATION IS 1,170. CONSISTING OF THE FOLLOWING:

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NO. 2320-20/7C

HEADQUARTERS,
DEPARTMENTS OF THE ARMY,
THE AIR FORCE, AND MARINE CORPS
WASHINGTON, D.C., 31 JANUARY 1996

TECHNICAL ORDER
NO. 36A12-1A-2092-1-3

TECHNICAL MANUAL VOLUME 3 OF 3

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M997A1 (2310-01-372-3934) (EIC: BBZ); M997A2 (2310-01-380-8225) (EIC: BB8);
- TRUCK, AMBULANCE, 2-LITTER, SOFT TOP, 4X4, M1035 (2310-01-146-7194);
M1035A1 (2310-01-371-9585) (EIC: BBW); M1035A2 (2310-01-380-8290) (EIC: BB9).

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This manual is published in three parts. TM 9-2320-280-20-1 contains chapters 1 and 2, TM 9-2320-280-20-2 contains chapters 3 through 9, and TM 9-2320-280-20-3 contains chapters 10 through 13 and Appendices A through G.

This manual contains a table of contents and alphabetized index for chapters 10 through 13.

* This publication supersedes TM 9-2320-280-20-3 dated 1 November 1993 and all changes.

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CHAPTER 10

BODY AND ACCESSORIES MAINTENANCE

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10-2. FUEL FILLER HOUSING REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP

Tools

General mechanic's tool kit
automotive (Appendix B, Item 1)

Manual Reference

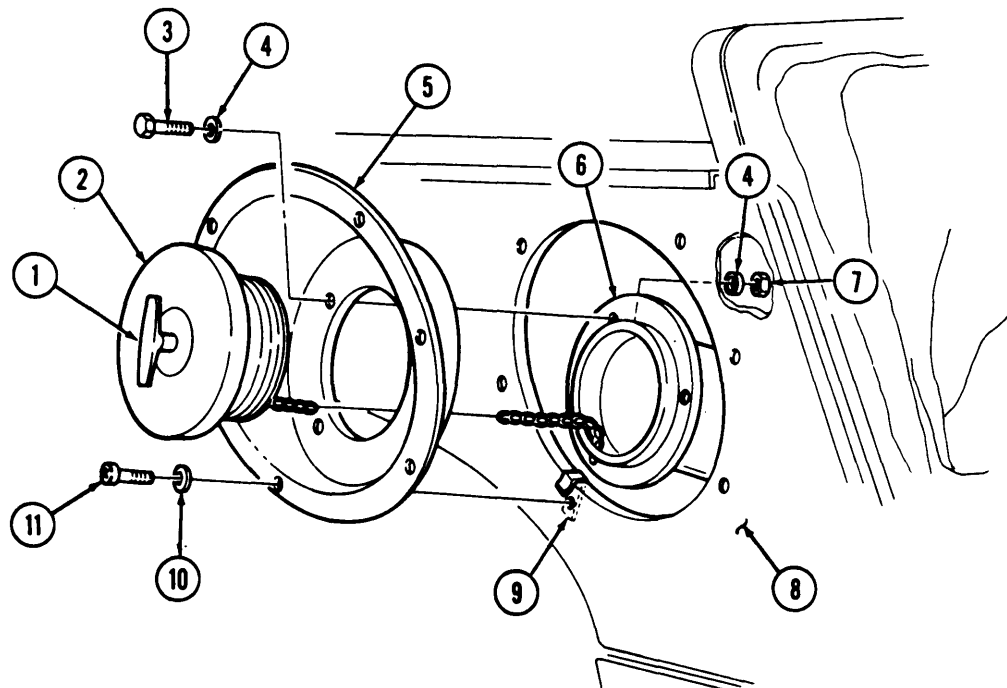
TM 9-2320-280-24P

a. Removal

1. Remove filler cap "T" handle (1) and filler cap (2) from filler spout (6).
2. Remove three nuts (7), washers (4), capscrews (3), and washers (4) from filler housing (5) and filler spout (6).
3. Remove six screws (11) and washers (10) from fuel filler housing (5) and right outer wheelhouse panel (8).
4. Push filler cap (2) through filler housing (5) and remove filler housing (5).
5. Inspect speed nuts (9) for presence or damage. Replace if defective or missing.

b. Installation

1. Pull filler cap (2) through filler housing (5) and install housing (5) on right outer wheelhouse panel (8).
2. Secure filler housing (5) to right outer wheelhouse panel (8) with six washers (10) and screw (11).
Tighten screws (11) to 20 lb-in. (2 N•m).
3. Secure filler housing (5) to filler spout (6) with three washers (4), capscrews (3), washers (4), and nuts (7).
4. Install filler cap (2) on filler spout (6) with "T" bade (1).



10-3. HOOD LATCH AND BRACKET REPLACEMENT

This task covers:

- | | |
|--|--|
| <ul style="list-style-type: none"> a. Removal b. Disassembly | <ul style="list-style-type: none"> c. Assembly d. Installation |
|--|--|

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Seven locknuts (Appendix G, Item 70)
Cotter pin (Appendix G, Item 16)
Spring pin (Appendix G, Item 298)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

Hood raised and secured (TM 9-2320-280-10).

a. Removal

NOTE

If only the rubber latch is to be replaced, the spring pin does not have to be completely out of base.

1. Remove two locknuts (6), washers (4), capscrews (3), and washers (4) from base (7) and body (5). Discard locknuts (6).
2. Remove spring pin (2) from latch (10) and base (7).
3. Remove two locknuts (16), washers (17), capscrews (12), and latch bracket (13) from hood (15). Discard locknuts (16).
4. Remove three locknuts (18), washers (19), capscrews (21), latch stop bracket (20), and latch plate (14) from hood (15). Discard locknuts (18).

b. Disassembly

Remove cotter pin (1), pin (8), two rollers (9), and hood latch (11) from latch (10). Discard cotter pin (1).

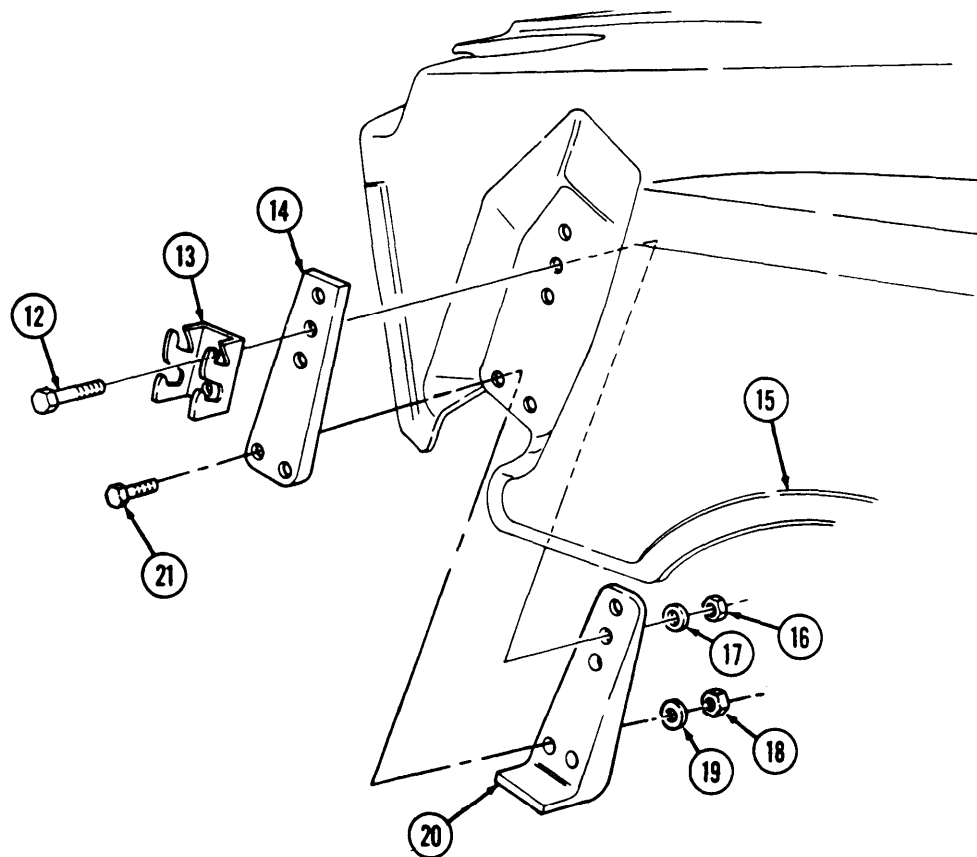
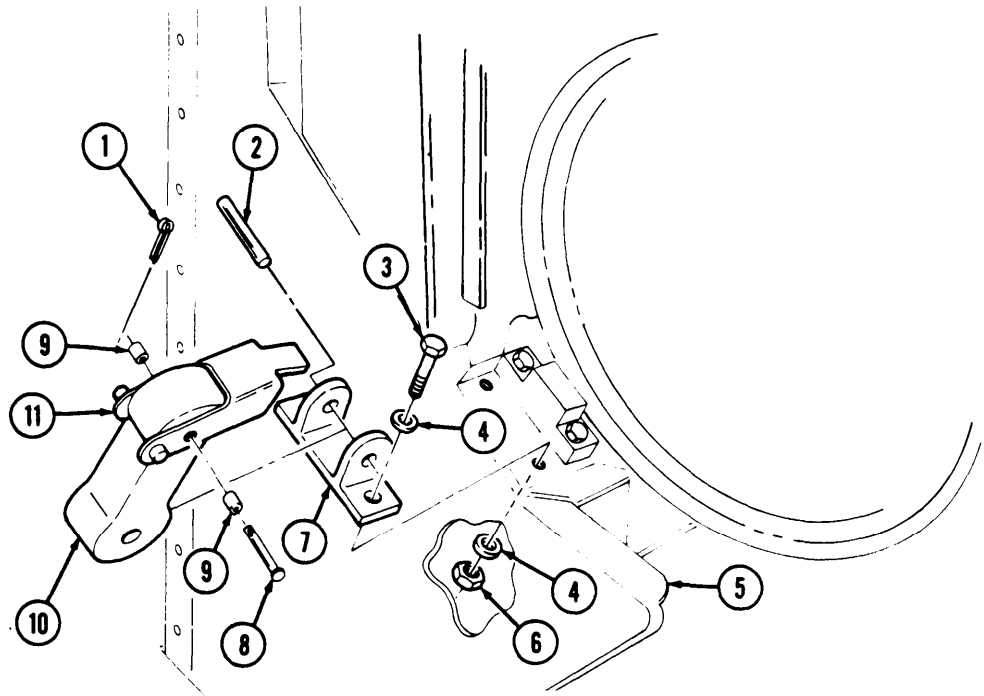
c. Assembly

Install hood latch (11) on latch (10) with two rollers (9), pin (8), and cotter pin (1).

d. Installation

1. Install latch plate (14) and latch stop bracket (20) on hood (15) with three capscrews (21), washers (19), and locknuts (18).
2. Install latch bracket (13) on latch plate (14) with two capscrews (12), washers (17), and locknuts (16). Tighten locknuts (16) and (18) to 10 lb-ft (14 N·m).
3. Install latch (10) on base (7) with spring pin (2).
4. Install base (7) on body (5) with two washers (4), capscrews (3), washers (4), and locknuts (6). Tighten capscrews (3) to 6 lb-ft (8 N·m).

10-3. HOOD LATCH AND BRACKET REPLACEMENT (Cont'd)



FOLLOW-ON TASK: **Lower and secure** hood (TM 9-2320-280-10).

10-4. HOOD PROP ROD AND BRACKET MAINTENANCE

This task covers:

- | | |
|---|--|
| <ul style="list-style-type: none"> a. Removal b. Disassembly c. Inspection | <ul style="list-style-type: none"> d. Assembly e. Installation |
|---|--|

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Four lockwashers (Appendix G, Item 135)
Locknut (Appendix G, Item 79)
Cotter pin (Appendix G, Item 12)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

Hood raised and secured (TM 9-2320-280-10).

General Safety Instructions

Hood must be supported during hood prop rod and bracket replacement.

WARNING

Hood must be supported during hood prop rod and bracket replacement. Failure to support hood may cause injury to personnel or damage to equipment.

a. Removal

1. Remove cotter pin (4), washer (3), hood prop rod (2), and washer (3) from hood (1). Discard cotter pin (4).
2. Remove four screws (8), lockwashers (7), bracket (6), and hood prop rod (2) from airlift bracket (5). Discard lockwashers (7).

b. Disassembly

1. Remove hood prop rod (2) from eyebolt (15).
2. Remove locknut (9), washer (10), bushing (16), spring (11), eyebolt (15), and washer (14) from bracket (6). Discard locknut (9).
3. Remove snapping (12) and bushing (13) from bracket (6).

c. Inspection

Inspect bushing (13), bushing (16), and spring (11) for cracks, wear, or distortion. Replace bushing (13), (16), or spring (11) if cracked, worn, or distorted.

d. Assembly

1. Install bushing (13) on bracket (6) with snapping (12).

NOTE

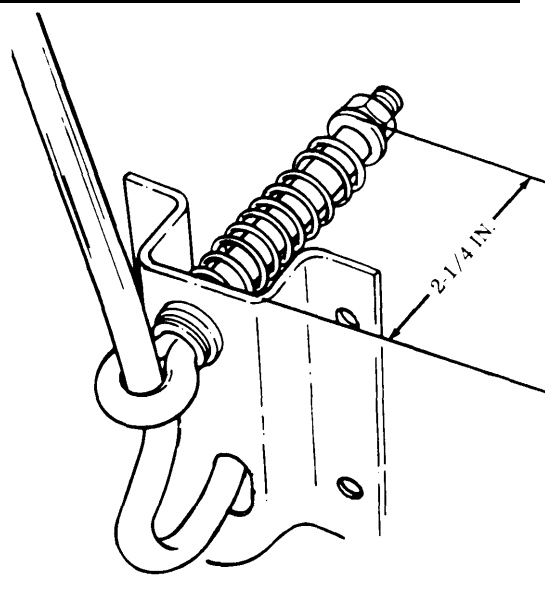
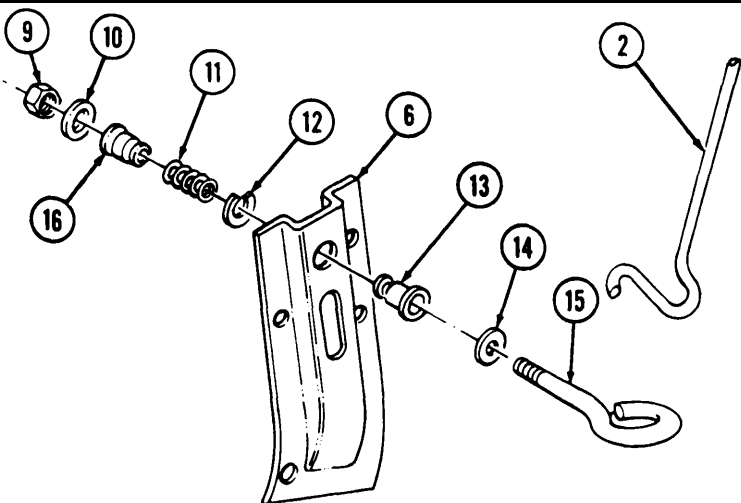
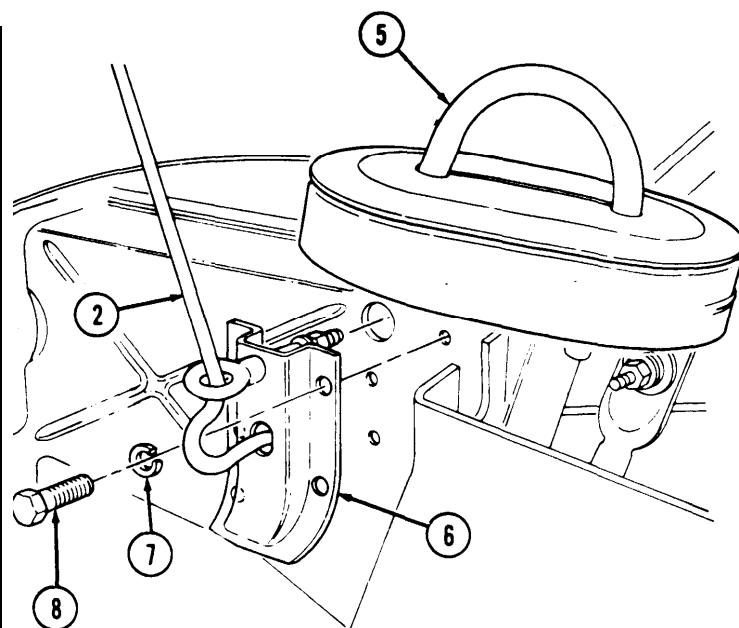
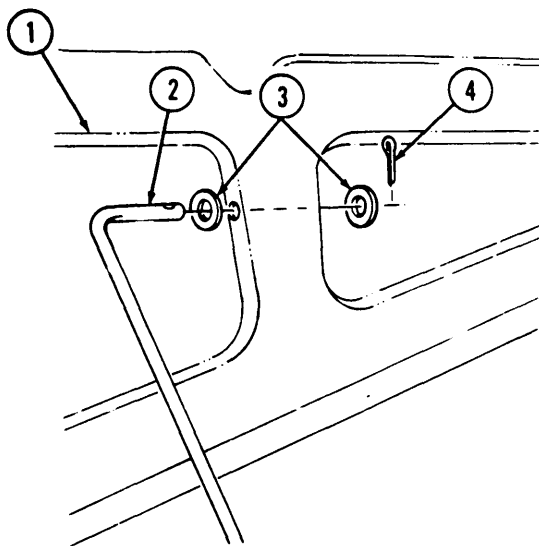
Length of spring with bracket assembled is 2-1/4 in. (5.7 cm).

2. Install washer (14), eyebolt (15), and spring (11) on bracket (6) with bushing (16), washer (10), and locknut (9).
3. Install hood prop rod (2) into eyebolt (15).

10-4. HOOD PROP ROD AND BRACKET MAINTENANCE (Cont'd)

e.. Installation

1. Install hood prop rod (2) and bracket (6) on airlift bracket (5) with four lockwashers (7) and screws (8).
Tighten screws (8) to 6 lb-ft (8 N.m).
2. Install washer (3) and hood prop rod (2) on hood (1) with washer (3) and rotter pin (4).



FOLLOW-ON TASK: Lower and secure hood (TM 9-2320-280-10).

10-5. HOOD AND HINGE REPLACEMENT

This task covers:

- | | |
|--|---------------------|
| <p>a. Removal</p> <p>b. Installation</p> | <p>c. Alignment</p> |
|--|---------------------|

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Sealing compound (Appendix C, Item 45)
Three cotter pins (Appendix G, Item 12)
Four locknuts (Appendix G, Item 98)

Personnel Required

One mechanic
One assistant

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P
TM 43-0139

Equipment Condition

- Battery ground cable disconnected (para. 4-73).
- Hood raised and secured (TM 9-2320-280-10).

General Safety Instructions

Hood must be supported during removal and installation.

WARNING

Hood must be supported during removal and installation. Failure to support hood may cause injury to personnel and damage to equipment.

NOTE

Hood surface has a thin layer of gel coat that can seem cracked, in a spiderweb pattern, due to hood flexing. No repair is necessary. Any other cracks should be repaired to prevent further damage.

a. Removal

1. Disconnect connector plug (11) from connector receptacle (7).
2. Remove two cotter pins (1), washers (2), hinge pins (13), and washers (2) from two upper hinge halves (14) and lower hinge halves (12). Discard cotter pins (1).
3. Remove cotter pin (17), washer (18), hood prop rod (19), and washer (18) from hood (15). Discard cotter pin (17).
4. Remove hood (15).

NOTE

- Perform steps 5 and 6 if replacing hinges.
 - Note position of hinge halves prior to removal, for installation.
5. Remove four capscrews (4), washers (3), two upper hinge halves (14), and hinge plates (16) from hood (15).
 6. Remove four locknuts (9), two hinge plates (8), four capscrews (5), washers (6), and two lower hinge halves (12) from brackets (10). Discard locknuts (9).

b. Installation

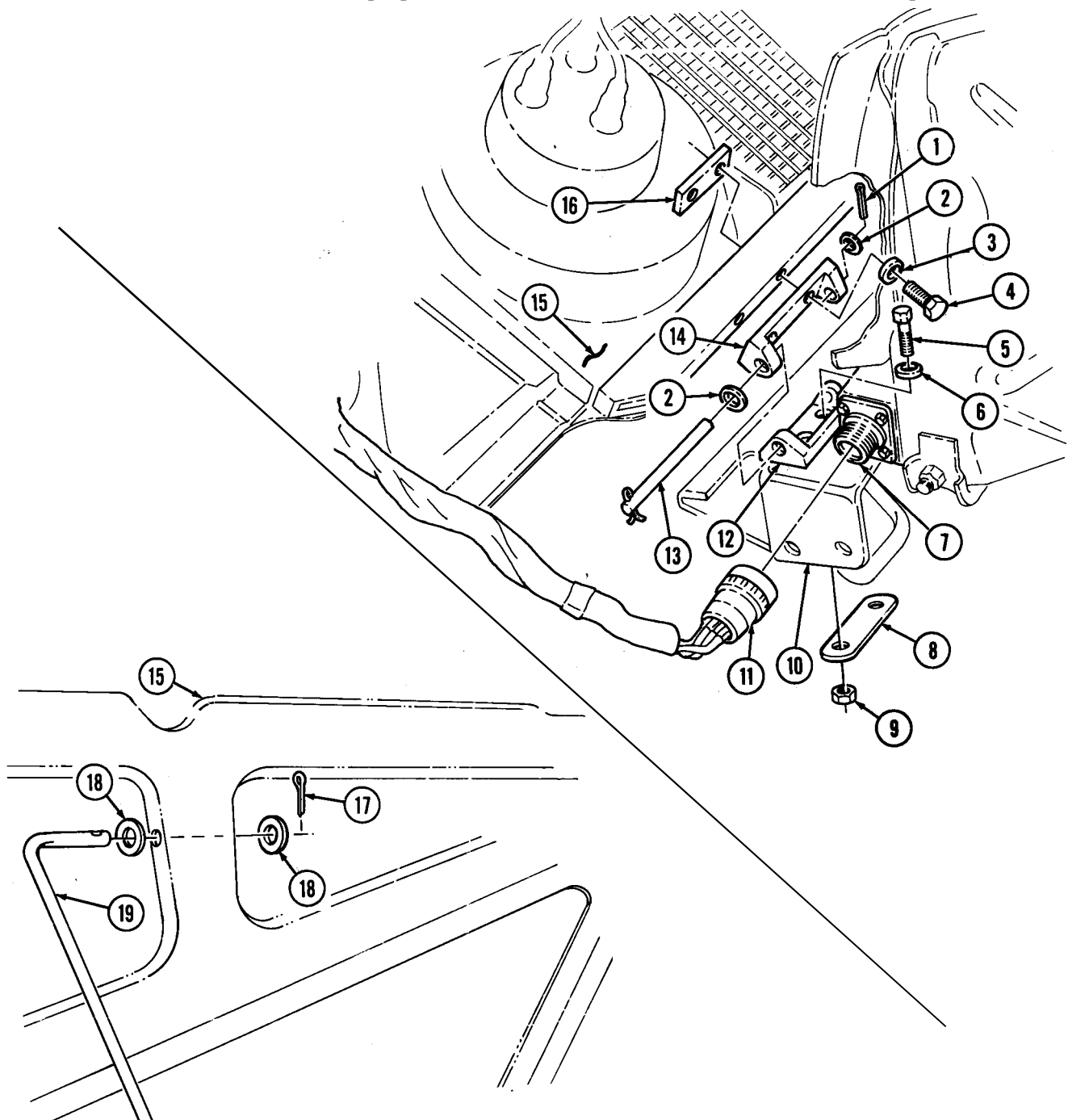
NOTE

Perform steps 1 through 3 if hinges were removed.

1. Install two lower hinge halves (12) on brackets (10) with four washers (6), capscrews (5), two plates (8), and four locknuts (9). Do not tighten locknuts (9).
2. Apply sealing compound to hinge plates (16) and install hinge plates (16) to hood (15).

10-5. HOOD AND HINGE REPLACEMENT (Contd)

3. Install two upper hinge halves (14) on hood (15) with four washers (3) and capscrews (4). Tighten capscrews to 28 lb-ft (38 N·m).
4. Install hood (15) and align two upper hinge halves (14) with lower hinge halves (12).
5. Secure two upper hinge halves (14) to lower hinge halves (12) with washers (2), hinge pins (13), washers (2), and cotter pins (1).
6. Connect connector plug (11) to connector receptacle (7).
7. Install washer (18) and hood prop rod (19) on hood (15) with washer (18) and cotter pin (17).



10-5. HOOD AND HINGE REPLACEMENT (Cont'd)

c. Alignment

1. Lower hood (4) and check alignment of hood stop guide (3) with center hood stop (2) on "A" pillar (1), and hood catch (5) with body latch (6).

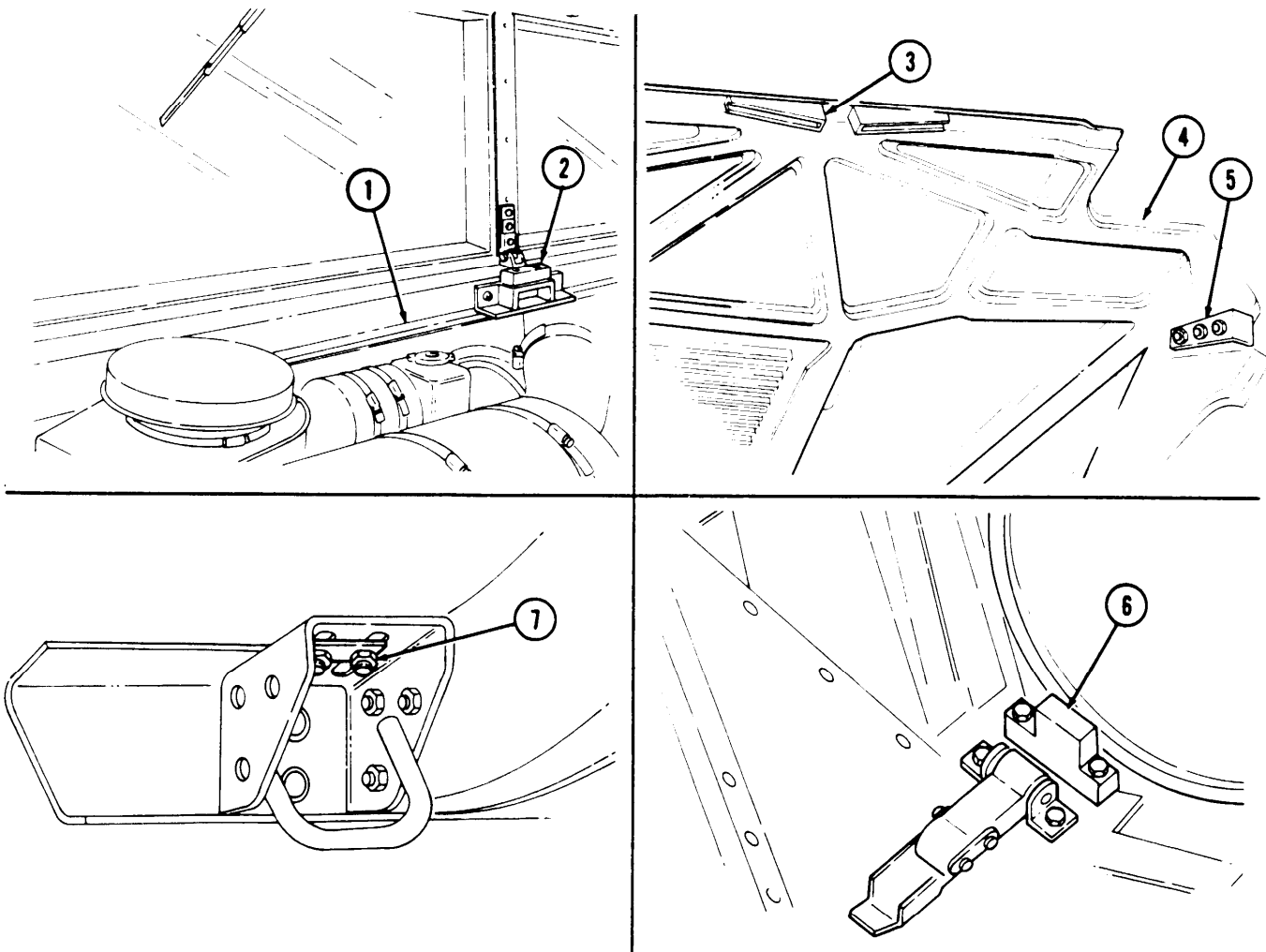
NOTE

Upper and lower hinge halves contain slotted mounting holes to allow for adjustment.

2. With hood (4) lowered and secured and alignment correct, tighten four lower hinge half attaching locknuts (7) to 60 lb-ft (81 N·m).

NOTE

After hood alignment is completed, some contact may occur between hood and left mirror bracket. If contact exists, use file and trim about 1/4 in. (6.4 mm) off left corner and edge of hood. Trim until hood closes without hitting left mirror bracket. Touch up trim with paint (refer to TM 43-0139).



- FOLLOW-ON TASKS:**
- Lower and secure hood (TM 9-2320-280-10).
 - Connect battery ground cable (para. 4-73).

10-6. OUTER HOOD SEAL REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

Hood raised and secured (TM 9-2320-280-10).

Manual References

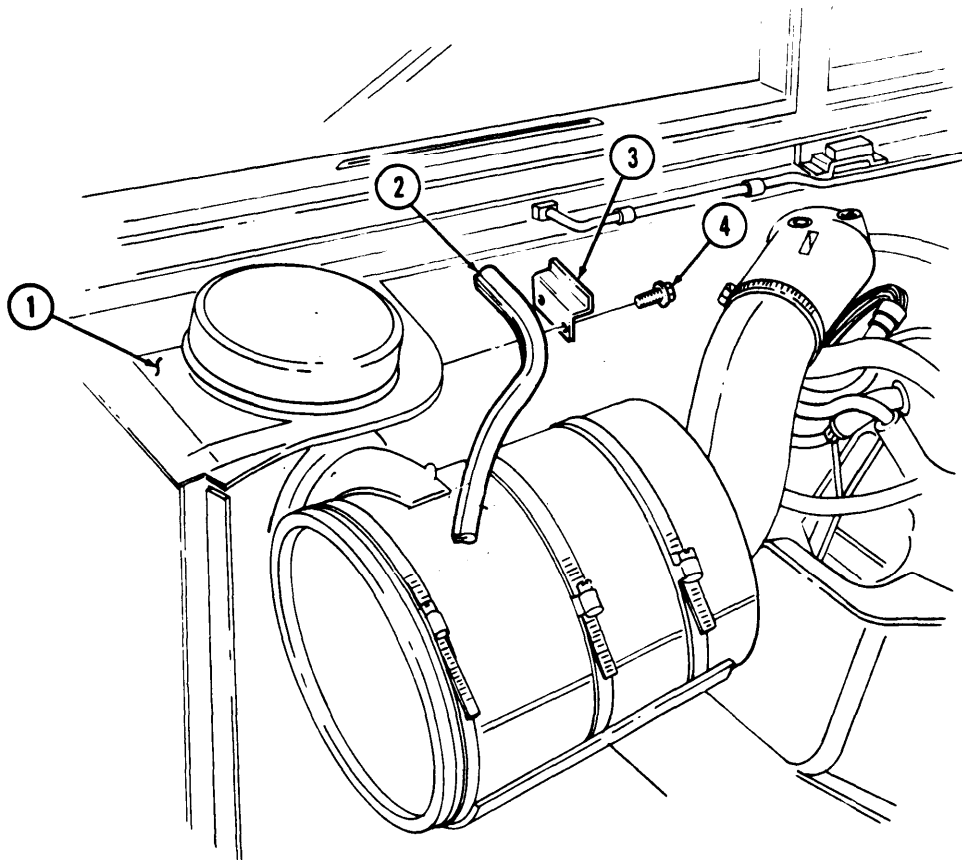
TM 9-2320-280-10
TM 9-2320-280-24P

a. Removal

Remove two capscrews (4), seal retainer (3), and hood seal (2) from body (1).

b. Installation

Install hood seal (2) on body (1) with seal retainer (3) and two capscrews (4).



FOLLOW-ON TASK Lower and secure hood (TM 9-2320-280-10).

10-7. SIDE HOOD STOP REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Materials/Parts

Two locknuts (Appendix G, Item 70)

Equipment Condition

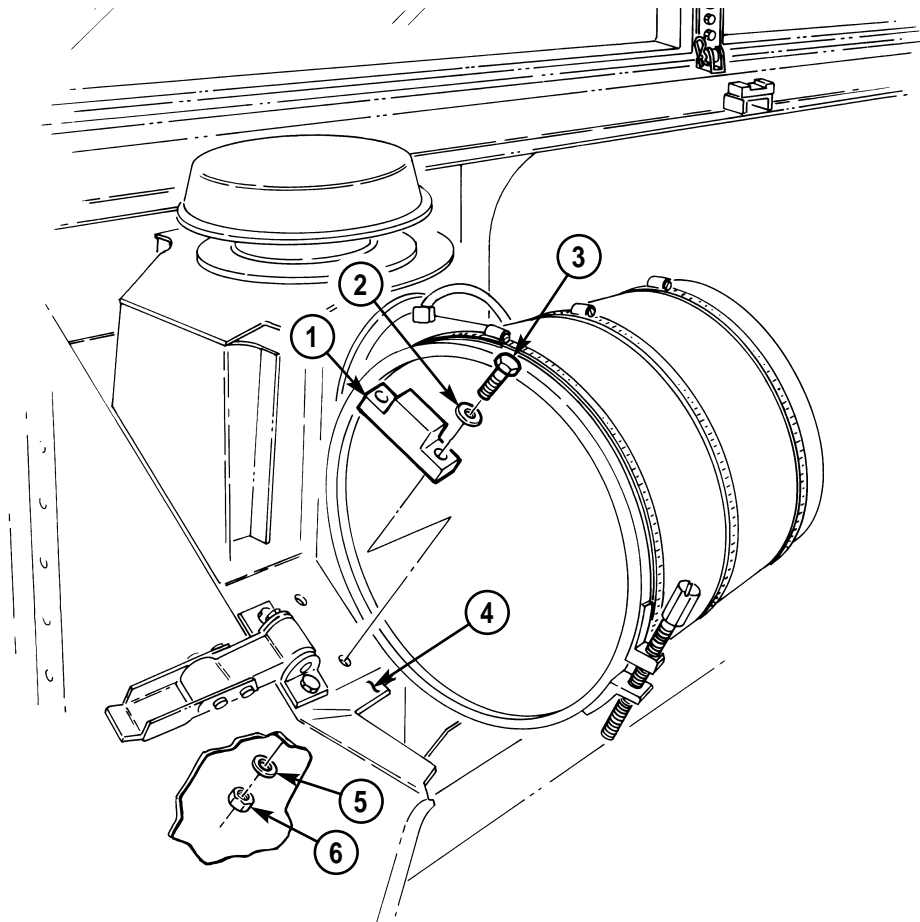
Hood raised and secured (TM 9-2320-280-10).

a. Removal

Remove two locknuts (6), washers (5), capscrews (3), washers (2), and side hood stop (1) from body (4). Discard locknuts (6).

b. Installation

Install side hood stop (1) on body (4) with two washers (2), capscrews (3), washers (5), and locknuts (6). Tighten capscrews (3) to 6 lb-ft (8 N·m).



FOLLOW-ON TASK: Lower and secure hood (TM 9-2320-280-10).

10-8. CENTER HOOD STOP REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

Hood raised and secured (TM 9-2320-280-10).

Manual References

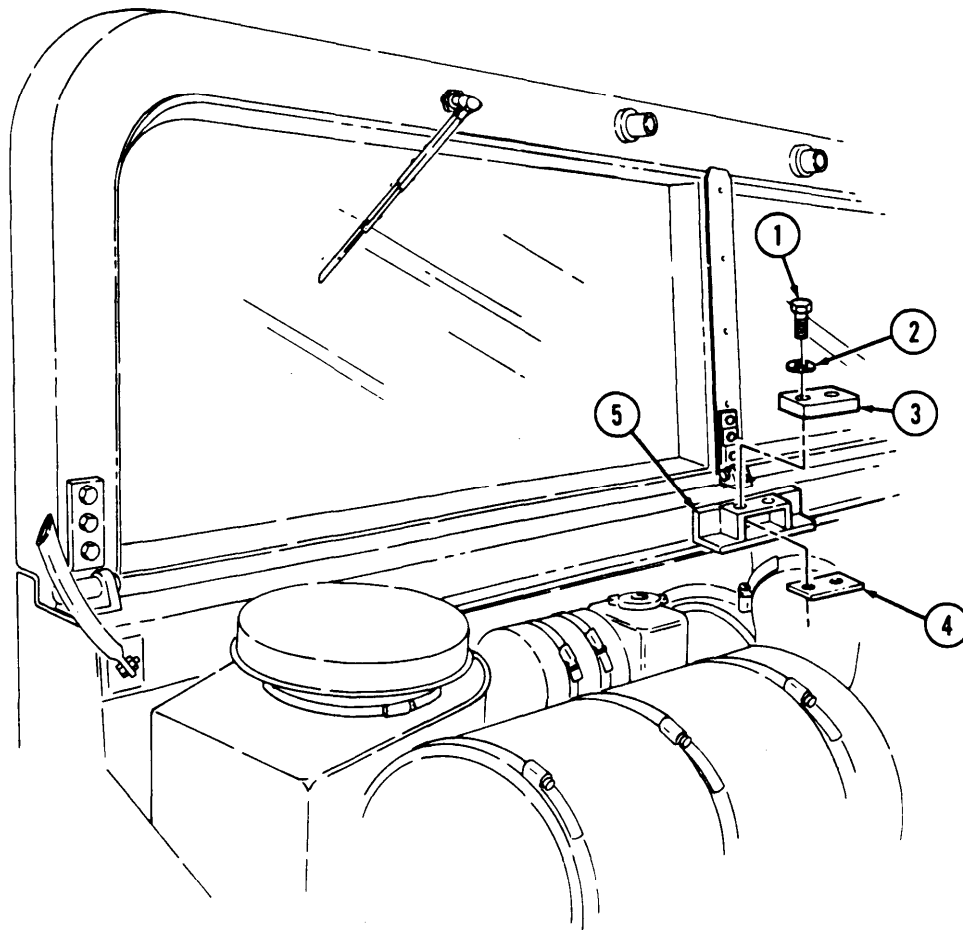
TM 9-2320-280-10
TM 9-2320-280-24P

a. Removal

Remove two capscrews (1), washers (2), center hood stop (3), and plate (4) from "A" beam (5).

b. Installation

Install center hood stop (3) and plate (4) on "A" beam (5) with two washers (2) and capscrews (1). Tighten capscrews (1) to 12 lb-ft (16 N•m).



FOLLOW-ON TASK Lower and secure hood (TM 9-2320-280-10).

10-9. FOOTMAN LOOP AND STRAP REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Materials/Parts

Two locknuts (Appendix G, Item 74)

Equipment Condition

Rear end of cargo shell door raised
(TM 9-2320-280-10).

NOTE

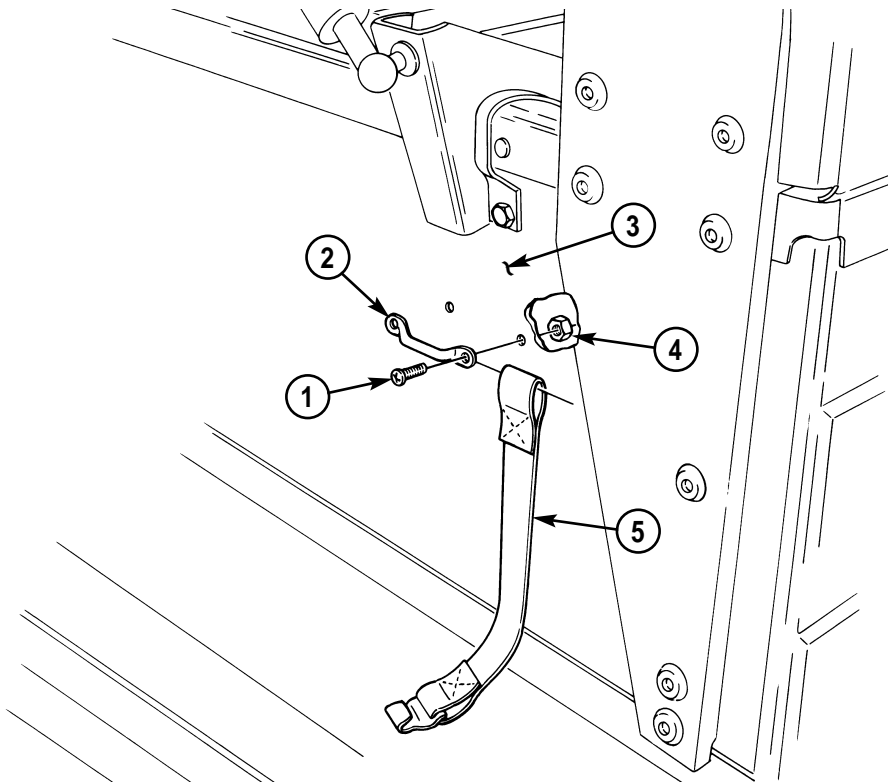
All footman loops and straps for stowage and tiedowns are replaced basically the same. This procedure covers the night sight battery case footman loop and strap.

a. Removal

1. Remove two locknuts (4), screws (1), and footman loop (2) from wheelhouse (3). Discard locknuts (4).
2. Remove strap (5) from footman loop (2).

b. Installation

Install strap (5) on footman loop (2) and wheelhouse (3) with two screws (1) and locknuts (4). Tighten locknuts (4) to 16-30 lb-in. (2-3 N•m).



FOLLOW-ON TASK: Close cargo shell door (TM 9-2320-280-10).

10-9.1. JACK RETAINING STRAP REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M1097A1, M1097A2, M1123

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Four locknuts (Appendix G, Item 97)

Manual References

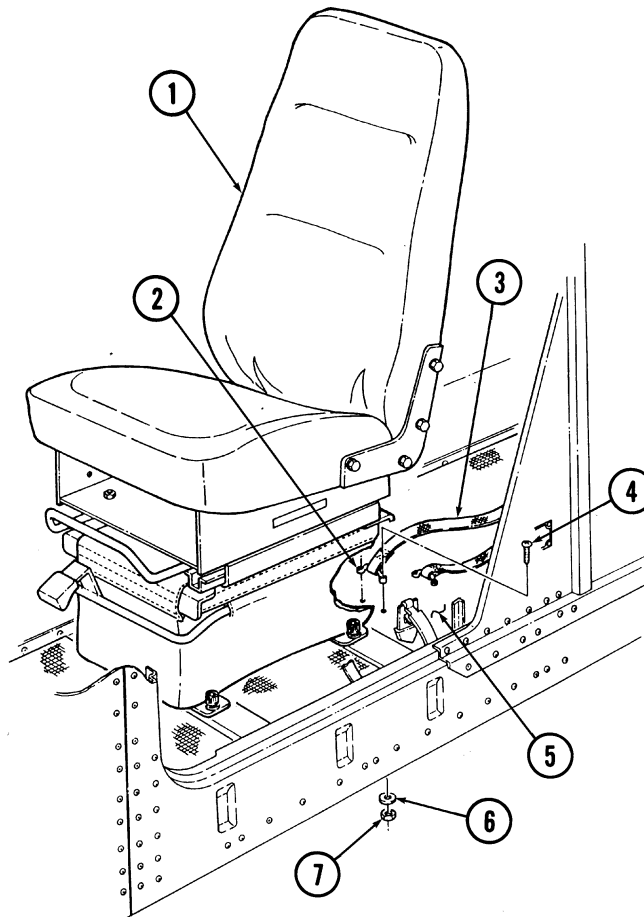
TM 9-2320-280-24P

a. Removal

1. Slide driver's seat (1) forward.
2. Remove four locknuts (7), washers (6), screws (4), two footman loops (2), and jack retaining strap (3) from vehicle floor (5). Discard locknuts (7).

b. Installation

1. Install jack retaining strap (3) and two footman loops (2) on vehicle floor (5) with four screws (4), washers (6), and locknuts (7).
2. Slide driver's seat (1) backward.



10-10. CENTER HOOD STOP GUIDE REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Materials/Parts

Six locknuts (Appendix G, Item 70)

Equipment Condition

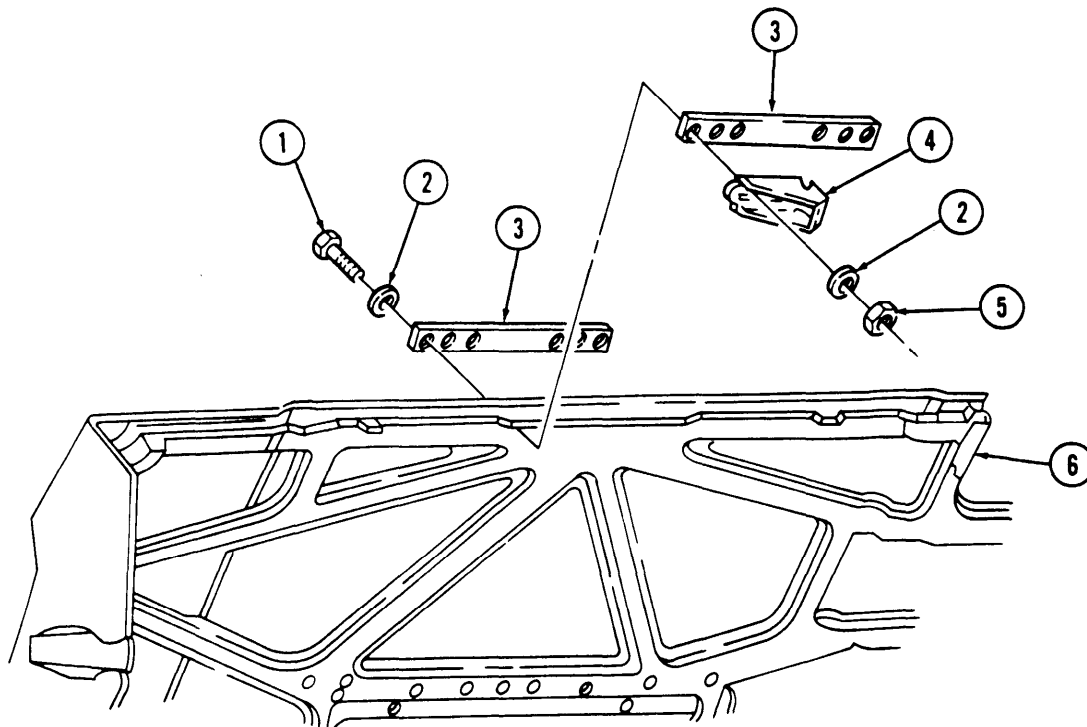
Rear end of cargo shell door raised
(TM 9-2320-280-10).

a. Removal

Remove six locknuts (5), washers (2), capscrews (1), washers (2), two guide plates (3), and guide brackets (4) from hood (6). Discard locknuts (5).

b. Installation

Install two guide plates (3) and guide brackets (4) on hood (6) with six washers (2), capscrews (1), washers (2), and locknuts (5). Tighten locknuts (5) to 10 lb-ft (14 N·m).



FOLLOW-ON TASK: Lower and secure hood (TM 9-2320-280-10).

10-11. FRONT HOOD SCREEN REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M998, M998A1, M1035, M1035A1, M1035A2,
M1037, M1038, M1038A1, M1042

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

Hood raised and secured (TM 9-2320-280-10).

Materials/Parts

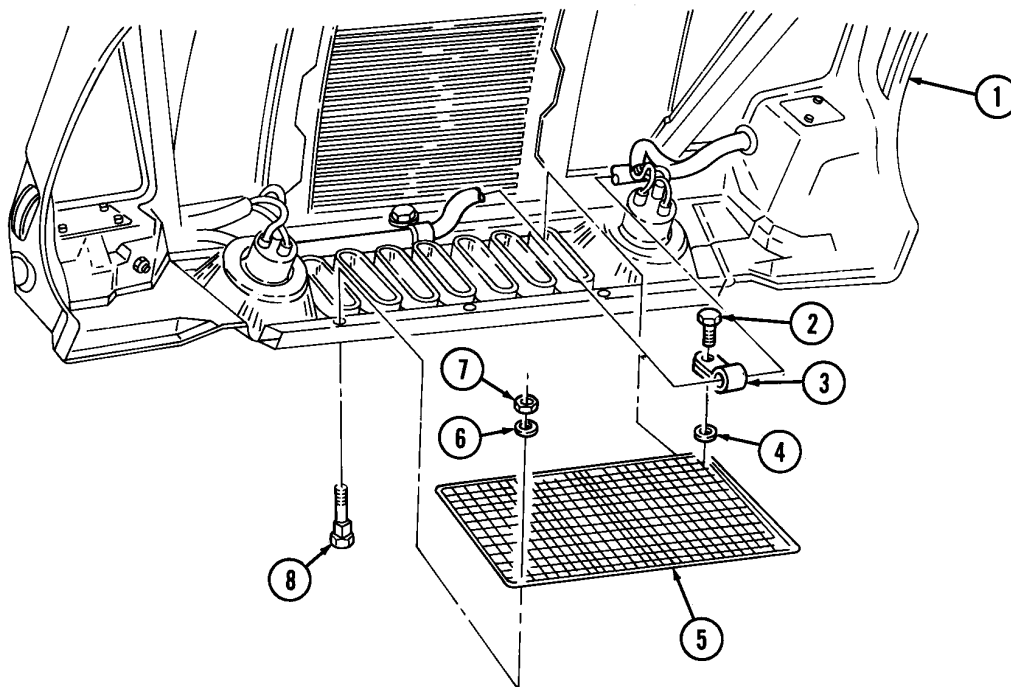
Sealant (Appendix C, Item 38)

a. Removal

1. Remove three nuts (7), washers (6), and carriage bolts (8) from front hood screen (5) and hood (1).
2. Remove three capscrews (2), harness clamps (3), washers (4), and front hood screen (5) from hood (1).

b. Installation

1. Apply sealant to threads of capscrews (2).
2. Install front hood screen (5) on hood (1) with three washers (4), harness clamps (3), and capscrews (2). Tighten capscrews (2) to 20-30 lb-in. (2-3 N•m).
3. Secure front hood screen (5) to hood (1) with three carriage bolts (8), washers (6), and nuts (7). Tighten nuts (7) to 21 lb-ft (29 N•m).



FOLLOW-ON TASK: Lower and secure hood (TM 9-2320-280-10).

10-12. HOOD GRILLE AND SCREEN REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M998, M998A1, M1035, M1035A1, M1035A2,
M1037, M1038, M1038A1, M1042

Materials/Parts

Six locknuts (Appendix G, Item 70)
Six locknuts (Appendix G, Item 107)

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

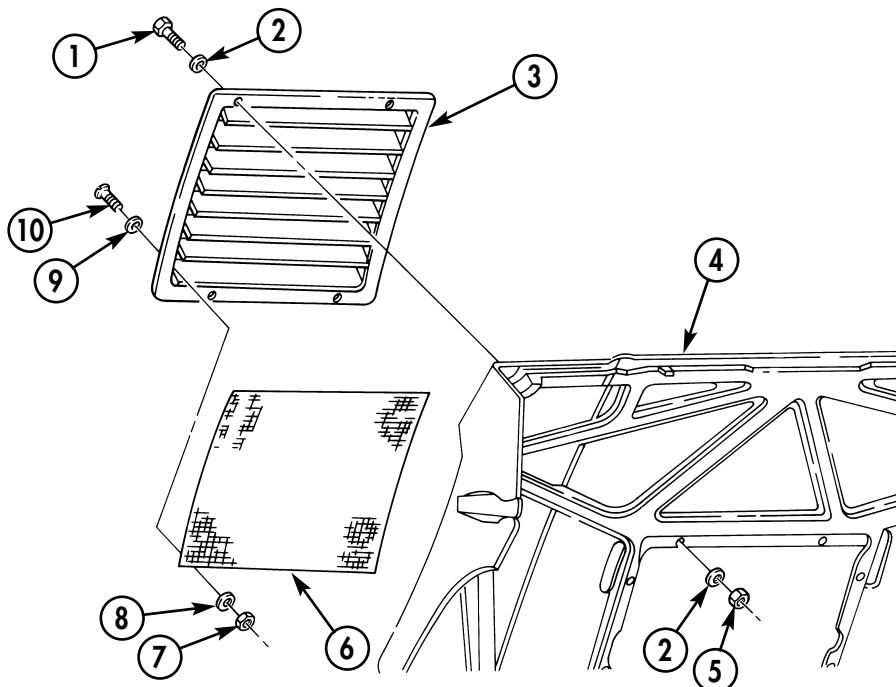
Hood raised and secured (TM 9-2320-280-10).

a. Removal

1. Remove six locknuts (5), washers (2), capscrews (1), washers (2), and grille (3) from hood (4). Discard locknuts (5).
2. Remove six locknuts (7), washers (8), screws (10), washers (9), and screen (6) from grille (3). Discard locknuts (7).

b. Installation

1. Install screen (6) on grille (3) with six washers (9), screws (10), washers (8), and locknuts (7). Tighten locknuts (7) to 6 lb-ft (8 N·m).
2. Install grille (3) on hood (4) with six washers (2), capscrews (1), washers (2), and locknuts (5). Tighten locknuts (5) to 7 lb-ft (10 N·m).



FOLLOW-ON TASK: Lower and secure hood (TM 9-2320-280-10).

10-13. DOOR HANDLE ASSEMBLY MAINTENANCE

This task covers:

- a. Removal
- b. Repair

c. Installation

INITIAL SETUP:

Applicable Models

M998, M998A1, M1035, M1035A1, M1035A2, M1037, M1038, M1038A1, M1042

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Adhesive (Appendix C, Item 7)
Spring pin (Appendix G, Item 299)

Manual References

TM 9-2320-280-24P

NOTE

Some door handle assemblies may separate. To prevent or fix door handle assembly separation, perform step b.

a. Removal

1. Remove screw (5), inside door handle (4), and door handle spring (6) from door frame (7) and outside door handle (1).
2. Remove outside door handle (1) and washer (3) from door frame (7).

b. Repair

NOTE

Repair procedures for all door handle assemblies are basically the same. This procedure covers the left front door handle assembly.

1. Tighten screw (5) on inside door handle (4) to 15 lb-in. (1.7 N•m).

NOTE

- If screw will secure inside door handle, perform steps 2 and 3.
- If screw will not secure inside door handle, perform steps 4 through 10.

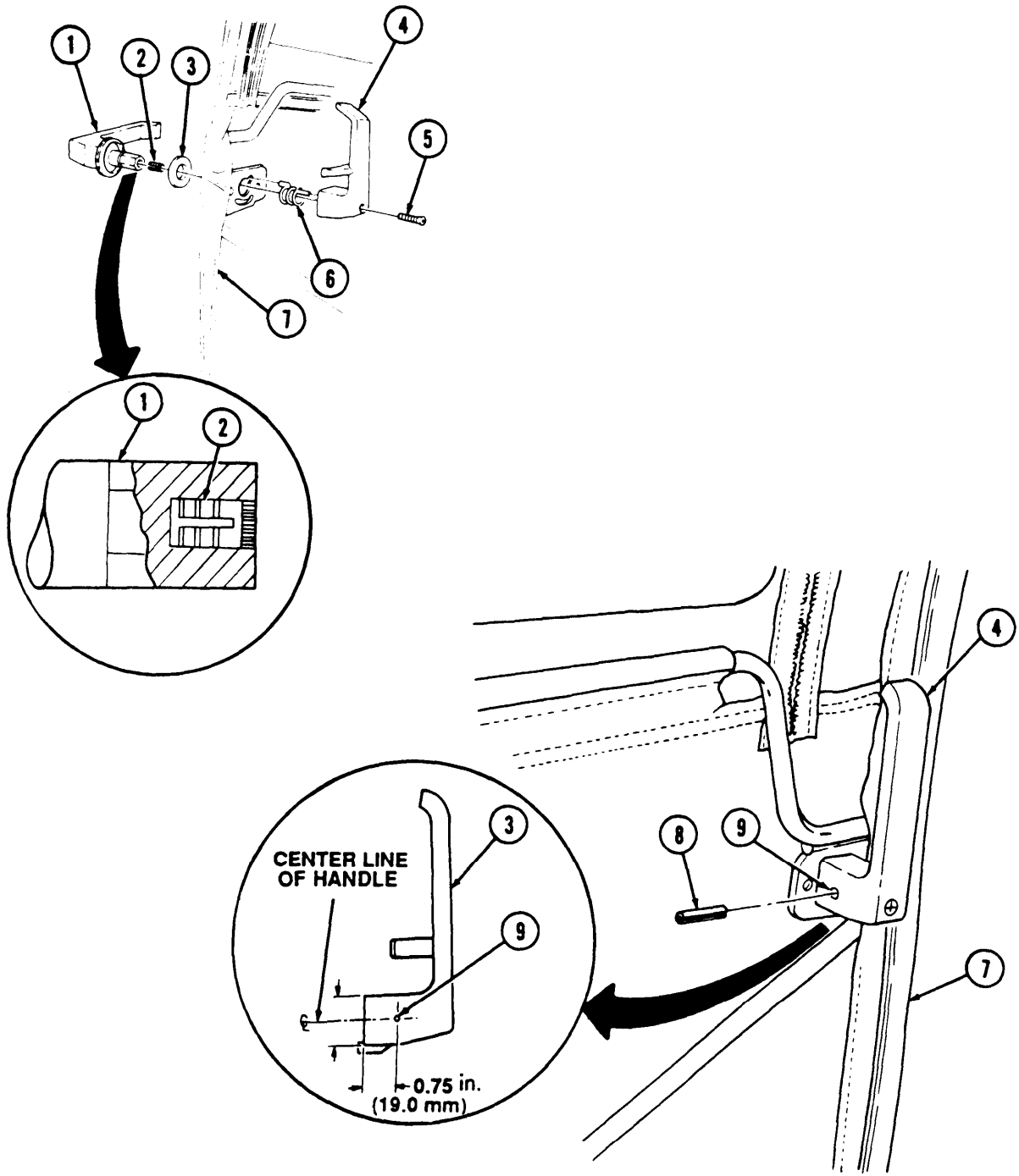
2. Locate, mark, and drill 0.125-in. (3.2-mm) diameter hole (9) through inside door handle (4) and outside door handle (1).
3. Install spring pin (8) through inside door handle (4) and outside door handle (1).

NOTE

Inside door handle can separate from outside door handle without removing screw.

4. Remove inside door handle (4) and door handle spring (6) from outside door handle (1) and door frame (7).
5. Remove outside door handle (1) and washer (3) from door frame (7).
6. Remove screw (5) and insert (2) from inside door handle (4).
7. Apply adhesive to outside of insert (2) and install insert (2) in outside door handle (1). Allow adhesive to cure for five minutes.
8. Install outside door handle (1) and washer (3) on door frame (7).
9. Install inside door handle spring (6) and inside door handle (4) on outside door handle (1) and door frame (7) with screw (5). Tighten screw (5) to 15 lb-in. (1.7 N•m).
10. Perform steps 2 and 3.

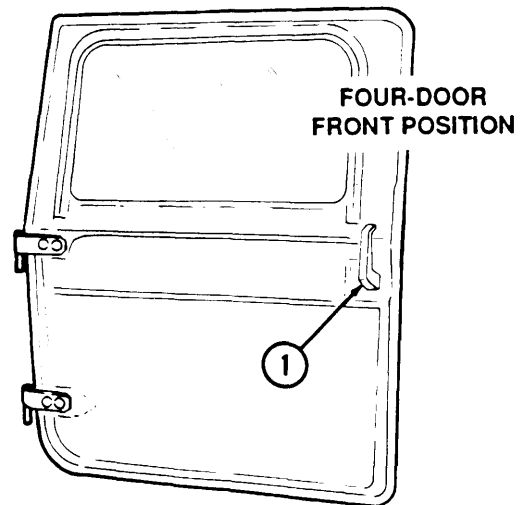
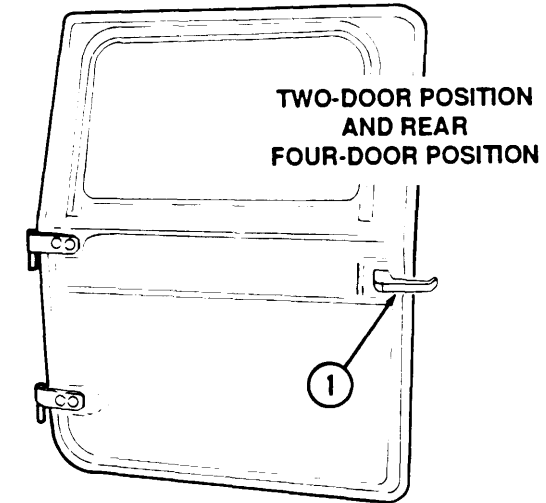
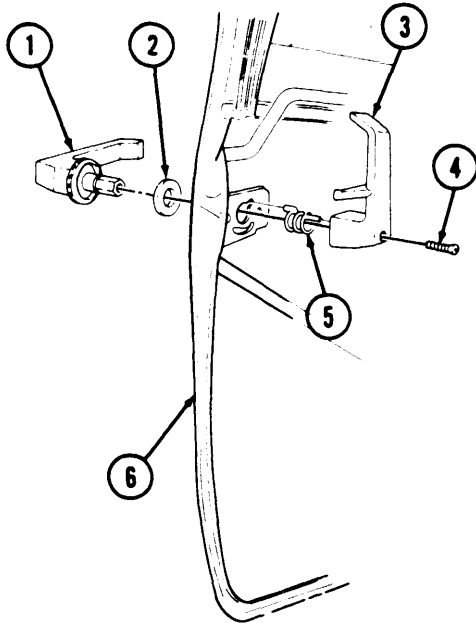
10-13. DOOR HANDLE ASSEMBLY MAINTENANCE (Cont'd)



10-13. DOOR HANDLE ASSEMBLY MAINTENANCE (Cont'd)

c. Installation

1. Install washer (2) and outside door handle (1) on door frame (6).
2. Install door handle spring (5) and inside door handle (3) on outside door handle (1) in door frame (6).
3. Place outside door handle (1) in horizontal position, and place inside door handle (3) in vertical position with grip end of handle pointing to top of door.
4. Install inside door handle (3) on outside door handle (1) and door frame (6) with screw (4). Tighten screw (4) to 15 lb-in. (1.7 N•m).



10-14. FIXED REAR DOOR REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M998, M998A1, M1037, M1038, M1038A1,
M1042, M1097, M1097A1, M1097A2

Manual References

TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

Troop seat removed, if installed (para. 12-18).

Materials/Parts

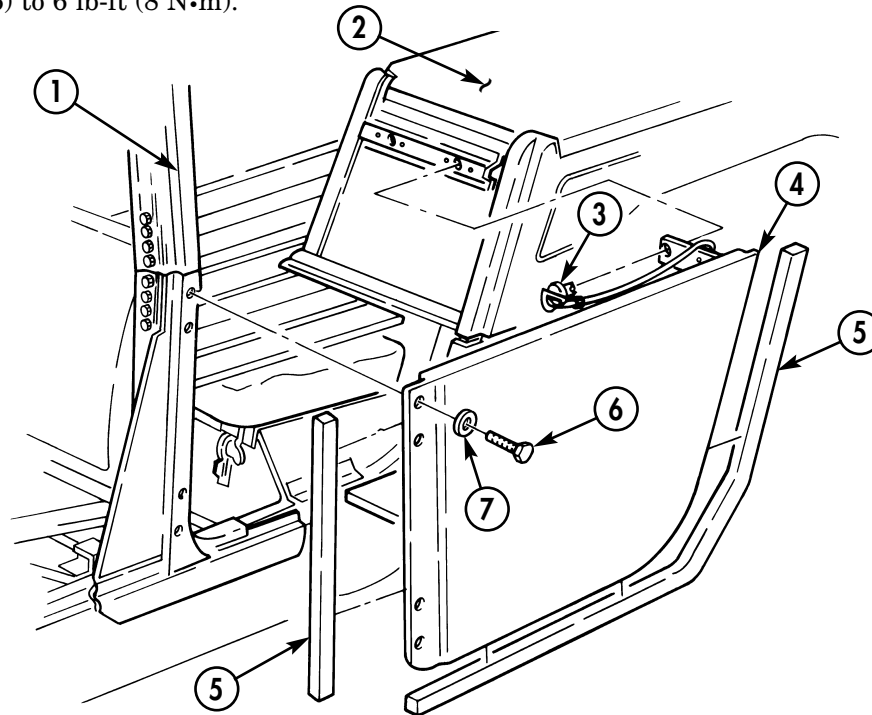
Door seals (Appendix G, Item 27)

a. Removal

1. Remove four capscrews (6) and washers (7) from fixed rear door (4) and "B" pillar (1).
2. Remove locking pin (3) and fixed rear door (4) from body (2).
3. Remove seals (5) from fixed rear door (4). Discard seals (5).

b. Installation

1. Install seals (5) on fixed rear door (4).
2. Install fixed rear door (4) on body (2) with locking pin (3).
3. Install fixed rear door (4) on "B" pillar (1) with four washers (7) and capscrews (6). Tighten capscrews (6) to 6 lb-ft (8 N·m).



FOLLOW-ON TASK: Install troop seat, if removed (para. 12-18).

10-15. ENGINE ACCESS COVER MAINTENANCE

This task covers:

- | | |
|----------------|-----------------|
| a. Removal | c. Assembly |
| b. Disassembly | d. Installation |

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Two locknuts (Appendix G, Item 79)
Seven rivets (Appendix G, Item 236)
Two rivets (Appendix G, Item 238)
Two rivets (Appendix G, Item 249)
Four rivets (Appendix G, Item 266)

Manual References

TM 9-2320-280-24P

Equipment Condition

Front radio rack removed (para. 12-132).

a. Removal

1. Unlatch two flexible latches (1) from keepers (2) on engine access cover holddown brackets (3).
2. Unlatch two engine access cover holddown latches (6) from two engine access cover holddown strikes (7).
3. Turn two ring studs (5) and remove engine access cover (4).

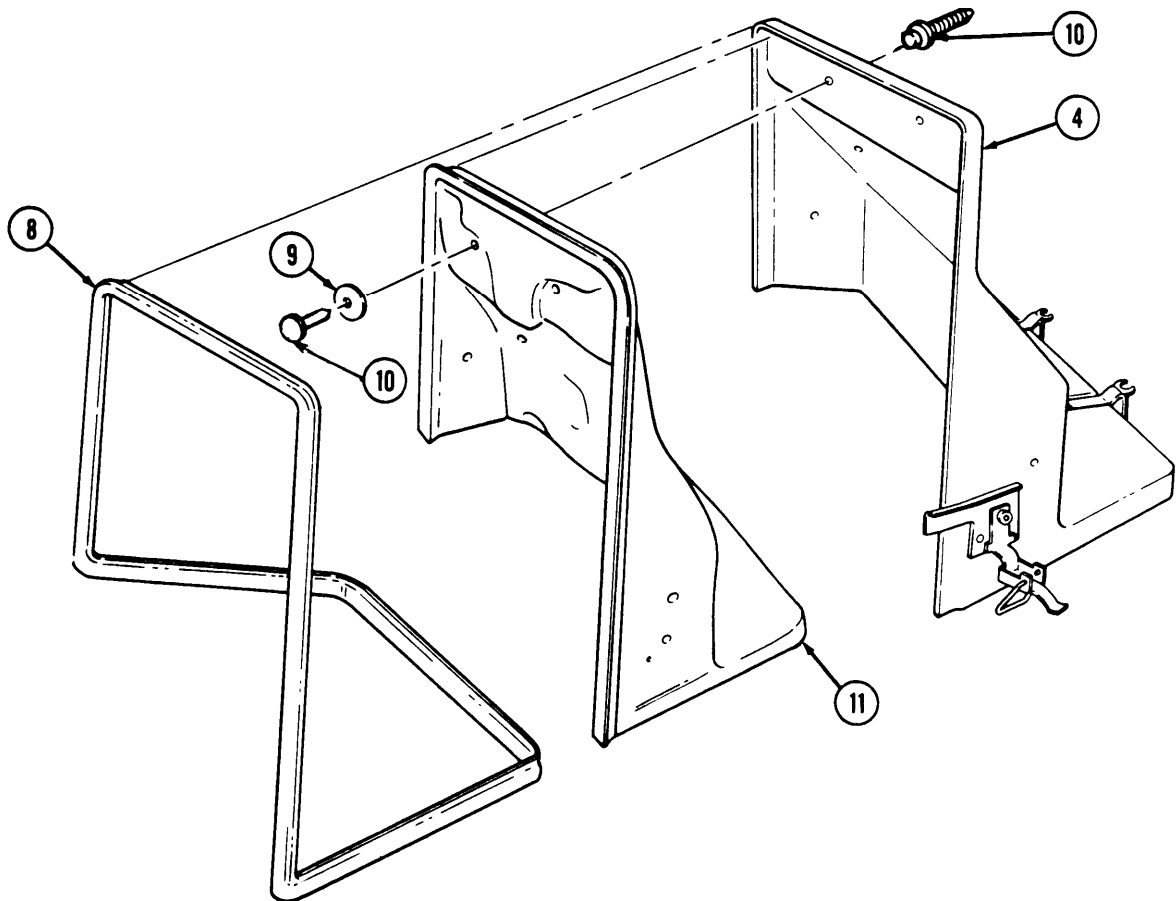
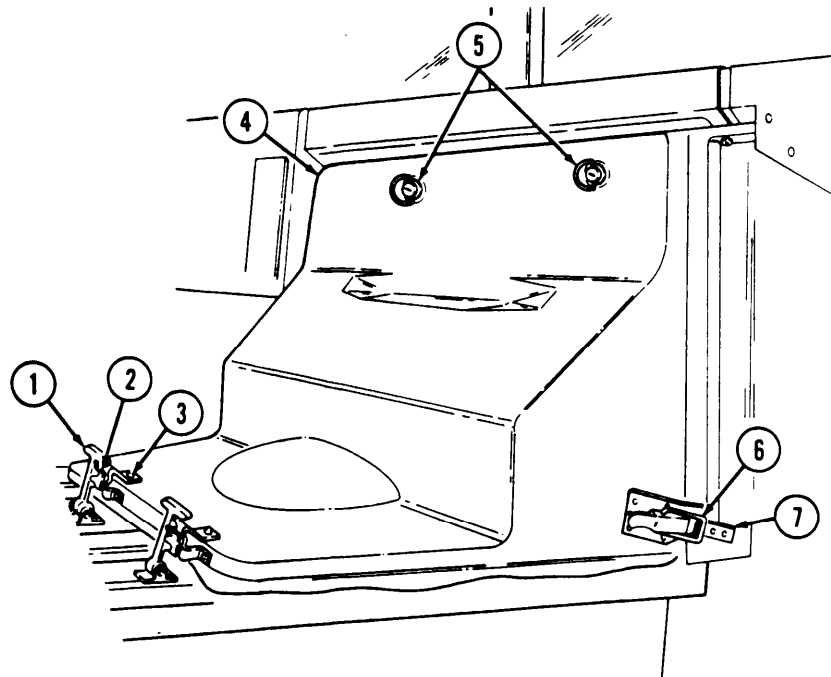
b. Disassembly

NOTE

For rivet replacement instructions, refer to para. 10-66.

1. Remove seven rivets (10) and retainers (9) and remove insulation (11).
2. Remove seal (8) from access cover (4).

10-15. ENGINE ACCESS COVER MAINTENANCE (cont'd)



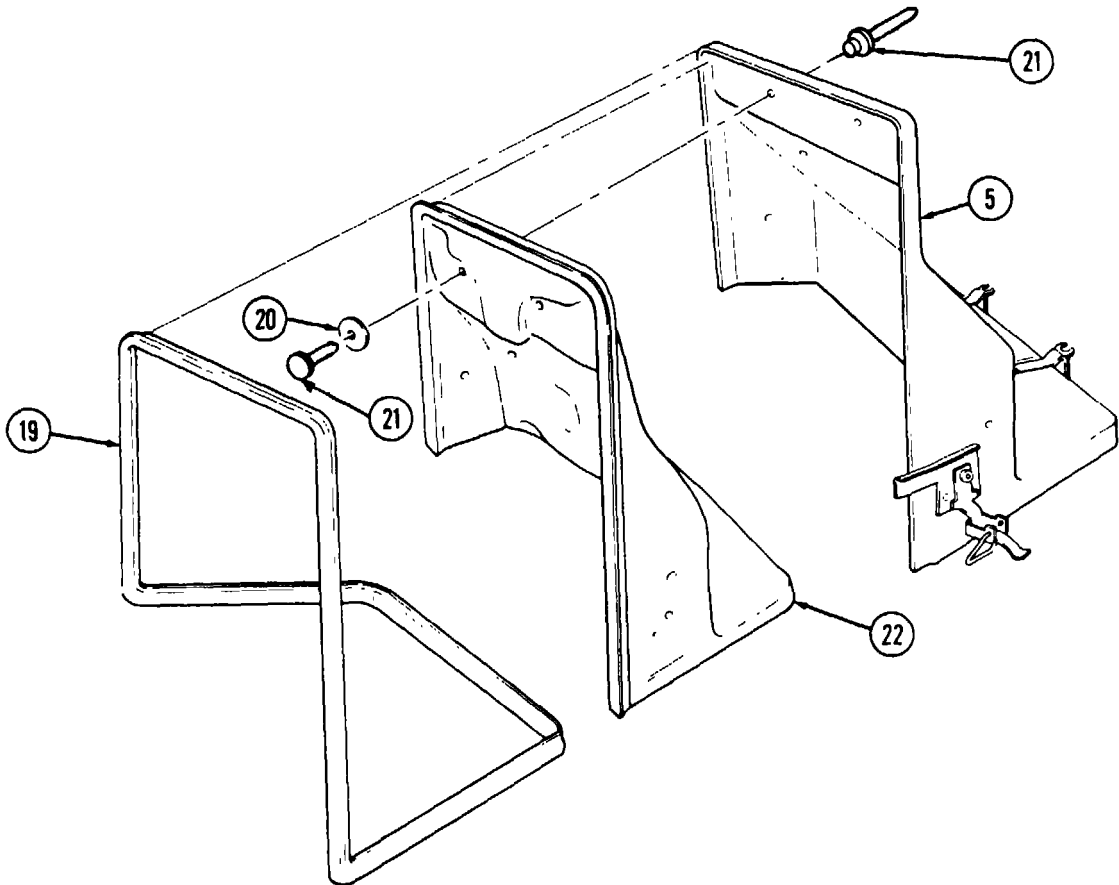
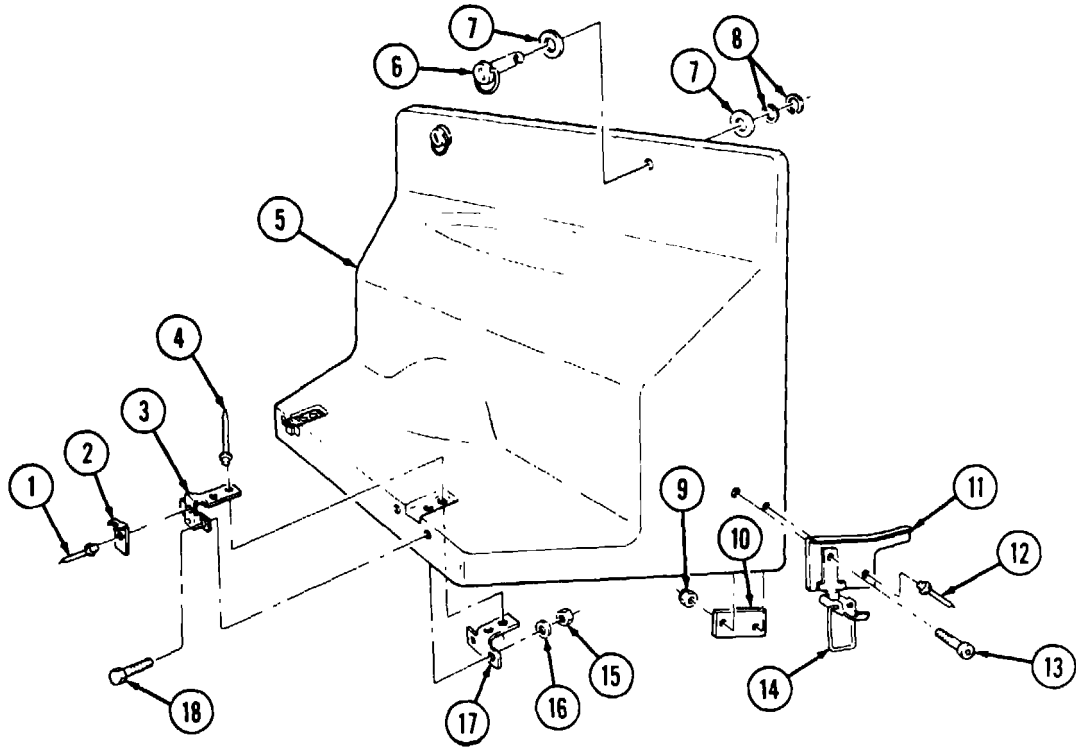
10-15. ENGINE ACCESS COVER MAINTENANCE (Cont'd)
--

3. Remove four retaining rings (8), two washers (7), ring studs (6), and washers (7) from access cover (5).
4. Remove two locknuts (9), shoulder bolts (13), and latches (14) from access cover (5). Discard locknuts (9).
5. Remove two rivets (12), backing plates (10), and guide plates (11) from access cover (5).
6. Remove two rivets (1) and keepers (2) from holddown brackets (3).
7. Remove four rivets (4), nuts (15), washers (16), capscrews (18), two holddown brackets (3), and backing plates (17) from access cover (5).

c. Assembly

1. Install two holddown brackets (3) and backing plates (17) on access cover (5) with four rivets (4), capscrews (18), washers (16), and nuts (15).
2. Install two keepers (2) on holddown brackets (3) with rivets (1).
3. Install two backing plates (10) and guide plates (11) on access cover (5) with rivets (12).
4. Install two latches (14) on plates (11) and access cover (5) with shoulder bolts (13) and locknuts (9).
5. Install two washers (7) and ring studs (6) on access cover (5) with washers (7) and four retaining rings (8).
6. Install seal (19) on access cover (5).
7. Install insulation (22) on access cover (5) with seven retainers (20) and rivets (21).

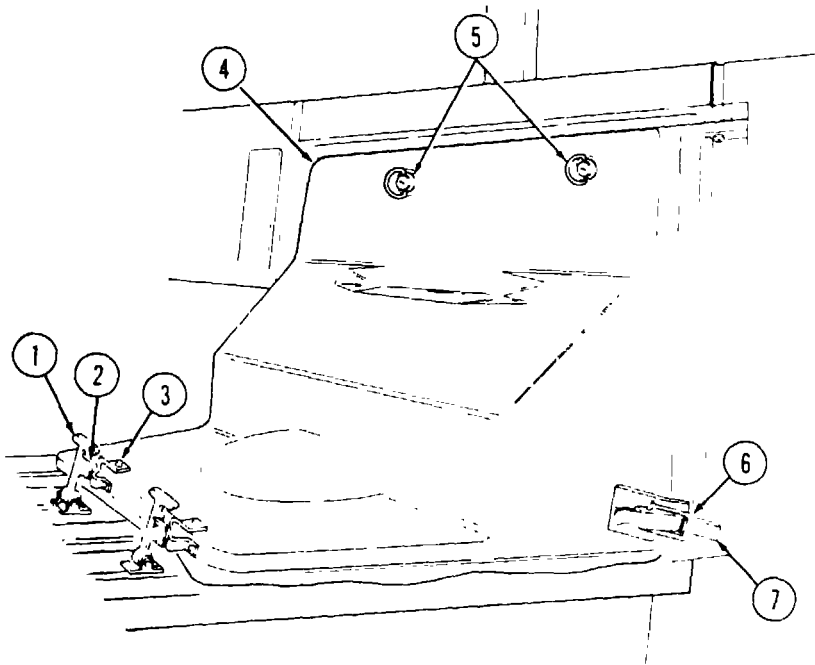
10-15. ENGINE ACCESS COVER MAINTENANCE (Cont'd)



10-15. ENGINE ACCESS COVER MAINTENANCE (Cont'd)

d. Installation

1. Install access cover (4) with two ring studs (5).
2. Install two holddown latches (6) on holddown strikes (7).
3. Latch two flexible latches (1) to keepers (2) on access cover holddown brackets (3).



FOLLOW-ON TASK: Install front radio rack (para. 12-132).

10-16. ENGINE ACCESS COVER FLEXIBLE LATCH AND HOLDDOWN STRIKE REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-24P

Materials/Parts

Two rivets (Appendix G, Item 248)
Rivet (Appendix G, Item 240)
Rivet (Appendix G, Item 238)

Equipment Condition

Engine access cover removed (para. 10-15).

a. Removal

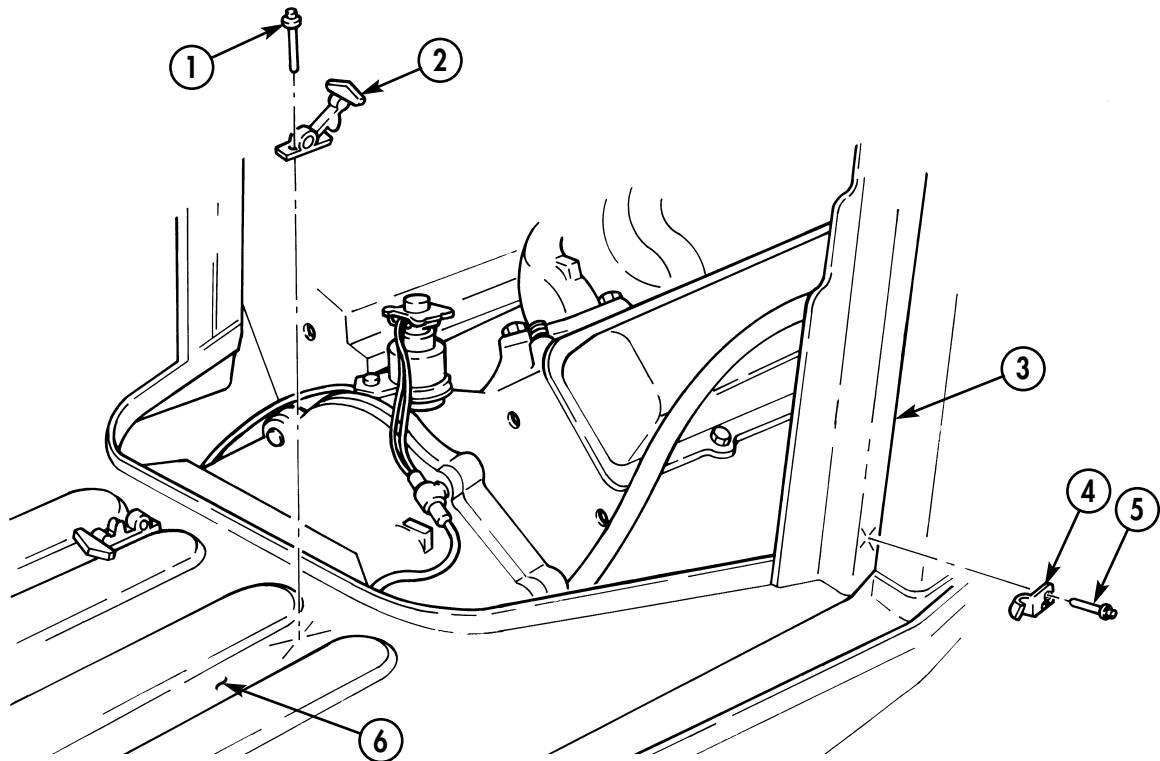
NOTE

For rivet replacement instructions, refer to para. 10-66.

1. Remove two rivets (5) and holddown strike (4) from body (3).
2. Remove two rivets (1) and flexible latch (2) from cargo floor (6).

b. Installation

1. Install flexible latch (2) on cargo floor (6) with two rivets (1).
2. Install holddown strike (4) on body (3) with two rivets (5).



FOLLOW-ON TASK: Install engine access cover (para. 10-15).

10-17. ENGINE LEFT SPLASH SHIELD MAINTENANCE

This task covers:

- | | |
|--------------------------------------|--|
| <p>a. Removal
b. Disassembly</p> | <p>c. Assembly
d. Installation</p> |
|--------------------------------------|--|

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Seven locknuts (Appendix G, Item 107)
Four lockwashers (Appendix G, Item 143)
Assembled locknut (Appendix G, Item 131)
Three locknuts (Appendix G, Item 79)
Two locknuts (Appendix G, Item 70)
Locknut (Appendix G, Item 128)
Lockwasher (Appendix G, Item 134)
Four rivets (Appendix G, Item 239)

Manual References

TM 9-2320-280-24P

Equipment Condition

- Battery ground cable disconnected (para. 4-73).
- Hood prop rod and bracket removed (para. 10-4).

General Safety Instructions

Hood must be supported during removal and installation.

WARNING

Hood must be supported during removal and installation. Failure to support hood may cause injury to personnel and damage to equipment.

NOTE

- Left splash shield maintenance is the same for all vehicles, except M998, M998A1, M1035, M1035A1, M1035A2, M1037, M1038, M1038A1, and M1042 vehicles do not have an armor plate attached to side of shield.
- The left splash shield can be modified with an access cover which will provide easier access to transmission oil cooler lines, at commander's discretion. Refer to appendix D, Figs. D-86 and D-87.

a. Removal

1. Disconnect hood harness (27) from connector receptacle (30).
2. Remove locknut (3), washer (2), capscrew (24), and washer (2) from splash shield (15) and support bracket (1). Discard locknut (3).
3. Remove locknut (10), washer (11), washer (12), capscrew (20), and washer (11) from splash shield (15) and airlift bracket (9). Discard locknut (10).
4. Remove capscrew (21), lockwasher (22), and washer (23) from splash shield (15) and airlift bracket (9). Discard lockwasher (22).
5. Remove four screws (28), lockwashers (29), and connector receptacle (30) from bracket (32). Discard lockwashers (29).
6. Remove assembled locknut (39) and screw (37) from harness and clamp (38) and splash shield (15). Discard assembled locknut (39).
7. Remove locknut (13), washer (14), capscrew (19), washer (14), and splash shield (15) from bracket (16). Discard locknut (13).

b. Disassembly

NOTE

Perform step 1 only if vehicle has an armor plate.

1. Remove locknut (33), washer (34), capscrew (36), washer (34), and armor plate (35) from splash shield (15). Discard locknut (31).

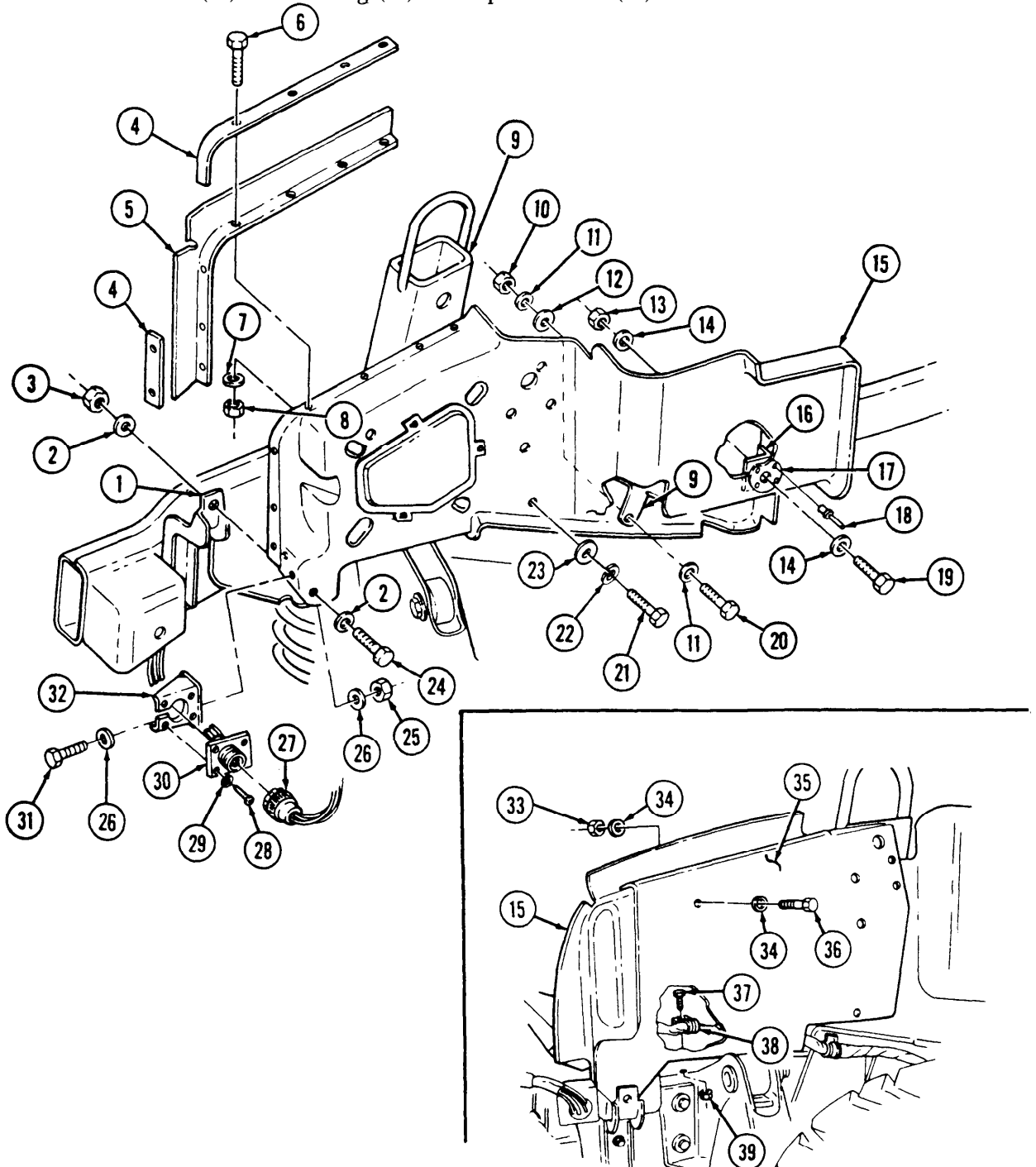
10-17. ENGINE LEFT SPLASH SHIELD MAINTENANCE (Cont'd)

2. Remove seven locknuts (8), washers (7), capscrews (6), seal retainers (4), and seal (5) from splash shield (15). Discard locknuts (8).
3. Remove two locknuts (25), washers (26), capscrews (31), washers (26), and bracket (32) from splash shield (15). Discard locknuts (25).

NOTE

For rivet replacement instructions refer to para. 10-66.

4. Remove four rivets (18) and bushing (17) from splash shield (15).



10-17. ENGINE LEFT SPLASH SHIELD MAINTENANCE (Cont'd)

c. Assembly

1. Install bushing (17) on splash shield (15) with four rivets (18).
2. Install bracket (32) on splash shield (15) with two washers (26), capscrews (31), washers (26), and locknuts (25). Tighten locknuts (25) to 6 lb-ft (8 N•m).
3. Install seal (5) and seal retainers (4) on splash shield (15) with seven capscrews (6), washers (7), and locknuts (8).

NOTE

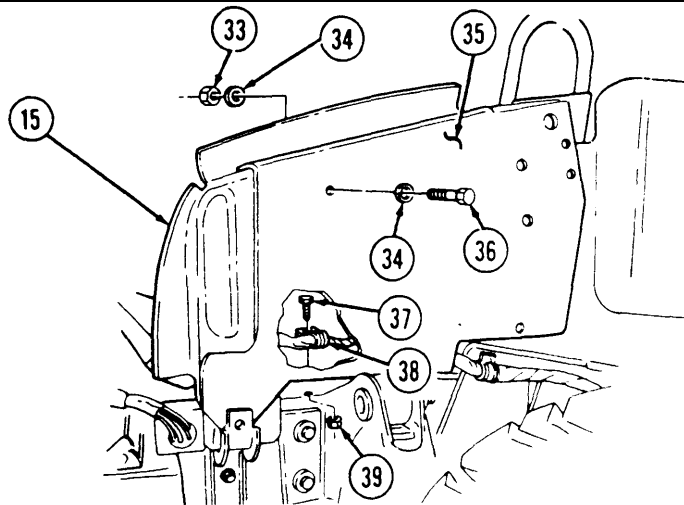
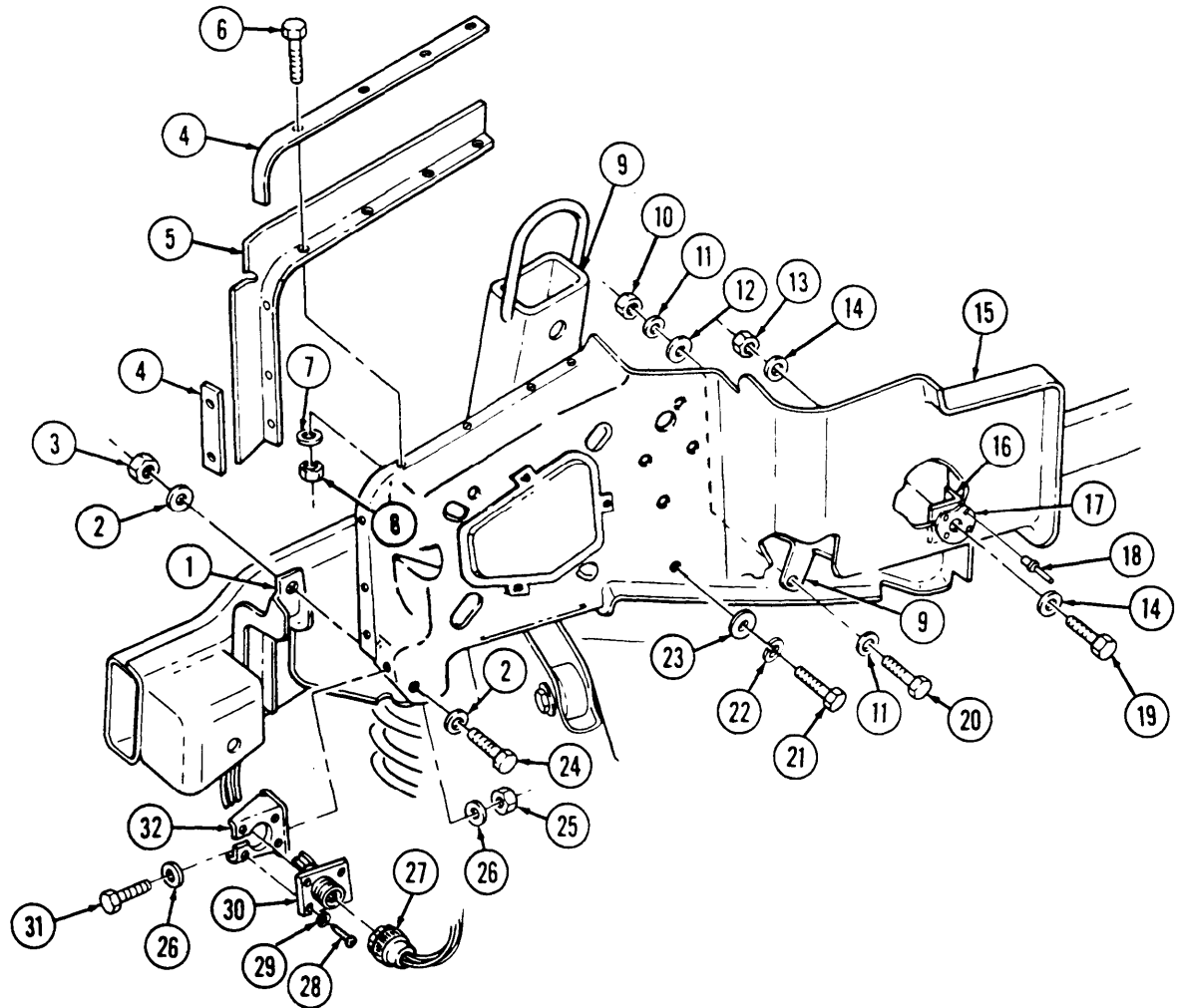
Perform step 4 only if vehicle has an armor plate.

4. Install armor plate (35) on splash shield (15) with washer (34), capscrew (36), washer (34), and locknut (33). Tighten locknut (33) to 15 lb-ft (20 N•m).

d. Installation

1. Install splash shield (15) on bracket (16) with washer (14), capscrew (19), washer (14), and locknut (13).
2. Install harness and clamp (38) on splash shield (15) with screw (37) and assembled locknut (39).
3. Install connector receptacle (30) on bracket (32) with four lockwashers (29) and screws (28).
4. Install splash shield (15) to airlift bracket (9) with washer (23), lockwasher (22), and capscrew (21). Tighten capscrew (21) to 10 lb-ft (14 N•m).
5. Install splash shield (15) on airlift bracket (9) with washer (11), capscrew (20), washer (12), washer (11), and locknut (10). Tighten capscrew (20) to 10 lb-ft (14 N•m).
6. Install splash shield (15) on support bracket (1) with washer (2), capscrew (24), washer (2), and locknut (3). Tighten capscrew (24) to 6 lb-ft (8 N•m).
7. Connect hood harness (27) to connector receptacle (30).

10-17. ENGINE LEFT SPLASH SHIELD MAINTENANCE (Cont'd)



FOLLOW-ON TASKS: •Install hood prop rod and bracket (para. 10-4)
 •Connect battery ground cable (para. 4-73).

10-18. ENGINE LEFT SPLASH SHIELD ACCESS COVER REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M997A2, M1025A2, M1035A2, M1043A2,
M1045A2, M1097A2 (or modified vehicles)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

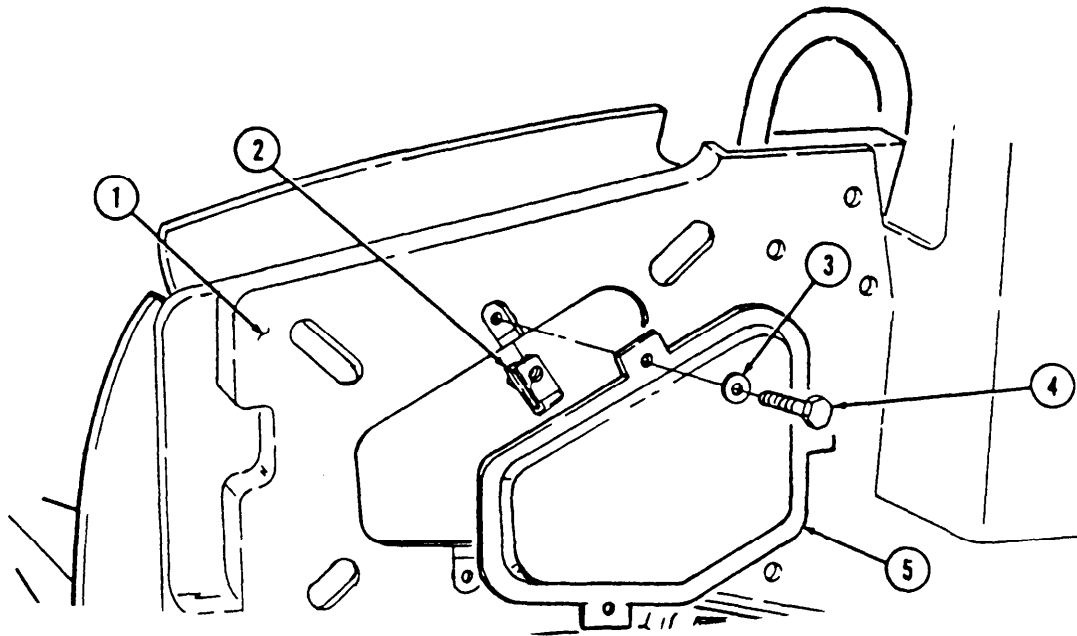
Hood raised and secured (TM 9-2320-280-10).

a. Removal

1. Remove three capscrews (4), washers (3), and splash shield access cover (5) from engine left splash shield (1).
2. Inspect spring nuts (2) for damage. Replace, if damaged.

b. Installation

Install splash shield access cover (5) to engine left splash shield (1) with three capscrews (4) and washers (3).



FOLLOW-ON TASK Lower and secure hood (TM 9-2320-280-10).

10-19. 3.5-TON JACK STOWAGE BRACKET AND COVER REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M997A2, M1025A2, M1035A2, M1043A2,
M1045A2, M1097A2, M1123

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Material/Parts

Two lockwashers (Appendix G, Item 135)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

Hood raised and secured (TM 9-2320-280-10).

NOTE

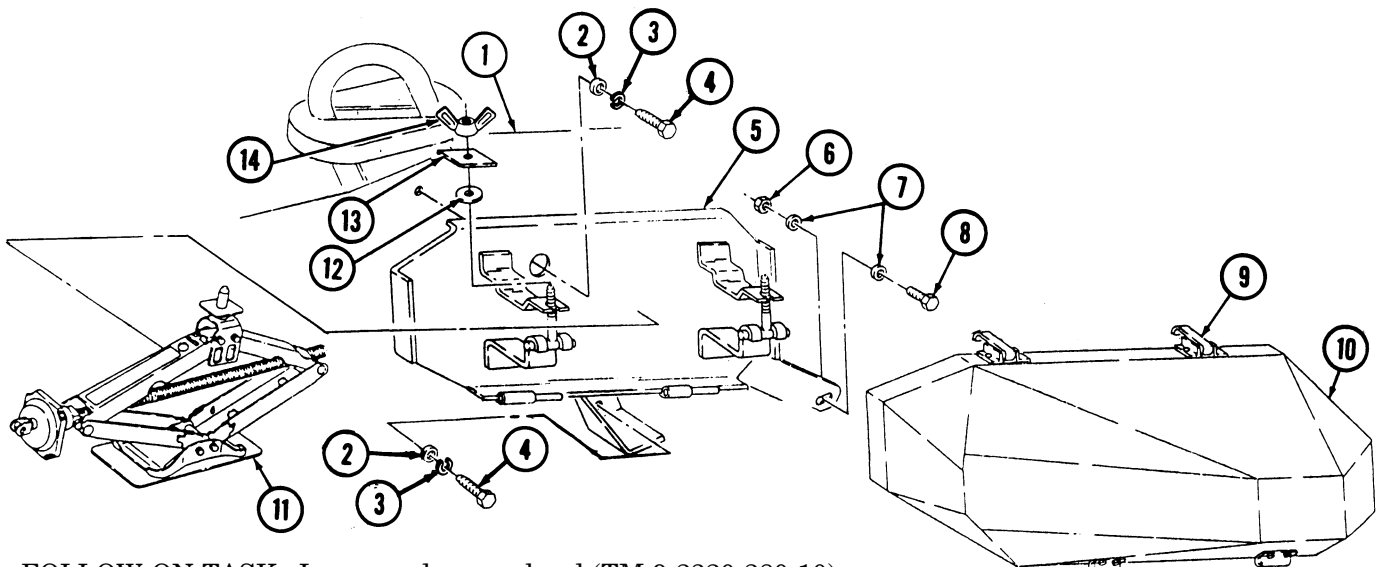
The tools for the jack are stored behind the driver's seat.

a. Removal

1. Lift two latches (9) on cover (10) and remove cover (10) from bracket (5).
2. Remove two wing nuts (14), spacers (13), washers (12), and jack (11) from bracket (5).
3. Remove nut (6), washer (7), capscrew (8), and washer (7) from bracket (5).
4. Remove two capscrews (4), lockwashers (3), washers (2), and bracket (5) from splash shield (1). Discard lockwashers (3).

b. Installation

1. Install bracket (5) on splash shield (1) with two washers (2), lockwashers (3), and capscrews (4).
2. Install washer (7), capscrew (8), washer (7), and nut (6) on bracket (5).
3. Install jack (11) on bracket (5) with two washers (12), spacers (13), and wing nuts (14).
4. Install cover (10) on bracket (5).
5. Secure cover (10) on bracket (5) with two latches (9).



FOLLOW-ON TASK: Lower and secure hood (TM 9-2320-280-10).

10-20. ENGINE RIGHT SPLASH SHIELD MAINTENANCE

This task covers:

- | | |
|---|---|
| <p>a. Removal</p> <p>b. Disassembly</p> | <p>c. Assembly</p> <p>d. Installation</p> |
|---|---|

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Materials/Parts

Four locknuts (Appendix G, Item 79)
Three lockwashers (Appendix G, Item 134)
Seven locknuts (Appendix G, Item 107)
Locknut (Appendix G, Item 70)

Equipment Condition

- Hood raised and secured (TM 9-2320-280-10).
- 3.5-ton jack stowage bracket and cover removed (M1123 and "A2" series only) (para. 10-19).

NOTE

Right splash shield maintenance is the same for all vehicles, except M998, M998A1, M1035, M1035A1, M1035A2, M1037, M1038, M1038A1, and M1042 vehicles do not have an armor plate attached to side of shield.

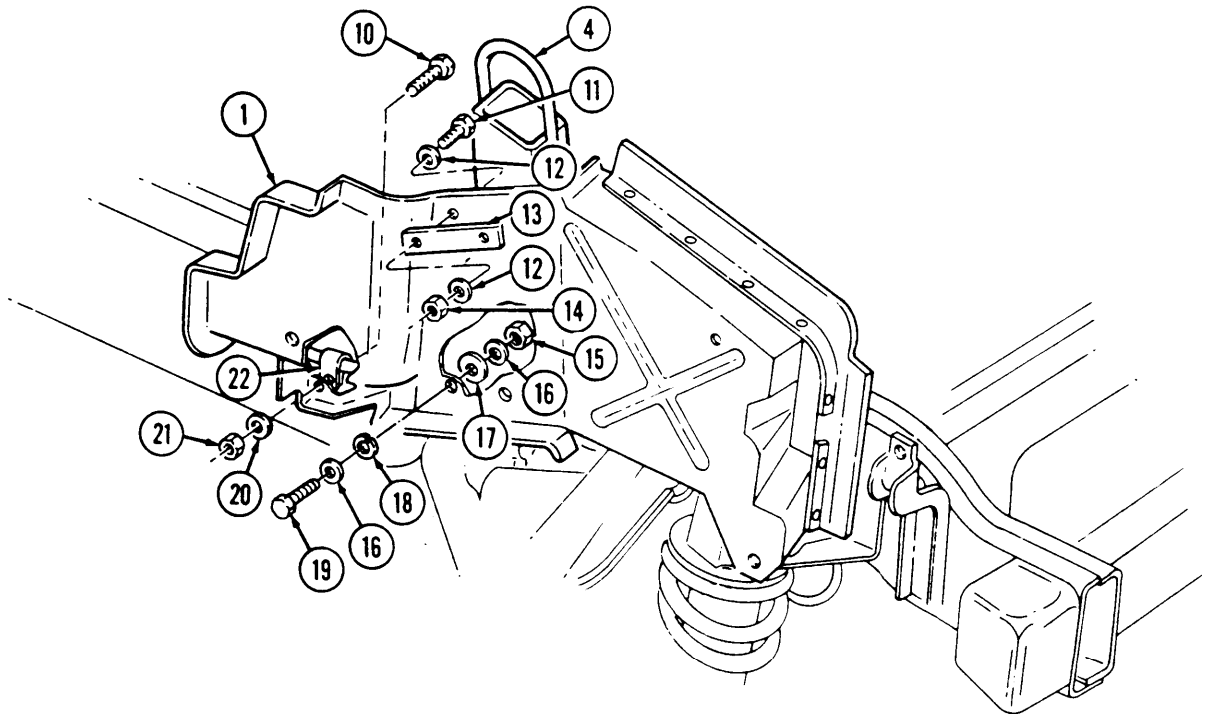
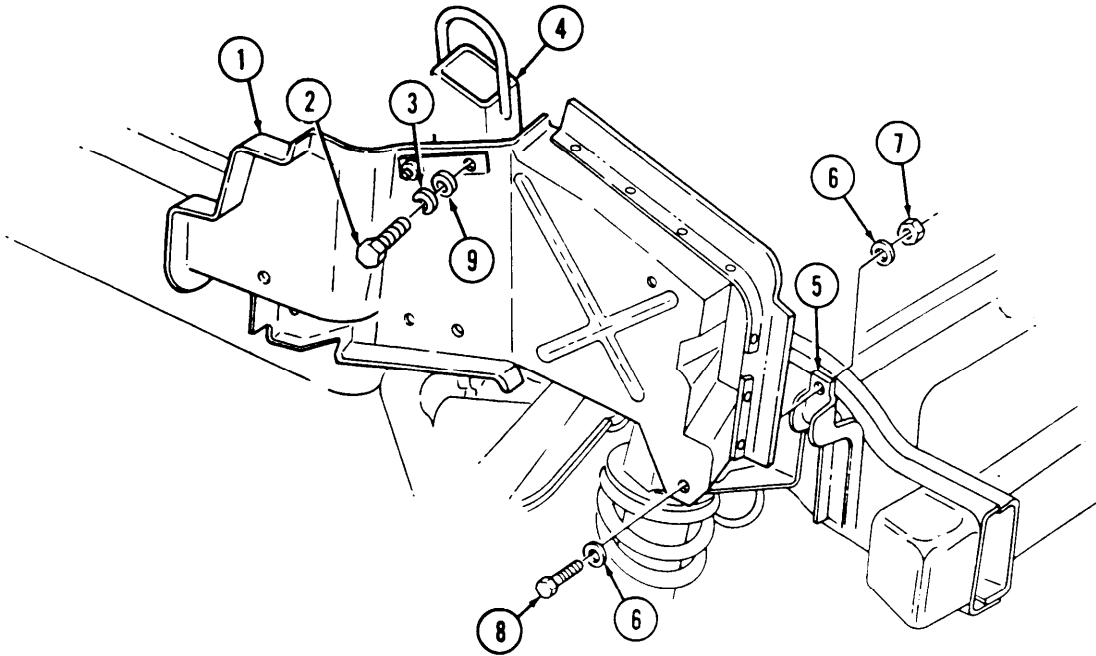
a. Removal

1. Remove locknut (7), washer (6), capscrew (8), and washer (6) from splash shield (1) and support bracket (5). Discard locknut (7).
2. Remove locknut (15), washer (16), washer (17), capscrew (19), lockwasher (18), and washer (16) from splash shield (1) and airlift bracket (4). Discard locknut (15) and lockwasher (18).
3. Remove locknut (21), washer (20), capscrew (10), and fuel line clamp (22) from splash shield (1). Discard locknut (21).
4. Remove two screws (2), lockwashers (3), washers (9) (vehicles without armor plate), and splash shield (1) from airlift bracket (4). Discard lockwashers (3).

b. Disassembly

1. Remove locknut (14), washer (12), capscrew (11), washer (12), and support plate (13) from splash shield (1). Discard locknut (14).

10-20. ENGINE RIGHT SPLASH SHIELD MAINTENANCE (Cont'd)



10-20. ENGINE RIGHT SPLASH SHIELD MAINTENANCE (Cont'd)

NOTE

Perform step 2 only if vehicle has an armor plate.

2. Remove locknut (2), washer (3), capscrew (4), washer (3), and armor plate (1) from splash shield (5). Discard locknut (2).
3. Remove seven locknuts (10), washers (9), capscrews (7), seal retainers (6), and seal (8) from splash shield (5). Discard locknuts (10).

c. Assembly

1. Install seal (8) and seal retainers (6) on splash shield (5) with seven capscrews (7), washers (9), and locknuts (10).

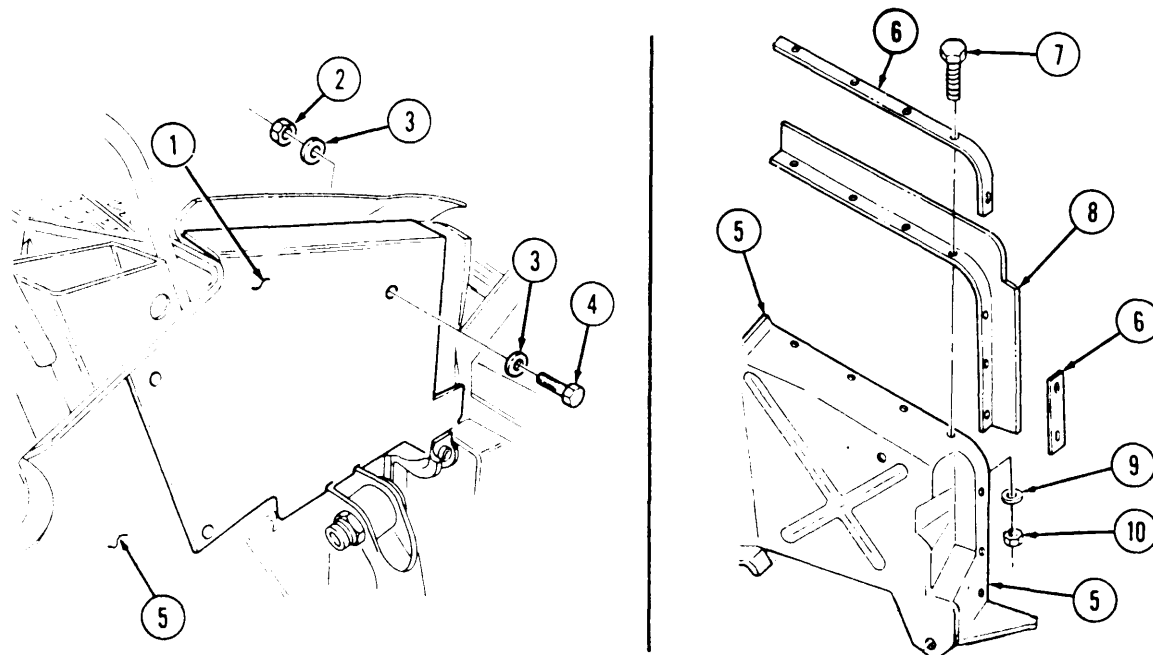
NOTE

Perform step 2 only if vehicle has an armor plate.

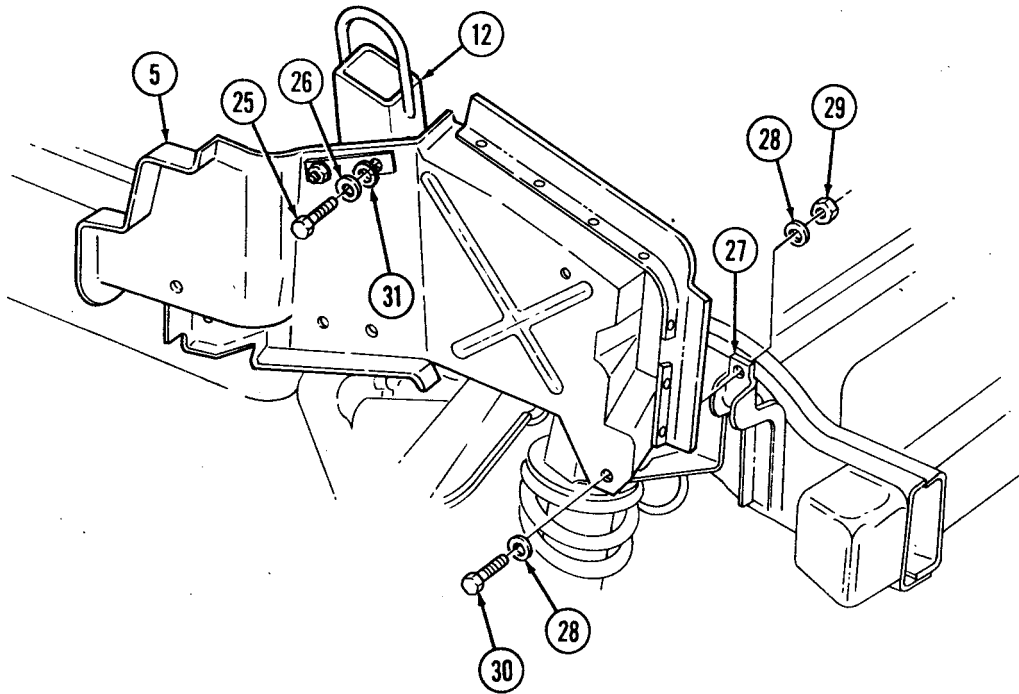
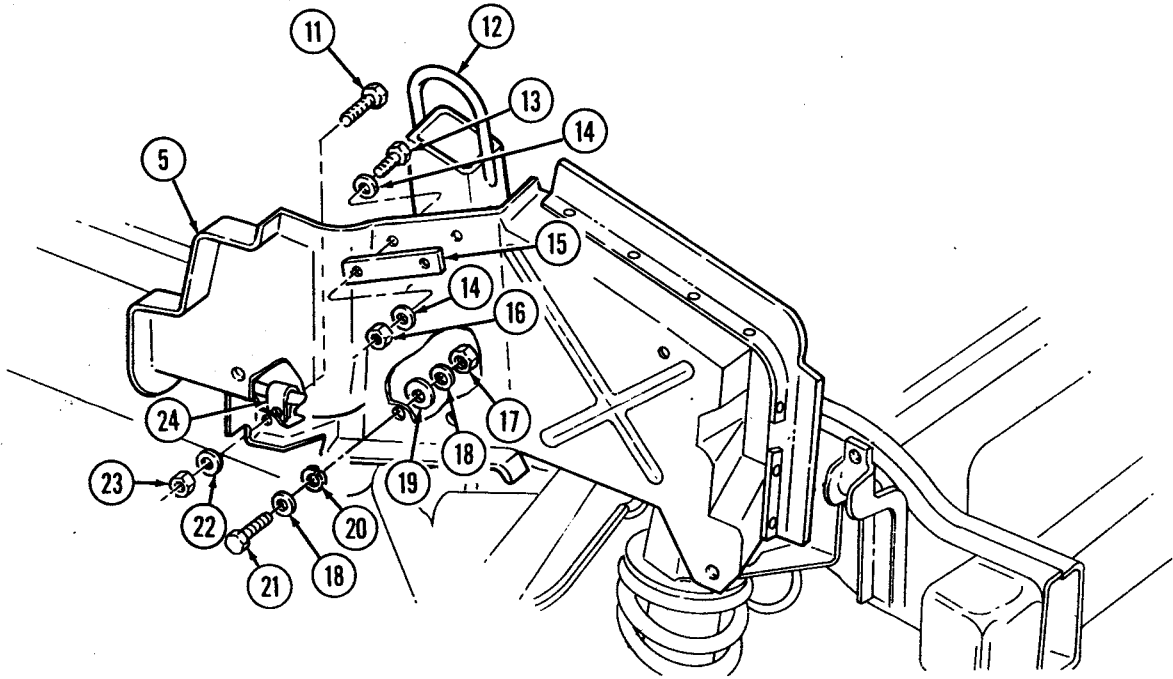
2. Install armor plate (1) on splash shield (5), ensuring capscrew holes align, and secure with washer (3), capscrew (4), washer (3), and locknut (2). Tighten locknut (2) to 15 lb-ft (20 N•m).
3. Install support plate (15) on splash shield (5), ensuring capscrew holes align, and secure with washer (14), capscrew (13), washer (14), and locknut (16).

d. Installation

1. Install splash shield (5) on airlift bracket (12) with two washers (31) (vehicles without armor plate), lockwashers (26), and screws (25).
2. Install fuel line clamp (24) on splash shield (5) with capscrew (11), washer (22), and locknut (23).
3. Secure splash shield (5) to airlift bracket (12) with lockwasher (20), washer (18), capscrew (21), washer (19), washer (18), and locknut (17). Tighten capscrew (21) to 10 lb-ft (14 N•m).
4. Secure splash shield (5) to support bracket (27) with washer (28), capscrew (30), washer (28), and locknut (29). Tighten capscrew (30) to 15 lb-ft (20 N•m).



10-20. ENGINE RIGHT SPLASH SHIELD MAINTENANCE (Cont'd)



- FOLLOW-ON TASKS:**
- Install 3.5-ton jack stowage bracket and cover (M1123 and “A2” series only) (para. 10-19).
 - Lower and secure hood (TM 9-2320-280-10).

10-21. WINDSHIELD GLASS AND WEATHERSTRIP REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M998, M998A1, M1035, M1035A1, M1035A2, M1037, M1038, M1038A1, M1042

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Sealant (Appendix C, Item 38)

Manual References

TM 9-2320-280-24P

Equipment Condition

Windshield wiper blade and arm removed
(para. 10-70).

General Safety Instructions

Eyeshields and gloves are required when installing and removing windshield glass.

WARNING

Use eyeshields and gloves when removing and installing windshield. Glass could shatter causing injury.

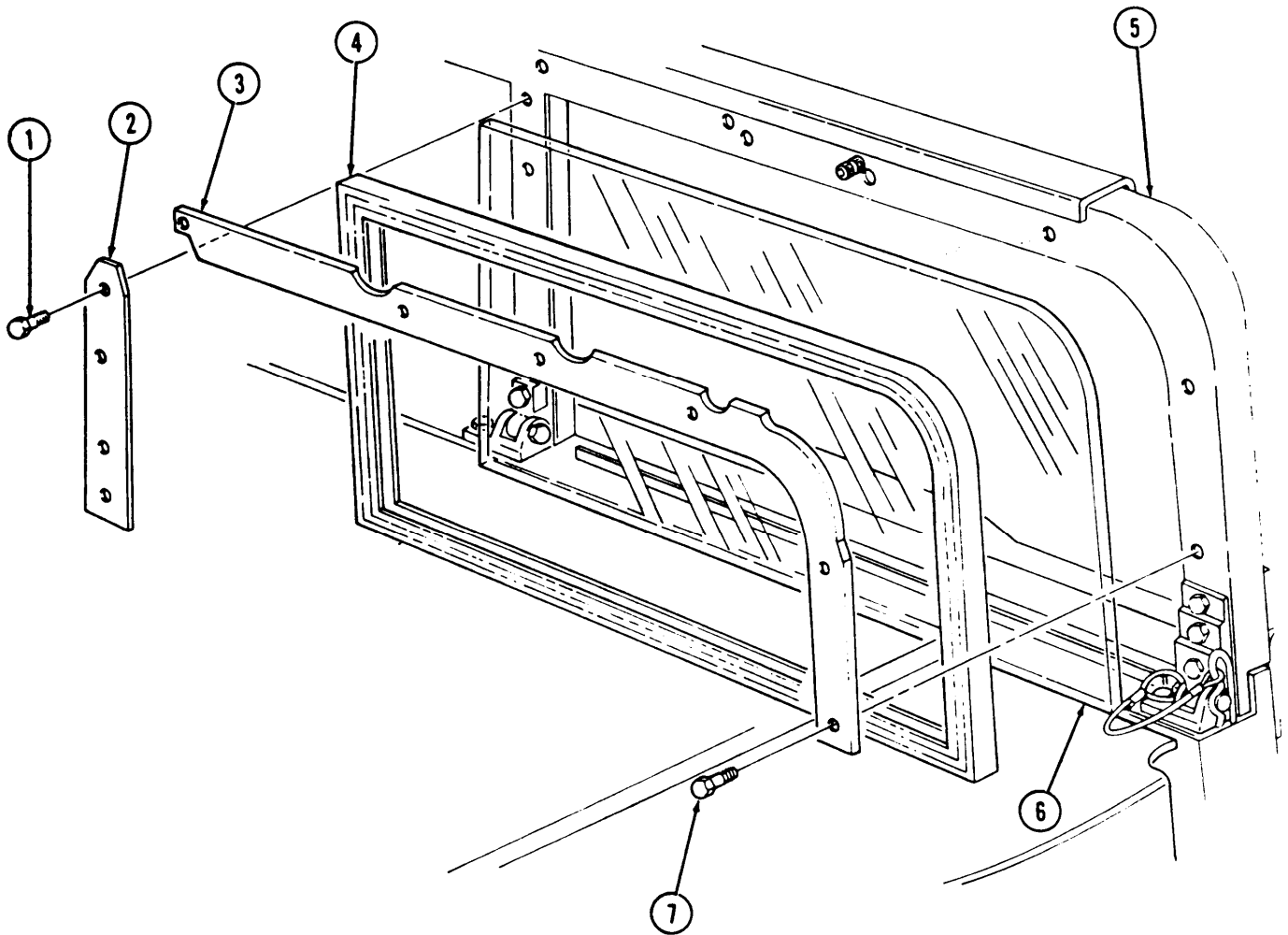
a. Removal

1. Remove six capscrews (7) and upper retainer (3) from windshield frame (5).
2. Remove four capscrews (1) and center retainer (2) from windshield frame (5).
3. Remove weatherstrip (4) and glass (6) from windshield frame (5).
4. Clean sealant from windshield frame (5).

b. Installation

1. Apply a 1/8 inch (3 mm) bead of sealing compound to edge of glass (6) and to windshield frame (5).
2. Install weatherstrip (4) on glass (6).
3. Install glass (6) and weatherstrip (4) on windshield frame (5) with center retainer (2) and four capscrews (1).
4. Apply a thin bead of sealant to top edge of outside weatherstrip (4).
5. Install upper retainer (3) on windshield frame (5) with six capscrews (7).

10-21. WINDSHIELD GLASS AND WEATHERSTRIP REPLACEMENT (Cont'd)



FOLLOW-ON TASK: Install windshield wiper blade and arm (para. 10-70).

10-22. WINDSHIELD BALLISTIC GLASS REPLACEMENT

I

This task covers:

a. Removal

b. Installation

INITIAL SETUP:**Applicable Models**

All except M998, M998A1, M1035, M1035A1, M1035A2, M1037, M1038, M1038A1, M1042

ToolsGeneral mechanic's tool kit:
automotive (Appendix B, Item 1)**Materials/Parts**

Sealing compound (Appendix C, Item 47)

Manual References

TM 9-2320-280-24P

Personnel RequiredOne mechanic
One assistant**Equipment Condition**Windshield wiper blade and arm removed
(para. 10-70).**General Safety Instructions**Eyeshields and gloves are required when installing
and removing windshield glass.

WARNING

Use eyeshields and gloves when removing and installing windshield glass. Glass could shatter causing injury.

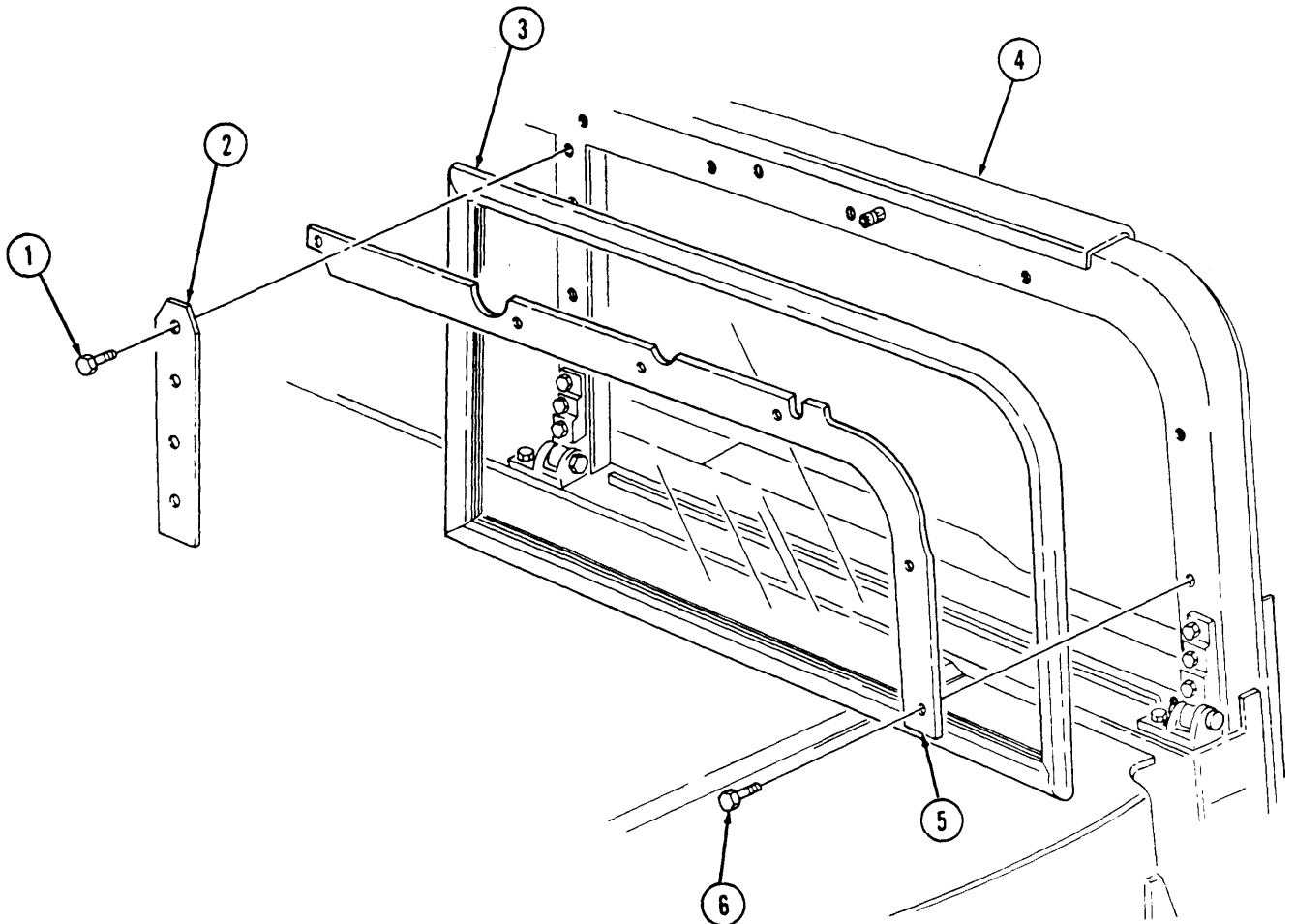
a. Removal

1. Remove six screws (6) and upper retainer (5) from windshield frame (4).
2. Remove four screws (1) and center retainer (2) from windshield frame (4).
3. Remove ballistic glass (3) from windshield frame (4).
4. Clean sealing compound from windshield frame (4).

b. Installation

1. Apply a 1/8 in. (3 mm) bead of sealing compound around windshield frame (4).
2. Position ballistic glass (3) to windshield frame (4) with marking on weatherstrip facing inward.
3. Install center retainer (2) on windshield frame (4) with four screws (1).
4. Install upper retainer (5) on windshield frame (4) with six screws (6).

10-22. WINDSHIELD BALLISTIC GLASS REPLACEMENT (Cont'd)



FOLLOW-ON TASK: Install windshield wiper blade and arm (para. 10-70).

10-23. WINDSHIELD ASSEMBLY MAINTENANCE

I

This task covers:

- | | |
|----------------|-----------------|
| a. Removal | c. Assembly |
| b. Disassembly | d. Installation |
-

INITIAL SETUP:

Applicable Models

M998, M998A1, M1035, M1035A1, M1035A2,
M1037, M1038, M1038A1, M1042

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Personnel Required

One mechanic
One assistant

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

- Soft top enclosure removed, if install.
(TM 9-2320-280-10).
- Windshield wiper blade and arm removed
(para. 10-70).
- Windshield wiper linkage removed (para. 10-73).
- Windshield wiper arm pivots removed
(para. 10-74).

General Safety Instructions

Windshield must be supported during removal and installation.

WARNING

Windshield must be supported during removal and installation.
Failure to support windshield may cause injury to personnel or
damage to equipment.

a. Removal

1. Remove five hitch pins (5) from five hinge pins (6).
2. Remove five hinge pins (6) from upper hinge halves (2) and lower hinge halves (4).
3. Remove grommet (11) from "A" pillar (12) and remove jumper harness (10).
4. Remove windshield assembly (1) from "A" pillar (12).
5. Remove two seals (3) from windshield assembly (1).
6. Clean remains of seal (3) from windshield assembly (1).

b. Disassembly

1. Remove thirteen screws (9), former (8), and seal (7) from windshield assembly (1).
2. Clean remains of seal (7) from windshield assembly (1).

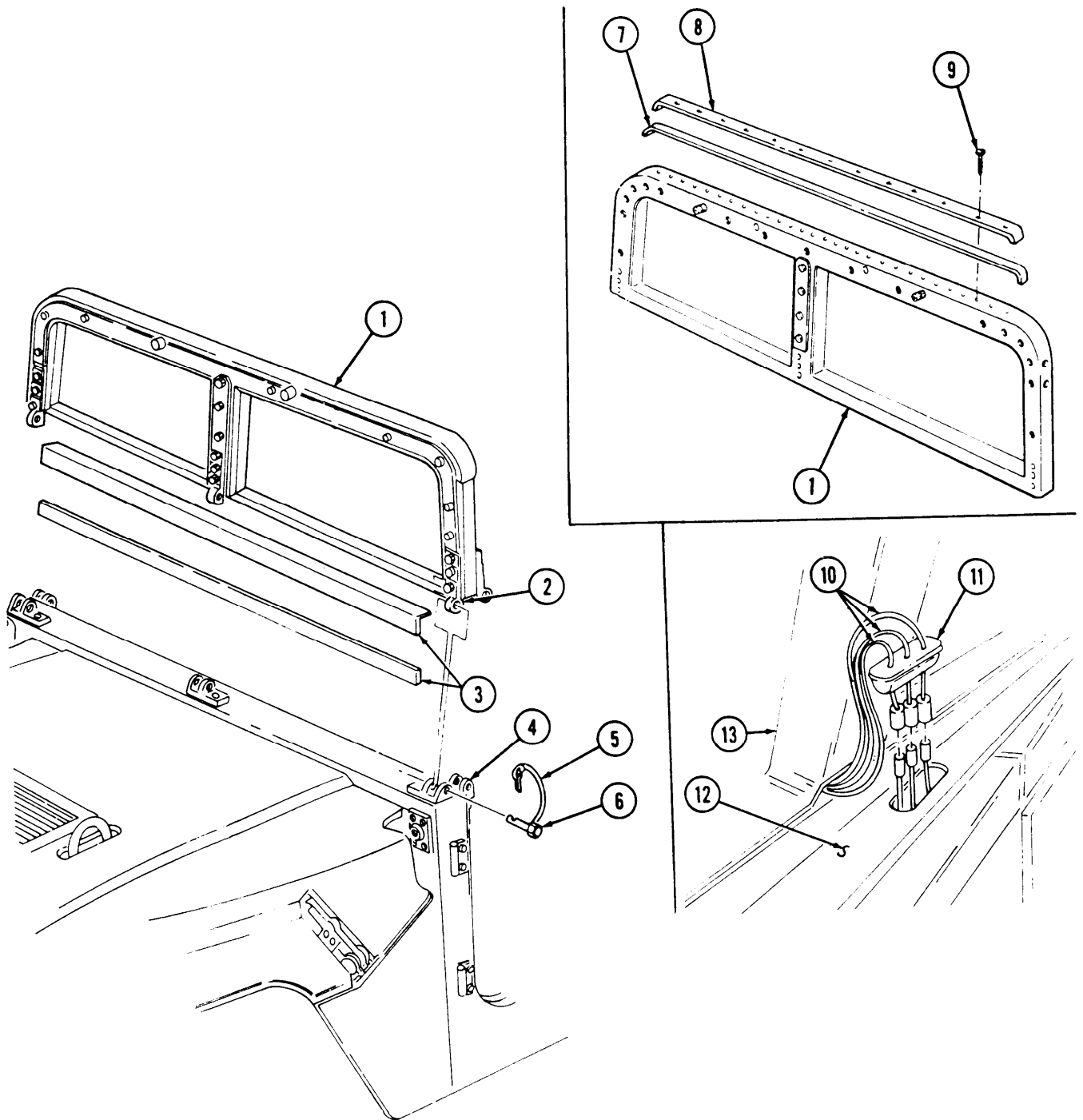
c. Assembly

1. Peel paper backing from seal (7) and install seal (7) on windshield assembly (1).
2. Install former (8) on seal (7) and windshield assembly (1) with thirteen screws (9).

d. Installation

1. Peel paper backing from two seals (3) and install seals (3) on windshield assembly (1).
2. Install windshield assembly (1) on "A" pillar (12).
3. Install jumper harness (10) on windshield center pillar (13) and install grommet (11) on "A" pillar (12).
4. Install upper hinge halves (2) on lower hinge halves (4) with five hinge pins (6).
5. Install five hitch pins (5) in hinge pins (6).

10-23. WINDSHIELD ASSEMBLY MAINTENANCE (Cont'd)



- FOLLOW-ON TASKS:
- Install windshield wiper arm pivots (para. 10-74).
 - Install windshield wiper linkage (para. 10-73).
 - Install windshield wiper blade and arm (para. 10-70).
 - Install soft top enclosure, if removed (TM 9-2320-280-10).

10-24. WINDSHIELD RETENTION BRACKET REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M997A2, M1025A2, M1035A2,
M1043A2, M1045A2, M1097A2

Materials/Parts

Four lockwashers (Appendix G, Item 139)

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

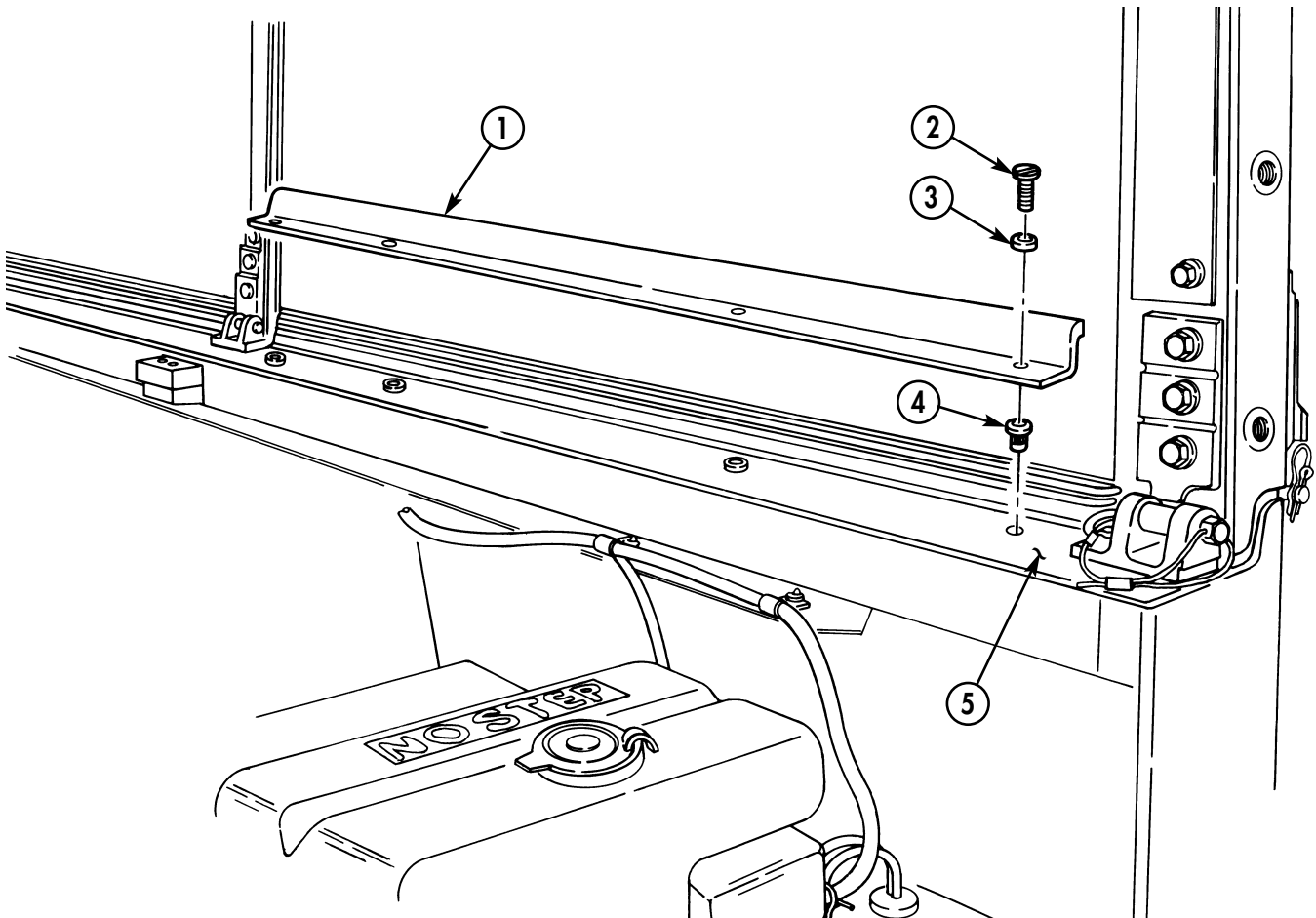
TM 9-2320-280-24P

a. Removal

1. Remove four capscrews (2), lockwashers (3), and retention bracket (1) from windshield frame (5). Discard lockwashers (3).
2. Inspect four nut inserts (4) for damage. Replace if damaged.

b. Installation

Install retention bracket (1) on windshield (5) with four lockwashers (3) and capscrews (2).



10-25. LEFT OUTER COWL INSULATION REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

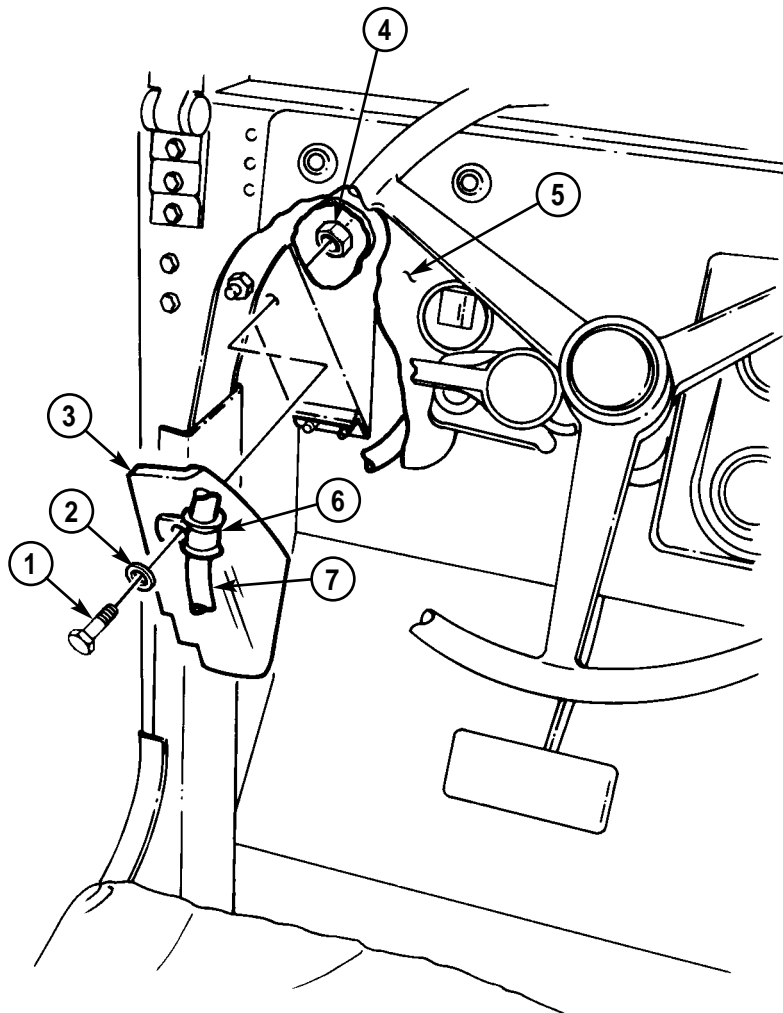
TM 9-2320-280-24P

a. Removal

Remove nut (4), capscrew (1), washer (2), clamp (6), wiring harness (7), and insulation (3) from cowl (5). ■

b. Installation

Install insulation (3) and wiring harness (7) on cowl (5) with clamp (6), washer (2), capscrew (1), and nut (4). ■



10-26. LEFT FRONT COWL INSULATION REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-24P

Materials/Parts

Four locknuts (Appendix G, Item 71)

Equipment Condition

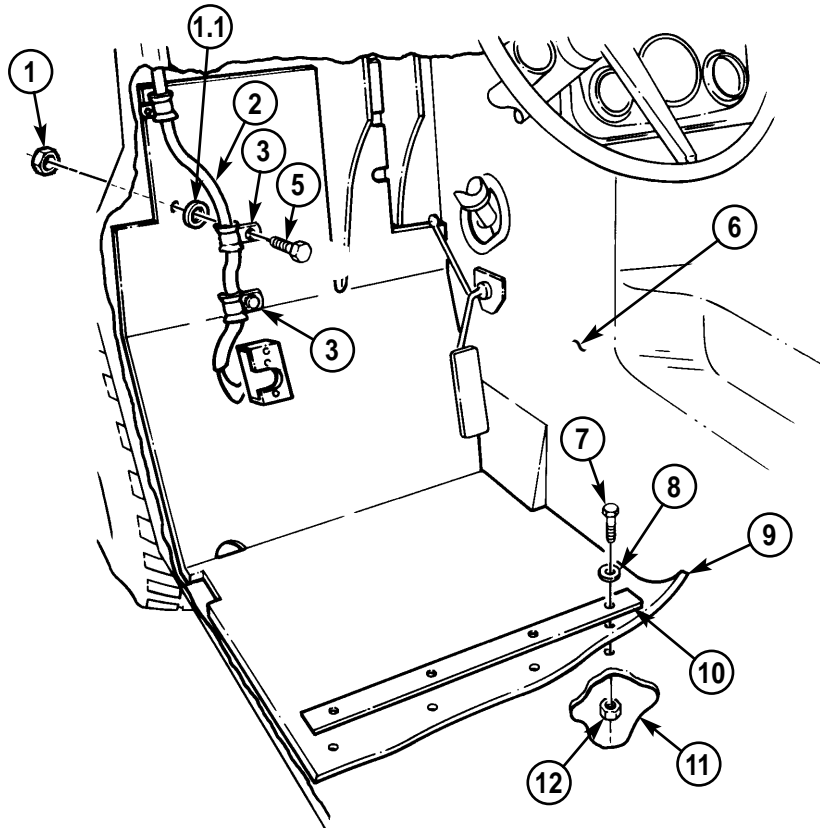
Headlight beam selector switch removed
(para. 4-58).

a. Removal

1. Remove two nuts (1), capscrews (5), washers (1.1), and clamps (3) from wiring harness (2), insulation (9), and body (6).
2. Remove four locknuts (12), capscrews (7), washers (8), retainer (10), and insulation (9) from floor (11). Discard locknuts (12).

b. Installation

1. Install insulation (9) and retainer (10) on floor (11) with four washers (8), capscrews (7), and locknuts (12). Tighten locknuts (12) to 6 lb-ft (8 N·m).
2. Install wiring harness (2) and insulation (9) on body (6) with two clamps (3), capscrews (5), washers (1.1), and nuts (1).



FOLLOW-ON TASK: Install headlight beam selector switch (para. 4-58).

10-27. RIGHT FRONT COWL INSULATION REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Four locknuts (Appendix G, Item 71)

Manual References

TM 9-2320-280-24P

Equipment Condition

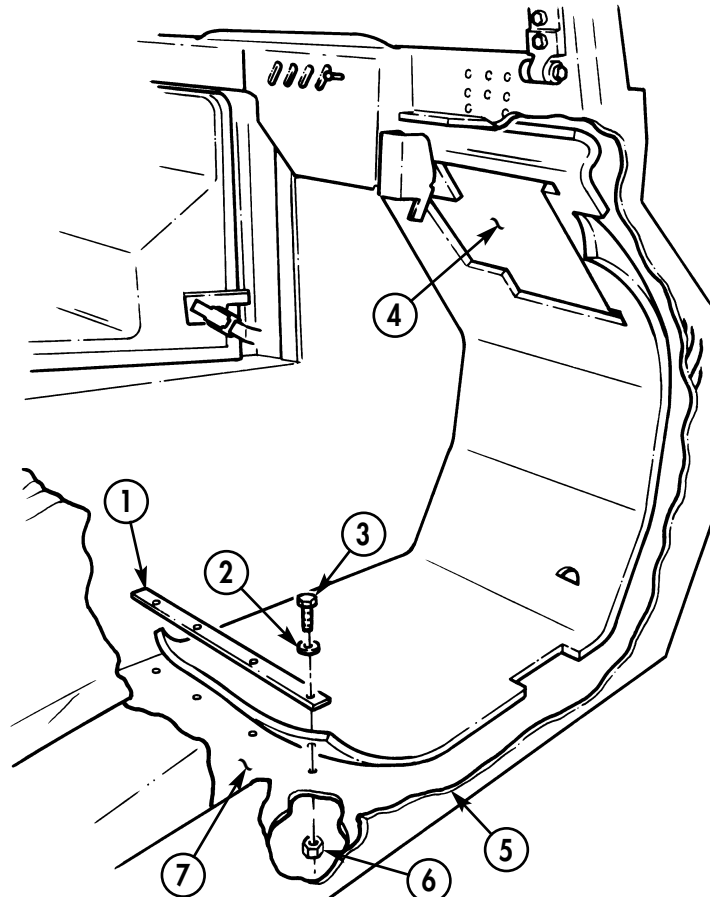
Heater assembly removed (para. 10-87).

a. Removal

Remove four locknuts (6), capscrews (3), washers (2), retainer (1), and insulation (5) from floor (7). Discard locknuts (6).

b. Installation

1. Install insulation (5) and retainer (1) on floor (7) with four washers (2), capscrews (3), and locknuts (6). Tighten locknuts (6) to 6 lb-ft (8 N•m).
2. Press insulation (5) into place on cowl (4).



FOLLOW-ON TASK: Install heater assembly (para. 10-87).

10-28. TUNNEL INTERIOR SIDE INSULATION REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

- Left front cowl insulation removed (para. 10-26).
- Front floorboard removed (para. 11-154).

Manual References

TM 9-2320-280-24P

NOTE

Removal and installation procedures for all tunnel interior side insulation are basically the same. This procedure covers the left front insulation.

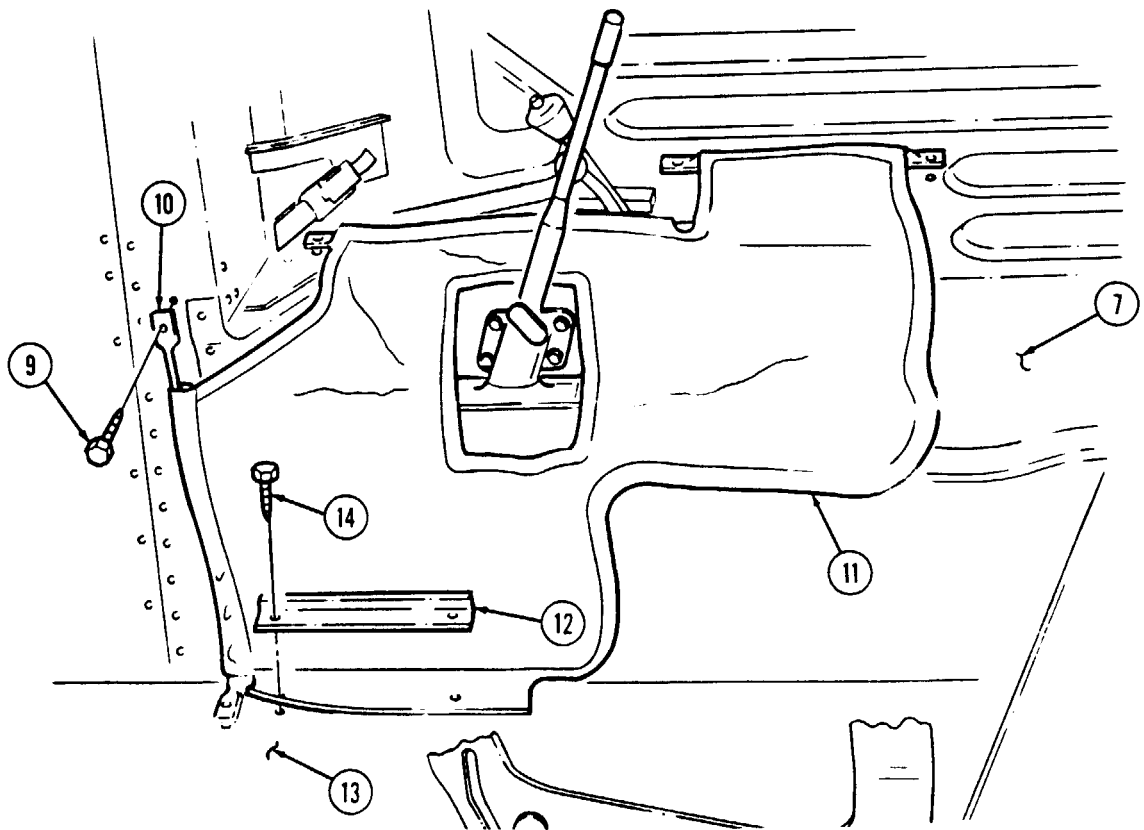
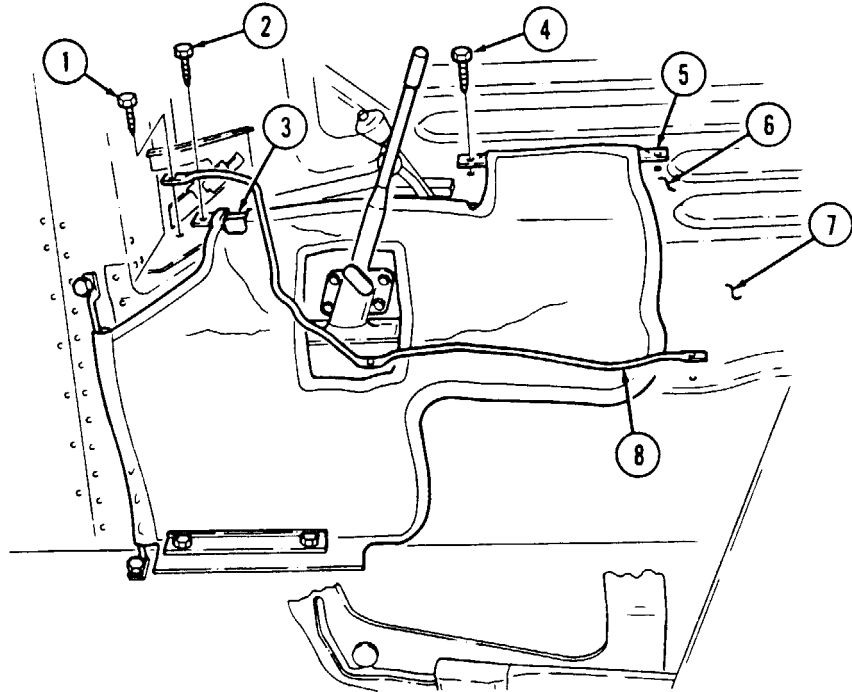
a. Removal

1. Remove two screws (4) from retaining rod (5) and cargo floor (6).
2. Remove two screws (2) from retaining rod (3) and cargo floor (6).
3. Remove three screws (1) and retaining rod (8) from tunnel (7) and cargo floor (6).
4. Remove two screws (9) from retaining rod (10) and tunnel (7).
5. Remove two screws (14), retainer (12), and insulation (11) from floor (13).
6. Remove retaining rods (3), (5), and (10) from insulation (11).

b. Installation

1. Install retaining rods (10), (3), and (5) on insulation (11).
2. Position insulation (11) into place against floor (13), tunnel (7), and cargo floor (6).
3. Install insulation (11) and retainer (12) on floor (13) with two screws (14).
4. Install retaining rod (10) on tunnel (7) with two screws (9).
5. Install retaining rod (8) on tunnel (7) with three screws (1).
6. Install retaining rod (3) on cargo floor (6) with two screws (2).
7. Install retaining rod (5) on cargo floor (6) with two screws (4).

10-28. TUNNEL INTERIOR SIDE INSULATION REPLACEMENT (Cont'd)



FOLLOW-ON TASKS: • Install left front cowl insulation (para. 10-26).
 • Install front floorboard (para. 11-154).

10-29. REAR SEAT FLOOR INSULATION REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit
automotive (Appendix B, Item 1)

Manual References

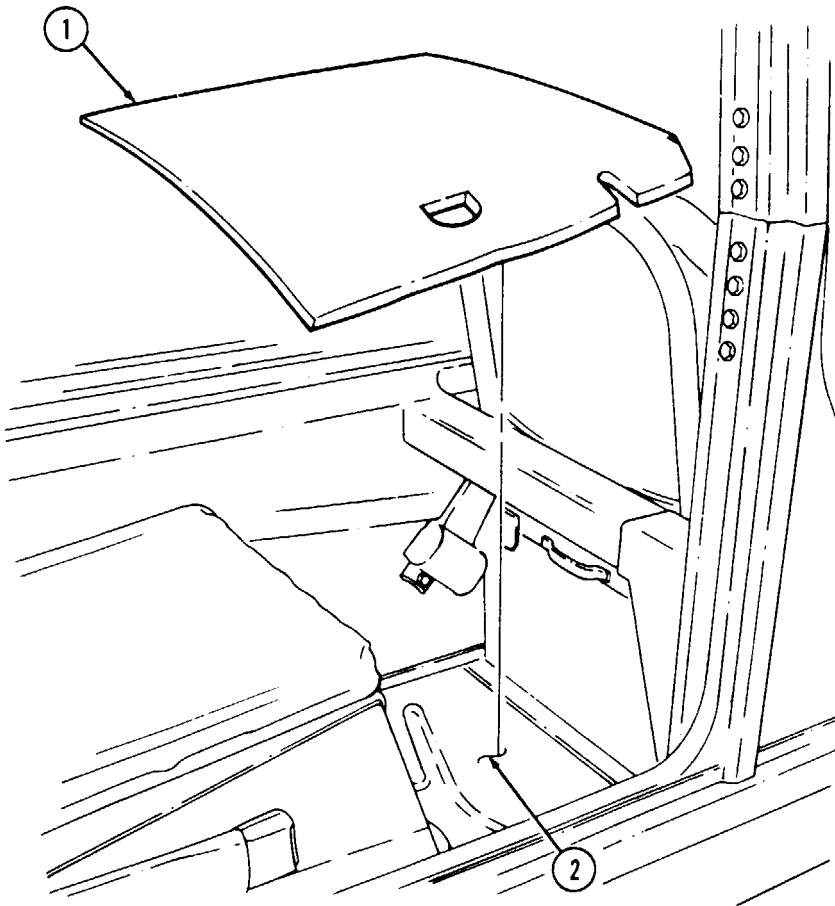
TM 9-2320-280-24P

a. Removal

Remove insulation (1) from floor (2).

b. Installation

Install insulation (1) on floor (2).



10-30. RIGHT INNER COWL INSULATION PANEL REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Materials/Parts

Three locknuts (Appendix G, Item 108)

Equipment Condition

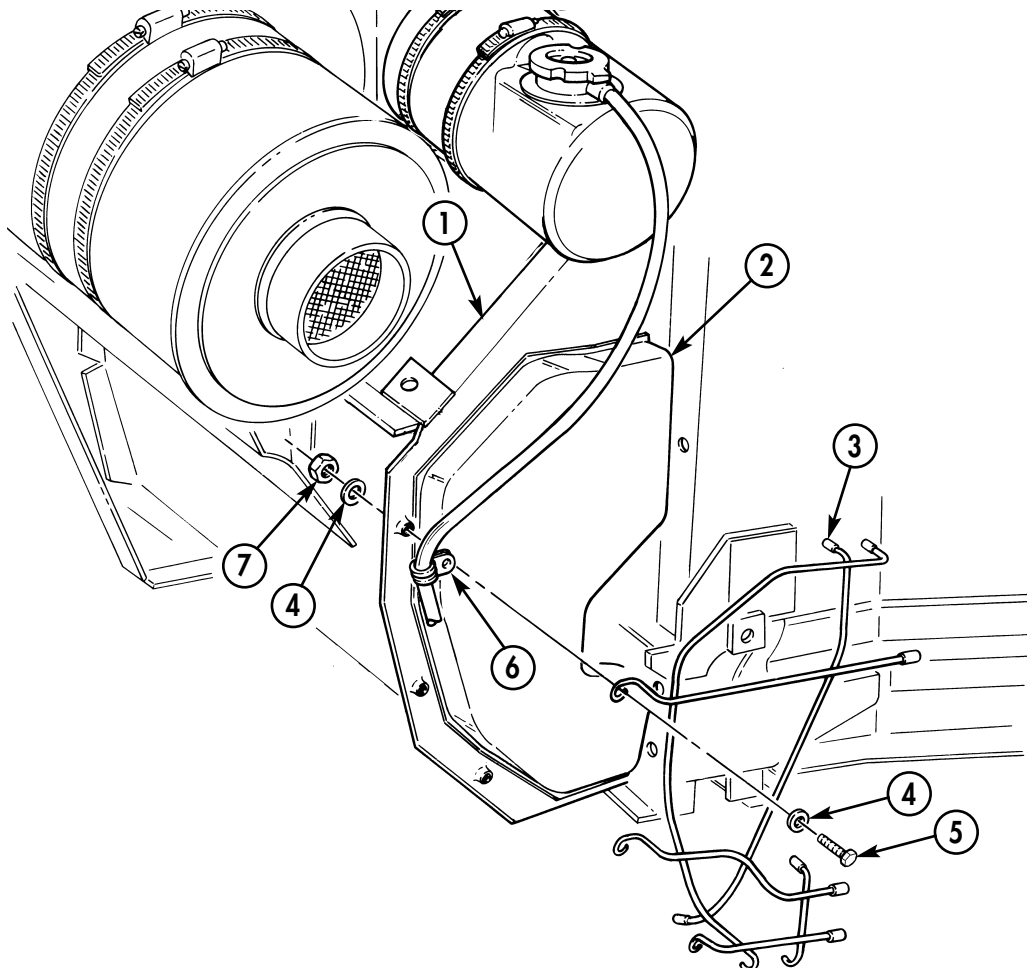
Hood raised and secured (TM 9-2320-280-10). ■

a. Removal

Remove three locknuts (7), washers (4), capscrews (5), washers (4), retainer (3), insulation (2), and drain hose clamp (6) from cowl (1). Discard locknuts (7).

b. Installation

Install drain hose clamp (6), insulation (2), and retainer (3) on cowl (1) with three washers (4), capscrews (5), washers (4), and locknuts (7).



FOLLOW-ON TASK: Lower and secure hood (TM 9-2320-280-10).

10-31. LEFT INNER COWL INSULATION PANEL REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Personnel Required

One mechanic
One assistant

Materials/Parts

Cotter pin (Appendix G, Item 11)
Four locknuts (Appendix G, Item 112)
Three assembled locknuts
(Appendix G, Item 131)
O-ring (Appendix G, Item 216)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

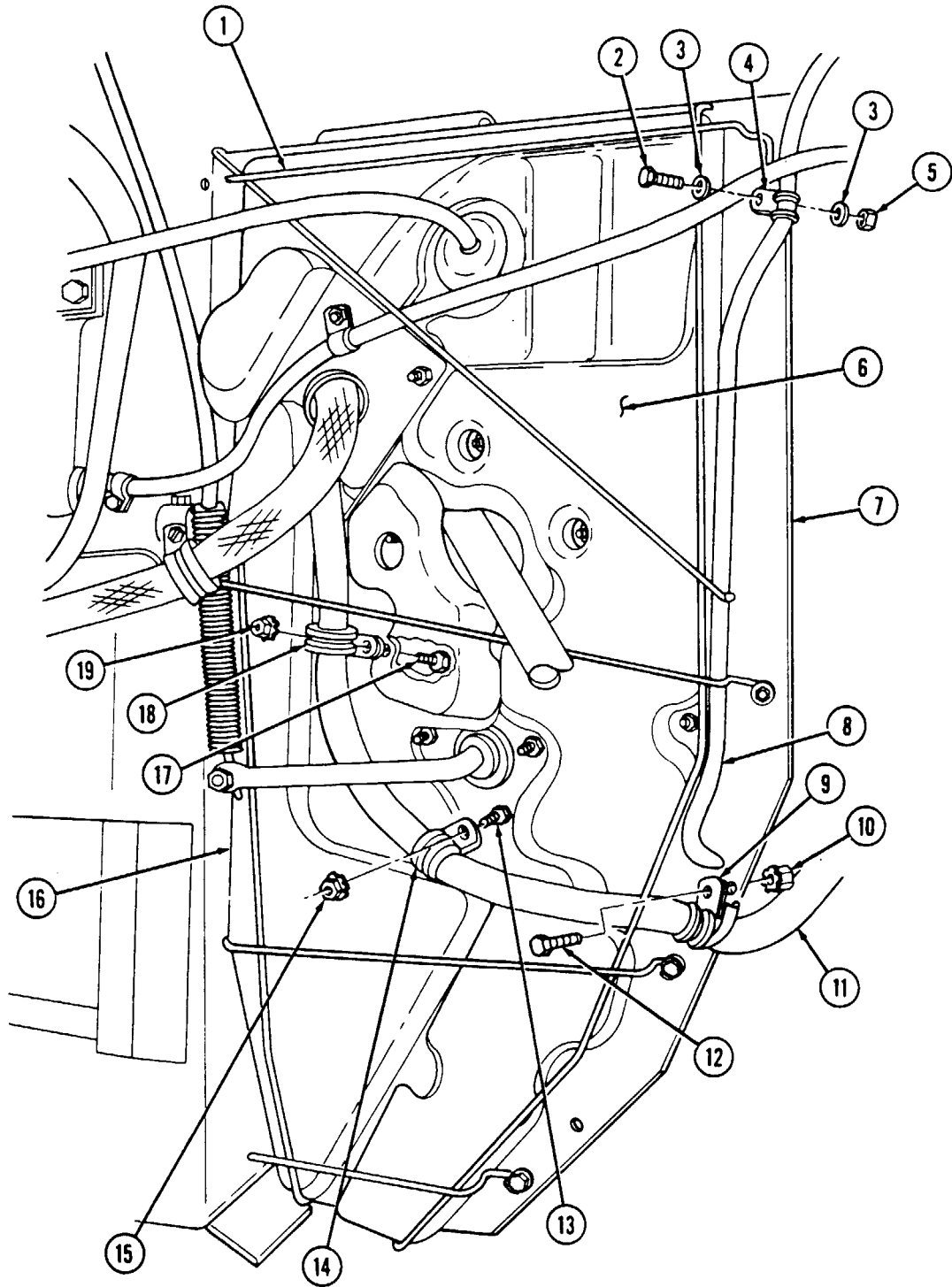
Equipment Condition

Hood raised and secured (TM 9-2320-280-10).

a. Removal

1. Remove four locknuts (5), washers (3), capscrews (2), and washers (3) from harness clamp (4), brake harness (8), retainer (1), and cowl (7). Discard locknuts (5).
2. Remove assembled locknut (10), capscrew (12), and harness clamp (9) from body harness (11), brake harness (8), and cowl (7). Discard assembled locknut (10).
3. Remove assembled locknut (15) and capscrew (13) from harness clamp (14) and cowl (7) and disconnect body harness (11) from cowl (7). Discard assembled locknut (15).
4. Remove upper insulation panel (6) by sliding up and out from between retainer (1) and cowl (7).
5. Remove assembled locknut (19) and capscrew (17) from clamp (18) and cowl (7). Discard assembled locknut (19).
6. Remove lower insulation panel (16) by sliding down between retainer (1) and cowl (7).

10-31. LEFT INNER COWL INSULATION PANEL REPLACEMENT (Cont'd)

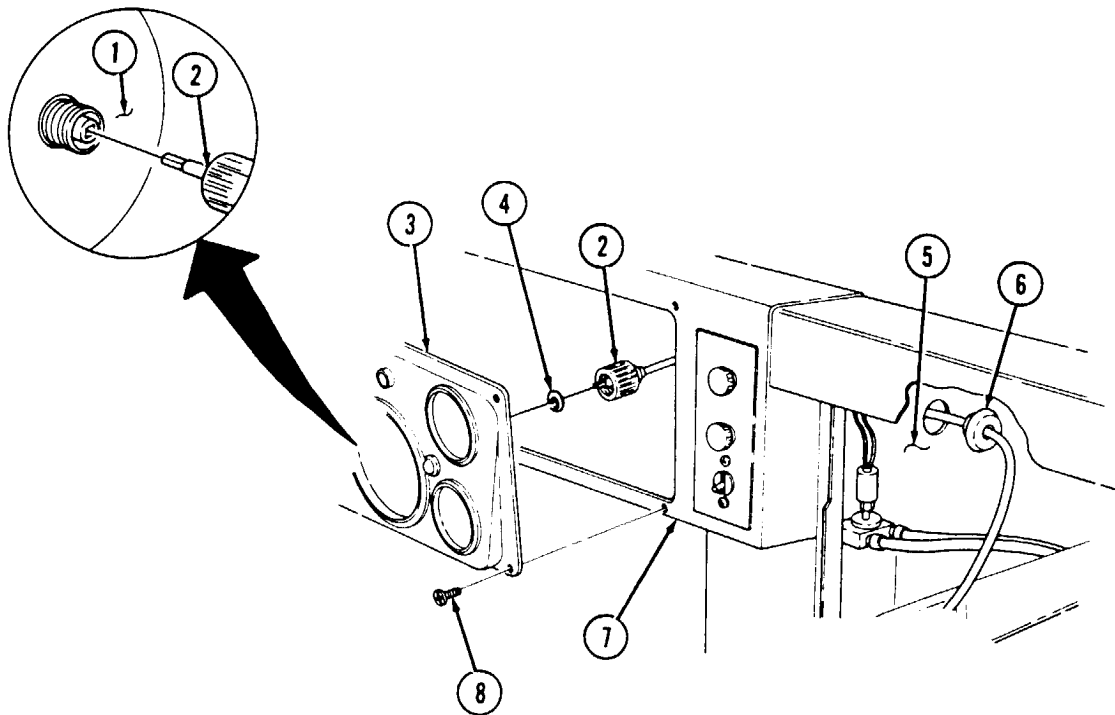


10-31. LEFT INNER COWL INSULATION PANEL REPLACEMENT (Cont'd)

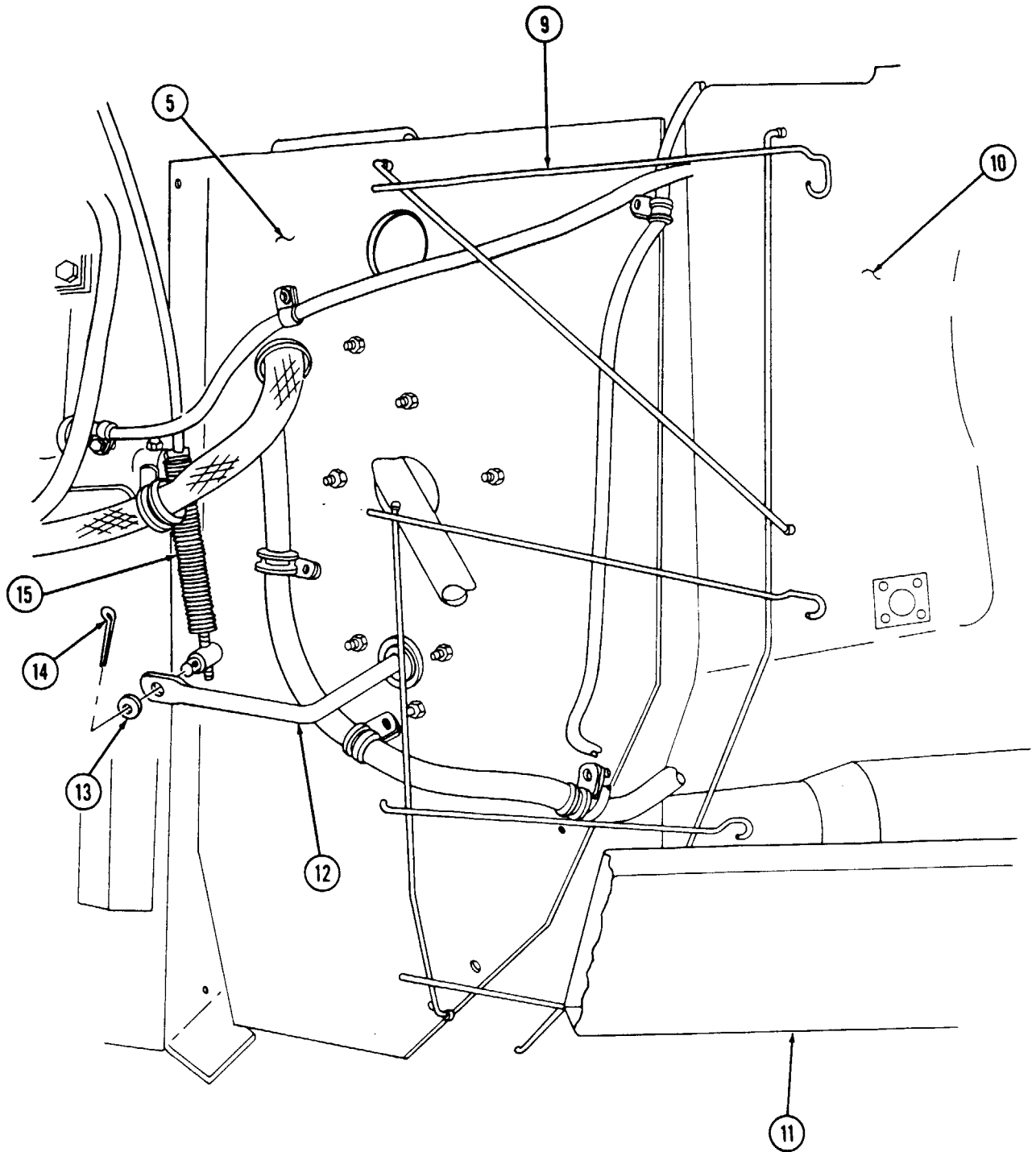
7. Remove four screws (8) from instrument cluster (3) and dash panel (7) and pull instrument cluster (3) away for access to speedometer cable (2).
8. Remove speedometer cable (2) and O-ring (4) from speedometer (1). Discard O-ring (4).
9. Remove grommet (6) from cowl (5) and route speedometer cable (2) through cowl (5).
10. Remove cotter pin (14), washer (13), and accelerator cable (15) from linkage (12). Discard cotter pin (14).
11. Pull retainer (9) clear of linkage (12) and remove retainer (9) from between splash shield (10) and frame rail (11) by pulling forward and then down.

b. Installation

1. Install retainer (9) by sliding up between splash shield (10) and frame rail (11) forward of cowl (5), and then sliding back to mounting position on cowl (5).
2. Connect accelerator cable (15) to linkage (12) with washer (13) and cotter pin (14).
3. Route speedometer cable (2) through cowl (5). Install O-ring (4) into end of speedometer cable (2) and connect speedometer cable (2) to speedometer (1).
4. Install instrument cluster (3) on dash panel (7) with four screws (8).
5. Install grommet (6) on speedometer cable (2) in cowl (5).



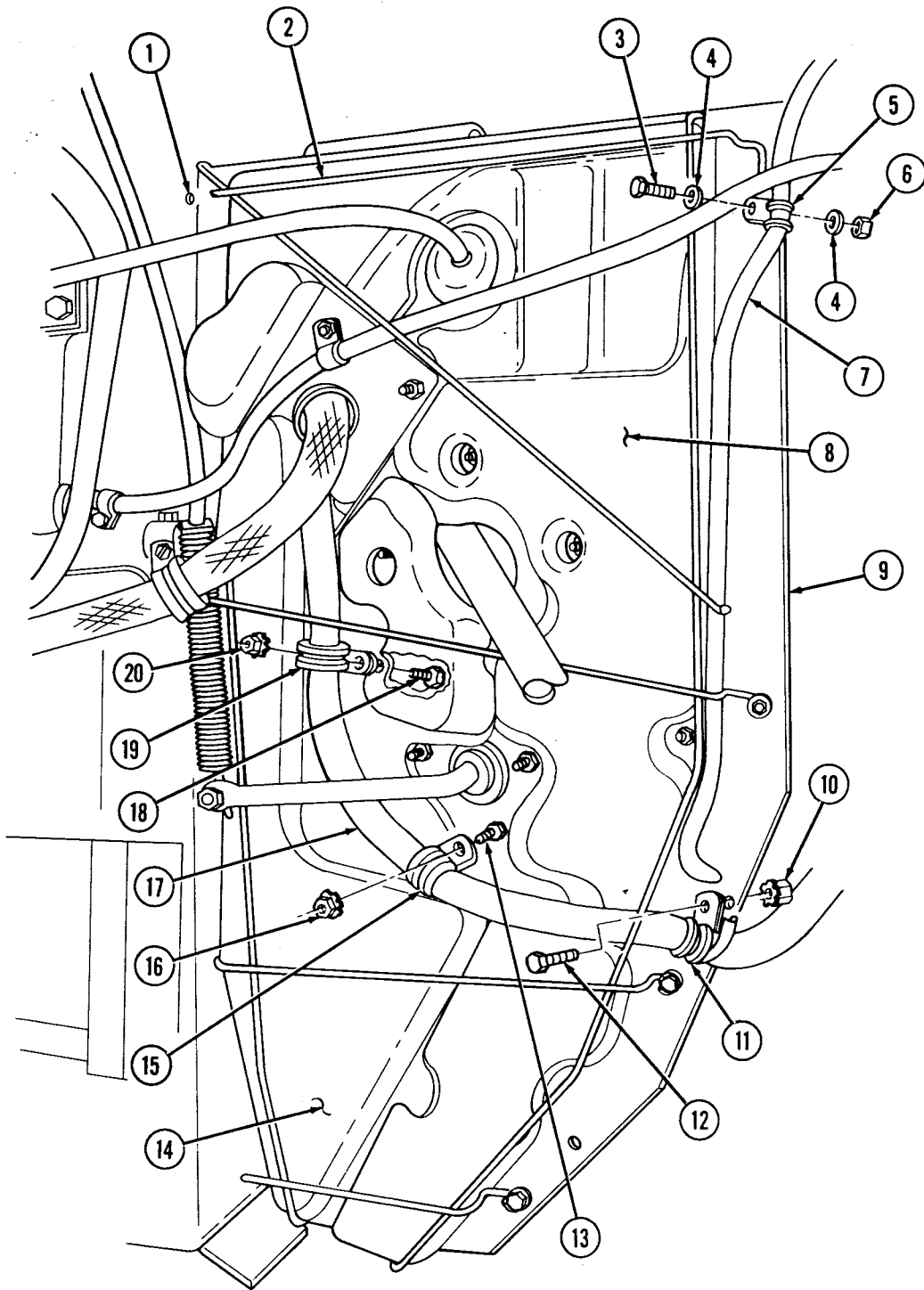
10-31. LEFT INNER COWL INSULATION PANEL REPLACEMENT (Cont'd)



10-31. LEFT INNER COWL INSULATION PANEL REPLACEMENT (Cont'd)

6. Install lower insulation panel (14) by sliding up into position between retainer (2) and cowl (9).
- 7. Install clamp (19) on cowl (9) with capscrew (18) and assembled locknut (20).
8. Install upper insulation panel (8) by sliding down into position between retainer (2) and cowl (9).
- 9. Install clamp (15) and body harness (17) on cowl (9) with screw (13) and assembled locknut (16).
- 10. Install clamp (11) on brake harness (7) and body harness (17) on cowl (9) with capscrew (12) and assembled locknut (10).
11. Install retainer (2) and brake harness (7) on cowl (9), ensuring rear ends of retainer (2) are inserted in body holes (1), with harness clamp (5), four washers (4), capscrews (3), washers (4), and locknuts (6).

10-31. LEFT INNER COWL INSULATION PANEL REPLACEMENT (Cont'd)



FOLLOW-ON TASK: Lower and secure hood (TM 9-2320-280-10).

10-31.1. CARGO FLOOR ACCESS COVER MAINTENANCE (M1123)

This task covers:

- a. Removal
- b. Inspection
- c. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Four lockwashers (Appendix G, Item 139)
Adhesive sealant (Appendix C, Item 9.1)

Manual References

TM 9-2320-280-24P

Equipment Condition

- Mortar ammo container removed, if equipped (para. 12-149).
- Rear radio rack removed, if equipped (para. 12-144).
- Troop/cargo winterization heater assembly removed, if equipped (para. 12-95).
- Troop/cargo winterization front cargo floor cover removed, if equipped (para. 12-110).
- S250 shelter removed, if equipped (para. 11-120).
- Ammo box tray (40 mm and 50 cal.) removed, if equipped (para. 11-105).
- Soft top ambulance litter assembly removed, if equipped (para. 11-124).

a. Removal

1. Remove four screws (2), lockwashers (3), washers (1), and cargo floor access cover (4) from cargo floor (5). Discard lockwashers (3).
2. Remove adhesive sealant from cargo floor access cover (4) and cargo floor (5).

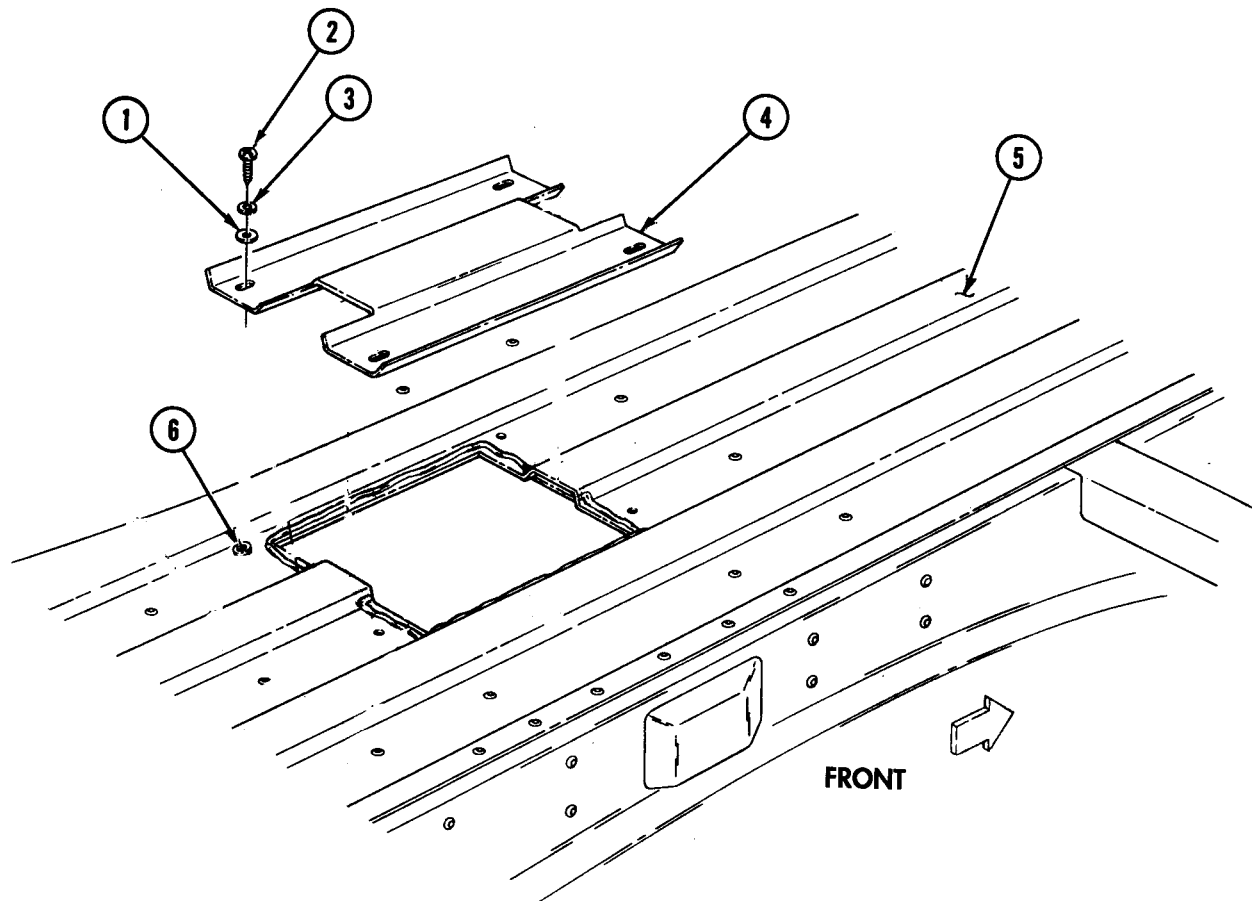
b. Inspection

Inspect for missing or damaged insert nuts (6). Replace missing or damaged insert nuts (6) (para. 10-66).

c. Installation

1. Apply adhesive sealant to cargo floor (5) and cargo floor access cover (4).
2. Install cargo floor access cover (4) on cargo floor (5) with four washers (1), lockwashers (3), and screws (2).

10-31.1. CARGO FLOOR ACCESS COVER MAINTENANCE (M1123) (cont'd)



- FOLLOW-ON TASKS:**
- Install soft top ambulance litter, if removed (para. 11-124).
 - Install ammo box tray (40 mm and 50 cal.), if removed (para. 11-105).
 - Install S250 shelter, if removed (para. 11-120).
 - Install troop/cargo winterization front floor cover, if removed (para. 12-110).
 - Install troop/cargo winterization heater assembly, if removed (para. 12-95).
 - Install rear radio rack, if removed (para. 12-144).
 - Install mortar ammo container, if removed (para. 12-149).

10-32. DRIVER'S SEAT FRAME REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M966, M996, M997, M998, M1025, M1026, M1035, M1036, M1037, M1038, M1042, M1043, M1044, M1045, M1046, M1097

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Sixteen locknuts (Appendix G, Item 79)

Manual References

TM 9-2320-280-24P

Equipment Condition

Driver's seat and seat back cushions removed (para. 10-33).

NOTE

Ensure P/N 12338503-1 is used for replacement of driver's seat frame on vehicles equipped with three-point seatbelt.

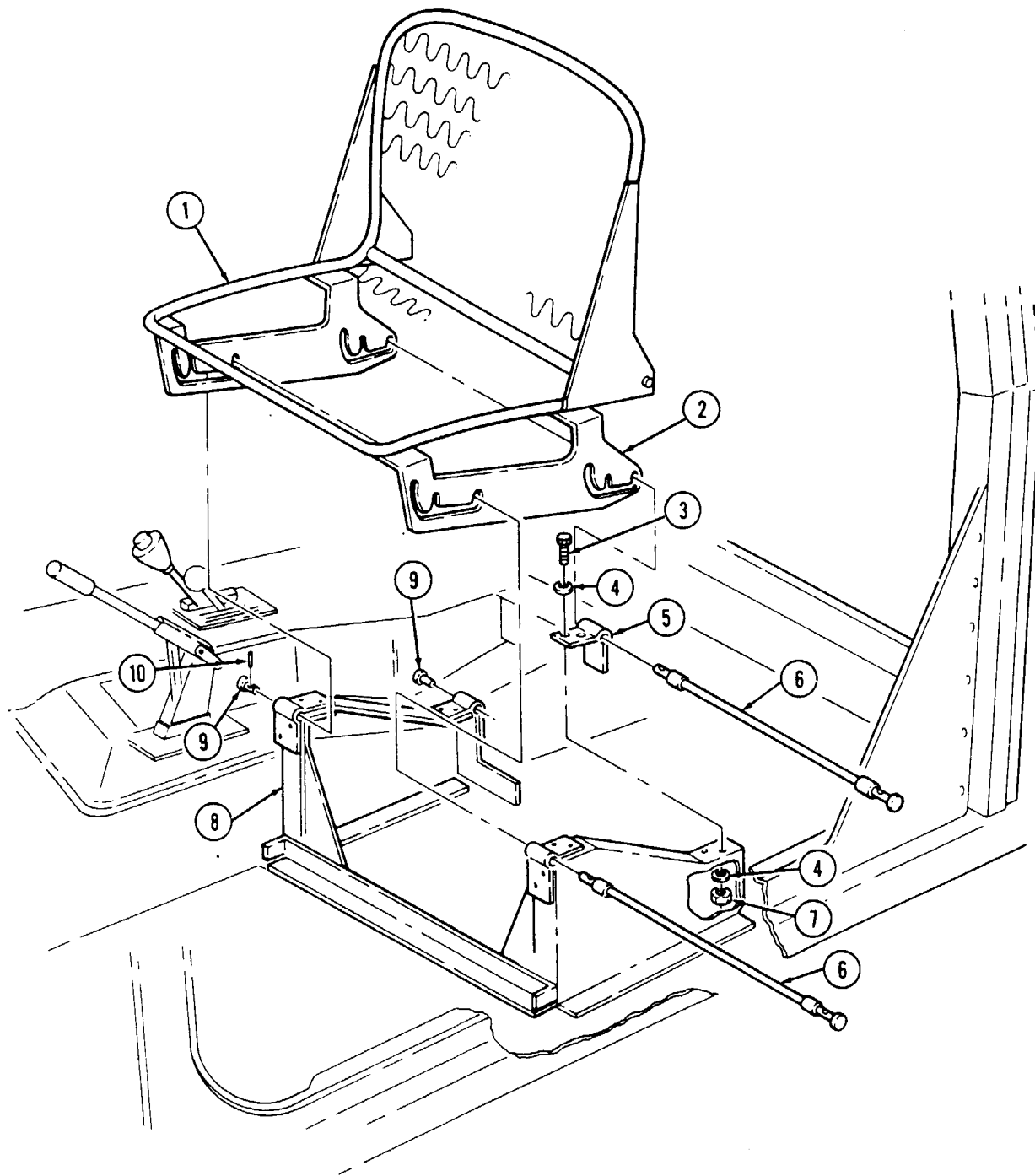
a. Removal

1. Place driver's seat (1) in full forward position.
2. Remove sixteen locknuts (7), washers (4), capscrews (3), washers (4), and four adjuster brackets (5) from driver's seat bracket (8). Discard locknuts (7).
3. Lift up on driver's seat frame (2) and remove from driver's seat bracket (8).
4. Remove two spring pins (10) from inside retainers (9) and two rod and bushing assemblies (6) in seat frame (2) by sliding rod and bushing assemblies out from seat frame (2).

b. Installation

1. Install two rod and bushing assemblies (6) on seat frame (2) with two inside retainers (9) and spring pins (10).
2. Install driver's seat frame (2) on driver's seat bracket (8) with four adjuster brackets (5), sixteen washers (4), capscrews (3), washers (4), and locknuts (7). Tighten locknuts (7) to 21 lb-ft (29 N•m).
3. Adjust driver's seat (1) for desired position.

10-32. DRIVER'S SEAT FRAME REPLACEMENT (Cont'd)



FOLLOW-ON TASK: Install driver's seat and seat back cushions (para. 10-33).

10-33. DRIVER'S SEAT AND SEAT BACK CUSHIONS REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M966, M996, M997, M998, M1025, M1026, M1035, M1036, M1037, M1038, M1042, M1043, M1044, M1045, M1046, M1097

Materials/Parts

Four lock pins (Appendix G, Item 132)

Manual References

TM 9-2320-280-24P

Tools

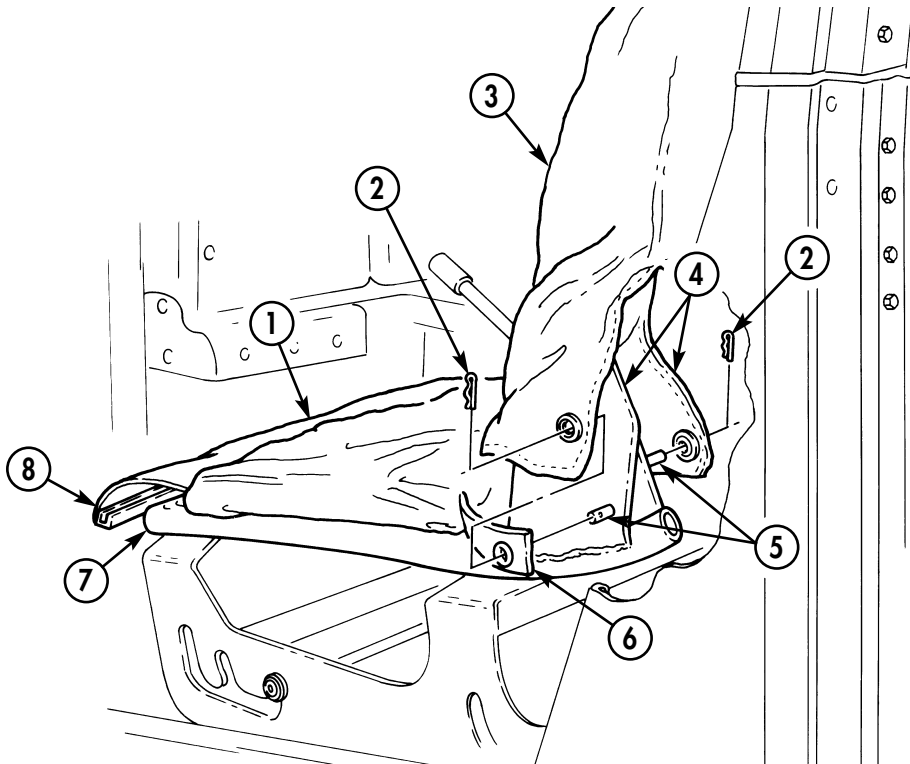
General mechanic's tool kit:
automotive (Appendix B, Item 1)

a. Removal

1. Remove four lock pins (2) from seat holddown pins (5). Discard lock pins (2).
2. Remove four seat back cushion flaps (4) from holddown pins (5) and remove seat back cushion (3) from seat frame (7).
3. Remove two seat cushion straps (6) from holddown pins (5).
4. Remove front retainer strip (8) from seat frame (7) and remove seat cushion (1).

b. Installation

1. Install seat cushion (1) on seat frame (7) and install retainer strip (8) on seat frame (7).
2. Install two seat cushion straps (6) on holddown pins (5).
3. Install seat back cushion (3) on seat frame (7) and four flaps (4) on holddown pins (5).
4. Install four lock pins (2) on holddown pins (5).



10-34. COMPANION SEAT BACK REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M966, M996, M997, M998, M1025, M1026,
M1035, M1036, M1037, M1038, M1042,
M1043, M1044, M1045, M1046, M1097

Equipment Condition

Companion seat and battery box cover removed
(para. 10-35).

Tools

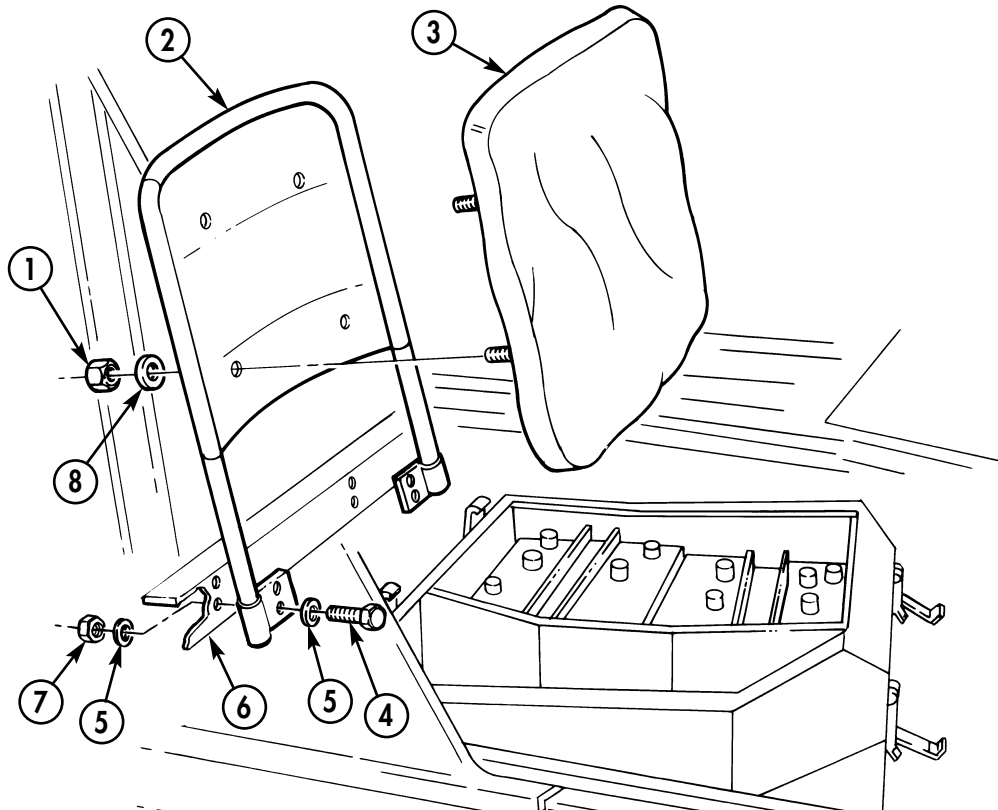
General mechanic's tool kit:
automotive (Appendix B, Item 1)

a. Removal

1. Remove four nuts (7), washers (5), capscrews (4), washers (5), and seat back (2) from body (6).
2. Remove four nuts (1), washers (8), and seat back cushion (3) from seat back (2).

b. Installation

1. Install seat back cushion (3) on seat back (2) with four washers (8) and nuts (1). Tighten nuts (1) to 15 lb-ft (20 N•m).
2. Install seat back (2) on body (6) with four washers (5), capscrews (4), washers (5), and nuts (7). Tighten capscrews (4) to 21 lb-ft (29 N•m).



FOLLOW-ON TASK: Install companion seat and battery box cover (para. 10-35).

10-35. COMPANION SEAT AND BATTERY BOX COVER REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP

Applicable Models

M966, M996, M997, M998, M1025, M1026,
M1035, M1036, M1037, M1038, M1042,
M1043, M1044, M1045, M1046, M1097

Tools

_General mechanic's tools kit:
_automotive (Appendix B, Item 1)

Manual References

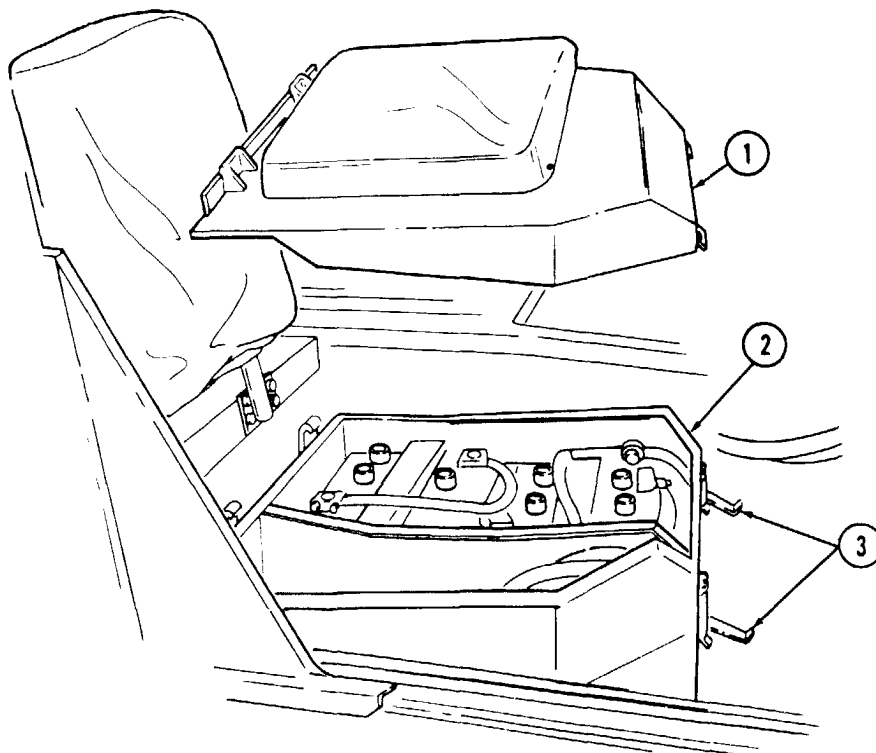
TM 9-2320-280-24P

a. Removal

1. Release two latches (3) from companion seat and battery box cover (1).
2. Lift up and pull forward on companion seat and battery box cover (1) and remove from battery box (2).

b. Installation

Install companion seat and battery box cover (1) on battery box (2) with two latches (3).



10-36. BATTERY BOX COVER LATCH REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M966, M996, M997, M998, M1025, M1026,
M1035, M1036, M1037, M1038, M1042,
M1043, M1044, M1045, M1046, M1097

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Two rivets (Appendix G, Item 240)
Two rivets (Appendix G, Item 241)

Manual References

TM 9-2320-280-24P

Equipment Condition

Batteries removed (para. 4-79).

NOTE

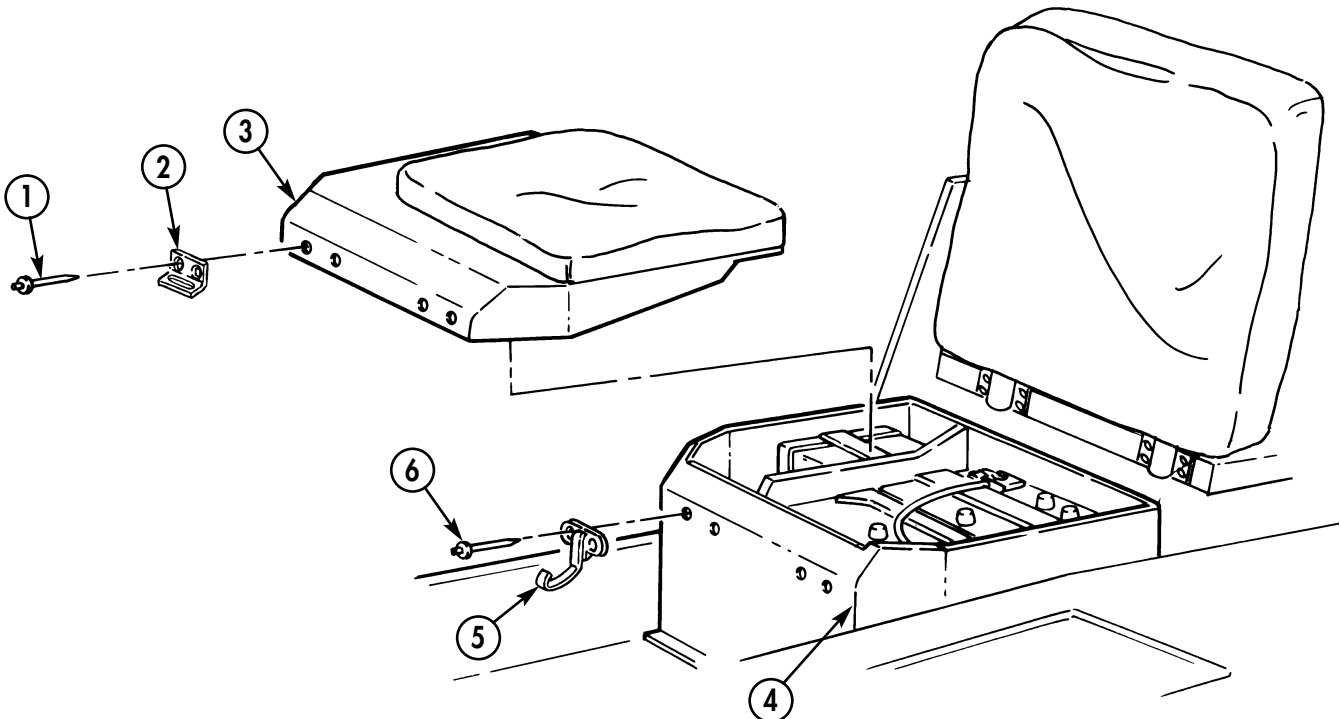
For instruction on replacement of rivets, refer to para. 10-66.

a. Removal

1. Remove two rivets (1) and striker latch (2) from battery box cover (3).
2. Remove two rivets (6) and tension latch (5) from battery box (4).

b. Installation

1. Install tension latch (5) on battery box (4) with two rivets (6).
2. Install striker latch (2) on battery box cover (3) with two rivets (1).



FOLLOW-ON TASK: Install batteries (para. 4-79).

10-37. COMPANION SEAT AND SEAT BACK CUSHIONS REPLACEMENT

This task covers:

a Removal

b. Installation

INITIAL SETUP

Applicable Models

M966, M996, M997, M998, M1025, M1026, M1035, M1036, M1037, M1038, M1042, M1043, M1044, M1045, M1046, M1097

Tools

General mechanic's tool kit
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-24P

Equipment Condition

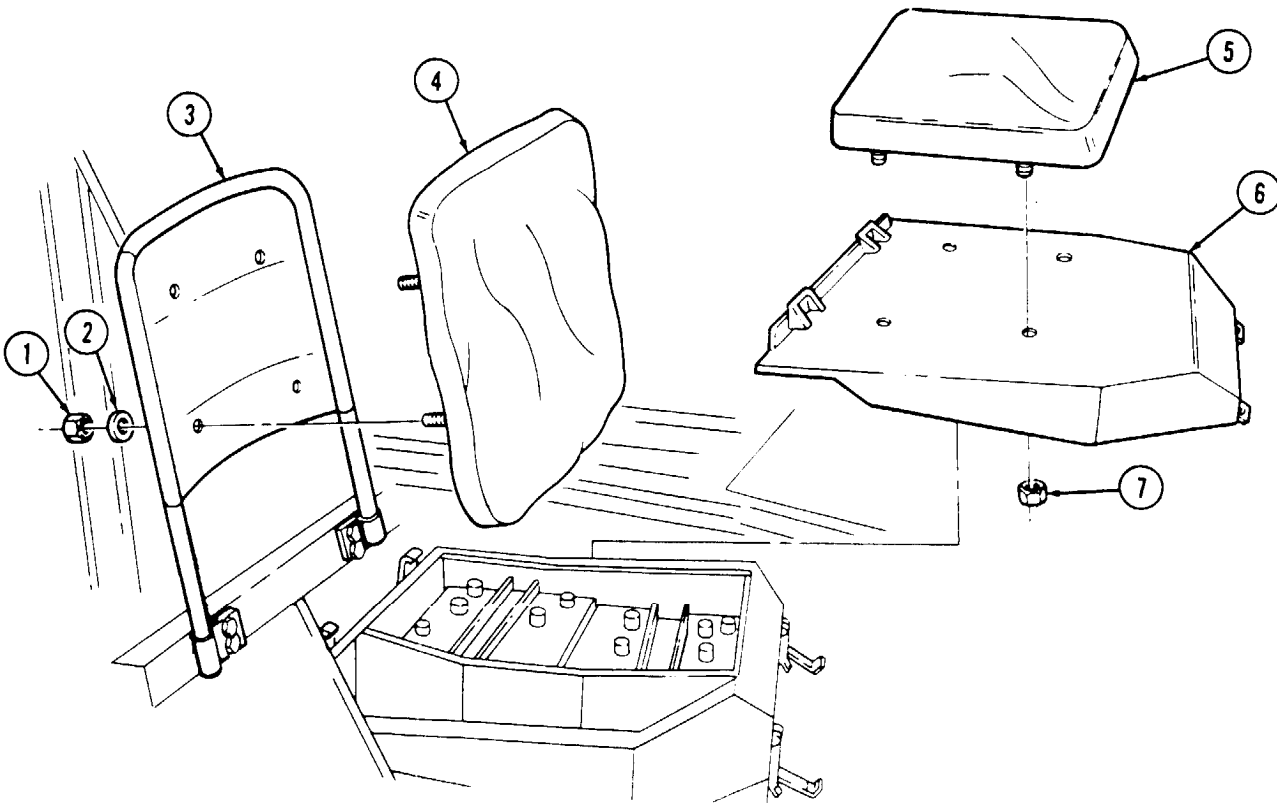
Companion seat and battery box cover removed
(para. 10-35).

a. Removal

1. Remove four nuts (7) and cushion (5) from battery box cover (6).
2. Remove four nuts (1), washers (2), and cushion (4) from seat back (3).

b. Installation

1. Install cushion (4) on seat back (3) with four washers (2) and nuts (1). Tighten nuts (1) to 15 lb-ft (20 N•m).
2. Install cushion (5) on battery box cover (6) with four nuts (7). Tighten nuts (7) to 15 lb-ft (20 N•m).



FOLLOW-ON TASK: Install companion seat and battery box cover (para. 10-35).

10-38. DRIVER'S SEAT ASSEMBLY REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M966A1, M996A1, M997A1, M997A2,
M998A1, M1025A1, M1025A2, M1026A1,
M1035A1, M1035A2, M1038A1, M1043A1,
M1043A2, M1044A1, M1045A1, M1045A2,
M1046A1, M1097A1, M1097A2

Materials/Parts

Four lockwashers (Appendix G, Item 134)

Manual References

TM 9-2320-280-24P

Tools

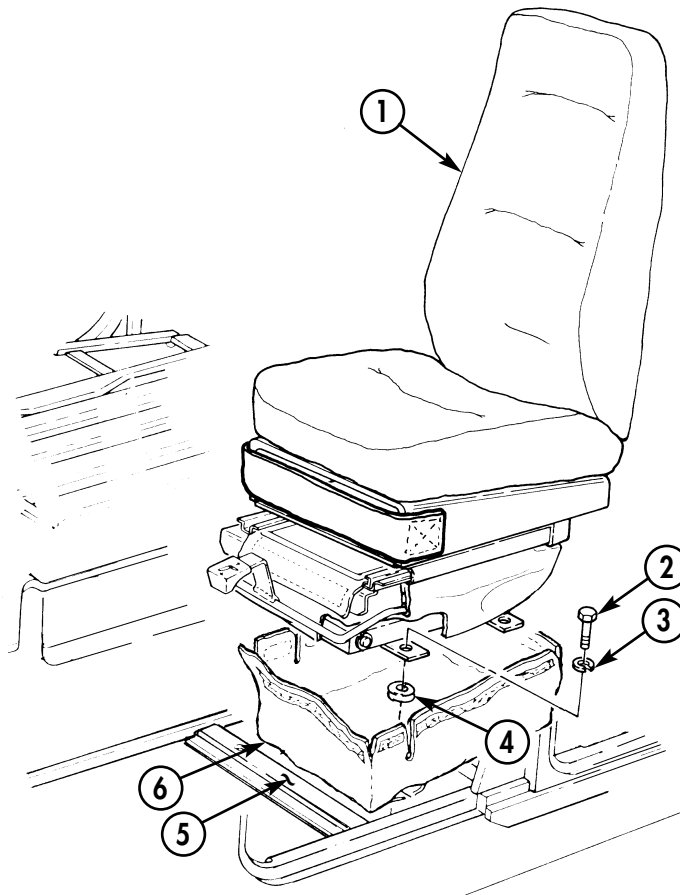
General mechanic's tool kit:
automotive (Appendix B, Item 1)

a. Removal

1. Spread cover (6) to allow access to capscrews (2).
2. Remove four capscrews (2), lockwashers (3), spacers (4), cover (6), and seat assembly (1) from floor (5).

b. Installation

Install cover (6) and seat assembly (1) on floor (5) with four spacers (4), lockwashers (3), and capscrews (2).



10-39. DRIVER'S SEAT ASSEMBLY MAINTENANCE

This task covers:

a. Disassembly

b. Assembly

INITIAL SETUP:

Applicable Models

M966A1, M996A1, M997A1, M997A2,
M998A1, M1025A1, M1025A2, M1026A1,
M1035A1, M1035A2, M1038A1, M1043A1
M1043A2, M1044A1, M1045A1, M1045A2,
M1046A1, M1097A1, M1097A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Eight lockwashers (Appendix G, Item 149)
Four lockwashers (Appendix G, Item 134)

Manual References

TM 9-2320-280-24P

Equipment Condition

Driver's seat assembly removed (para. 10-38).

NOTE

Slide seat back and forth to gain access to slide set hardware.

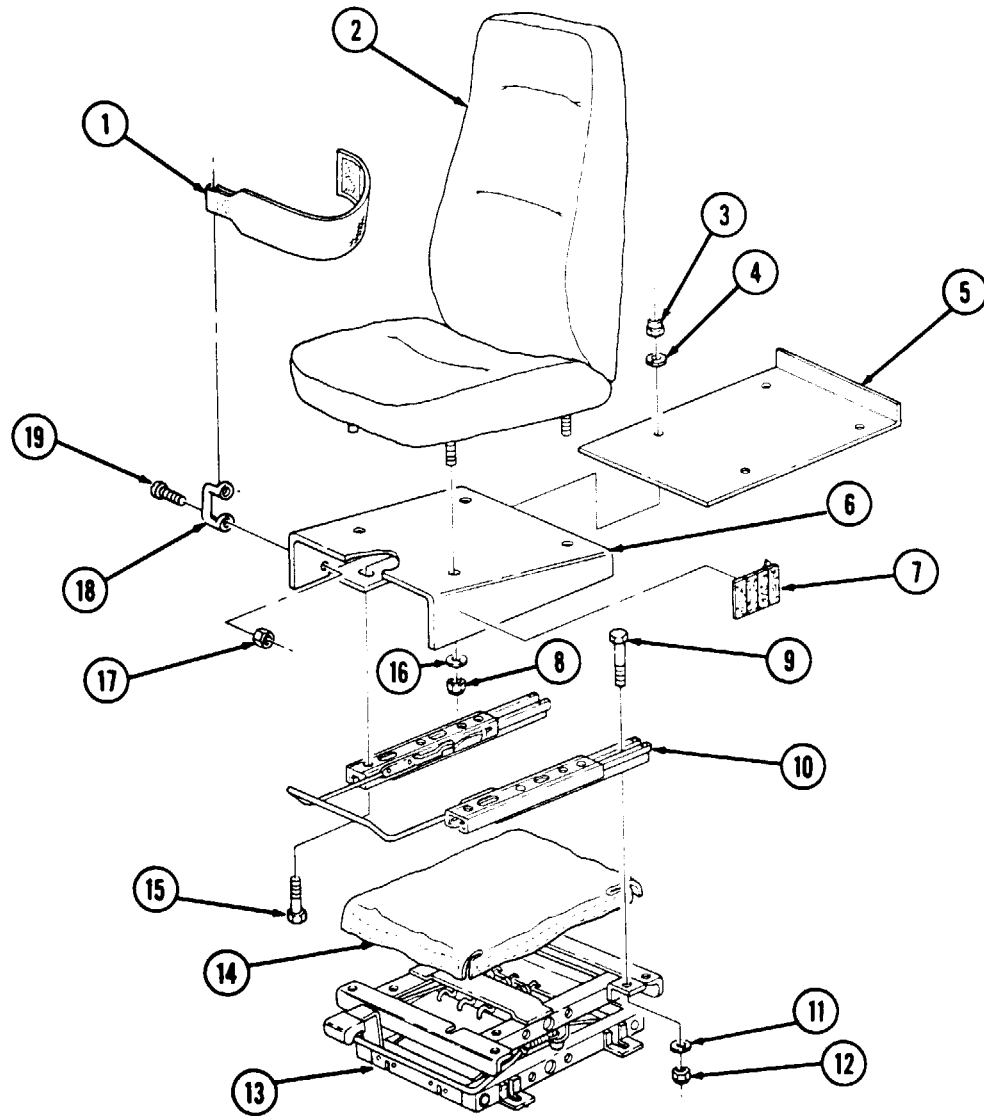
a. Disassembly

1. Remove four nuts (12), lockwashers (11), capscrews (9), height adjuster (13), and cover (14) from slide set (10). Discard lockwashers (11).
2. Remove four nuts (8), lockwashers (16), and seat (2) from riser (6). Discard lockwashers (16).
3. Remove four nuts (3), lockwashers (4), capscrews (15), riser (6), and tray (5) from slide set (10). Discard lockwashers (4).
4. Remove two nuts (17), capscrews (19), loop (18), and strap (1) from riser (6).
5. Inspect velcro strip (7) on riser (6) for damage and replace if damaged.

b. Assembly

1. Install strap (1) and loop (18) on riser (6) with two capscrews (19) and nuts (17).
2. Install tray (5) and riser (6) on slide set (10) with four capscrews (15), lockwashers (4), and nuts (3).
3. Install seat (2) on riser (6) with four lockwashers (16) and nuts (8).
4. Install height adjuster (13) and cover (14) on slide set (10) with four capscrews (9), lockwashers (11), and nuts (12).

10-39. DRIVER'S SEAT ASSEMBLY MAINTENANCE (Cont'd)



FOLLOW-ON TASK: Install driver's seat assembly (para. 10-38).

10-40. BATTERY BOX COVER CATCH REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M966A1, M996A1, M997A1, M997A2,
M998A1, M1025A1, M1025A2, M1026A1,
M1035A1, M1035A2, M1038A1, M1043A1,
M1043A2, M1044A1, M1045A1, M1045A2,
M1046A1, M1097A1, M1097A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Two rivets (Appendix G, Item 240)
Two rivets (Appendix G, Item 241)

Manual References

TM 9-2320-280-24P

Equipment Condition

Batteries removed (para. 4-79).

NOTE

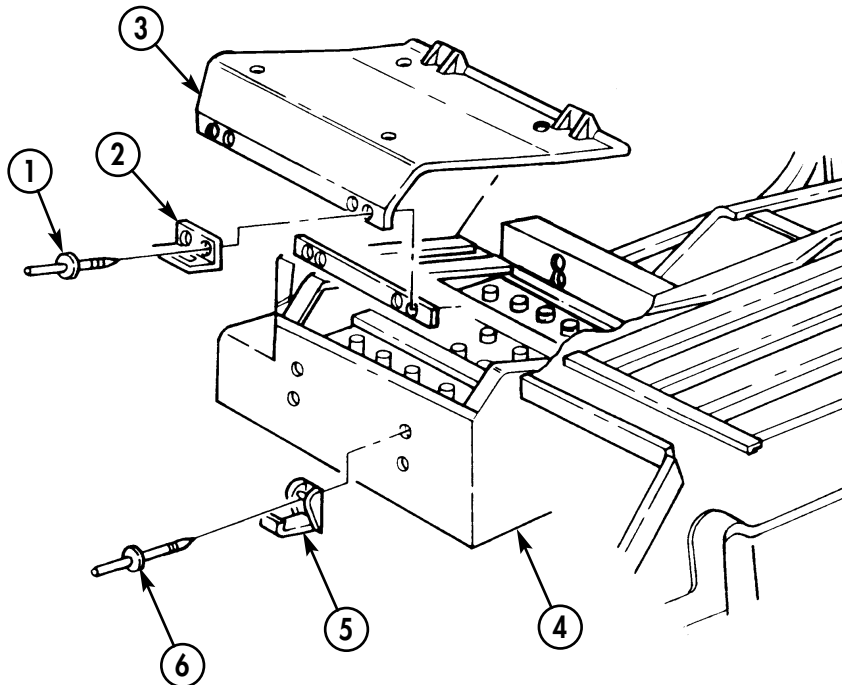
For instruction on replacement of rivets, refer to para. 10-66.

a. Removal

1. Remove two rivets (1) and striker catch (2) from battery box cover (3) and bracket (7).
2. Remove two rivets (6) and clamping catch (5) from battery box (4).

b. Installation

1. Install clamping catch (5) on battery box (4) with two rivets (6).
2. Install striker catch (2) on battery box cover (3) and bracket (7) with two rivets (1).



FOLLOW-ON TASK: Install batteries (para. 4-79).

10-41. COMPANION SEAT ASSEMBLY AND BATTERY BOX COVER REPLACEMENT

This task covers:

a Removal

b. Installation

INITIAL SETUP:

Applicable Models

M966A1, M996A1, M997A1, M997A2,
M998A1, M1025A1, M1025A2, M1026A1,
M1035A1, M1035A2, M1038A1, M1043A1,
M1043A2, M1044A1, M1045A1, M1045A2,
M1046A1, M1097A1, M1097A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

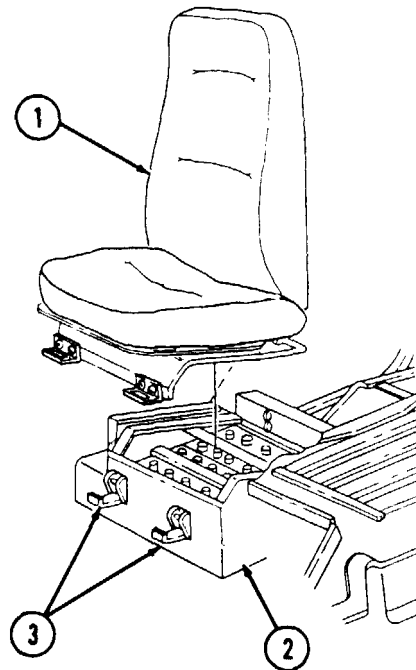
TM 9-2320-280-24P

a. Removal

1. Release two latches (3) from companion seat and battery box cover (1).
2. Lift up and pull forward on companion seat and battery box cover (1) and remove from battery box (2).

b. Installation

Install companion seat and battery box cover (1) on battery box (2) with two latches (3)



10-42. COMPANION SEAT ASSEMBLY MAINTENANCE

This task covers:

a. Disassembly

b. Assembly

INITIAL SETUP:

Applicable Models

M966A1, M996A1, M997A1, M997A2,
M998A1, M1025A1, M1025A2, M1026A1,
M1035A1, M1035A2, M1038A1, M1043A1,
M1043A2, M1044A1, M1045A1, M1045A2,
M1046A1, M1097A1, M1097A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Four lockwashers (Appendix G, Item 134)

Manual References

TM 9-2320-280-24P

Equipment Condition

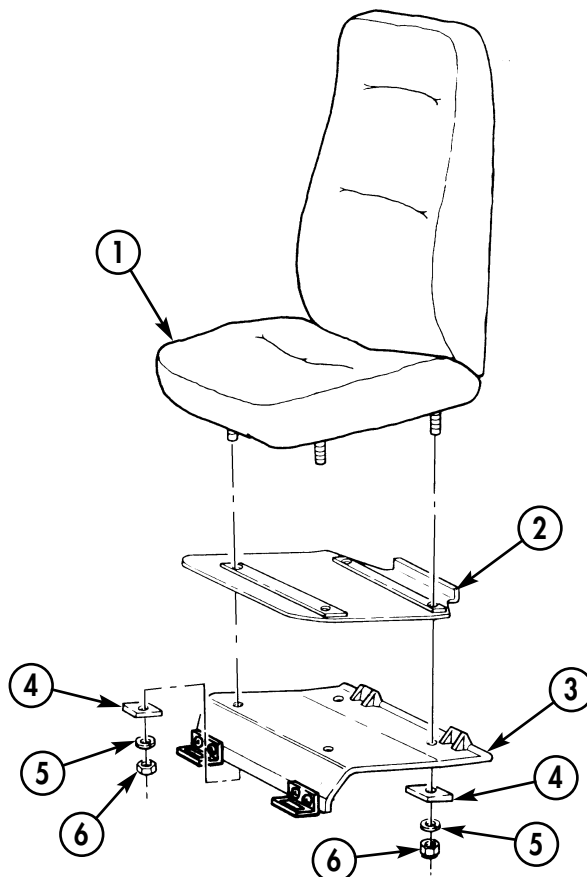
Companion seat assembly and battery box cover removed (para. 10-41).

a. Disassembly

Remove four nuts (6), lockwashers (5), spacers (4), seat (1), and plate (2) from battery box cover (3).

b. Assembly

Install plate (2) and seat (1) on battery box cover (3) with four spacers (4), lockwashers (5), and nuts (6). Tighten nuts (6) to 15 lb-ft (20 N·m).



FOLLOW-ON TASK: Install companion seat assembly and battery box cover (para. 10-41).

10-43. PASSENGER SEAT AND STORAGE COMPARTMENT COVER REPLACEMENT

This task covers:

a Removal

b. Installation

INITIAL SETUP:**Applicable Models**

All except M996, M996A1, M997, M997A1,
M997A2, M1037, M1042

Manual References

TM 9-2320-280-24P

Tools

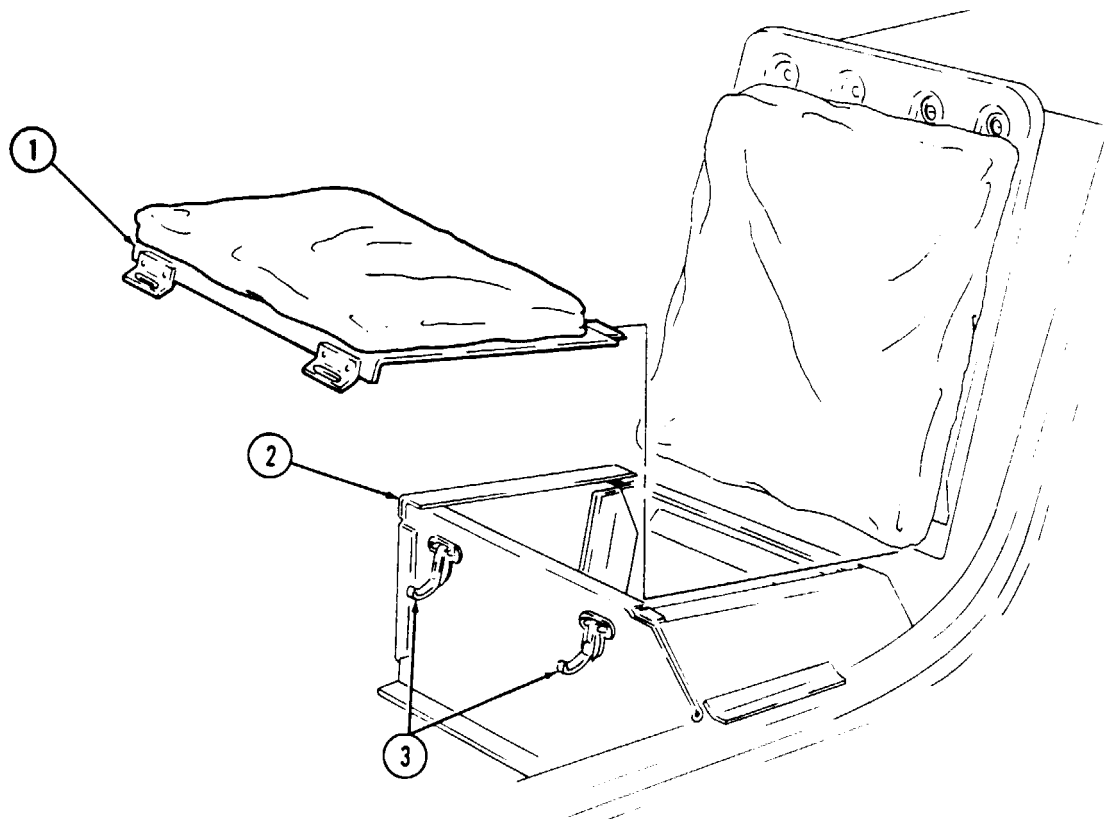
General mechanic's tool kit
automotive (Appendix B, Item 1)

a. Removal

Release two latches (3) and remove passenger seat and storage compartment cover (1) from storage compartment box (2).

b. Installation

Install passenger seat and storage compartment cover (1) on storage compartment box (2) with two latches (3).



10-44. PASSENGER SEAT AND STORAGE COMPARTMENT LATCH REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

All except M996, M996A1, M997, M997A1, M997A2, M1037, M1042

Manual References

TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

Passenger seat and storage compartment cover removed (para. 10-43).

Materials/Parts

Two rivets (Appendix G, Item 240)
Two rivets (Appendix G, Item 241)

NOTE

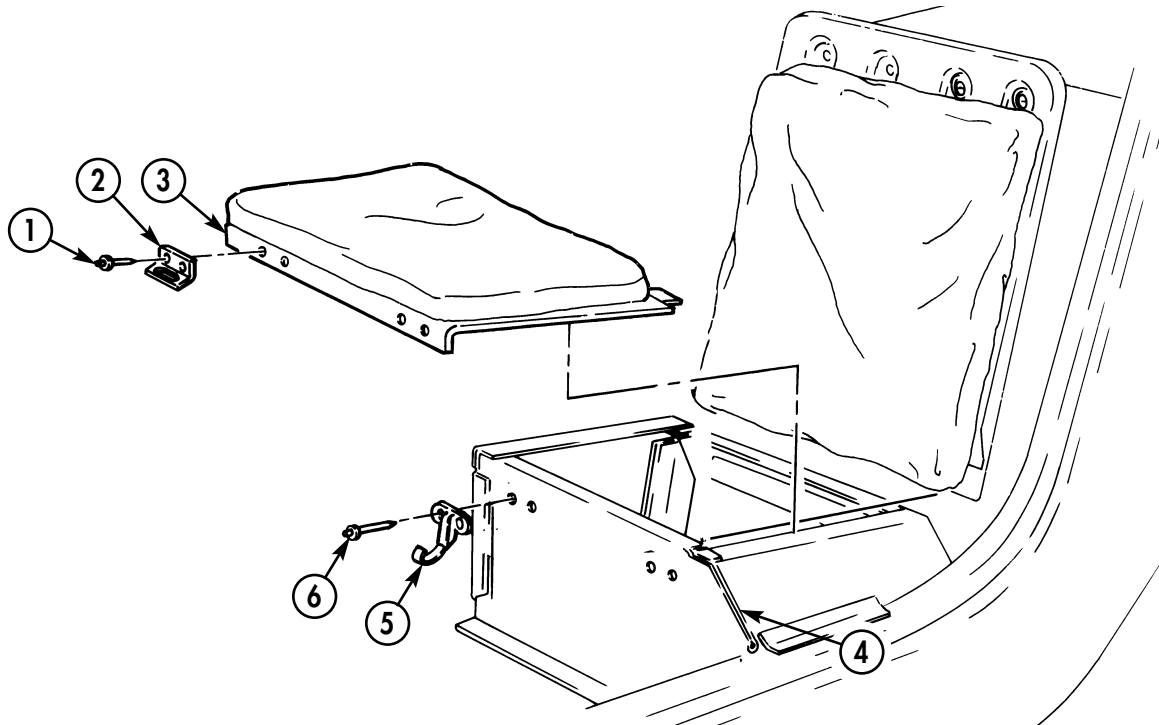
For instructions on replacement of rivets, refer to para. 10-66.

a. Removal

1. Remove two rivets (1) and striker latch (2) from passenger seat and storage compartment cover (3).
2. Remove two rivets (6) and tension latch (5) from storage compartment box (4).

b. Installation

1. Install tension latch (5) on storage compartment box (4) with two rivets (6).
2. Install striker latch (2) on passenger seat and storage compartment cover (3) with two rivets (1).



FOLLOW-ON TASK: Install passenger seat and storage compartment cover (para. 10-43).

10-45. PASSENGER SEAT BACK REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP

Applicable Models

All except M996, M996A1, M997, M997A1,
M997A2, M1037, M1042

Manual References

TM 9-2320-280-24P

Tools

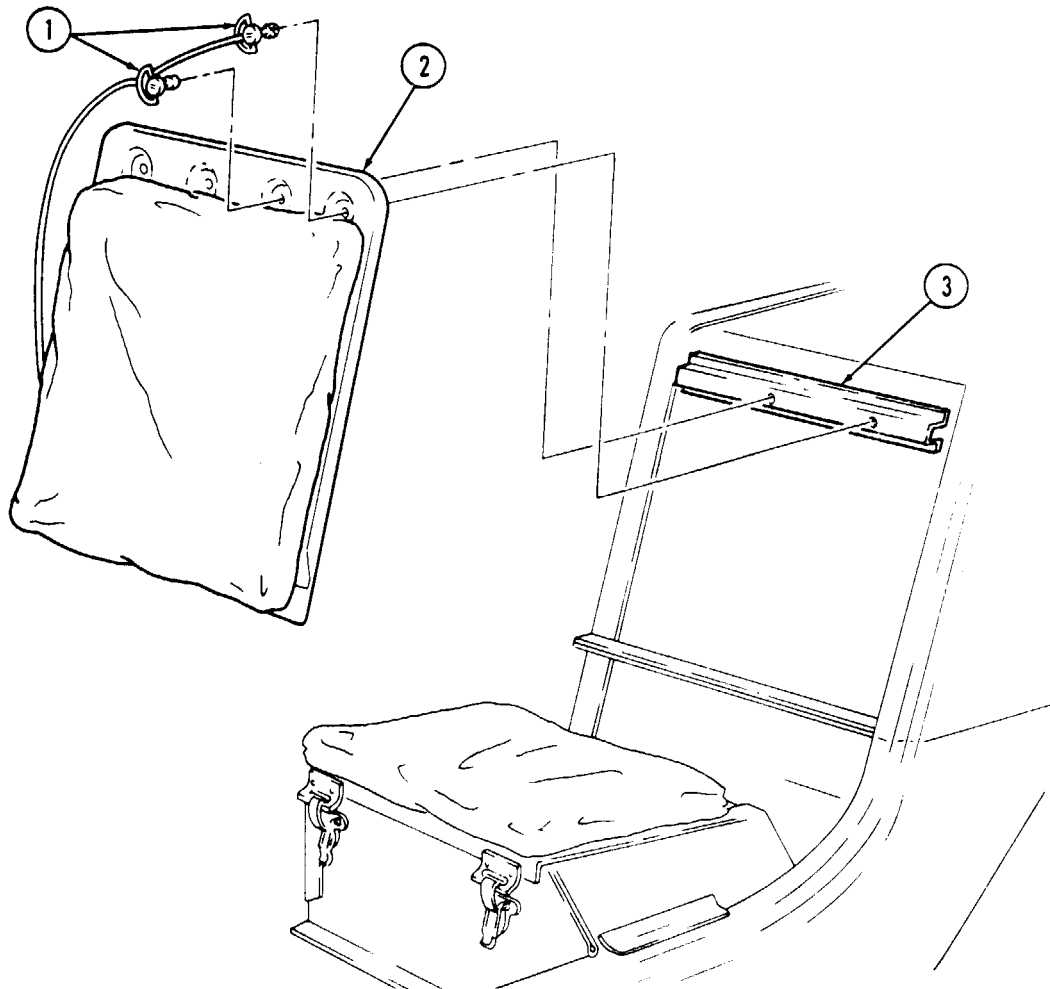
General mechanic's tool kit:
automotive (Appendix B, Item 1)

a. Removal

Remove two locking pins (1) and passenger seat back (2) from body (3).

b. Installation

Install passenger seat back (2) on body (3) with two locking pins (1).



10-46. PASSENGER SEAT AND SEAT BACK CUSHIONS REPLACEMENT

This task covers:

- a. Removal b. Installation

INITIAL SETUP:

Applicable Models

All except M996, M996A1, M997, M997A1, M997A2, M1037, M1042

Tools

General mechanic's tool kit
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-24P

Equipment Condition

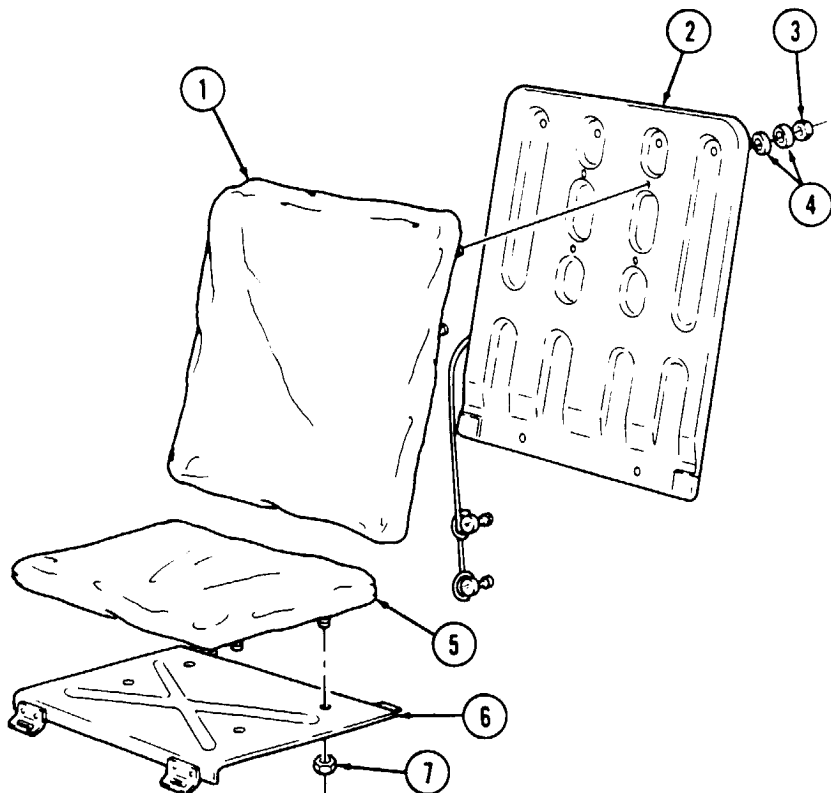
- Passenger seat and storage compartment cover removed (para. 10-43).
- Passenger seat back removed (para. 10-45).

a. Removal

1. Remove four nuts (7) and seat cushion (5) from storage compartment cover (6).
2. Remove four nuts (3), eight spacers (4), and seat back cushion (1) from seat back (2).

b. Installation

1. Install seat back cushion (1) on seat back (2) with eight spacers (4) and four nuts (3). Tighten nuts (3) to 15 lb-ft (20 N•m).
2. Install seat cushion (5) on storage compartment cover (6) with four nuts (7). Tighten nuts (7) to 15 lb-ft (20 N•m).



- FOLLOW-ON TASKS:**
- Install passenger seat and storage compartment cover (para. 10-43).
 - Install passenger seat back (para. 10-45).

10-47. SEATBELT ASSEMBLY REPLACEMENT

This task covers:

a Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-24P

Equipment Condition

- Passenger seat back removed, rear seatbelt only (para. 10-45).
- Companion seat and battery box cover removed, companion seatbelt only (para- 10-35).

General Safety Instructions

Seatbelts are to be replaced as a set.

WARNING

Seatbelts are to be replaced as a set. Failure to do this may cause injury to personnel or damage to equipment.

NOTE

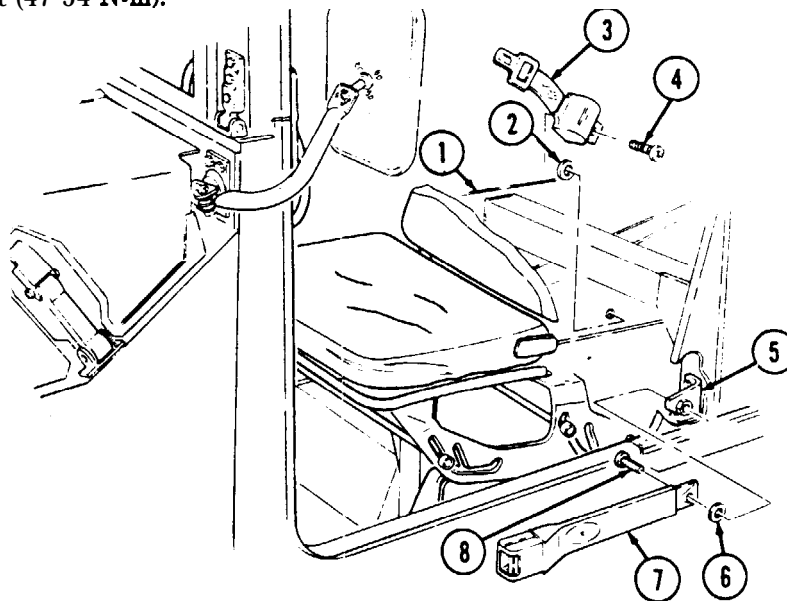
- This procedure applies to all vehicles with serial numbers USBL Eff. 99,999 and below.
- All seatbelt removal and installation procedures are basically the same. This procedure covers the driver's seatbelt.

a. Removal

1. Remove anchor bolt (8), buckle assembly (7), and washer (6) from bracket (5).
2. Remove anchor bolt (4), connector assembly (3), and washer (2) from body (1).

b. Installation

1. Install washer (2) and connector assembly (3) on body (1) with anchor bolt (4). Tighten anchor bolt (4) to 35-40 lb-ft (47-54 **N•m**).
2. Install washer (6) and buckle assembly (7) on bracket (5) with anchor bolt (8). Tighten anchor bolt (8) to 35-40 lb-ft (47-54 **N•m**).



- FOLLOW-ON TASKS:
- Install passenger seat back, rear seatbelt only (Pam. 10-45).
 - Install companion seat battery box cover, companion seatbelt only (para. 10-35).

10-48. THREE POINT SEATBELT MAINTENANCE

This task covers:

- | | |
|--------------------------------------|-------------------------------------|
| a. Front Seatbelt Removal | d. Rear Seatbelt Removal |
| b. Front Seatbelt Bracket Inspection | e. Rear Seatbelt Bracket Inspection |
| c. Front Seatbelt Installation | f. Rear Seatbelt Installation |

INITIAL SETUP:

Applicable Models

All models except M996, M996A1, M997, M997A1, M997A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

- Passenger seat back removed, rear seatbelt only (para. 10-45).
- Companion seat and battery box cover removed, companion seatbelt only (para. 10-35).
- Four-man soft top curtain removed, rear seatbelt only (TM 9-2320-280-10).
- Rear doors removed, armament vehicles only (para. 11-2).

General Safety Instructions

Seatbelts are to be replaced as a set.

WARNING

Seatbelts are to be replaced as a set. Failure to do this may cause injury to personnel or damage to equipment.

NOTE

Left and right seatbelt maintenance procedures are basically the same. This procedure covers the left seatbelt.

a. Front Seatbelt Removal

1. Remove capscrew (26), buckle assembly (25), and washer (24) from body (23).
2. Remove capscrew (22), connector assembly (21), and washer (20) from bracket (19).

NOTE

Steps 3 and 4 apply to all armament vehicles.

3. Remove two screws (7) and washers (8) from "B" pillar cover (12) and roof (6).
4. Remove two screws (14), washers (13), and "B" pillar cover (12) from "B" pillar (11).

NOTE

Step 5 applies to armament vehicles with serial numbers USBL Eff. 100,000 through 134,152 only.

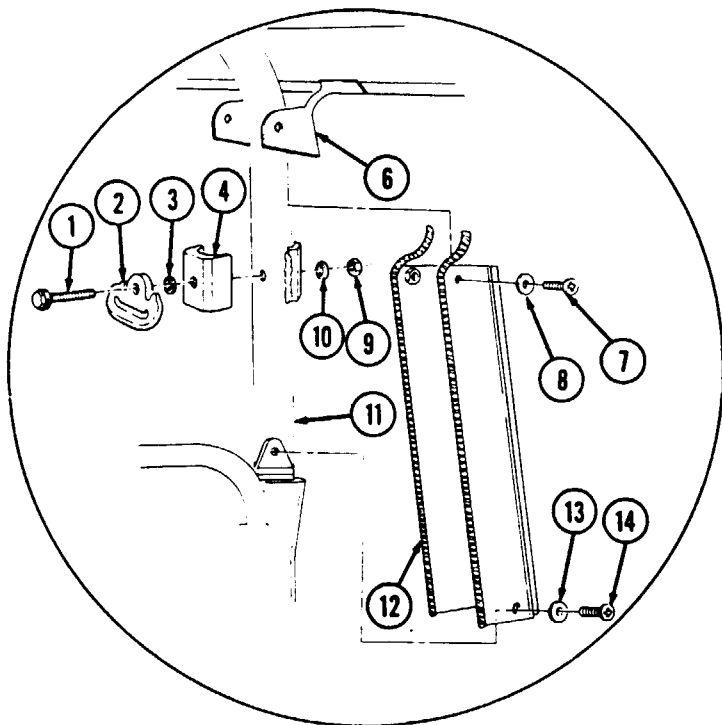
5. Remove nut (9), washer (10), capscrew (1), "D" ring (2), washer (3), and bracket half (4) from "B" pillar (11).

NOTE

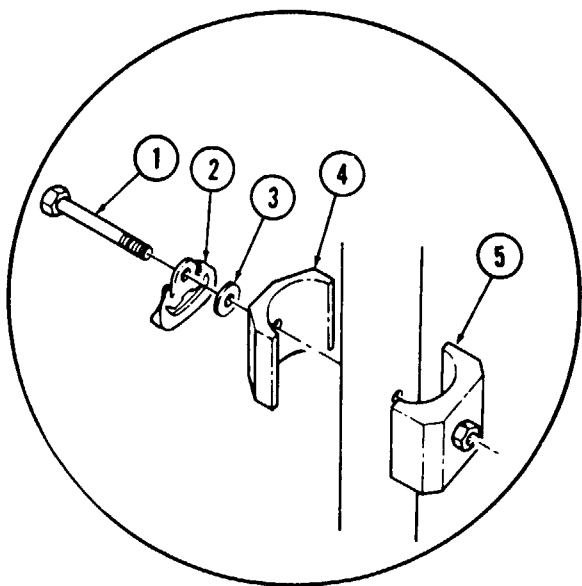
Step 6 applies to armament vehicles with serial numbers USBL Eff. 134,153 and above only. Steps 7 and 8 apply to all other vehicles.

6. Remove capscrew (1), "D" ring (2), washer (3), and bracket halves (4) and (5) from "B" pillar (11).
7. Remove capscrew (15), "D" ring (16), and washer (17) from upper bracket (18).
8. Remove capscrew (27), washer (28), and retractor (29) from lower bracket (30).

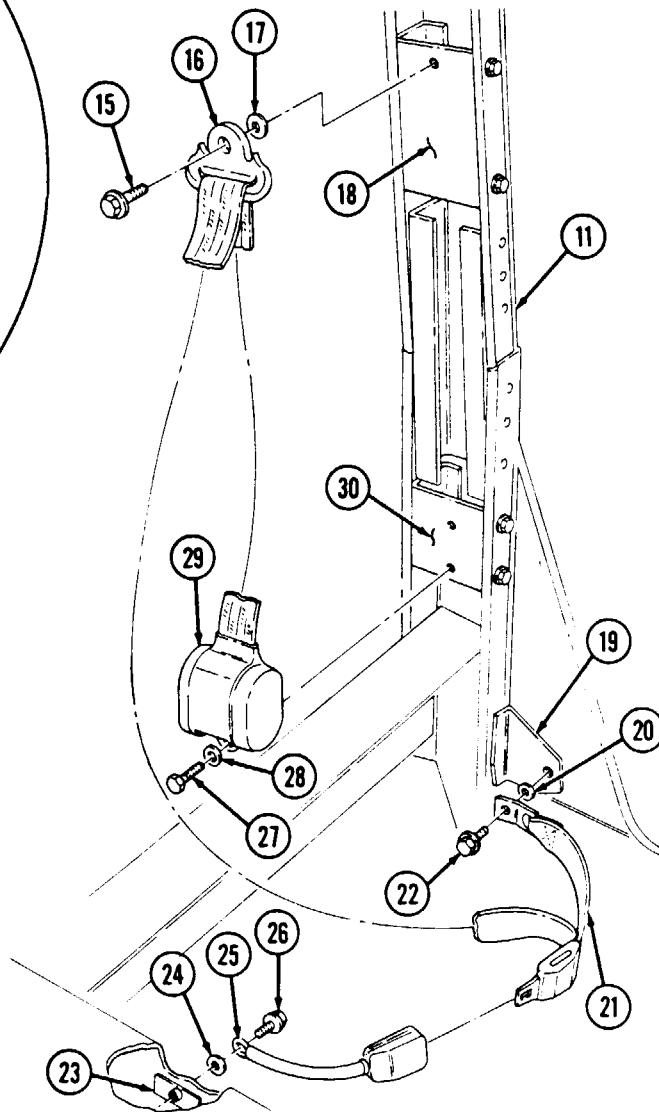
10-48. THREE POINT SEATBELT MAINTENANCE (Cont'd)



ARMAMENT VEHICLES OLD CONFIGURATION



ARMAMENT VEHICLES NEW CONFIGURATION



10-48. THREE POINT SEATBELT MAINTENANCE (Cont'd)

b. Front Seatbelt Bracket Inspection

NOTE

Step 1 applies to armament vehicles only. Step 2 applies to all other vehicles.

1. Inspect bracket halves (4) and (5) for bends, or cracks. Replace if broken, bent or cracked.
2. Inspect upper bracket (18) for breaks, bends, or cracks. Replace if broken, bent, or cracked, refer to **para. 10-49.**
3. Inspect lower bracket (30) for breaks, bends, or cracks. Replace if broken, bent, or cracked, refer to para. 10-49.

c. Front Seatbelt Installation

1. Install retractor (29) on lower bracket (30) with washer (28) and capscrew (27). Tighten capscrew (27) to 43-60 lb-ft (58-81 **N•m**).

NOTE

Step 2 applies to armament vehicles with serial numbers USBL Eff. 134,153 and above only.

2. Install "D" ring (2) and bracket halves (4) and (5) to "B" pillar (11) with washer (3) and capscrew (1).

NOTE

Step 3 applies to armament vehicles with serial numbers USBL Eff. 100,000 through 134,152 only.

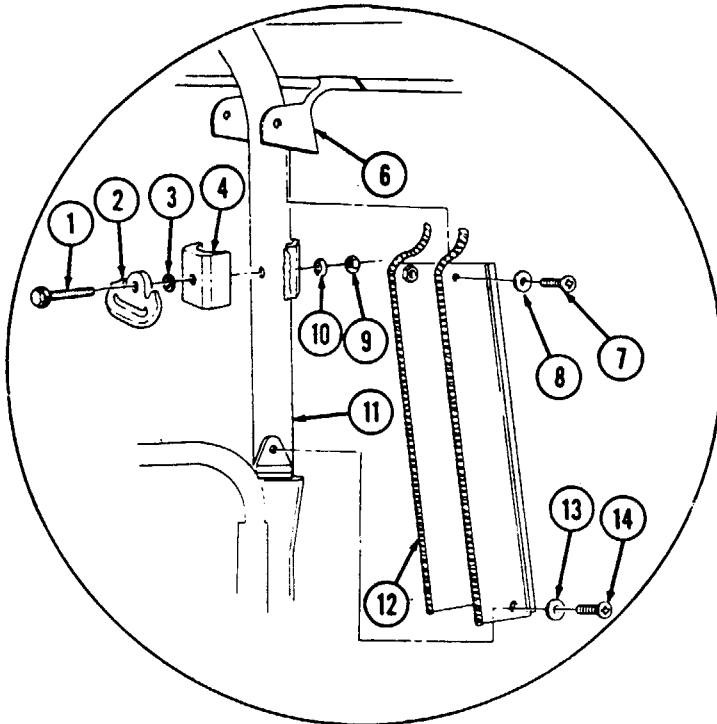
3. Install bracket half (4), washer (3), and "D" ring (2) on "B" pillar (11) with capscrew (1), washer (10), and nut (9). Tighten nut (9) to 35-40 lb-ft (47-54 **N•m**).

NOTE

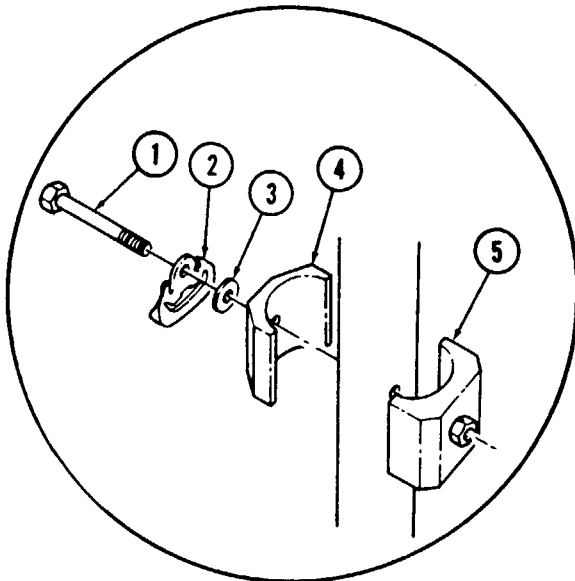
Steps 4 and 5 apply to all armament vehicles.

4. Install "B" pillar cover (12) on roof (6) with two washers (8) and screws (7).
5. Install "B" pillar cover (12) on "B" pillar (11) with two washers (13) and screws (14).
6. Install washer (17) and "D" ring (16) on upper bracket (18) with capscrew (15). Tighten capscrew (15) to 35-40 lb-ft (47-54 **N•m**).
7. Install washer (20) and connector assembly (21) on bracket (19) with capscrew (22). Tighten capscrew (22) to 35-40 lb-ft (47-54 **N•m**).
8. Install washer (24) and buckle assembly (25) on body (23) with capscrew (26). Tighten capscrew (26) to 35-40 lb-ft. (47-54 **N•m**).

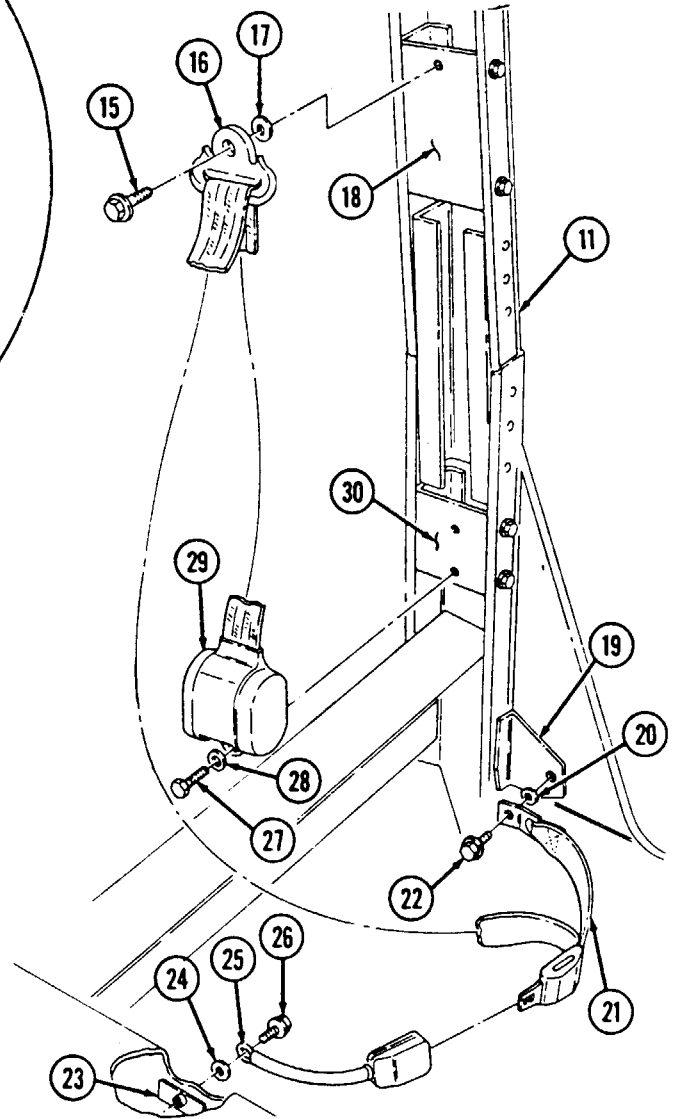
10-48. THREE POINT SEATBELT MAINTENANCE (Cont'd)



ARMAMENT VEHICLES OLD CONFIGURATION



ARMAMENT VEHICLES NEW CONFIGURATION



10-48. THREE POINT SEATBELT MAINTENANCE (Cont'd)

d. Rear Seatbelt Removal

NOTE

Left and right seatbelt maintenance procedures are basically the same. This procedure covers the right seatbelt.

1. Remove capscrew (22), buckle assembly (25), and washer (23) from body (24).
2. Remove capscrew (21), connector assembly (26), and washer (20) from bracket (27).

NOTE

Steps 3 and 4 apply to armament vehicles only. Steps 5 and 6 apply to all other vehicles.

3. Remove capscrew (4), "D" ring (5), and washer (6) from bracket (7).
4. Remove capscrew (1), washer (2), and retractor (3) from bracket (7).
5. Remove nut (17), washer (16), capscrew (12), "D" ring (13), and washer (14) from bracket (11).
6. Remove nut (18), washer (19), capscrew (8), washer (9), and retractor (10) from bracket (11).

e. Rear Seatbelt Bracket Inspection

NOTE

Rear seatbelt bracket inspection applies to all vehicles except armament vehicles.

1. Inspect bracket (11) for breaks, bends, or cracks. Replace if broken, bent, or cracked (refer to para. 10-49).
2. Inspect turnbutton (15) for bends, corrosion, or damage. Replace if bent, corroded, or damaged (refer to para. 10-66 for rivet removal).

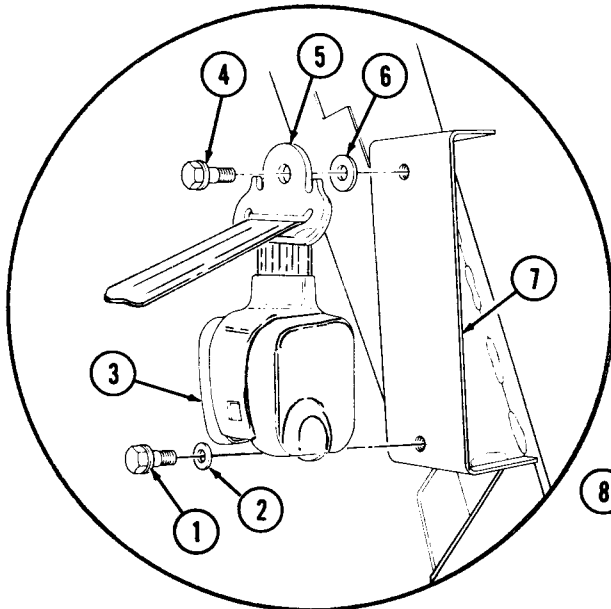
f. Rear Seatbelt Installation

NOTE

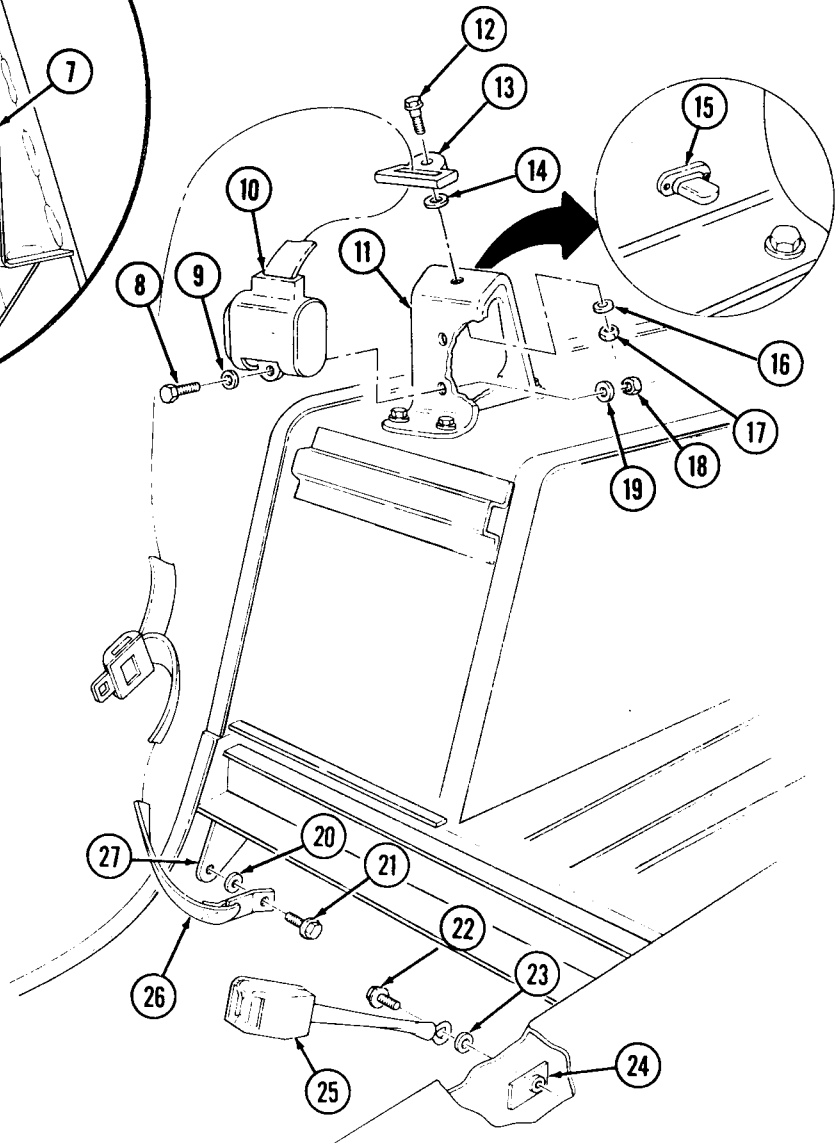
Steps 1 and 2 apply to armament vehicles only. Steps 3 and 4 apply to all other vehicles.

1. Install retractor (3) on bracket (7) with washer (2) and capscrew (1). Tighten capscrew (1) to 35-40 lb-ft (47-54 **N•m**).
2. Install washer (6) and "D" ring (5) on bracket (7) with capscrew (4). Tighten capscrew (4) to 35-40 lb-ft (47-54 **N•m**).
3. Install retractor (10) on bracket (11) with washer (9), capscrew (8), washer (19), and nut (18). Tighten capscrew (8) to 43-60 lb-ft (58-81 **N•m**).
4. Install washer (14) and "n" ring (13) on bracket (11) with capscrew (12), washer (16), and nut (17). Tighten nut (17) to 35-40 lb-ft (47-54 **N•m**).
5. Install washer (20) and connector assembly (26) on bracket (27) with capscrew (21). Tighten capscrew (21) to 35-40 lb-ft (47-54 **N•m**).
6. Install washer (23) and buckle assembly (25) on body (24) with capscrew (22). Tighten capscrew (22) to 35-40 lb-ft (47-54 **N•m**).

10-48. THREE POINT SEATBELT MAINTENANCE (Cont'd)



ARMAMENT VEHICLE



- FOLLOW-ON TASKS:**
- Install passenger seat back, rear seatbelt only (para. 10-45).
 - Install companion seat and battery box cover, companion seatbelt only (para. 10-35).
 - Install four-man soft top curtain, rear seatbelt only (TM 9-2320-280-10).
 - Install rear doors, armament vehicles only (para. 11-2).

10-48.1. THREE POINT SEATBELT MAINTENANCE (M996, M996A1, M997, M997A1, AND M997A2)

This task covers:

- a. Seatbelt Removal
- b. Seatbelt Bracket Inspection
- c. Seatbelt Installation

INITIAL SETUP:

Applicable Models

M996, M996A1, M997, M997A1, M997A2

Manual References

TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

Companion seat and battery box cover removed,
(companion seatbelt only) (para. 10-35).

WARNING

Seatbelts are to be replaced as a set. Failure to do this may cause injury to personnel or damage to equipment.

NOTE

Left and right seatbelt maintenance procedures are basically the same. This procedure covers the left seatbelt.

a. Seatbelt Removal

1. Remove capscrew (4), buckle assembly (3), and washer (2) from bracket (1).
2. Remove capscrew (8), connector assembly (5), and washer (7) from body (6).
3. Remove capscrew (9), D-ring (11), and washer (10) from bulkhead (12).
4. Remove capscrew (16), retractor (15), and washer (14) from bracket (13).

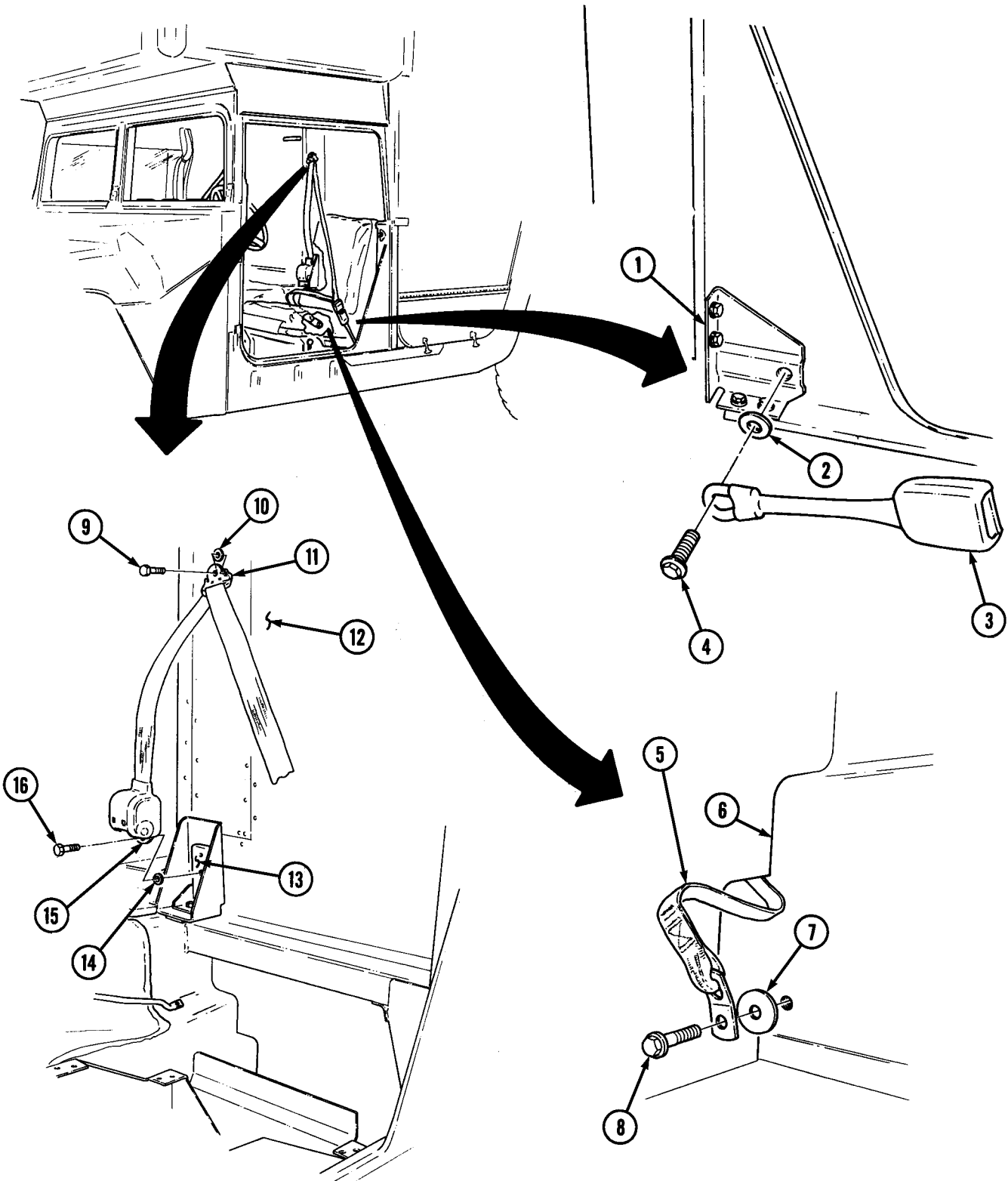
b. Seatbelt Bracket Inspection

Inspect brackets (1) and (13) for breaks, bends, or cracks. Replace if broken, bent, or cracked (para. 10-49.1).

c. Seatbelt Installation

1. Install washer (14) and retractor (15) on bracket (13) with capscrew (16). Tighten capscrew (16) to 35-40 lb-ft (47-54 N•m).
2. Install washer (10) and D-ring (11) on bulkhead (12) with capscrew (9). Tighten capscrew (9) to 35-40 lb-ft (47-54 N•m).
3. Install washer (7) and connector assembly (5) on body (6) with capscrew (8). Tighten capscrew (8) to 35-40 lb-ft (47-54 N•m).
4. Install washer (2) and buckle assembly (3) on bracket (1) with capscrew (4). Tighten capscrew (4) to 35-40 lb-ft (47-54 N•m).

10-48.1. THREE POINT SEATBELT MAINTENANCE (M996, M996A1, M997, M997A1, AND M997A2) (Cont'd)



FOLLOW-ON TASK: Install companion seat and battery box cover (companion seatbelt only) (para. 10-35).

10-49. THREE POINT SEATBELT BRACKETS REPLACEMENT

This task covers:

- | | |
|--|---------------------------------------|
| a. Front Seatbelt Bracket Removal | c. Rear Seatbelt Bracket Removal |
| b. Front Seatbelt Bracket Installation | d. Rear Seatbelt Bracket Installation |
-

INITIAL SETUP:

Applicable Models

All models except M996, M996A1, M997, M997A1, M997A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-24P

Equipment Condition

Three point seatbelt removed (para. 10-48).

NOTE

Left and right seatbelt brackets replacement procedures are basically the same. This procedure covers the left seatbelt bracket.

a. Front Seatbelt Bracket Removal

1. Remove four capscrews (3), washers (2), and upper bracket (1) from "B" pillar (4).
2. Remove four capscrews (6), washers (5), and lower bracket (7) from "B" pillar (4).

b. Front seatbelt Bracket Installation

1. Install lower bracket (7) on "B" pillar (4) with four washers (5) and capscrews (6). Tighten capscrews (6) to 15-21 lb-n (20-29 N•m).
2. Install upper bracket (1) on "B" pillar (4) with four washers (2) and capscrews (3). Tighten capscrews (3) to 15-21 lb-ft (20-29 N•m).

c. Rear Seatbelt Bracket Removal

NOTE

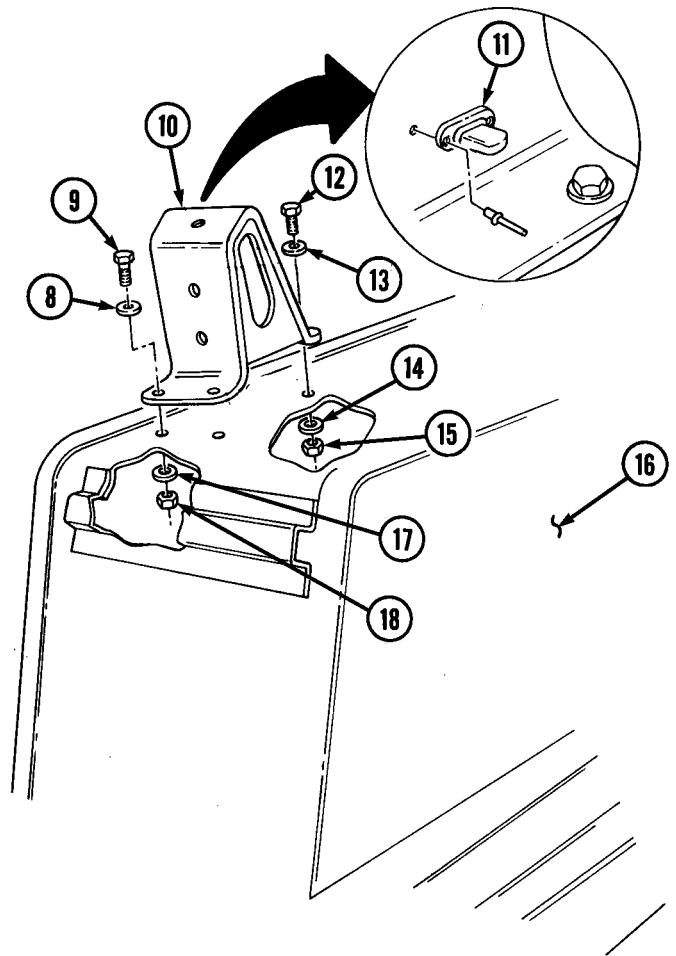
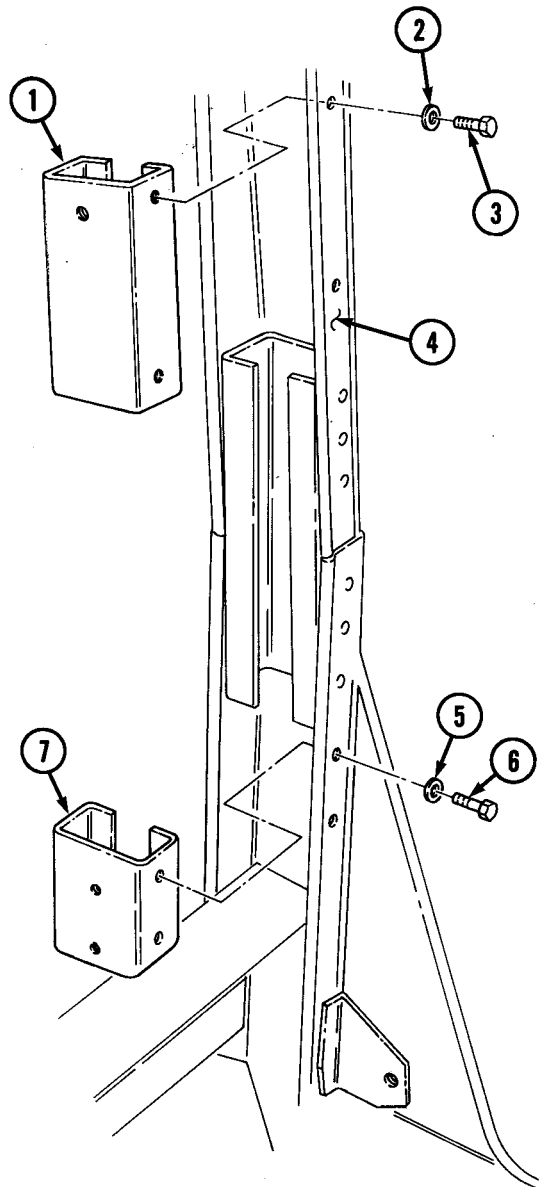
Left and right seatbelt brackets replacement procedures are basically the same. This procedure covers the right seatbelt bracket.

1. Remove two nuts (15), washers (14), capscrews (12), and washers (13) from bracket (10) and wheelhouse (16).
2. Remove two nuts (18), washers (17), capscrews (9), washers (8), and bracket (10) from wheelhouse (16).
3. Inspect turnbutton (11) for bends, corrosion, or damage. Replace if damaged, refer to para. 10-66 for rivet removal.

d. Rear seatbelt Bracket installation

1. Install bracket (10) on wheelhouse (16) with two washers (8), capscrews (9), washers (17), and nuts (18). Tighten capscrews (9) to 43-60 lb-ft (58-81 N•m).
2. Secure bracket (10) to wheelhouse (16) with two washers (13), capscrews (12), washers (14), and nuts (15). Tighten capscrews (12) to 43-60 lb-ft (58-81 N•m).

10-49. THREE POINT SEATBELT BRACKETS REPLACEMENT (Cont'd)



FOLLOW-ON TASK: Install three point seatbelt (para. 10-48).

10-49.1. THREE POINT SEATBELT BRACKETS REPLACEMENT (M996, M996A1, M997, M997A1, AND M997A2)

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M996, M996A1, M997, M997A1, M997A2

Manual References

TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

Three point seatbelt removed (para. 10-48.1).

NOTE

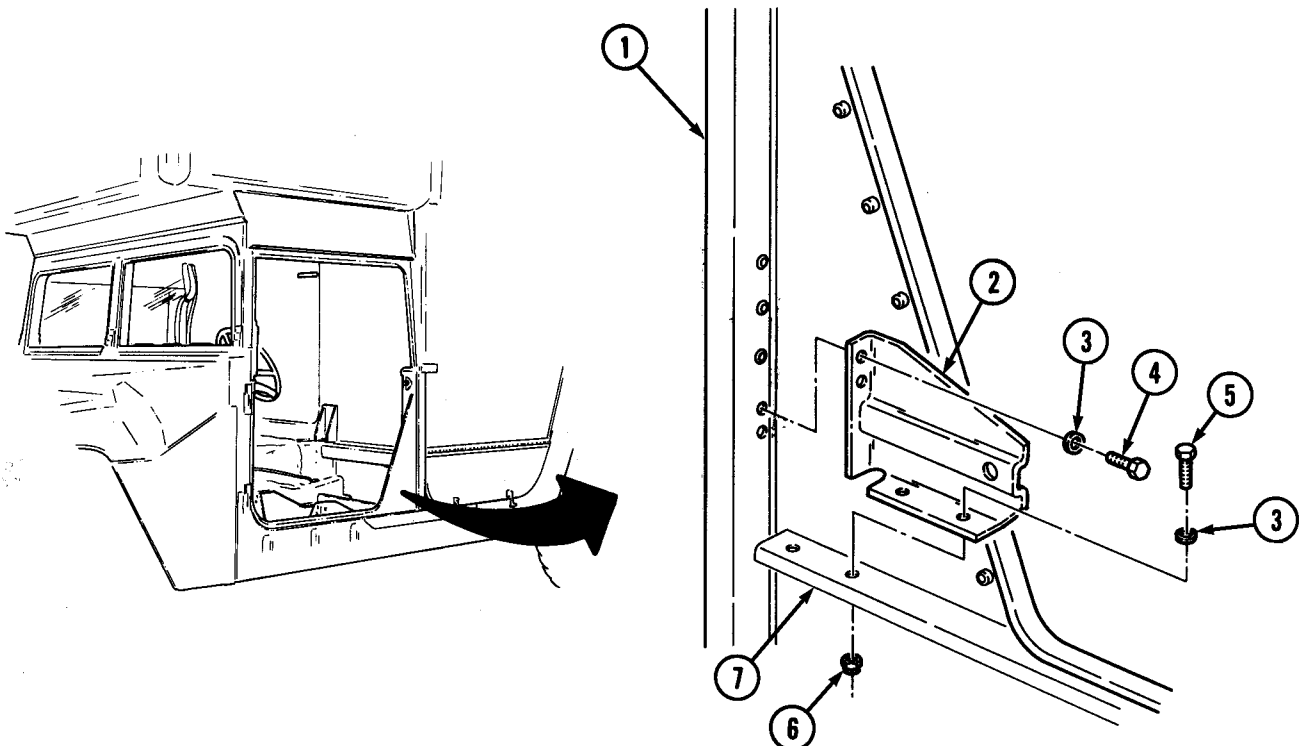
Left and right seatbelt bracket replacement procedures are basically the same. This procedure covers the left seatbelt bracket.

a. Removal

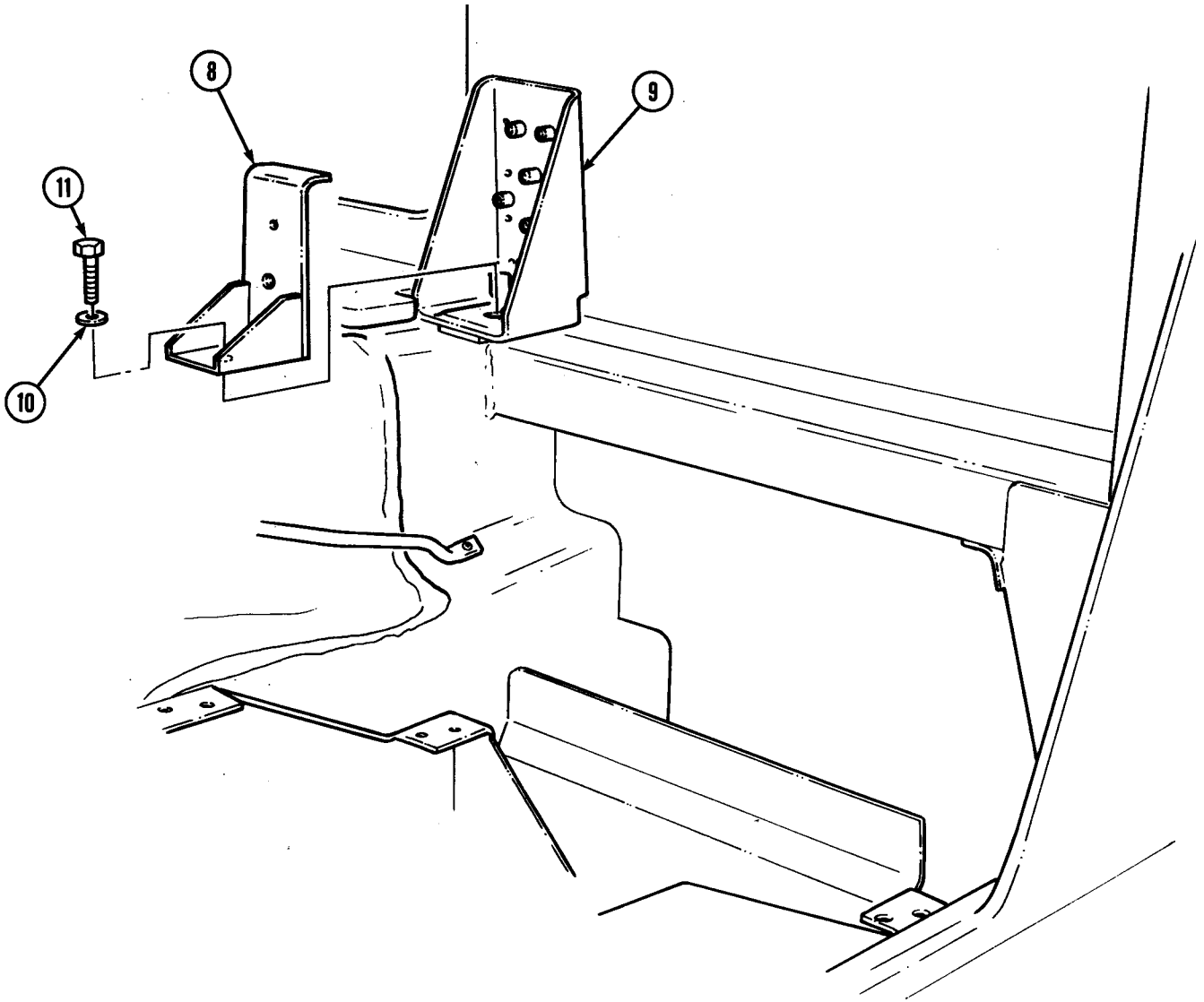
1. Remove two nuts (6), capscrews (4) and (5), four washers (3), and bracket (2) from body (7) and "B" pillar (1).
2. Remove capscrew (11), washer (10), and bracket (8) from mount (9).

b. Installation

1. Install bracket (8) on mount (9) with washer (10) and capscrew (11). Tighten capscrew (11) to 90-95 lb-ft (122-129 N•m).
2. Install bracket (2) on body (7) and "B" pillar (1) with four washers (3), two capscrews (4) and (5), and nuts (6). Tighten capscrews (4) to 9-11 lb-ft (12-15 N•m) and capscrews (5) to 20-22 lb-ft (27-30 N•m).



10-49.1. THREE POINT SEATBELT BRACKETS REPLACEMENT (M996, M996A1, M997, M997A1, AND M997A2) (Cont'd)



FOLLOW-ON TASK: Install three point seatbelt (para. 10-48.1).

10-50. PIONEER TOOL STOWAGE TRAY MAINTENANCE

This task covers:

a. Disassembly

b. Assembly

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Materials/Parts

Two lockwashers (Appendix G, Item 135)
Twelve lockwashers (Appendix G, Item 178)

Equipment Condition

Pioneer tool stowage tray removed
(TM 9-2320-280-10).

NOTE

- The procedures for disassembly and assembly of pioneer tool stowage trays for all vehicles are basically the same. The tray for M1037 and M1042 has tension latches mounted on angle brackets.
- Note position of straps for assembly.

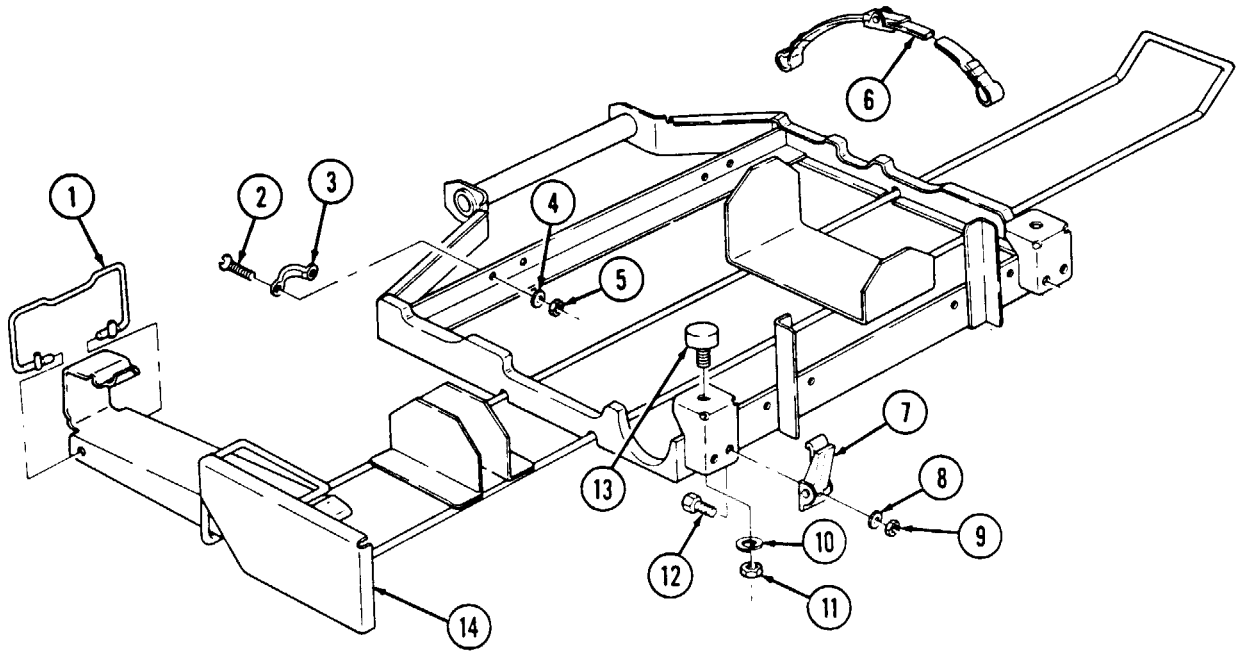
a. Disassembly

1. Remove retainer (1) from pioneer tool stowage tray (14).
2. Remove eight nuts (5), lockwashers (4), screws (2), four footman loops (3), and two strap assemblies (6) from pioneer tool stowage tray (14). Discard lockwashers (4).
3. Remove two nuts (11), lockwashers (10), and two bumpers (13) from tool stowage tray (14). Discard lockwashers (10).
4. Remove four nuts (9), lockwashers (8), capscrews (12), and two latches (7) from pioneer tool stowage tray (14). Discard lockwashers (8).

b. Assembly

1. Install two latches (7) on pioneer tool stowage tray (14) with four capscrews (12), lockwashers (8), and nuts (9). Tighten nuts (9) to 16-30 lb-in. (2-3 N•m).
2. Install two bumpers (13) on pioneer tool stowage tray (14) with lockwashers (10) and nuts (11).
3. Install two strap assemblies (6) on pioneer tool stowage tray (14) with four footman loops (3), eight screws (2), lockwashers (4), and nuts (5). Tighten nuts (5) to 16-30 lb-in. (2-3 N•m).
4. Install retainer (1) on pioneer tool stowage tray (14).

10-50. PIONEER TOOL STOWAGE TRAY MAINTENANCE (Cont'd)



FOLLOW-ON TASK: Install pioneer tool stowage tray (TM 9-2320-280-10).

10-51. PIONEER TOOL STOWAGE TRAY MOUNTING BRACKET REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

Pioneer tool stowage tray removed
(TM 9-2320-280-10).

Manual References

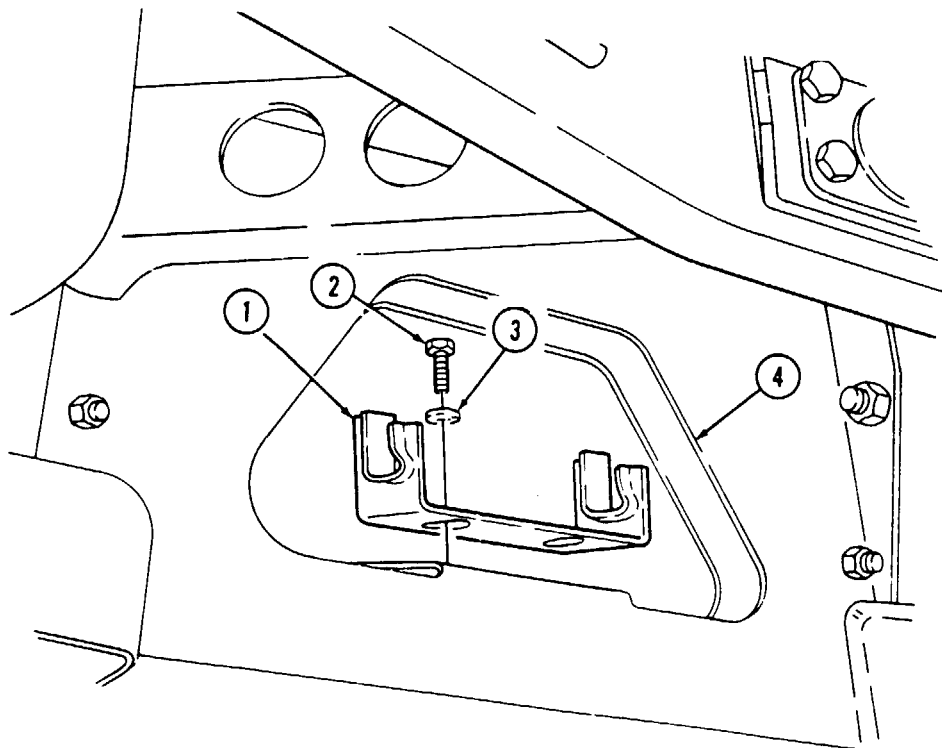
TM 9-2320-280-10
TM 9-2320-280-24P

a. Removal

Remove two capscrews (2), washers (3), and mounting bracket (1) from rear crossmember (4).

b. Installation

Install bracket (1) on rear crossmember (4) with two washers (3) and capscrews (2). Tighten capscrews (2) to 37 lb-ft (50 N•m).



FOLLOW-ON TASK: Install pioneer tool stowage tray (TM 9-2320-280-10).

10-52. PIONEER TOOL STOWAGE TRAY LATCH STRIKER REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Materials/Parts

Two lockwashers (Appendix G, Item 178)

Equipment Condition

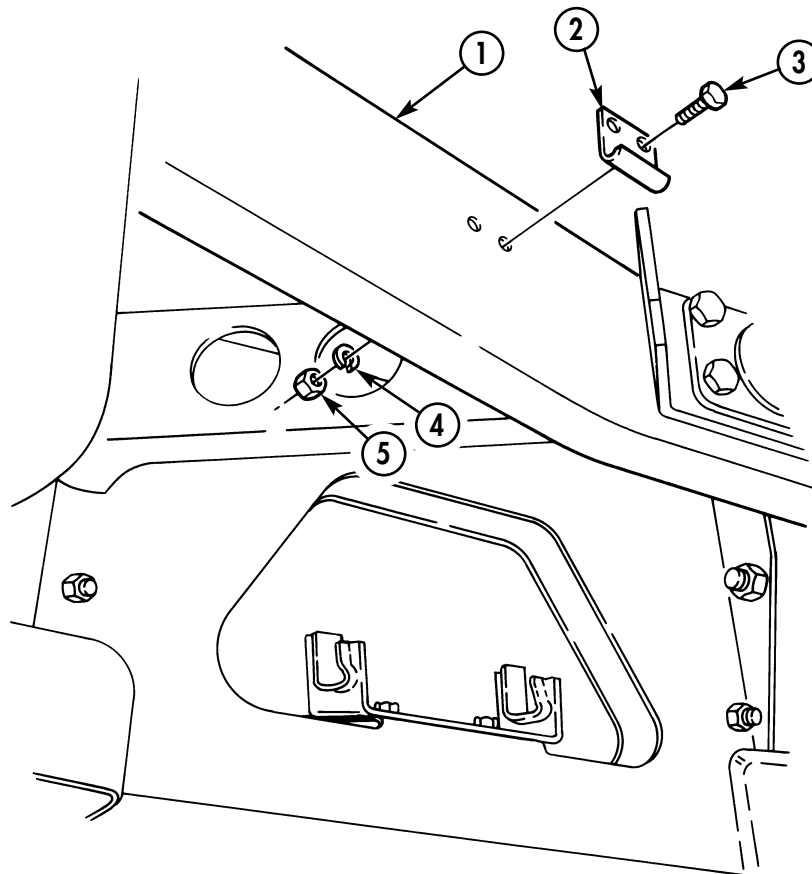
Pioneer tool stowage tray removed
(TM 9-2320-280-10).

a. Removal

Remove two nuts (5), lockwashers (4), capscrews (3), and tool tray latch striker (2) from frame (1).
Discard lockwashers (4).

b. Installation

Install tool tray latch striker (2) on frame (1) with two capscrews (3), lockwashers (4), and nuts (5).
Tighten nuts (5) to 16-30 lb-in. (2-3 N·m).



FOLLOW-ON TASK: Install pioneer tool stowage tray (TM 9-2320-280-10).

10-53. CARGO BULKHEAD REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M998, M998A1, M1038, M1038A1, M1097, M1097A1, M1097A2

Materials/Parts

Four lockwashers (Appendix G, Item 152)

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

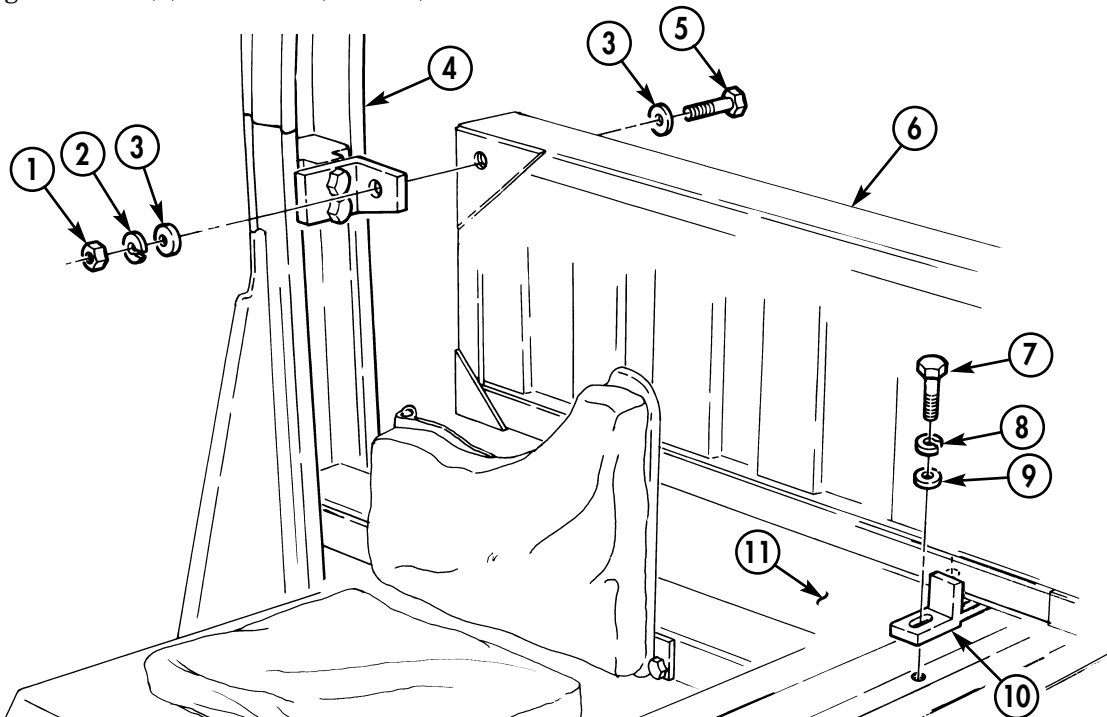
TM 9-2320-280-24P

a. Removal

1. Remove two capscrews (7), lockwashers (8), washers (9), and cargo bulkhead bracket (10) from cargo floor (11). Discard lockwashers (8).
2. Remove two nuts (1), lockwashers (2), washers (3), capscrews (5), and washers (3) from cargo bulkhead (6) and "B" pillar (4). Discard lockwashers (2).
3. Remove cargo bulkhead (6) from vehicle.
4. Inspect anti-noise pads (12) for damage. Replace if damaged.

b. Installation

1. Install cargo bulkhead (6) on cargo floor (11).
2. Install cargo bulkhead (6) on "B" pillar (4) with two washers (3), capscrews (5), washers (3), lockwashers (2), and nuts (1).
3. Install cargo bulkhead bracket (10) on cargo floor (11) with two washers (9), lockwashers (8), and capscrews (7). Tighten capscrews (7) to 65 lb-ft (88 N·m).
4. Tighten nuts (1) to 15 lb-ft (20 N·m).



10-54. CARGO BULKHEAD MOUNTING BRACKETS REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M998, M998A1, M1038, M1038A1, M1097,
M1097A1, M1097A2

Manual References

TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

Cargo bulkhead removed (para. 10-53).

a. Removal

1. Remove nut (6), washer (7), capscrew (10), washer (7), cargo bracket (9), and tiedown (8) from cargo floor (5).

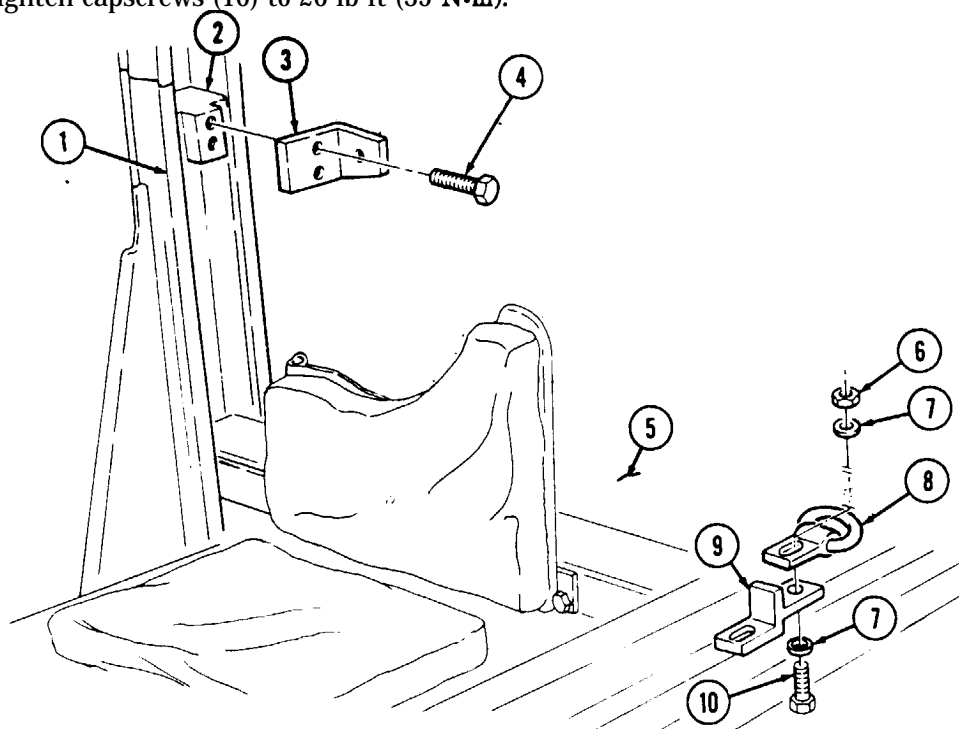
NOTE

Note position of latch on "B" pillar for installation.

2. Remove two capscrews (4), latch (3), and latch retainer (2) from "B" pillar (1).

b. Installation

1. Install latch (3) and latch retainer (2) on "B" pillar (1) with two capscrews (4). Tighten capscrews (4) to 6 lb-ft (8 N•m)
2. Install tiedown (8) and bracket (9) on cargo floor (5) with washer (7), capscrew (10), washer (7), and nut (6). Tighten capscrews (10) to 26 lb-ft (35 N•m).



FOLLOW-ON TASK: Install cargo bulkhead (para. 10-53).

10-55. CARGO BARRIER EXTENSION MAINTENANCE

This task covers:

- | | |
|--|--|
| <ul style="list-style-type: none"> a. Removal b. Disassembly | <ul style="list-style-type: none"> c. Assembly d. Installation |
|--|--|

INITIAL SETUP:

Applicable Models

M998, M998A1, M1038, M1038A1, M1097, M1097A1, M1097A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Eight locknuts (Appendix G, Item 86)

Manual References

TM 9-2320-280-24P

a. Removal

Remove quick release pin (12) from post assembly (4) and remove cargo barrier extension (5) from cargo bulkhead (13).

b. Disassembly

1. Remove screw (6) and lanyard (7) from post assembly (4).
2. Remove twenty-four screws (1), nut and washer assemblies (3), and three backboards (2) from four post assemblies (4).
3. Remove eight locknuts (11), washers (9), capscrews (8), washers (9), and four mounting brackets (10) from cargo bulkhead (13). Discard locknuts (11).

c. Assembly

1. Install lanyard (7) on post assembly (4) with screw (6).
2. Install three backboards (2) on post four assemblies (4) with twenty-four screws (1) and nut and washer assemblies (3).
3. Install four mounting brackets (10) on cargo bulkhead (13) with eight washers (9), capscrews (8), washers (9), and locknuts (11).

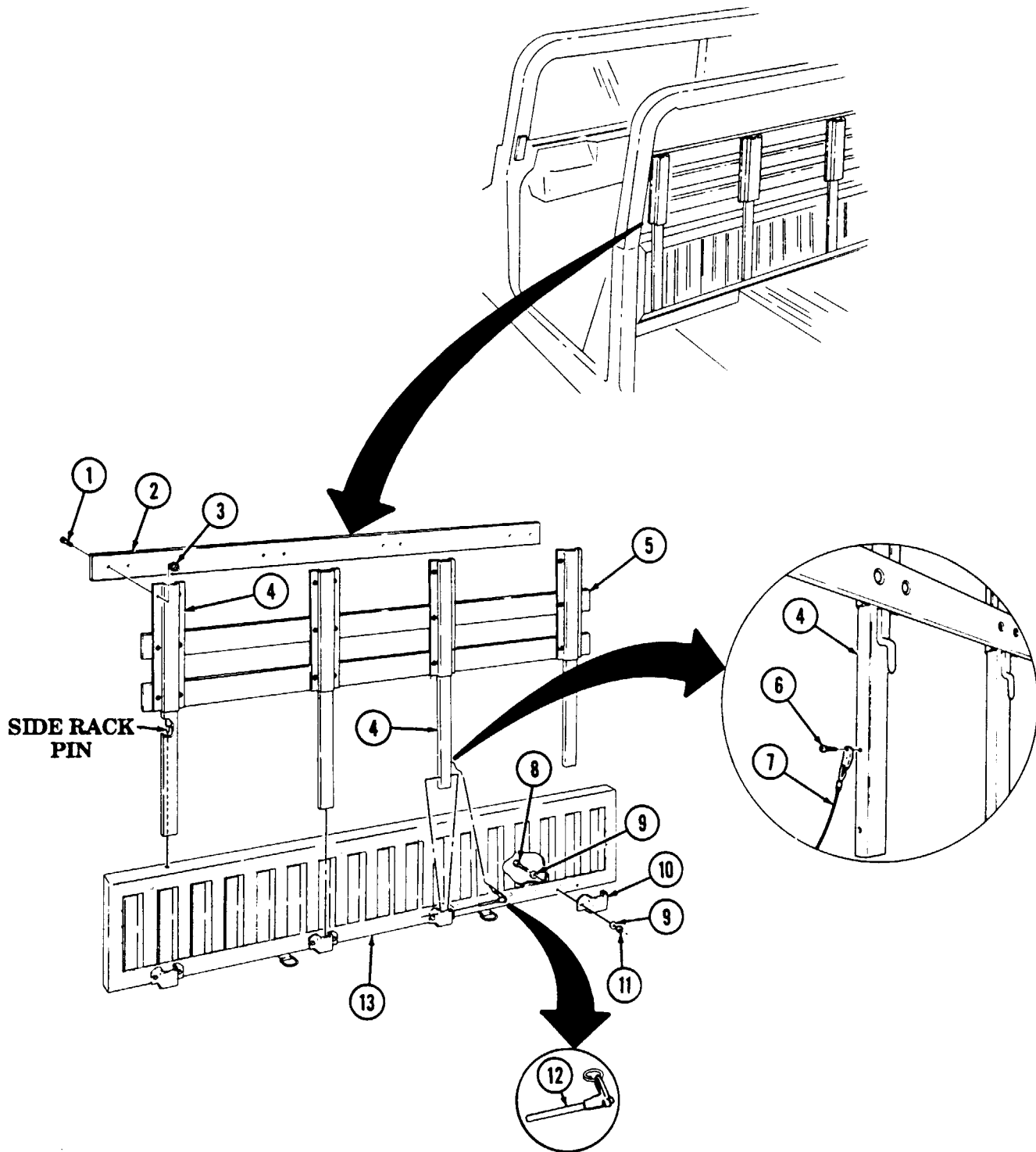
d. Installation

NOTE

When installing cargo barrier extension, ensure side rack pins on post assemblies slide into holes of cargo bulkhead.

Install cargo barrier extension (5) to cargo bulkhead (13) with quick release pin (12).

10-55. CARGO BARRIER EXTENSION MAINTENANCE (Cont'd)



10-56. CARGO TIEDOWN REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

All except M996, M996A1, M997, M997A1, M997A2, M1037, M1042

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Locknut (Appendix G, Item 79)

Manual References

TM 9-2320-280-24P

Personnel Required

One mechanic
One assistant

a. Removal

NOTE

- For removal of rear cargo tiedown, one assistant will be needed.
- Early production vehicles will have a capscrew in place of a hex head screw.

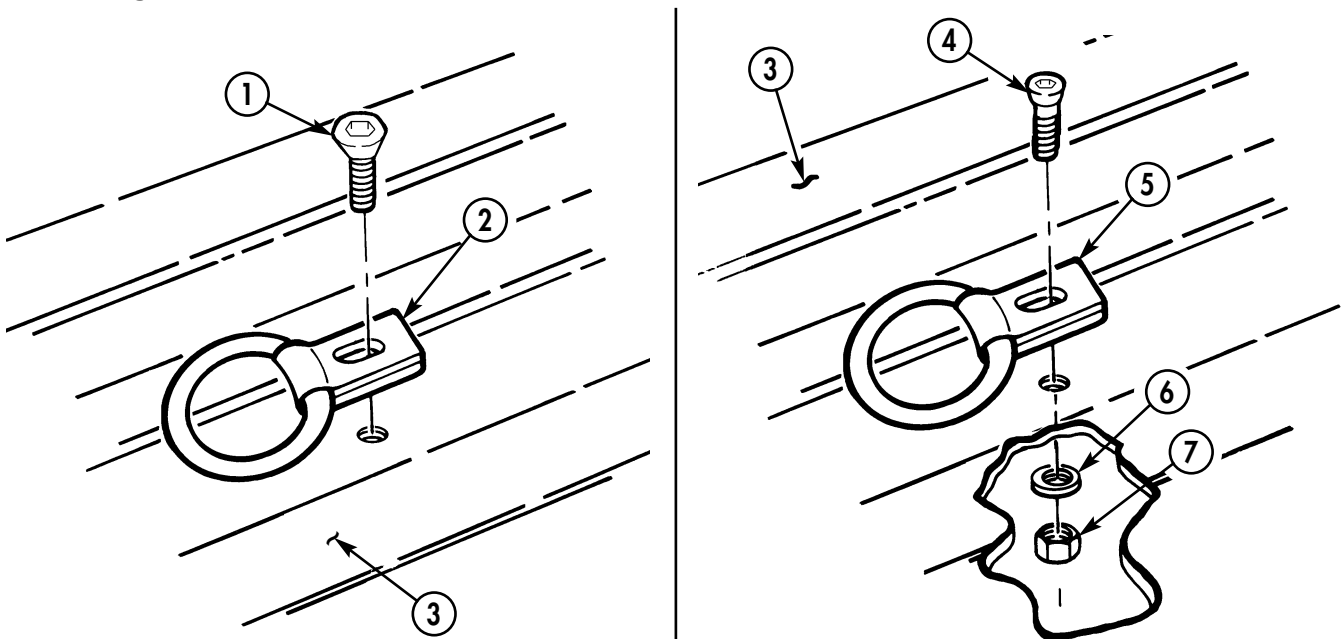
1. Remove hex head screw (1) and front cargo tiedown (2) from cargo floor (3).
2. Remove locknut (7), washer (6), hex head screw (4), and rear cargo tiedown (5) from cargo floor (3). Discard locknut (7).

b. Installation

NOTE

For installation of rear cargo tiedown, one assistant will be needed.

1. Install front cargo tiedown (2) on cargo floor (3) with hex head screw (1). Tighten hex head screw (1) to 65 lb-ft (88 N·m).
2. Install rear cargo tiedown (5) on cargo floor (3) with hex head screw (4), washer (6), and locknut (7). Tighten locknut (7) to 65 lb-ft (88 N·m).



10-57. FIRE EXTINGUISHER BRACKET REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-24P

Materials/Parts

Four locknuts (Appendix G, Item 70)

NOTE

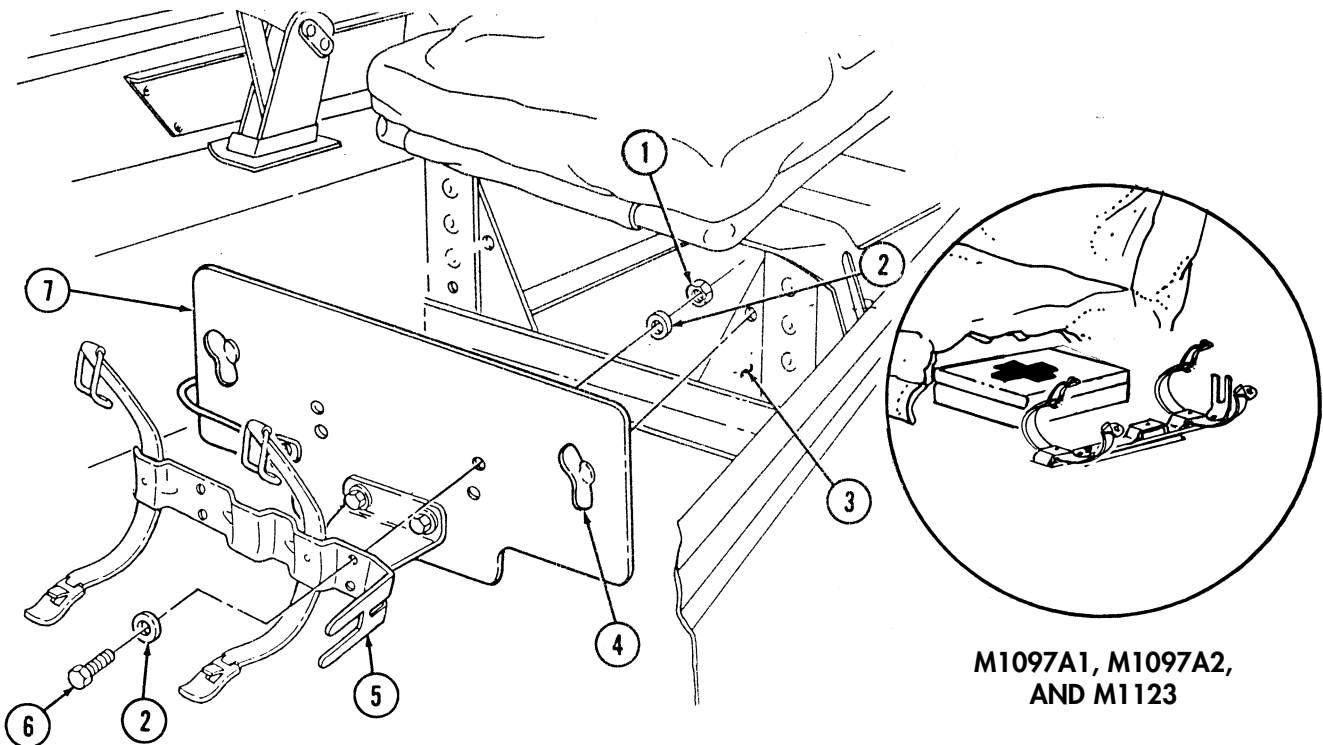
M1097A1, M1097A2, and M1123 models fire extinguisher bracket and retainer plate is mounted on the floor, left side of driver's seat, with capscrews securing retainer plate instead of wing head studs.

a. Removal

1. Turn two wing head studs (4) and remove driver's seat base retainer plate (7) from driver's seat base (3).
2. Remove four locknuts (1), washers (2), capscrews (6), washers (2), and fire extinguisher bracket (5) from driver's seat base retainer plate (7). Discard locknuts (1).

b. Installation

1. Install fire extinguisher bracket (5) on driver's seat base retainer plate (7) with four washers (2), capscrews (6), washers (2), and locknuts (1). Tighten locknuts (1) to 6 lb-ft (8 N·m).
2. Install driver's seat base retainer plate (7) on driver's seat base (3) with two wing head studs (4).



10-58. FIRE EXTINGUISHER SUPPORT REPLACEMENT

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP:

Applicable Models

M966, M996, M997, M998, M1025, M1026,
M1035, M1036, M1037, M1038, M1042,
M1043, M1044, M1045, M1046

Manual References

TM 9-2320-280-24P

Equipment Condition

Fire extinguisher bracket removed (para. 10-57).

Tools

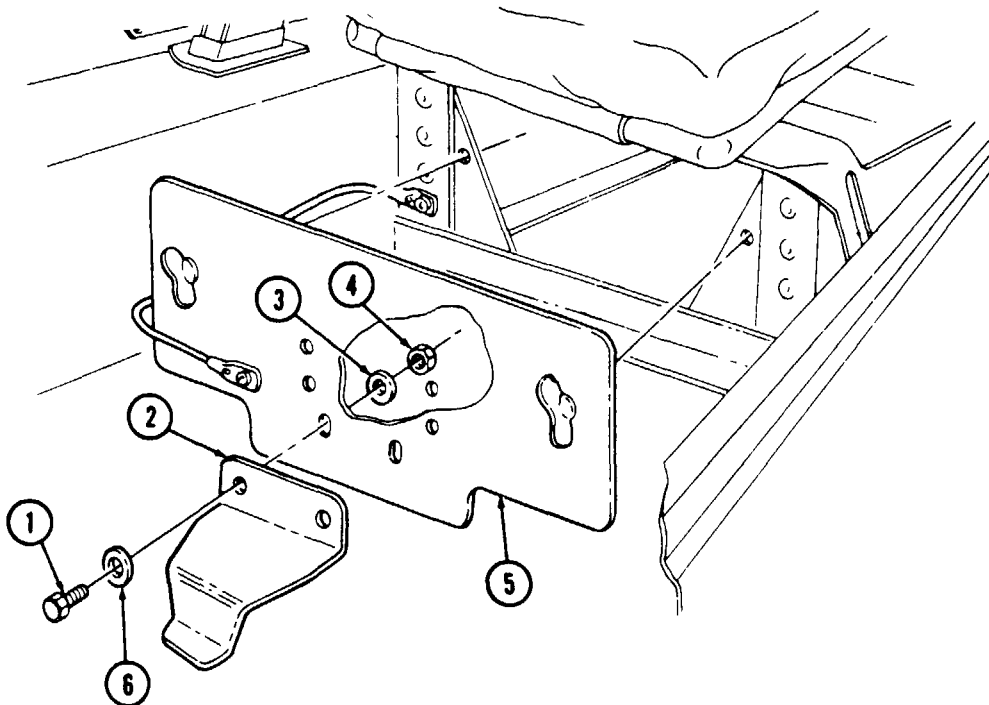
General mechanic's tool kit
automotive (Appendix B, Item 1)

a. Removal

Remove two nuts (4), washers (3), capscrews (1), washers (6), and fire extinguisher support (2) from driver's seat base retainer plate (5).

b. Installation

Install the extinguisher support (2) on driver's seat base retainer plate (5) with two washers (6), capscrews (1), washers (3), and nuts (4). Tighten nuts (4) to 21 lb-in. (2 N•m).



FOLLOW-ON TASK: Install fire extinguisher bracket (para. 10-57).

10-59. DRIVER'S SEAT RETAINER PLATE ASSEMBLY REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M966, M996, M997, M998, M1025, M1026,
M1035, M1036, M1037, M1038, M1042,
M1043, M1044, M1045, M1046

Manual References

TM 9-2320-280-24P

Equipment Condition

Fire extinguisher support removed (para. 10-58).

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Rivet (Appendix G, Item 253)

NOTE

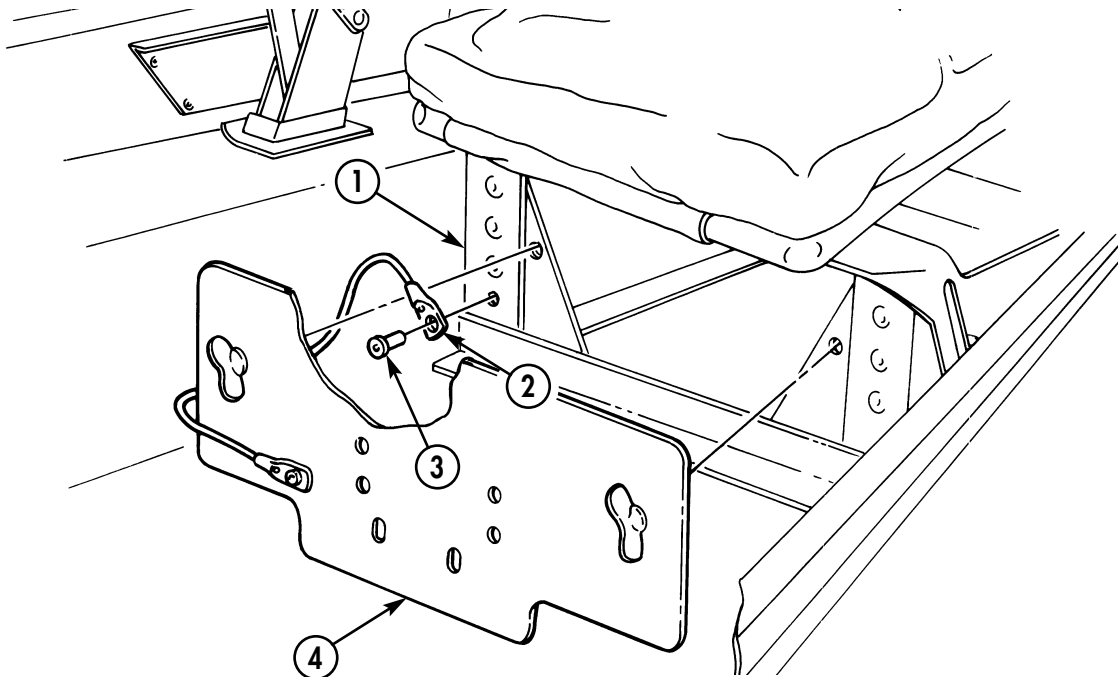
For instructions on replacement of rivets, refer to para. 10-66.

a. Removal

Remove rivet (3) and retaining cable (2) from seat base (1) and remove driver's seat base retainer plate (4) and retaining cable (2).

b. Installation

Install driver's seat base retainer plate (4) and retaining cable (2) on driver's seat base (1) with rivet (3).



FOLLOW-ON TASK: Install fire extinguisher support (para. 10-58).

10-60. TAILGATE CHAIN AND BRACKETS REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

All models except M996, M996A1, M997, M997A1, M997A2

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

Tailgate lowered (TM 9-2320-280-10).

Materials/Parts

Four locknuts (Appendix G, Item 79)

a. Removal

1. Open tailgate chain cap link (6) and disconnect tailgate chain (7) from bracket (9).
2. Unhook tailgate chain (7) from tailgate chain bracket (4) and remove tailgate chain (7).
3. Remove four locknuts (1), washers (2), capscrews (5), washers (2), angle bracket (10), chain bracket (9), and latch bracket (4) from body (3). Discard locknuts (1).

NOTE

Perform step 4 only if tailgate chain cover is damaged.

4. Remove cover (8) from tailgate chain (7).

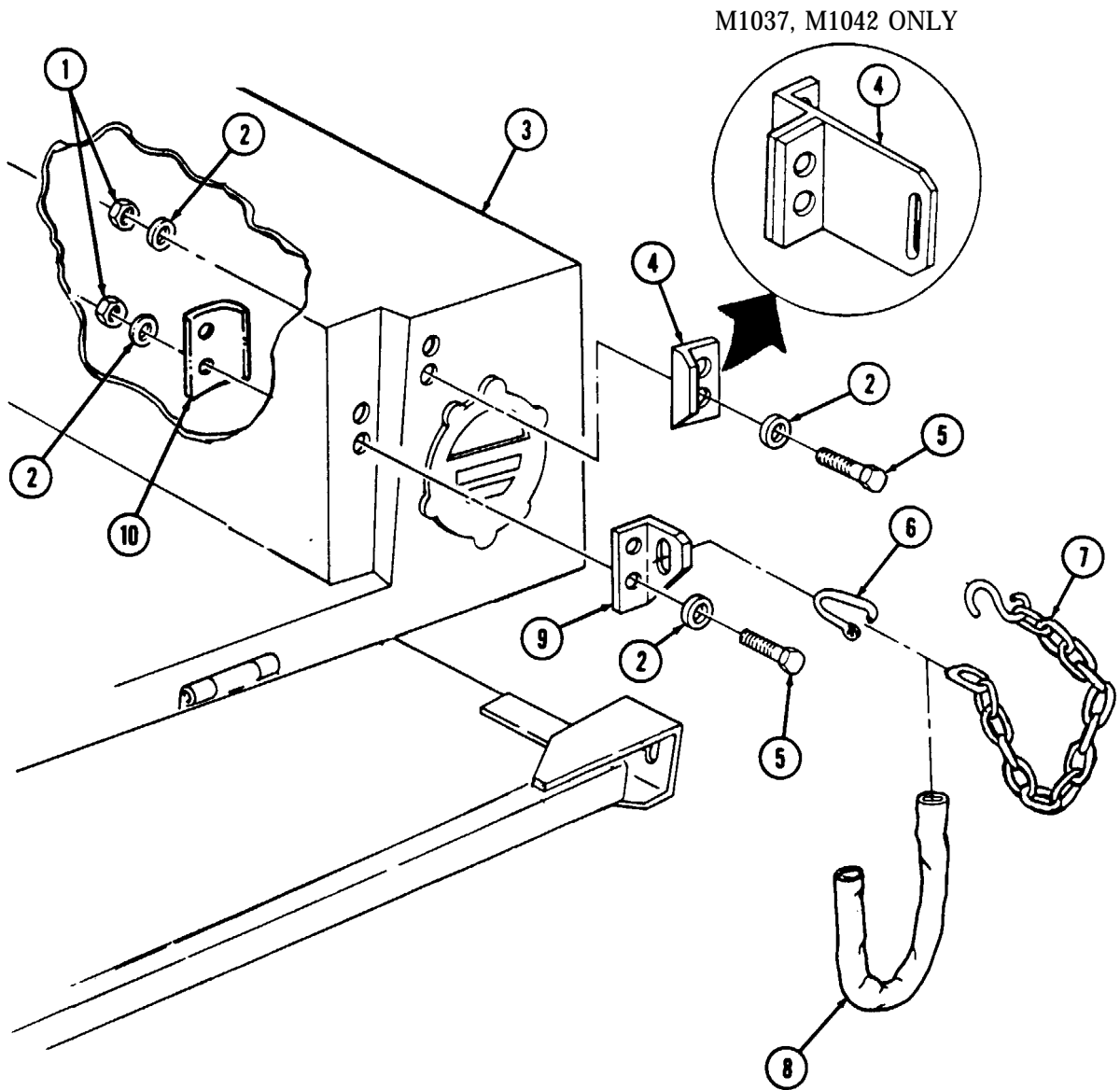
b. Installation

NOTE

Perform step 1 only if tailgate chain cover was removed.

1. Install cover (8) on tailgate chain (7).
2. Install angle bracket (10), chain bracket (9), and latch bracket (4) on body (3) with four washers (2), capscrews (5), washers (2), and locknuts (1). Tighten locknuts (1) to 15 lb-ft (20 N.m).
3. Hook tailgate chain (7) to tailgate chain bracket (4).
4. Connect tailgate chain cap link (6) to bracket (9) by closing chain cap link (6).

10-60. TAILGATE CHAIN AND BRACKETS REPLACEMENT (Cont'd)



FOLLOW-ON TASK: Raise and secure tailgate (TM-9-2320-280-10).

10-61. TAILGATE REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

All models except M996, M996A1, M997, M997A1, M997A2, M1037, M1042

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Six locknuts (Appendix G, Item 128)

Personnel Required

One mechanic
One assistant

Manual References

TM 9-2320-280-24P

Equipment Condition

M1025, M1025A1, M1025A2, M1026, M1026A1, M1036, M1043, M1043A1, M1043A2, M1044, M1044A1, M1045, M1045A1, M1045A2, M1046, and M1046A1 only:
Camouflage pack stowage straps removed (para. 10-9).

a. Removal

1. Remove six locknuts (10), washers (9), and capscrews (7) from tailgate (3) and body (2). Discard locknuts (10).
2. Disconnect two tailgate chains (1) from tailgate (3) and remove tailgate (3) and shims (8).

NOTE

- Perform step 3 if replacing seal(s).
- Seal across bottom of tailgate is used on TOW and armament carrier vehicles only.
- Vehicles equipped with tailgate upper hinge kit, P/N 12342446 will have a three-piece seal.

3. Remove seals (4) and (6) from tailgate (3).
4. Clean adhesive from tailgate (3).

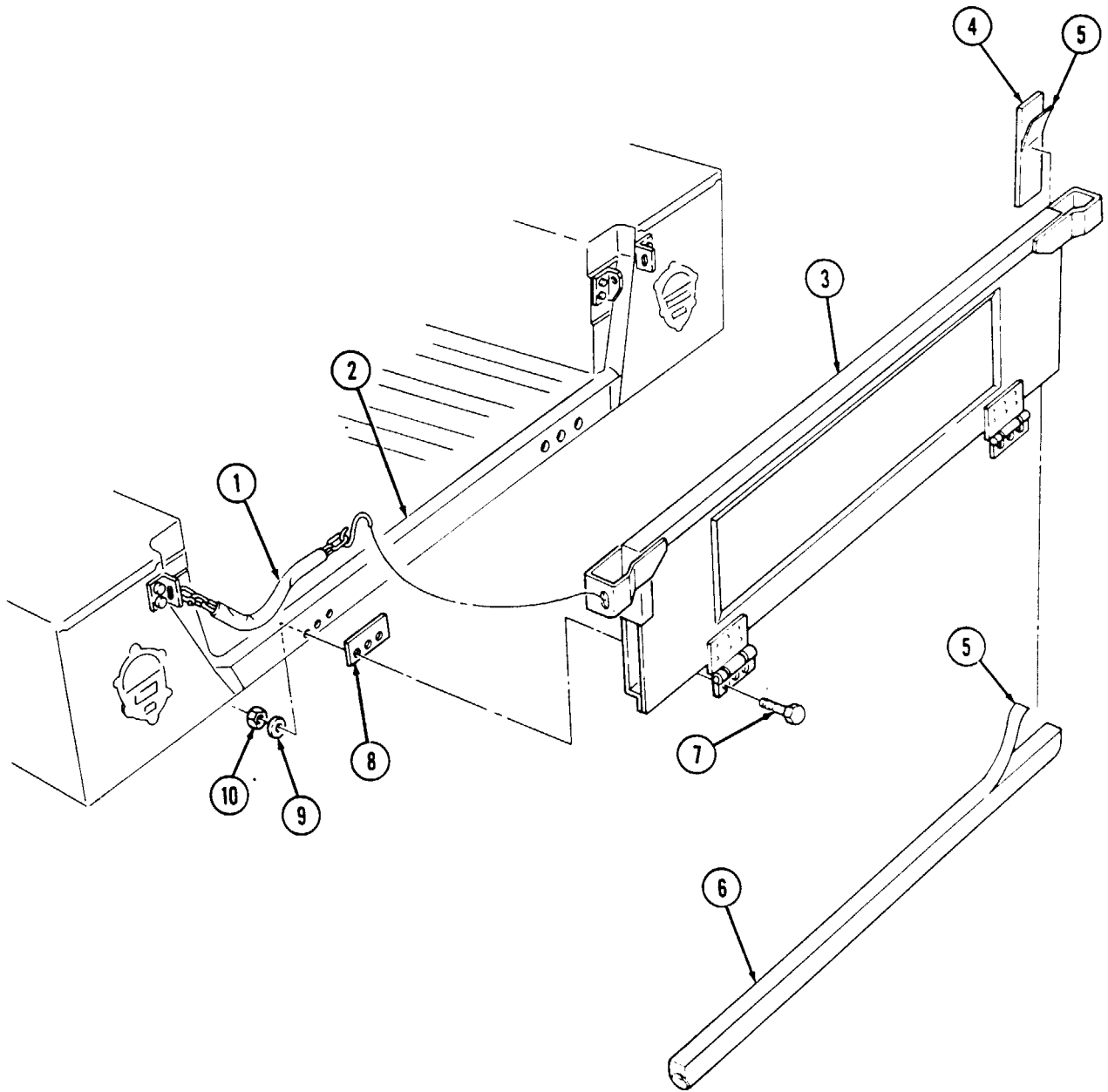
b. Installation

NOTE

- Perform step 1 if replacing seal(s).
- Seal across bottom of tailgate is used on TOW and armament carrier vehicles only.
- Vehicles equipped with tailgate upper hinge kit, P/N 12342446, will have a three-piece seal.

1. Peel paper backing (5) from seals (4) and (6) and install seals (4) and (6) on tailgate (3).
2. Install shims (8) and tailgate (3) on body (2) with six capscrews (7), washers (9), and locknuts (10). Tighten locknuts (10) to 26 lb-ft (35 N•m).
3. Connect two tailgate chains (1) to tailgate (3).

10-61. TAILGATE REPLACEMENT (Cont'd)



FOLLOW-ON TASK: M1025, M1025A1, M1025A2, M1026, M1026A1, M1036, M1043, M1043A1, M1043A2, M1044, M1044A1, M1045, M1045A1, M1045A2, M1046, and M1046A1 only
 Install camouflage pack stowage straps (para. 10-9).

10-62. TAILGATE UPPER HINGE REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

All models except M996, M996A1, M997, M997A1, M997A2, M1037, M1042

Personnel Required

One mechanic
One assistant

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-24P

Materials/Parts

Eight locknuts (Appendix G, Item 122)

Equipment Condition

Tailgate removed (para. 10-61).

a. Removal

NOTE

- Left and right tailgate upper hinge replacement procedures are basically the same. This procedure covers the left tailgate upper hinge.
- Seal across bottom of tailgate is used on TOW and armament carrier vehicles only. For access to capscrews, a small portion of the seal has to be removed.
- The upper hinge is installed with rivets during manufacturing. A kit has been developed to repair the upper hinge. Use kit P/N 57K0107 for installation.

1. Remove seal (10) from tailgate (6) behind upper hinge (7).

NOTE

- Perform step 2 for TOW and armament carrier vehicles only. Perform step 3 for all other vehicles.
- Note direction of capscrews for installation.

2. Remove two locknuts (8), washers (4), spacers (5), capscrews (3), and washers (4) from upper hinge (7) and tailgate (6). Discard locknuts (8).
3. Remove three locknuts (8), washers (4), spacers (5), capscrews (3), and washers (4) from upper hinge (7) and tailgate (6). Discard locknuts (8).
4. Remove three locknuts (9), washers (1), capscrews (2), washers (1), and upper hinge (7) from tailgate (6). Discard locknuts (9).
5. Remove pin (12) and lower hinge (11) from upper hinge (7).

b. Installation

1. Install lower hinge (11) on upper hinge (7) with pin (12).
2. Install upper hinge (7) on tailgate (6) with three washers (1), capscrews (2), washers (1), and locknuts (9). Tighten locknuts (9) to 8 lb-ft (11 N•m).

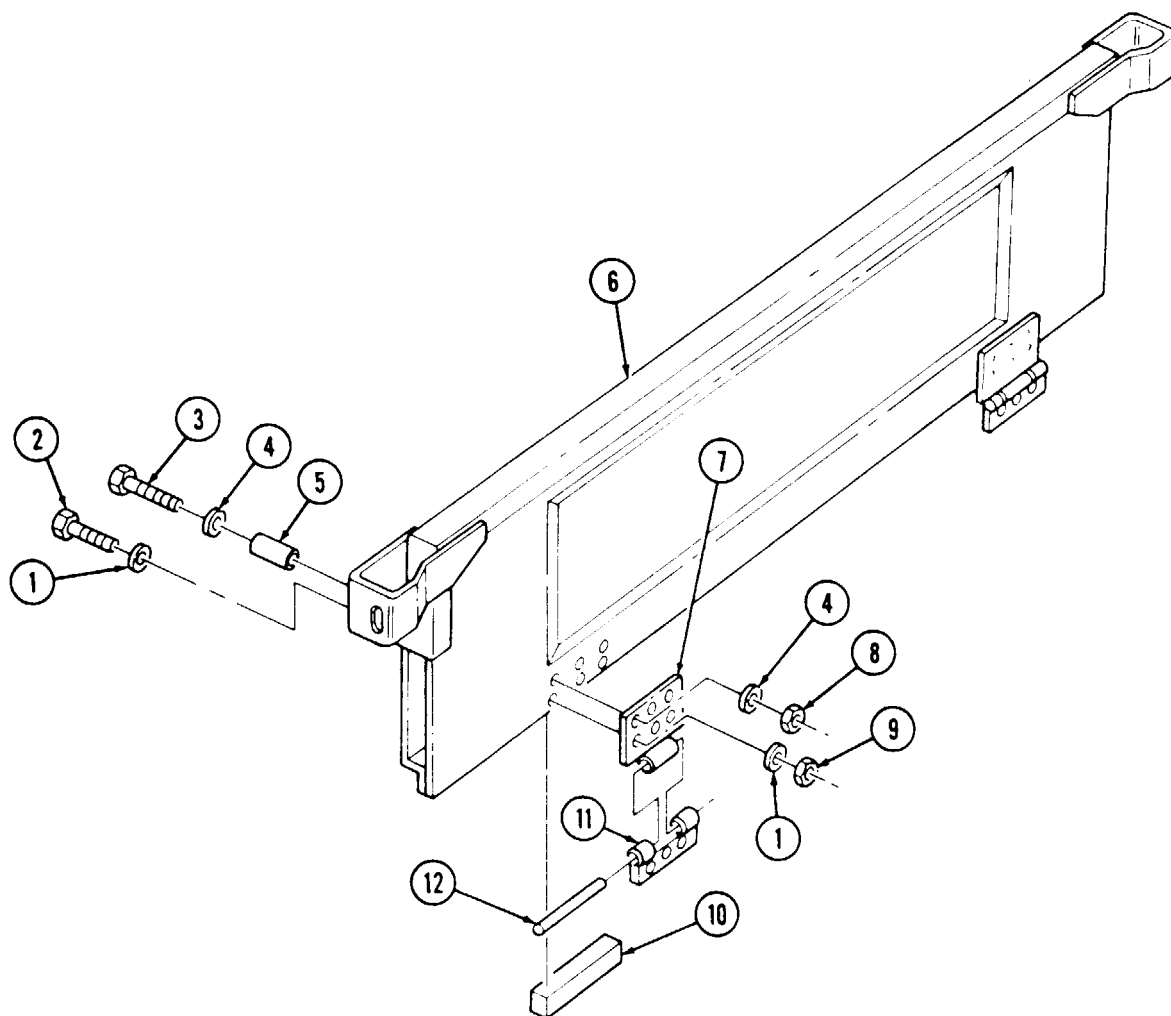
NOTE

Perform step 3 for TOW and armament carrier vehicles only.
Perform step 4 for all other vehicles.

3. Secure upper hinge (7) to tailgate (6) with two washers (4), capscrews (3), spacers (5), washers (4), and locknuts (8). Tighten locknuts (8) to 8 lb-ft (11 N•m).

10-62. TAILGATE UPPER HINGE REPLACEMENT (Cont'd)

4. Secure upper hinge (7) to tailgate (6) with three washers (4), capscrews (3), spacers (5), washers (4), and locknuts (8). Tighten locknuts (8) to 8 lb-ft (11 N·m).
5. Install seal (10) on tailgate (6) behind upper hinge (7).



FOLLOW-ON TASK: Install tailgate (para. 10-61).

10-63. MUD FLAP INSTALLATION

This task covers:

Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

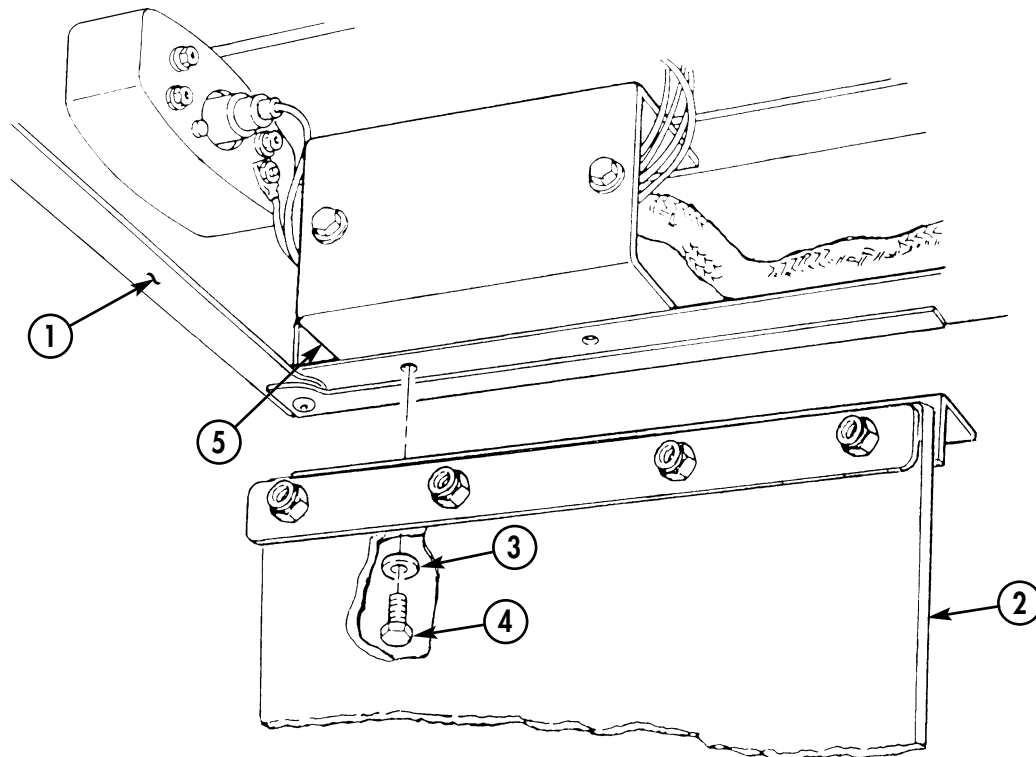
TM 9-2320-280-24P

Installation

NOTE

Mud flap installation will prevent stones thrown by tires from hitting other vehicles. Installation is at commander's discretion. Refer to appendix D, Fig. D-88.

1. Remove two capscrews (4) and washers (3) from shield (5) and body (1).
2. Install mud flap assembly (2) on shield (5) and body (1) with two washers (3) and capscrews (4).
3. Repeat steps 1 and 2 for opposite side.



10-64. BODY HINGE MOUNT REPLACEMENT

This task covers:

a Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

M998, M998A1, M1035, M1035A1, M1035A2,
M1037, M1038, M1038A1, M1042 only:
• Soft top door removed (TM 9-2320-280-10).
M966, M966A1, M996, M996A1, M1025, M1025A1,
M1025A2, M1026, M1026A1, M1043, M1043A1,
M1043A2, M1044, M1044A1, M1045, M1045A1,
M1045A2, M1046 and M1046A1 only
• Ballistic crew door removed (para. 11-2).

a. Removal

NOTE

Perform step 1 for upper front body hinge removal.

1. Remove two nuts (1), washers (2), twelve-point screws (5), washers (4), and upper front body hinge mount (3) from body (6).

NOTE

Perform step 2 for lower front body hinge removal.

2. Remove two twelve-point screws (9), washers (8), and lower front body hinge mount (7) from body (6).

b. Installation

NOTE

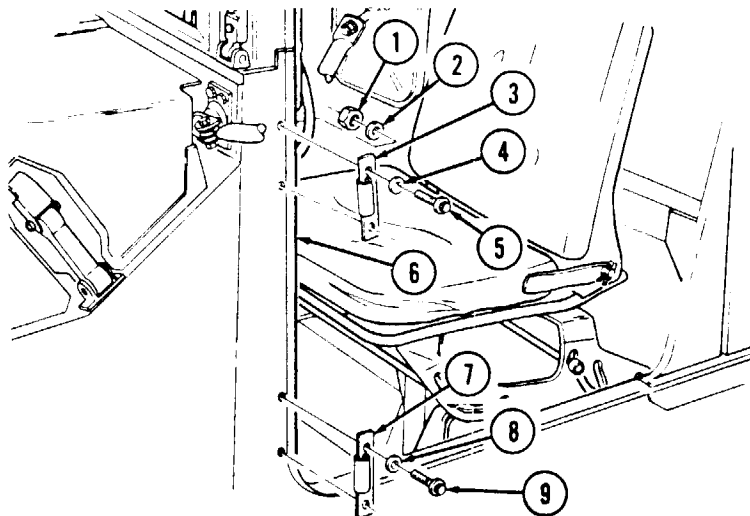
Perform step 1 for lower and rear body hinge mount installation.

1. Install lower body hinge mount (7) on body (6) with two washers (8) and twelve-point screw (9). Tighten twelve-point screws (9) to 8 lb-ft (11 N•m).

NOTE

Perform step 2 for upper front body hinge installation.

2. Install upper body hinge mount (3) on body (6) with two washers (4), twelve-point screws (5), washers (2), and nuts (1). Tighten twelve-point screws (5) to 8 lb-ft (11 N•m).



FOLLOW-ON TASKS: M998, M998A1, M1035, M1035A1, M1035A2, M1037, M1038, M1038A1, M1042 only
 • Install soft top door (TM 9-2320-280-10).
 M966, M966A1, M996, M996A1, M1025, M1025A1, M1025A2, M1026, M1026A1,
 M1043, M1043A1, M1043A2, M1044, M1044A1, M1045, M1045A1, M1045A2,
 M1046 and M1046A1 only:
 • Install ballistic crew door (para. 11-2).
 • Adjust soft top door (para. 10-102).

10-65. AIRLIFT BRACKET TO HOOD SEAL REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit
automotive (Appendix B, Item 1)

Equipment Condition

Hood raised and secured (TM 9-2320-280-10).

Manual References

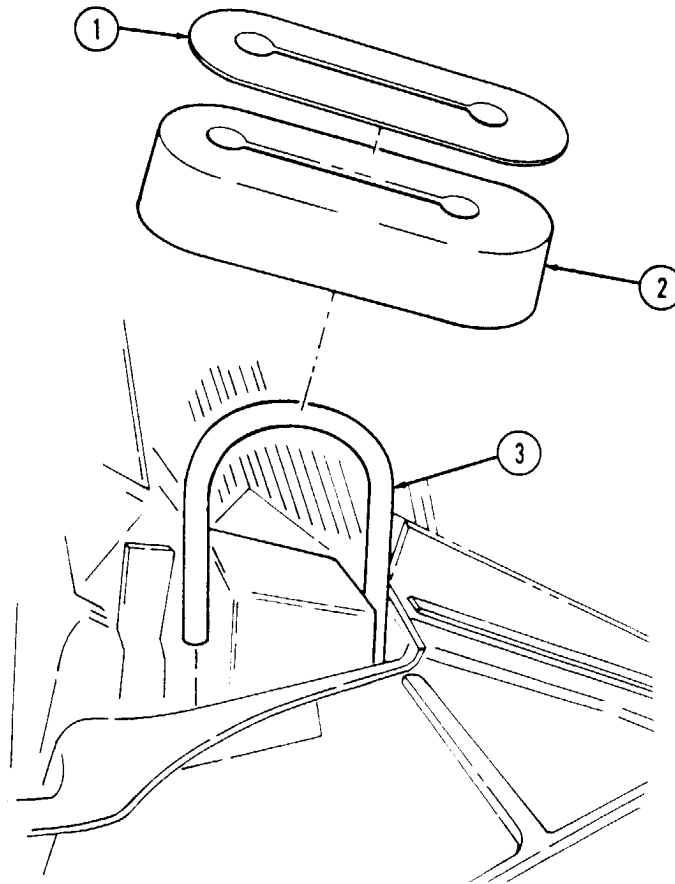
TM 9-2320-280-10
TM 9-2320-280-24P

a. Removal

Remove protector (1) and seal (2) from airlift bracket (3).

b. Installation

Install seal (2) and protector (1) on airlift bracket (3).



FOLLOW-ON TASK: Lower and secure hood (TM 9-2320-280-10).

10-66. BODY REPAIR

This task covers:

- | | |
|---------------|----------------------|
| a. General | c. Rivet Replacement |
| b. Inspection | |

INITIAL SETUP:

Tools

General mechanic's tool kit
automotive (Appendix B, Item 1)

Special Tools

Tool kit, riveter (Appendix B, Item 139)

Materials/Parts

Sealing compound (Appendix C, Item 40)

Manual References

TM 9-2320-280-24P

a. General

- The M998 series body is constructed from aluminum alloys that have been heat treated to obtain high strength. Welding cannot be used to make body repairs. Heat generated in welding will reverse the heat treatment process and cause a great reduction in strength of material.
- Solid 3/16 inch diameter aluminum rivets are the primary method of joining body components. Rivets are inserted into a hole through two pieces of metal and a second head is formed by manual or pneumatic impacting, or by squeezing the rivet. A bucking bar is used to backup the rivet to form rivet head. When making repairs, use blind rivets of the same size or oversize diameter with the appropriate grip length.
- Blind structural aluminum rivets of 3/16 inch diameter are used in applications where there is access from only one side of the part. Blind rivets are installed using a tool that pulls on the rivet stem causing a bulbed head to form on the back side of the part. Fastening is complete when stem breaks off. High strength is obtained in blind structural rivets by mechanically locking the remaining stem inside rivet body. Blind pop rivets are used in locations where non-structural attachments such as latches, striker plates, etc., are attached to the body.
- Steel pull-type lockbolt fasteners in 3/16 and 1/4-inch diameter are used where tension or high shear loads exist. Lockbolts are two-piece unthreaded fasteners. One part is a high-strength, steel-headed bolt-like part with aberrations on its shank. The mating part is a collar which is swaged over the serrations causing the fastener to be locked in place.
- Rivnut/plusnut fasteners are tubular rivets with internal threads. Rivnut/plusnut fasteners are installed using a tool that engages the threads of the fastener and extends a pull, causing the shank to expand tightly against the material being fastened. This process is called "upsetting" a rivnut/plusnut.
- Rivet and Lockbolt replacement.
To facilitate repairs to body, it is acceptable to replace lockbolts and rivets with 1/4 inch AN4 series bolts. Do not replace lockbolts with rivets. Standard threaded fasteners should not be used, as these will quickly wear the aluminum structure. Bolt lengths should be chosen so that the cylindrical portion of bolt is bearing on all members being joined. Bolts are designated as AN4-XX or AN4C-XX where XX defines grip length. Tighten all bolts to 70-75 lb-in. (8-9 N•m).
- Fatigue strength of riveted joints and seams is increased by one part epoxy adhesive. This adhesive requires special material storage and metal preparation along with a low temperature heat cycle for curing. Because of its impracticality in field repairs, epoxy adhesive will not be used. Where possible, extra rivets and thicker metal gages should be used instead of adhesives. When making repairs, note epoxy exists and that parts may be difficult to separate, even after rivets are removed.

10-66. BODY REPAIR (Cont'd)

b. Inspection

1. The damaged area should be thoroughly cleaned and inspected to determine cause and extent of damage. Body parts should be inspected for holes, cracks, dents, distortion, or breaks. Fasteners should be inspected for breaks, stretching, looseness, cocked heads, or hole elongation. Seams, flanges, and joints should be inspected for straightness or local deformation as an indication that fasteners may have been stretched or holes elongated. It is possible for this to happen and fasteners still appear to be tight in their holes. In addition, make thorough inspection of adjacent areas to determine if high loads have been transmitted from the damaged area to other areas. This can result in secondary damage in the form of distorted panels or seams, loosened or sheared fasteners, elongated fastener holes, and cracks.
2. Signs of rivet failure include tipped heads, looseness, and sometimes chipped or cracked paint. If heads are tipped in the same direction and rivets are loose in consecutive groups, the joint has undergone excessive load. Rivet heads which are tipped in different directions and are not in groups may be improperly installed. With chipped or cracked paint, it may be necessary to remove paint to check true condition of rivets. Rivets subjected to critical loads but showing no distortion, should be inspected if failure is suspected. The head should be drilled off, and the shank should be carefully punched out. Failure is indicated by notched rivet shank and misaligned holes. Flush rivets showing head slippage within the dimple or countersink indicate either sheet bearing or rivet shear failure and must be removed for inspection and replacement. If failure of rivets cannot be detected by visual inspection, the joint can be checked by drilling and punching out several rivets. If rivet shanks are notched, rivets should be replaced with next larger size rivets. If rivet holes show elongation due to local failure in tearing of the sheet, next larger size rivet must be used in replacement. Any deformation of the sheet around the rivet, tear outs, or cracks between rivets usually indicates partially failed or damaged rivets. Complete repair of the joint will require replacement by next larger size rivets. Use the next 1/32 inch larger diameter rivet to obtain a tight joint when original hole has been enlarged. If original size rivet is installed, the rivet would not be able to carry its share of the shear load, and the joint would not meet its strength requirement.

c. Rivet Replacement

NOTE

When removing rivets, care should be taken to not enlarge rivet hole as this would require use of an oversize or larger rivet for replacement.

1. Solid Rivet Removal.
 - (a) File a flat surface on the manufactured head if accessible, It is always preferable to work on manufactured head rather than the one that is bucked over, since the former will always be more symmetrical about the shank.
 - (b) Indent center of the filed surface with a center punch.
 - (c) Drill through rivet head. Be sure to use a drill slightly smaller than diameter of rivet shank to avoid making rivet hole oversized.
 - (d) Shear weakened rivet head off with a sharp chisel. For this operation, support back side of rivet and cut rivet head along direction of rivet line or panel edge. This will prevent distortion of the panel.
 - (e) Firmly support the panel from the opposite side and drive out shank with a pin punch. If rivet is unduly tight because of swelling between sheets, drill rivet shank out with an undersize drill.
2. Blind Rivet Removal.
 - (a) File a small flat on rivet head.
 - (b) Center punch the flat. Support rivet backside, if possible.
 - (c) Using a small drill about the size of rivet pin, drill off tapered end of pin which forms the lock.

10-66. BODY REPAIR (Cont'd)

- (d) Shear lock using a pin punch to drive out pin.
 - (e) Pry out remainder of locking collar.
 - (f) Using a drill slightly smaller than rivet shank, drill almost through rivet head.
 - (g) Pry off rivet head with a pin punch.
 - (h) Tap out rivet shank with a pin punch.
3. Rivnut/Plusnut Removal.
- (a) Drill through rivnut head.
 - (b) Punch out shank.
4. Rivet Hole Drilling.
- (a) Center punch all new rivet locations. Center punch mark must be large enough to prevent drill from slipping out of position, yet it must not dent the surface of the material. To prevent denting, place a bucking bar behind material during punching.
 - (b) Make sure drill is the correct size (tables 10-1 and 10-2) and point is properly ground. A no. 10 drill is used to install standard 3/16-inch blind rivets.

Table 10-1. Drill Sues for Solid Shank Rivets

RIVET DIAMETER (INCH)	DRILL SIZE	DRILL DIAMETER (INCH)
1/16	#51	0.0670
3/32	#41	0.0960
1/8	#30	0.1285
5/32	#21	0.1590
3/16	#10	0.1910
1/4	F	0.2570
5/16	P	0.3230
3/8	W	0.3860

Table 10-2. Drill Sizes for Blind Rivets

NOMINAL DIAMETER (INCH)				OVERSIZE DIAMETER (INCH)			
RIVET DIAMETER	DRILL SIZE	MINIMUM	MAXIMUM	RIVET DIAMETER	DRILL SIZE	MINIMUM	MAXIMUM
1/8	#30	0.129	0.132	1/8	#27	0.143	0.146
5/32	#20	0.160	0.164	5/32	#16	0.176	0.180
3/16	#10	0.192	0.196	3/16	#5	0.205	0.209

- (c) Place drill in center mark for new rivet locations, or align drill with old hole when replacing old rivets with oversize rivets. When using a power drill, give the bit a few turns with fingers before starting motor. This will help assure that drill does not jump out of position when motor is started.

10-66. BODY REPAIR (Cont'd)

NOTE

- While drilling, hold drill at 90 degree angle to material surface. Avoid letting drill wobble, marking oblong holes.
- Avoid excessive pressure. Let drill bit do the cutting.
- Do not push drill through material.

- (d) Remove all burrs with a metal countersink or file.
- (e) Clean away all drill chips. Care must be taken to assure that no chips are trapped between sheets of metal.
- (f) Apply sealing compound to hole and surrounding area.

5. Hole Countersinking.

NOTE

Some rivet installations in the body require that rivet head be flush with the material surface. In these instances, countersunk or flush head rivets are used.

- (a) When using countersunk rivets, rivet holes must be countersunk with a tool having a 100° taper so rivet head will fit flush with surface.
- (b) When using a hand-operated countersink, the hole must be tried with a rivet so the recess will not be too deep or too shallow. It is best to use a countersink with a stop on it so depth of countersink can be controlled. Typical countersinking dimensions for blind rivets are shown in table 10-3. The minimum sheet thickness that can be machined for 100° countersink rivets is given in table 10-4.
- (c) Do not remove edge of hole on blind side of joint.

Table 10-3. Countersinking Dimensions for 100° Countersunk Blind Rivets

COUNTERSINKING DIMENSIONS (100°)		
← C →		
	010R. MIN.	
RIVET DIAMETER (INCH)	C (INCH)	
	MINIMUM	MAXIMUM
1/8	0.222	0.228
5/32	0.283	0.289
3/16	0.350	0.356

010R.
MIN.

Table 10-4. Minimum Sheet Gage & 100° Machine Countersink

RIVET SIZE (INCH)	3/32	1/8	5/32	3/16	1/4
GAGE (INCH)	0.040	0.050	0.064	0.072	0.072

10-66. BODY REPAIR (Cont'd)

6. Blind Rivet Driving Practices and Precautions.

- (a) Rivets should be inspected for proper installation. The grip length of each rivet is marked on top of its head to provide positive identification. Use of proper grip length will produce a rivet installation where locking collar is flush with top surface of rivet head. Tolerance limit on flushness is 0.020 in. (0.5 mm).
- (b) For proper rivet installation, it is imperative that holes be properly prepared, tools be in good working order, and rivets properly applied. When problems occur, the source of trouble could be in any of these areas.

7. Blind Rivet Installation.

NOTE

- Prior to installing blind rivets, the hole must be prepared, the parts aligned and clamped firmly in place. These steps are the same as for solid riveting operations. Proper drill sizes for standard and oversized blind rivets are given in table 10-2. Countersinking dimensions and minimum sheet gage for countersunk blind rivets are shown in tables 10-3 and 10-4.
- It is very important that the proper length rivet is selected for each application. Rivet lengths are sized by the range of material thickness that the rivet will grip. Selecting the proper rivet length is critical because rivets can tolerate only 1/16 inch variation in material thickness for each particular rivet length. Rivet grip lengths are called out as a “dash number” at the end of the manufacturer’s part number. Grip lengths are determined as shown in table 10-5.
- For double dimpled sheets, add countersunk head height to materials thickness.
- Use rivet installation tool kit for all blind rivets.

Table 10-5. Rivet Grip Length Determination

MATERIAL THICKNESS RANGE (INCH)		RIVET GRIP NO.
MINIMUM	MAXIMUM	
	1/16	1
	1/8	2
1/8	3/16	3
3/16	1/4	4
1/4	5/16	5
5/16	3/8	6
3/8	7/16	7
7/16	1/2	8
1/2	9/16	9
9/16	5/8	10
5/8	11/16	11
11/16	3/4	12

10-66. BODY REPAIR (Cont'd)

- (a) Insert rivet stem into pulling head of rivet gun.
 - (b) Hold rivet gun in line with axis of rivet as accurately as possible.
 - (c) Apply a steady firm pressure against rivet head.
 - (d) Squeeze handles of manual gun. The rivet clamping action will pull sheets together, seat rivet head, and break stem flush with head of rivet.
8. Rivnut/Plusnut/Insertnut Installation.
- (a) Thread rivnut onto mandrel of installation tool.
 - (b) Insert rivnut into hole for installation.
 - (c) Apply steady firm pressure against rivnut head.
 - (d) Squeeze handles of tool to clinch rivnut shank against material.
 - (e) Remove mandrel from rivnut.

10-67. "B" PILLAR REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M998, M998A1, M1035, M1035A1, M1035A2,
M1037, M1038, M1038A1, M1042

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

- Soft top removed, if installed (TM 9-2320-280-10).
- Soft top door strikers removed, if installed (para. 10-103).
- Three point seatbelt removed (para. 10-48 or 10-48.1).

Materials/Parts

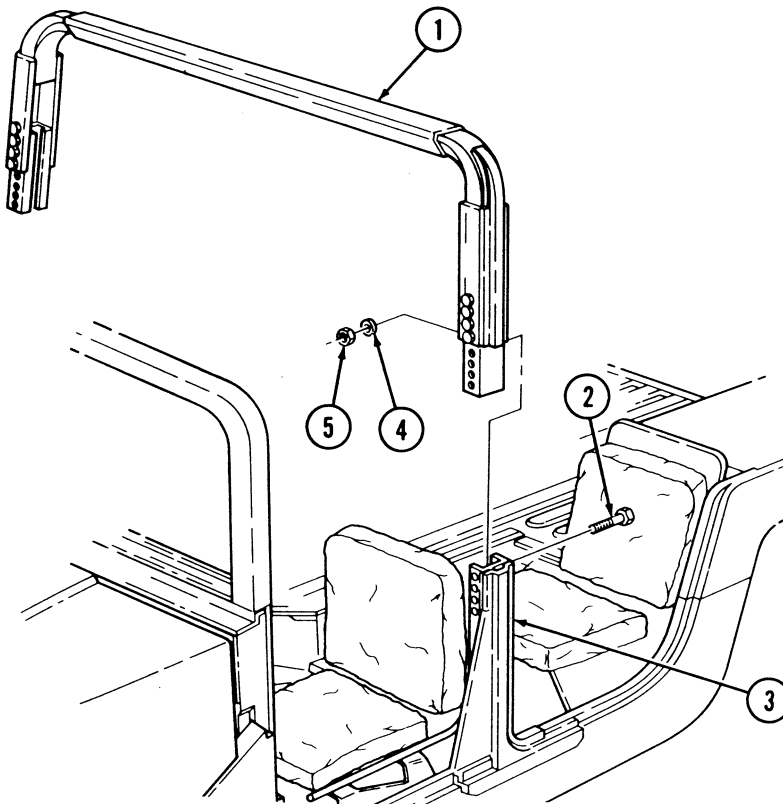
Twelve locknuts (Appendix G, Item 86)

a. Removal

Remove twelve locknuts (5), washers (4), capscrews (2), and "B" pillar (1) from body (3). Discard locknuts (5).

b. Installation

Install "B" pillar (1) on body (3) with twelve capscrews (2), washers (4), and locknuts (5). Tighten locknuts (5) to 15 lb-ft (20 N•m).



- FOLLOW-ON TASKS:
- Install soft top, if removed (TM 9-2320-280-10).
 - Install soft top door strikers, if removed (para. 10-103).
 - Install three point seatbelt (para. 10-48 or 10-48.1).

10-68. M11 DECONTAMINATION BRACKETS INSTALLATION

This task covers:

Installation

INITIAL SETUP:

Applicable Models

M966, M966A1, M998, M998A1, M1025, M1025A1, M1025A2, M1026, M1026A1, M1036, M1037, M1038, M1038A1, M1042, M1121

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

NOTE

The following procedure is for initial installation of apparatus (P/N D5-51-269). This apparatus is not included in TM 9-2320-280-24P.

Installation

NOTE

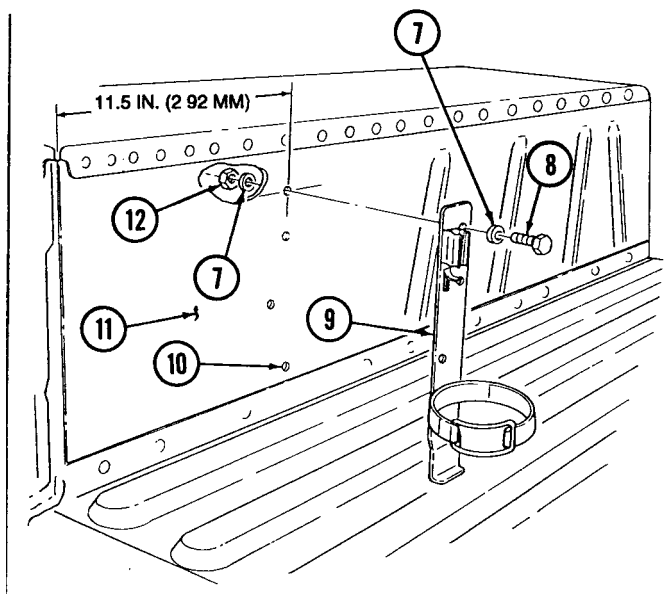
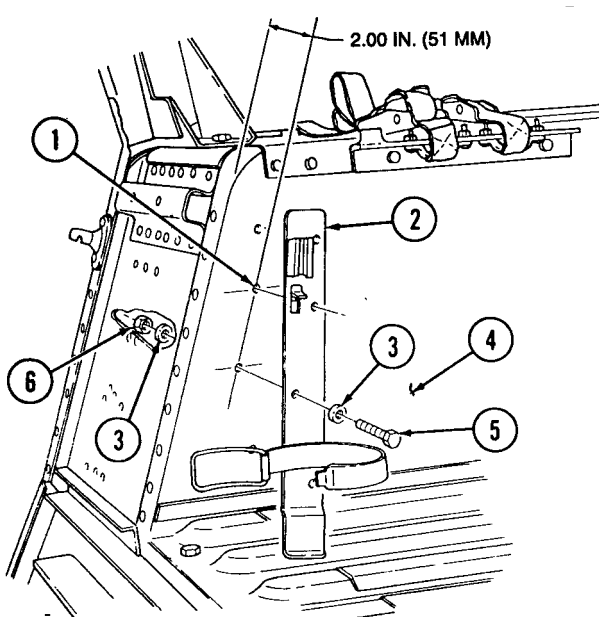
Perform steps 1 and 2 for models M966, M966A1, and M1036 vehicles only.

1. Using bracket (2) as a template, locate, mark, and drill four 0.281-inch (7.14 mm) diameter holes (1) in right wheel housing (4).
2. Install bracket (2) on right wheel housing (4) with four washers (3), screws (5), washers (3), and nuts (6).

NOTE

Perform steps 3 and 4 for models M998, M998A1, M1038, and M1038A1 vehicles only.

3. Using bracket (9) as a template, locate, mark, and drill four 0.281-inch (7.14 mm) diameter holes (10) in left wheel housing (11).
4. Install bracket (9) on left wheel housing (11) with four washers (7), screws (8), washers (7), and nuts (12).

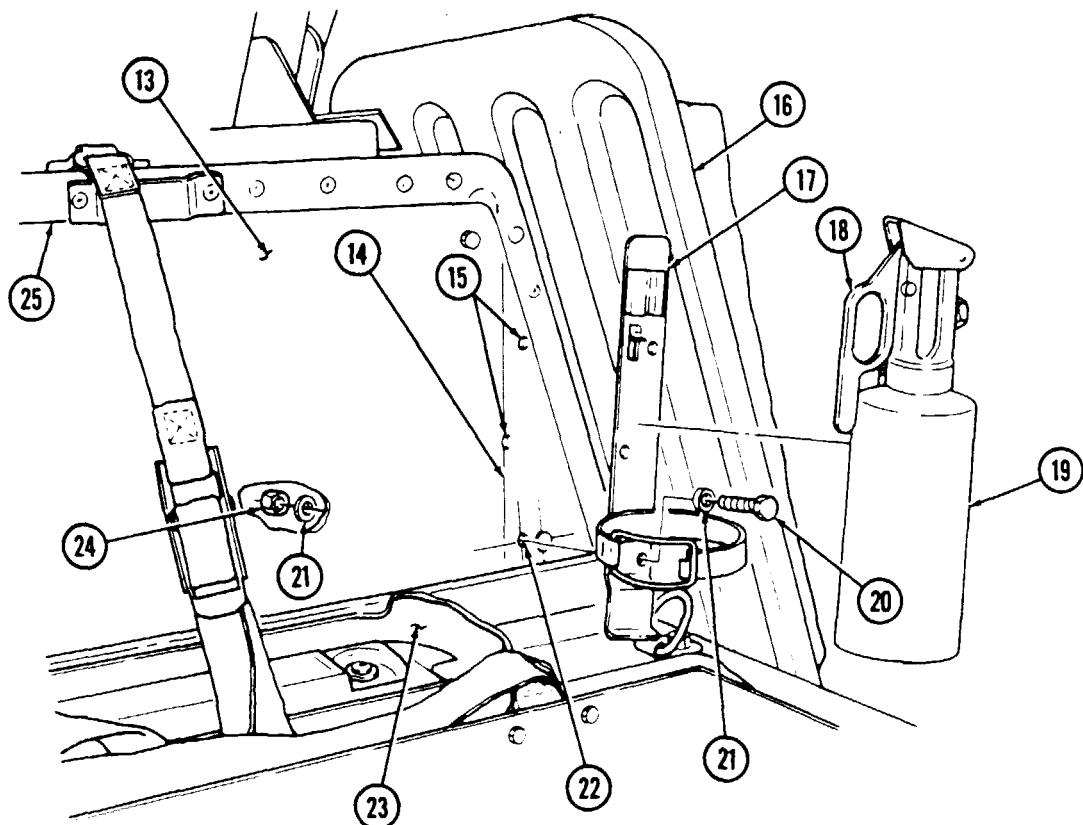


10-68. M11 DECONTAMINATION BRACKETS INSTALLATION (Cont'd)

NOTE

Perform steps 5 through 10 for models M1025, M1025A1, M1025A2, M1026, and M1026A1 vehicles only.

5. Using bracket (17) as a template, locate, mark, and drill a 0.281-inch (7.14 mm) diameter hole (22) through armor panel (13) and left wheel housing (25).
6. Install bracket (17) on armor panel (13) and left wheel housing (25) with washer (21), screw (20), washer (21), and nut (24). Do not tighten nut (24).
7. Position M11 decontaminating apparatus (19) in bracket (17) with handle (18) toward rear of vehicle.
8. Place top of M11 decontaminating apparatus (19) and bracket (17) between rear seat (16) and M13 decontamination mount bracket (23) in an upright position. Using bracket (17) as a template, scribe a reference line (14) on armor panel (13). Remove M11 decontaminating apparatus (19) from bracket (17).
9. Using marked reference line (14) on armor panel (13) and bracket (17) as a template, locate, mark, and drill two 0.281-inch (7.14mm) diameter holes (15).
10. Install bracket (17) on armor panel (13) with two washers (21), screws (20), washers (21), and nuts (24). Tighten screw (20) and nut (24) installed in step 6.

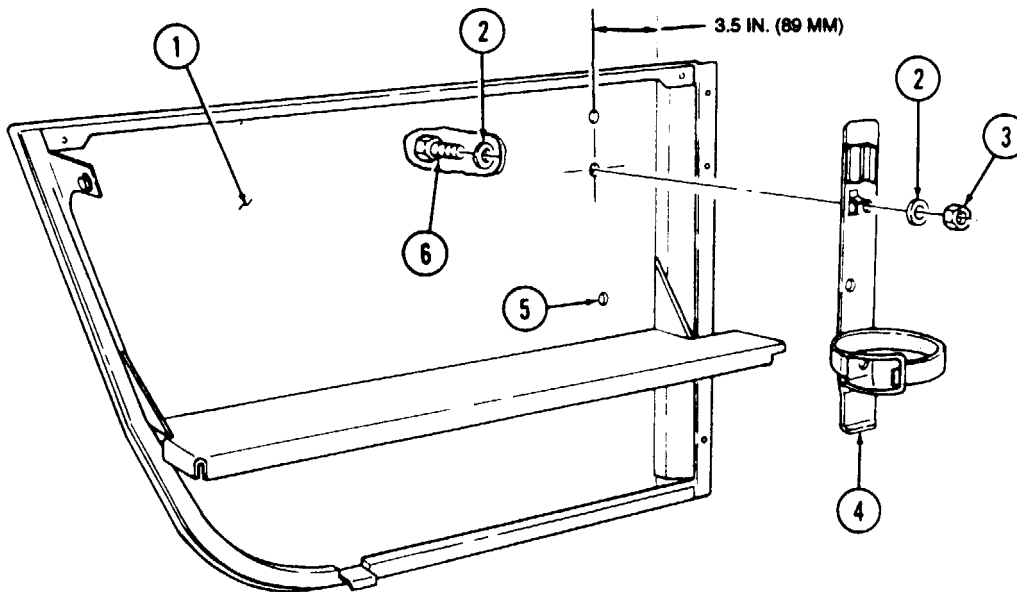


10-68. M11 DECONTAMINATION BRACKETS INSTALLATION (Cont'd)

NOTE

Perform steps 11 through 14 for model M1037 and M1042 vehicles only.

11. Remove left rear fixed door (1) (para. 10-14).
12. Using bracket (4) as a template, locate, mark, and drill four 0.281-inch (7.14 mm) diameter holes (5) in left rear fixed door (1).
13. Install bracket (4) on left rear fixed door (1) with four washers (2), screws (6), washers (2), and nuts (3).
14. Install left rear fixed door (1) (para. 10-14).



Section II. BODY ACCESSORIES MAINTENANCE

10-69. BODY ACCESSORIES MAINTENANCE TASK SUMMARY

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10-69. BODY ACCESSORIES MAINTENANCE TASK SUMMARY (Cont'd)
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TASK PARA.	PROCEDURES	PAGE NO.
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10-70. WINDSHIELD WIPER BLADE AND ARM MAINTENANCE

This task covers:

- | | |
|---|------------------------|
| <p>a. Removal</p> <p>b. Repair (Optional)</p> | <p>c. Installation</p> |
|---|------------------------|

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Materials/Parts

Spring (Appendix G, Item 299.1)

NOTE

Ensure windshield wiper motor switch is in OFF position. Note position of wiper arm for installation.

a. Removal

NOTE

Perform only if wiper blade and arm assembly is to be replaced.

1. Remove screw (1), nut (10), and blade assembly (8) from wiper arm (2).
2. Lift wiper arm (2) away from windshield (9).
3. Lift up latch (3) at base of wiper arm (2) and remove wiper arm (2) from splined shaft (4).

b. Repair (Optional)

NOTE

If spring inside wiper arm loses its tension, it can be replaced with spring as an alternate to replacing the wiper arm.

1. Remove wiper arm (2) and blade assembly (8). See task a.
2. Remove spring (7) from wiper arm (2). Discard spring (7).
3. Install spring (7) in second hole (6) of wiper arm tabs (5).
4. Install wiper arm (2) and blade assembly (8). See task c.

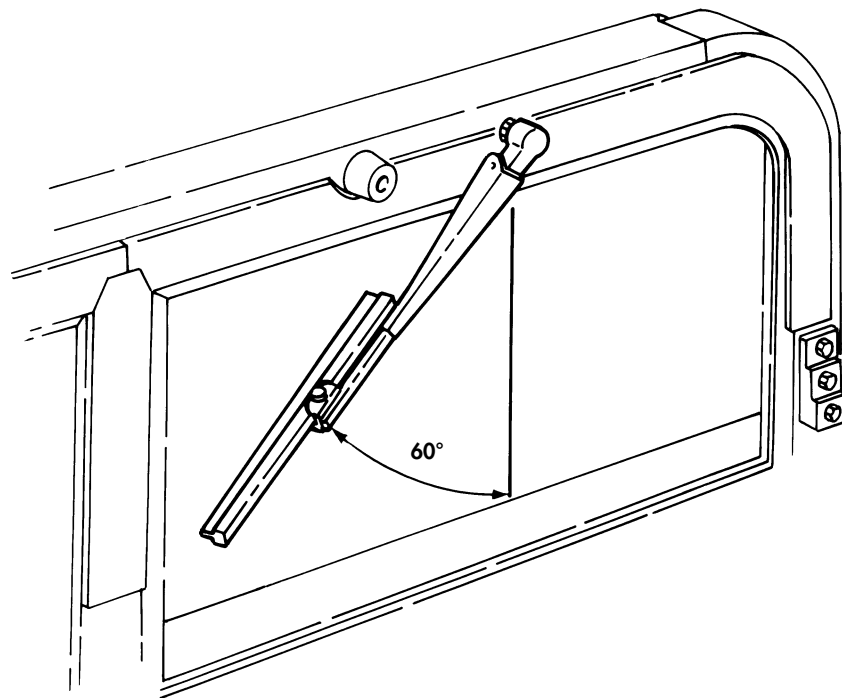
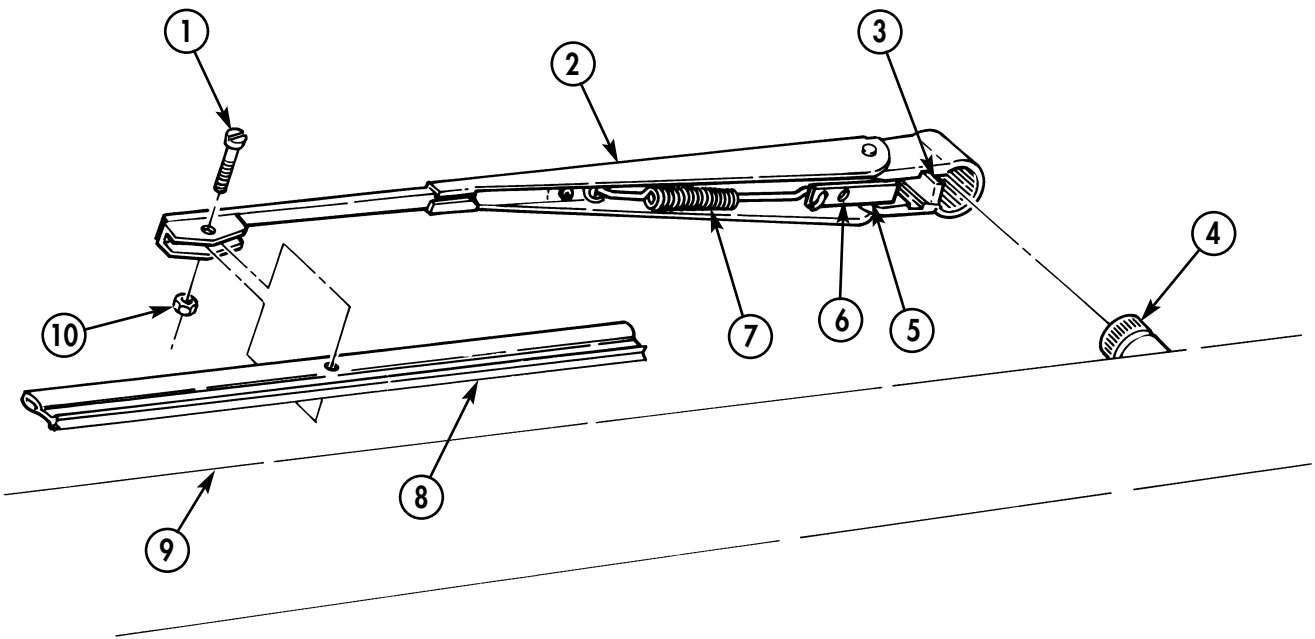
c. Installation

NOTE

- Perform only if wiper blade and arm assembly was removed.
- With motor switched OFF (parked position), mount wiper arm approximately 60° to vertical centerline, so that a sweep of approximately 120° will be achieved in operation.

1. Ensure wiper arm latch (3) is unlocked.
2. Install wiper arm (2) on splined shaft (4).
3. Install blade assembly (8) on wiper arm (2) with screw (1) and nut (10).

10-70. WINDSHIELD WIPER BLADE AND ARM MAINTENANCE (Cont'd)



FOLLOW-ON TASK: Check windshield wiper for proper operation (TM 9-2320-280-10).

10-71. WINDSHIELD WIPER MOTOR (SF5578716) REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Materials/Parts

Adhesive-sealant (Appendix C, Item 10)
Two lockwashers (Appendix G, Item 175)
Gasket (Appendix G, Item 40.1)

Equipment Condition

Battery ground cable disconnected (para. 4-73).

a. Removal

NOTE

The windshield wiper motor for this application is no longer available. For replacement of a defective windshield wiper motor, refer to para. 10-72.

1. Disconnect connector (20) from wiper motor (15).
2. Remove screw (16) and washer (17) from wiper motor bracket (18) and windshield frame (1).
3. Remove screw (12), lockwasher (11), and ground lead 57G (10) from wiper motor (15). Discard lockwasher (11).
4. Remove three capscrews (9) and washers (8) from antenna cable clamp (7) (M996, M996A1, M997, M997A1, and M997A2 only), wiper motor mounting plate (4), and windshield frame (1).
5. Pull wiper motor mounting plate (4) and wiper motor (15) away from windshield frame (1) for access to cap screw (2).
6. Remove screw (14) and lockwasher (13) from wiper motor (15) and motor mounting plate (4), and separate wiper motor (15) and gasket (19) from motor mounting plate (4). Discard lockwasher (13) and gasket (19).
7. Remove cap screw (2) from motor drive lever assembly (3) and wiper motor (15), and remove wiper motor (15) and wiper motor mounting plate (4) from windshield frame (1).
8. Remove right access cover (6) from windshield frame (1).

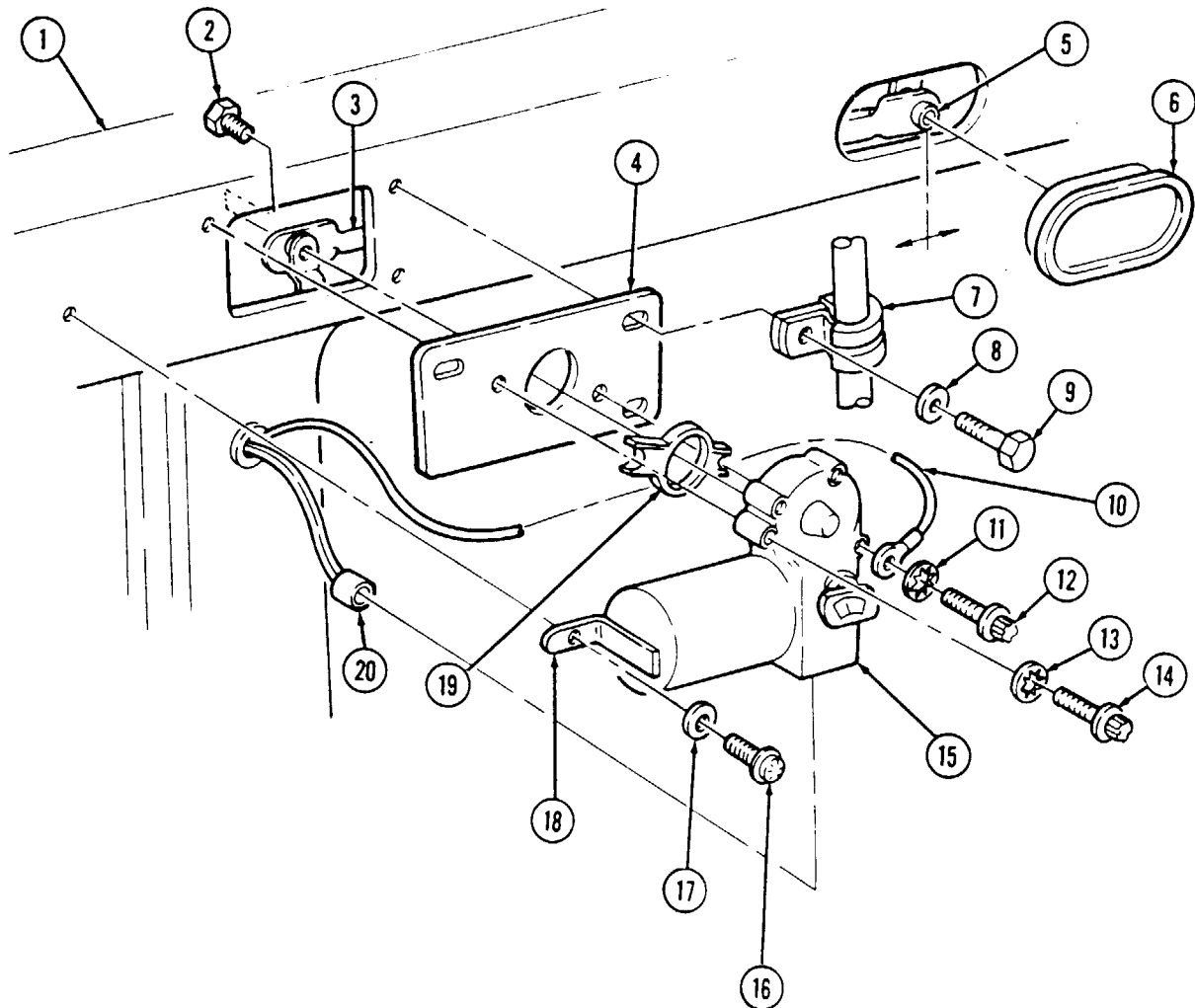
b. Installation

NOTE

- Coat wiper motor and both sides of mounting plate with adhesive-sealant. Allow to dry approximately 2 hours.
 - To ease future wiper/motor removal and installation, the twelve point screws used in steps 1 and 3 may be discarded and replaced with hex head screws (NSN 5305-00-071-2505).
1. Install wiper motor (15) and gasket (19) on wiper motor mounting plate (4) with lockwasher (13) and screw (14).
 2. Position wiper motor mounting plate (4), gasket (19), and wiper motor (15) in windshield frame (1) and install motor drive lever assembly (3) on wiper motor (15) with cap screw (2).
 3. Install ground lead 57G (10) and wiper motor (15) on wiper motor mounting plate (4) with lockwasher (11) and screw (12).

10-71. WINDSHIELD WIPER MOTOR (SF5578716) REPLACEMENT (Cont'd)

8. Install wiper motor bracket (18) on windshield frame (1) with washer (17) and screw (16).
9. Install right access cover (6) on windshield frame (1).



- FOLLOW-ON TASKS:**
- Connect battery ground cable (para 4-73).
 - Check wiper motor for proper operation (TM 9-2320-280-10).

10-72. WINDSHIELD WIPER SWITCH/MOTOR (12342501) REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Materials/Parts

Lockwasher (Appendix G, Item 176)
Lockwasher (Appendix G, Item 193)
Lockwasher (Appendix G, Item 175)

Equipment Condition

Battery ground cable disconnected (para. 4-73).

a. Removal

NOTE

Perform steps 1 through 4 for removal of wiper motor switch.
Proceed to step 5 for removal of wiper motor assembly.

1. Disconnect lead (12) from wiper switch (11).
2. Depress retaining clip on back of knob (15) and remove knob (15) from wiper switch (11).
3. Remove nut (14) and lockwasher (13) from wiper switch (11) and wiper motor mounting plate (10). Discard lockwasher (13).
4. Disconnect switch connector (9) from wiper motor (5) and remove wiper switch (11).
5. Remove screw (16) and lockwashers (17) and (19) from ground lead 57G (18) and wiper motor mounting plate (10). Discard lockwashers (17) and (19).
6. Remove three capscrews (8) and washers (7) from antenna cable clamp (6) (M996 and M997 only), wiper motor (5), and windshield frame (2).
7. Pull wiper motor (5) away from windshield frame (2) for access to clip (3).
8. Remove clip (3) and disconnect connecting links (1) and (4) from wiper motor (5) and remove wiper motor (5) from windshield frame (2).

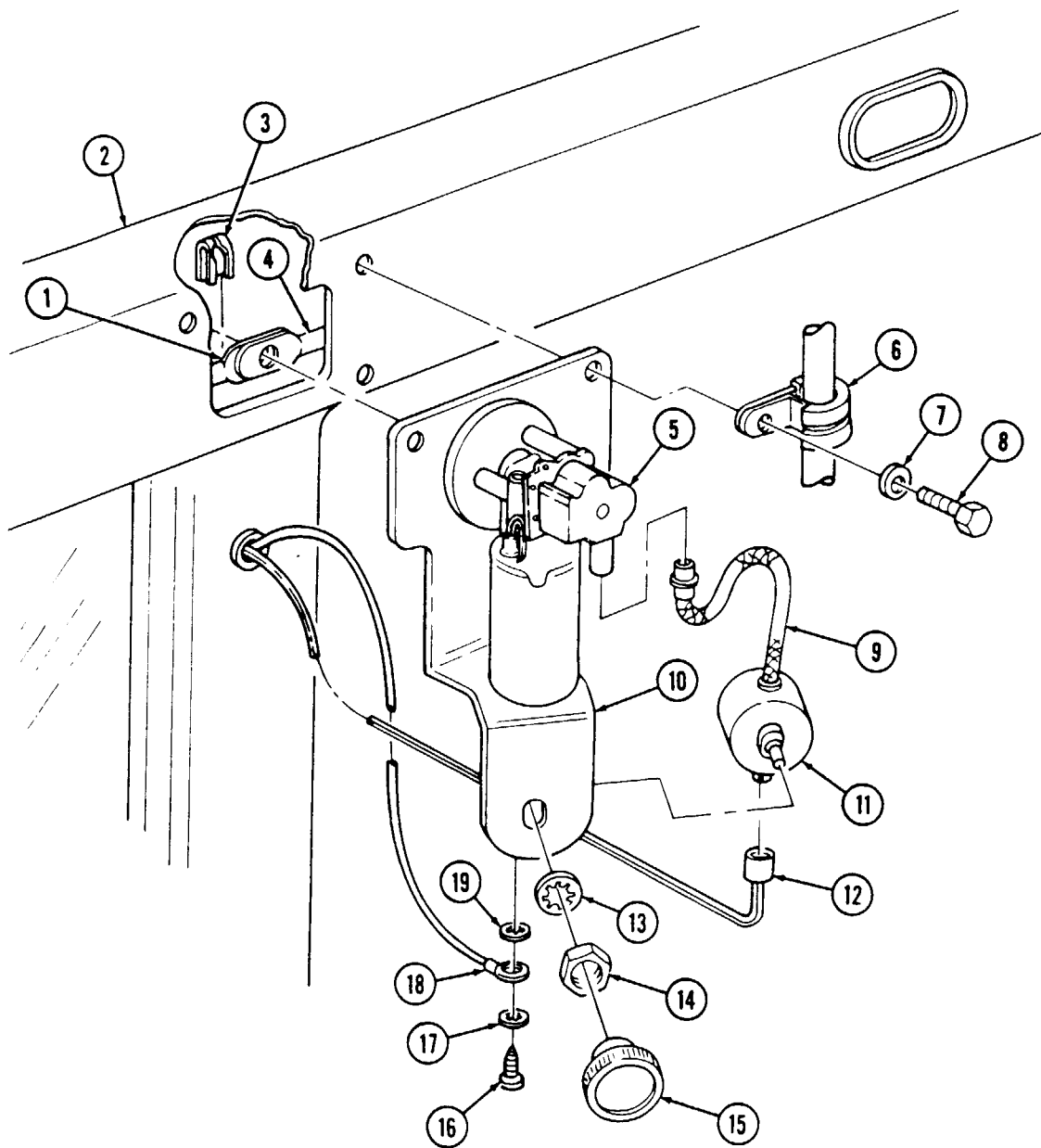
b. Installation

NOTE

Perform steps 1 through 4 for installation of wiper motor switch.
Proceed to step 5 for installation of wiper motor assembly.

1. Install wiper switch (11) on wiper motor mounting plate (10) with lockwasher (13) and nut (14).
2. Depress retaining clip on back of knob (15) and install knob (15) on wiper switch (11).
3. Connect switch connector (9) to wiper motor (5).
4. Connect lead (12) to wiper switch (11).
5. Position wiper motor (5) in windshield frame (2) install connecting links (4) and (1) on wiper motor (5) with clip (3).
6. Install wiper motor (5) and antenna cable clamp (6) (M996 and M997 only) on windshield frame (2) with three washers (7) and capscrews (8).
7. Install ground lead 57G (18) on wiper motor mounting plate (10) with lockwashers (19) and (17) and screw (16).

10-72. WINDSHIELD WIPER SWITCH/MOTOR (12342501) REPLACEMENT (Cont'd)



FOLLOW-ON TASKS: •Connect battery ground cable (para 4-73),
 •Check wiper motor for proper operation (TM 9-2320-280-10).

10-73. WINDSHIELD WIPER LINKAGE REPLACEMENT

This task covers:

a Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-24P

Equipment Condition

- Windshield wiper switch/motor (12342501) removed (para. 10-72).
- Windshield wiper motor (SF5578716) removed (para. 10-71).

a. Removal

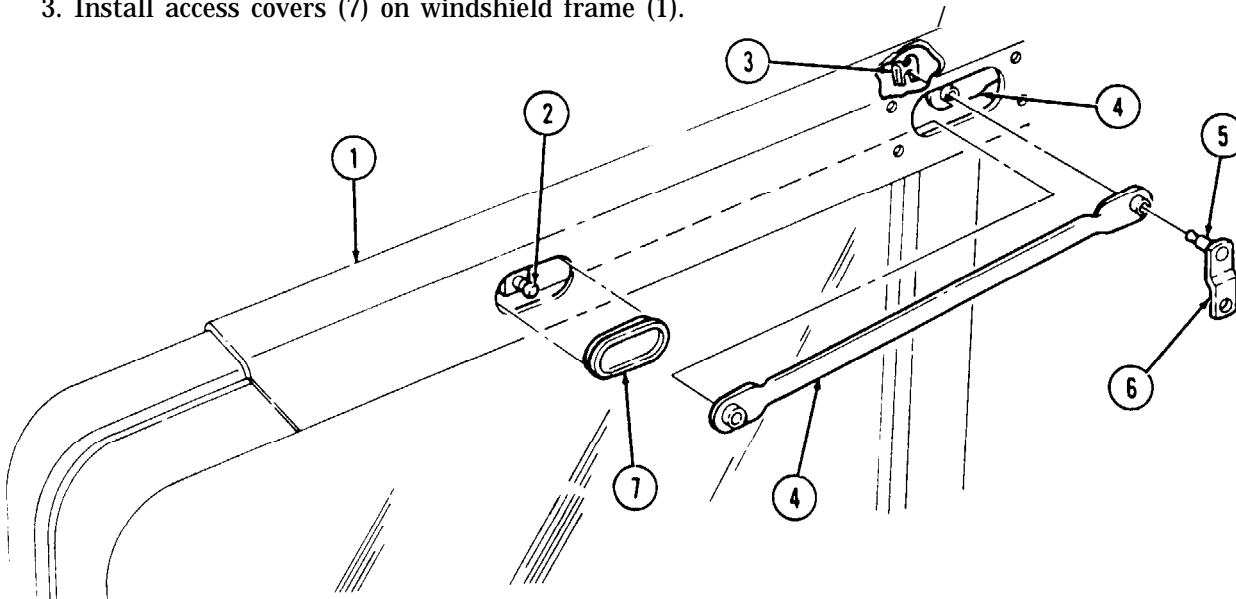
1. Remove two access covers (7) from windshield frame (1).
2. Pull connector arm retainer (3) from ball stud (5) and remove motor drive lever (6) from connector arms (4).
3. Disconnect connector arms (4) from wiper arm pivots (2) and remove connector arms (4) through center access in windshield frame (1).

b. Installation

CAUTION

Install the left (driver's) side connector arm first or damage to equipment will result.

1. Install connector arms (4) through center access on windshield frame (1) and connect connector arms (4) to wiper arm pivots (2).
2. Connect connector arms (4) together with motor drive lever (6) and connector arm retainer (3) on ball stud (5).
3. Install access covers (7) on windshield frame (1).



FOLLOW-ON TASK: • Install windshield wiper switch/motor (12342501) (para. 10-72).
• Install windshield wiper motor (SF5578716) (para. 10-71).

10-74. WINDSHIELD WIPER ARM PIVOT REPLACEMENT

This task covers:

- a. Repair (Optional)
- b. Removal

c Installation

INITIAL SETUP

Tools

General mechanic's tool kit
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-24P

Equipment Condition

- Windshield wiper linkage removed (para. 10-73).
 - Windshield wiper blade and arm removed (para. 10-70).
-

a. Repair (Optional)

NOTE

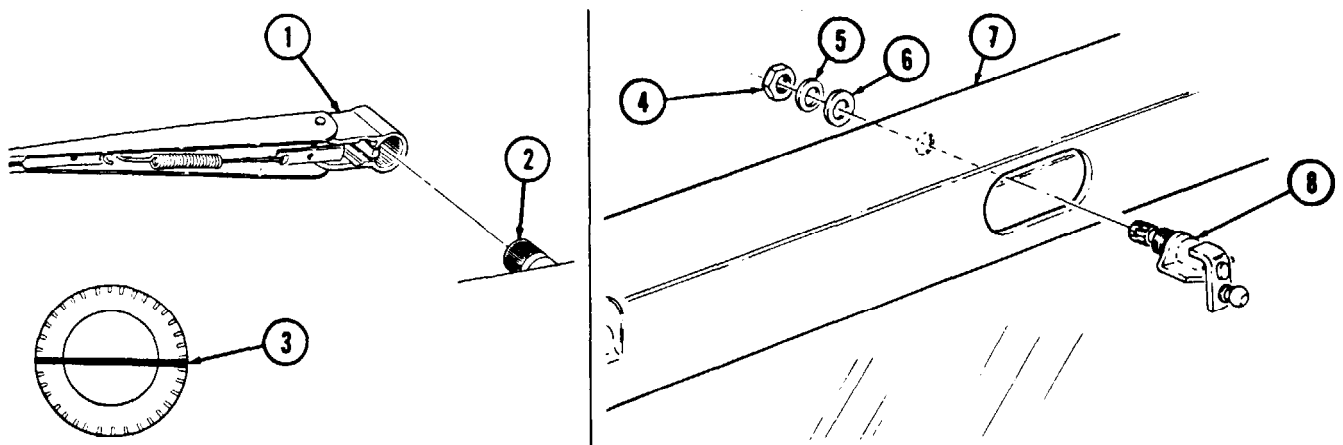
- Steps 1 through 3 is an alternative repair for the windshield wiper arm pivot. The repair can be done at commander's discretion.
 - For easy handling, use of an old wiper arm as a hole guide is recommended. This will also protect the splined surface of the pivot.
 - Use roll pin (5315-01-027-4759) for repair.
1. Center punch the side of the wiper arm (1). Position the wiper arm (1) so it is horizontal for drilling
 2. Drill a 3/32 in. hole halfway through the center shaft (2). remove the old wiper arm (1), and continue drilling all the way through the shaft (2) and cap.
 3. Using a small hammer or punch drive a roll pin (3) into the hole until it is flush with the surface. Replace the original wiper arm.

b Removal

Remove nut (4), washer (5), seal (6), and pivot (8) from windshield frame (7).

c Installation

Install pivot (8) on windshield frame (7) with seal (6), washer (5), and nut (4).



- FOLLOW-ON TASKS:
- Install windshield wiper blade and arm (para. 10-73).
 - Install windshield wiper linkage (para. 10-70).

10-75. WINDSHIELD WASHER RESERVOIR AND PUMP ASSEMBLY REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Materials/Parts

Two lockwashers (Appendix G, Item 135)
Lockwasher (Appendix G, Item 138)
Plain-assembled nut (Appendix G, Item 201)
Packing retainer (Appendix G, Item 229)

Equipment Condition

- Battery ground cable disconnected (para. 4-73).
- Hood raised and secured (TM 9-2320-280-10).

a. Removal

1. Disconnect harness leads 71C (6) and 57D (7) from pump leads (5) under dash panel and remove grommet (3) from cowl (10).
2. Loosen clamp (2) and disconnect windshield washer hose (1) from reservoir and pump assembly (4).

NOTE

Perform steps 3 and 4 for windshield washer reservoir with non-removable pump assembly only. Perform steps 5 through 7 for windshield washer reservoir with removable pump assembly only.

3. Remove plain-assembled nut (4.1), capscrew (1.1), and washer (1.2) from reservoir and pump assembly (4) and cowl (10). Discard plain-assembled nut (4.1).
4. Remove two nuts (12), lockwashers (11), capscrews (8), washers (9), and reservoir and pump assembly (4) from cowl (10). Discard lockwashers (11).
5. Remove two nuts (12), lockwashers (11), capscrews (8), washers (9), and reservoir (18) with pump assembly (4) from cowl (10). Discard lockwashers (11).
6. Remove nut (16), lockwasher (15), washer (14), capscrew (13), washer (14), and pump assembly (4) from reservoir (18). Discard lockwasher (15).
7. Remove packing retainer (17) from reservoir (18). Discard packing retainer (17).

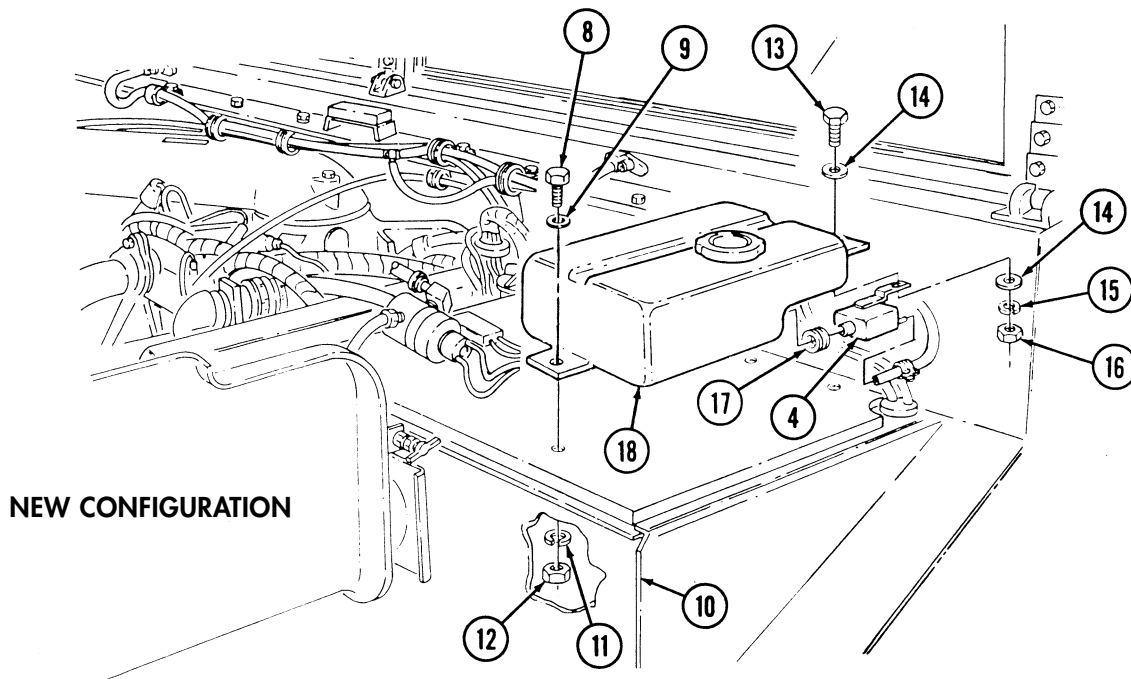
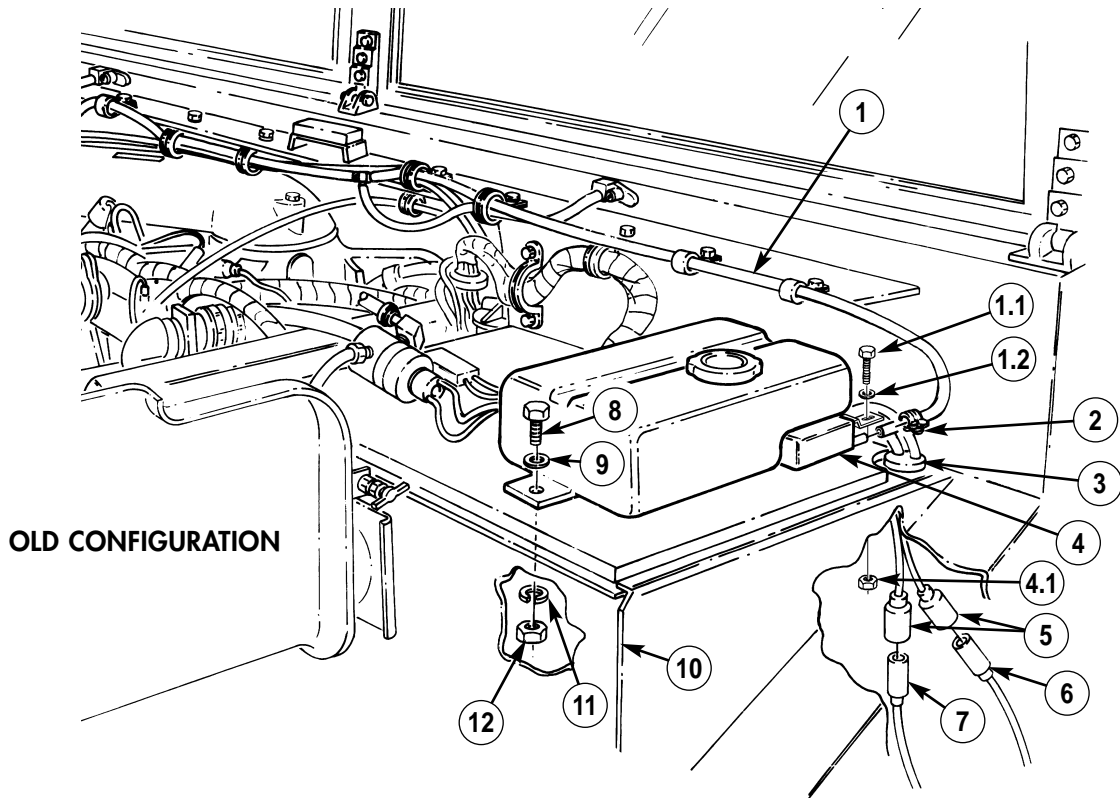
b. Installation

NOTE

Perform steps 1 through 3 for windshield washer reservoir with removable pump assembly only. Perform steps 4 and 5 for windshield washer reservoir with non-removable pump assembly only.

1. Install packing retainer (17) on reservoir (18).
2. Install pump assembly (4) on windshield washer reservoir (18) with washer (14), capscrew (13), washer (14), lockwasher (15), and nut (16). Tighten nut (16) to 6-10 lb-ft (8-14 N•m).
3. Install reservoir (18) and pump assembly (4) on cowl (10) with two washers (9), capscrews (8), lockwashers (11), and nuts (12). Tighten nuts (12) to 8 lb-ft (11 N•m).
4. Install reservoir and pump assembly (4) on cowl (10) with two washers (9), capscrews (8), lockwashers (11), and nuts (12). Tighten nuts (12) to 8 lb-ft (11 N•m).
5. Install capscrew (1.1), washer (1.2), and plain-assembled nut (4.1) on reservoir and pump assembly (4) and cowl (10).
6. Connect windshield washer hose (1) to reservoir and pump assembly (4) and tighten clamp (2).
7. Connect harness leads 71C (6) and 57D (7) to pump leads (5) and install grommet (3) in cowl (10).

10-75. WINDSHIELD WASHER RESERVOIR AND PUMP ASSEMBLY REPLACEMENT (Cont'd)



- FOLLOW-ON TASKS:**
- Fill reservoir (TM 9-2320-280-10).
 - Lower and secure hood (TM 9-2320-280-10).
 - Connect battery ground cable (para. 4-73).

10-76. WINDSHIELD WASHER HOSES REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

Hood raised and secured (TM 9-2320-280-10).

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

a. Removal

1. Remove nut (18), washer (4), capscrew (5), and washer (4) from clamp (3), and remove washer hose (1) from body hood rail (13).
2. Remove two nuts (11), washers (10), capscrews (16), and washers (10) from clamps (9), and remove washer hose (12) from top of body hood rail (13).
3. Loosen clamp (14) and disconnect washer hose (12) from pump (15) and tee (6), and remove through clamp (17).
4. Disconnect washer hose (7) from tee (6) and nozzle (8) and remove through clamp (17).
5. Disconnect washer hose (1) from tee (6) and nozzle (2) and remove through clamp (17).

b. Installation

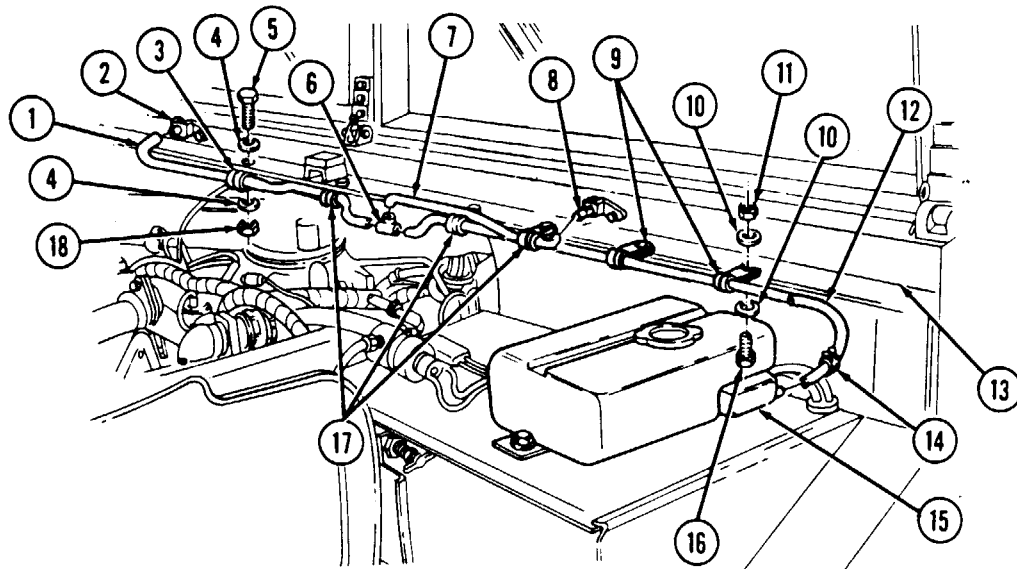
1. Install washer hose (1) through clamp (17) and connect to nozzle (2) and tee (6).
2. Install washer hose (7) through clamp (17) and connect to nozzle (8) and tee (6).
3. Install washer hose (12) through clamp (17) and connect to tee (6) and pump (15) and tighten clamp (14).

NOTE

When mounting the clamps, ensure they are positioned below the hood rest, so when the hood is closed it does not interfere with the clamps or hose.

4. Install washer hose (1) on body hood rail (13) and secure with clamp (3), washer (4), capscrew (5), washer (4), and nut (18).
5. Install washer hose (12) under body hood rail (13) and secure with two clamps (9), washers (10), capscrews (16), washers (10), and nuts (11).

10-76. WINDSHIELD WASHER HOSES REPLACEMENT (Cont'd)



FOLLOW-ON TASK: Lower and secure hood (TM 8-2320-280-10).

10-77. SUN VISOR REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M997A2, M1025A2, M1035A2,
M1043A2, M1045A2, M1097A2, M1123

Materials/Parts

Four lockwashers (Appendix G, Item 133)

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-24P

NOTE

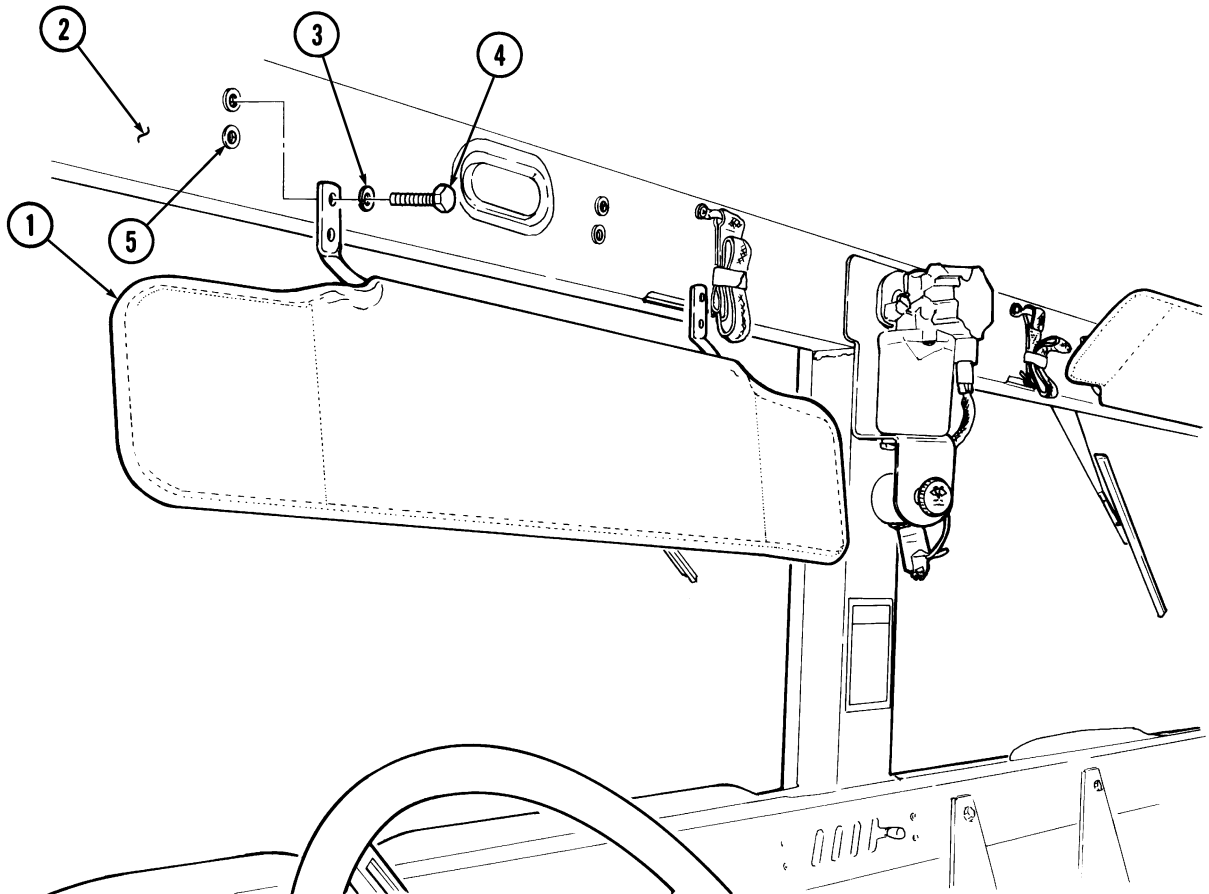
The procedure for left and right sun visors is basically the same.
This procedure covers the left sun visor.

a. Removal

1. Remove four capscrews (4), lockwashers (3), and sun visor (1) from windshield frame (2). Discard lockwashers (3).
2. Inspect four nut inserts (5) for damage. Replace if damaged.

b. Installation

Install sun visor (1) on windshield frame (2) with four lockwashers (3) and capscrews (4).



10-78. WINDSHIELD WASHER NOZZLE REPLACEMENT

This task covers:

a. Removal**b. Installation**

INITIAL SETUP:**Tools**

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

Hood raised and secured (TM 9-2320-280-10).

Manual References

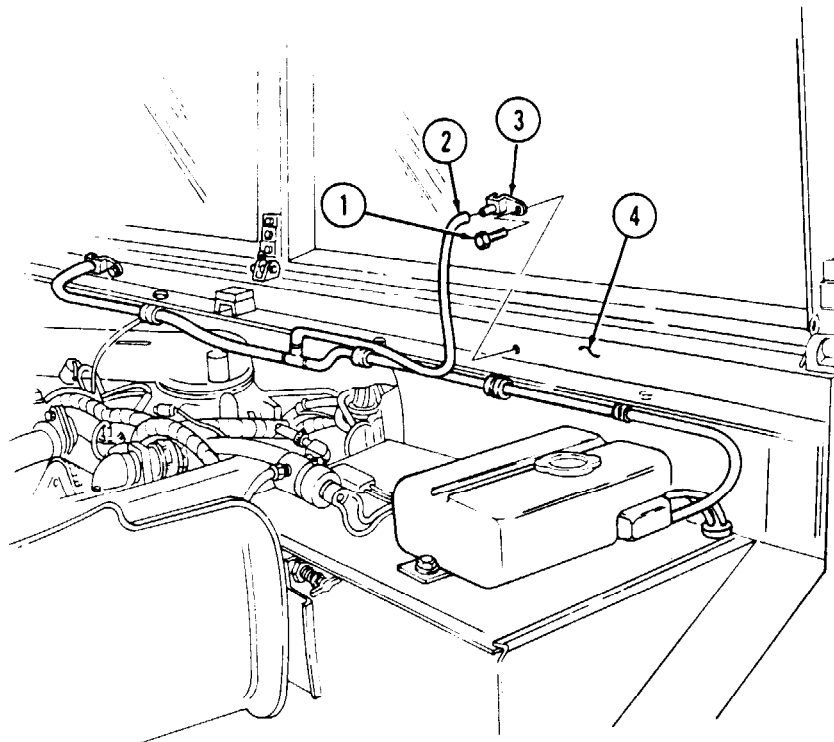
TM 9-2320-280-10
TM 9-2320-280-24P

a. Removal

1. Disconnect hose (2) from nozzle (3).
2. Remove screw (1) and nozzle (3) from body (4).

b. Installation

1. Install nozzle (3) on body (4) with screw (1).
2. Connect hose (2) to nozzle (3).



FOLLOW-ON TASK: Lower and secure hood (TM 9-2320-280-10).

10-79. MIRROR REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-24P

Materials/Parts

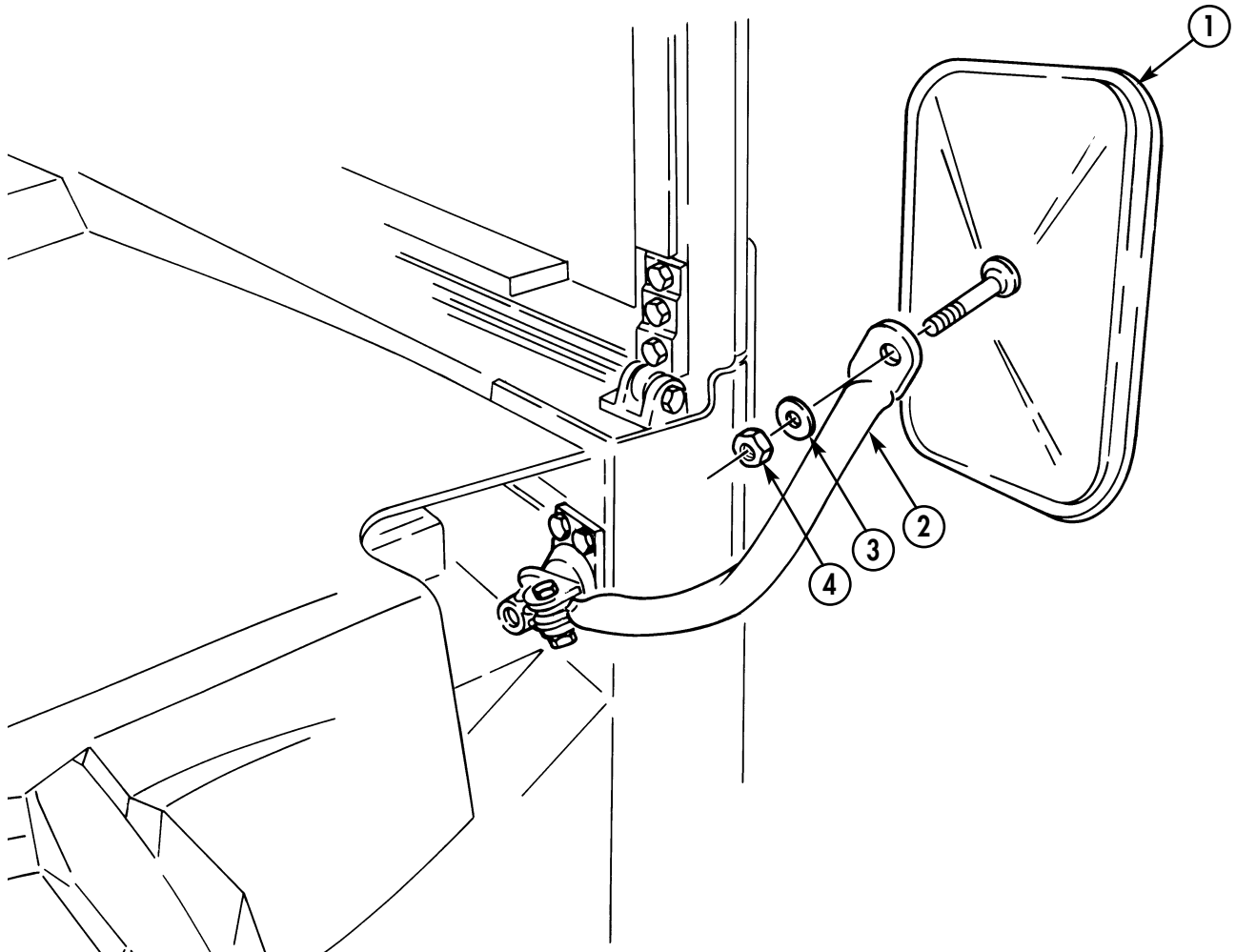
Locknut (Appendix G, Item 84)

a. Removal

Remove locknut (4), washer (3), and mirror (1) from arm assembly (2). Discard locknut (4).

b. Installation

Install mirror (1) on arm assembly (2) with washer (3) and locknut (4). Tighten locknut (4) to 6 lb-ft (8 N·m).



10-80. MIRROR ARM ASSEMBLY REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Lockwasher (Appendix G, Item 134)
Lockwasher (Appendix G, Item 133)
Flat washer (Appendix G, Item 39)

Manual References

TM 9-2320-280-24P

Equipment Condition

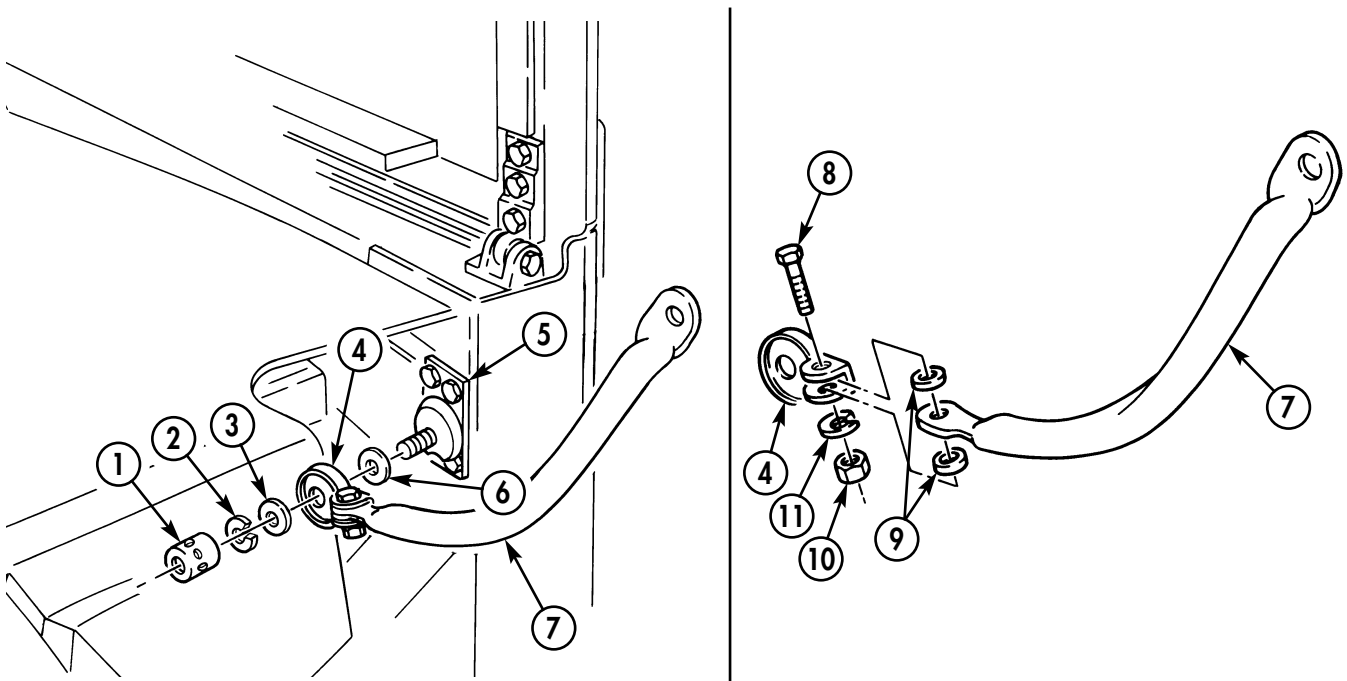
Mirror removed (para. 10-79).

a. Removal

1. Remove special nut (1), lockwasher (2), and washer (3) from pivot bracket (4) and mounting bracket (5). Discard lockwasher (2).
2. Remove mirror arm (7), pivot bracket (4), and flat washer (6) from mounting bracket (5). Discard flat washer (6).
3. Remove nut (10), lockwasher (11), capscrew (8), two spacers (9), and mirror arm (7) from pivot bracket (4). Discard lockwasher (11).

b. Installation

1. Install two spacers (9) and mirror arm (7) on pivot bracket (4) with capscrew (8), lockwasher (11), and nut (10). Tighten nut (10) to 15 lb-ft (20 N·m).
2. Install flat washer (6), pivot bracket (4), and mirror arm (7) on mounting bracket (5) with washer (3), lockwasher (2), and special nut (1).



FOLLOW-ON TASK: Install mirror (para. 10-79).

10-81. MIRROR MOUNTING BRACKET REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-24P

Materials/Parts

Four locknuts (Appendix G, Item 79)

Equipment Condition

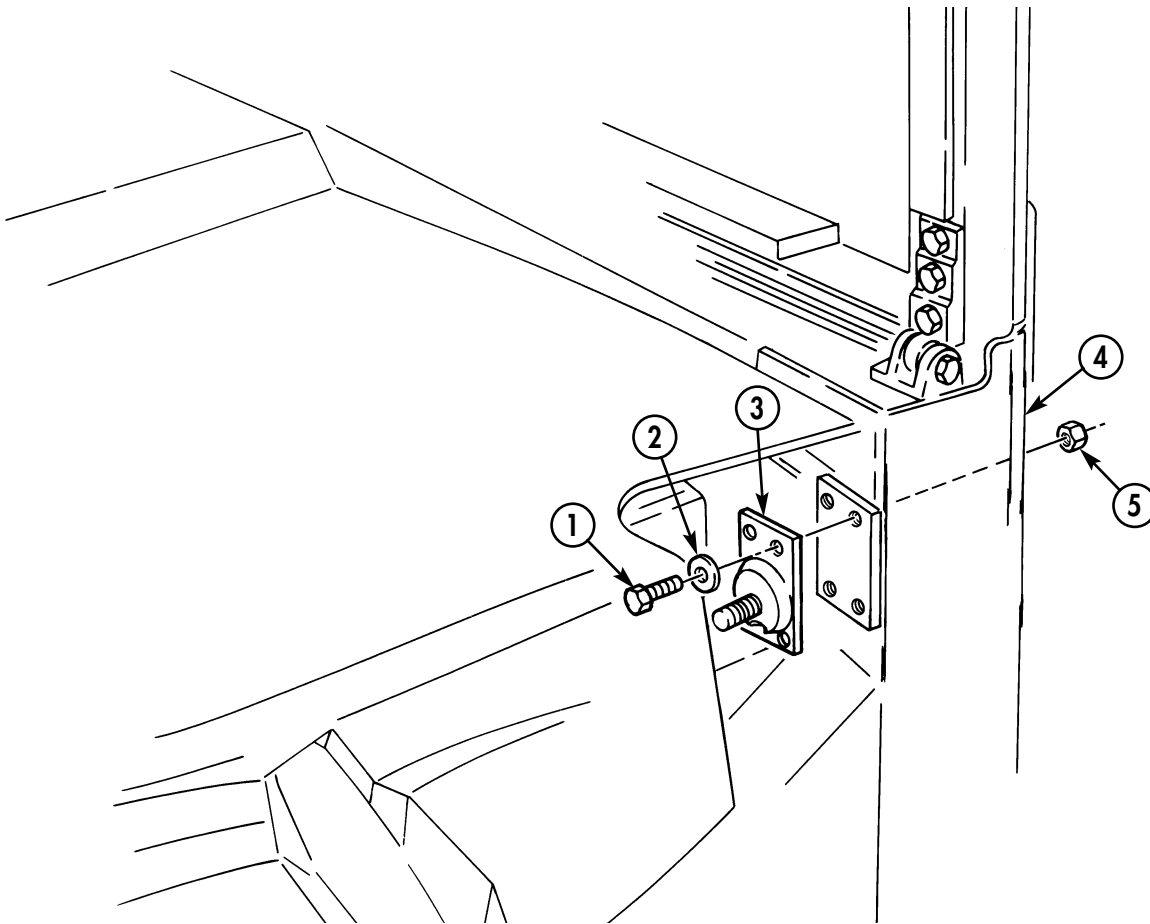
Mirror arm assembly removed (para. 10-80).

a. Removal

Remove four locknuts (5), capscrews (1), washers (2), and mounting bracket (3) from body (4). Discard locknuts (5).

b. Installation

Install mounting bracket (3) on body (4) with four washers (2), capscrews (1), and locknuts (5). Tighten capscrews (1) to 15 lb-ft (20 N·m).



FOLLOW-ON TASK: Install mirror arm assembly (para. 10-80).

10-82. REARVIEW MIRROR MAINTENANCE

This task covers:

- | | |
|----------------|-----------------|
| a. Removal | d. Assembly |
| b. Inspection | e. Installation |
| c. Disassembly | |

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-24P

Materials/Parts

Three locknuts (Appendix G, Item 128)
Four lockwashers (Appendix G, Item 134)
Two locknuts (Appendix G, Item 79)

NOTE

Left and right rearview mirror removal procedures are basically the same. However, the left side rearview mirror upper mounting bracket may be mounted on the top (All A2 Series or M1123) or bottom (Basic/A1 Series) of the mirror assembly. This procedure covers the left rearview mirror.

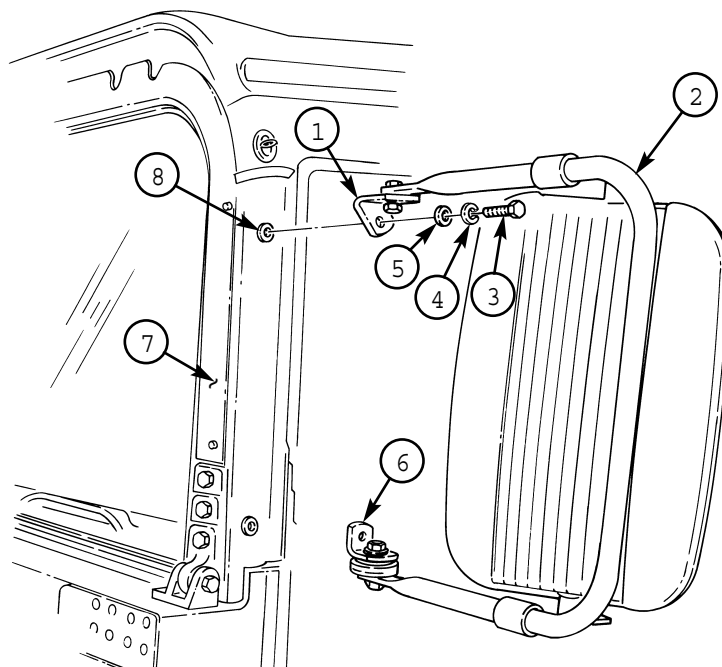
a. Removal

Remove two capscrews (3), lockwashers (4), washers (5), upper mounting bracket (1), lower mounting bracket (6), and mirror assembly (2) from windshield frame (7). Discard lockwashers (4).

b. Inspection

NOTE

For inspection and removal of blind rivet or insertnut, refer to para. 10-66. Inspect blind rivet or insertnut (8) for damage. Replace with insertnut if damaged.



10-82. REARVIEW MIRROR MAINTENANCE (Cont'd)

c. Disassembly

1. Remove two capscrews (10), lockwashers (9), washers (8), spacers (6), and mirror head (5) from mirror brackets (7). Discard lockwashers (9).
2. Remove locknut (21), washer (22), nylon washers (23) and (2), capscrew (4) and upper mounting bracket (1) from mirror arm assembly (3). Discard locknut (21).
3. Remove locknut (20), washer (19), and lower mounting bracket (18) from mirror lock (17). Discard locknut (20).
4. Remove locknut (15), washer (16), and mirror lock (17) from arm assembly (3). Discard locknut (15).

NOTE

To remove clamps, slide clamps off mirror arm assembly.

5. Remove two locknuts (11), washers (12), capscrews (14), two clamps (13), and brackets (7) from mirror arm assembly (3). Discard locknuts (11).

d. Assembly

NOTE

- To install clamps, slide clamps on mirror arm assembly,
- Ensure clamps are positioned on mirror arm assembly to align with center of mirror head.

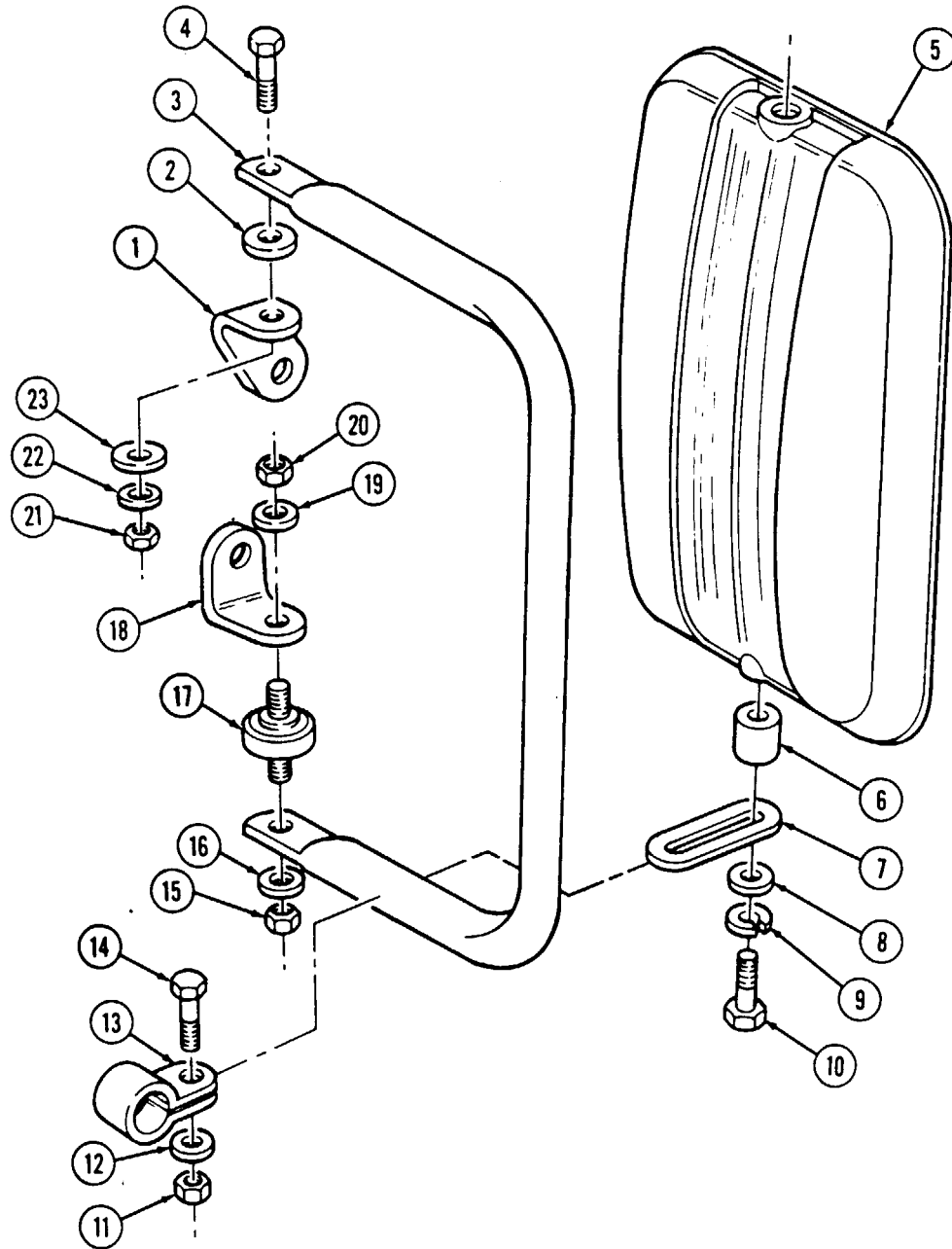
1. Install two clamps (13) and mirror brackets (7) on mirror arm assembly (3). Install mirror brackets (7) between clamps (13) with two capscrews (14), washers (12), and locknuts (11).
2. Install mirror lock (17) on mirror arm assembly (3) with washer (16) and locknut (15).
3. Install lower mounting bracket (18) on mirror lock (17) with washer (19) and locknut (20).
4. Install upper mounting bracket (1) on mirror arm assembly (3) with capscrew (4), nylon washers (2) and (23), washer (22), and locknut (21).

NOTE

Spacers must be positioned between mirror head and mirror brackets for proper installation,

5. Install mirror head (5) and two spacers (6) on mirror brackets (7) with washers (8), lockwashers (9), and capscrews (10).

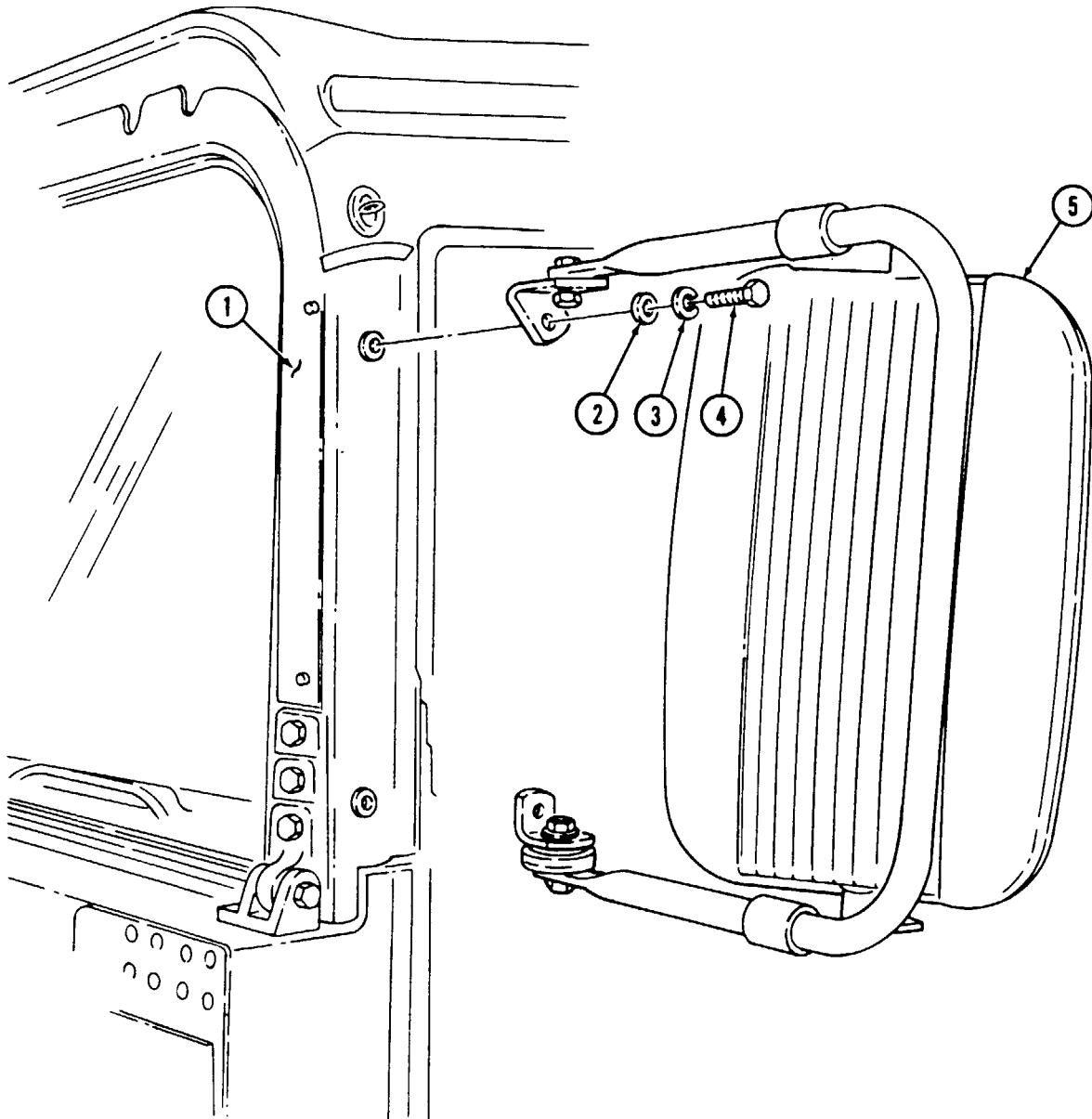
10-82. REARVIEW MIRROR MOUNTING (Cont'd)



10-82. REARVIEW MIRROR MAINTENANCE (Cont'd)

e. Installation

Install mirror assembly (5) on windshield frame (1) with two washers (2), lockwashers (3), and capscrews (4).



FOLLOW-ON TASK: Adjust rearview mirror (TM 9-2320-280-10).

10-83. HEATER SHUTOFF VALVE REPLACEMENT

This task covers:

a. Removal

b Installation

INITIAL SETUP:

Tools

General mechanic's tool kit
automotive (Appendix B, Item 1)

Equipment Condition

Cooling system drained as required (para. 3-60).

Manual References

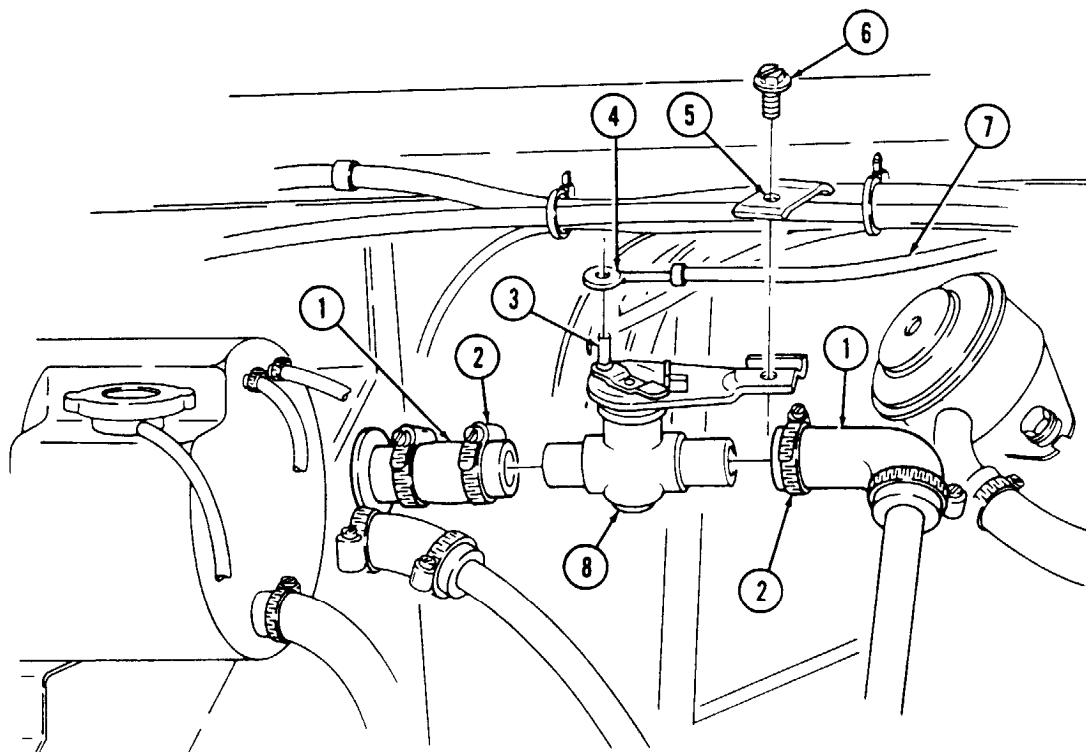
TM 9-2320-280-10
TM 9-2320-280-24P

a. Removal

1. Remove screw (6) and clip (5) from shutoff valve (8).
2. Disconnect control wire (4) of heater control cable (7) from pin (3) of shutoff valve (8).
3. Loosen two clamps (2) and remove shutoff valve (8) from hoses (1).

b. Inspection

1. Connect shutoff valve (8) to two hoses (1) and tighten clamps (2).
2. Connect control wire (4) of heater control cable (7) to pin (3) of shutoff valve (8) with clip (5) and screw (6).



- FOLLOW-ON TASKS:
- Fill cooling system (para. 3-60).
 - Start engine (TM 9-2320-280-10) and check shutoff valve for leaks.

10-84. HEATER OUTLET/INLET PIPING MAINTENANCE

This task covers:

- | | |
|---|---|
| <ul style="list-style-type: none"> a. Removal b. Inspection | <ul style="list-style-type: none"> c. Installation |
|---|---|

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

Cooling system drained as required (para. 3-60).

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

NOTE

Procedures for installing and removing inlet and outlet piping are basically the same. This procedure covers the outlet piping.

a. Removal

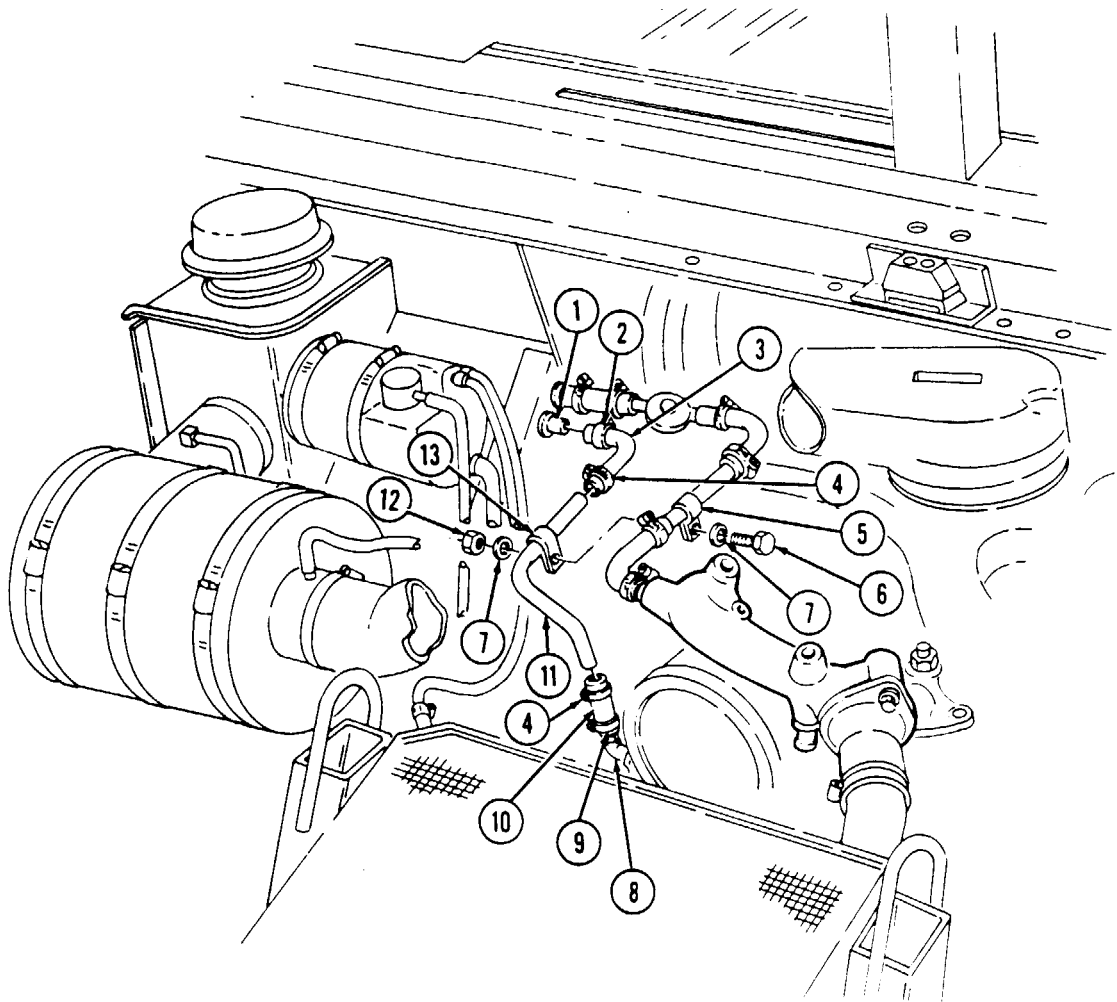
1. Loosen clamp (9) from heater outlet hose (10) and water pump nipple (8) and disconnect outlet hose (10).
2. Remove nut (12), washer (7), capscrew (6), and washer (7) from inlet hose clamp (5) and outlet hose clamp (13).
3. Loosen clamp (2) and remove heater outlet hoses (3) and (10), and heater outlet tube (11) from vehicle.
4. Loosen two clamps (4) and remove heater outlet tube (11) from heater outlet hoses (3) and (10).
5. Remove clamps (2), (4), (13), and (9) from hoses (3) and (10).

b. Inspection

Inspect heater outlet port (1) and water pump nipple (8) for damage. Replace if damaged.

c. Installation

1. Install clamps (2), (4), (13), and (9) on hoses (3) and (10).
2. Connect two heater outlet hoses (3) and (10) to heater outlet tube (11) and tighten two clamps (4).
3. Install heater outlet hoses (3) and (10) and heater outlet tube (11) between heater outlet port (1) and water pump nipple (8).
4. Connect heater outlet hose (3) to heater outlet port (1) and tighten clamp (2).
5. Install outlet hose clamp (13) on inlet hose clamp (5) with washer (7), capscrew (6), washer (7), and nut (12).
6. Connect heater outlet hose (10) to water pump nipple (8) and tighten clamp (9).

10-84. HEATER OUTLET/INLET PIPING MAINTENANCE (Cont'd)

- FOLLOW-ON TASKS:
- Fill cooling system (para. 3-60).
 - Start engine (TM 9-2320-280-10) and check outlet piping for leaks.

10-85. HEATER FAN SWITCH REPLACEMENT

This task covers:

- a. Removal b. Installation
-

INITIAL SETUP:

Tools

General mechanic's tool kit
automotive (Appendix B, Item 1)

Equipment Condition

Battery ground cable disconnected (para. 4-73).

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

a. Removal

1. Remove four capscrews (8) from instrument cluster (1) and instrument panel (6), and pull instrument cluster (1) away from panel (6) for access to fan switch (2).
2. Remove two screws (7) from fan switch (2) and panel (6).
3. Pull fan switch (2) out from behind panel (6).

NOTE

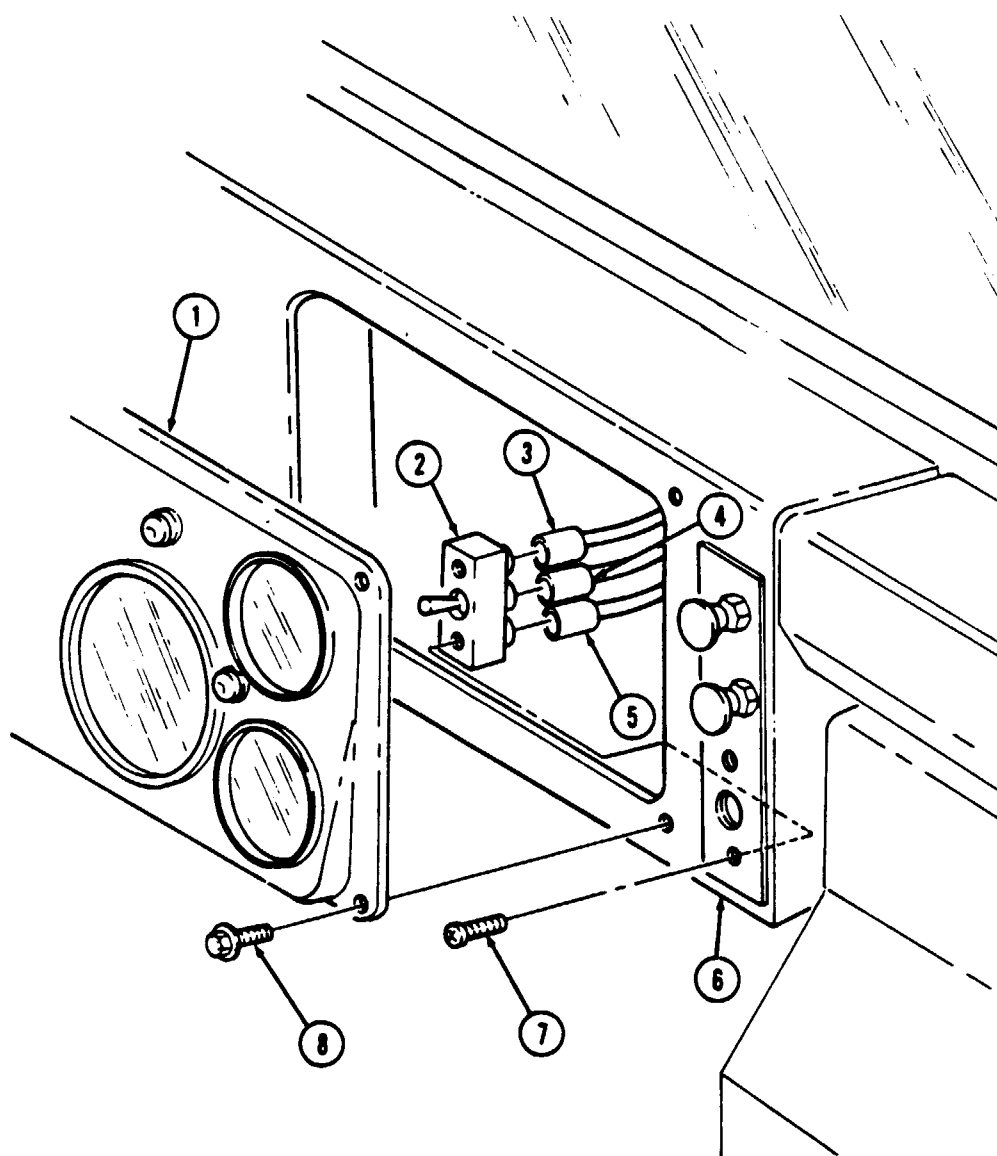
Prior to removal, tag leads for installation.

4. Disconnect leads 399 (3), 27D (4), and 400 (5) from fan switch (2) and remove fan switch (2).

b. Installation

1. Connect leads 399 (3), 27D (4), and 400 (5) to fan switch (2).
2. Install fan switch (2) on panel (6) with two screws (7).
3. Install instrument cluster (1) on panel (6) with four capscrews (8).

10-85. HEATER FAN SWITCH REPLACEMENT (Cont'd)



- FOLLOW-ON TASKS:
- Connect battery ground cable (para 4-73).
 - Check heater fan for proper operation (TM 9-2320-280-10).

10-86. HEATER FAN MOTOR RESISTOR ASSEMBLY REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP

Tools

General mechanic's tool kit
automotive (Appendix B, Item 1)

Equipment Condition

Battery ground cable disconnected (para. 4-73).

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

a. Removal

1. Remove four capscrews (12) from instrument cluster (1) and instrument panel (2), and pull instrument cluster (1) away from panel (2) for access to resistor assembly (5).
2. Remove two screws (11) and heater fan switch (8) from panel (2). Pull heater fan switch (8) out from behind panel (2).

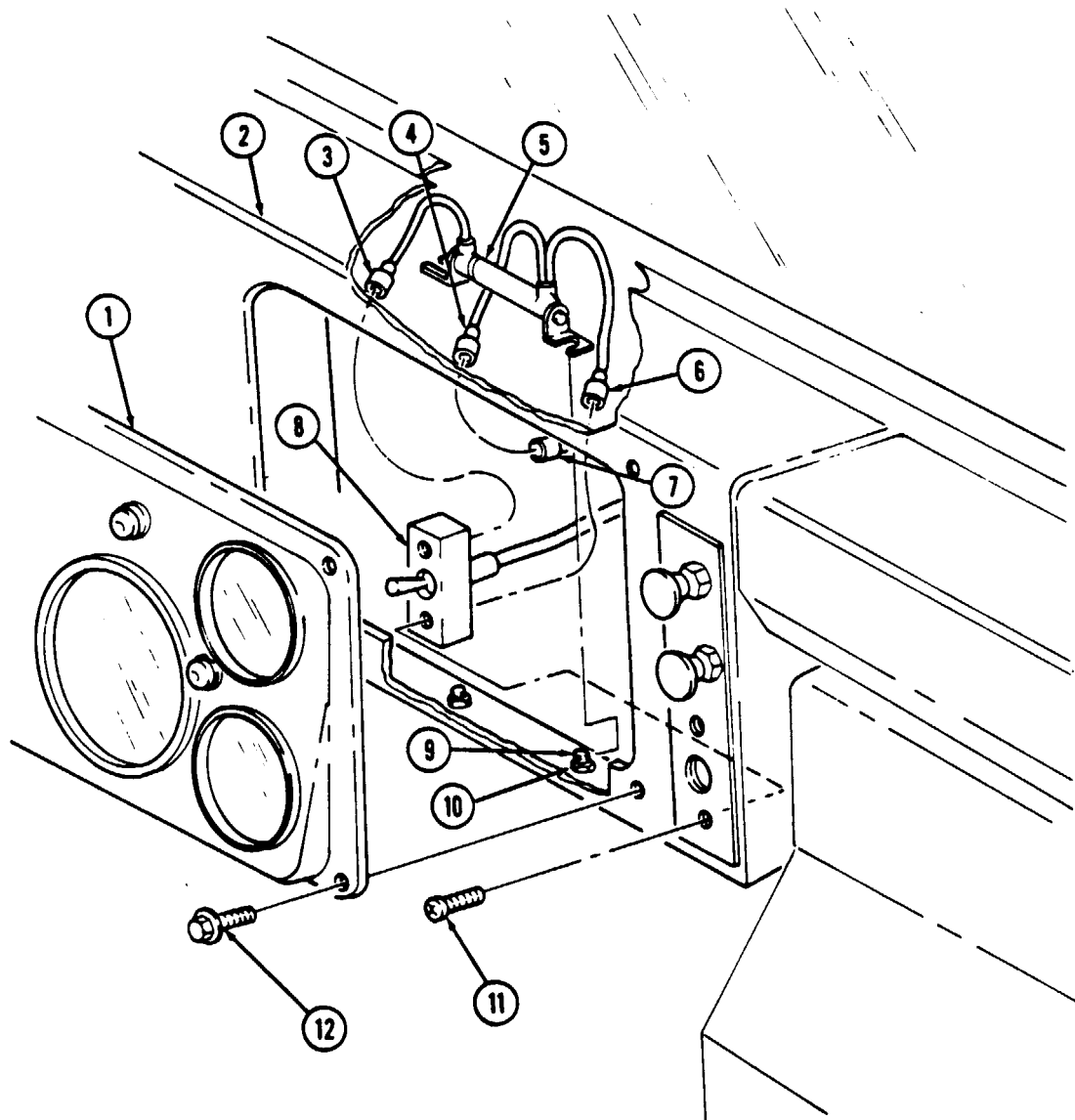
NOTE

Prior to removal, tag leads for installation.

3. Disconnect leads 399 (3) and 400 (6) from heater fan switch (8). Disconnect lead 400 (4) from harness lead 400D (7).
4. Loosen two screws (9) and nuts (10) and remove resistor assembly (5) from panel (2).

b. Installation

1. Connect lead 400 (4) to harness lead 400D (7). Connect leads 400 (6) and 399 (3) to heater fan switch (8).
2. Install resistor assembly (5) on panel (2) and tighten two screws (9) and nuts (10).
3. Install heater fan switch (8) on panel (2) with two screws (11).
4. Install instrument cluster (1) on panel (2) with four capscrews (12).

10-86. HEATER FAN MOTOR RESISTOR ASSEMBLY REPLACEMENT (Cont'd)

FOLLOW-ON TASKS: • Connect battery ground cable (para. 4-73).
• Check heater fan for proper operation (TM 9-2320-280-10).

10-87. HEATER ASSEMBLY REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Materials/Parts

Four locknuts (Appendix G, Item 79)
Plain-assembled nut (Appendix G, Item 201)
Tiedown strap (Appendix G, Item 307)

Equipment Condition

- Battery ground cable disconnected (para. 4-73).
- Cooling system drained as required (para. 3-60).
- Weathercap removed (para. 3-18).
- Air cleaner assembly removed (para. 3-12).

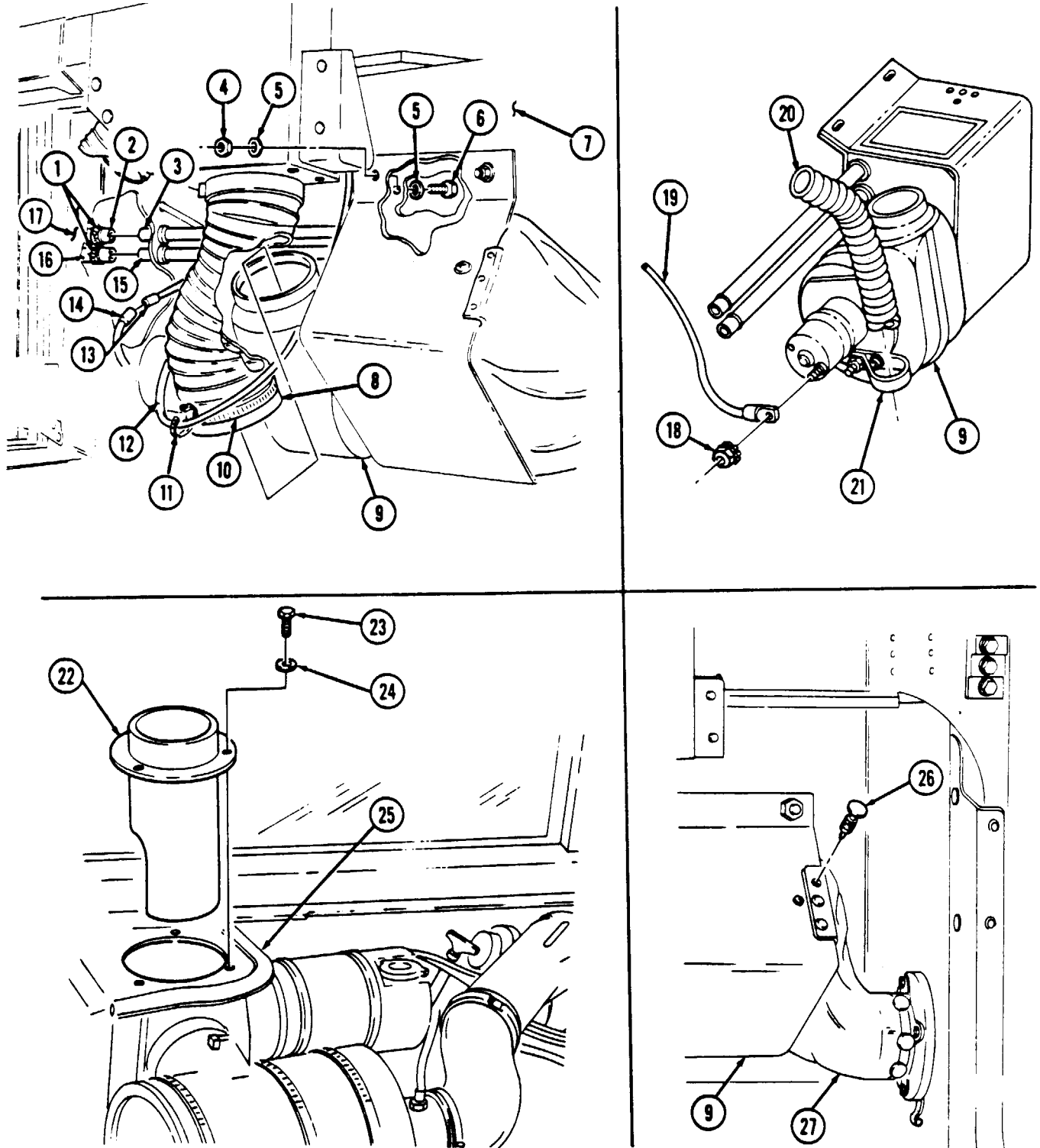
a. Removal

1. Remove tiedown strap (11) from cable (12) and clamp (10). Discard tiedown strap (11).
2. Loosen clamp (10) and disconnect diverter box duct (8) from heater assembly (9).
3. Disconnect harness lead 400D (13) from heater assembly lead (14).
4. Remove plain-assembled nut (18) and lead 57E (19) from heater assembly (9). Discard plain-assembled nut (18).
5. Loosen two clamps (1) and disconnect heater inlet hose (2) and heater outlet hose (16) from inlet port (3) and outlet port (15).
6. Loosen clamp (21) and remove hose (20) from clamp (21) on heater assembly (9).
7. Remove three screws (23) and washers (24) from air intake neck (22) and cowl (25). Remove neck (22) for access to heater mounting hardware.
8. Remove four locknuts (4), washers (5), capscrews (6), and washers (5) from heater assembly (9) and body (7). Discard locknuts (4).
9. Remove ten clips (26) from heater boot (27) and heater assembly (9).
10. Slide heater assembly (9) right and away from firewall (17) to allow heater inlet port (3) and outlet port (15) to clear grommet openings in firewall (17) and remove heater assembly (9).

b. Installation

1. Install heater assembly (9) on firewall (17) and insert heater inlet port (3) and heater outlet port (15) through grommet openings in firewall (17).
2. Install heater boot (27) on heater assembly (9) with ten clips (26).
3. Install heater assembly (9) on body (7) with four washers (5), capscrews (6), washers (5), and locknuts (4). Tighten locknuts (4) to 15 lb-ft (20 N•m).
4. Install air intake neck (22) on cowl (25) with three washers (24) and capscrews (23). Tighten capscrews (23) to 6 lb-ft (8 N•m).
5. Connect heater inlet hose (2) and heater outlet hose (16) to heater assembly (9) inlet port (3) and outlet port (15) and tighten two clamps (1).
6. Install lead 57E (19) to heater assembly (9) with plain-assembled nut (18).
7. Connect harness lead 400D (13) to heater assembly lead (14).
8. Connect diverter box duct (8) to heater assembly (9) and tighten clamp (10).
9. Install hose (20) in clamp (21) on heater assembly (9) and tighten clamp (21).
10. Install cable (12) on clamp (10) with tiedown strap (11).

10-87. HEATER ASSEMBLY REPLACEMENT (Cont'd)



- FOLLOW-ON TASKS:
- Install weathercap (para. 3-18).
 - Install air cleaner assembly (para. 3-12).
 - Connect battery ground cable (para. 4-73).
 - Fill cooling system (para. 3-60).
 - Check heater assembly for proper operation (TM 9-2320-280-10).

10-88. DEFROST CONTROL REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Materials/Parts

Tiedown strap (Appendix G, Item 307)
Plug button (Appendix G, Item 8)
Lockwasher (Appendix G, Item 143)

Equipment Condition

- Hood raised and secured (TM 9-2320-280-10).
- Engine access cover removed (para. 10-15).

a. Removal

1. Remove four capscrews (2) from instrument cluster (5) and instrument panel (3).
2. Pull instrument cluster (5) away from panel (3).
3. Remove nut (15), lockwasher (16), screw (9), clamp (14), and control cable (6) from diverter box bracket (10). Discard lockwasher (16).
4. Remove plug button (12) from control wire (13) and baffle pin (11). Discard plug button (12).
5. Disconnect control wire (13) from baffle pin (11) on diverter box bracket (10).
6. Remove tiedown strap (18) from control cable (6) and hose clamp (17). Discard tiedown strap (18).
7. Pull control cable (6) through firewall (19) and three clamps (7) on "A" beam (8) and firewall (19).
8. Remove nut (4) from threaded shaft (1) and instrument panel (3) and pull control cable (6) through panel (3).

b. Installation

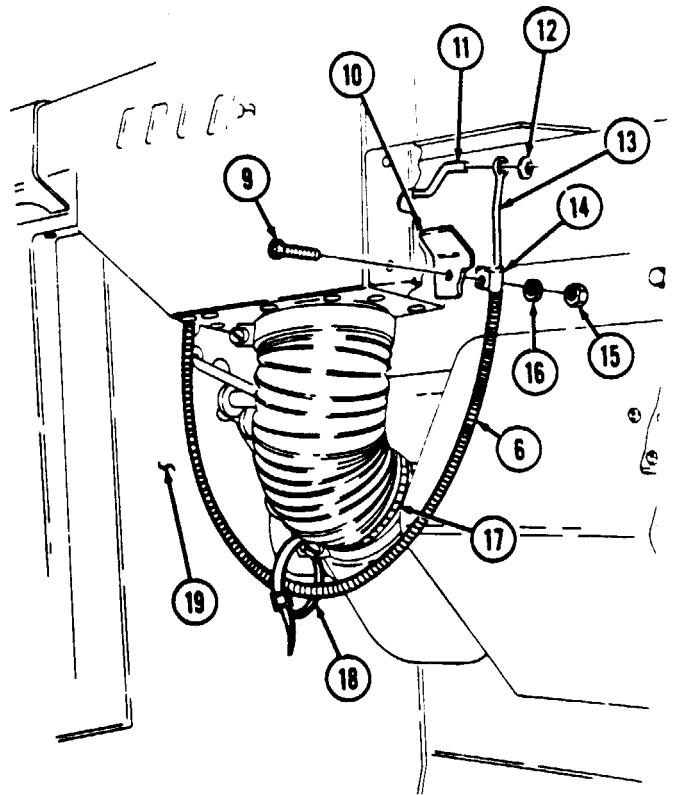
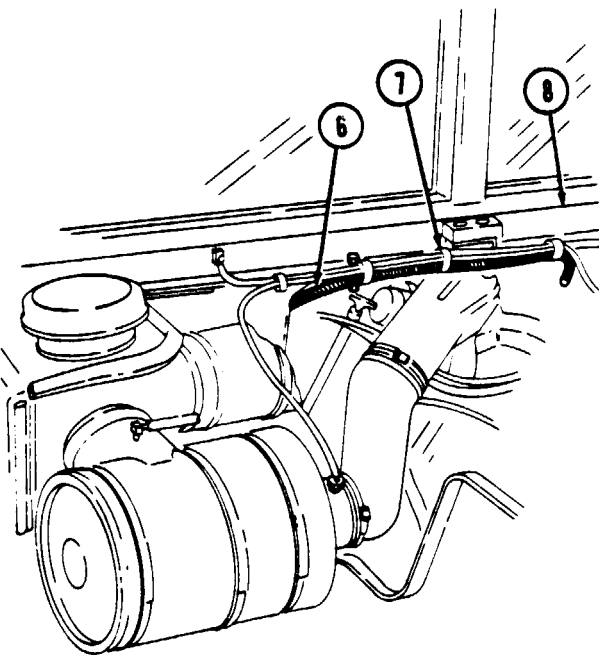
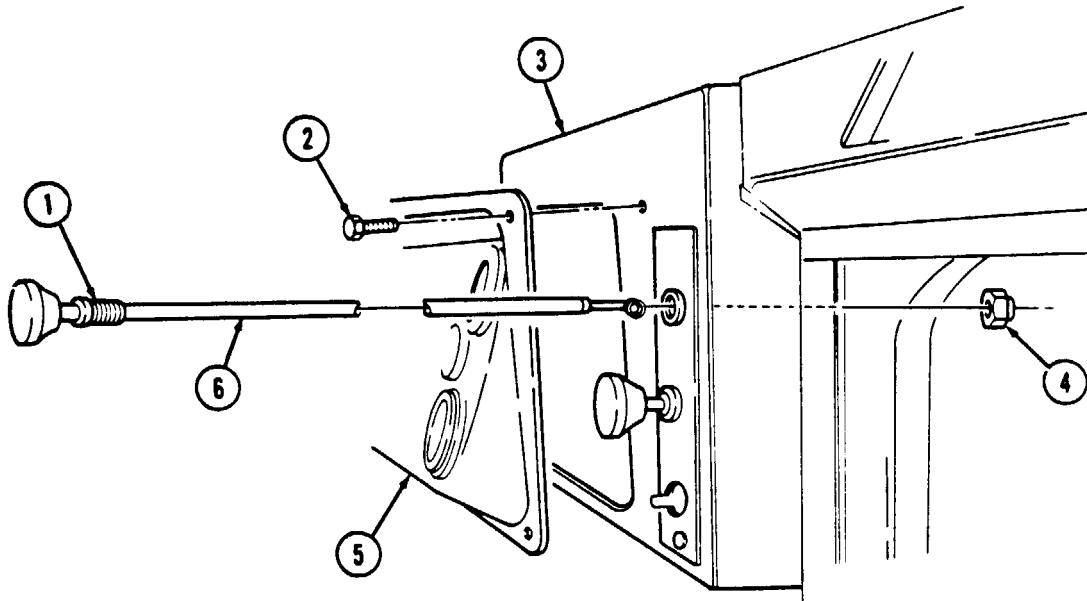
1. Feed control cable (6) through instrument panel (3) and install threaded shaft (1) on panel (3) with nut (4).
2. Route control cable (6) through three clamps (7) on "A" beam (8) and firewall (19).
3. Connect control wire (13) to baffle pin (11) on diverter box bracket (10) with plug button (12).

NOTE

Control wire and knob must be pushed in, and baffle pin must be in the upward position before securing control cable to diverter box.

4. Install clamp (14) on control cable (6) and diverter box bracket (10) with screw (9), lockwasher (16), and nut (15).
5. Install control cable (6) on hose clamp (17) with tiedown strap (18).
6. Install instrument cluster (5) on panel (3) with four capscrews (2).

10-88. DEFROST CONTROL REPLACEMENT (Cont'd)



- FOLLOW-ON TASKS:**
- Lower and secure hood (TM 9-2320-280-10).
 - Install engine access cover (para. 10-15).
 - Check defroster control for proper operation (TM 9-2320-280-10).

10-89. HEATER CONTROL REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

- Hood raised and secured (TM 9-2320-280-10).
- Engine access cover removed (pars. 10-15).

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

a. Removal

1. Remove screw (12) and clamp (11) from cable (7) and heater shutoff valve (15).
2. Remove control wire (10) from pin (9) on heater shutoff valve (15).
3. Carefully work cable (7) through three clips (13) along "A" beam (14).
4. Remove four capscrews (2) from instrument cluster (6) and instrument panel (3).
5. Pull instrument cluster (6) away from instrument panel (3).
6. Loosen nut (4) and slide along cable (7).
7. Pull cable (7) through nut (4) and instrument panel (3).

b. Installation

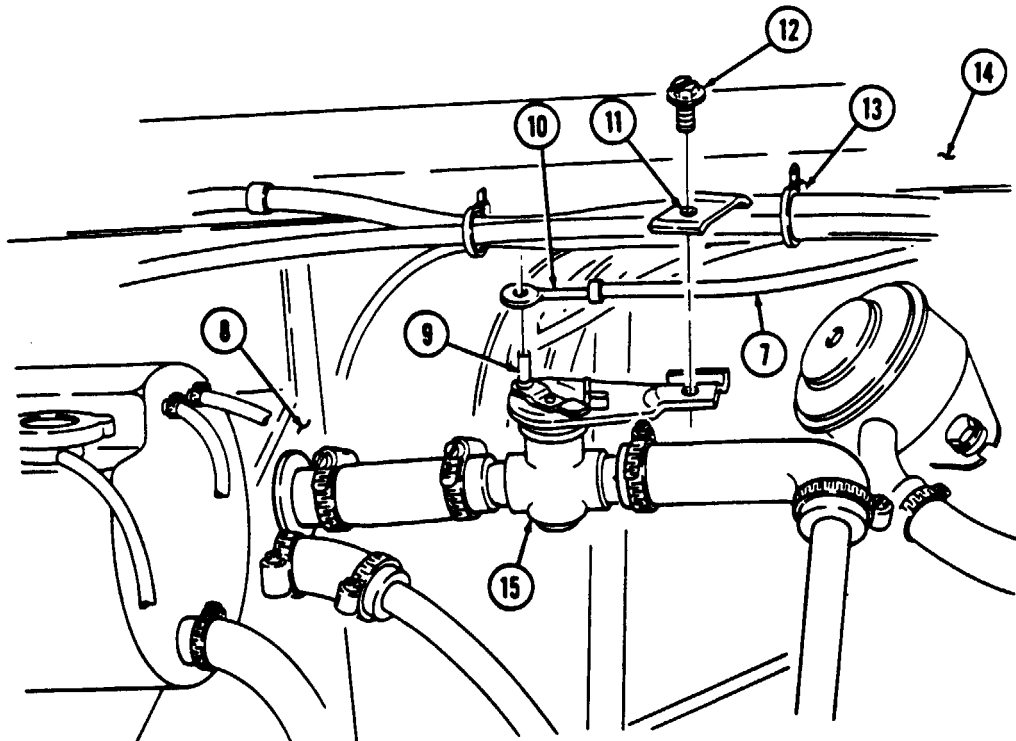
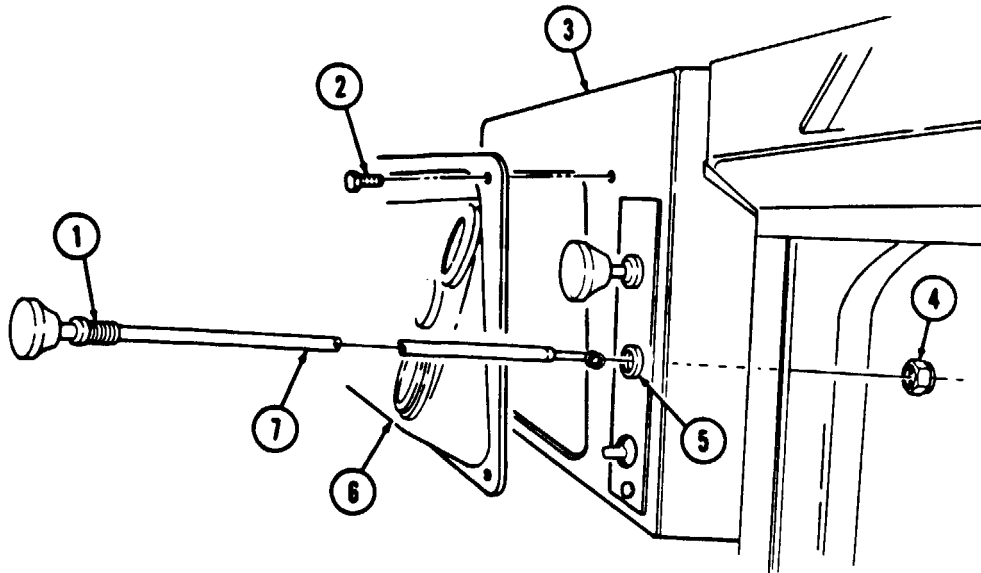
1. Feed cable (7) through instrument panel (3) and seat threaded shaft (1) in grommet (5).
2. Place nut (4) over cable (7) and secure threaded shaft (1) on instrument panel (3) by tightening nut (4).
3. Install instrument cluster (6) on instrument panel (3) with four capscrews (2).
4. Feed cable (7) carefully through three clips (13) along "A" beam (14).
5. Slip coiled end of control wire (10) over pin (9).

NOTE

Control wire and knob must be pushed in, and pin and lever rotated toward heater before anchoring cable to shutoff valve.

6. With control wire (10) and knob all the way in and pin (9) moved as close to heater (8) as possible, install cable (7) on shutoff valve (15) with clamp (11) and screw (12).

10-89. HEATER CONTROL REPLACEMENT (Cont'd)



- FOLLOW-ON TASKS:
- Lower and secure hood (TM 9-2320-280-10).
 - Install engine access cover (para. 10-15).
 - Check heater control for proper operation (TM 9-2320-280-10).

10-90. HEATER CONTROL CABLE AND SHUTOFF VALVE ADJUSTMENT

This task covers:

Adjustment

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Materials/Parts

Lubricating oil (Appendix C, Item 32)

General Safety Instructions

Ensure engine is cool prior to performing this procedure.

NOTE

Perform the following procedure if the heater temperature control assembly is difficult to operate. The repositioning of the heater temperature control cable and heater shutoff valve will reduce cable bends and allow access for lubrication.

Adjustment

1. Push heater control knob (18) to "OFF" position.

WARNING

Ensure engine is cool prior to performing this procedure. Steam or hot coolant under pressure can cause injury to personnel.

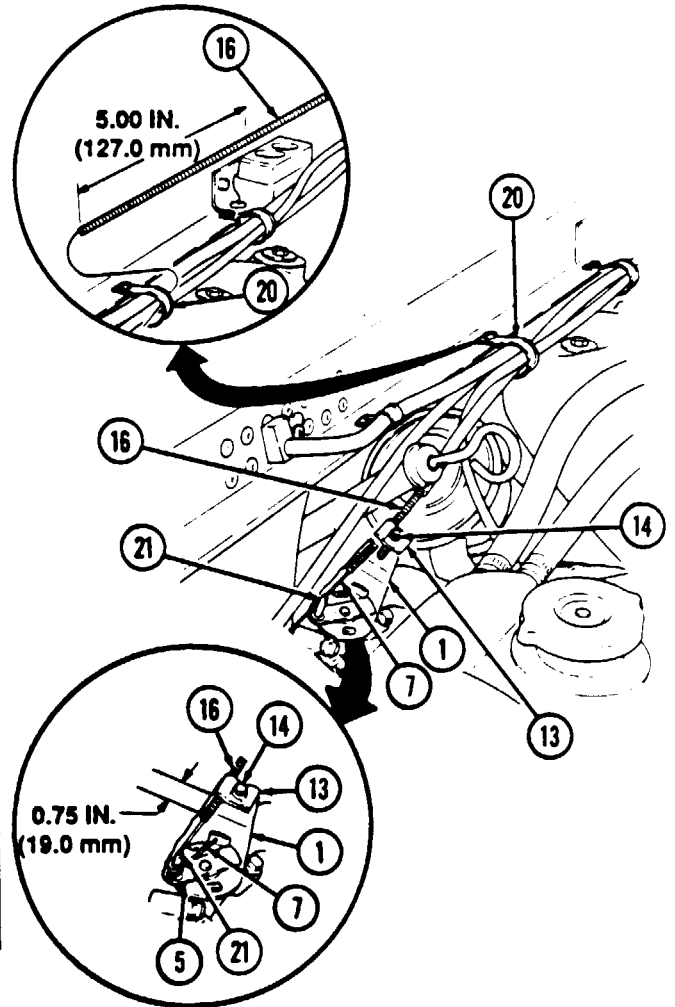
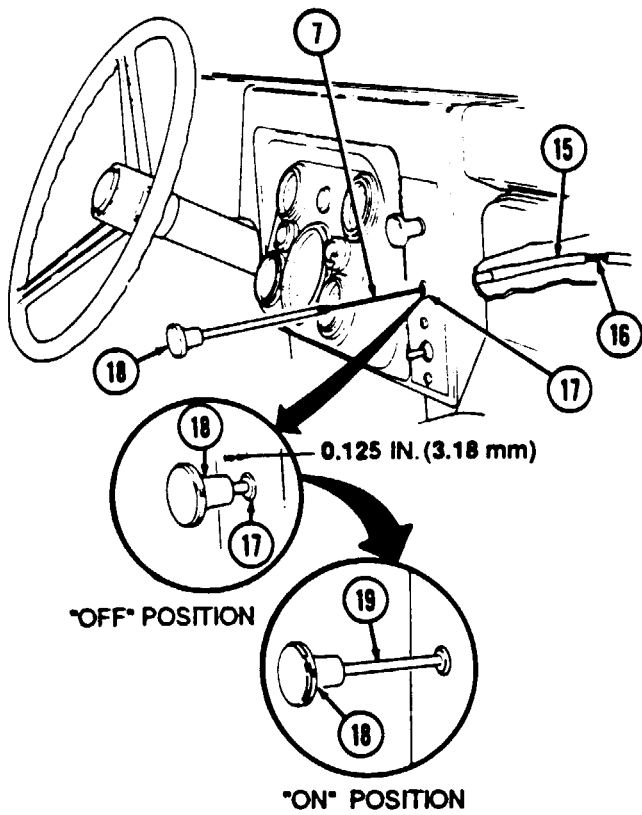
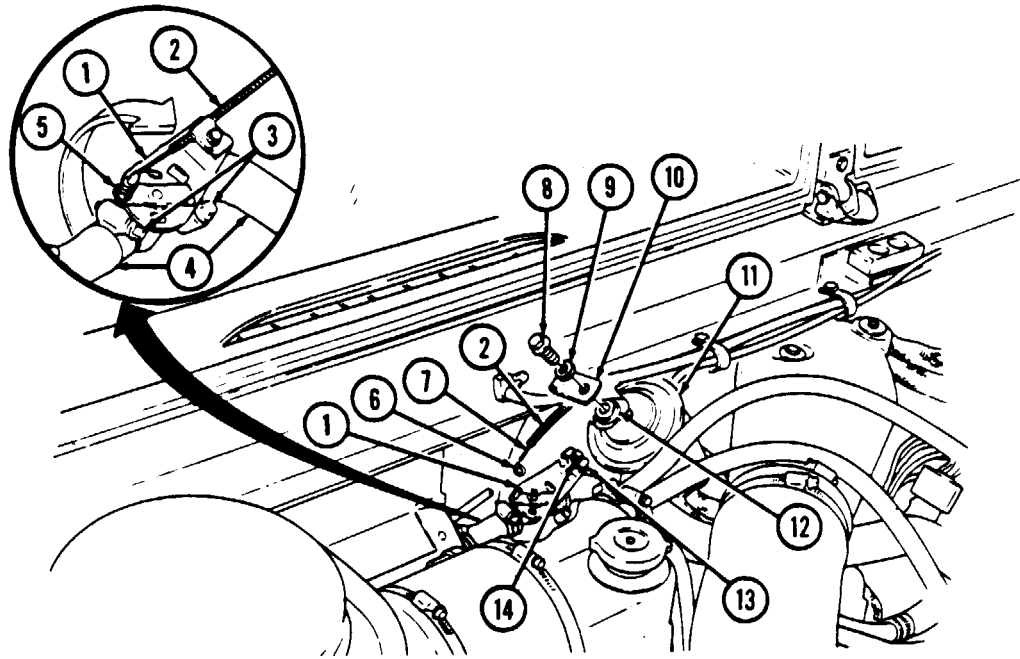
2. Loosen two clamps (3) on hoses (4).
3. Rotate heater shutoff valve (1) and position heater shutoff valve lever (5) in the upward position.
4. Tighten two clamps (3) on hoses (4).
5. Loosen screw (14) and clip (13) and remove cable assembly (2) from heater shutoff valve (1).
6. Remove screw (8), washer (9), clamp (10), and crankcase depression regulator valve (11) from mounting bracket (12).
7. Install crankcase depression regulator valve (11) on mounting bracket (12) with screw (8) and washer (9).
8. Cut loop end (6) from spring wire (7). Cut as close to loop end (6) as possible.
9. Remove spring wire (7) from steel casing (16) and tube (15) by pulling heater control knob (18). Remove any kinks in spring wire (7).

NOTE

If control cable is 47.5 in. (1207 mm) in length, perform step 10.

10. Remove a 5 in. (127.0 mm) section from steel casing (16).
11. Route steel casing (16) through clamp (20).
12. Install spring wire (7) into steel casing (16) and tube (15).
13. Position end of steel casing (16) 0.75 in. (19.0 mm) from clip (13) and install steel casing (16) on heater shutoff valve (1) with clip (13) and screw (14).
14. Position heater control knob (18) 0.125 in. (3.18 mm) from instrument panel (17).
15. Turn spring wire (7) three turns around heater shutoff valve pin (21). Cut off any excess spring wire (7).
16. Pull out heater control knob (18) to "ON" position.
17. Apply lubricating oil to heater shutoff valve lever (5) and shutoff valve pin (21).
18. Apply lubricating oil to plunger (19).
19. Move heater control knob (18) to "OFF" and "ON" several times to distribute oil.
20. Check engine coolant level (TM 9-2320-280-10).
21. Start engine (TM 9-2320-280-10) and check heater shutoff valve (1) connections for leaks.

10-90. HEATER CONTROL CABLE AND SHUTOFF VALVE ADJUSTMENT (Cont'd)



10-91. HEATER DUCTING REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Materials/Parts

Two locknuts (Appendix G, Item 70)

Equipment Condition

- Engine access cover removed (para. 10-15).
- Front radio rack assembly removed, if equipped (para. 12-132).

a. Removal

NOTE

- Perform steps 1 and 2 for vehicles with new configuration.
 - Proceed to step 3 for vehicles with old configuration.
1. Remove two capscrews (8.1) and washers (8.2) securing two radio rack upper mounting brackets (8.3) to plenum (7).
 2. Remove nine screws (8) securing plenum (7) to "A" beam (4).
 3. Remove nine screws (8), two capscrews (6), and washers (5) securing plenum (7) to "A" beam (4).
 4. Disconnect connector (23) from light switch (10).
 5. Remove two locknuts (25), washers (11), capscrews (12), and washers (11) securing instrument panel (9) to firewall (24). Discard locknuts (25).
 6. Remove nut (19), washer (18), capscrew (17), and washer (18) securing panel (9) and hand throttle bracket (15) to steering column bracket (20).
 7. Remove nut (13) and screw (16) securing hand throttle bracket (15) to instrument panel (9).
 8. Remove screw (14) securing panel (9) to firewall (24) and pull panel (9) away from "A" beam (4) for access to heat flex duct (1).
 9. Remove clamp (2) securing heat flex duct (1) to "A" beam (4) and plenum bracket (3).
 10. Remove clamp (22) securing heat flex duct (1) to steering column mount (21) and remove heat flex duct (1).

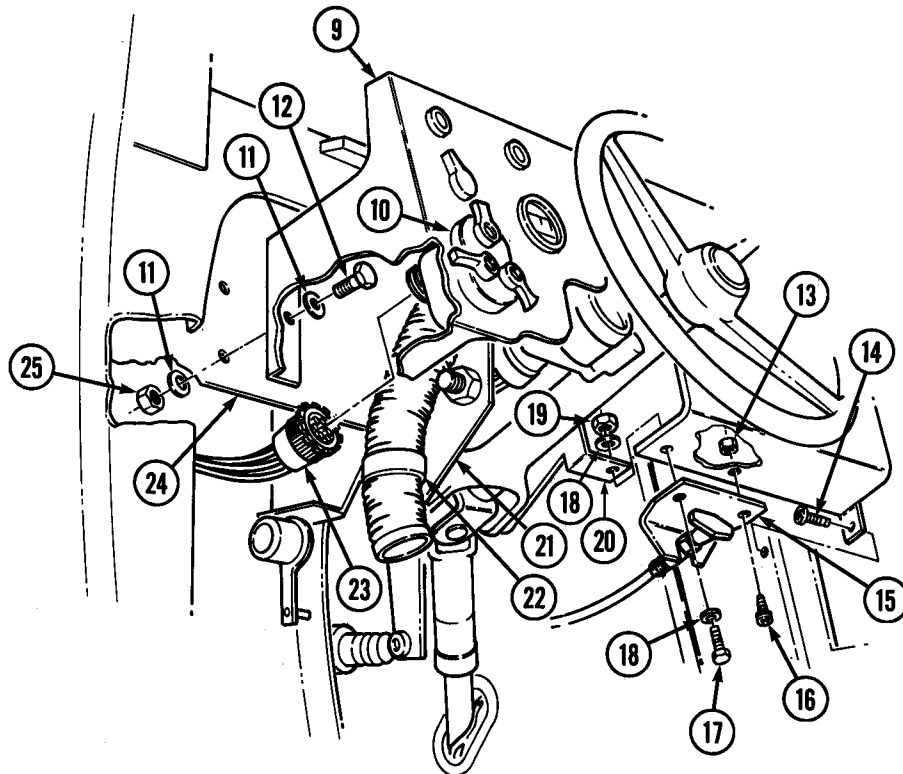
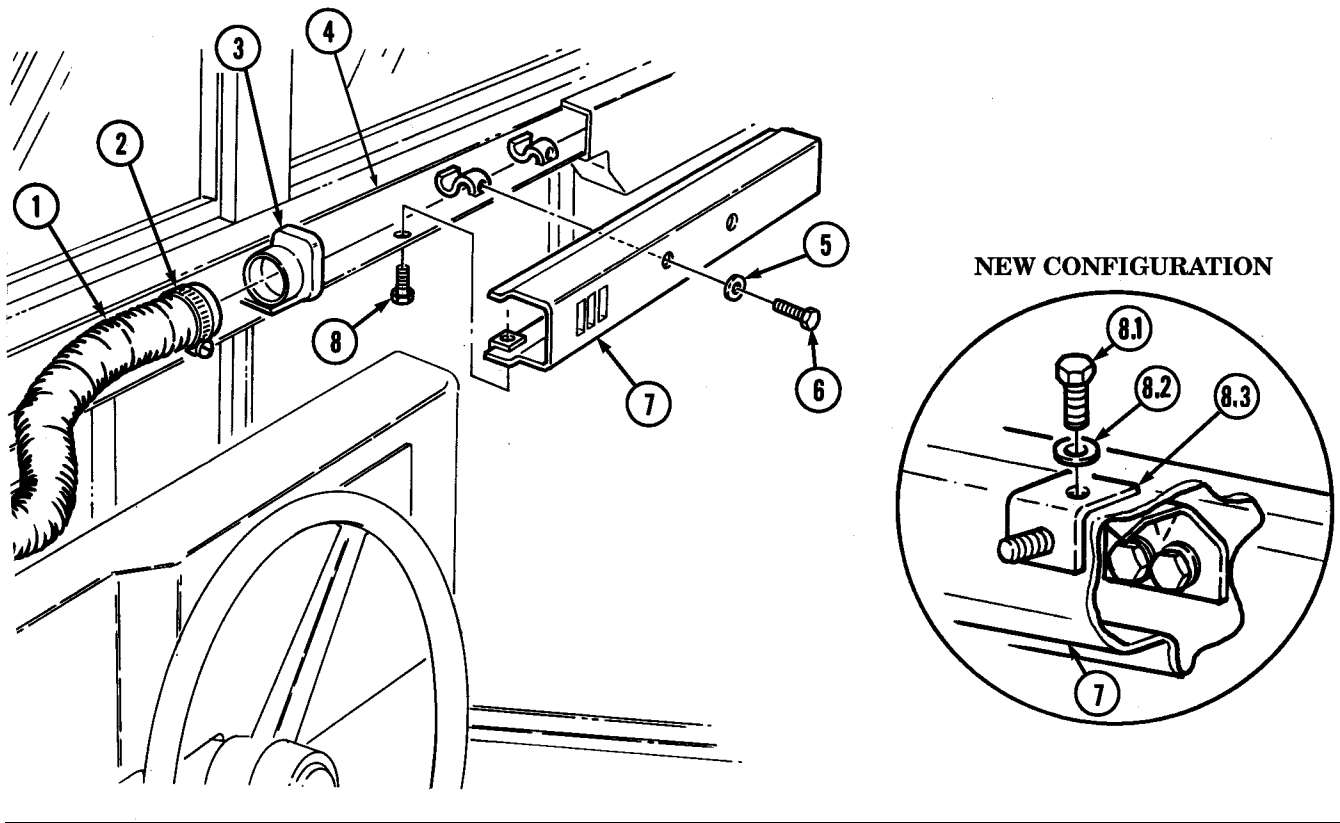
b. Installation

1. Install heat flex duct (1) to steering column mount (21) and secure with clamp (22).
2. Secure heat flex duct (1) to "A" beam (4) and plenum bracket (3) with clamp (2).
3. Place panel (9) back to "A" beam (4). Secure panel (9) to firewall (24) with screw (14).
4. Secure panel (9) and hand throttle bracket (15) to steering column bracket (20) with washer (18), capscrew (17), washer (18), and nut (19).
5. Secure hand throttle bracket (15) to instrument panel (9) with screw (16) and nut (13).
6. Secure panel (9) to firewall (24) with two washers (11), capscrews (12), washers (11), and locknuts (25).
7. Connect connector (23) to light switch (10).

NOTE

- Perform steps 8 and 9 for vehicles with new configuration.
 - Proceed to step 10 for vehicles with old configuration.
8. Install plenum (7) on "A" beam (4) with nine screws (8).
 9. Install two radio rack upper mounting brackets (8.3) to plenum (7) with two washers (8.2) and capscrews (8.1).
 10. Install plenum (7) on "A" beam (4) with nine screws (8), two washers (5), and capscrews (6).

10-91. HEATER DUCTING REPLACEMENT(Cont'd)



- FOLLOW-ON TASKS:**
- Install engine access cover (para. 10-15).
 - Install front radio rack assembly, if equipped (para. 12-132).

10-92. DIVERTER BOX REPLACEMENT (ALL EXCEPT M998A2)

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

All except M998A2 series and M1123

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Lockwasher (Appendix G, Item 143)
Plug button (Appendix G, Item 8)

Manual References

TM 9-2320-280-24P

a. Removal

1. Loosen clamp (12) and disconnect heater flex duct (11) from bottom of diverter box (16).
2. Loosen clamp (15) and disconnect heater flex duct (14) from diverter box (16).
3. Remove nut (8), lockwasher (9), screw (13), and clip (10) from diverter box (16). Discard lockwasher (9).
4. Remove plug button (7) and disconnect cable core (6) from baffle pin (5). Discard plug button (7).
5. Remove three screws (17) from diverter box (16), right mounting bracket (3), and "A" beam (1).
6. Pull diverter box (16) away from "A" beam (1) and loosen two clamps (4) on defroster flex ducts (2) and remove diverter box (16).

b. Installation

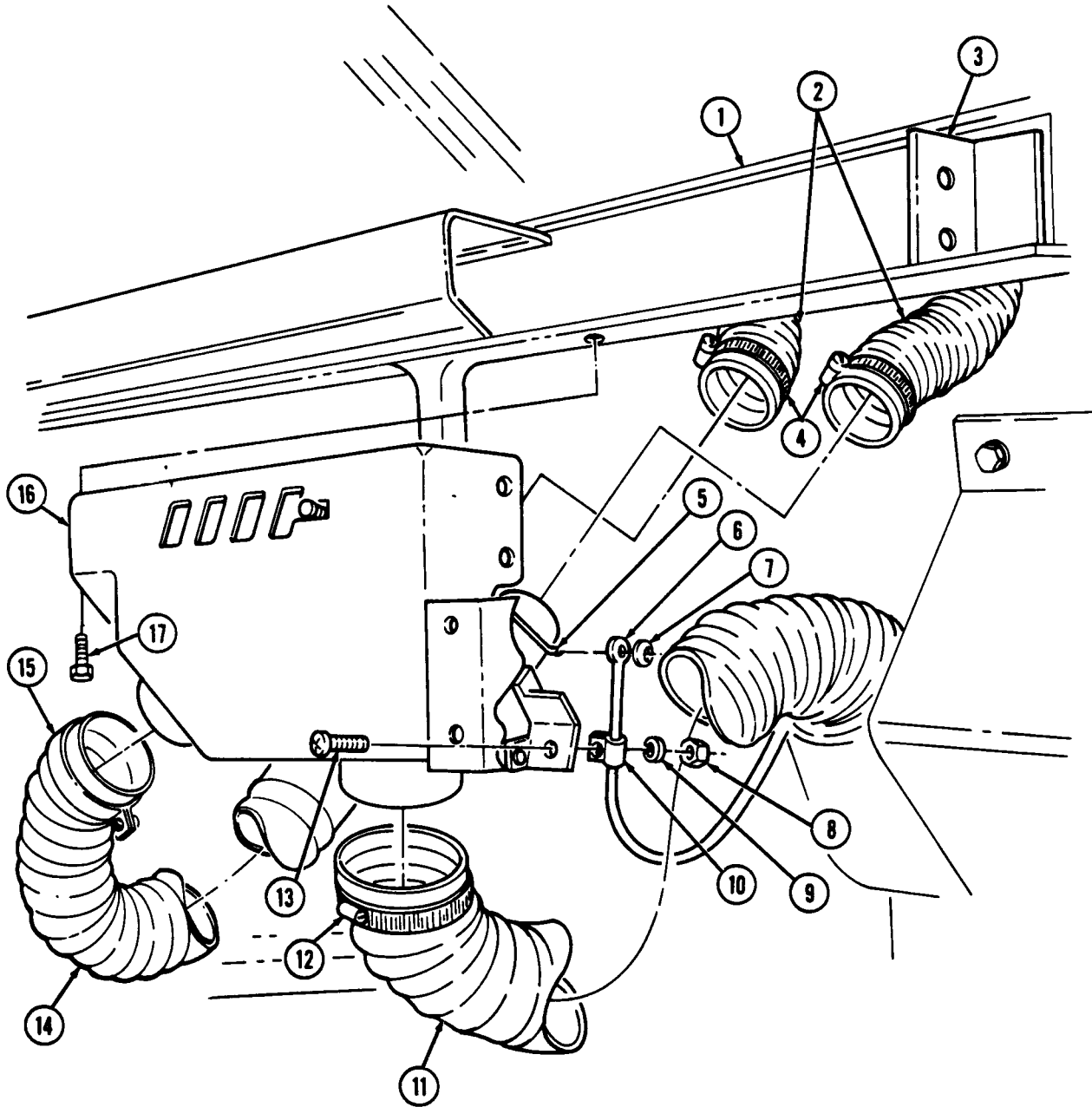
1. Position diverter box (16) under "A" beam (1) and connect two defroster flex ducts (2) to diverter box (16) and tighten clamps (4).
2. Install diverter box (16) on "A" beam (1) and right mounting bracket (3) with three screws (17).
3. Connect defroster cable core (6) to baffle pin (5) with plug button (7).

NOTE

Control cable must be pushed in, and baffle pin must be in the upward position before installing control cable on diverter box.

4. Install clip (10) on diverter box (16) with screw (13), lockwasher (9), and nut (8).
5. Connect heater flex duct (11) to bottom of diverter box (16) and tighten clamp (12).
6. Connect heater flex duct (14) to diverter box (16) and tighten clamp (15).

10-92. DIVERTER BOX REPLACEMENT (ALL EXCEPT M998A2) (Cont'd)



10-92.1. DIVERTER MANIFOLD AND HOUSING REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M997A2, M1025A2, M1035A2, M1043A2,
M1045A2, M1097A2, M1123

Materials/Parts

Plug button (Appendix G, Item 8)
Four rivets (Appendix G, Item 258)

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-24P

a. Removal

1. Remove four screws (16) and panel assembly (15) from right mounting bracket (3) and "A" beam (1).
2. Remove four rivets (14) from manifold and housing (9) and duct (13).
3. Remove two screws (8) from manifold and housing (9) and heater (7).
4. Remove screw (6) from clip (5) and manifold and housing (9).
5. Remove plug button (10) and disconnect defroster cable core (12) from baffle pin (11). Discard plug button (10).
6. Pull manifold and housing (9) away from "A" beam (1) and loosen two clamps (4) securing defroster flex ducts (2) to manifold and housing (9).
7. Remove manifold and housing (9) from heater (7).

b. Installation

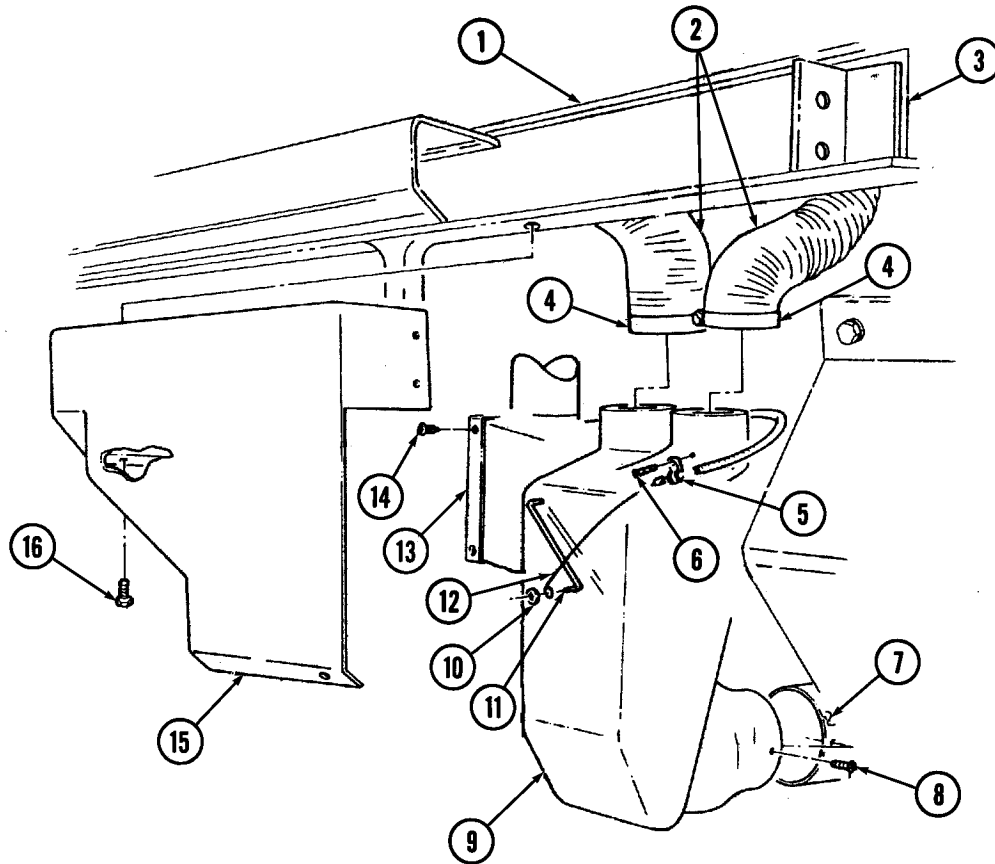
1. Position manifold and housing (9) under "A" beam (1) and connect two defroster flex ducts (2) to manifold and housing (9) with two clamps (4).
2. Connect defroster cable core (12) to baffle pin (11) and install plug button (10).
3. Install duct (13) on manifold and housing (9) with four rivets (14).

NOTE

Ensure diverter control knob is pushed into cowl and baffle pin is in the downward position before securing control cable to diverter box.

4. Install clip (5) on manifold and housing (9) with screw (6).
5. Install manifold and housing (9) on heater (7) with two screws (8).
6. Install panel assembly (15) on "A" beam (1) and right mounting bracket (3) with four screws (16).

10-92.1. DIVERTER MANIFOLD AND HOUSING REPLACEMENT (Cont'd)



10-93. DEFROSTER DUCTING REPLACEMENT (ALL EXCEPT M1097A2, M1123)

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

All except M1097A2, M1123

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

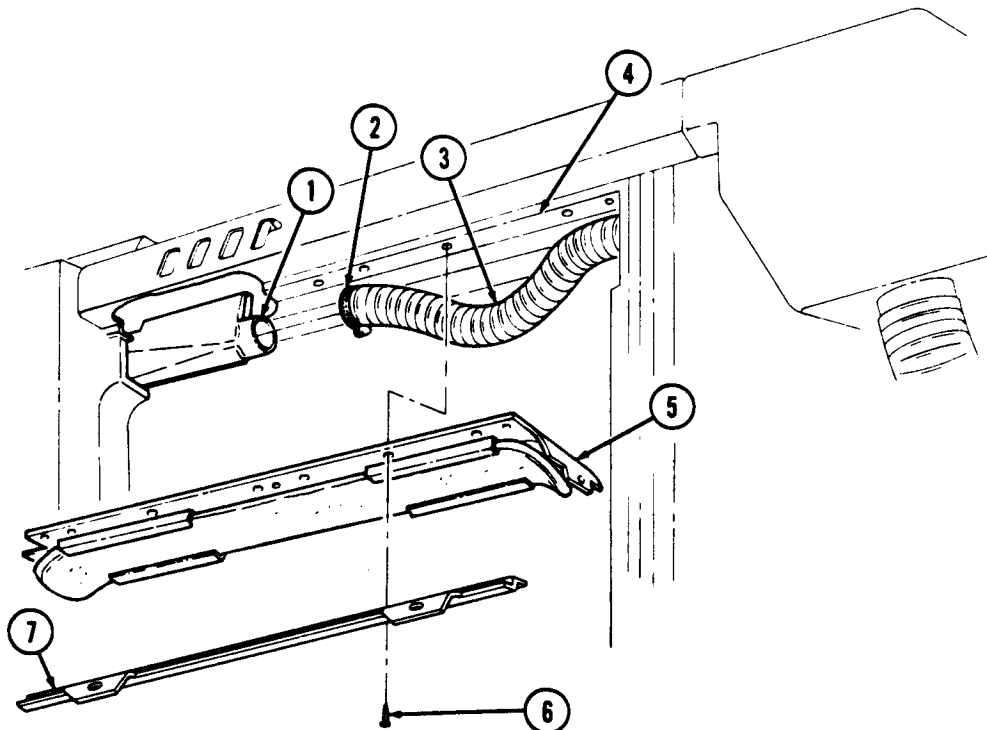
TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

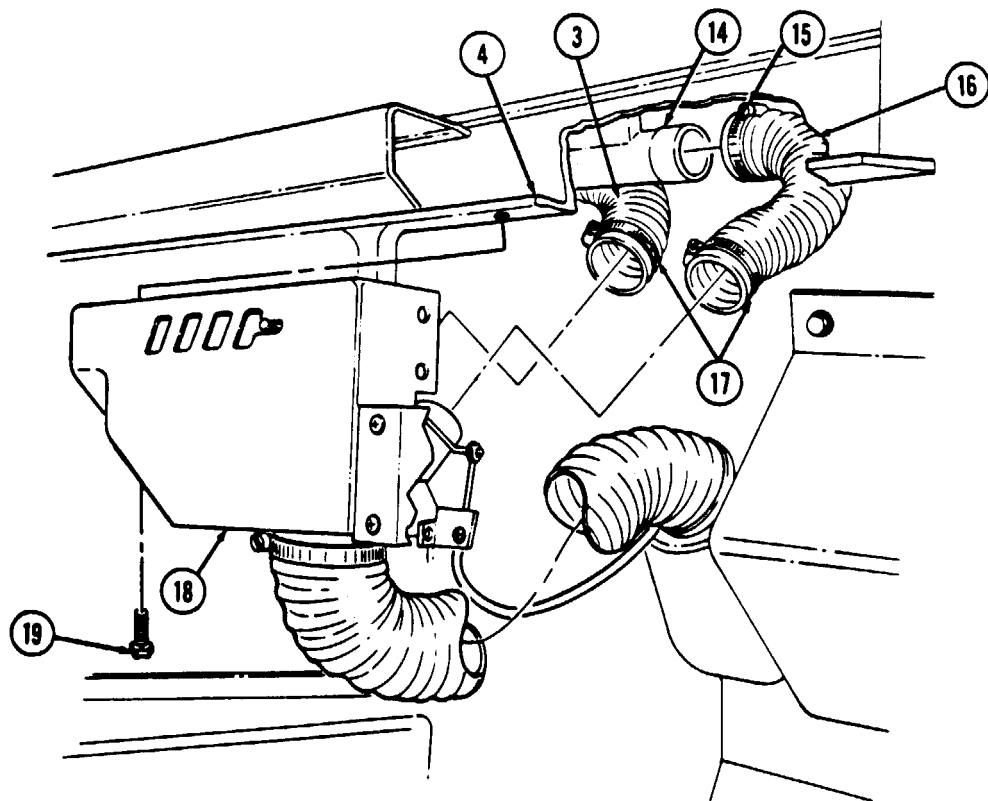
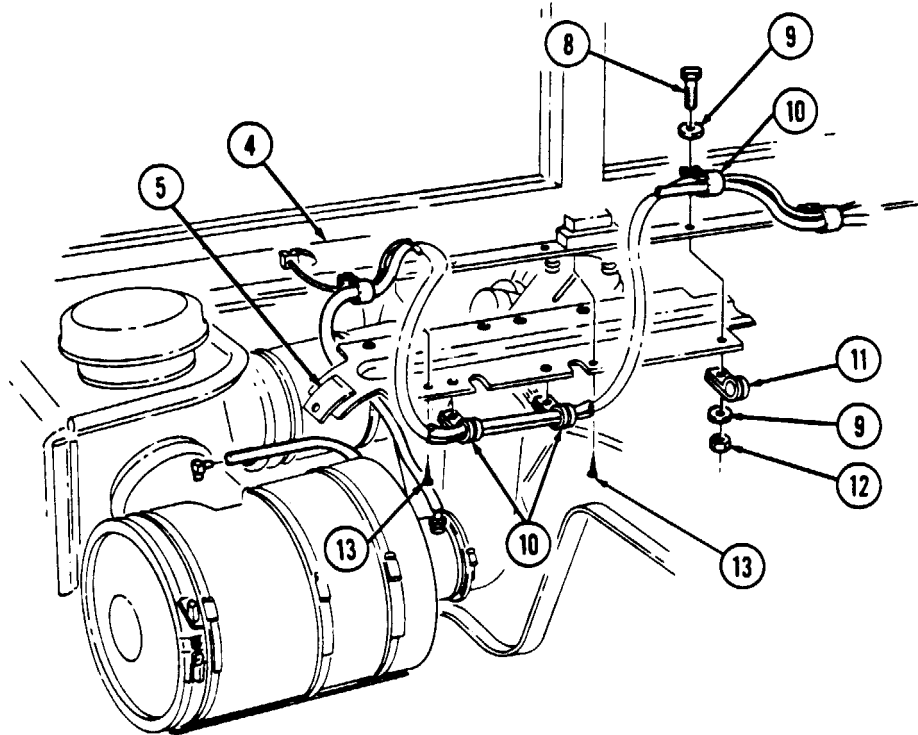
- Hood raised and secured (TM 9-2320-280-10).
- Engine access cover removed (para. 10-15).

a. Removal

1. Remove eight screws (6) and retainer (7) from closeout panel (5) and "A" beam (4).
2. Remove three nuts (12), washers (9), capscrews (8), washers (9), clamps (10), and cable clamp (11) from closeout panel (5) and "A" beam (4).
3. Remove two screws (13) and closeout panel (5) from "A" beam (4).
4. Loosen clamp (2) and disconnect left flex duct (3) from left defroster nozzle (1).
5. Remove three screws (19) from diverter box (18) and "A" beam (4), and pull diverter box (18) away from "A" beam (4) for access to right defroster nozzle (14).
6. Loosen clamp (15) and disconnect right flex duct (16) from right defroster nozzle (14).
7. Loosen two clamps (17) and disconnect left flex duct (3) and right flex duct (16) from diverter box (18).



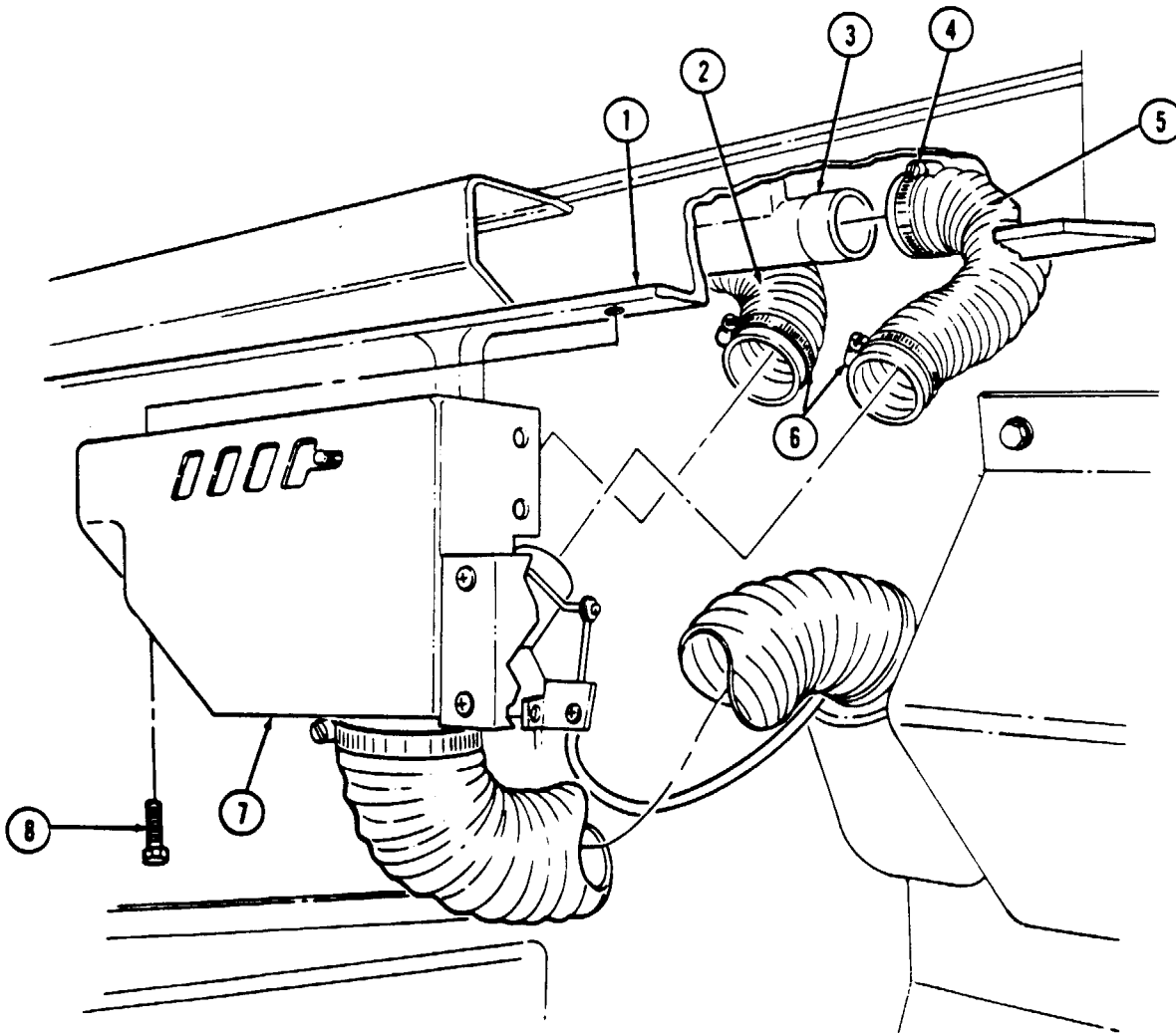
10-93. DEFROSTER DUCTING REPLACEMENT (Cont'd)



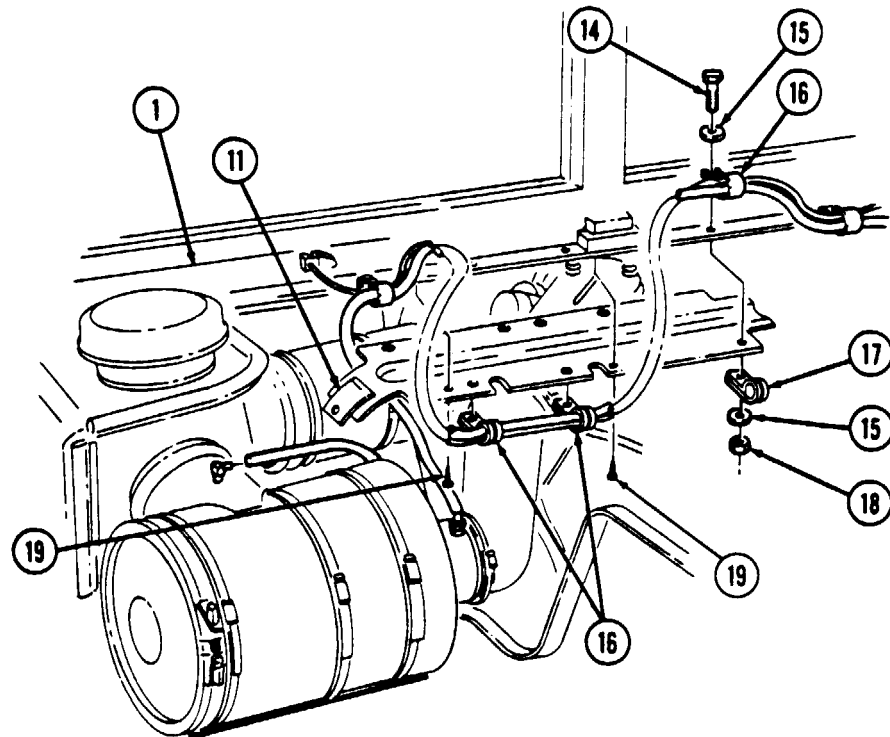
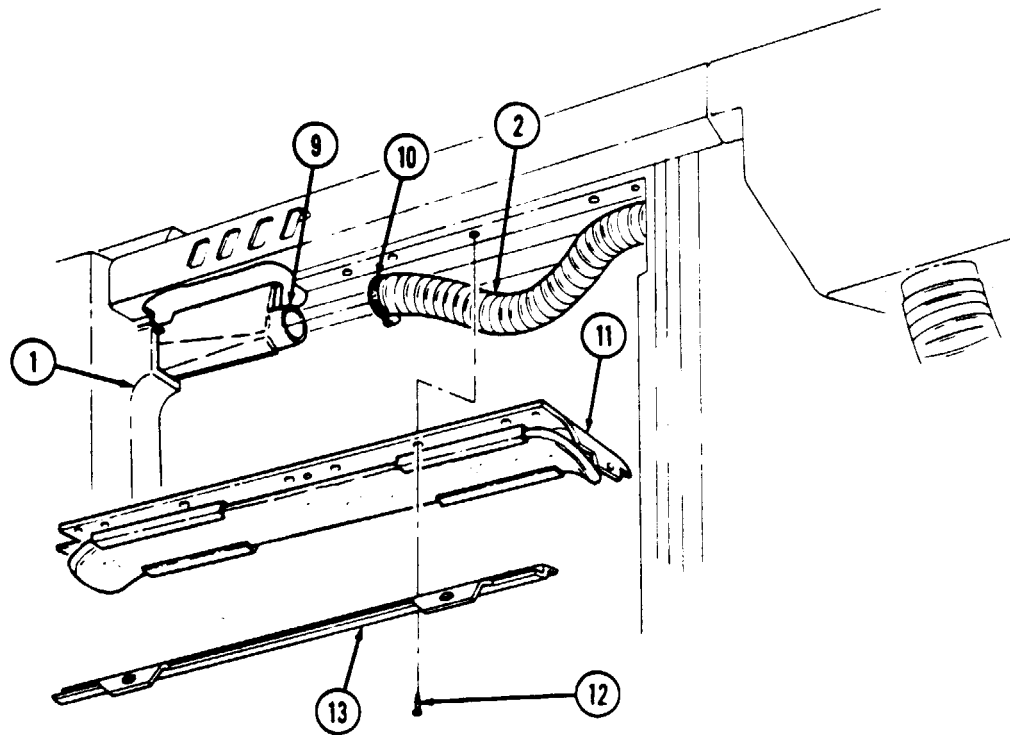
10-93. DEFROSTER DUCTING REPLACEMENT (Cont'd)

b. Installation

1. Connect left flex duct (2) and right flex duct (5) to diverter box (7) and tighten two clamps (6).
2. Connect right flex duct (5) to right defroster nozzle (3) and tighten clamp (4).
3. Install diverter box (7) on "A" beam (1) with three screws (8).
4. Connect left flex duct (2) to left defroster nozzle (9) and tighten clamp (10).
5. Install closeout panel (11) retainer (13) on "A" beam (1) with eight screws (12).
6. Secure closeout panel (11) to "A" beam (1) with two screws (19).
7. Install three clamps (16) and cable clamp (17) on closeout panel (11) and "A" beam (1) with three washers (15), capscrews (14), washers (15), and nuts (18).



10-93. DEFROSTER DUCTING REPLACEMENT (Cont'd)



- FOLLOW-ON TASKS:
- Install engine access cover (para. 10-15).
 - Lower and secure hood (TM 9-2320-280-10).

10-94. LEFT DEFROSTER NOZZLE REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Materials/Parts

Lockwasher (Appendix G, Item 183)
Locknut (Appendix G, Item 128)
Locknut (Appendix G, Item 126)
Adhesive sealant (Appendix C, Item 10)

Equipment Condition

- Hood raised and secured (TM 9-2320-280-10).
- Engine access cover removed (para. 10-15).

a. Removal

1. Remove eight capscrews (5) and retainer (6) from closeout panel (4) and "A" beam (7).
2. Remove three nuts (20), washers (17), capscrews (16), and washers (17) from three clamps (18), cable clamp (19), closeout panel (4), and "A" beam (7).
3. Remove three screws (21) and closeout panel (4) from "A" beam (7).
4. Loosen clamp (2.1) and disconnect defroster duct (3) from defroster nozzle (2).
5. Remove locknut (9), lockwasher (10), washer (11), and pin (14) from steering column (15) and bracket (13), and lower steering column (15). Discard locknut (9) and lockwasher (10).

NOTE

Perform steps 5.1 and 5.2 for M1097A2 and M1123 series vehicles only.

- 5.1. Remove nut (15.1), screw (15.3), and ground wire 57C (15.2) from steering column (15).
- 5.2. Remove locknut (15.5), washer (15.6), capscrew (15.8), washer (15.7), and two brackets (15.4) from steering column (15). Discard locknut (15.5).
6. Remove retaining pin (12) from defroster nozzle (2) and bracket (13).

NOTE

Note position of defroster nozzle for installation.

7. Turn defroster nozzle (2) counterclockwise and remove from "A" beam (7).

b. Installation

1. Install defroster nozzle (2) on "A" beam (7).
2. Turn defroster nozzle (2) clockwise until defroster nozzle outlets (8) align with windshield frame louvers (1).
3. Install defroster nozzle (2) on bracket (13) with retaining pin (12).

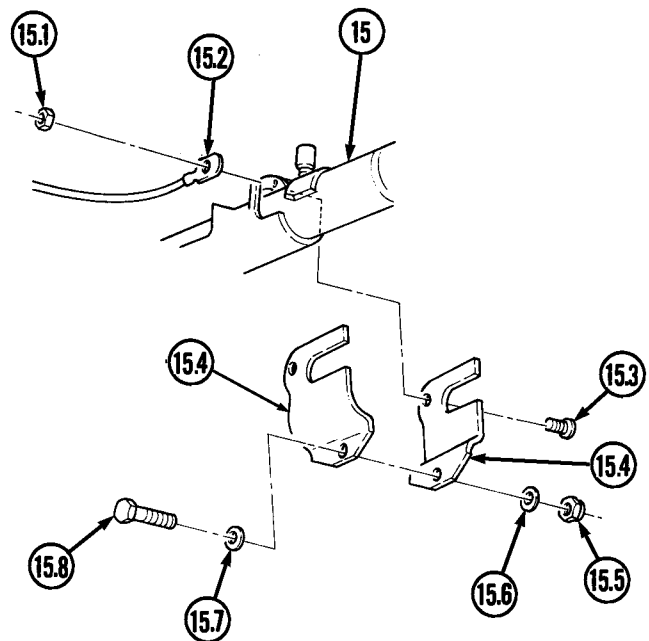
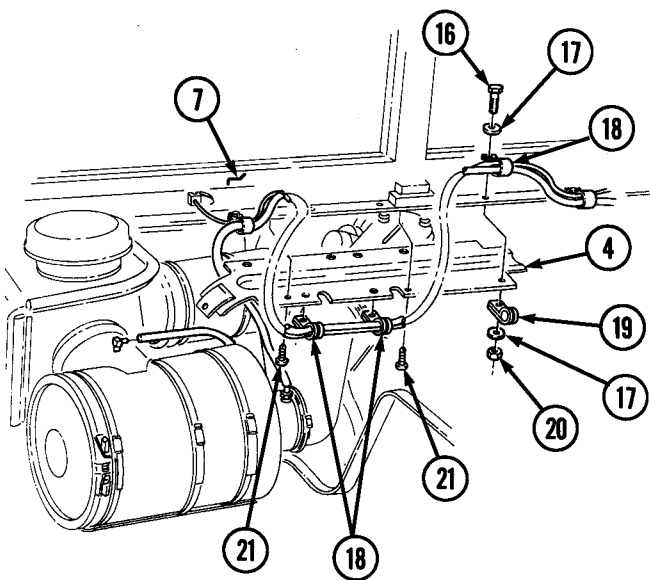
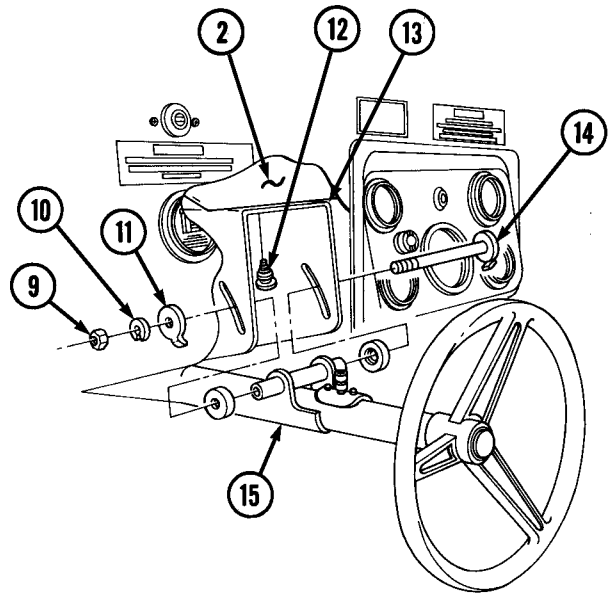
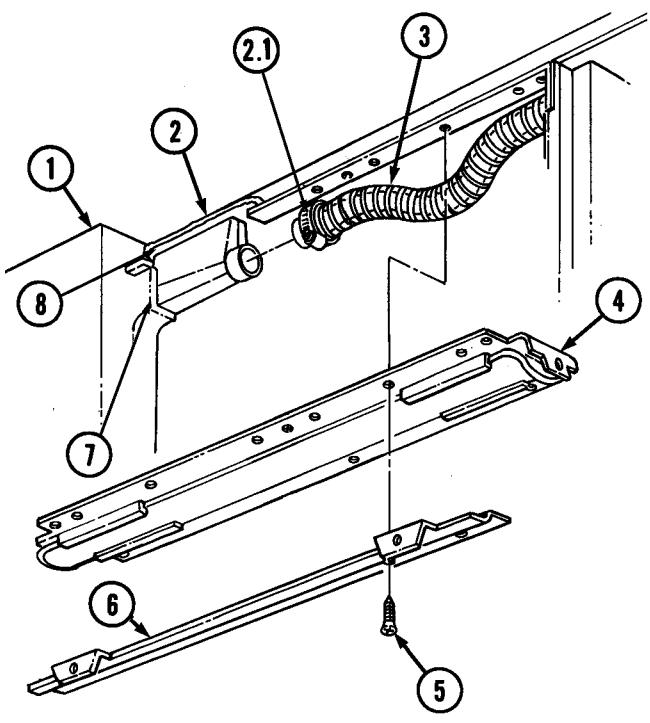
NOTE

Perform steps 3.1 and 3.2 for M1097A2 and M1123 series vehicles only.

- 3.1. Install two brackets (15.4) on steering column (15) with washer (15.7), capscrew (15.8), washer (15.6), and locknut (15.5).
- 3.2. Install ground wire 57C (15.2), screw (15.3), and nut (15.1) on steering column (15).
4. Place steering column (15) in desired position, and install on bracket (13) with pin (14), washer (11), lockwasher (10), and locknut (9). Tighten locknut (9) to 31 lb-ft (42 N·m).
5. Apply adhesive and connect defroster duct (3) to defroster nozzle (2) and tighten clamp (2.1).

10-94. LEFT DEFROSTER NOZZLE REPLACEMENT (Cont'd)

6. Install retainer (6) and closeout panel (4) on "A" beam (7) with eight capscrews (5).
7. Secure closeout panel (4) to A-beam (7) with three capscrews (21).
8. Install closeout panel (4), three clamps (18), and cable clamp (19) on "A" beam (7) with three washers (17), capscrews (16), washers (17), and nuts (20).



FOLLOW-ON TASKS:

- Lower and secure hood (TM 9-2320-280-10).
- Install engine access cover (para. 10-15).

10-94.1. HEATER NOZZLE DEFLECTOR REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:**Applicable Models**

M1097A2, M1123

Manual References

TM 9-2320-280-24P

Tools

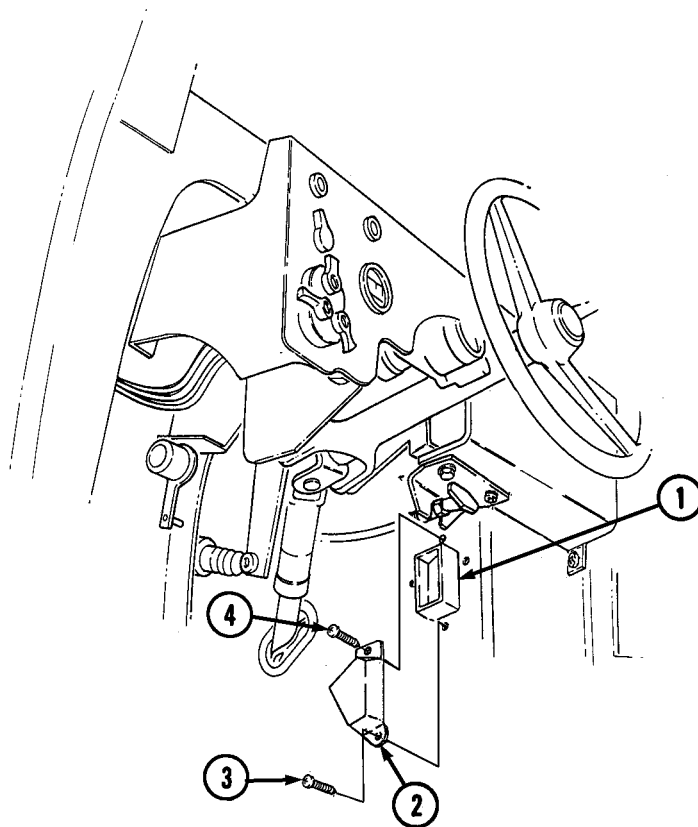
General mechanic's tool kit:
automotive (Appendix B, Item 1)

a. Removal

Remove capscrews (3) and (4) and nozzle deflector (2) from left duct (1).

b. Installation

Install nozzle deflector (2) on left duct (1) with capscrews (3) and (4).



10-95. RIGHT DEFROSTER NOZZLE REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

Defroster ducting removed (para. 10-93),
M1097A2 and M1123 (para. 10-96.1).

Manual References

TM 9-2320-280-24P

a. Removal

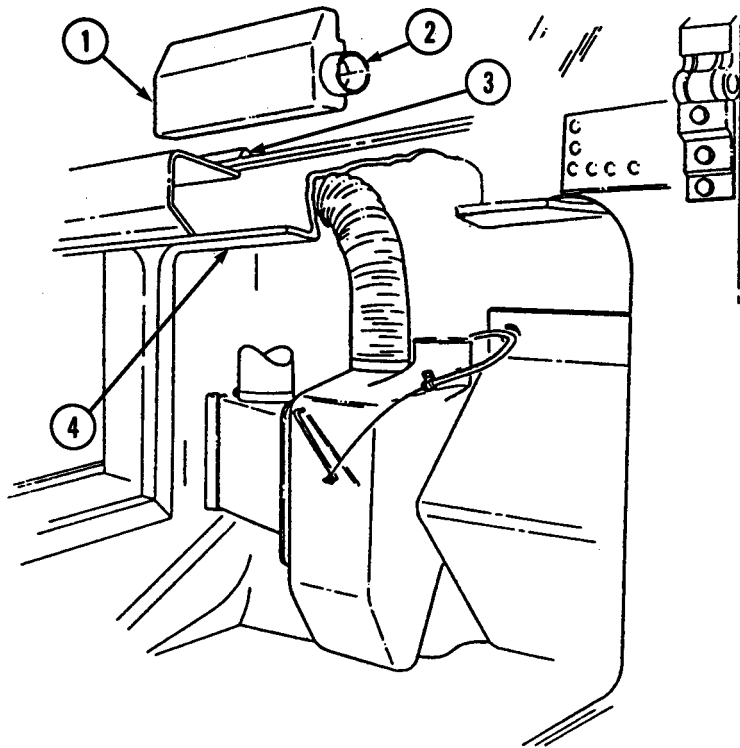
NOTE

Note position of defroster nozzle for installation.

Turn defroster nozzle (2) counterclockwise and remove from "A" beam (4).

b. Installation

Install defroster nozzle (2) on "A" beam (4) and turn defroster nozzle (2) clockwise until defroster nozzle outlets (1) align with windshield frame louvers (3).



FOLLOW-ON TASK: Install defroster ducting (para. 10-93), M1097A2 and M1123 (para. 10-96.1).

10-96. HEATER BOOT REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:**Tools**

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

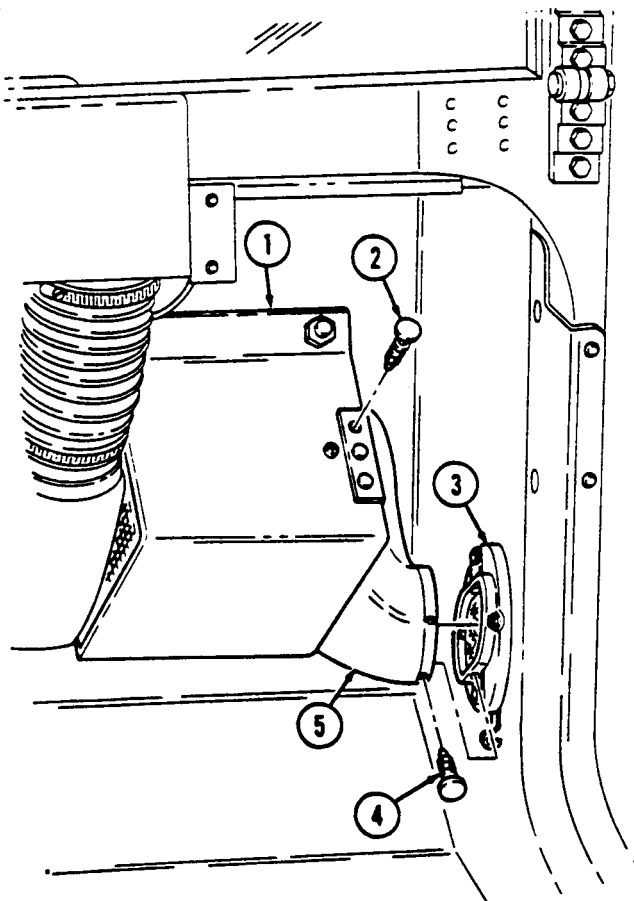
TM 9-2320-280-24P

a. Removal

1. Remove ten clips (2) from heater boot (5) and heater assembly (1).
2. Remove six clips (4) and heater boot (5) from air duct retainer (3).

b. Installation

1. Install heater boot (5) on air duct retainer (3) with six clips (4).
2. Install heater boot (5) on heater assembly (1) with ten clips (2).



10-96.1. DEFROSTER DUCTING REPLACEMENT (M1097A2, M1123)

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M1097A2, M1123

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Adhesive sealant (Appendix C, Item 3)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

- Hood raised and secured (TM 9-2320-280-10).
- Engine access cover removed (para. 10-15).

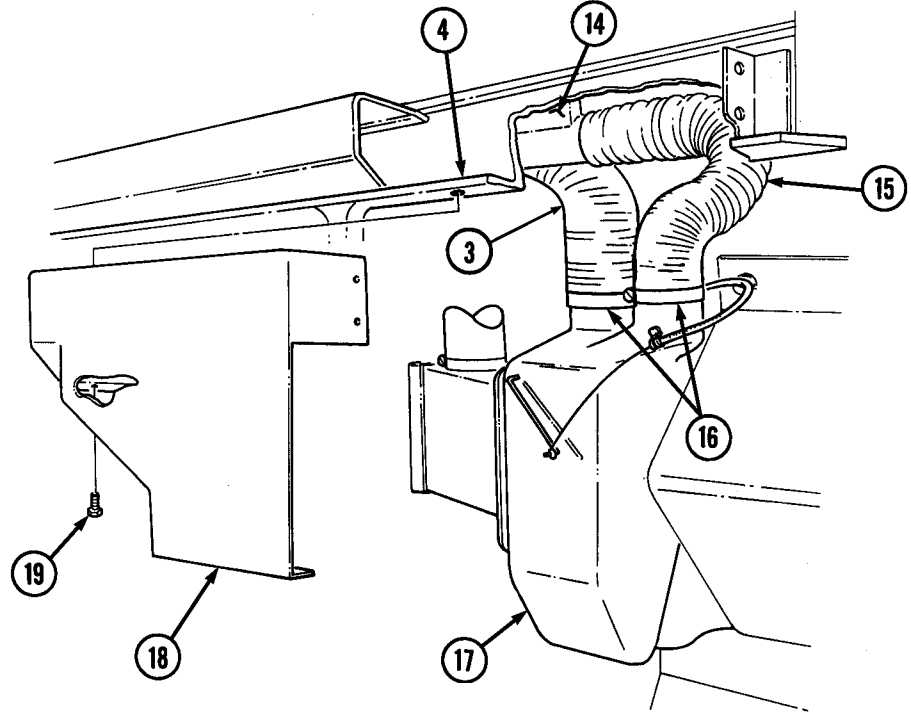
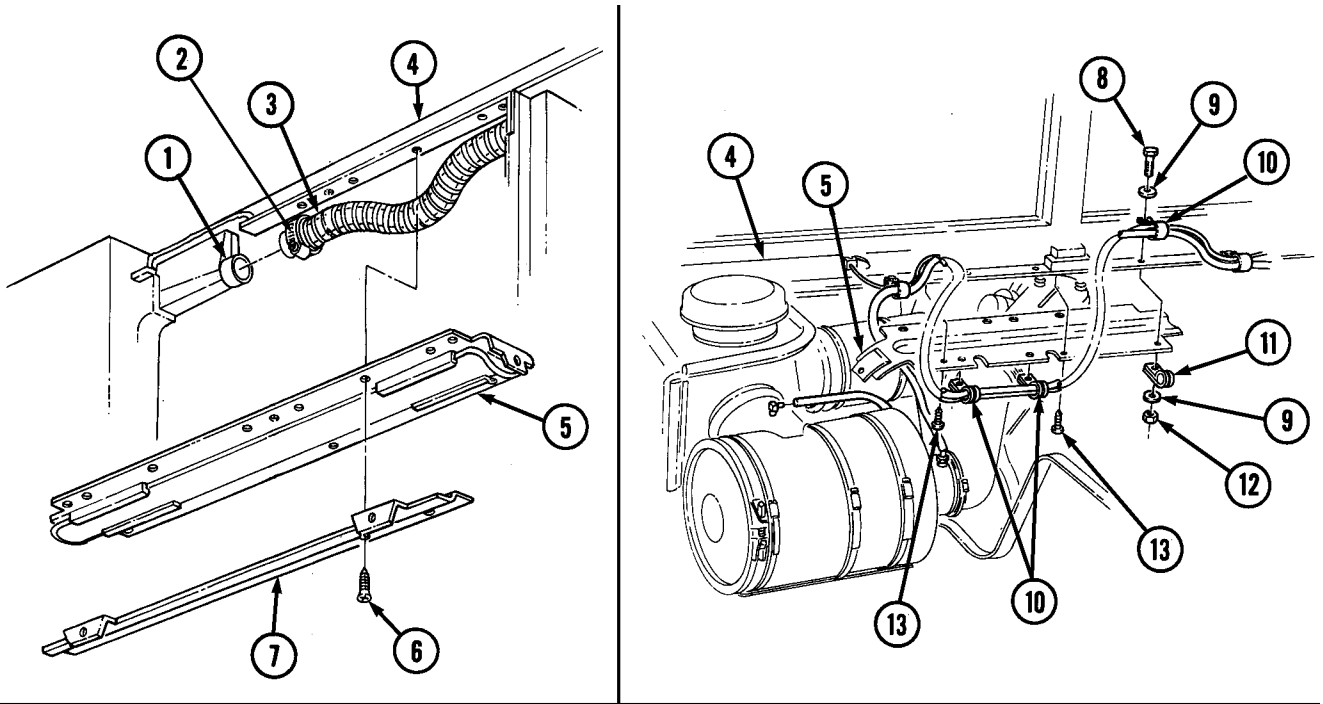
a. Removal

1. Remove eight screws (6), retainer (7), and closeout panel (5) from "A" beam (4).
2. Remove three nuts (12), washers (9), capscrews (8), and washers (9) from three clamps (10), cable clamp (11), closeout panel (5), and "A" beam (4).
3. Remove three screws (13) from closeout panel (5) and "A" beam (4).
4. Loosen clamp (2) and disconnect left flex duct (3) from left defroster nozzle (1).
5. Remove four screws (19) and diverter cover (18) from "A" beam (4).
6. Disconnect right flex duct (15) from right defroster nozzle (14).
7. Loosen two clamps (16) and disconnect left flex duct (3) and right flex duct (15) from diverter housing (17).

b. Installation

1. Connect left flex duct (3) and right flex duct (15) to diverter housing (17) and tighten two clamps (16).
2. Apply adhesive sealant and connect right flex duct (15) to right defroster nozzle (14).
3. Install diverter cover (18) on "A" beam (4) with four screws (19).
4. Apply adhesive and connect left flex duct (3) to left defroster nozzle (1) and tighten clamp (2).
5. Install closeout panel (5) and retainer (7) on "A" beam (4) with eight screws (6).
6. Secure closeout panel (5) to "A" beam (4) with three screws (13).
7. Install three clamps (10), cable clamp (11), and closeout panel (5) on "A" beam (4) with three washers (9), capscrews (8), washers (9), and nuts (12).

10-96.1. DEFROSTER DUCTING REPLACEMENT (M1097A2, M1123) (Cont'd)



- FOLLOW-ON TASKS:**
- Install engine access cover (para. 10-15).
 - Lower and secure hood (TM 9-2320-280-10).

10-96.2. HEATER HOSE REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M1097A2, M1123

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Adhesive (Appendix C, Item 10)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

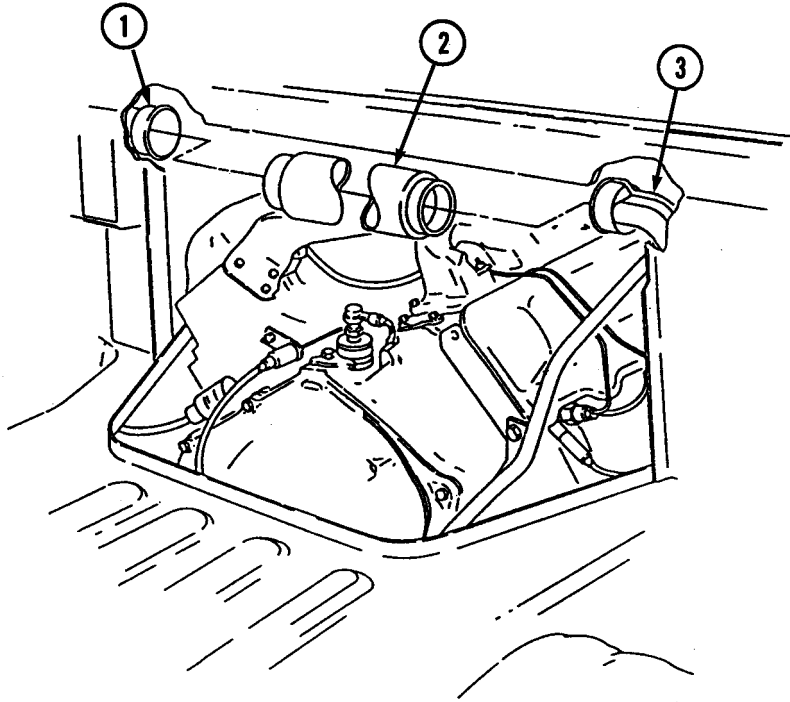
- Hood raised and secured (TM 9-2320-280-10).
- Engine access cover removed (para. 10-15).

a. Removal

Disconnect heater hose (2) from left duct (1) and right duct (3), and remove heater hose (2).

b. Installation

Apply adhesive and connect heater hose (2) to left duct (1) and right duct (3).



- FOLLOW-ON TASKS:
- Install engine access cover (para. 10-15).
 - Lower and secure hood (TM 9-2320-280-10).

10-96.3. DIVERTER BOX COVER REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:**Applicable Models**

M1097A2, M1123

Manual References

TM 9-2320-280-24P

Tools

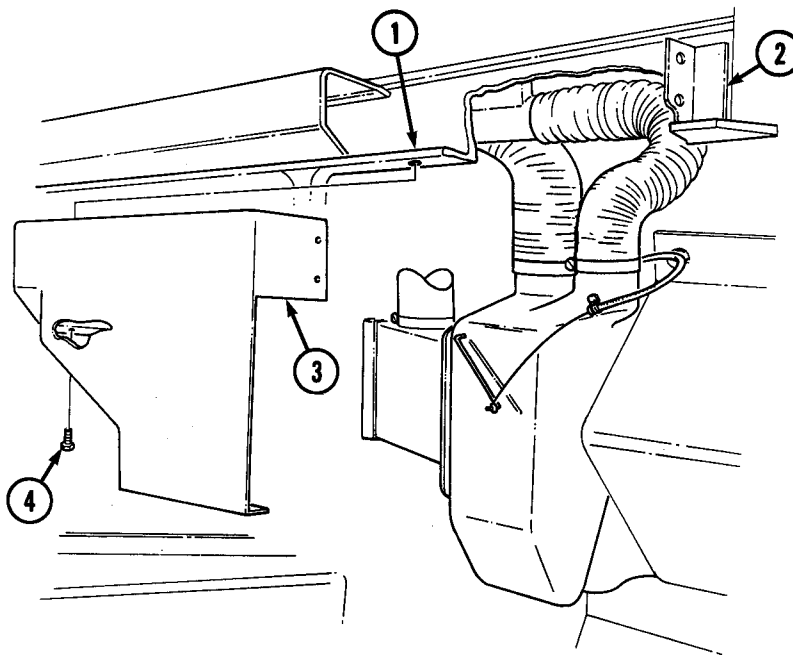
General mechanic's tool kit:
automotive (Appendix B, Item 1)

a. Removal

Remove four screws (4) and diverter box cover (3) from right mounting bracket (2) and "A" beam (1).

b. Installation

Install diverter box cover (3) on right mounting bracket (2) and "A" beam (1) with four screws (4).



10-96.4. DIVERTER DUCTING REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M1097A2, M1123

Manual References

TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual Reference

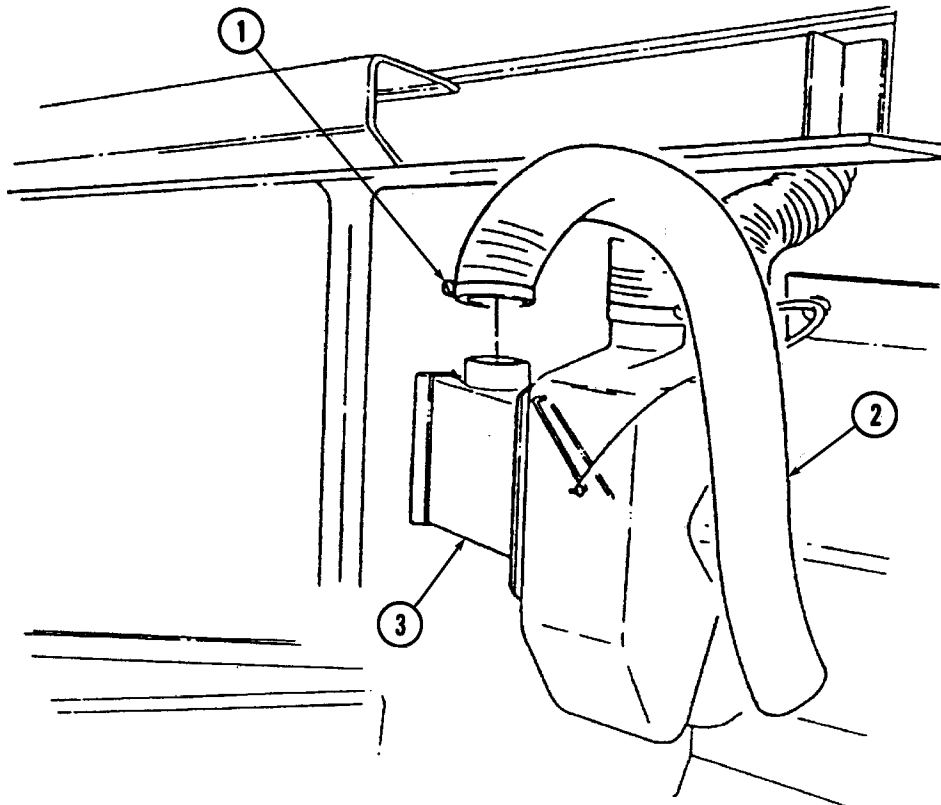
Diverter box cover removed (para. 10-96.3).

a. Removal

Loosen clamp (1) and remove diverter ducting (2) from diverter duct (3).

b. Installation

Install diverter ducting (2) on diverter duct (3) and tighten clamp (1).



FOLLOW-ON TASK: Install diverter box cover (para. 10-96.3).

10-97. AIR DUCT ASSEMBLY REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

- Arctic heater removed, if installed (para. 12-41).
- Heater boot removed (para. 10-96).

Manual References

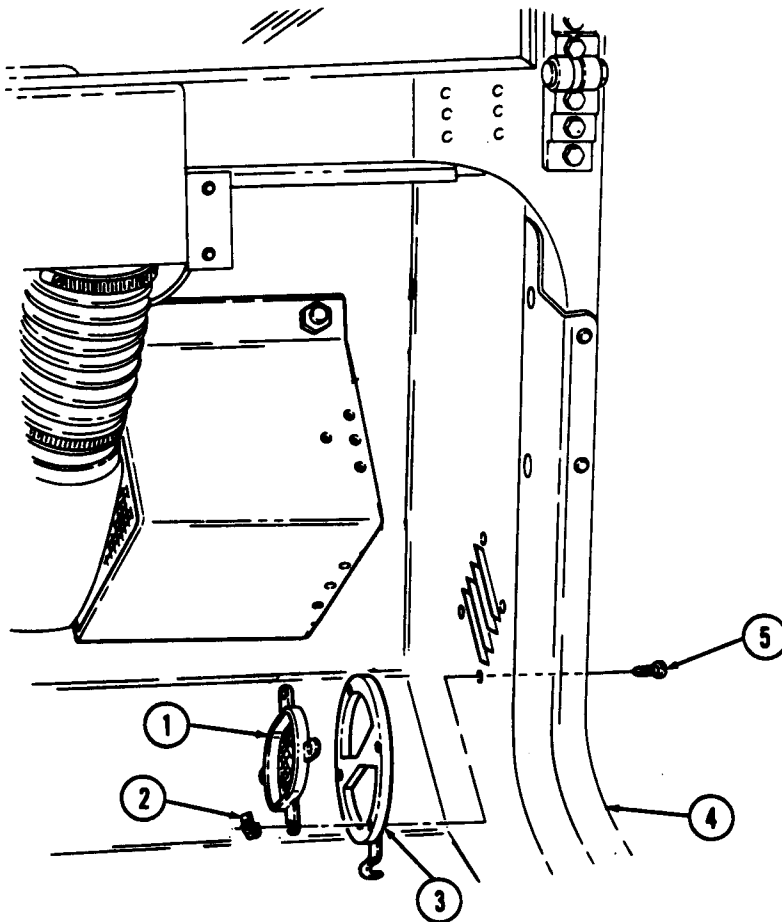
TM 9-2320-280-24P

a. Removal

Remove four speed nuts (2), screws (5), air duct retainer (1), and grille assembly (3) from body (4).

b. Installation

Install grille assembly (3) and air duct retainer (1) on body (4) with four screws (5) and speed nuts (2).



- FOLLOW-ON TASKS:
- Install arctic heater, if removed (para. 12-41).
 - Install heater boot (para. 10-96).

10-97.1. DIVERTER BOX REPLACEMENT (M998A2 SERIES)

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M998A2 series

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-24P

Materials/Parts

Two clips (Appendix G, Item 10)
Four rivets (Appendix G, Item 258)
Two rivets (Appendix G, Item 253)
Push on nut (Appendix G, Item 226)

Equipment Condition

- Diverter box cover removed (para. 10-96.3).
- Diverter ducting removed (para. 10-96.4).

a. Removal

1. Remove two clips (14) from transition diverter (12) and transition (13). Discard two clips (14).
2. Remove two screws (8) from diverter (9) and heater (7).
3. Remove screw (5) and clamp (4) from diverter (9).
4. Remove push on nut (11) and disconnect cable core (6) from baffle pin (10). Discard push on nut (11).
5. Pull diverter (9) away from "A" beam (1) and loosen two clamps (3) on defroster flex ducts (2) and remove diverter (9).
6. Remove four rivets (21) and transition diverter (15) from diverter (17).
7. Remove louver (16) from transition diverter (15).
8. Remove two rivets (19), flap (20), and bracket (18) from diverter (17).

b. Installation

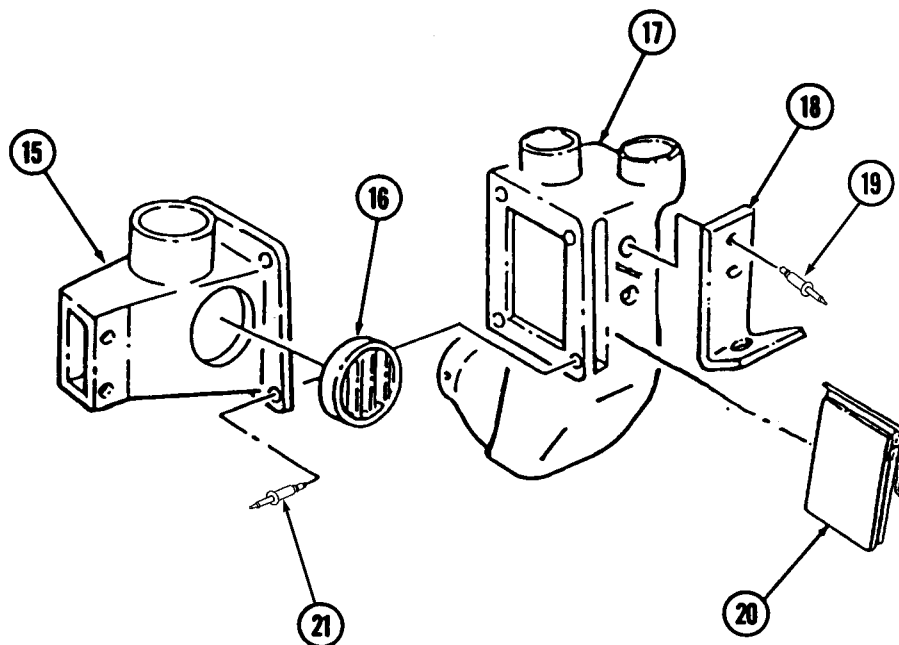
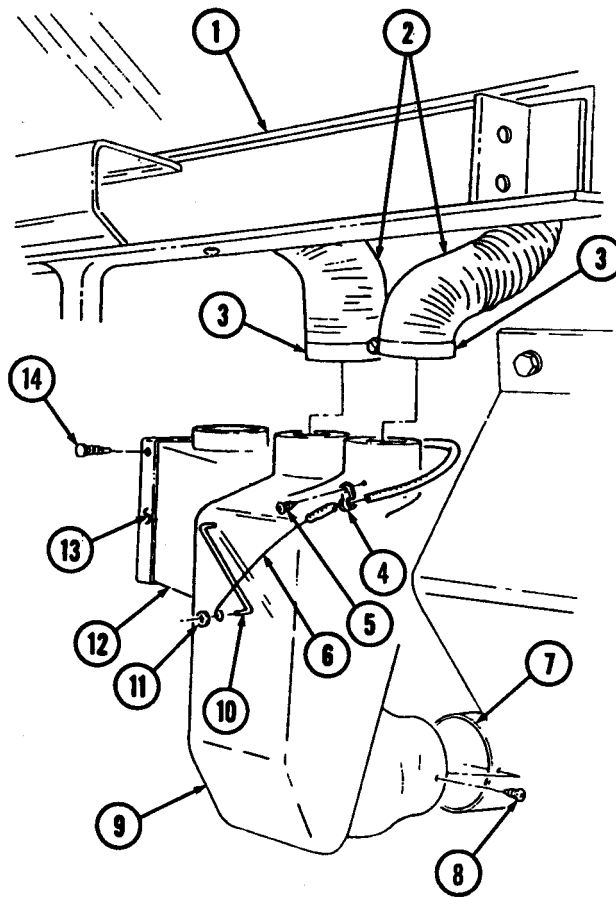
1. Install flap (20) and bracket (18) on diverter (17) with two rivets (19).
2. Install louver (16) on transition diverter (15).
3. Install transition diverter (15) on diverter (17) with four rivets (21).
4. Position diverter (9) under "A" beam (1), connect two defroster flex ducts (2) to diverter (9), and tighten clamps (3).
5. Connect defroster cable core (6) to baffle pin (10) and install push on nut (11).
6. Install transition diverter (12) on transition (13) with two clips (14).

NOTE

Control cable must be pushed in, and baffle pin must be in the upward position before securing control cable to diverter box.

7. Install clamp (4) on diverter (9) with screw (5).
8. Install diverter (9) on heater (7) with two screws (8).

10-97.1. DIVERTER BOX REPLACEMENT (M998A2 SERIES) (Cont'd)



- FOLLOW-ON TASKS:
- Install diverter ducting (para. 10-96.4).
 - Install diverter box cover (para. 10-96.3).

10-98. "A" PILLAR FORMER ASSEMBLY REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M998, M998A1, M1035, M1035A1, M1035A2,
M1037, M1038, M1038A1, M1042

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

Soft top removed (TM 9-2320-280-10).

Materials/Parts

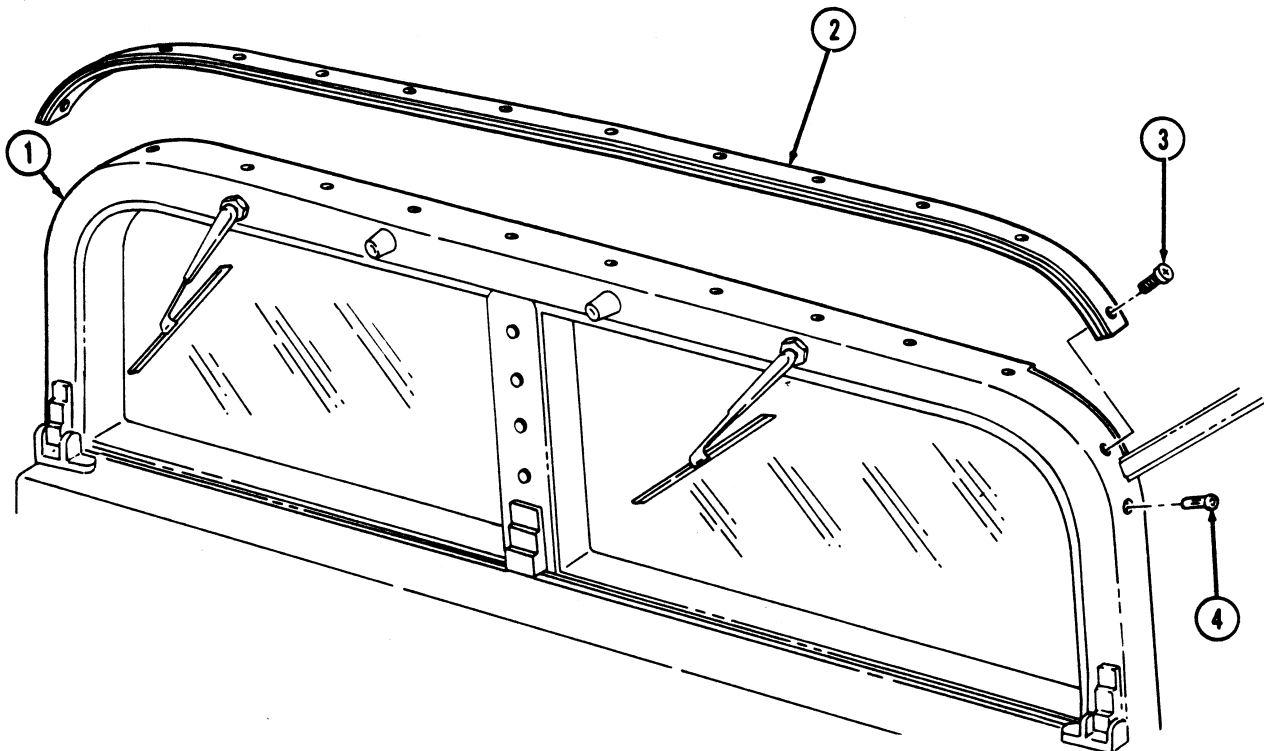
Turnbutton stud (Appendix G, Item 303)

a. Removal

1. Remove thirteen screws (3) and "A" pillar former (2) from "A" pillar (1).
2. Clean weatherstrip from "A" pillar (1).
3. Inspect turnbutton stud (4) for damage. Replace if damaged.

b. Installation

1. Peel backing paper from "A" pillar former (2).
2. Install "A" pillar former (2) on "A" pillar (1) with thirteen screws (3).



FOLLOW-ON TASK: Install soft top (TM 9-2320-280-10).

10-99. "C" PILLAR REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M998, M998A1, M1035, M1035A1,
M1038, M1038A1

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Four locknuts (Appendix G, Item 119)
Four locknuts (Appendix G, Item 71)
Eight rivets (Appendix G, Item 256)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

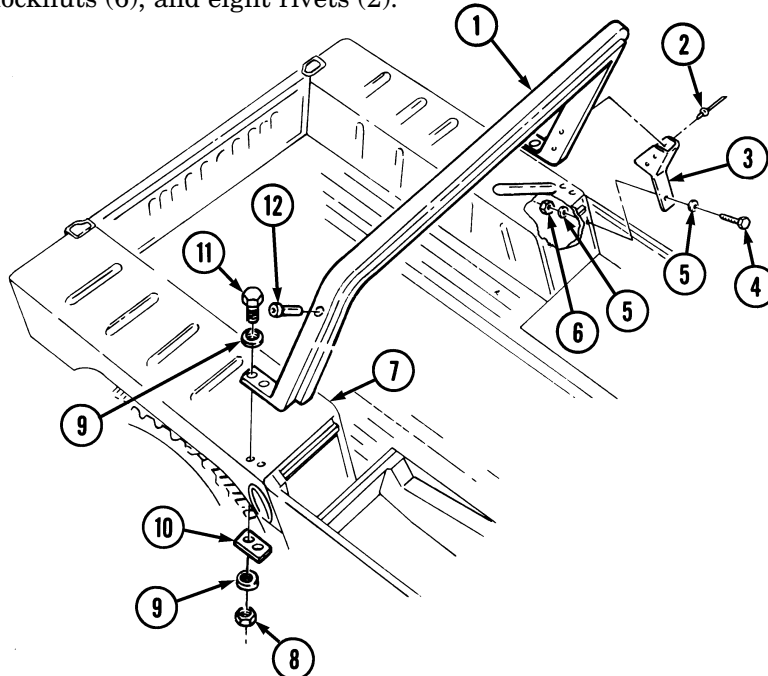
Soft top removed (TM 9-2320-280-10).

a. Removal

1. Remove four locknuts (6), washers (5), capscrews (4), washers (5), eight rivets (2), and two braces (3) from "C" pillar (1) and wheelhouses (7). Discard locknuts (6).
2. Remove four locknuts (8), washers (9), capscrews (11), washers (9), two plates (10), and "C" pillar (1) from wheelhouses (7). Discard locknuts (8).
3. Inspect rivnut (12) for damage. Replace if damaged.

b. Installation

1. Install "C" pillar (1) on wheelhouses (7) with two plates (10), four washers (9), capscrews (11), washers (9), and locknuts (8). Tighten locknuts (8) to 6 lb-ft (8 N·m).
2. Install two braces (3) on wheelhouses (7) and "C" pillar (1) with four washers (5), capscrews (4), washers (5), locknuts (6), and eight rivets (2).



FOLLOW-ON TASK: Install soft top (TM 9-2320-280-10).

10-100. REAR BOW PIVOT BRACKET REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M998, M998A1, M1035, M1035A1, M1035A2,
M1038, M1038A1, M1097, M1097A1,
M1097A2

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

Bows removed (TM 9-2320-280-10).

Materials/Parts

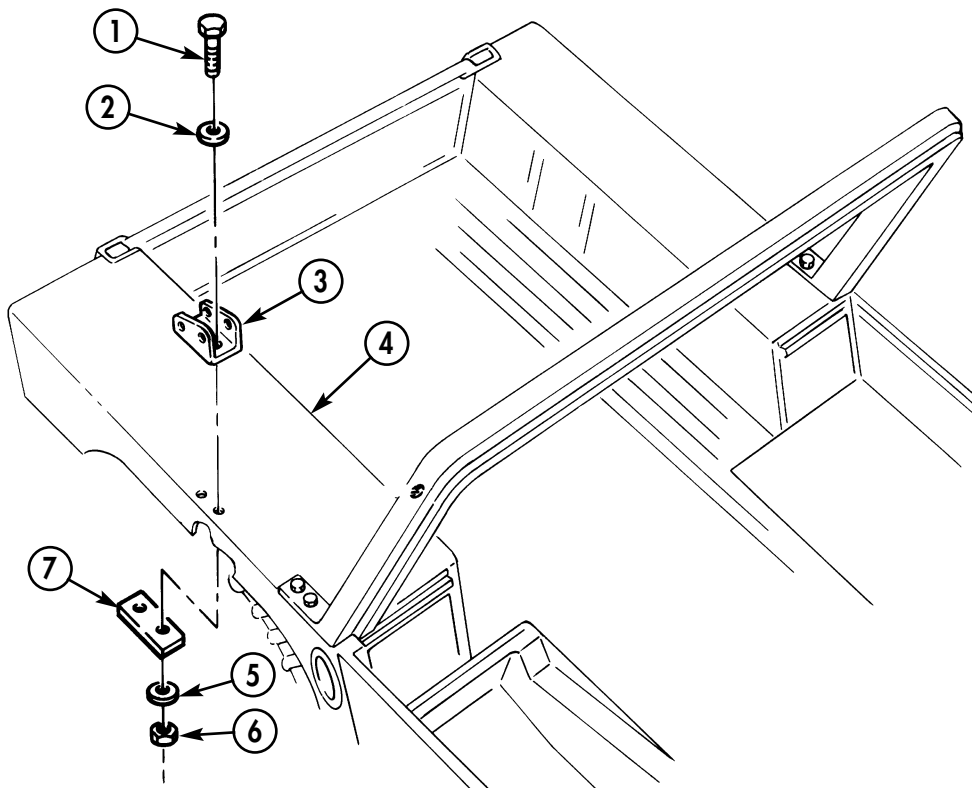
Two locknuts (Appendix G, Item 70)

a. Removal

Remove two locknuts (6), washers (5), capscrews (1), washers (2), bow pivot bracket (3), and plate (7) from body (4). Discard locknuts (6).

b. Installation

Install plate (7) and bow pivot bracket (3) on body (4) with two washers (2), capscrews (1), washers (5), and locknuts (6). Align bow pivot bracket (3) flush with side of body (4) and tighten two locknuts (6) to 6 lb-ft (8 N·m).



FOLLOW-ON TASK: Install bows (TM 9-2320-280-10).

10-101. SOFT TOP DOOR HINGE REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M998, M998A1, M1035, M1035A1, M1035A2,
M1037, M1038, M1038A1, M1042, M1097,
M1097A1, M1097A2

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

Soft top door removed (TM 9-2320-280-10).

NOTE

Doorstrap brackets are attached to upper hinges only. This procedure covers the left door upper hinge.

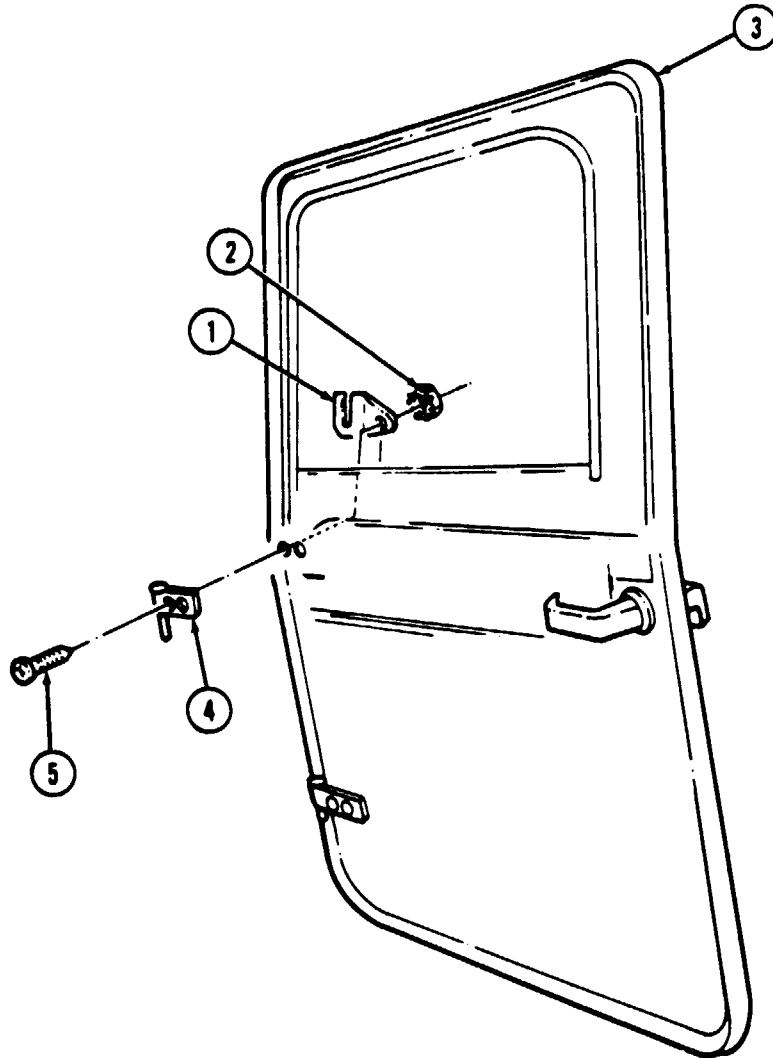
a. Removal

- Remove two nuts (2), screws (5), hinge (4), and bracket (1) from door (3). Discard nuts (2).

b. Installation

- Install hinge (4) and bracket (1) on door (3) with two screws (5) and nuts (2). Tighten nuts (2) to 6 lb-ft (8 N•m).

10-101. SOFT TOP DOOR HINGE REPLACEMENT (Cont'd)



- FOLLOW-ON TASKS:
- Install door (TM 9-2320-280-10).
 - Adjust soft top door (para. 10-102).

10-102. SOFT TOP DOOR ADJUSTMENT

This task covers:

Adjustment

INITIAL SETUP:

Applicable Models

M998, M998A1, M1035, M1035A1, M1035A2, M1037, M1038, M1038A1, M1042, M1097, M1097A1, M1097A2, M1123

Personnel Required

One mechanic
One assistant

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Adjustment

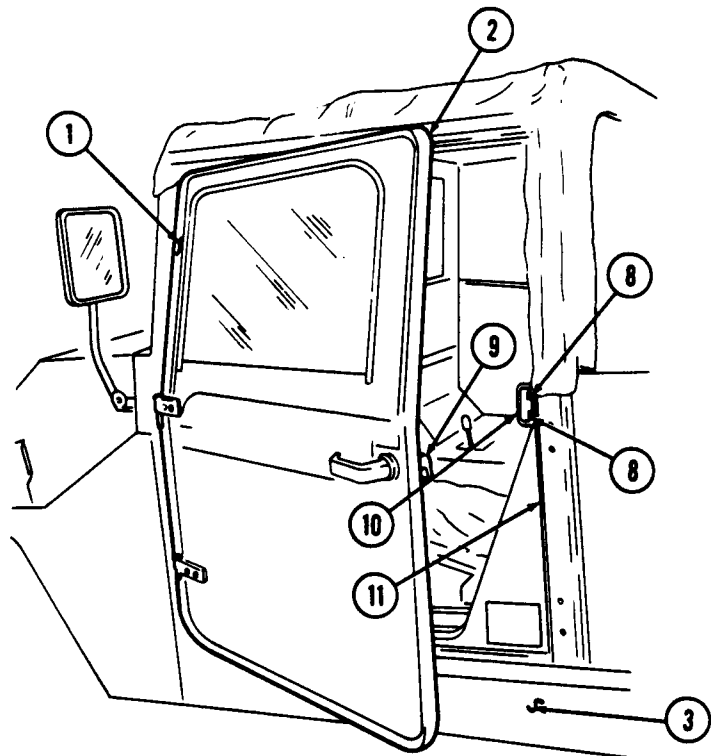
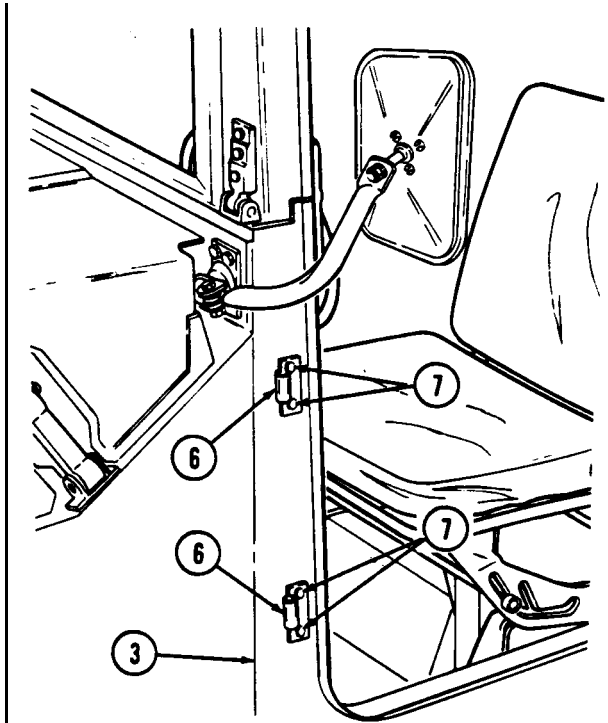
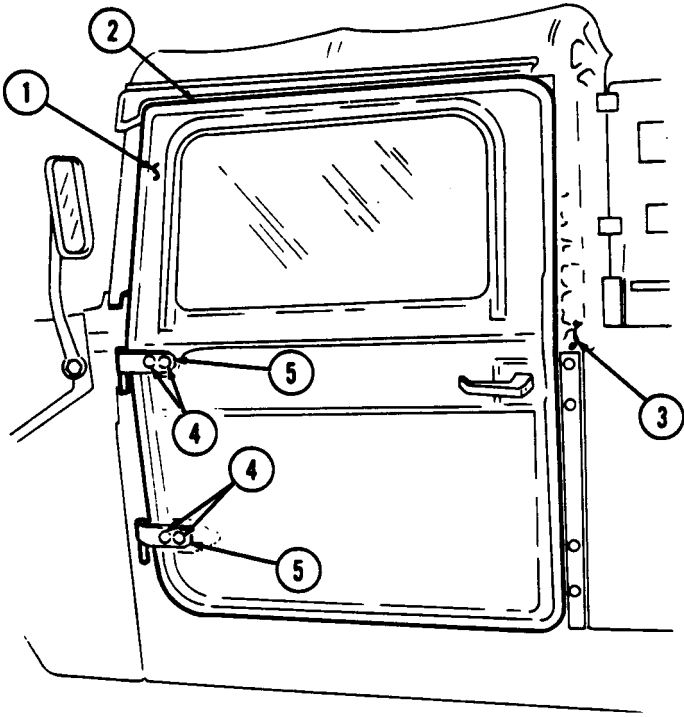
1. Open and close door (1) to check fit of door seal (2) to body (3). Door seal (2) should fit inside and contact door outline on body (3).
2. For vertical and horizontal adjustment of door (1), loosen four screws (4) on two hinges (5) and door (1). Slide door (1) to fit door outline on body (3). Hold door (1) in position, and tighten four screws (4) on two door hinges (5) and door (1).

NOTE

If additional vertical adjustment is needed, follow step 3. If no additional vertical adjustment is needed, go to step 4.

3. For additional vertical adjustment of door (1), remove door (1) from body (3) (TM 9-2320-280-10). Loosen four capscrews (7) on two body hinge mounts (6) and body (3) and slide body hinge mounts (6) up or down for adjustment. Hold body hinge mounts (6) in position, and tighten four capscrews (7) to 8 lb-ft (11 N•m). Install door (TM 9-2320-280-10).
4. For in and out adjustment of door (1), loosen two capscrews (8) on striker (10) and "B" pillar (11). With door (1) closed and door seal (2) pressed against body (3), slide striker (10) against inner door handle latch (9) and tighten two capscrews (8). Open door (1) and tighten two capscrews (8) to 15 lb-ft (20 N•m).
5. Close door (1) and check for fit of door seal (2) to door outline on body (3) and inner door handle latch (9) operation. Readjust door (1) if necessary.

10-102. SOFT TOP DOOR ADJUSTMENT (Cont'd)



10-102.1. SOFT TOP DOOR HANDLE REPAIR

This task covers:

- a. Removal
- b. Repair
- c. Installation

INITIAL SETUP:

Applicable Models

M998, M998A1, M1035, M1035A1, M1035A2,
M1037, M1038, M1038A1, M1042, M1097,
M1097A1, M1097A2, M1123

Manual References

TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

a. Removal

1. Remove screw (5), inner (4) and outer (1) door handles, washer (7), and spring (6) from door (3).
2. Remove insert (2) from outer door handle (1) if present.

b. Repair

1. Drill 0.250-in. (6.35 mm) diameter hole through outer door handle (1).

NOTE

Countersink hole deep enough so screw is flush with surface of handle.

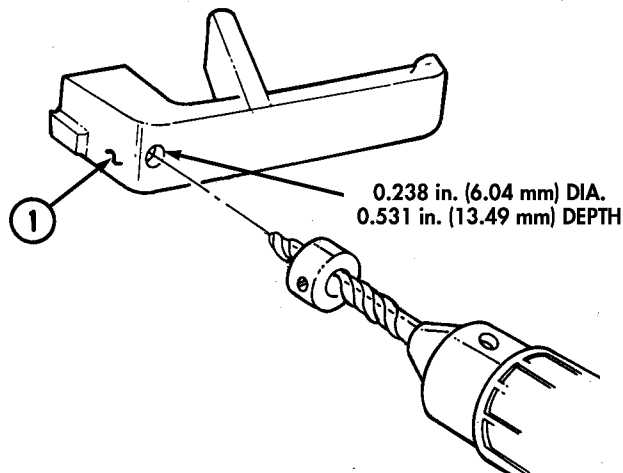
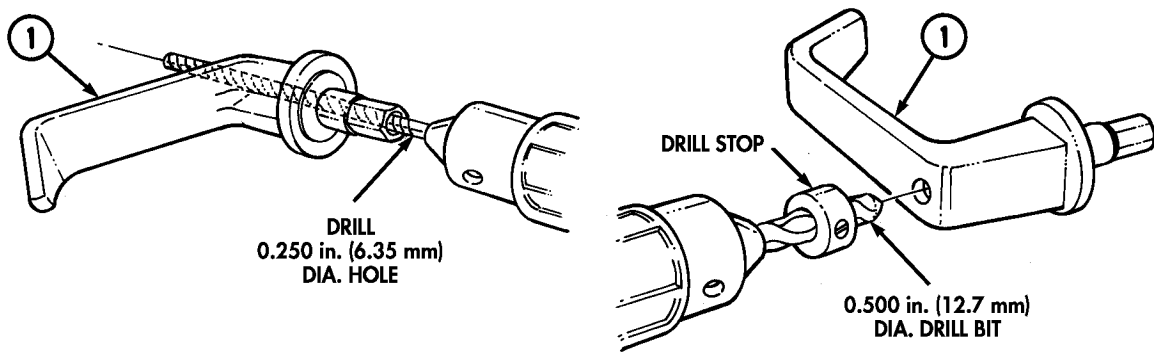
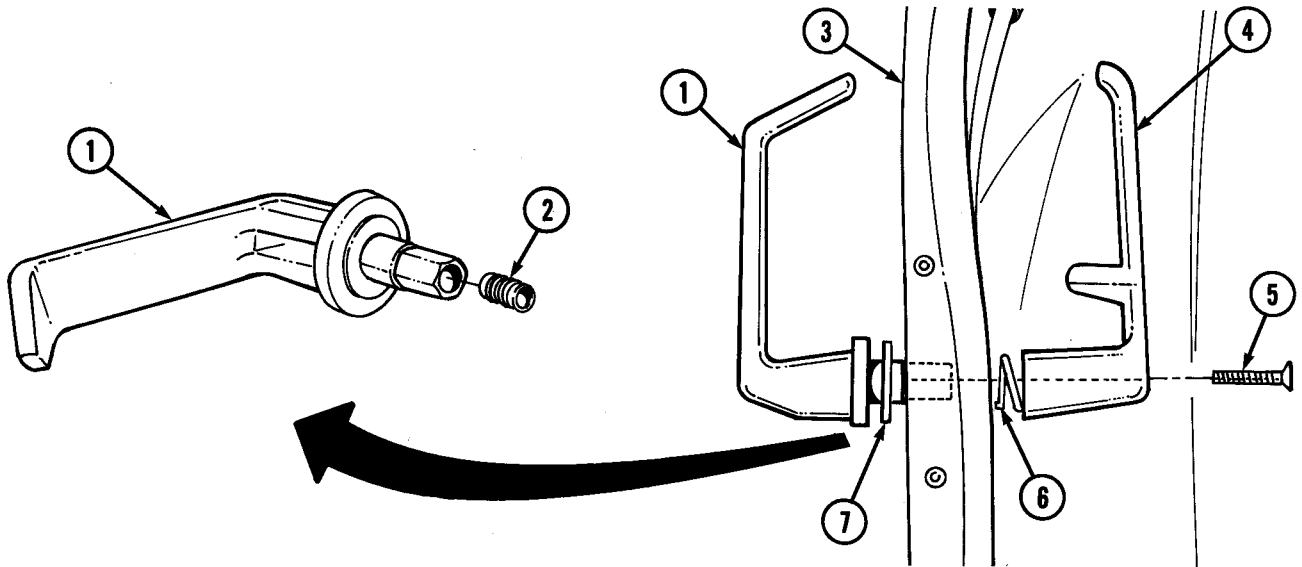
2. Using a 0.500-in. (12.7 mm) diameter drill bit, countersink outer handle (1).

CAUTION

Use tape or drill stop to ensure the proper depth is not exceeded when counterboring, or inner door handle may be damaged.

3. Counterbore inner door handle (4) to 0.238-in. (6.04 mm) diameter, 0.531-in. (13.49 mm) depth.

10-102.1. SOFT TOP DOOR HANDLE REPAIR (Cont'd)

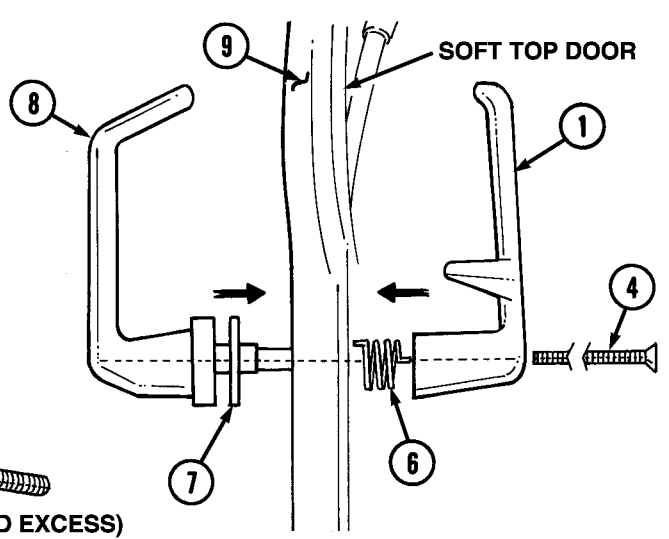
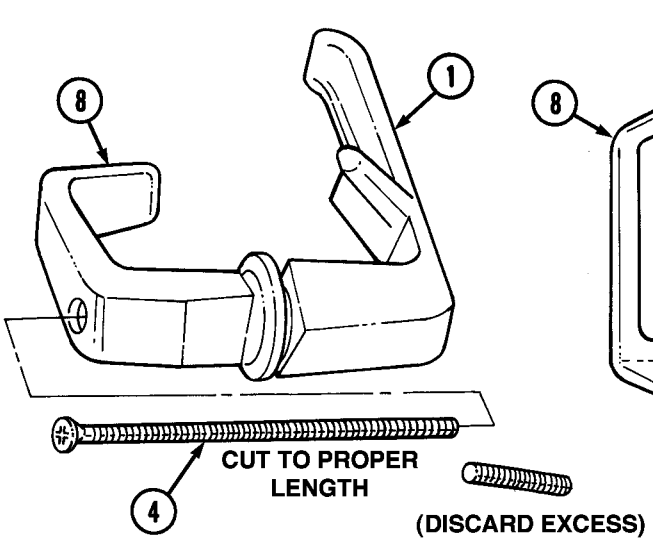
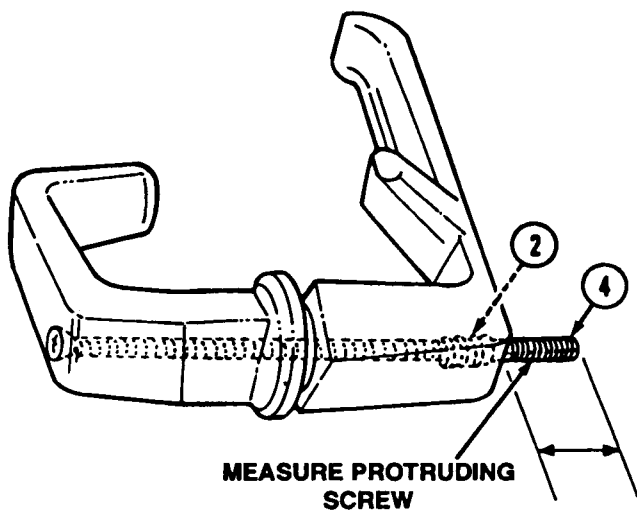
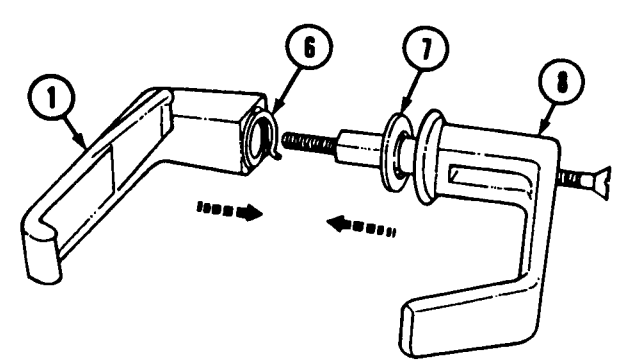
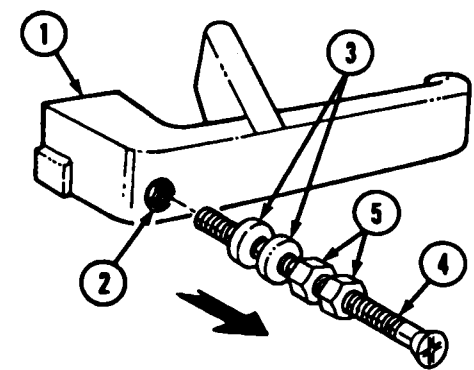
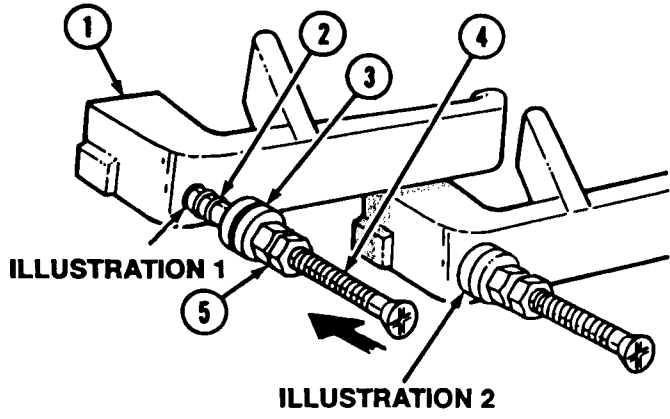


10-102.1. SOFT TOP DOOR HANDLE REPAIR (Cont'd)

c. Installation

1. Install two nuts (5), washers (3), and insert (2) on screw (4).
2. Install insert (2) with screw (4) into inner handle (1). Seat bottom washer (3) against handle surface (1).
3. Loosen two nuts (5) and remove screw (4), two nuts (5), and washers (3) from insert (2).
4. Assemble inner handle (1), washer (7), spring (6), and outer handle (8) with screw (4).
5. Measure length of screw (4) from insert (2).
6. Remove screw (4) and cut to measurement.
7. Install washer (7), outer handle (8), spring (6), and inner handle (1) on door (9) with screw (4).
8. Check door handle for proper operation.

10-102.1. SOFT TOP DOOR HANDLE REPAIR (Cont'd)



10-103. SOFT TOP DOOR STRIKER REPLACEMENT

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP:

Applicable Models

M998, M998A1, M1035, M1035A1, M1035A2,
M1037, M1038, M1038A1, M1042, M1097,
M1097A1, M1097A2

Manual References

TM 9-2320-280-24P

Tools

General mechanic's tool kit
automotive (Appendix B, Item 1)

NOTE

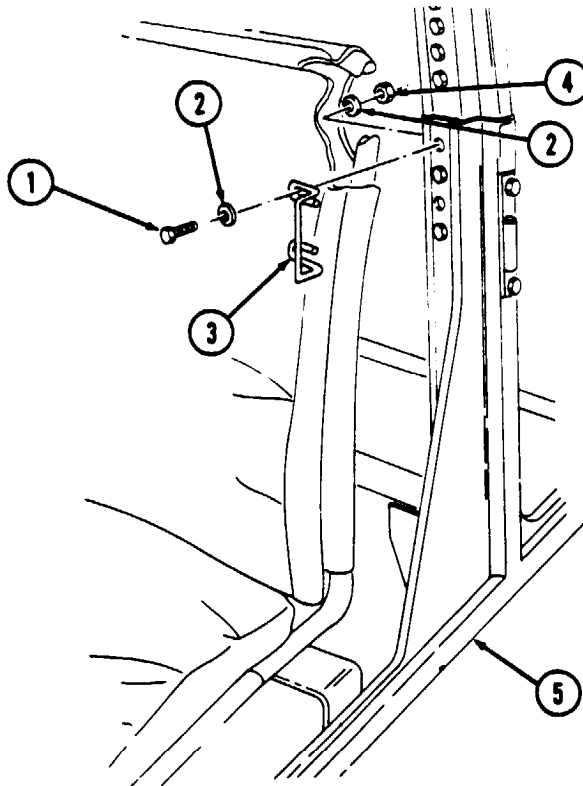
Front door strikers are installed with washers and capscrews.
Rear door strikers are installed with star washers and capscrews.
This procedure covers a front door striker.

a. Removal

Remove two nuts (4), washers (2), capscrews (1), washers (2), and door striker (3) from body (5).

b. Installation

Install door striker (3) on body (5) with two washers (2), capscrews (1), washers (2), and nuts (4).
Tighten capscrews (1) to 15 lb-ft (20 N·m).



FOLLOW-ON TASK: Adjust soft top door (para. 10-102).

10-104. SOFT TOP REPAIR

This task covers:

- | | |
|--|---|
| <ul style="list-style-type: none"> a. Inspection and Cleaning b. Soft Top Material Repair c. Soft Top Window Repair | <ul style="list-style-type: none"> d. Soft Top Window Zipper Repair (Temporary) e. Soft Top Canvas Repair |
|--|---|

INITIAL SETUP:

Applicable Models

M998, M998A1, M1035, M1035A1, M1035A2,
M1037, M1038, M1038A1, M1042, M1097,
M1097A1, M1097A2, M1123

Manual Reference

FM 10-16
TM 9-2320-280-10
TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

Soft top enclosure removed, as required
(TM 9-2320-280-10).

Materials/Parts

Sealing compound (Appendix C, Item 42)
Hook and pile material (Appendix C, Item 52)
Two plastic sheets (Appendix D, Figure D-64)
Green plastic canvas
(Appendix D, Figure D-114)
Six socket turnbuttons (Appendix G, Item 293)
Six grommets (Appendix G, Item 63)
Twelve clinch plate turnbuttons
(Appendix G, Item 316)

a. Inspection and Cleaning

1. Inspect soft top doors and tops for pin holes and leaks around the seam areas.
2. Using soapy water solution and stiff brush, clean area to be sealed on the outer side of the canvas. Allow to dry.

b. Soft Top Material Repair

1. Apply sealing compound to cleaned area where leak occurred. Ensure sealing compound is pressed into stitching of seams.
2. Allow 20 minutes for sealing compound to cure.

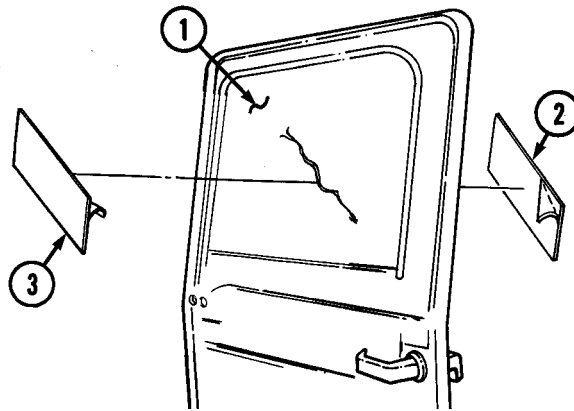
10-104. SOFT TOP REPAIR (Cont'd)

c. Soft Top Window Repair

NOTE

The use of pressure-sensitive, adhesive-coated plastic sheets for temporary repair of small window cracks and holes should only be utilized if it does not hinder operator's vision. If damaged area is large enough so that plastic sheets will hinder operator's vision, door assembly should be replaced.

1. Ensure damaged area of window (1) is clean and dry.
2. Peel backing off plastic sheet (2) and apply to damaged area of window (1).
3. Peel backing off plastic sheet (3) and apply to other side of damaged area of window (1).

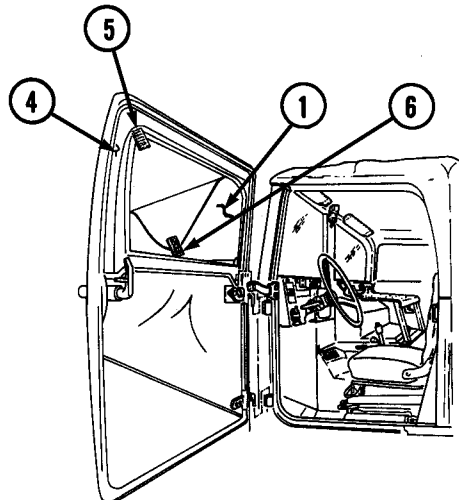


d. Soft Top Window Zipper Repair (Temporary)

NOTE

Use hook and pile material as a temporary measure to secure window with failed zipper until zipper or door can be replaced.

1. Apply half (5) of the self-adhesive hook and pile material on inside of door (4) around window (1).
2. Put mating half (6) of hook and pile material on window (1). Apply strips as required to firmly secure window.



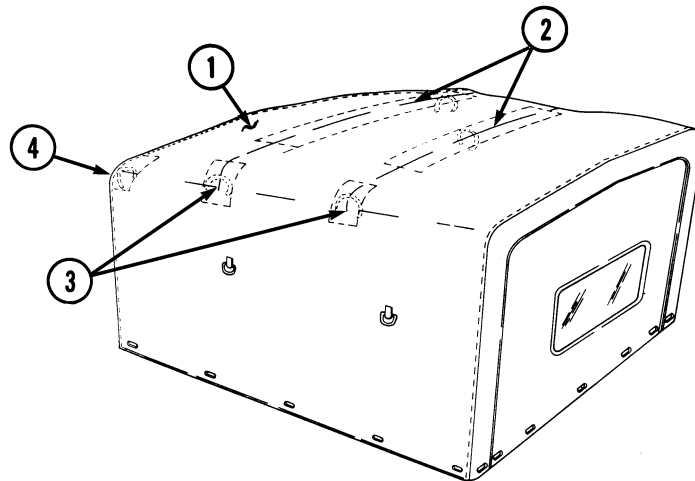
10-104. SOFT TOP REPAIR (Cont'd)

e. Soft Top Canvas Repair

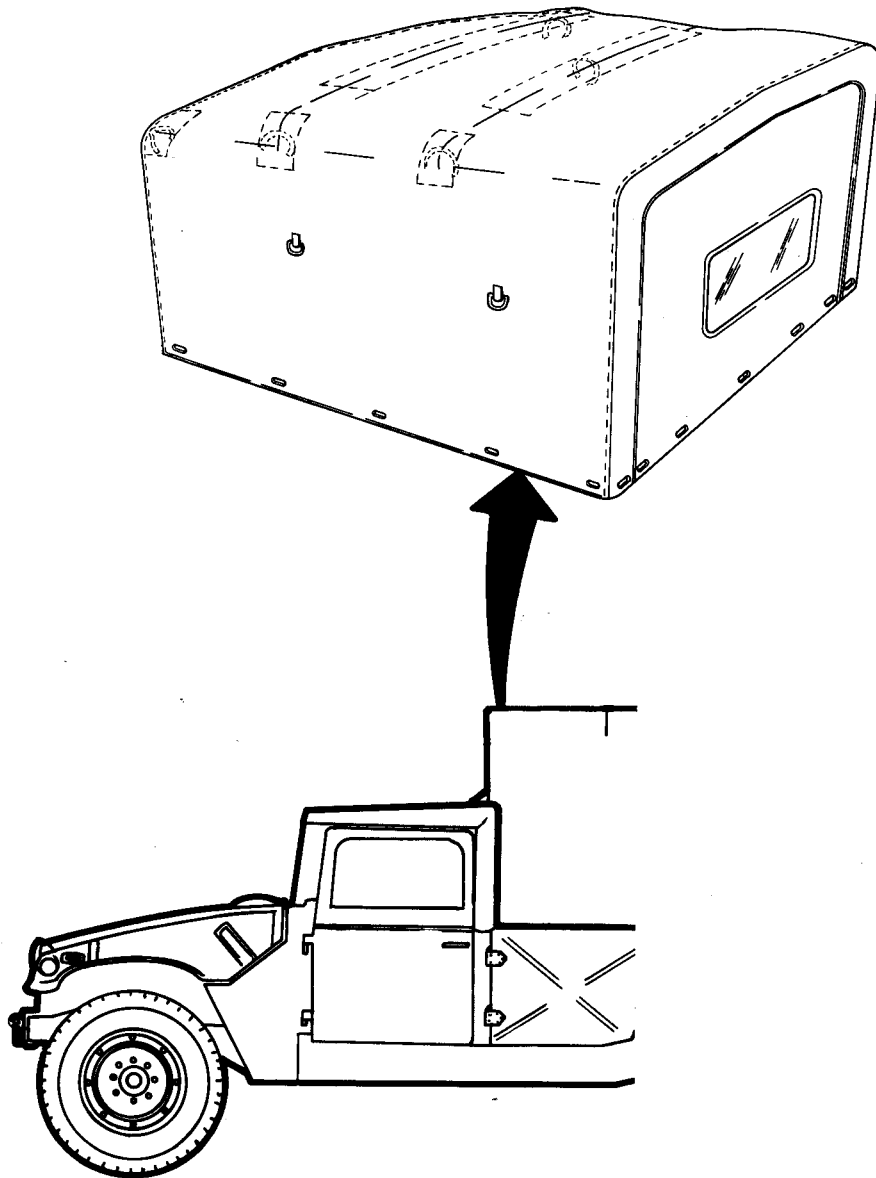
NOTE

Since these procedures are a reinforcement guide, you can modify them to meet individual needs. These reinforcement procedures are helpful because:

- The securing straps reinforce the enclosure and reduce its “ballooning” action.
 - The extra wear, damage, and holes in the enclosure are reduced.
 - Any enclosure can be returned to a serviceable condition at a significantly lower cost than replacing the enclosure.
1. Secure six socket turnbuttons and grommets to canvas straps (2), (3), and (4) using twelve clinch plate turnbuttons, follow procedures found in FM 10-16, General Fabric Repair.
 2. Sew the eight canvas straps (2), (3), and (4) to inside of soft top enclosure (1). Follow procedures for sewing on straps as found in FM 10-16, General Fabric Repair. Attach straps in the following locations:
 - (a) Strap A (4) – On top front corners of soft top enclosure (1).
 - (b) Strap B (3) – Where the corners of second and third bows make contact with the enclosure (1).
 - (c) Strap C (2) – On the soft top enclosure (1) where second and third bows make contact with soft top enclosure (1).



10-104. SOFT TOP REPAIR (Cont'd)



FOLLOW-ON TASK: Install soft top enclosure, as required, (TM 9-2320-280-10), ensuring straps are fastened around bows.

10-105. "C" PILLAR REINFORCEMENT BRACKETS INSTALLATION

This task covers:

Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Two brackets (Appendix D, Fig. D-89)
Two locknuts (Appendix G, Item 119)
Eight rivets (Appendix G, Item 256)

Manual Reference

TM 9-2320-280-10
TM 9-2320-280-24P
TM 43-0139

Equipment Condition

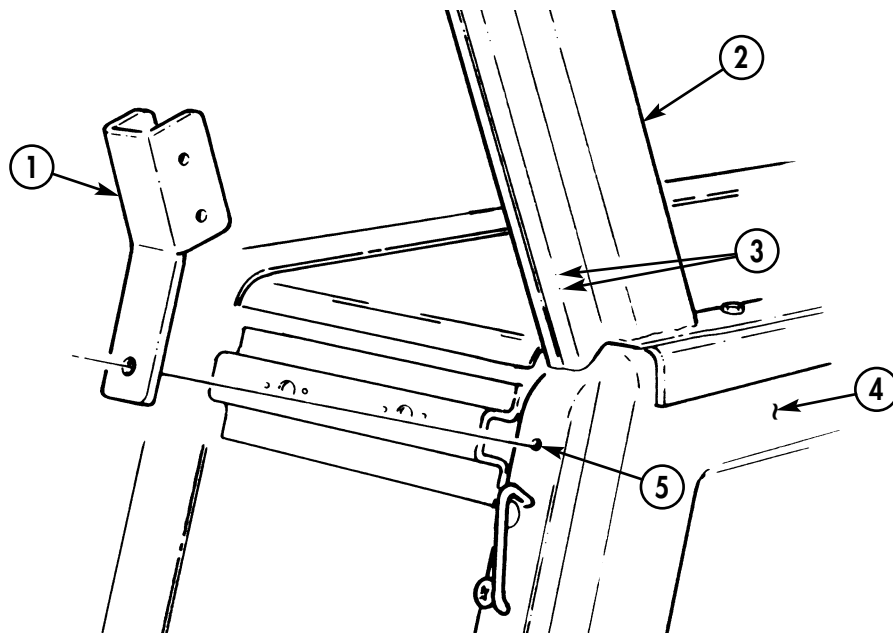
Soft top removed as required (TM 9-2320-280-10).

Installation

NOTE

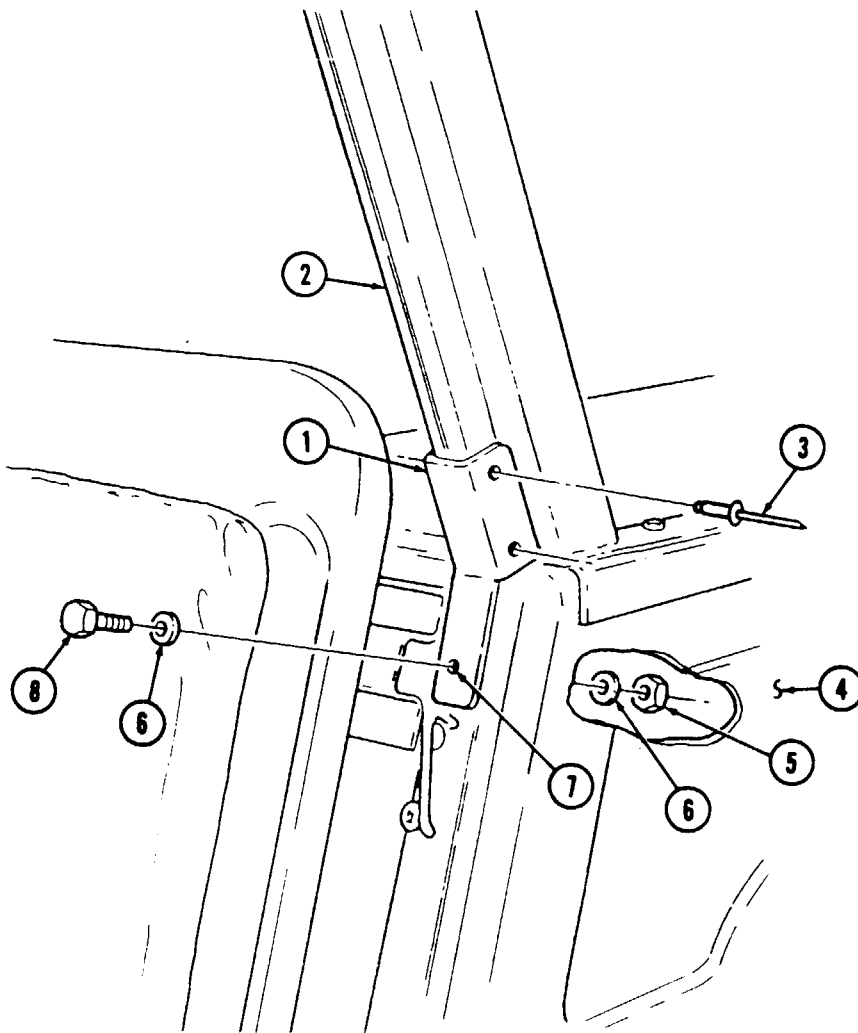
- The following procedure can be performed to prevent fatigue cracking of the "C" pillar mount brackets. Installation is at commander's discretion.
- For instructions on replacement of rivets, refer to para. 10-66.

1. Using 0.187-inch drill bit, remove rivet (5) from wheelhousing (4).
2. Scribe two reference lines (3) on "C" pillar (2).
3. Align reinforcement bracket (1) with reference lines (3) on "C" pillar (2).
4. Scribe hole location (5) on wheelhousing (4) onto reinforcement bracket (1).
5. Using reinforcement bracket as template, drill four 0.187-inch diameter holes through reinforcement bracket (1) and "C" pillar (2). Remove bracket (1).
6. Using 0.281-inch drill bit, enlarge hole (5) in wheelhousing (4).
7. Using hole location marked in step 4, drill 0.281-inch diameter hole in reinforcement bracket (1).
8. Spot paint reinforcement bracket (refer to TM 43-0139).



10-105. "C" PILLAR REINFORCEMENT BRACKETS INSTALLATION

9. Install reinforcement bracket (1) on "C" pillar (2) with four rivets (3).
10. Align mount hole (7) in reinforcement bracket (1) and hole in wheelhousing (4) and install washer (6), screw (8), washer (6), and locknut (5).
11. Spot paint as necessary (refer to TM 43-0139).



FOLLOW-ON TASK: Install soft top as required (TM 9-2320-280-10).

Section III. WINCH MAINTENANCE

10-106. WINCH MAINTENANCE TASK SUMMARY

TASK PARA.	PROCEDURES	PAGE NO.
10-107.	6,000 Lb Electric Winch Replacement	10-180
10-108.	9,000 Lb Electric Winch Replacement	10-184
10-108.1.	10,500 Lb Hydraulic Winch and Brackets Replacement	10-186.2
10-109.	6,000 Lb and 9,000 Lb Electric Winch Control Box Replacement	10-188
10-110.	6,000 Lb and 9,000 Lb Electric Winch Cable Replacement	10-190
10-110.1.	10,500 Lb Hydraulic Winch Cable Replacement	10-190.2
10-111.	6,000 Lb and 9,000 Lb Electric Winch Vent Line Replacement	10-192
10-112.	Fairlead Roller Bracket Assembly Replacement	10-193
10-113.	10,500 Lb Winch Hydraulic Hose Replacement	10-194
10-114.	10,500 Lb Hydraulic Winch Controller Plug Replacement	10-196

10-107. 6,000 LB ELECTRIC WINCH REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M1026, M1026A1, M1036, M1038, M1038A1, M1042, M1044, M1044A1, M1046, M1046A1

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Two lockwashers (Appendix G, Item 135)
Three tiedown straps (Appendix G, Item 307)
Assembled locknut (Appendix G, Item 131)
Lockwasher (Appendix G, Item 133)
Lockwasher (Appendix G, Item 137)

Personnel Required

One mechanic
One assistant

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

- Winch cable removed (para. 10-110).
- Battery ground cable disconnected (para. 4-73).
- Hood raised and secured (TM 9-2320-280-10).

General Safety Instructions

Winch must be supported during removal and installation.

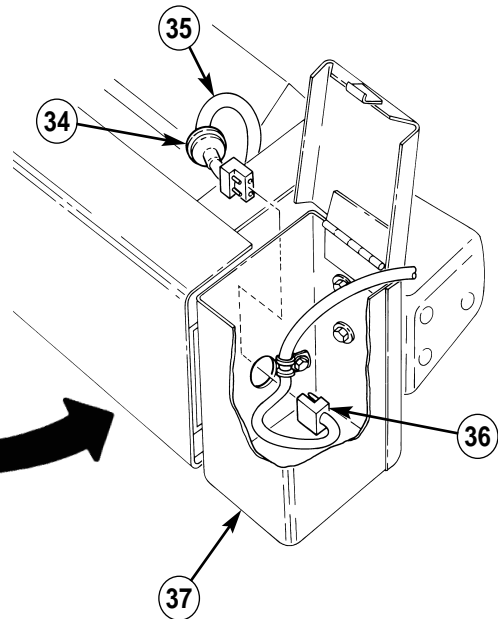
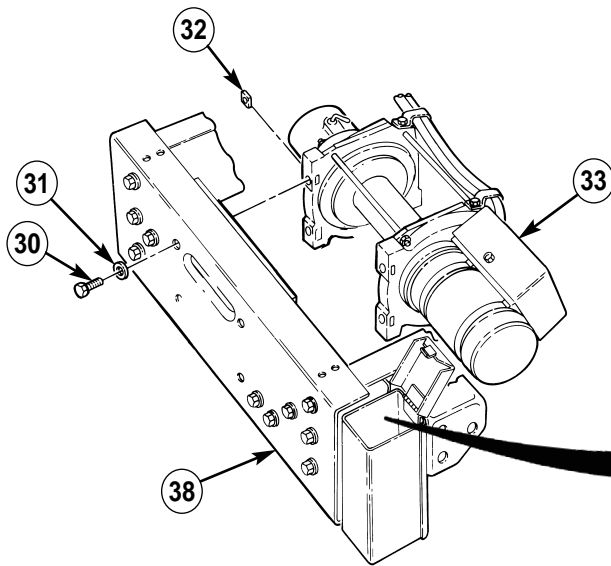
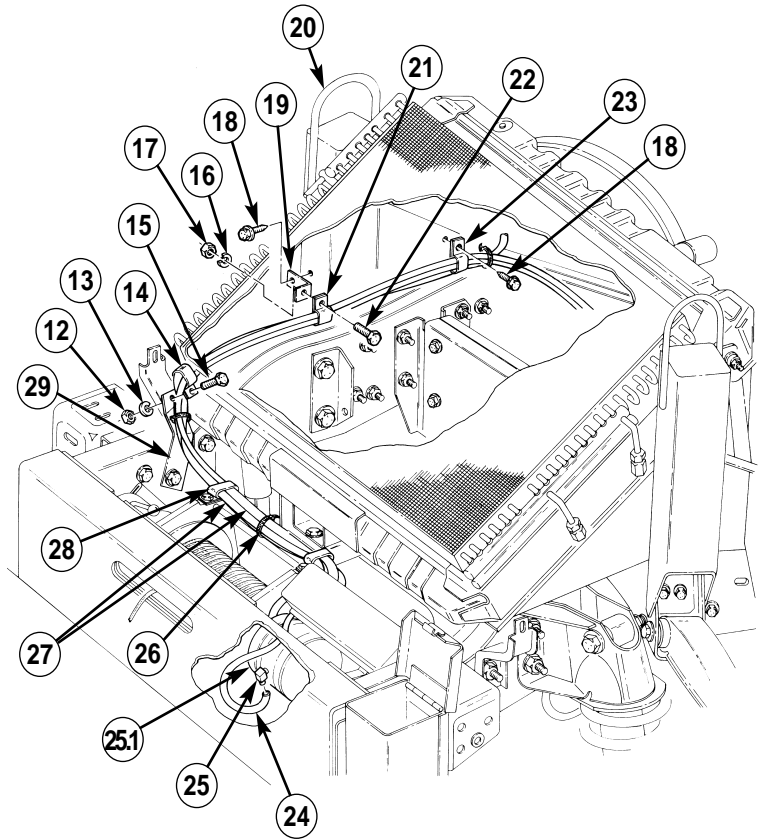
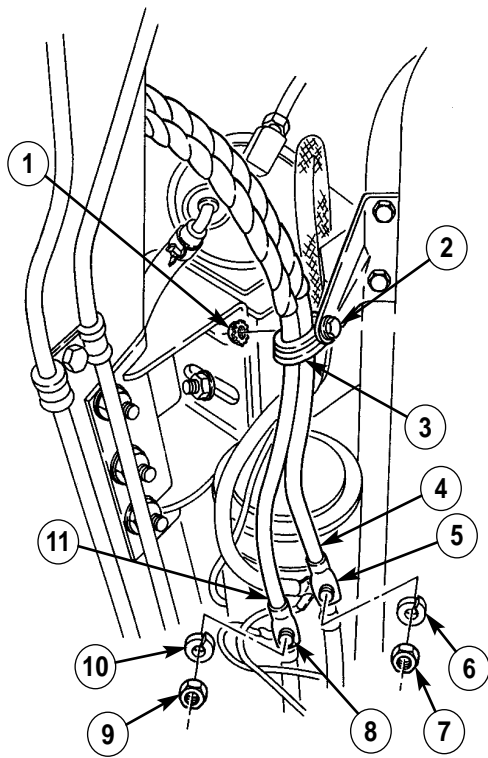
WARNING

Winch must be supported during removal and installation.
Failure to support winch may result in injury to personnel or damage to equipment.

a. Removal

1. Remove nut (9) and lockwasher (10) and disconnect lead 7 (11) from starter terminal (8). Discard lockwasher (10).
2. Remove nut (7) and lockwasher (6) and disconnect lead 6 (4) from starter terminal (5). Discard lockwasher (6).
3. Remove assembled locknut (1) and clamp (3) from oil pan bracket screw (2). Discard assembled locknut (1).
4. Remove two capscrews (18), clamp (23), and bracket (19) from airlift bracket (20).
5. Remove nut (12), lockwasher (13), capscrew (15), and clamp (14) from frame bracket (29). Discard lockwasher (13). Pull cables (27) to front of vehicle.
6. Disconnect cable (35) from control cable (36) in winch control box (37) and remove grommet (34) and cable (35) from control box (37).
7. Disconnect vent line (24) from fitting (25) on winch motor (25.1) and remove three tiedown straps (26) from vent line (24) and power cables (27). Discard tiedown straps (26).
8. Remove four capscrews (30), washers (31), and nuts (32) from winch (33) and front bumper (38). Lower and remove winch (33) and power cables (27) from vehicle.
9. Measure length of power cables (27) from clamp (28) on winch (33) to clamp (21) on bracket (19) and record. Remove nut (17), lockwasher (16), capscrew (22), clamp (21), and bracket (19) from power cables (27). Discard lockwasher (16).

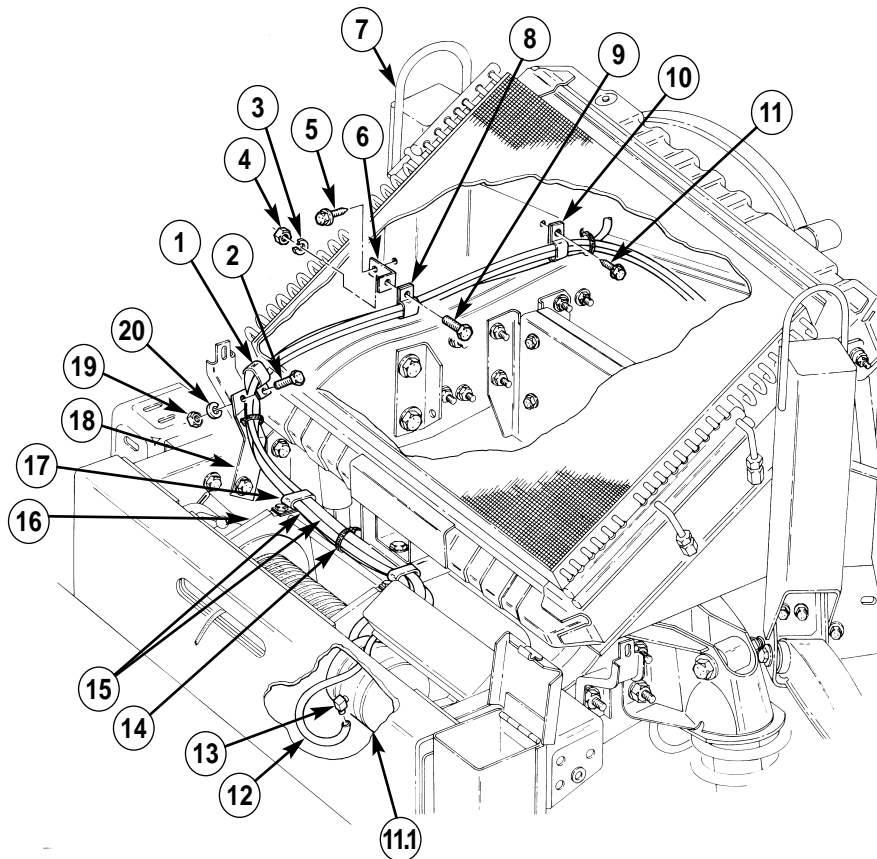
10-107. 6,000 LB ELECTRIC WINCH REPLACEMENT (Cont'd)



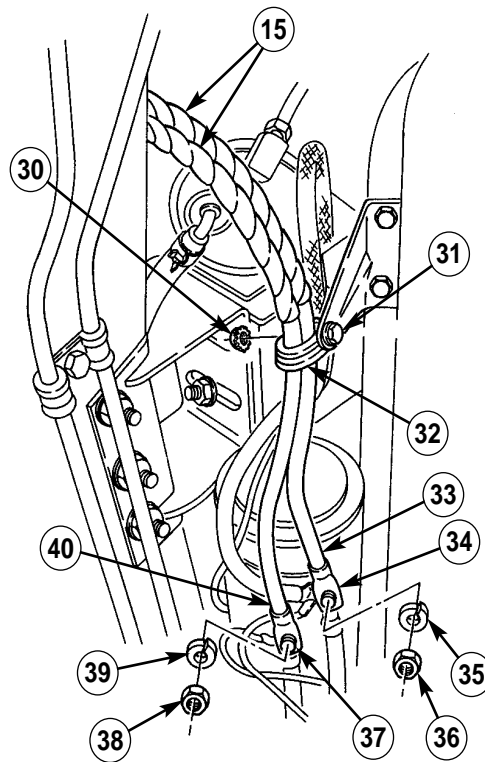
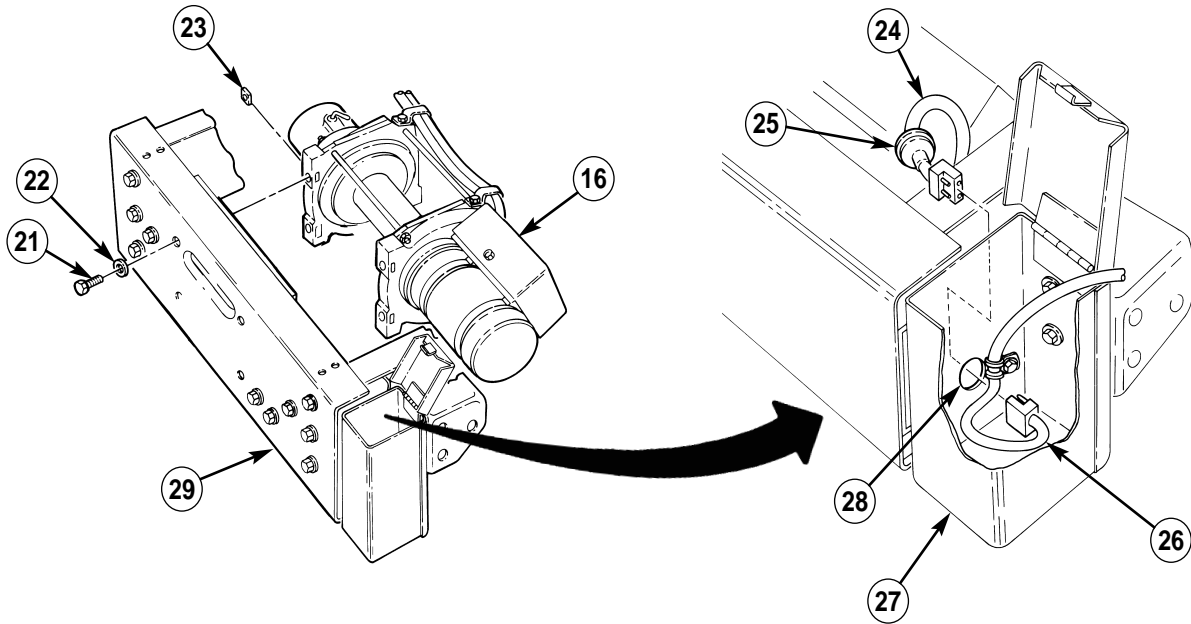
10-107. 6,000 LB ELECTRIC WINCH REPLACEMENT (Cont'd)

b. Installation

1. Install clamp (8) on power cables (15) at same distance from clamp (17) on winch (16) that was recorded in removal.
2. Install clamp (8) and bracket (6) on power cables (15) with capscrew (9), lockwasher (3), and nut (4).
3. Install winch (16) on front bumper (29) with four nuts (23), washers (22), and capscrews (21). Tighten capscrews (21) to 60 lb-ft (81 N·m).
4. Route cable (24) through opening (28) in control box (27) and connect to control cable (26). Install grommet (25) in opening (28).
5. Route power cables (15) in approximate mounting location in vehicle.
6. Install lead 7 (40) on starter terminal (37) with lockwasher (39) and nut (38). Tighten nut (38) to 15 lb-ft (20 N·m).
7. Install lead 6 (33) on starter terminal (34) with lockwasher (35) and nut (36). Tighten nut (36) to 25 lb-ft (34 N·m).
8. Install clamp (32) and power cables (15) on oil pan bracket screw (31) with assembled locknut (30).
9. Install clamp (10) on power cables (15) and airlift bracket (7) with capscrew (11).
10. Install bracket (6) on airlift bracket (7) with capscrew (5).
11. Install clamp (1) on power cables (15) and frame bracket (18) with capscrew (2), lockwasher (20), and nut (19).
12. Connect vent line (12) to fitting (13) on winch motor (11.1). Install vent line (12) on power cables (15) with three tiedown straps (14).



10-107. 6,000 LB ELECTRIC WINCH REPLACEMENT (Cont'd)



- FOLLOW-ON TASKS:**
- Connect battery ground cable (para. 4-73).
 - Install winch cable (para. 10-110).
 - Lower and secure hood (TM 9-2320-280-10).

10-108. 9,000 LB ELECTRIC WINCH REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M997A2, M1025A2, M1035A2, M1043A2,
M1045A2, M1097A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Two lockwashers (Appendix G, Item 164)
Lockwasher (Appendix G, Item 137)
Lockwasher (Appendix G, Item 194)
Four tiedown straps (Appendix G, Item 308)
Assembled locknut (Appendix G, Item 130)

Personnel Required

One mechanic
One assistant

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

- Battery ground cables disconnected (para. 4-73).
- Hood raised and secured (TM 9-2320-280-10).
- Engine right splash shield removed (para. 10-20).

General Safety Instructions

Winch must be supported during removal and installation.

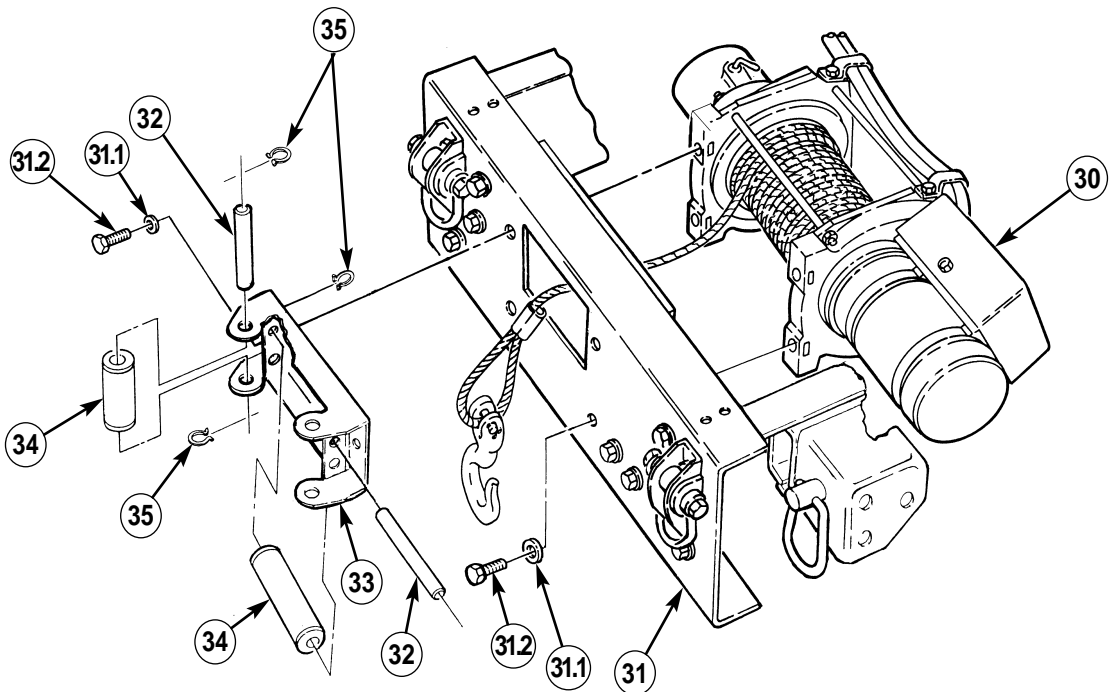
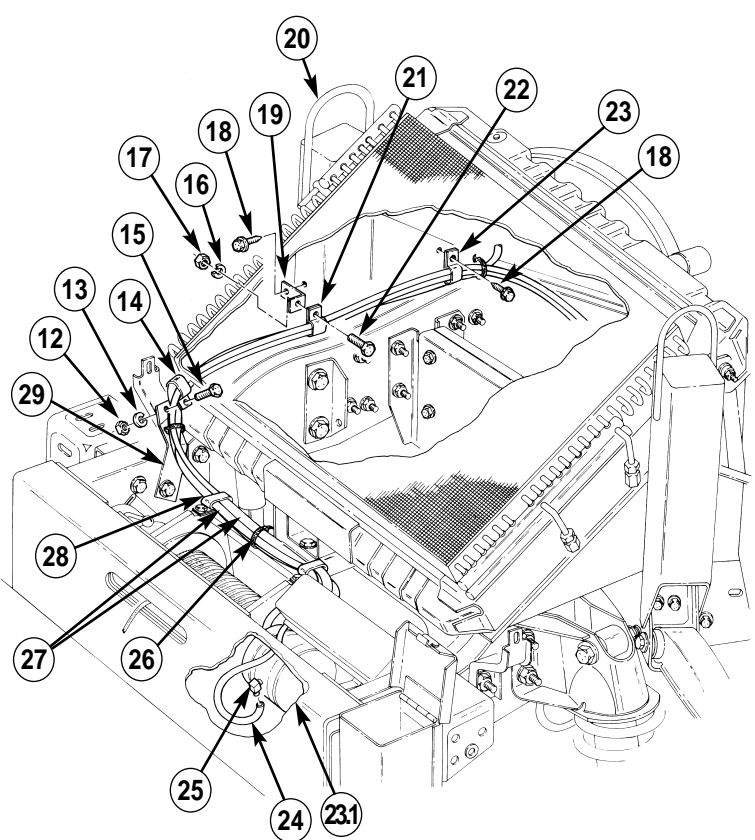
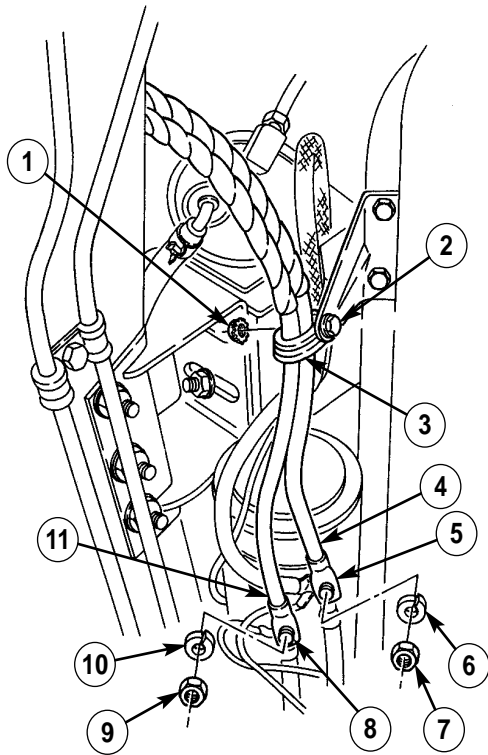
WARNING

Winch must be supported during removal and installation. Failure to support winch may result in injury to personnel or damage to equipment.

a. Removal

1. Remove nut (9) and lockwasher (10) and disconnect lead 7 (11) from starter terminal (8). Discard lockwasher (10).
2. Remove nut (7) and lockwasher (6) and disconnect lead 6 (4) from starter terminal (5). Discard lockwasher (6).
3. Remove assembled locknut (1) and clamp (3) from oil pan bracket screw (2). Discard assembled locknut (1).
4. Remove two capscrews (18), clamp (23), and bracket (19) from airlift bracket (20).
5. Remove nut (12), lockwasher (13), capscrew (15), and clamp (14) from frame bracket (29). Discard lockwasher (13).
6. Disconnect vent line (24) from fitting (25) on winch motor (23.1) and remove four tiedown straps (26) and vent line (24) from power cables (27). Pull cables (27) to front of vehicle and discard tiedown straps (26).
7. Remove four retaining rings (35), two shafts (32), and rollers (34) from fairlead roller bracket (33). Pull cable (38) through bumper (31).
8. Remove two capscrews (31.2), washers (31.1), and fairlead roller bracket (33) from bumper (31) and winch (30).
9. Remove two capscrews (31.2) and washers (31.1) from winch (30) and front bumper (31). Lower and remove winch (30) and power cables (27) from vehicle.
10. Measure length of power cables (27) from clamp (28) on winch (30) to clamp (21) on bracket (19) and record. Remove nut (17), lockwasher (16), capscrew (22), clamp (21), and bracket (19) from power cables (27). Discard lockwasher (16).

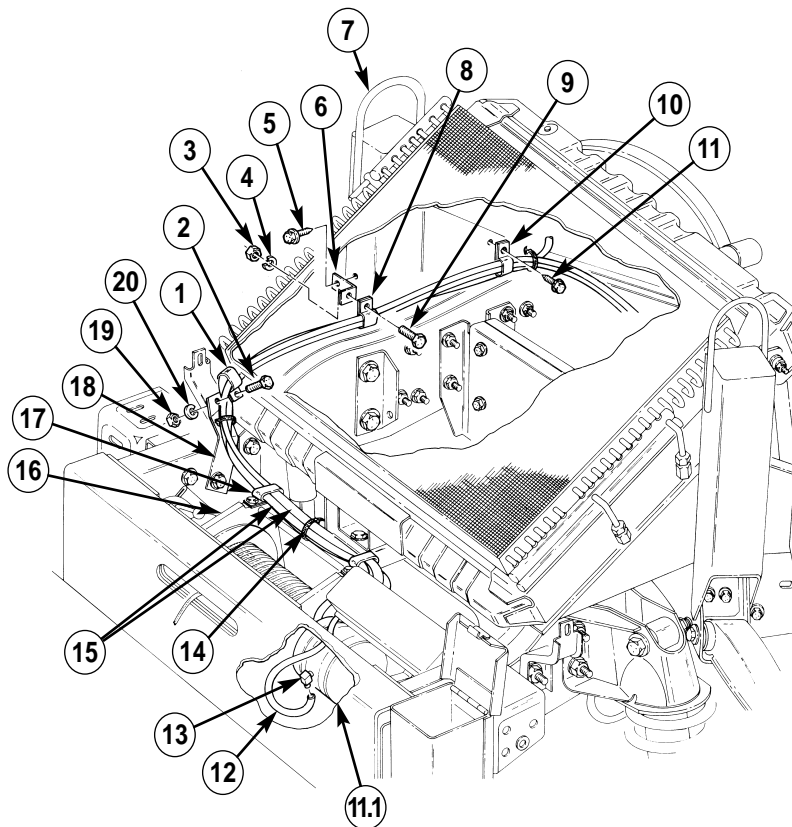
10-108. 9,000 LB ELECTRIC WINCH REPLACEMENT (Cont'd)



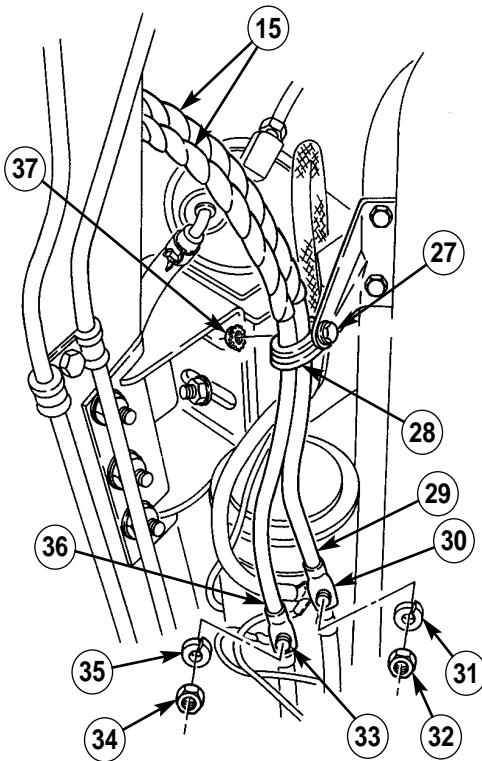
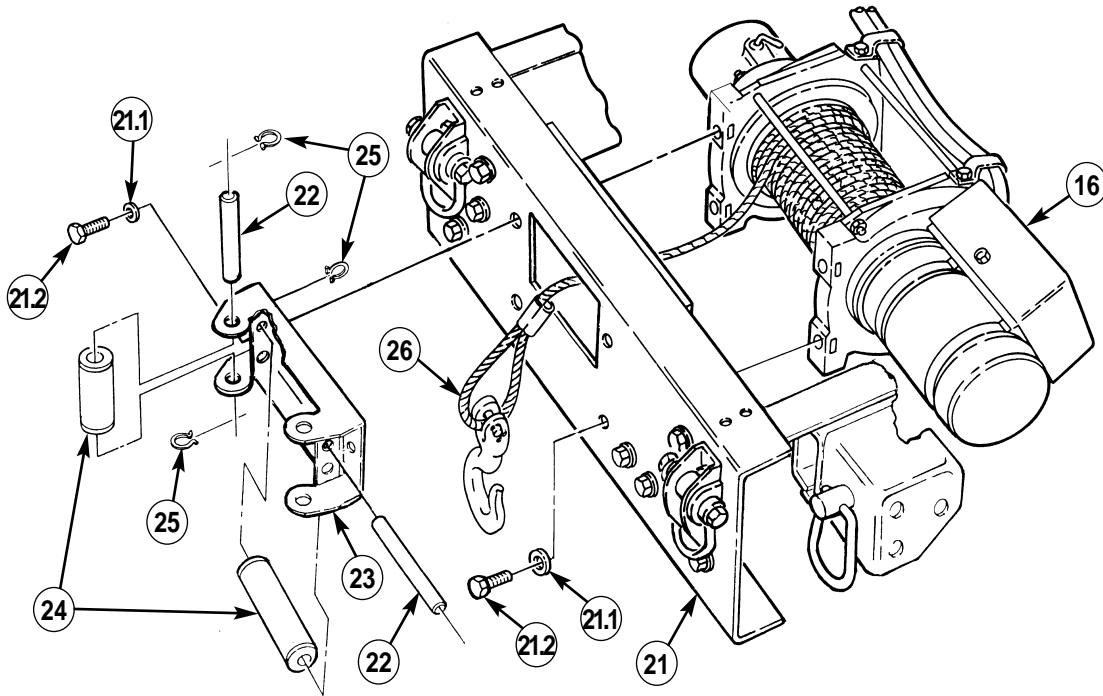
10-108. 9,000 LB ELECTRIC WINCH REPLACEMENT (Cont'd)

b. Installation

1. Position clamp (8) on power cables (15) at same distance from clamp (17) on winch (16) that was recorded in removal.
2. Install clamp (8) on power cables (15) and bracket (6) with capscrew (9), lockwasher (3), and nut (4).
3. Install winch (16) on bumper (21) with two washers (21.1) and capscrews (21.2). Tighten capscrews (21.2) to 35 lb-ft (47 N•m).
4. Install fairlead roller bracket (23) on bumper (21) and winch (16) with two washers (21.1) and capscrews (21.2). Feed cable (26) through bumper (21) and bracket (23). Tighten capscrews (21.2) to 35 lb-ft (47 N•m).
5. Install four rollers (24) and shafts (22) on fairlead roller bracket (23) with eight retaining rings (25).
6. Route power cables (15) in approximate mounting location in vehicle.
7. Install lead 7 (36) on starter terminal (33) with lockwasher (35) and nut (34). Tighten nut (34) to 15 lb-ft (20 N•m).
8. Install lead 6 (29) on starter terminal (30) with lockwasher (31) and nut (32). Tighten nut (32) to 25 lb-ft (34 N•m).
9. Install clamp (28) and power cables (15) on oil pan bracket screw (27) with assembled locknut (37).
10. Install clamp (10) on power cables (15) and airlift bracket (7) with capscrew (11).
11. Install bracket (6) on airlift bracket (7) with capscrew (5).
12. Install clamp (1) on power cables (15) and frame bracket (18) with capscrew (2), lockwasher (20), and nut (19).
13. Connect vent line (12) to fitting (13) on winch motor (11.1). Install vent line (12) on power cables (15) with four tiedown straps (14).



10-108. 9,000 LB ELECTRIC WINCH REPLACEMENT (Cont'd)



- FOLLOW-ON TASKS:**
- Install engine right splash shield (para. 10-20).
 - Connect battery ground cables (para. 4-73).
 - Lower and secure hood (TM 9-2320-280-10).

10-108.1. 10,500 LB HYDRAULIC WINCH AND BRACKETS REPLACEMENT

This task covers:

- | | |
|--|--|
| <p>a. Winch Removal</p> <p>b. Brackets Removal</p> | <p>c. Brackets Installation</p> <p>d. Winch Installation</p> |
|--|--|

INITIAL SETUP:

Applicable Models:

All vehicles except M996, M996A1, M997, M997A1, M997A2, M1035, M1035A1, M1035A2.

Tools

General mechanics tool kit: automotive (Appendix B, Item 1)
 Maintenance and repair shop equipment: automotive (Appendix B, Item 2)

Materials/Parts

Locknut (Appendix G, Item 70)
 Six locknuts (Appendix G, Item 80)
 Four locknuts (Appendix G, Item 81)
 Two locknuts (Appendix G, Item 89)

Manual References

TM 9-2320-280-10
 TM 9-2320-280-24P

Equipment Condition

- Parking brake applied (TM 9-2320-280-10)
- Battery ground cables disconnected (para. 4-73).
- Underbody protection kit removed (if applicable) (para. 12-186).
- Brake protection guards removed (if applicable) (para. 7-8.1).

General Safety Instructions

Support winch and bumper during winch replacement.

NOTE

Tag all leads prior to removal.

a. Winch Removal

1. Disconnect controller plug lead 758C (10) from winch lead 758C (9).
2. Disconnect controller plug lead 758A (8) from winch lead 758A (7).
3. Disconnect controller plug lead 758B (6) from lead wire 758B (5).
4. Remove locknut (14), washer (13), screw (11), and two clamps (12) with hydraulic hose assemblies (1) and (4) from winch and bumper assembly (15). Discard locknut (14).

CAUTION

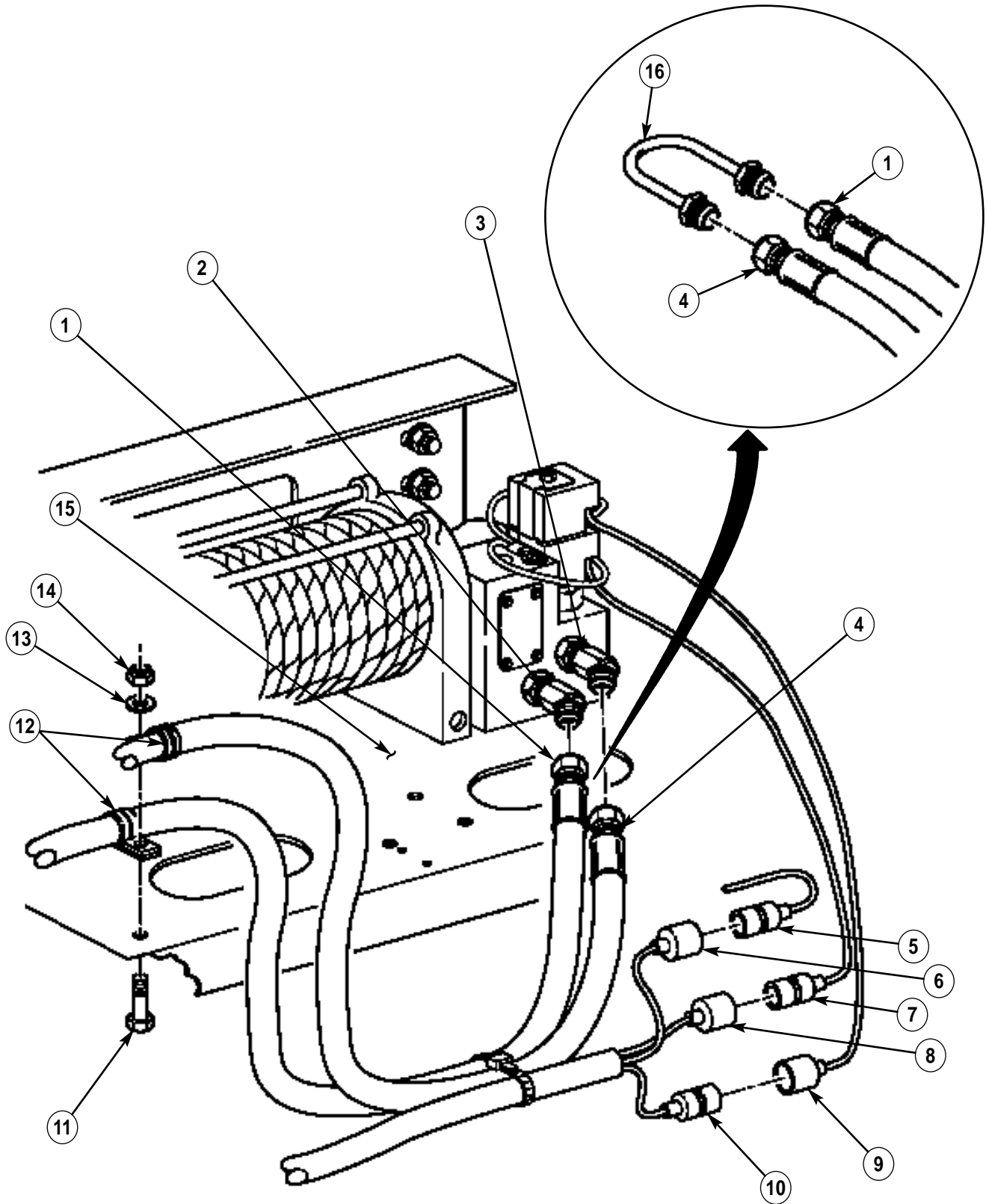
- Tag hoses and connections prior to removal to assist in proper installation.
 - Cover or plug hoses and connections immediately after removal to prevent contamination. Remove all plugs prior to connecting hoses.
5. Disconnect hydraulic hose (1) from elbow (2) on bottom winch outlet port on winch (15) .
 6. Disconnect hydraulic hose (4) from elbow (3) on top winch inlet port on winch (15).

NOTE

If vehicle is to be operated with winch assembly removed, perform step 7.

7. Connect tube assembly (16) to hydraulic hose assemblies (1) and (4).

10-108.1. 10,500 LB HYDRAULIC WINCH AND BRACKETS REPLACEMENT (Cont'd)



10-108.1. 10,500 LB HYDRAULIC WINCH AND BRACKETS REPLACEMENT (Cont'd)

WARNING

Winch and bumper must be supported with a floor jack during winch replacement. Failure to support winch may result in injury to personnel or damage to equipment.

8. Remove four locknuts (14), washers (10), capscrews (11), washers (10), and two tow brackets (9) from winch and bumper assembly (8) and left and right bracket assemblies (5). Discard locknuts (14).
9. Remove two locknuts (12), washers (13), and winch and bumper assembly (8) from left and right lower control arm screws (1). Discard locknuts (12).

b. Brackets Removal

NOTE

- Brackets may not require replacement. Replace brackets only when damaged.
 - The left and right side brackets are removed the same. This procedure covers the left side.
1. Remove three locknuts (3), washers (2), capscrews (15), and washers (2) from left hand bracket assembly (5) and frame rail (4.1). Discard locknuts (3).
 2. Remove capscrew (7), washer (6), and left hand bracket assembly (5) from grille extension (4).

c. Brackets Installation

1. Install left hand bracket assembly (5) on grille extension (4) with washer (6) and capscrew (7). Finger tighten capscrew (7).
2. Install left hand bracket assembly (5) on frame rail (4.1) with three washers (2), capscrews (15), washers (2), and locknuts (3). Tighten locknuts (3) to 225 lb-ft (303 N•m).

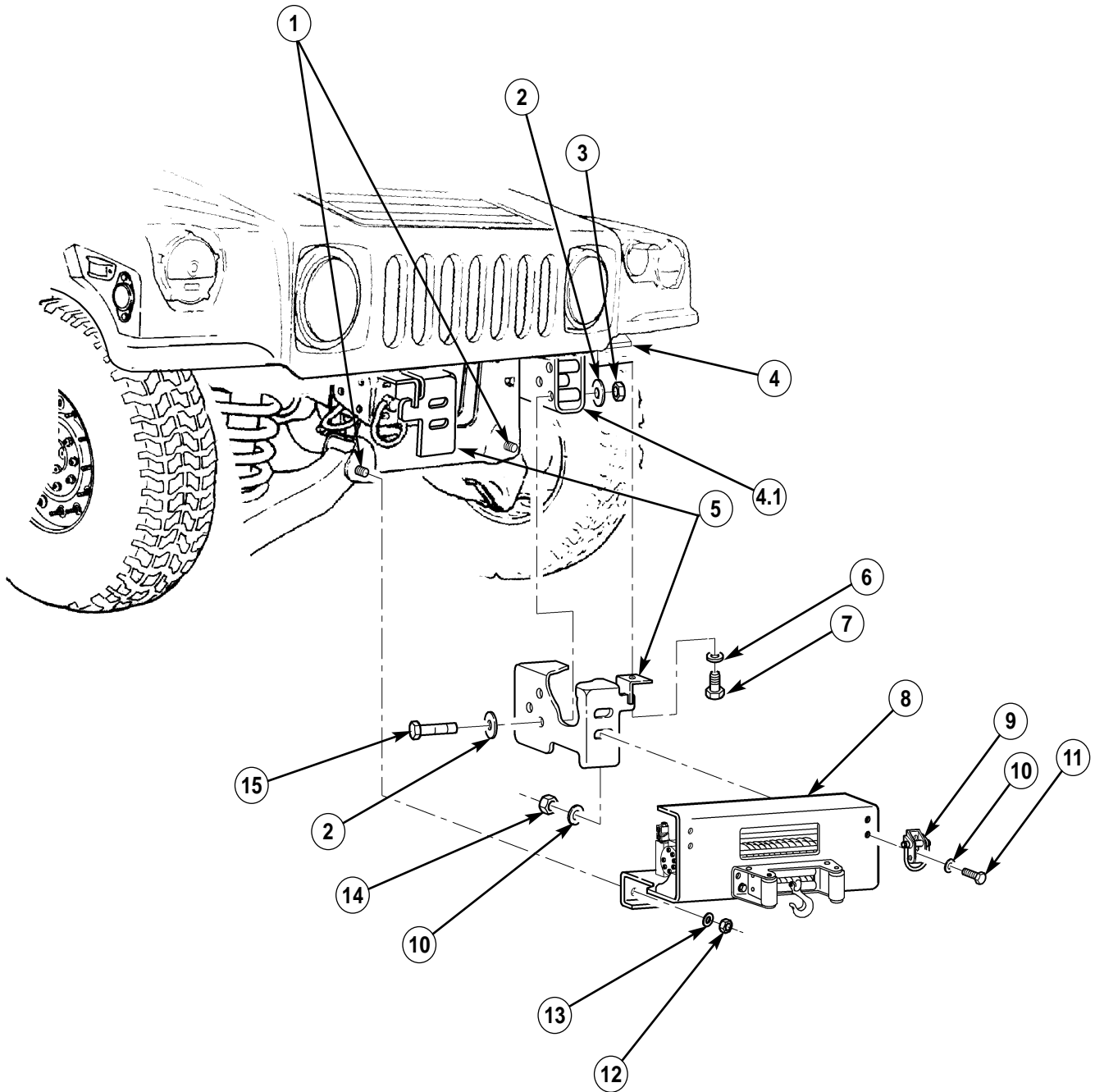
d. Winch Installation

WARNING

Winch and bumper must be supported with a floor jack during winch replacement. Failure to support winch may result in injury to personnel or damage to equipment.

1. Install winch and bumper assembly (8) on left and right lower control arm screws (1) with two washers (13) and locknuts (12). Finger tighten locknuts (12).
2. Secure winch and bumper assembly (8) and two tow brackets (9) on left and right bracket assemblies (5) with four washers (10), capscrews (11), washers (10), and locknuts (14).
3. Tighten capscrews (7) installed in step c.1. to 37 lb-ft (50 N•m).
4. Tighten locknuts (12) to 260 lb-ft (353 N•m).
5. Tighten locknuts (14) to 90 lb-ft (122 N•m).

10-108.1. 10,500 LB HYDRAULIC WINCH AND BRACKETS REPLACEMENT (Cont'd)



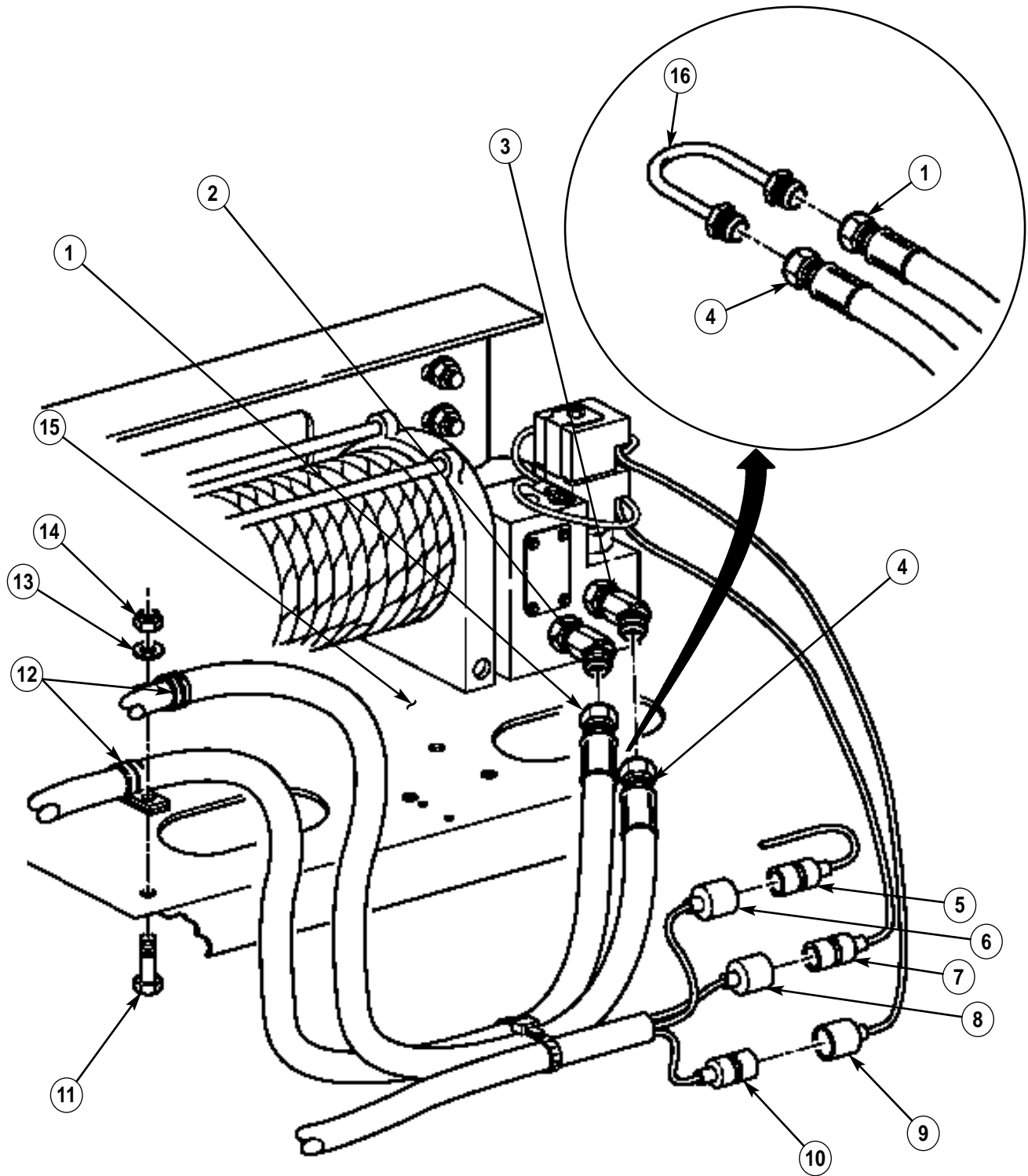
10-108.1. 10,500 LB HYDRAULIC WINCH AND BRACKETS REPLACEMENT (Cont'd)

NOTE

If tube assembly is installed, perform step 4.

4. Disconnect tube assembly (16) from hydraulic hose assemblies (1) and (4).
5. Connect hydraulic hose assembly (4) to elbow (3) on top winch inlet port on winch (15).
6. Connect hydraulic hose assembly (1) to elbow (2) on bottom winch outlet port on winch (15).
7. Install hydraulic hose assemblies (1) and (4) on winch and bumper assembly (15) with two clamps (12), capscrew (11), washer (13), locknut (14).
8. Connect controller plug lead 758B (6) to lead wire 785B (5).
9. Connect controller plug lead 758A (8) to winch lead 758A (7).
10. Connect controller plug lead 758C (10) to winch lead 758C (9).

10-108.1. 10,500 LB HYDRAULIC WINCH AND BRACKETS REPLACEMENT (Cont'd)



- FOLLOW-ON TASKS:**
- Install brake protection guards (if applicable) (para. 7-8.1).
 - Install underbody protection kit (if applicable) (para. 12-186).
 - Connect battery ground cables (para. 4-73).
 - Bleed power steering system (para. 8-29).

10-109. 6,000 LB AND 9,000 LB ELECTRIC WINCH CONTROL BOX REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M1026, M1026A1, M1036, M1038, M1038A1, M1042, M1044, M1044A1, M1046, M1046A1

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Lockwasher (Appendix G, Item 177)

Manual References

TM 9-2320-280-24P

Equipment Condition

Battery ground cable disconnected (para. 4-73).

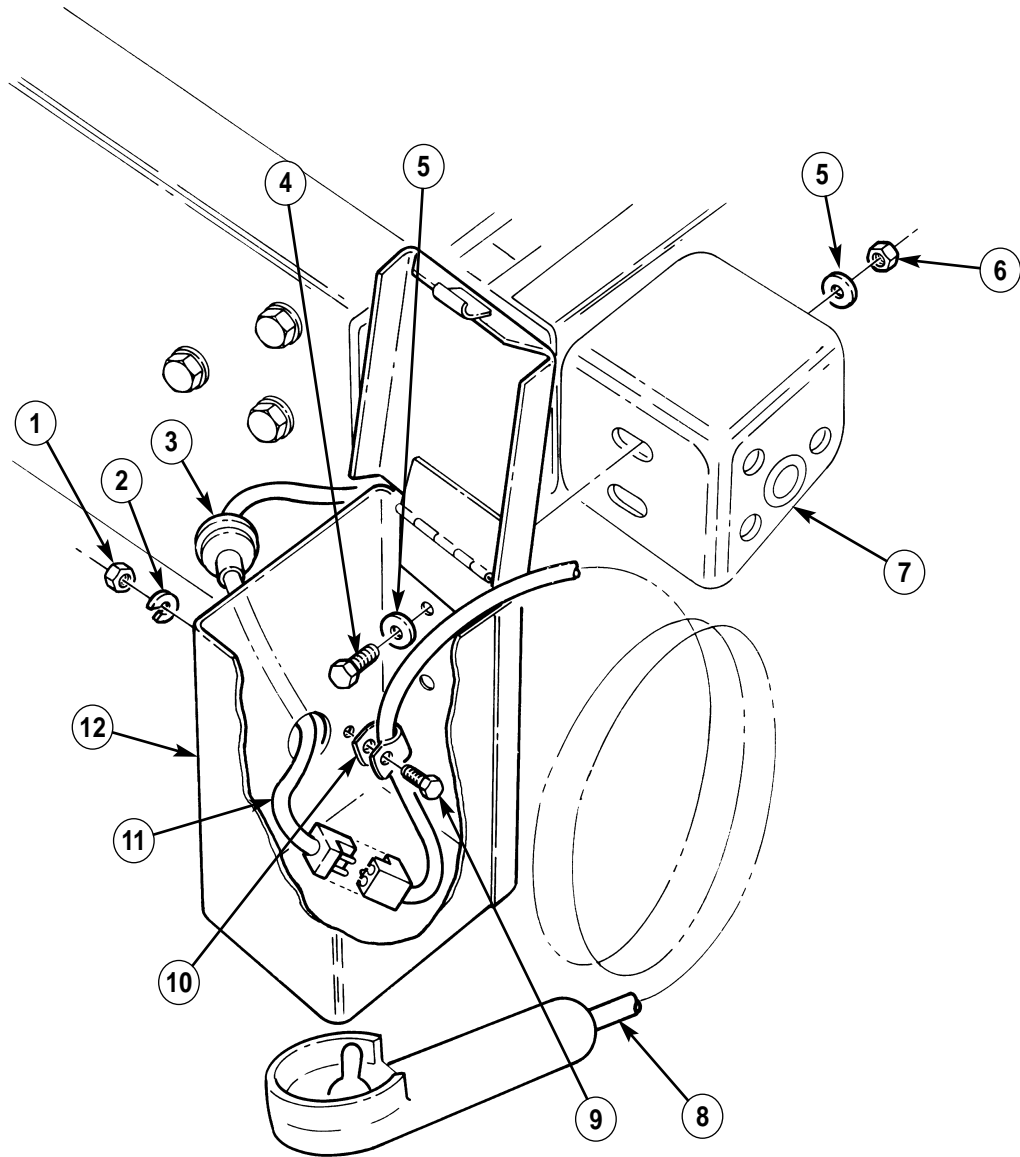
a. Removal

1. Open winch control box (12) and pull control cable (8) out.
2. Remove capscrew (9), clamp (10), lockwasher (2), and nut (1) from control cable (8) and control box (12). Discard lockwasher (2).
3. Disconnect control cable (8) from cable (11) and remove control cable (8) from control box (12).
4. Remove two nuts (6), washers (5), capscrews (4), washers (5), and control box (12) from mounting bracket (7).
5. Slide cable (11) and grommet (3) out of control box (12).

b. Installation

1. Push cable (11) and grommet (3) into control box (12).
2. Install control box (12) on mounting bracket (7) with two washers (5), capscrews (4), and nuts (6). Tighten nuts (6) to 90 lb-ft (122 N•m).
3. Connect control cable (8) to cable (11).
4. Install control cable (8) on control box (12) with capscrew (9), clamp (10), lockwasher (2), and nut (1). Tighten nut (1) to 6 lb-ft (8 N•m). Close and secure control box (12).

**10-109. 6,000 LB AND 9,000 LB ELECTRIC WINCH CONTROL BOX
REPLACEMENT (Cont'd)**



FOLLOW-ON TASK: Connect battery ground cable (para. 4-73).

10-110. 6,000 LB AND 9,000 LB ELECTRIC WINCH CABLE REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M997A2, M1025A2, M1026, M1026A1, M1035A2, M1036, M1038, M1038A1, M1042, M1043A2, M1044, M1044A1, M1045A2, M1046, M1046A1, M1097A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Cotter pin (Appendix G, Item 23)

Personnel Required

One mechanic
One assistant

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

General Safety Instruction

Wear leather gloves when handling winch cable.

WARNING

Gloves must be worn whenever handling winch cable. Severe injury may result.

a. Removal

1. Unwind winch cable (2) from drum assembly (1) (TM 9-2320-280-10).
2. Remove capscrew (5) and winch cable (2) from drum assembly (1).
3. Remove cotter pin (7), clevis pin (6), and hook (4) from winch cable (2). Discard cotter pin (7).

b. Installation

NOTE

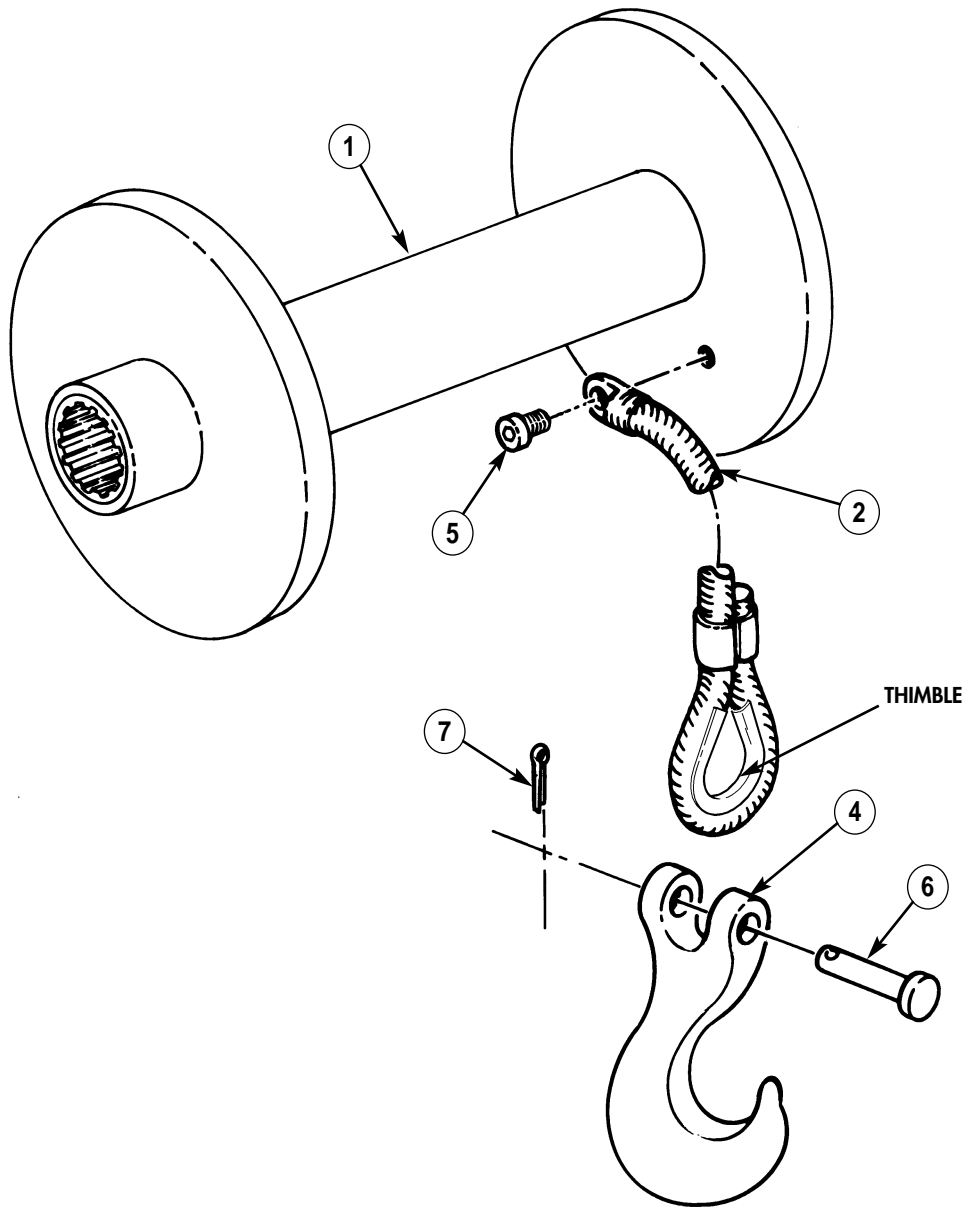
If thimble is not installed on winch cable, or if wires are shearing or breaking, install thimble on winch cable. Refer to appendix D, fig. D-91 for instructions.

1. Install hook (4) on winch cable (2) with clevis pin (6) and cotter pin (7).
2. Install winch cable (2) on drum assembly (1) with capscrew (5).

CAUTION

- The winch cable must be spooled on the drum according to the direction of rotation label on the winch or the brake will not function.
 - Winch cable must be installed on drum under a load of at least 500 lbs (227 kg) or outer wraps will draw into inner wraps and damage winch cable.
3. Rewind winch cable (2) (TM 9-2320-280-10).

10-110. 6,000 LB AND 9,000 LB ELECTRIC WINCH CABLE REPLACEMENT (Cont'd)



- FOLLOW-ON TASKS:
- Lubricate winch cable (TM 9-2320-280-10).
 - Check winch for proper operation (TM 9-2320-280-10).

10-110.1. 10,500 LB HYDRAULIC WINCH CABLE REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP

Applicable Models:

All vehicles except M996, M996A1, M997, M997A1, M997A2, M1035, M1035A1, M1035A2

Tools

General mechanics tool kit: automotive (Appendix B, Item 1)

Materials/Parts

Cotter pin (Appendix G, Item 23)

Personnel Required

One mechanic
One assistant

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

General Safety Instructions

Wear leather gloves when handling winch cable.

WARNING

Gloves must be worn when handling winch cable or severe personnel injury may result.

a. Removal

1. Unwind winch cable (2) from drum assembly (1) (TM 9-2320-280-10).
2. Remove capscrew (4), terminal (3), and winch cable (2) from drum assembly (1).
3. Remove cotter pin (7), clevis pin (5), and hook (6) from winch cable (2). Discard cotter pin (7).

b. Installation

CAUTION

If wires on winch cable are shearing or breaking around thimble, repair can be performed. Refer to appendix D, fig. D-91 for instructions.

1. Install hook (6) on winch cable (2) with clevis pin (5) and cotter pin (7).

CAUTION

When installing cable on drum assembly, route cable in through fairlead assembly, under drum, and install on top of drum. Failure to do so may cause damage to cable and winch.

NOTE

It may be necessary to place the drumlock handles in FREE to route the winch cable through the rear winch mounting bracket, reinforcement plate, and roller assembly. Place drumlock handle back to ENGAGED position to prevent cable from unwrapping from drum.

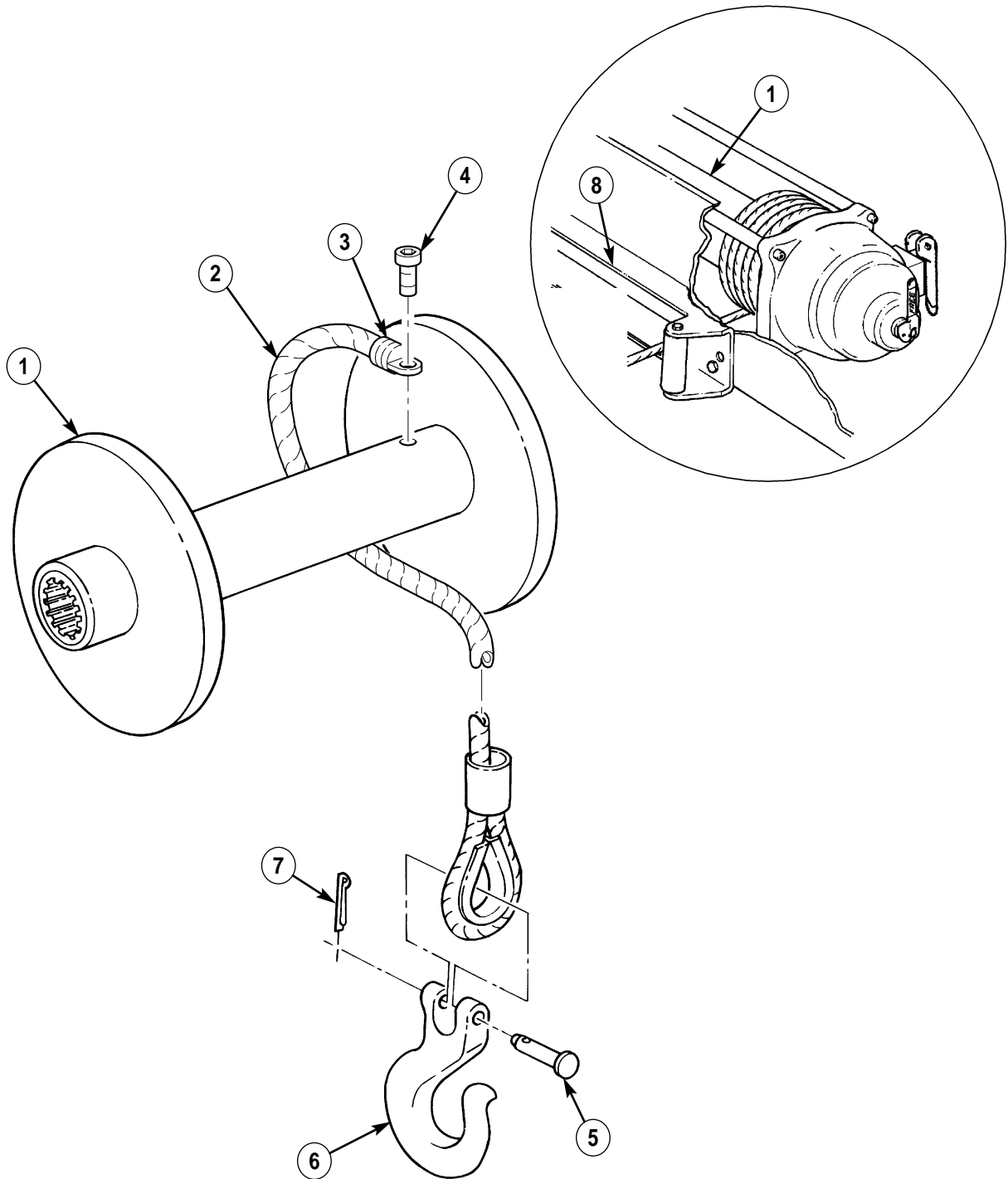
2. Route winch cable (2) through fairlead assembly (8), under drum assembly (1), and install terminal (3) on drum assembly (1) with capscrew (4).

CAUTION

- The winch cable must be spooled on the drum according to the direction of rotation label on the winch or brake will not function.
- Winch cable must be installed on drum under a load of at least 500 lb (227 kg) or outer wraps will draw into inner wraps and damage winch cable.

3. Install winch cable (2) on drum assembly (1) (TM 9-2320-280-10).

10-110.1. 10,500 LB HYDRAULIC WINCH CABLE REPLACEMENT (Cont'd)



- FOLLOW ON TASKS:
- Lubricate winch cable (TM 9-2320-280-10).
 - Check winch for proper operation (TM 9-2320-280-10).

10-111. 6,000 LB AND 9,000 LB ELECTRIC WINCH VENT LINE REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M997A2, M1025A2, M1026, M1026A1, M1035A2, M1036, M1038, M1038A1, M1042, M1043A2, M1044, M1044A1, M1045A2, M1046, M1046A1, M1097A2

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

- Hood raised and secured (TM 9-2320-280-10).
- Engine right splash shield removed (para. 10-20).

Materials/Parts

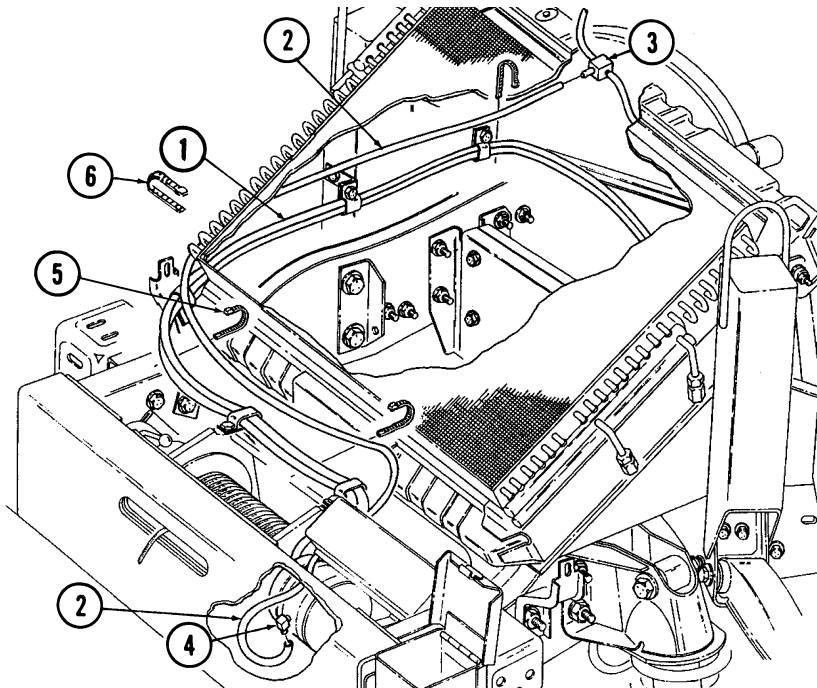
Four tiedown straps (Appendix G, Item 308)

a. Removal

1. Disconnect vent line (2) from winch fitting (4).
2. Remove three tiedown straps (5) and tiedown strap (6) (9,000 lb. winch only) from vent line (2) and cables (1). Discard tiedown straps (5) and (6).
3. Disconnect vent line (2) from tee fitting (3) and remove vent line (2).

b. Installation

1. Connect vent line (2) to tee fitting (3) and winch fitting (4).
2. Install vent line (2) on cables (1) with tiedown strap (6) (9,000 lb. winch only) and three tiedown straps (5).



- FOLLOW-ON TASK:
- Lower and secure hood (TM 9-2320-280-10).
 - Install engine right splash shield (para. 10-20).

10-112. FAIRLEAD ROLLER BRACKET ASSEMBLY REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP

Applicable Models

All vehicles except M996, M996A1, M997, M997A1, M997A2, M1035, M1035A1, M1035A2

Tools

General mechanics tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-24P

General Safety Instructions

Winch must be supported during removal and installation.

WARNING

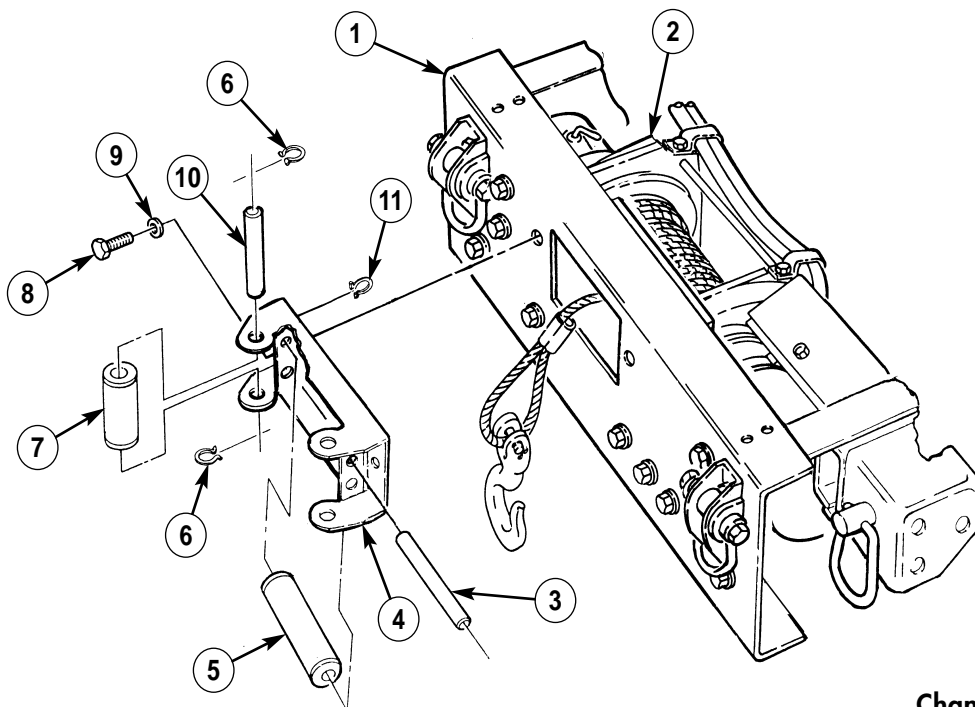
Winch must be supported during removal and installation. Failure to support winch may result in injury to personnel or damage to equipment.

a. Removal

1. Remove four retaining rings (11), two shafts (3), and rollers (5) from bracket (4).
2. Remove four retaining rings (6), two shafts (10), and rollers (7) from bracket (4).
3. Remove two capscrews (8), washers (9), and bracket (4) from bumper (1) and winch (2).

b. Installation

1. Install bracket (4) on bumper (1) and winch (2) with two washers (9) and capscrews (8). Tighten capscrews (8) to 35 lb-ft (47 N·m).
2. Install two rollers (7) and shafts (10) in bracket (4) with four retaining rings (6).
3. Install two rollers (5) and shafts (3) in bracket (4) with four retaining rings (11).



10-113. 10,500 LB WINCH HYDRAULIC HOSE REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models:

All vehicles except M996, M996A1, M997, M997A1, M997A2, M1035, M1035A1, M1035A2

Tools

General mechanics tool kit: automotive (Appendix B, Item 1)

Materials/Parts

Lubricant (Appendix C, Item 33)
Two O-rings (Appendix G, Item 218)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

Hood raised and secured (TM 9-2320-280-10)

a. Removal

CAUTION

Cover or plug power steering gear and hydro-boost connections immediately after removing hoses to prevent contamination. Remove all plugs prior to connecting hoses.

NOTE

Ensure area around power steering port is clean before removing hose.

1. Remove hydraulic hose (2) and O-ring (5) from power steering gear port (6). Discard O-ring (5).
2. Remove hydraulic hose (2) from winch outlet port (1) on winch (8).

NOTE

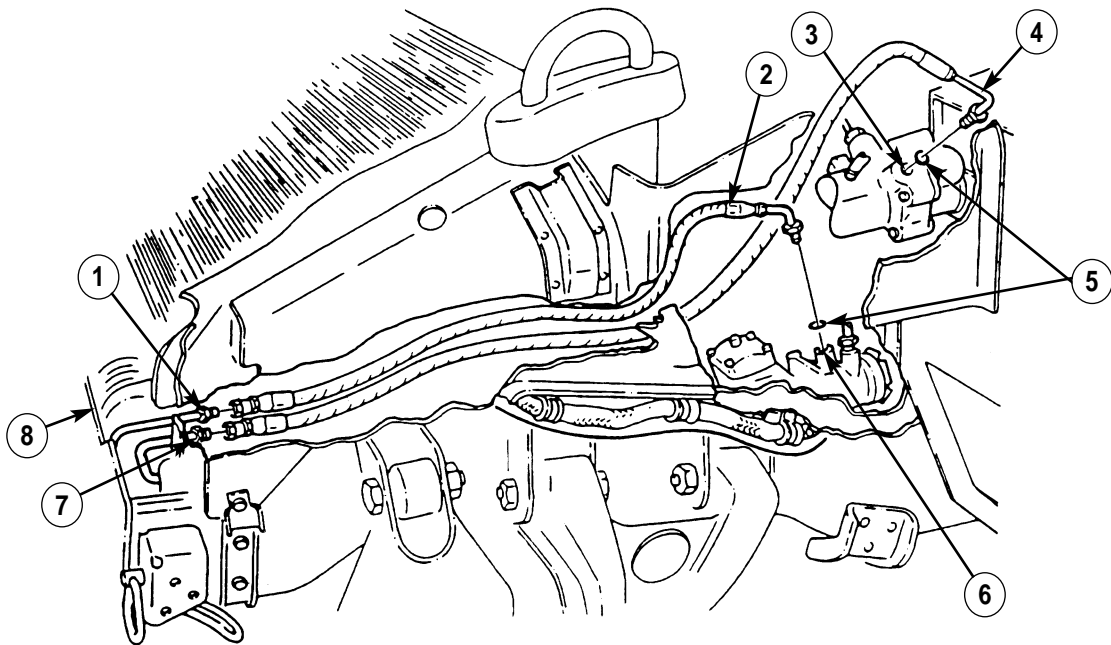
Ensure area around hydro-boost port is clean before removing hose.

3. Remove hydraulic hose (4) and O-ring (5) from hydro-boost port (3). Discard O-ring (5).
4. Remove hydraulic hose (4) from winch inlet port (7).

b. Installation

1. Apply lubricant to O-ring (5) and install O-ring (5) on hydraulic hose (4).
2. Install hydraulic hose (4) on hydro-boost port (3).
3. Route hydraulic hose (4) from hydro-boost port (3) to winch (8) and install hydraulic hose (4) to winch inlet port (7).
4. Apply lubricant to O-ring (5) and install O-ring (5) on hydraulic hose (2).
5. Install hydraulic hose (2) on power steering gear port (6).
6. Route hydraulic hose (2) from power steering gear port (6) along side hydraulic hose (4) and install hydraulic hose (2) on winch outlet port (1).

10-113. 10,500 LB WINCH HYDRAULIC HOSE REPLACEMENT (Cont'd)



FOLLOW-ON TASK: Bleed power steering system (para. 8-29).

10-114. 10,500 LB HYDRAULIC WINCH CONTROLLER PLUG REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

All vehicles except M996, M996A1, M997, M997A1, M997A2, M1035, M1035A1, M1035A2

Tools

General mechanics tool kit: automotive (Appendix B, Item1)

Materials/Parts

Eight tiedown straps (Appendix G, Item 310)

Manual References

TM 9-2320-280-10

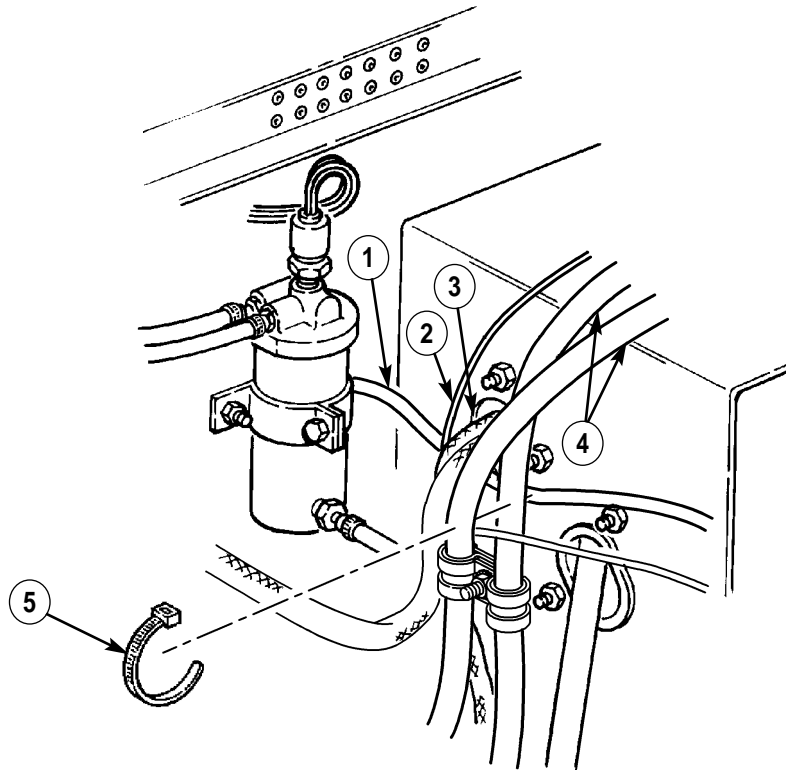
TM 9-2320-280-24P

Equipment Condition

- Hood raised and secured (TM 9-2320-280-10).
- Battery ground cables disconnected (para 4-73).
- Engine left splash shield removed (para 10-17).

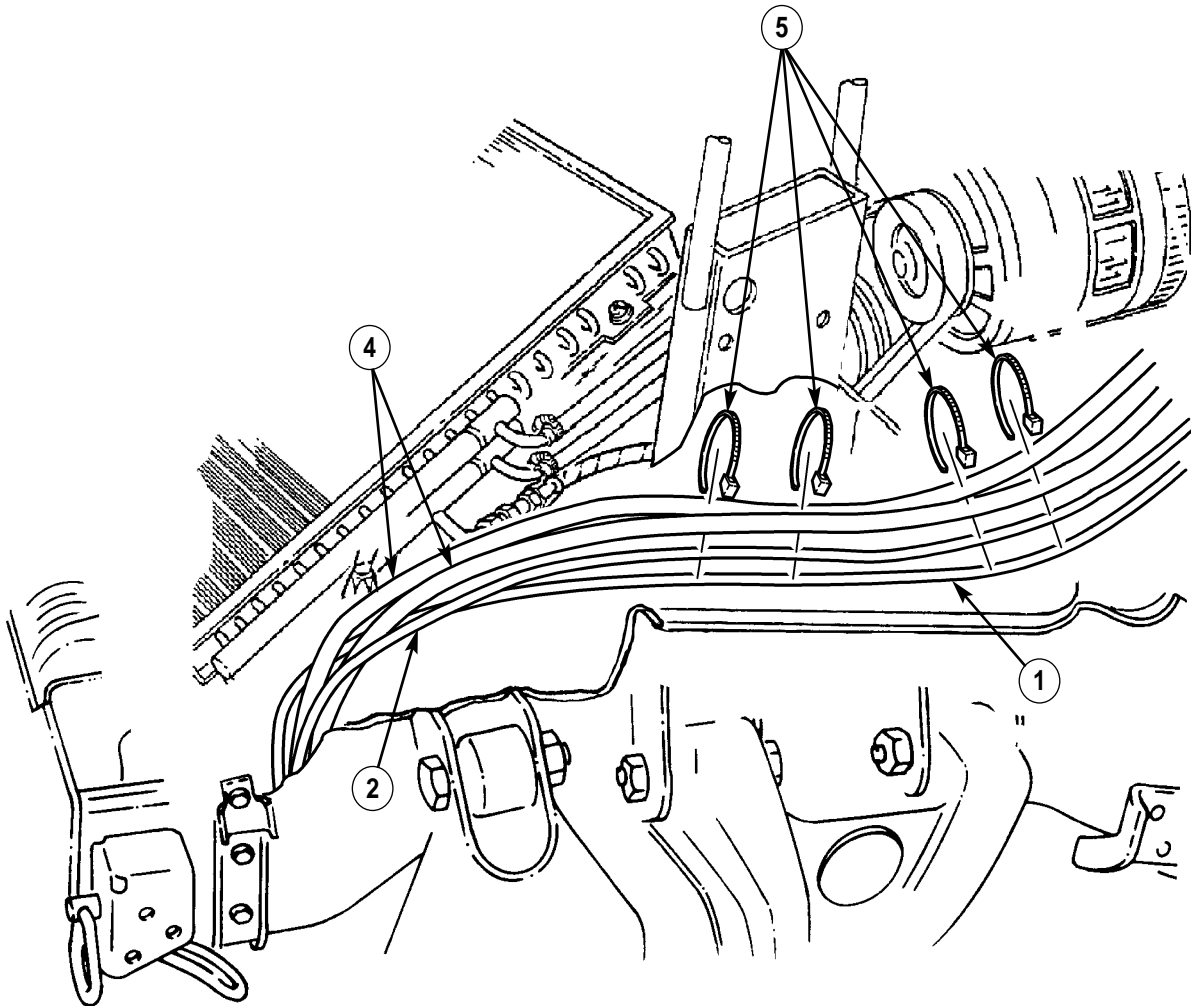
a. Removal

1. Remove tiedown strap (5) from controller plug harness (1), body harness (3), lead wire (2), and two hydraulic hose assemblies (4). Discard tiedown strap (5).



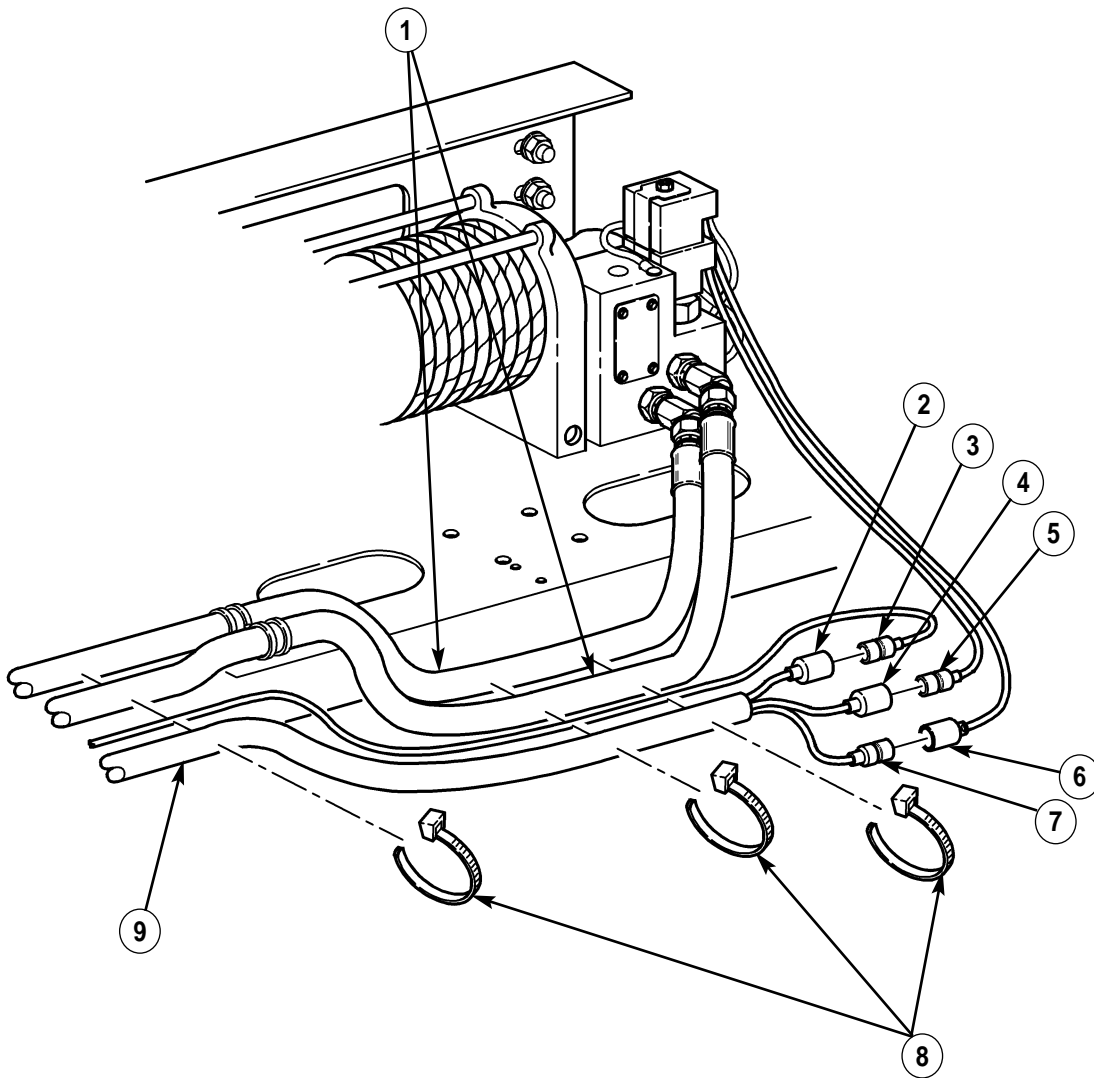
10-114. 10,500 LB HYDRAULIC WINCH CONTROLLER PLUG REPLACEMENT (Cont'd)

2. Remove four tiedown straps (5) from controller plug harness (1), lead wire (2), and two hydraulic hose assemblies (4). Discard tiedown straps (5).



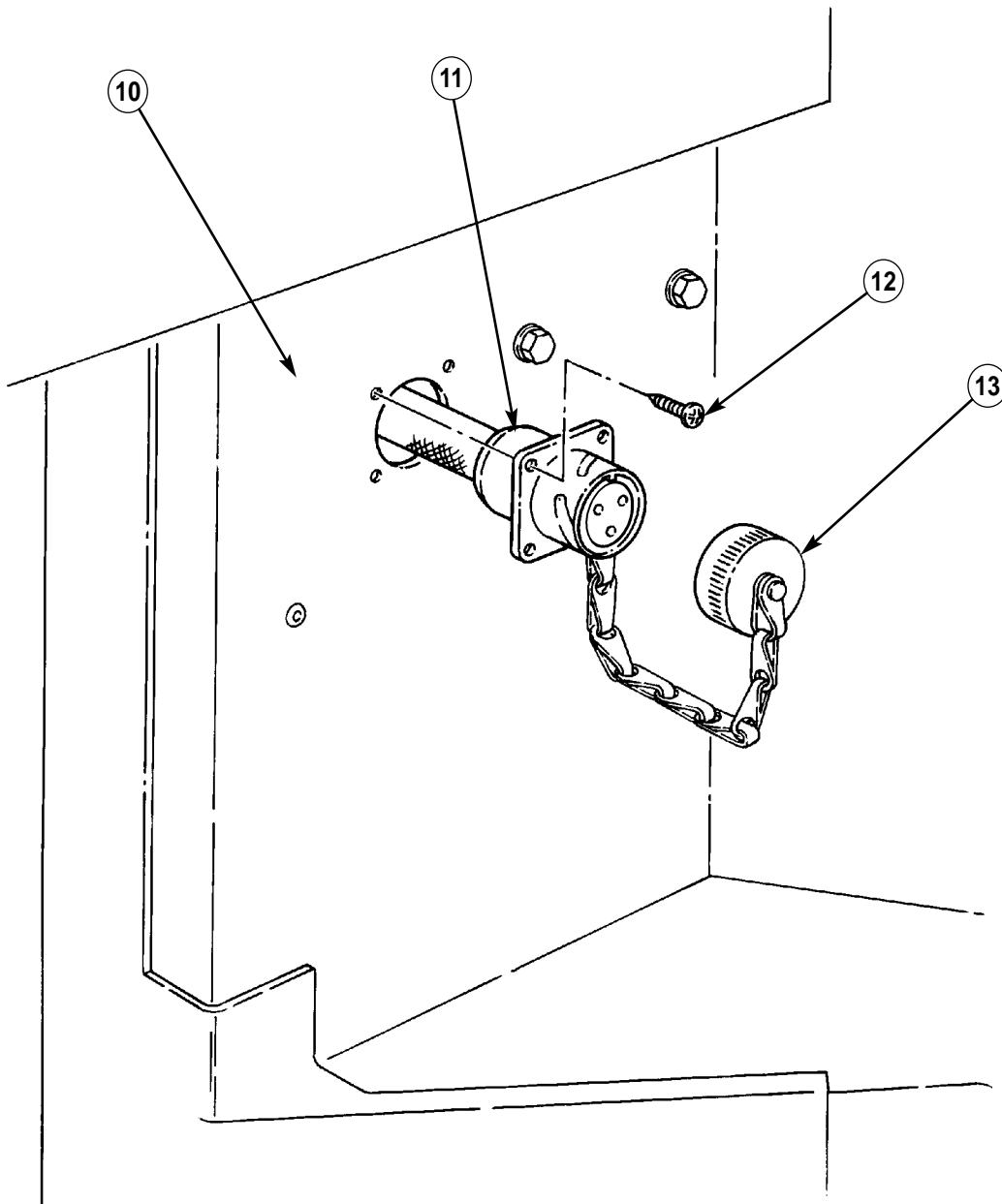
10-114. 10,500 LB HYDRAULIC WINCH CONTROLLER PLUG REPLACEMENT (Cont'd)

3. Remove three tiedown straps (8) from controller plug harness (9), lead wire (3), and two hydraulic hose assemblies (1). Discard tiedown straps (8).
4. Disconnect controller plug lead 785C (7) from winch lead 785C (6).
5. Disconnect controller plug lead 785A (4) from winch lead 785A (5).
6. Disconnect controller plug lead 785B (2) from lead wire 785B (3).



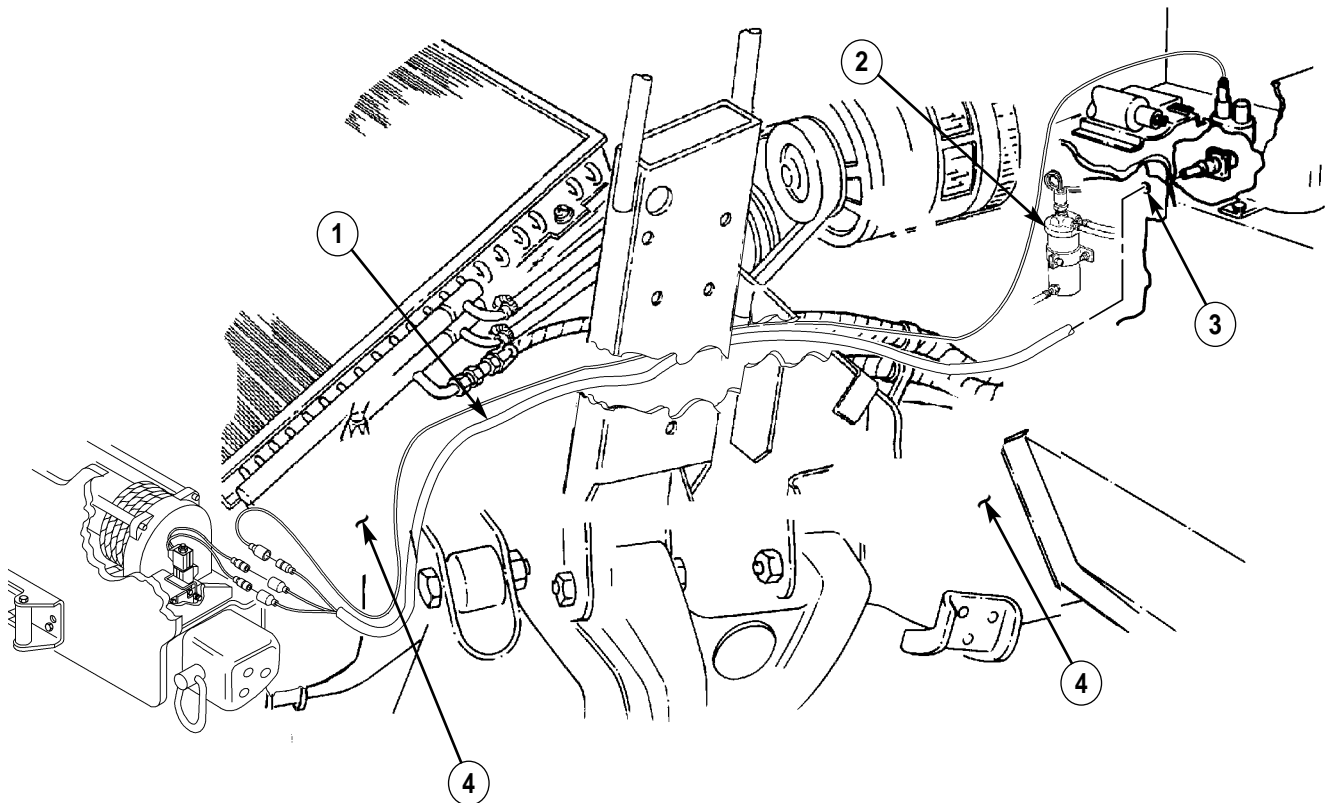
10-114. 10,500 LB HYDRAULIC WINCH CONTROLLER PLUG REPLACEMENT (Cont'd)

7. Remove four screws (12), controller plug (11), and cap with chain (13) from body panel (10).



10-114. 10,500 LB HYDRAULIC WINCH CONTROLLER PLUG REPLACEMENT (Cont'd)

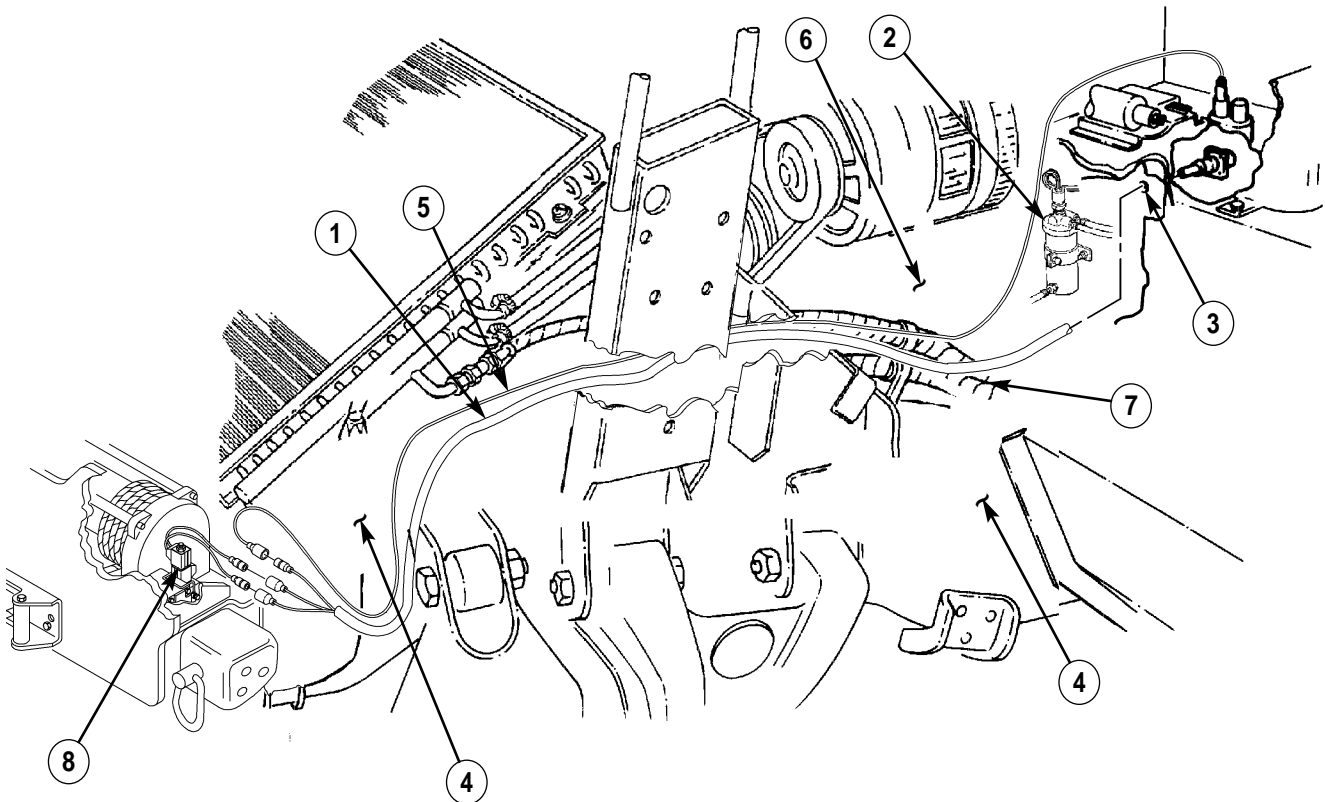
8. Move controller plug harness (1) away from frame rail (4) and from around fuel filter (2) and route controller plug harness (1) back through hole in body panel (3).



10-114. 10,500 LB HYDRAULIC WINCH CONTROLLER PLUG REPLACEMENT (Cont'd)**b. Installation****CAUTION**

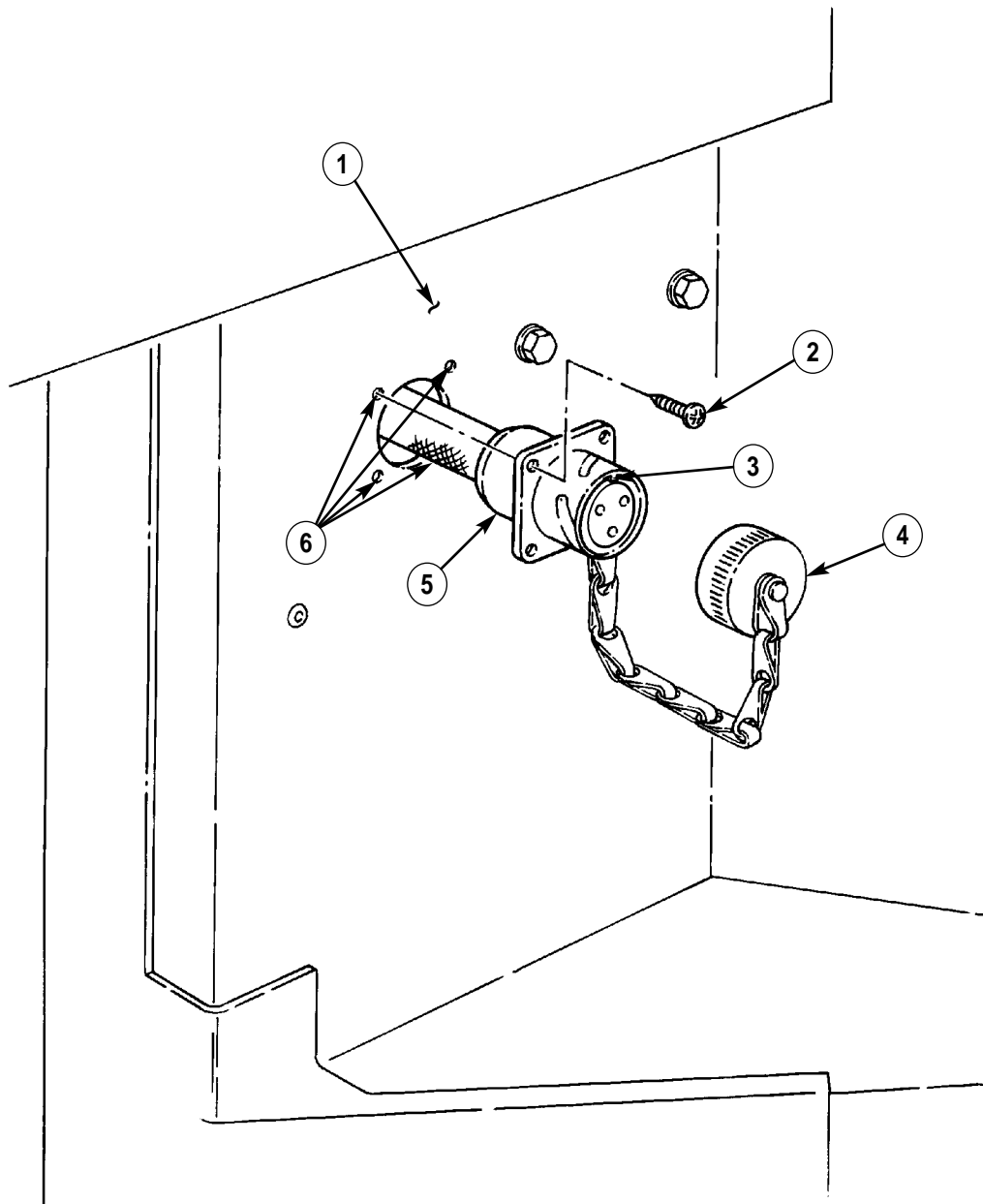
Ensure controller plug harness does not contact any moving parts.

1. Route controller plug harness (1) through hole in body panel (3) into engine compartment (6).
2. Route controller plug harness (1) around fuel filter (2) and along body wiring harness (7) and lead wire (5) to frame rail (4) and then down to winch valve assembly (8).



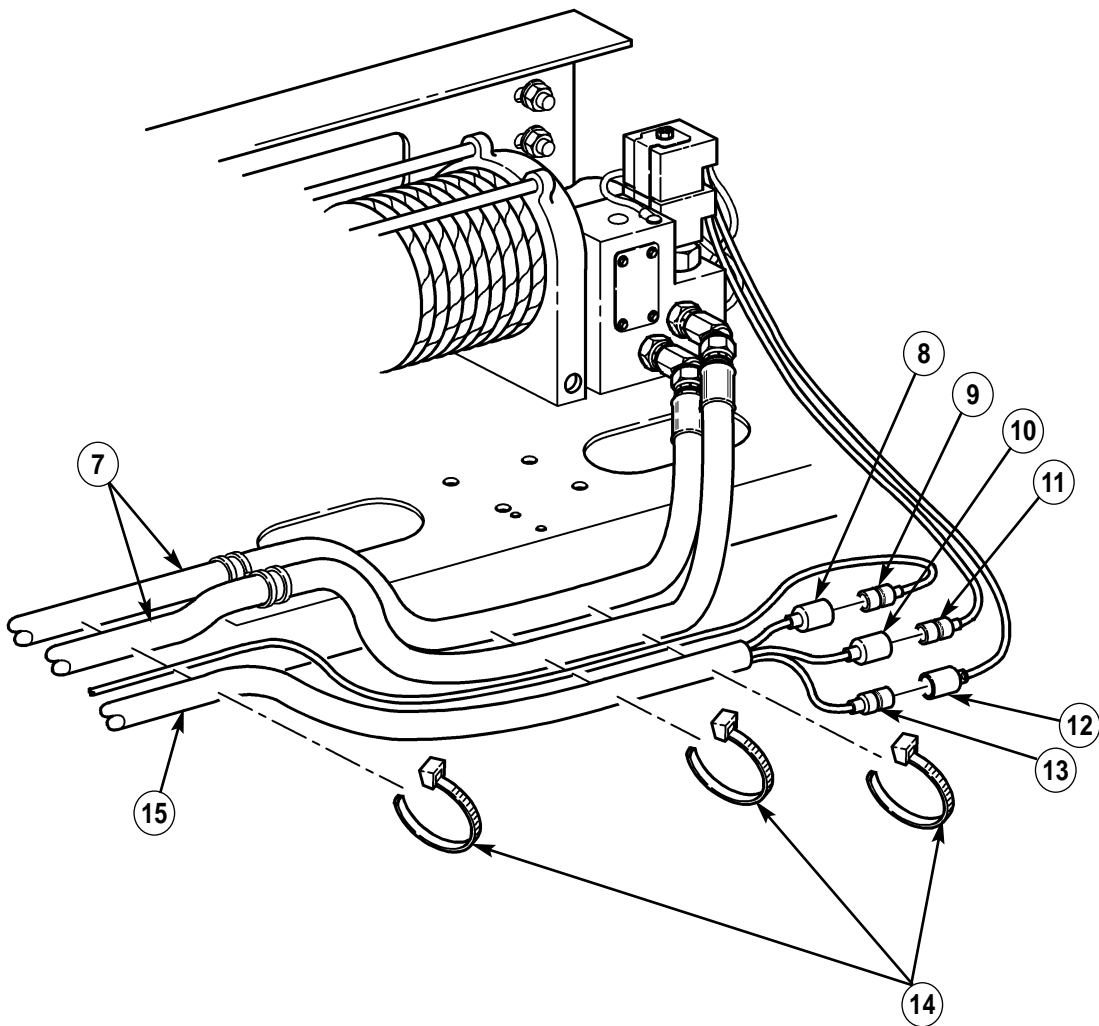
10-114. 10,500 LB HYDRAULIC WINCH CONTROLLER PLUG REPLACEMENT (Cont'd)

3. Align holes in controller plug (5) with holes (6) in body panel (1) and blind spline (3) at top position and install controller plug (5) and cap with chain (4) on body panel (1) with four screws (2).



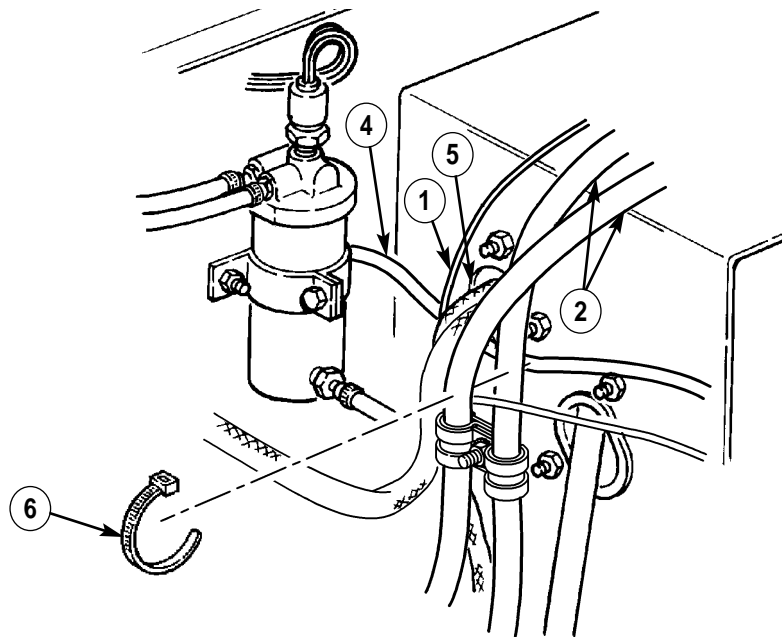
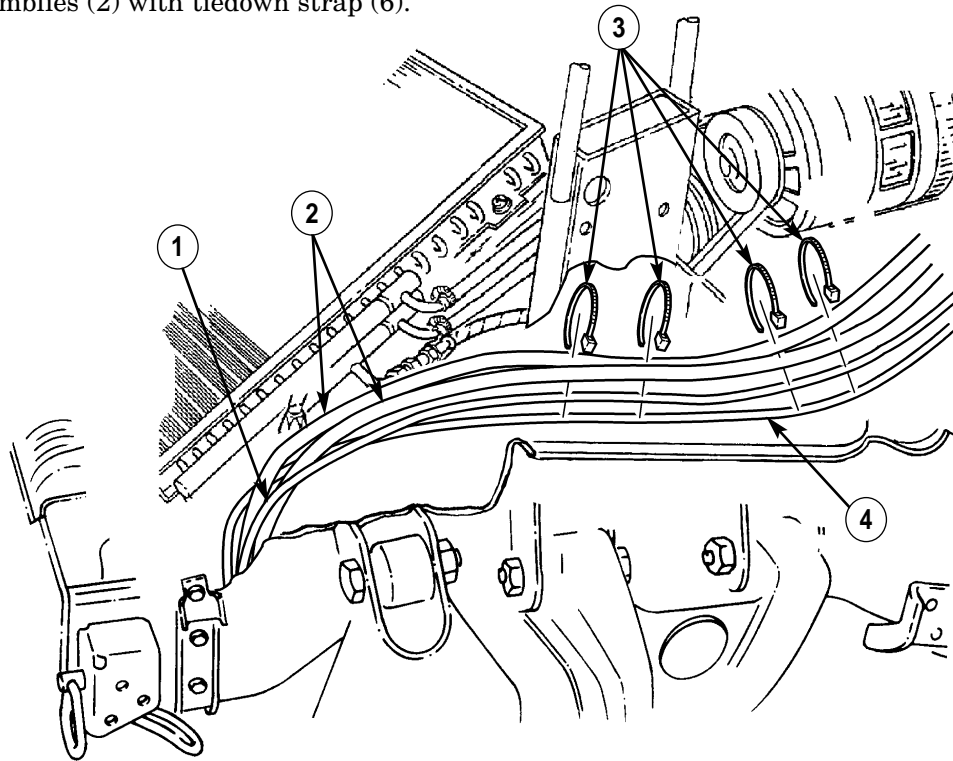
10-114. 10,500 LB HYDRAULIC WINCH CONTROLLER PLUG REPLACEMENT (Cont'd)

4. Connect lead wire 785B (9) to controller plug lead (8) 785B.
5. Connect controller plug lead 785A (10) to winch lead 785A (11).
6. Connect controller plug lead 785C (13) to winch lead 785C (12).
7. Secure controller plug harness (15) and lead wire (9) to two hydraulic hose assemblies (7) with three tiedown straps (14).



10-114. 10,500 LB HYDRAULIC WINCH CONTROLLER PLUG REPLACEMENT (Cont'd)

8. Secure lead wire (1) and controller plug harness (4) to two hydraulic hose assemblies (2) with four tiedown straps (3).
9. Secure controller plug harness (4), body harness (5), and lead wire (1) to two hydraulic hose assemblies (2) with tiedown strap (6).



- FOLLOW-ON TASKS:**
- Install engine left splash shield. (para. 10-17).
 - Connect battery ground cables (para. 4-73).
 - Lower and secure hood (TM 9-2320-280-10).

CHAPTER 11 SPECIAL PURPOSE BODIES

Section I. WEAPON CARRIER BODY MAINTENANCE

11-1. WEAPON CARRIER BODY MAINTENANCE TASK SUMMARY

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11-2. BALLISTIC CREW DOOR MAINTENANCE

This task covers:

- | | |
|---|--|
| <ul style="list-style-type: none"> a. Removal b. Installation | <ul style="list-style-type: none"> c. Inspection d. Adjustment |
|---|--|

INITIAL SETUP:

Applicable Models

All models except M998, M998A1, M1035, M1035A1, M1035A2, M1037, M1038, M1038A1, M1042, M1097, M1097A1, M1097A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Six locknuts (Appendix G, Item 87)
Spacer plate, 0.125-in. (3.2-mm) thick
(Appendix G, Item 296)

Materials/Parts (Cont'd)

Spacer plate, 0.060-in. (1.5-mm) thick
(Appendix G, Item 231)
Spacer plate, hinge (Appendix G, Item 232)

Personnel Required

One mechanic
One assistant

Manual References

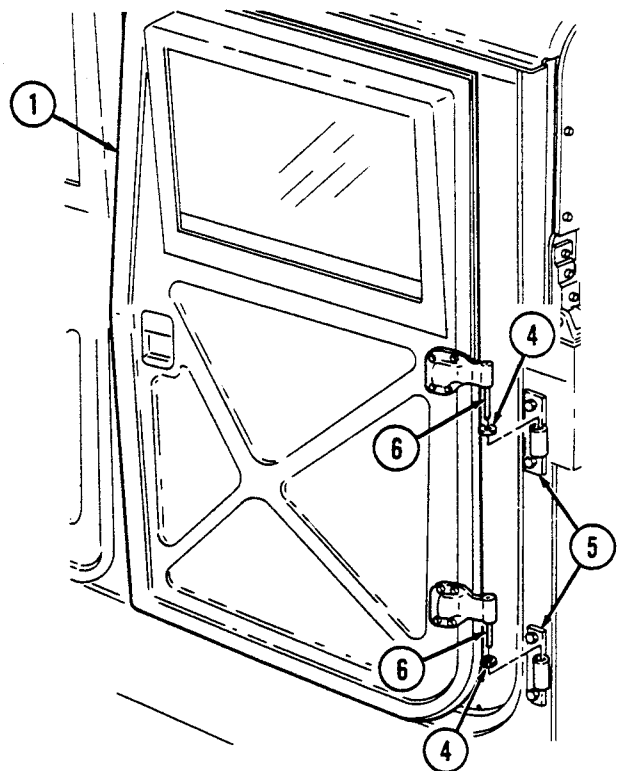
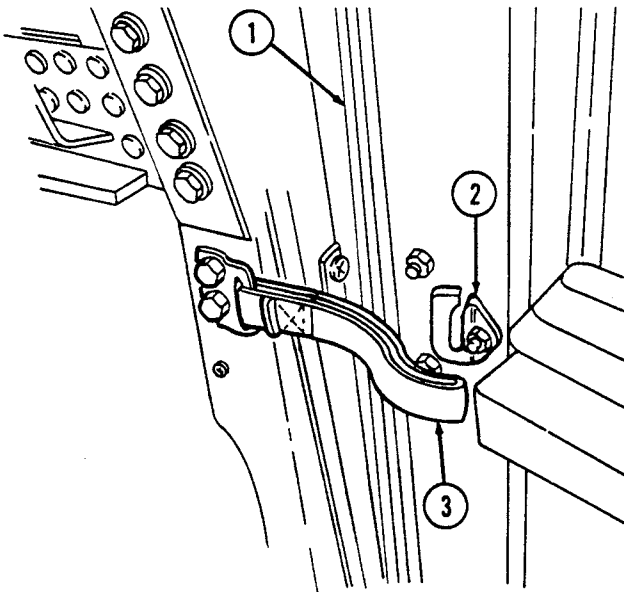
TM 9-2320-280-24P

a. Removal

1. Slide doorstrap (3) off doorstop bracket (2).
2. Open and hold crew door (1) straight out from vehicle. Lift up crew door (1) to remove door hinge pins (6) from body hinge mounts (5) and remove crew door (1) and washers (4) (if present).

b. Installation

1. Hold crew door (1) straight out from vehicle and insert washers (4) (if removed) and door hinge pins (6) on body hinge mounts (5).
2. Slide doorstrap (3) on doorstop bracket (2).



11-2. BALLISTIC CREW DOOR MAINTENANCE (Cont'd)

c. Inspection

1. Inspect crew door assembly (2) for proper alignment. Ensure door (2) is centered between pillar (7), roof (5), cargo shell (10), and lower side rail (8). If out-of-alignment condition exists, perform horizontal or vertical adjustment procedures.
2. Inspect crew door assembly (2) to ensure latch (1) is closing completely on striker (15) without extreme force. If latch (1) is out of adjustment, perform latch (1) adjustment procedures.
3. Inspect hinge (4) and latch (1) for adjustment. Insert a piece of paper (9) between crew door assembly (2) and pillar (7), and close door (2). Perform this test at four or five locations around the door (2). Door seals should offer some resistance when paper is pulled out. If door seal does not offer resistance, or resistance is excessive, perform hinge and latch adjustment procedures.
4. Inspect latch (1), hinge (4), and door handle (3) for loose, missing, or unserviceable parts.

d. Adjustment

NOTE

Perform steps 1 and 2 for horizontal adjustment. Perform steps 3 through 6 for vertical adjustment. Perform steps 7 through 18 for hinge adjustment and steps 19 through 23 for latch adjustment.

1. Loosen six screws (6) from two hinges (4) and crew door assembly (2).
2. Align and center crew door assembly (2) between pillar (7), roof (5), cargo shell (10), and lower side rail (8). Tighten six screws (6) to 6 lb-ft (8 N•m).
3. Remove door strap (11) from doorstop bracket (12).
4. Open crew door assembly (2) to approximately 45°, and lift and remove door (2) from body hinge mounts (14).
5. Install washer (13) on each door hinge (4), and install crew door assembly (2) on body hinge mounts (14).
6. Check vertical adjustment and repeat steps if necessary.
7. Remove door strap (11) from doorstop bracket (12).
8. Open crew door assembly (2) to approximately 45°, and lift door (2) and remove washers (13) (if installed) from body hinge mounts (14).
9. Remove locknut (19), washer (17), screw (16), washer (17), and doorstop bracket (12) from crew door assembly (2). Discard locknut (19).
10. Remove five locknuts (20), washers (21), screws (23), washers (21), two hinges (4), and spacer plates (18) (if installed) from crew door assembly (2). Discard locknuts (20).
11. To increase resistance to that portion of the door seal (22), install two hinge spacer plates (18) between door hinge (4) and outer side of crew door assembly (2).
12. To decrease resistance to that portion of the door seal (22), discard hinge spacer plate (18) between door hinge (4) and outer side of crew door assembly (2).
13. Install two spacer plates (18) (if required) and door hinges (4) on crew door assembly (2) with five washers (21), screws (23), washers (21), and locknuts (20).
14. Install doorstop bracket (12) on crew door assembly (2) with washer (17), screw (16), washer (17), and locknut (19).
15. Tighten locknuts (19) and (20) installed in steps 13 and 14 to 6 lb-ft (8 N•m).
16. Install two door hinge washers (13) (if removed), position crew assembly door (2) to approximately 45°, and install door hinges (4) on body hinge mounts (14).
17. Check hinge (4) adjustment and repeat steps if necessary.
18. Install door strap (11) on doorstop bracket (12).

11-2. BALLISTIC CREW DOOR MAINTENANCE (Cont'd)

19. Remove crew door latch (para. 11-11).

NOTE

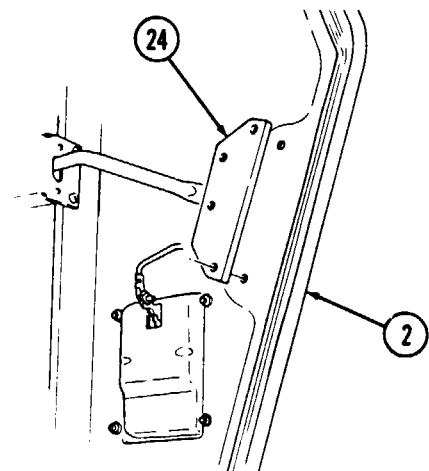
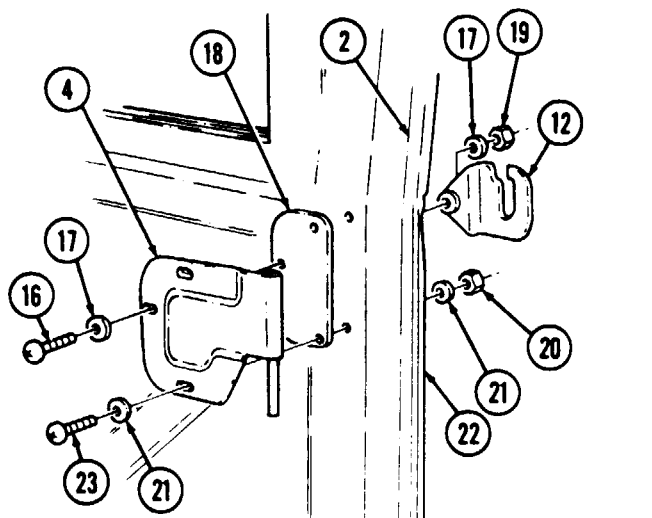
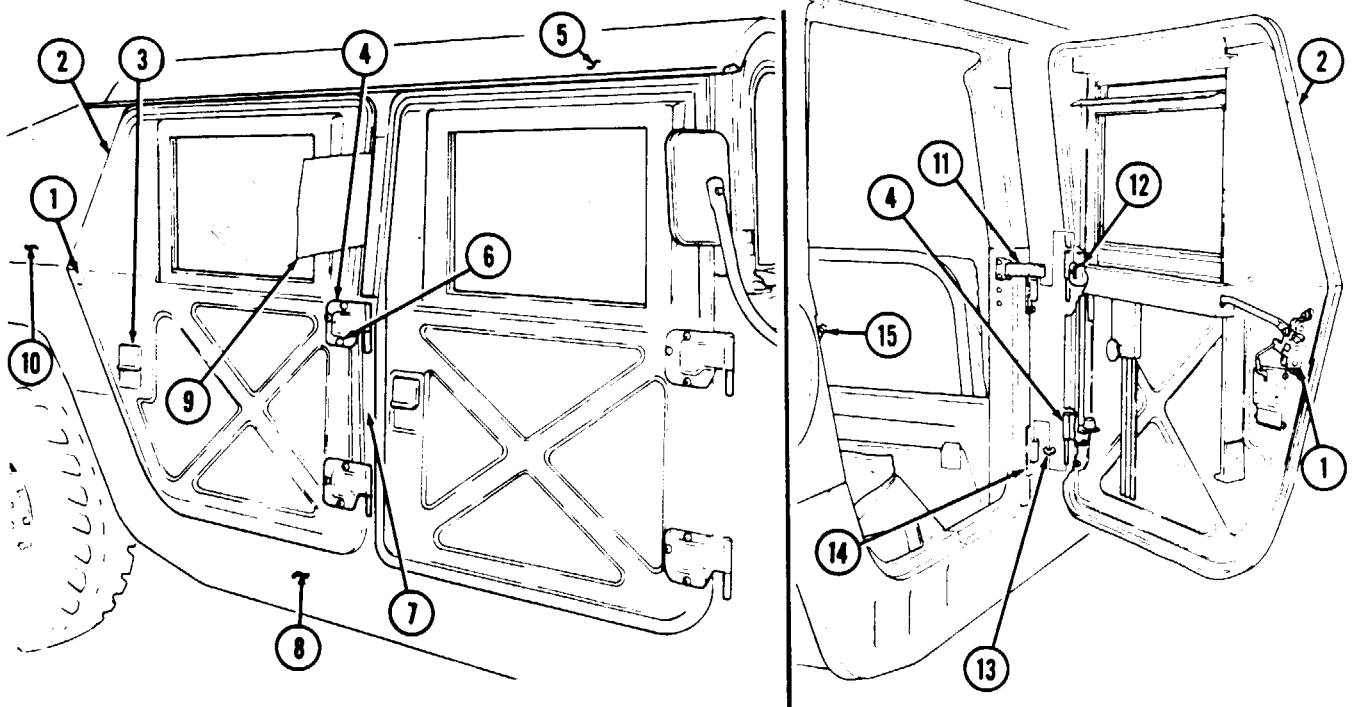
- To increase resistance to door seal and adjust rear of crew door assembly, perform step 20.
- To decrease resistance to door seal and adjust rear of crew door assembly, perform step 21.

20. Discard spacer plate(s) (24) from crew door (2).

21. Add spacer plate (24) 0.125-in. (3.2-mm) thick or spacer plate (24) 0.060-in. (1.5-mm) thick to crew door (2).

22. Install crew door latch (para. 11-11).

23. Check door latch adjustment and repeat steps if necessary.



11-3. BALLISTIC CREW DOOR HINGE REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

All models except M998, M998A1, M1035, M1035A1, M1035A2, M1037, M1038, M1038A1, M1042, M1097, M1097A1, M1097A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Three locknuts (Appendix G, Item 87)

Manual References

TM 9-2320-280-24P

Equipment Condition

Ballistic crew door removed (para. 11-2).

NOTE

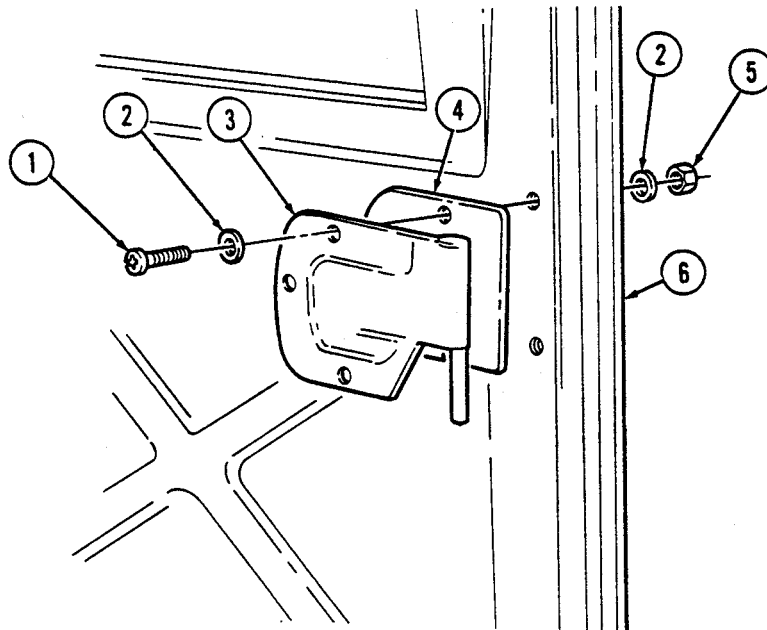
- M966, M966A1, M996, M996A1, M997, M997A1, M997A2, M1025, M1025A1, M1025A2, M1026, M1026A1, and M1036 vehicles have one additional hinge shim on the inner door side of each door hinge mounting hardware.
- On top hinges, note position of doorstop bracket.

a. Removal

Remove three locknuts (5), washers (2), screws (1), washers (2), hinge (3), and shim(s) (4) from crew door (6). Discard locknuts (5).

b. Installation

Install shim(s) (4) and hinge (3) on crew door (6) with three washers (2), capscrews (1), washers (2), and locknuts (5). Tighten locknuts (5) to 6 lb-ft (8 N•m).



FOLLOW-ON TASK: Install ballistic crew door (para. 11-2).

11-4. BALLISTIC CREW DOOR REAR STRIKER PLATE REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

All models except M998, M998A1, M1035, M1035A1, M1035A2, M1037, M1038, M1038A1, M1042, M1097, M1097A1, M1097A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Tape (Appendix C, Item 50)

Manual References

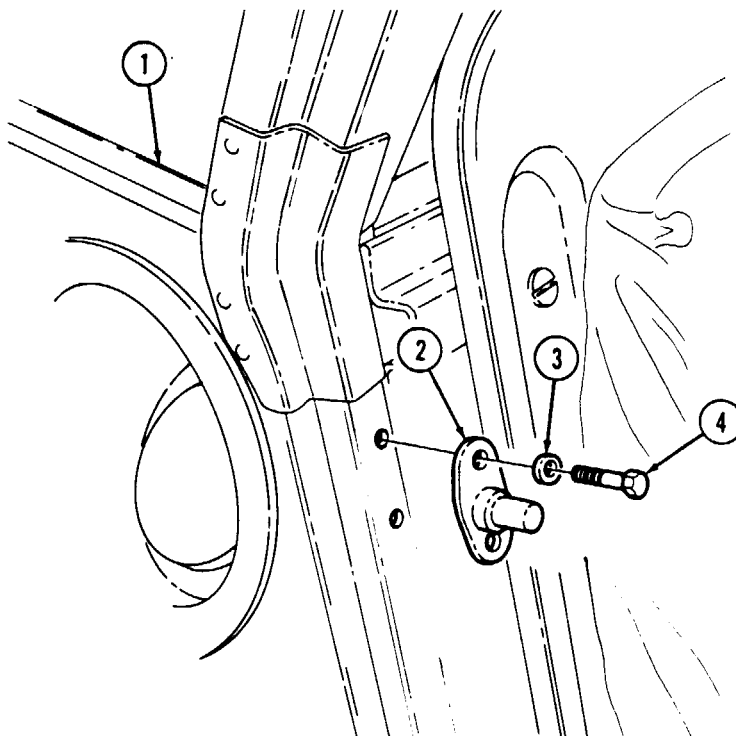
TM 9-2320-280-24P

a. Removal

Remove two capscrews (4), washers (3), and rear striker plate (2) from body (1). Remove tape from rear striker plate (2) and discard tape.

b. Installation

Apply tape to rear striker plate (2) mounting surface. Install rear striker plates (2) on body (1) with two washers (3) and capscrews (4). Tighten capscrews (4) to 8 lb-ft (11 N•m).



11-5. BALLISTIC CREW DOOR FRONT STRIKER PLATE MAINTENANCE

This task covers:

- a. Removal
- c. Adjustment
- b. Installation

INITIAL SETUP:

Applicable Models

All models except M998, M998A1, M1035, M1035A1, M1035A2, M1037, M1038, M1038A1, M1042, M1097, M1097A1, M1097A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Tape (Appendix C, Item 50)
Two locknuts (Appendix G, Item 86)

Manual References

TM 9-2320-280-24P

a. Removal

Remove two locknuts (5), door strap (4), two capscrews (1), and front striker plate (2) from "B" pillar (3). Discard locknuts (5). Remove tape from front striker plate (2) and discard tape.

b. Installation

Apply tape to front striker plate (2) mounting surface. Install front striker plate (2) on "B" pillar (3) with two capscrews (1), door strap (4), and two locknuts (5). Finger tighten locknuts (5).

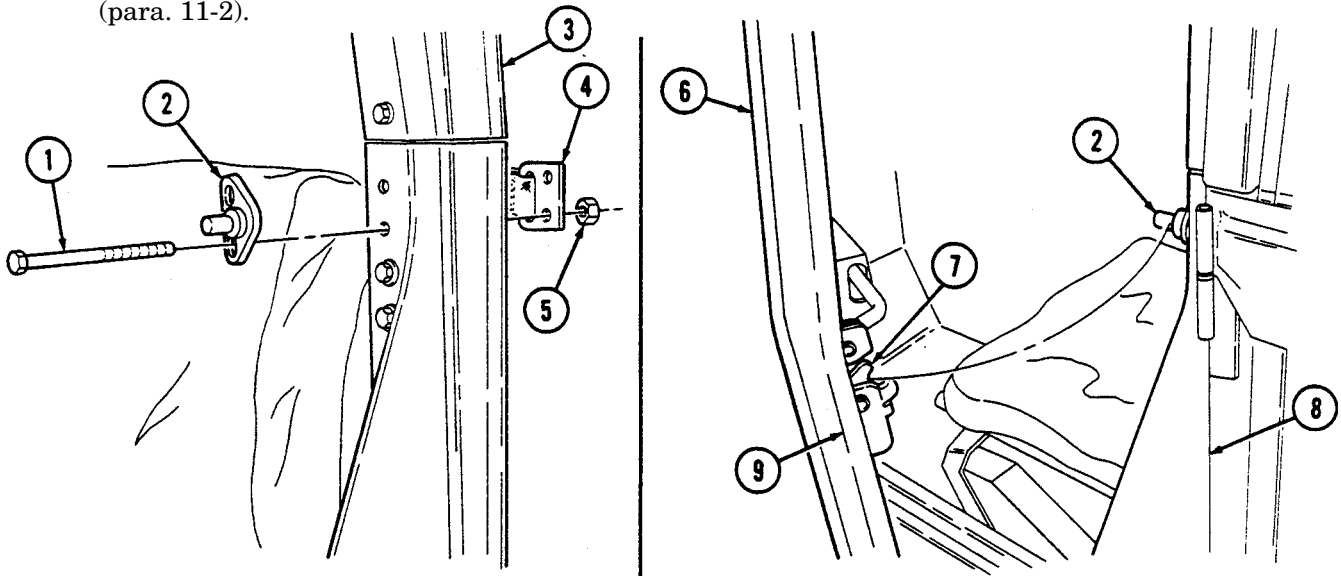
c. Adjustment

1. Close door (6) ensuring latch (7) latches on front striker plate (2).

NOTE

Front striker plates are slotted for vertical adjustment.

2. Press crew door (6) slightly inward and upward until seal (9) contacts body (8). Tighten locknuts (5) to 19 lb-ft (26 N•m).
3. Open and close crew door (6) several times to ensure proper latch (7) and front striker plate (2) alignment. If front striker plate (2) cannot be adjusted to align with latch (7), adjust crew door (6) (para. 11-2).



11-6. BALLISTIC CREW DOOR PADDLE LOCK REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

All models except M998, M998A1, M1035, M1035A1, M1035A2, M1037, M1038, M1038A1, M1042, M1097, M1097A1, M1097A2

Materials/Parts

Four locknuts (Appendix G, Item 85)

Manual References

TM 9-2320-280-24P

Tools

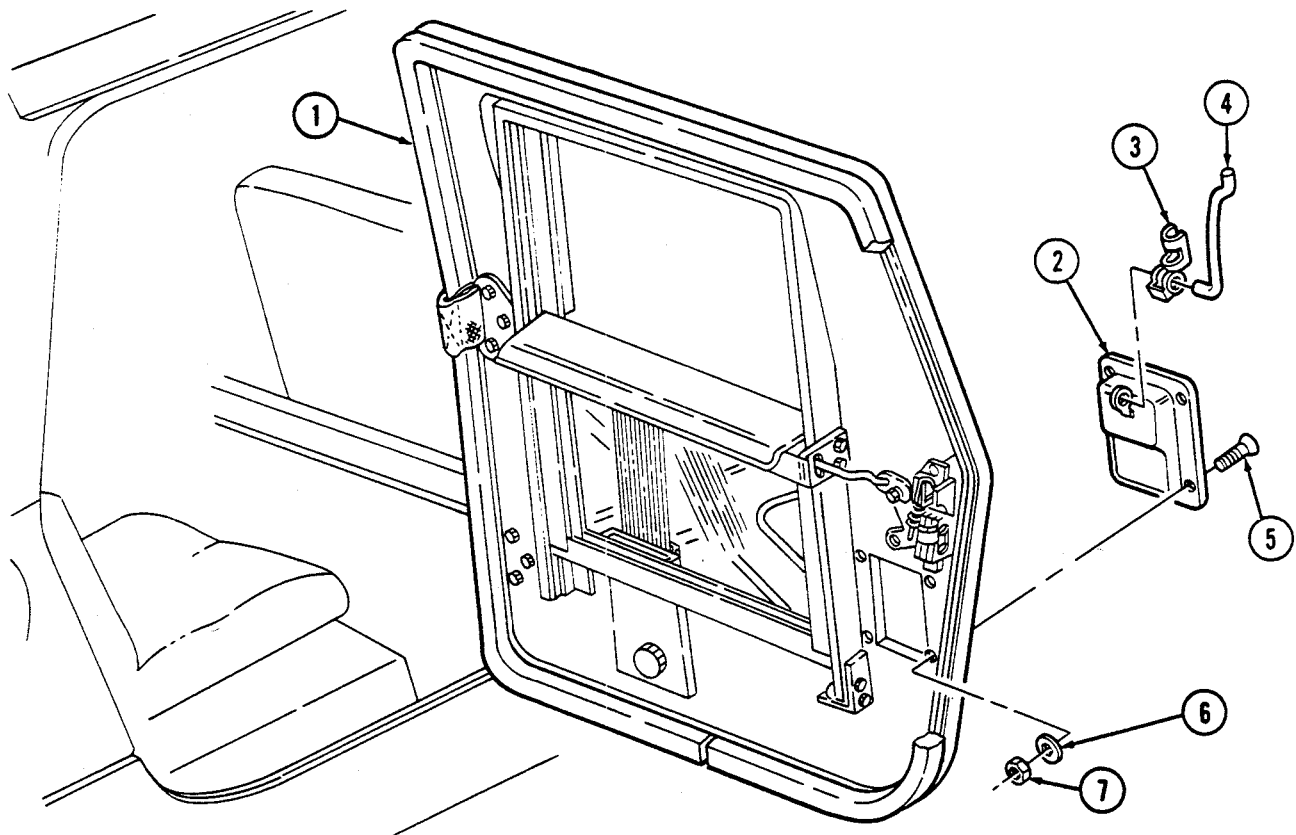
General mechanic's tool kit:
automotive (Appendix B, Item 1)

a. Removal

1. Release clevis clip (3) from hook (4) and remove hook (4) and clevis clip (3) from paddle lock (2).
2. Remove four locknuts (7), washers (6), screws (5), and paddle lock (2) from crew door (1). Discard locknuts (7).

b. Installation

1. Install paddle lock (2) on crew door (1) with four screws (5), washers (6), and locknuts (7). Tighten locknuts (7) to 12-17 lb-in. (1-2 N•m).
2. Connect hook (4) to paddle lock (2) with clevis clip (3).



11-7. BALLISTIC CREW DOOR WINDOW ASSEMBLY MAINTENANCE

This task covers:

- | | |
|---|---|
| <p>a. Removal</p> <p>b. Disassembly</p> | <p>c. Assembly</p> <p>d. Installation</p> |
|---|---|

INITIAL SETUP:

Applicable Models

All models except M998, M998A1, M1035, M1035A1, M1035A2, M1037, M1038, M1038A1, M1042, M1097, M1097A1, M1097A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Sealing compound (Appendix C, Item 43)
Retaining ring (Appendix G, Item 231)

Manual References

TM 9-2320-280-24P

Equipment Condition

- Window stops removed (para. 11-9).
- Latch tube removed (para. 11-12).

a. Removal

Pull out on window latch knob (4) and slide window (5) down and out from door side rails (1) and guide channel (2).

b. Disassembly

1. Remove latch knob (4) from pin (6).
2. Remove retaining ring (9), pin (6), and spring (10) from window latch (3). Discard retaining ring (9).
3. Remove four rollers (8) from guide pins (7).
4. Remove four guide pins (7) from window (5).

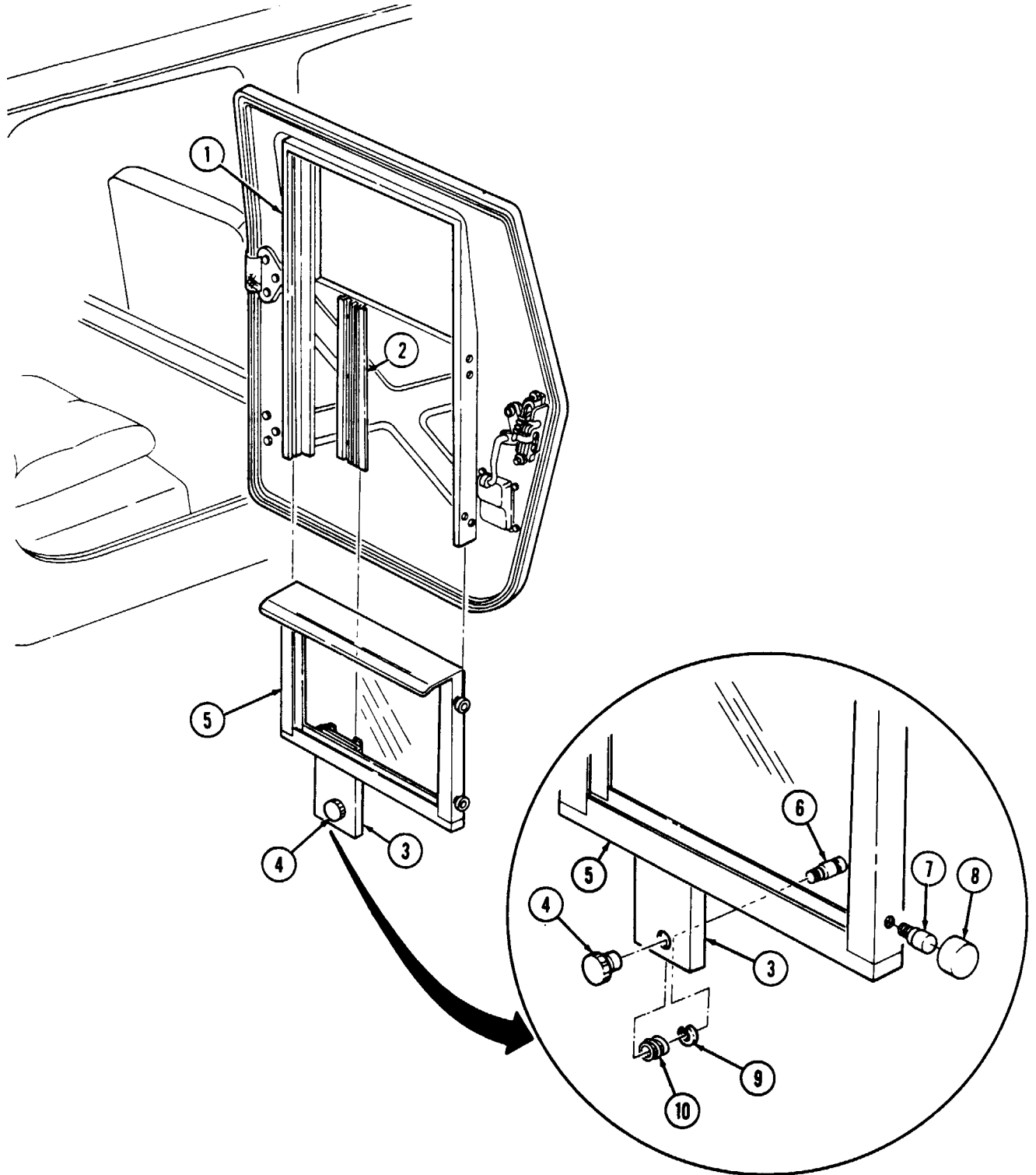
c. Assembly

1. Apply sealing compound to threads of guide pins (7) and install guide pins (7) on window (5) frame.
2. Install spring (10) and pin (6) on window latch (3) with retaining ring (9).
3. Apply sealing compound to threads of pin (6) and install latch knob (4) onto pin (6).
4. Install four rollers (8) on guide pins (7).

d. Installation

Align window latch (3) with window guide channel (2) and push window (5) up into guide channel (2) and door side rails (1).

11-7. BALLISTIC CREW DOOR WINDOW ASSEMBLY MAINTENANCE Cont'd)



- FOLLOW-ON TASKS:
- Install latch tubs (para. 11-12).
 - Install window stops (para. 11-9).

11-8. BALLISTIC CREW DOOR WINDOW PROTECTIVE SHIELD REPLACEMENT

This task covers:

- | | |
|---|---|
| <ul style="list-style-type: none"> a. Initial Installation b. Removal | <ul style="list-style-type: none"> c. Installation |
|---|---|

INITIAL SETUP:

Applicable Models

All models except M998, M998A1, M1035, M1035A1, M1035A2, M1037, M1038, M1038A1, M1042, M1097, M1097A1, M1097A2

Materials/Parts (Cont'd)

Protective shield (Appendix D, Fig. D-65)
 Two blind rivets (Appendix G, Item 253)
 Two blind rivets (Appendix G, Item 251)

Tools

General mechanic's tool kit:
 automotive (Appendix B, Item 1)

Manual References

TM 43-0139
 TM 9-2320-280-24P

NOTE

- The following procedure can be performed to prevent damage to door glass. This task can be accomplished with the approval of the unit commander.
- Procedures for initial installation and replacement of the protective shields are basically the same for all windows. This procedure covers the left front protective shield.

a. Initial Installation

NOTE

Initial installation steps apply only to vehicles that have not been previously retrofitted with protective shields.

1. Position protective shield (3) on inside of ballistic door (1).
2. Using protective shield (3) as a template, locate and mark three top holes (2) and two bottom holes (5) on inside of ballistic door (1).

NOTE

Ensure window is closed tightly before drilling holes for the protective shield.

3. Drill three 0.156-in. (0.396-cm) diameter holes (8) through ballistic door frame (9).
4. Drill two 0.193-in. (0.490-cm) diameter holes (6) through ballistic door (1).
5. Install protective shield (3) on ballistic door frame (9) with three screws (4).

NOTE

Perform step 6 for M966, M966A1, M996, M996A1, M997, M997A1, M997A2, M1025, M1025A1, M1025A2, M1026, M1026A1, and M1036 vehicles. Perform step 7 for M1043, M1043A1, M1043A2, M1044, M1044A1, M1045, M1045A1, M1045A2, M1046, and M1046A1 vehicles.

6. Install protective shield (3) on ballistic door (1) with two 5/32-in. blind rivets (7).
7. Secure protective shield (3) to ballistic door (1) with two 3/16-in. blind rivets (7).
8. Spot paint ballistic door (1) and protective shield (3) as necessary. Refer to TM 43-0139.

11-8. BALLISTIC CREW DOOR WINDOW PROTECTIVE SHIELD REPLACEMENT (Cont'd)

b. Removal
NOTE

For instructions on replacement of rivets, refer to para. 11-66.

1. Remove two rivets (7) from protective shield (3) and ballistic door (1).
2. Remove three screws (4) and protective shield (3) from ballistic door frame (9).

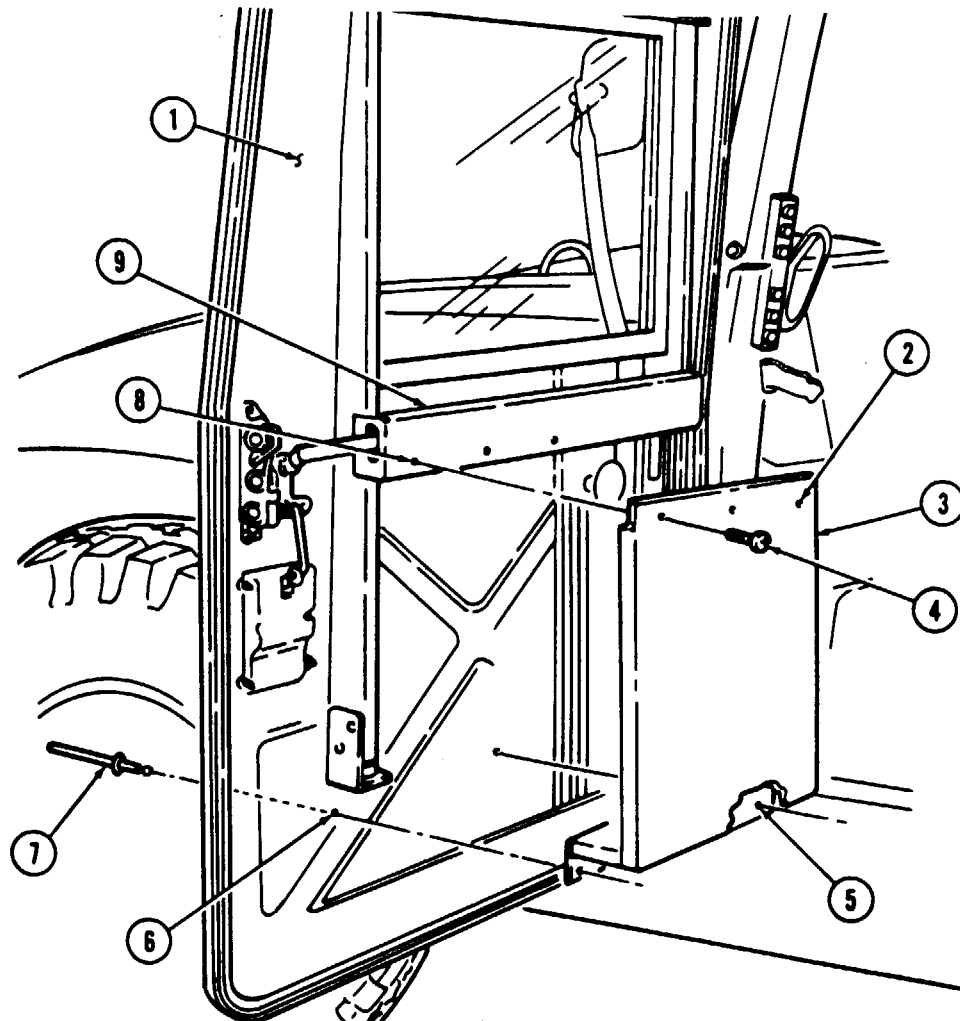
c. Installation

1. Install protective shield (3) on ballistic doorframe (9) with three screws (4).

NOTE

Perform step 2 for M966, M966A1, M996, M996A1, M997, M997A1, M997A2, M1025, M1025A1, M1025A2, M1026, M1026A1, and M1036 vehicles. Perform step 3 for M1043, M1043A1, M1043A2, M1044, M1044A1, M1045, M1045A1, M1045A2, M1046, and M1046A1 vehicles,

2. Install protective shield (3) on ballistic door (1) with two 5/32-in. blind rivets (7).
3. Install protective shield (3) on ballistic door (1) with two 3/16-in. blind rivets (7).



11-9. BALLISTIC CREW DOOR WINDOW STOP REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP

Applicable Models

All models except M998, M998A1, M1035, M1035A1, M1035A2, M1037, M1038, M1038A1, M1042, M1097, M1097A1, M1097A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Two locknuts (Appendix G, Item 87)
Locknut (Appendix G, Item 88)

Manual References

TM 9-2320-280-24P

CAUTION

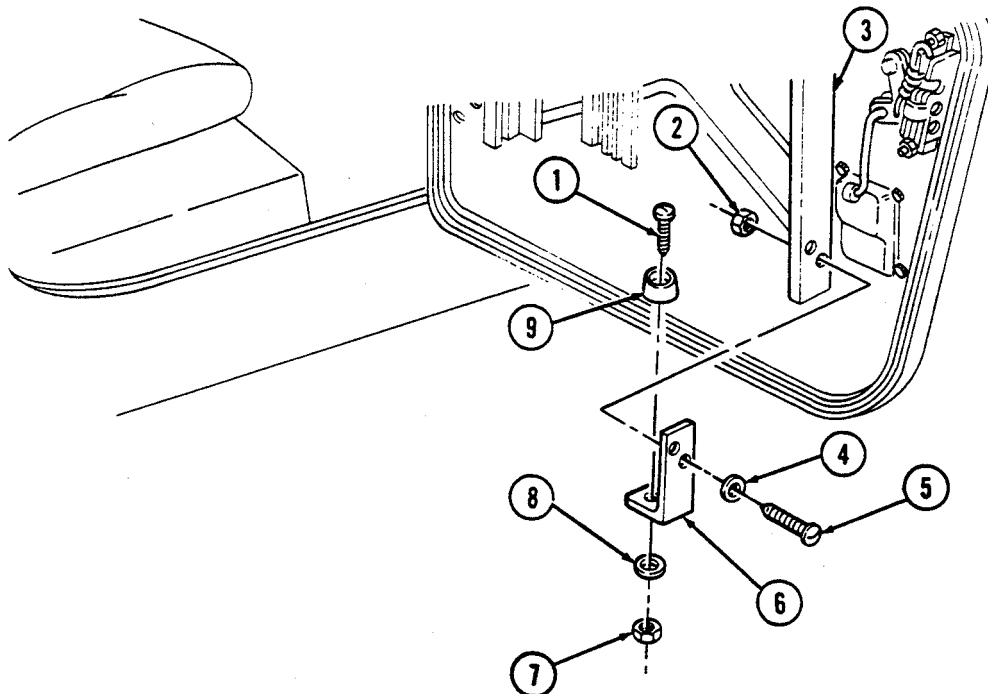
If both window stops are being replaced, ensure ballistic window is locked in the full up position to prevent damage to window.

a. Removal

1. Remove two locknuts (2), screws (5), washers (4), and window stop bracket (6) from side rail (3). Discard locknuts (2).
2. Remove locknut (7), washer (8), screw (1), and pad (9) from window stop bracket (6). Discard locknut (7).

b. Installation

1. Install pad (9) on window stop bracket (6) with screw (1), washer (8), and locknut (7).
2. Install window stop bracket (6) on side rail (3) with two washers (4), screws (5), and locknuts (2).



11-10. BALLISTIC CREW DOOR SEAL REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

All models except M998, M998A1, M1035, M1035A1, M1035A2, M1037, M1038, M1038A1, M1042, M1097, M1097A1, M1097A2

Materials/Parts

Detergent (Appendix C, Item 17)

Manual References

TM 9-2320-280-24P

Tools

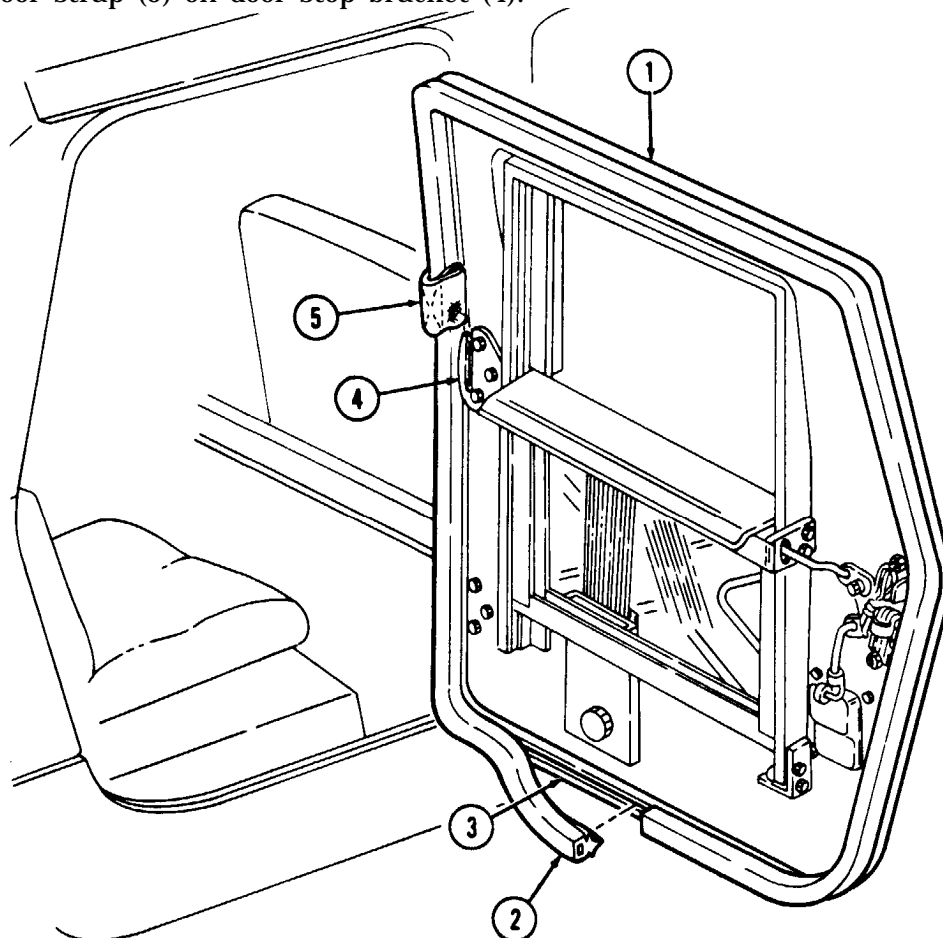
General mechanic's tool kit:
automotive (Appendix B, Item 1)

a. Removal

1. Slide door strap (5) off doorstop bracket (4).
2. Start at end of seal (2) and pry seal (2) from seal retainer (3) around crew door (1).

b. Installation

1. Coat seal (2) with liquid detergent. Start at one end of seal (2) and press seal (2) into retainer (3) around door (1).
2. Slide door strap (5) on door stop bracket (4).



11-11. BALLISTIC CREW DOOR LATCH REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

All models except M998, M998A1, M1035, M1035A1, M1035A2, M1037, M1038, M1038A1, M1042, M1097, M1097A1, M1097A2

Materials/Parts

Lockbolt (Appendix G, Item 68)
Four locknuts (Appendix G, Item 87)

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

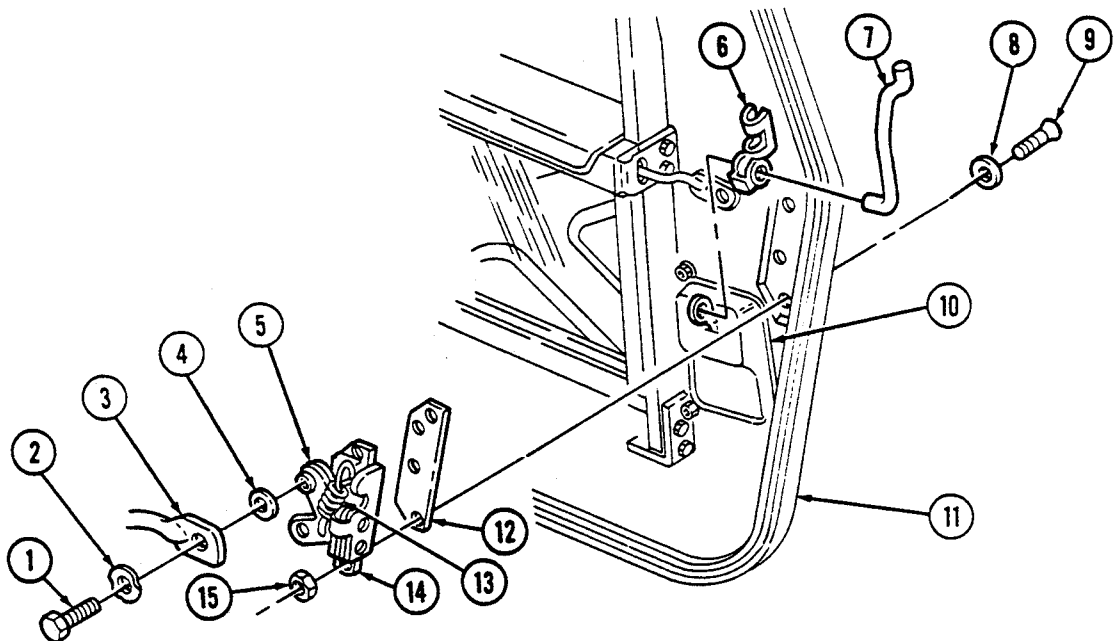
TM 9-2320-280-24P

a. Removal

1. Remove clevis clip (6) and hook (7) from paddle lock (10) and disconnect hook (7) from door latch (14).
2. Disconnect spring (13) from top of latch (14).
3. Remove lockbolt (1), wave washer (2), latch tube (3), and washer (4) from latch arm (5). Discard lockbolt (1).
4. Remove four locknuts (15), washer (8), screws (9), latch (14), and spacer (12) from crew door (11). Discard locknuts (15).

b. Installation

1. Install spacer (12) and latch (14) on crew door (11) with four washers (8), screws (9), and locknuts (15). Tighten locknuts (15) to 6 lb-ft (8 N·m).
2. Connect spring (13) to top of latch (14).
3. Install washer (4) and latch tube (3) on latch arm (5) with wave washer (2) and lockbolt (1). Tighten lockbolt (1) to 6 lb-ft (8 N·m).
4. Install hook (7) on latch (14) and connect other end of hook (7) to paddle lock (10) with clevis clip (6).



11-12. BALLISTIC CREW DOOR LATCH TUBE REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

All models except M998, M998A1, M1035, M1035A1, M1035A2, M1037, M1038, M1038A1, M1042, M1097, M1097A1, M1097A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Lockbolt (Appendix G, Item 68)
Four screws (Appendix G, Item 282)

Manual References

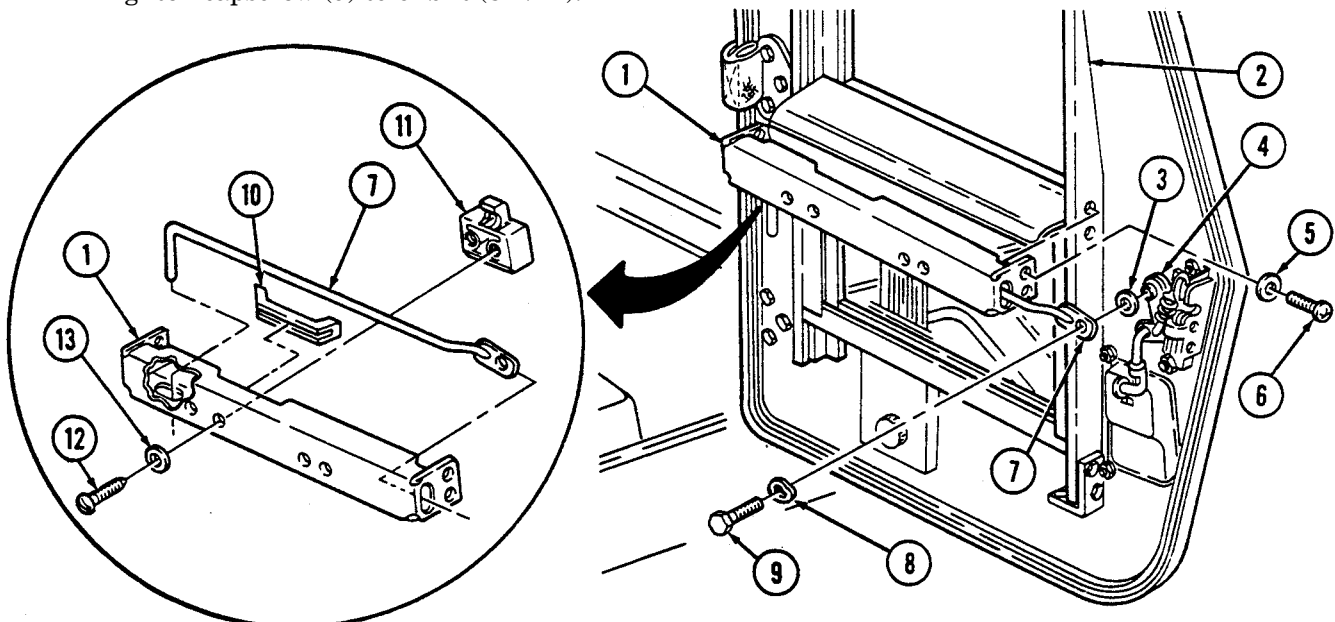
TM 9-2320-280-24P

a. Removal

1. Remove lockbolt (9), wave washer (8), latch tube (7), and washer (3) from latch arm (4). Discard lockbolt (9).
2. Remove four screws (6), washers (5), and bracket (1) from side rails (2). Discard screws (6).
3. Remove two screws (12), washers (13), and guide (11) from bracket (1).
4. Slide latch tube (7) out of bracket (1).
5. Remove protector (10) from bracket (1).

b. Installation

1. Install protector (10) on bracket (1).
2. Slide latch tube (7) into bracket (1).
3. Install guide (11) on bracket (1) with two washers (13) and screws (12).
4. Install bracket (1) on side rails (2) with four washers (5) and screws (6).
5. Install washer (3) and latch tube (7) on latch arm (4) with wave washer (8) and lockbolt (9). Tighten capscrew (9) to 6 lb-ft (8 N·m).



11-13. CARGO SHELL DOOR MAINTENANCE

This task covers:

- a. Removal
- c. Adjustment
- b. Installation

INITIAL SETUP:

Applicable Models

All models except M996, M996A1, M997, M997A1, M997A2, M998, M998A1, M1035, M1035A1, M1035A2, M1037, M1038, M1038A1, M1042, M1097, M1097A1, M1097A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Two locknuts (Appendix G, Item 70)
Two assembled washer screws (Appendix G, Item 279)
Two locknuts (Appendix G, Item 79)

Personnel Required

One mechanic
One assistant

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

Rear end of cargo shell door raised (TM 9-2320-280-10).

General Safety Instructions

Never open one end of cargo shell door before ensuring opposite end is securely closed.

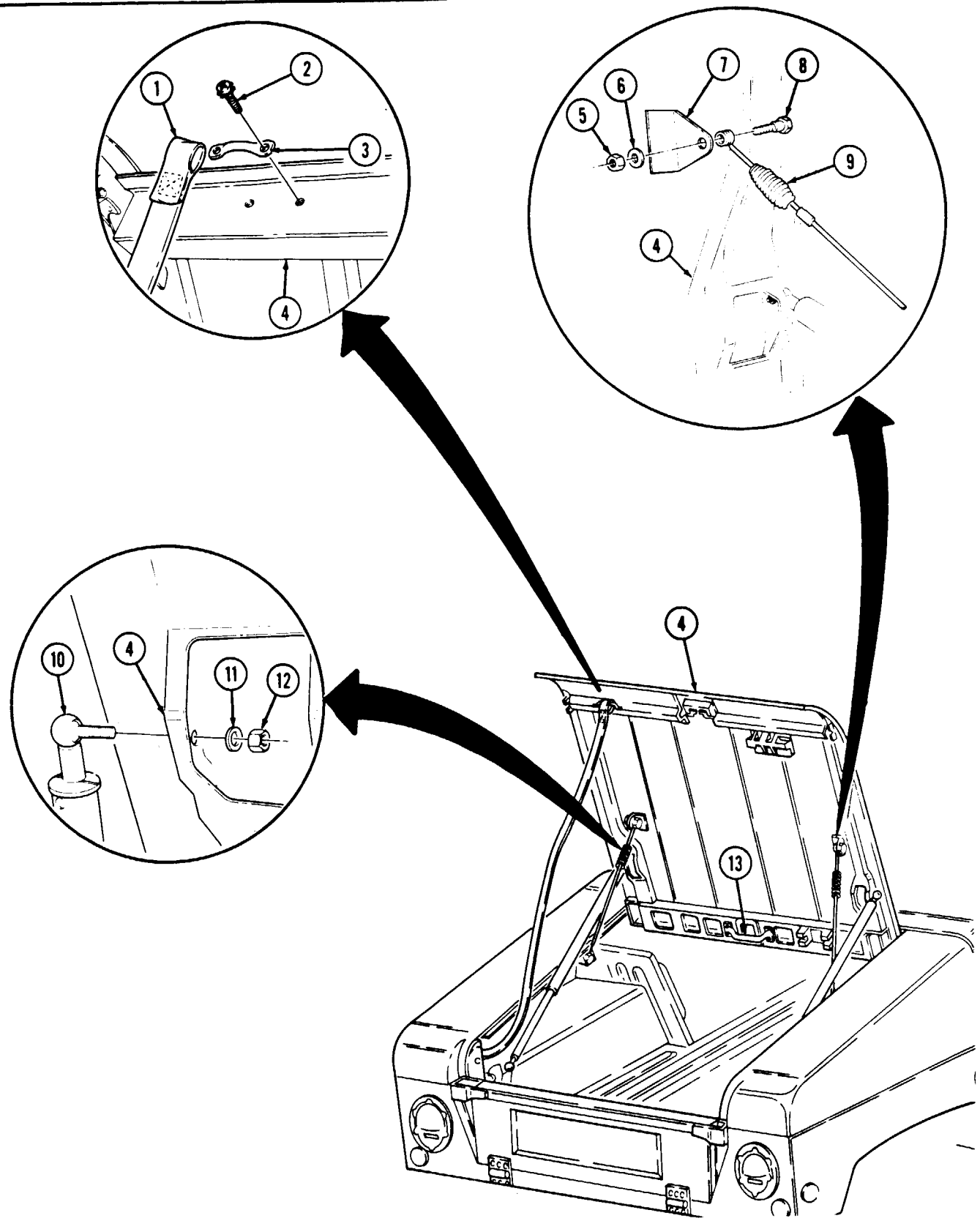
a. Removal

WARNING

Opening one end of cargo door before ensuring opposite end is fully closed will cause both ends to open simultaneously, resulting in injury to personnel or damage to equipment.

1. Remove two assembled washer screws (2) and footman loop (3) from strap (1) and cargo door (4). Discard assembled washer screws (2).
2. Lower cargo door (4) slightly, and remove two locknuts (5), washers (6), shoulder bolts (8), and retention cable (9) from two retention cable brackets (7). Discard locknuts (5).
3. Slowly raise cargo door (4) as far as possible to allow removal of gas springs (10) from cargo door (4).
4. Remove two locknuts (12), washers (11), and gas springs (10) from cargo door (4) and lay gas springs (10) inside vehicle. Discard locknuts (12).
5. Lower cargo door (4), release handle latch (13), and remove cargo door (4).

11-13. CARGO SHELL DOOR MAINTENANCE (Cont'd)



11-13. CARGO SHELL DOOR MAINTENANCE (Cont'd)

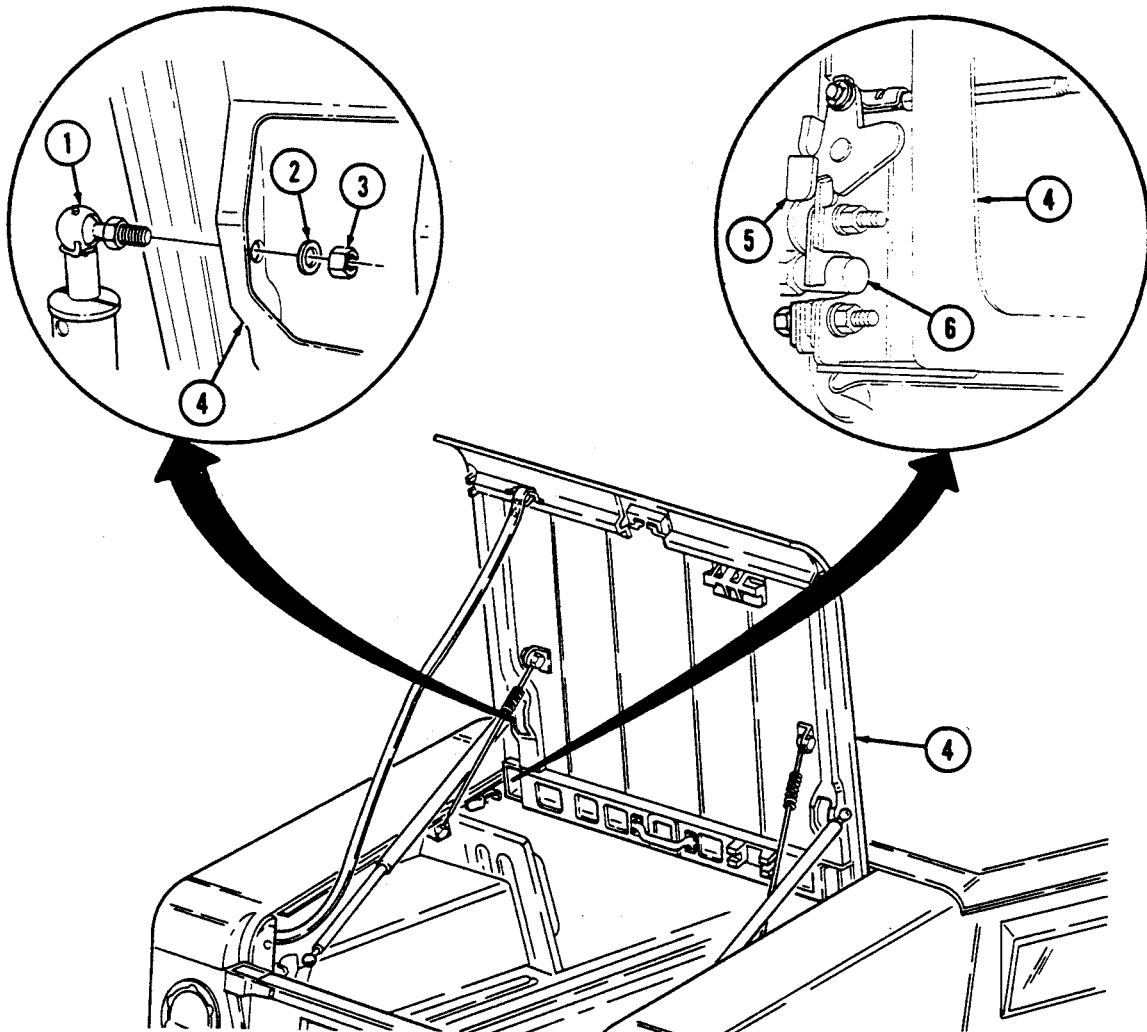
b. Installation

1. Install front latches (5) on front striker pins (6).
2. Push down on cargo door (4) edge to ensure front striker pins (6) are locked in front latches (5).
3. Slowly raise cargo door (4) as far as possible to allow installation of gas springs (1) on cargo door (4).
4. Connect two gas springs (1) to cargo door (4) with two washers (2) and locknuts (3). Tighten locknuts (3) to 15-20 lb-ft (20-27 N•m).
5. Connect two retention cables (14) to retention cable brackets (12) with two shoulder bolts (13), washers (11), and locknuts (10). Tighten locknuts (10) to 85-110 lb-in. (10-12 N•m).
6. Install strap (7) on cargo door (4) with footman loop (9) and two assembled washer screws (8).

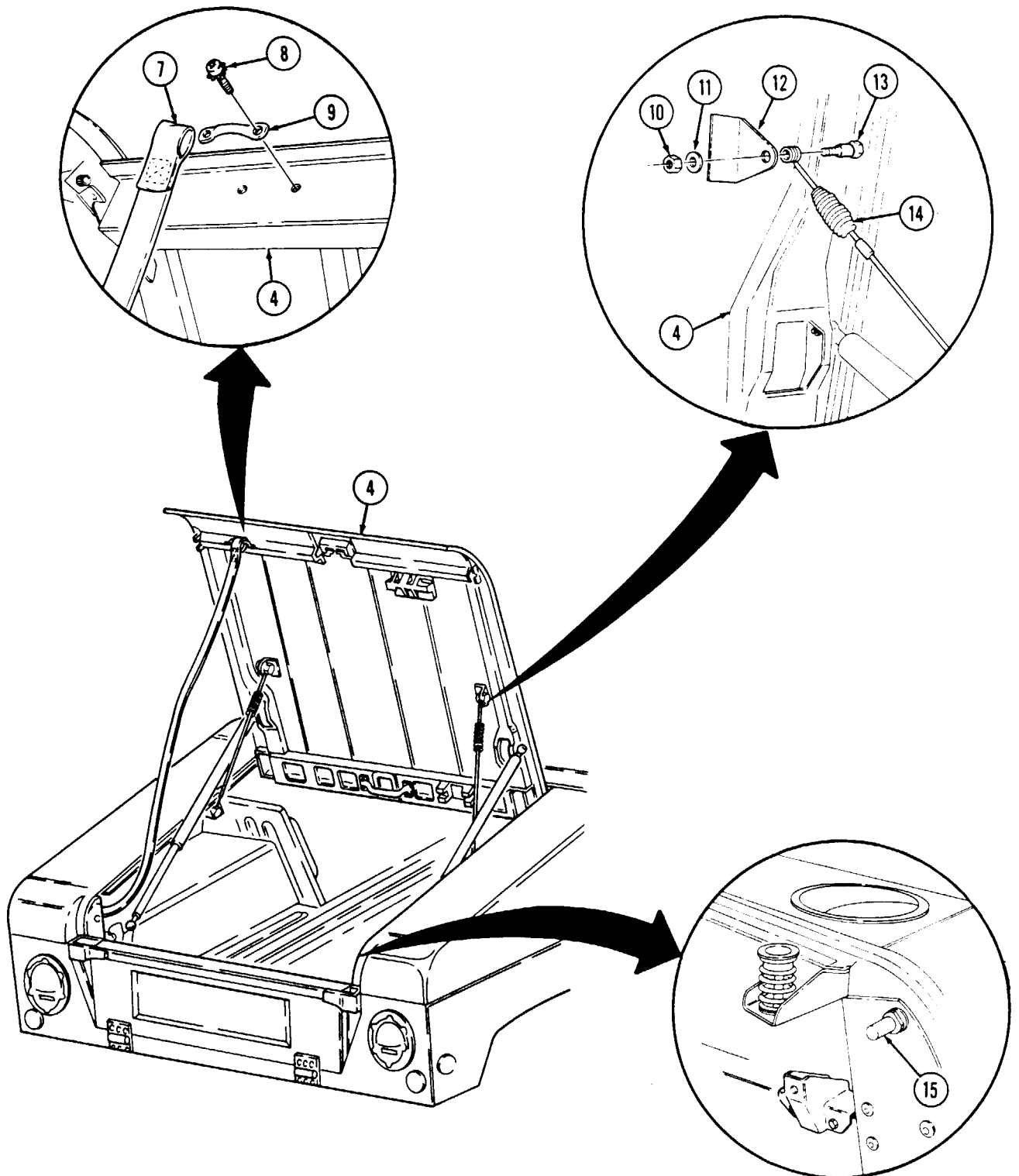
NOTE

To assist closing cargo shell door, a grab loop may be added. Refer to cargo shell door strap replacement (para. 11-22).

7. Close cargo door (4), and ensure cargo door (4) is securely latched on rear striker pins (15).



11-13. CARGO SHELL DOOR MAINTENANCE (Cont'd)



11-13. CARGO SHELL DOOR MAINTENANCE (Cont'd)

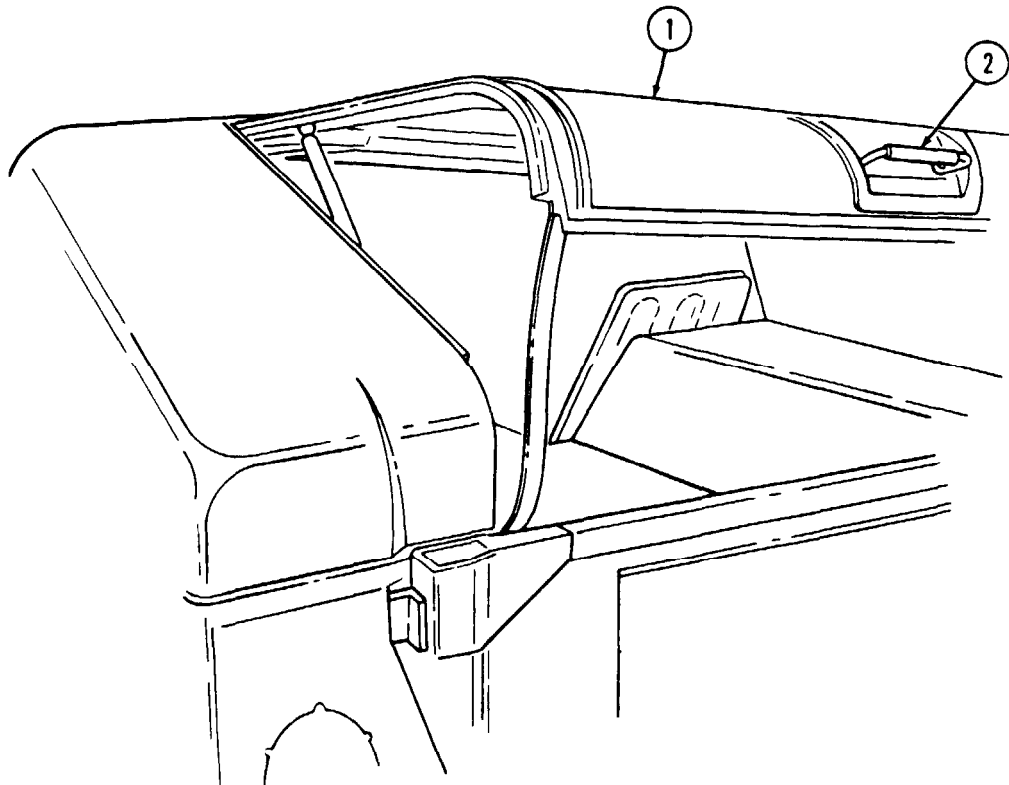
c. Adjustment

1. Pull rear wire handle (2) and raise rear end of cargo shell door (1).
2. Perform steps 1 through 4 of a., Removal.
3. Close cargo door (1).
4. Release handle latch (3) and push cargo door (1) open.
5. Loosen two front striker pin mounting nuts (5).
6. Loosen two countersunk screws (11) and nuts (10) to allow movement of male dovetail (9).
7. Close cargo door (1). Ensure front striker pins (7) are secured and centered in front latches (6).
8. Ensure male dovetail (9) is aligned with female dovetail (8).

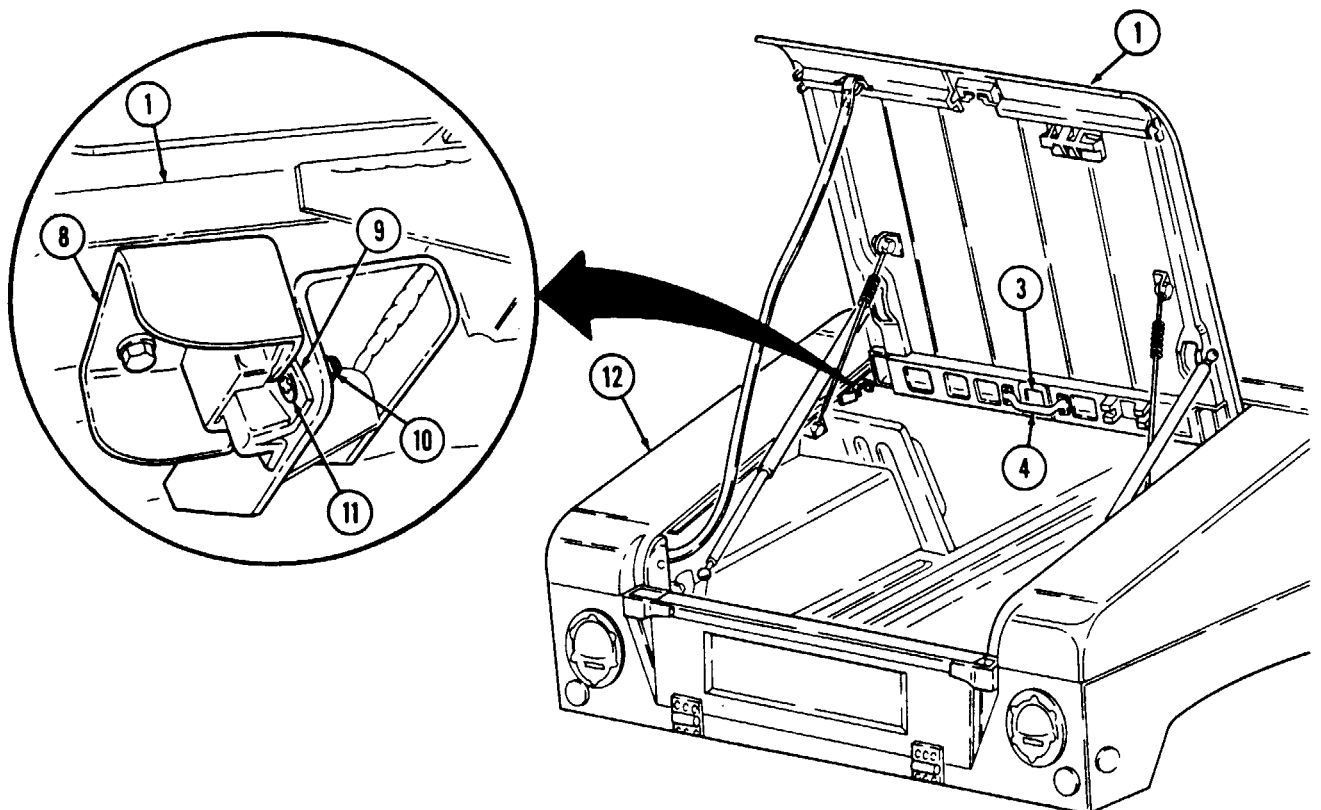
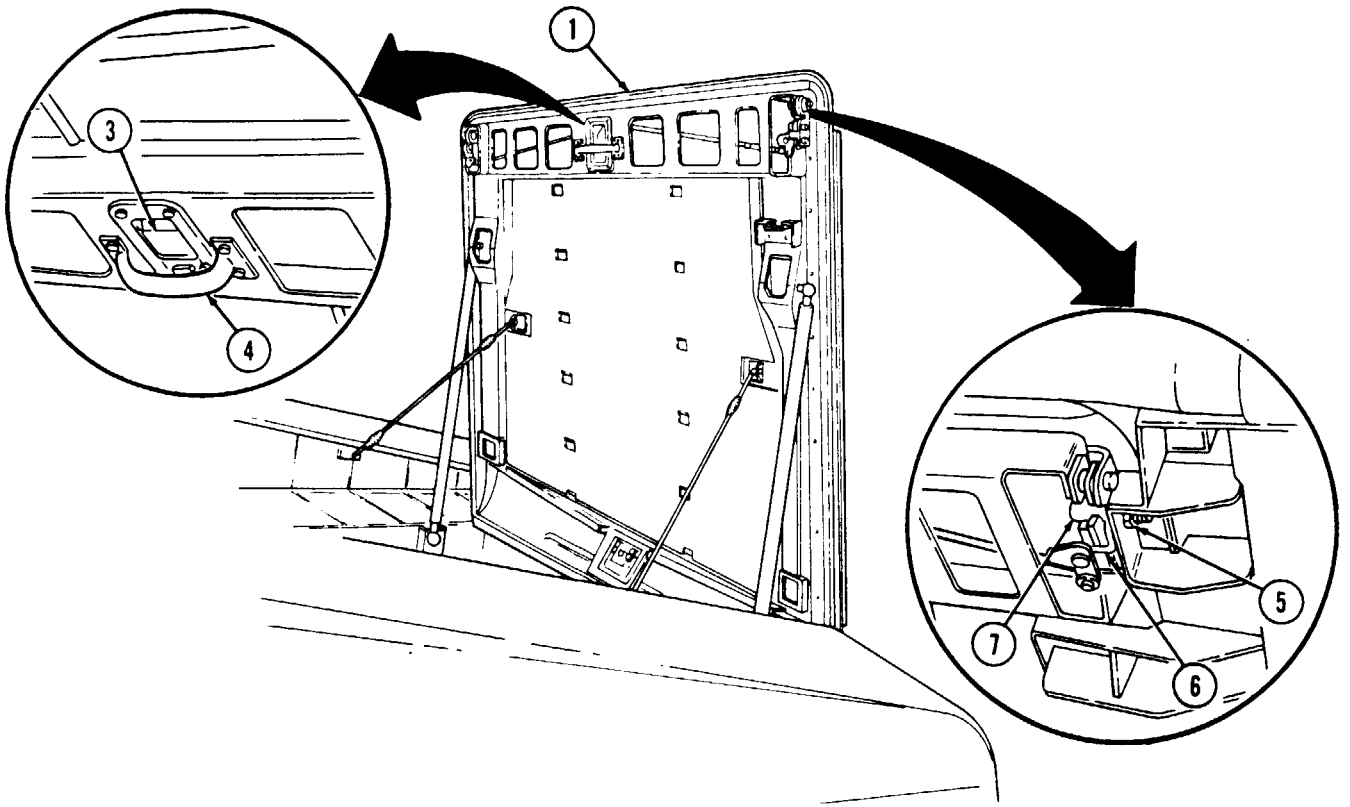
NOTE

It may be necessary to shim front striker pins for proper door alignment and operation.

9. Pull down on handle (4) to ensure cargo door (1) properly seals to cargo shell (12). With striker pins (7) properly adjusted, tighten striker pin mounting nuts (5) to 35-45 lb-ft (47-61 N•m).
10. Release handle latch (3) and push cargo door (1) open.
11. Tighten two nuts (10) on male dovetail (9) to 85-110 lb-in. (10-12 N•m).
12. Lower cargo door (1). Ensure front striker pins (7) are secured and centered in front latches (6).
13. Raise cargo door (1) from rear wire handle (2) and perform steps 3 through 6 of b., Installation.
14. Insert a piece of paper between door seals and door opening. With cargo door closed, seals should offer resistance when pulling out paper. If door seals do not offer resistance, readjust cargo door.



11-13. CARGO SHELL DOOR MAINTENANCE (Cont'd)



FOLLOW-ON TASK: Close cargo shell door (TM 9-2320-280-10).

11-14. CARGO SHELL DOOR WIRE HANDLE LOCK REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

All models except M996, M996A1, M997, M997A1, M997A2, M998, M998A1, M1035, M1035A1, M1035A2, M1037, M1038, M1038A1, M1042, M1097, M1097A1, M1097A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Sealing compound (Appendix C, Item 45)
Two push on nuts (Appendix G, Item 228)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

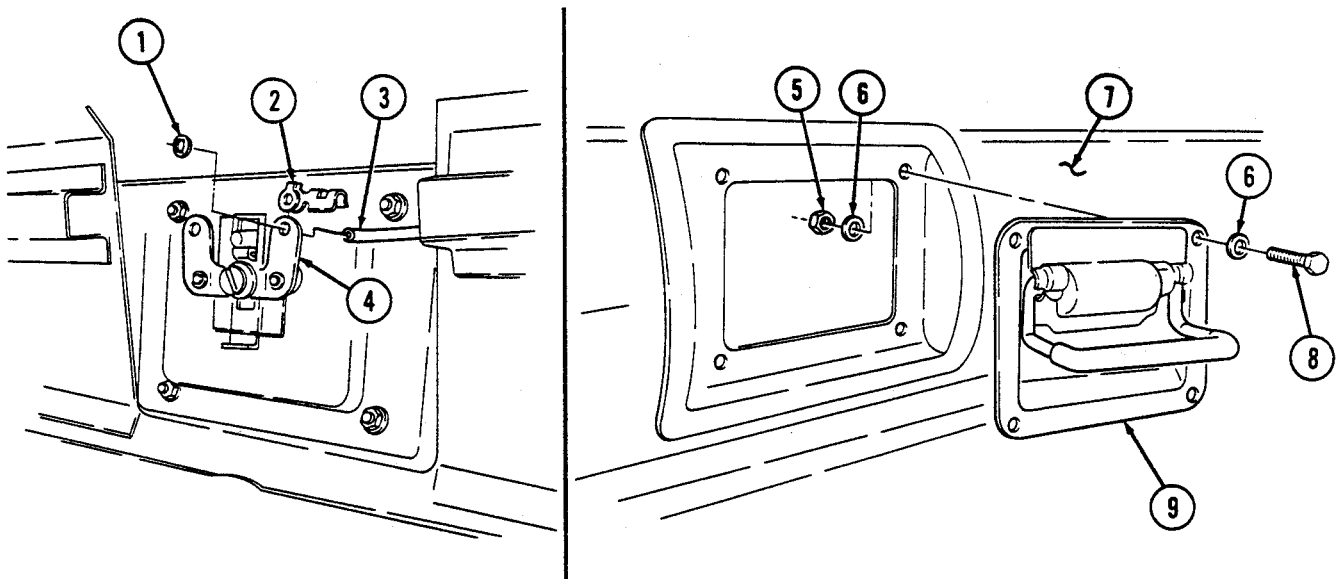
Tailgate lowered (TM 9-2320-280-10).

a. Removal

1. Remove two push on nuts (1), rod end clips (2), and latch rods (3) from wire handle lock pivot arms (4). Discard push on nuts (1).
2. Remove four nuts (5), washers (6), capscrews (8), washers (6), and wire handle lock (9) from cargo door (7).

b. Installation

1. Apply sealing compound to threads of capscrews (8).
2. Install wire handle lock (9) on cargo door (7) with four washers (6), capscrews (8), washers (6), and nuts (5).
3. Install two latch rods (3) on wire handle lock pivot arms (4) with rod end clips (2) and push on nuts (1).



- FOLLOW-ON TASKS:
- Raise and secure tailgate (TM 9-2320-280-10).
 - Check cargo shell door for proper operation (TM 9-2320-280-10).

11-15. CARGO SHELL DOOR GRAB HANDLE REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

All models except M996, M996A1, M997, M997A1, M997A2, M998, M998A1, M1035, M1035A1, M1035A2, M1037, M1038, M1038A1, M1042, M1097, M1097A1, M1097A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Sealing compound (Appendix C, Item 45)
Four lockwashers (Appendix G, Item 173)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

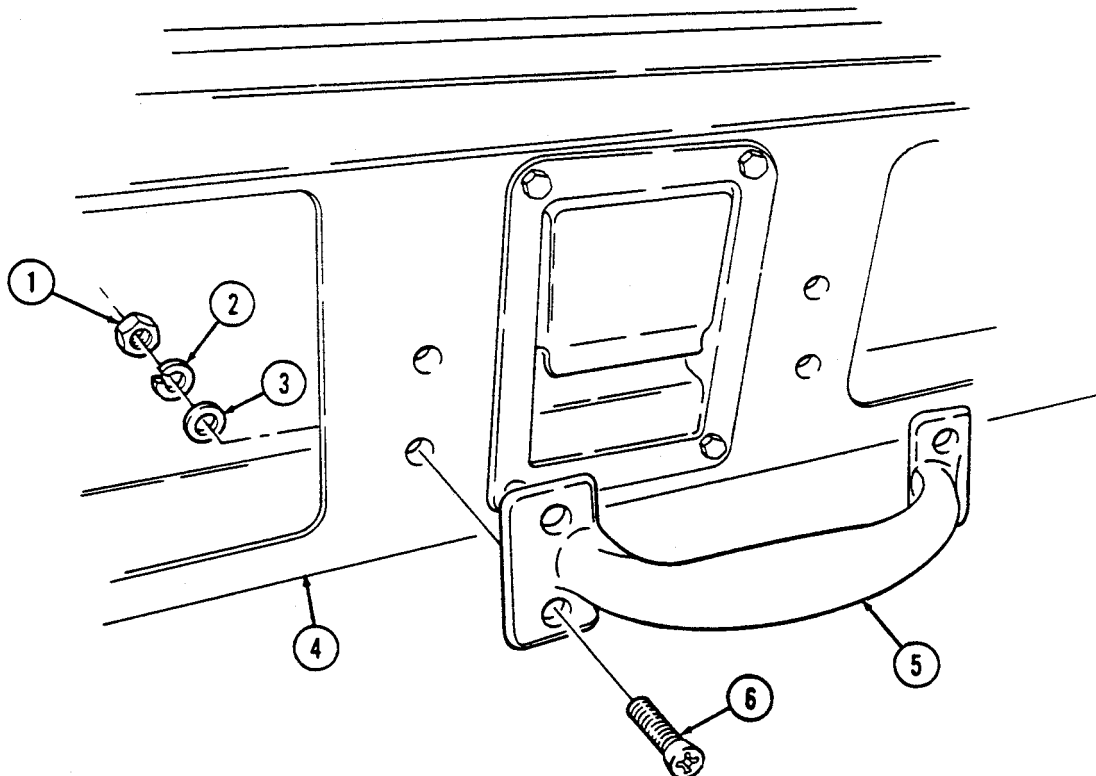
Forward end of cargo shell door raised
(TM 9-2320-280-10).

a. Removal

Remove four nuts (1), lockwashers (2), washers (3), countersunk screws (6), and grab handle (5) from cargo door (4). Discard lockwashers (3).

b. Installation

1. Apply sealing compound to threads of countersunk screw (6).
2. Install grab handle (5) on cargo door (4) with four countersunk screws (6), washers (3), lockwashers (2), and nuts (1).



FOLLOW-ON TASK: Close cargo shell door (TM 9-2320-280-10).

11-16. CARGO SHELL DOOR HANDLE LATCH REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

All models except M996, M996A1, M997, M997A1, M997A2, M998, M998A1, M1035, M1035A1, M1035A2, M1037, M1038, M1038A1, M1042, M1097, M1097A1, M1097A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Two push on nuts (Appendix G, Item 228)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

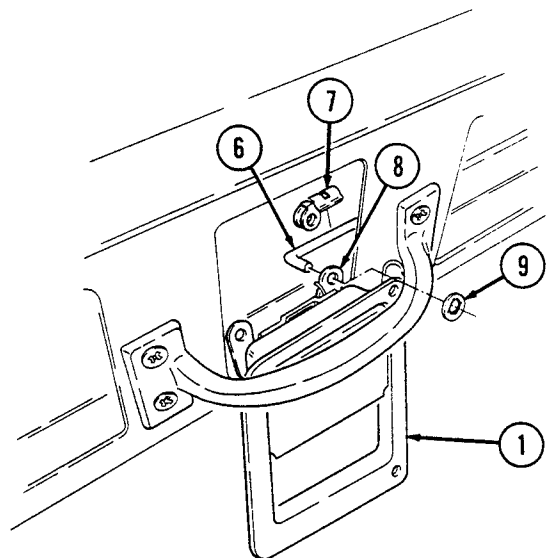
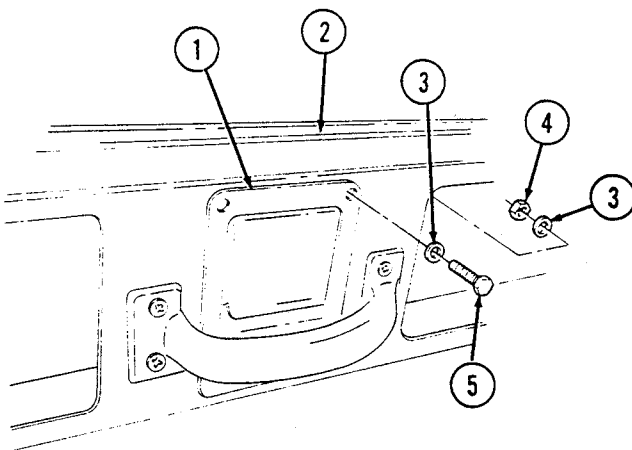
Forward end of cargo shell door raised
(TM 9-2320-280-10).

a. Removal

1. Remove four nuts (4), washers (3), capscrews (5), and washers (3) from handle latch lock (1) and cargo door (2).
2. Pull handle latch (1) out and down until latch rods (6) are visible.
3. Remove two push on nuts (9), rod end clips (7), latch rods (6), and handle latch (1) from pivot arms (8). Discard push on nuts (9).

b. Installation

1. Position handle latch (1) to cargo door (2) until latch rods (6) can be connected to handle latch pivot arms (8) and secure latch rods (6) on pivot arms (8) with two rod end clips (7) and push on nuts (9).
2. Install handle latch (1) on cargo door (2) with four washers (3), capscrews (5), washers (3), and nuts (4).



FOLLOW-ON TASK: Check cargo shell door for proper operation (TM 9-2320-280-10).

11-17. CARGO SHELL DOOR LATCH MAINTENANCE

This task covers:

- a. Removal
- b. Installation
- c. Adjustment

INITIAL SETUP:

Applicable Models

All models except M996, M996A1, M997, M997A1, M997A2, M998, M998A1, M1035, M1035A1, M1035A2, M1037, M1038, M1038A1, M1042, M1097, M1097A1, M1097A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Three lockwashers (Appendix G, Item 134)
Push on nut (Appendix G, Item 228)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

Rear end of cargo shell door raised
(TM 9-2320-280-10).

a. Removal

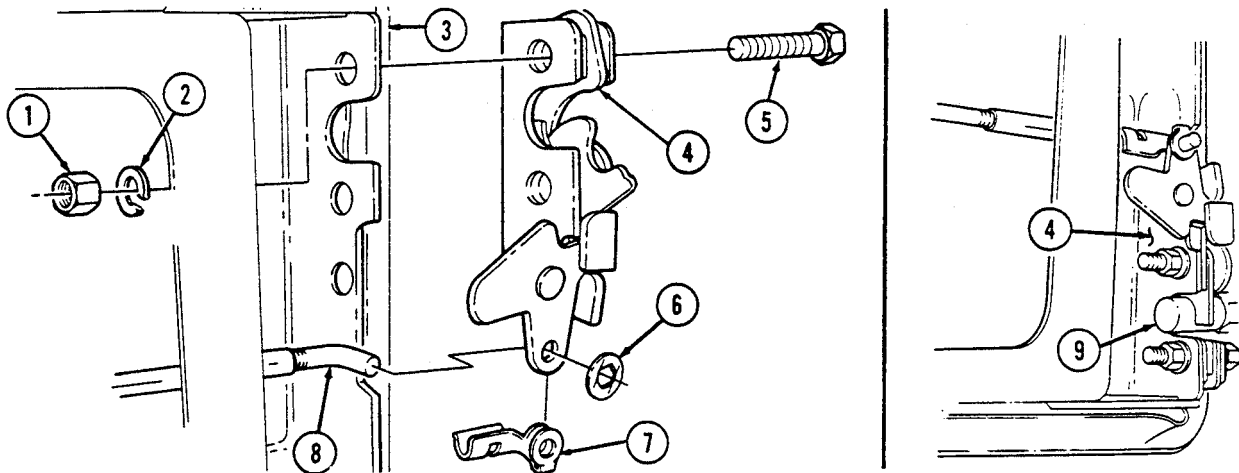
1. Remove push on nut (6), rod end clip (7), and rod (8) from door latch (4). Discard push on nut (6).
2. Remove three nuts (1), lockwashers (2), capscrews (5), and door latch (4) from cargo door (3). Discard lockwashers (2).

b. Installation

Install door latch (4) on cargo door (3) with three capscrews (5), lockwashers (2), and nuts (1). Do not tighten nuts (1) all the way.

c. Adjustment

1. Loosen three nuts (1) from door latch (4) and cargo door (3).
2. Close cargo door (3) ensuring latch (4) is fully engaged on door striker pins (9).
3. Tighten three nuts (1) to 17 lb-ft (23 N·m).
4. Install rod (8) on latch (4) with rod end clip (7) and push on nut (6).



- FOLLOW-ON TASKS:
- Lubricate door latch (TM 9-2320-280-10).
 - Check cargo shell door for proper operation (TM 9-2320-280-10).

11-18. CARGO SHELL DOOR LATCH ROD MAINTENANCE

This task covers:

- | | |
|---|---|
| <ul style="list-style-type: none"> a. Removal b. Installation | <ul style="list-style-type: none"> c. Adjustment |
|---|---|

INITIAL SETUP:

Applicable Models

All models except M996, M996A1, M997, M997A1, M997A2, M998, M998A1, M1035, M1035A1, M1035A2, M1037, M1038, M1038A1, M1042, M1097, M1097A1, M1097A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Two push on nuts (Appendix G, Item 228)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

Forward end of cargo shell door raised (TM 9-2320-280-10).

NOTE

Maintenance procedures for all cargo shell door latch rods are basically the same. This procedure covers the left rear latch rod.

a. Removal

1. Remove push on nut (1), rod end clip (3), and latch rod (4) from pivot arm (2) on wire handle lock (5). Discard push on nut (1).
2. Remove push on nut (7), rod end clip (6), and latch rod (4) from door latch (8). Discard push on nut (7).

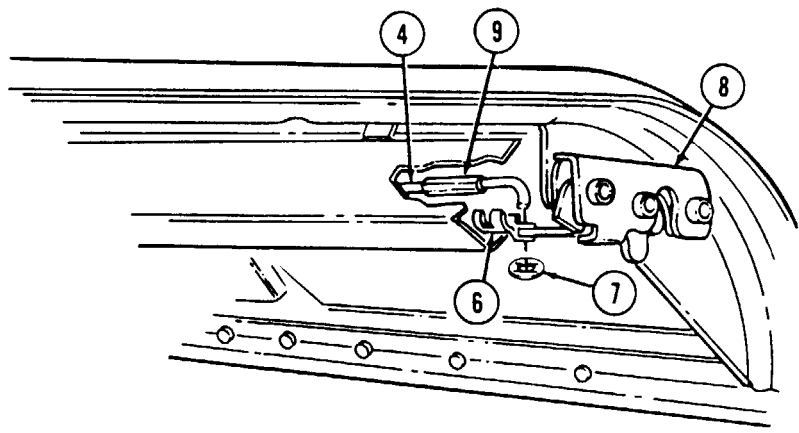
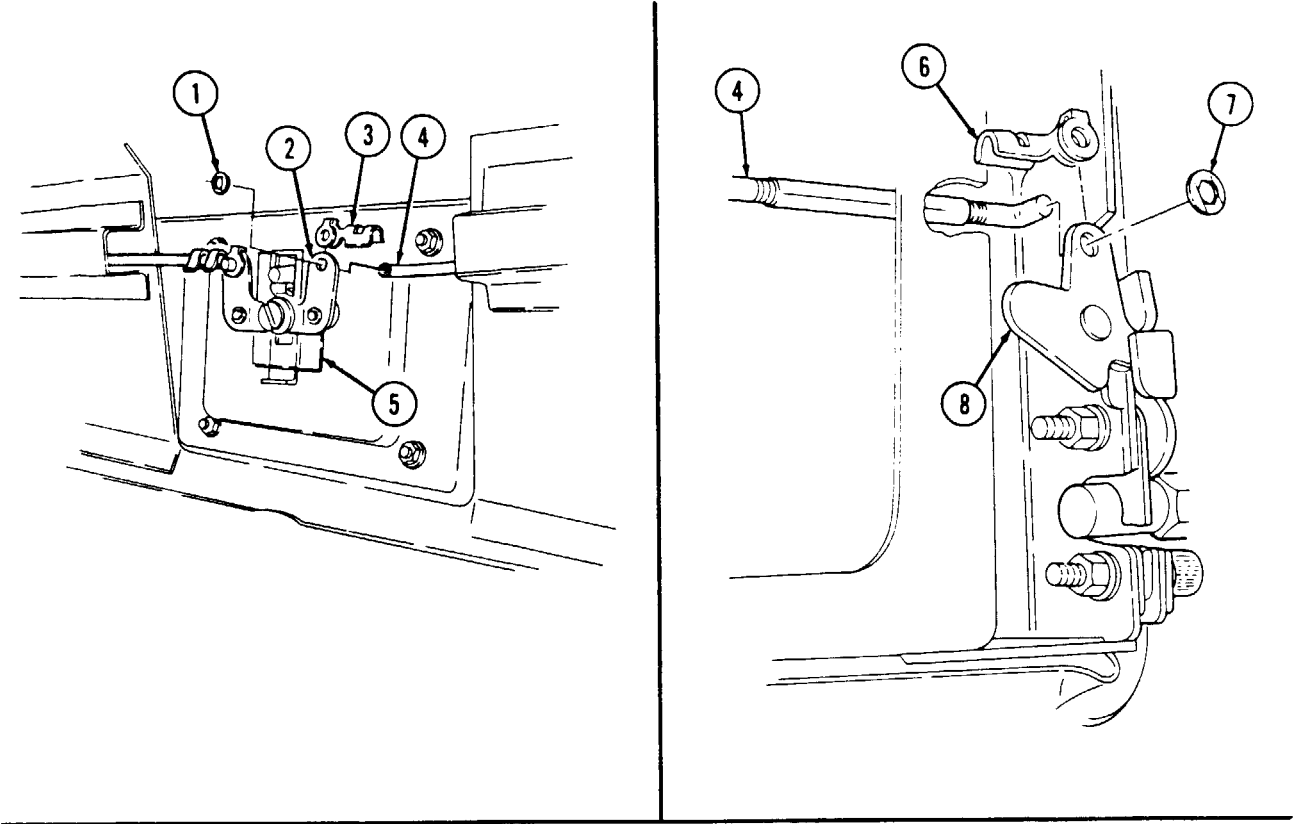
b. Installation

1. Connect latch rod (4) to door latch (8) with rod end clip (6).
2. Connect latch rod (4) to pivot arm (2) on wire handle lock (5) with rod end clip (3) and push on nut (1).
3. Close forward end of cargo door.

c. Adjustment

1. Open rear end of cargo door.
2. Close both rear door latches (8) to check latch action.
3. Gently pull wire handle lock (5) and observe movement of door latches (8). If both door latches (8) unlatch at the same time, install push on nut (7) on latch rod (4), no adjustment is necessary. If door latches (8) do not unlatch at the same time, go to step 4.
4. Remove rod end clip (6) from rod (4) and door latch (8). Rotate rod adjuster (9) in, if door latch (8) unlatches after opposite latch (8), or rotate rod adjuster (9) out, if door latch (8) unlatches before opposite door latch (8).
5. Repeat step 4 until door latches (8) unlatch at the same time.
6. Install latch rod (4) on door latch (8) with rod end clip (6) and push on nut (7).

11-18. CARGO SHELL DOOR LATCH ROD MAINTENANCE (Cont'd)



FOLLOW-ON TASK: Check cargo shell door for proper operation (TM 9-2320-280-10).

11-19. CARGO SHELL DOOR DOVETAIL ASSEMBLY MAINTENANCE

This task covers:

- | | |
|---|---|
| <ul style="list-style-type: none"> a. Removal b. Installation | <ul style="list-style-type: none"> c. Adjustment |
|---|---|

INITIAL SETUP:

Applicable Models

All models except M996, M996A1, M997, M997A1, M997A2, M998, M998A1, M1035, M1035A1, M1035A2, M1037, M 1038, M1038A1, M1042, M1097, M1097A1, M1097A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Two locknuts (Appendix G, Item 70)
Two lockwashers (Appendix G, Item 175)

Manual References

TM 9-2320-280-24P

Equipment Condition

Rear end of cargo shell door raised
(TM 9-2320-280-10).

NOTE

The cargo shell door dovetail assembly is of two-piece construction. The female half is mounted on the cargo door. The male half is mounted on a bracket attached to the left cargo shell. Both halves are adjustable and function as a door alignment device.

a. Removal

1. Remove two capscrews (1), lockwashers (2), washers (3), and female dovetail (4) from cargo door (5). Discard lockwashers (2).
2. Remove two locknuts (6), washers (7), countersunk screws (11), male dovetail (10), and shim (9) from cargo shell bracket (8). Discard locknuts (6).

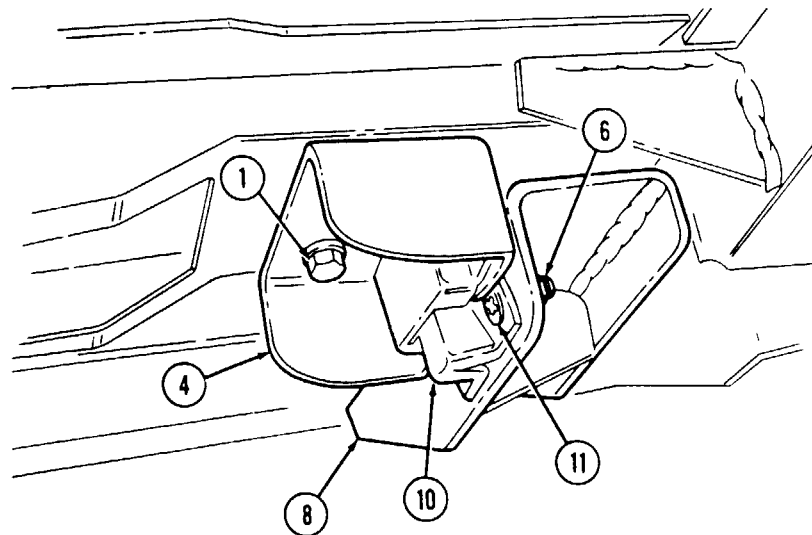
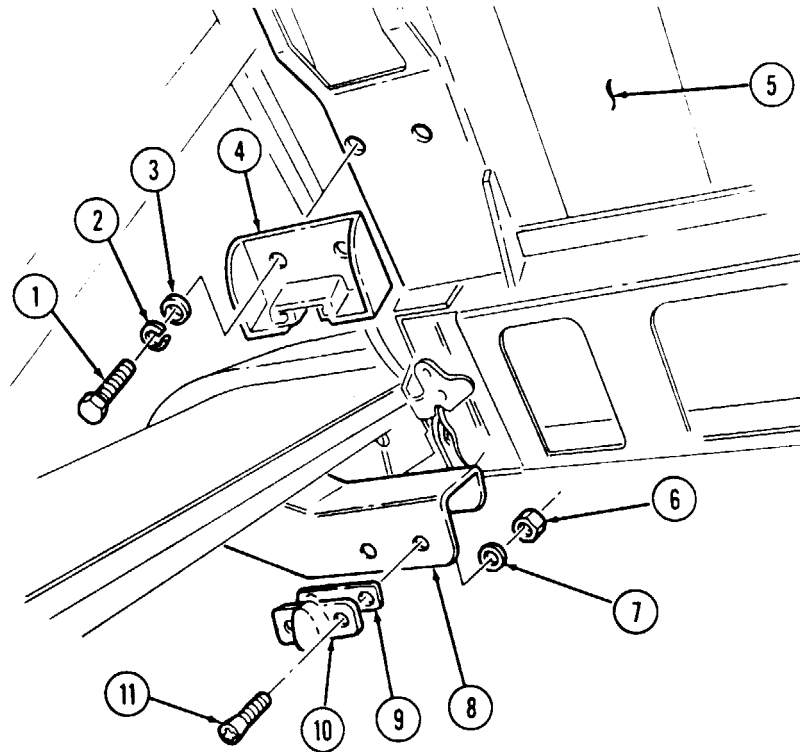
b. Installation

1. Install shim (9) and male dovetail (10) on cargo shell bracket (8) with two countersunk screws (11), washers (7), and locknuts (6). Leave male dovetail (10) loose enough to allow movement from left to right.
2. Install female dovetail (4) on cargo door (5) with two washers (3), lockwashers (2), and capscrews (1). Leave dovetail (4) loose enough to allow movement up and down.
3. Close rear end of cargo door (5).

c. Adjustment

1. Open forward end of cargo door (5).
2. Loosen two capscrews (1) from female dovetail (4) and cargo door (5) until female dovetail (4) will slide up and down.
3. Loosen two countersunk screws (11) and locknuts (6) from male dovetail (10) and cargo shell bracket (8) until male dovetail (10) can be moved from left to right.
4. Gently close cargo door (5) until male dovetail (10) and female dovetail (4) fully seat without interference. Once this condition exists, tighten mounting hardware of dovetails (4) and (10).
5. Open and close cargo door (5) several times to ensure proper dovetail (4) and (10) adjustment.
6. Tighten two capscrews (1) on female dovetail (4) to 10 lb-ft (14 N•m).
7. Tighten two locknuts (6) on male dovetail (10) to 85-100 lb-in. (10-11 N•m).

11-19. CARGO SHELL DOOR DOVETAIL ASSEMBLY MAINTENANCE (Cont'd)



FOLLOW-ON TASK: Close cargo shell door (TM 9-2320-280-10).

11-20. CARGO SHELL DOOR RETENTION CABLE REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

All models except M996, M996A1, M997, M997A1, M997A2, M998, M998A1, M1035, M1035A1, M1035A2, M1037, M1038, M1038A1, M1042, M1097, M1097A1, M1097A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Two locknuts (Appendix G, Item 70)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

Forward end of cargo shell door raised
(TM 9-2320-280-10).

a. Removal

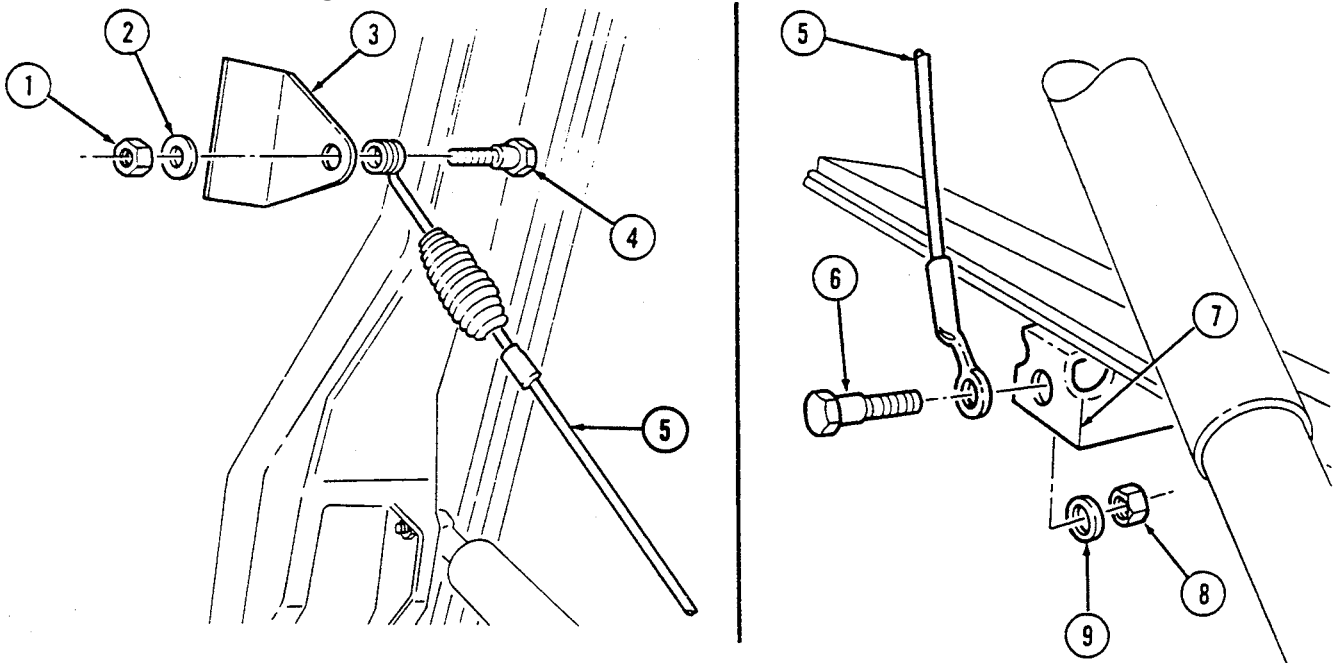
NOTE

It will be necessary to lower cargo shell door slightly to relieve cable tension during step 1.

1. Remove locknut (1), washer (2), shoulder bolt (4), and spring end of cable (5) from cargo door bracket (3). Discard locknut (1).
2. Remove locknut (8), washer (9), shoulder bolt (6), and cable (5) from left cargo shell bracket (7). Discard locknut (8).

b. Installation

1. Install cable (5) on cargo shell bracket (7) with shoulder bolt (6), washer (9), and locknut (8). Tighten locknut (8) to 85-110 lb-in. (10-12 N·m).
2. Install spring end of cable (5) on cargo door bracket (3) with shoulder bolt (4), washer (2), and locknut (1). Tighten locknut (1) to 85-110 lb-in. (10-12 N·m).



FOLLOW-ON TASK: Close cargo shell door (TM 9-2320-280-10).

11-21. CARGO SHELL DOOR GAS SPRING MAINTENANCE

This task covers:

- | | |
|----------------|-----------------|
| a. Rotating | d. Assembly |
| b. Removal | e. Installation |
| c. Disassembly | |

INITIAL SETUP:

Applicable Models

All models except M996, M996A1, M997, M997A1, M997A2, M998, M998A1, M1035, M1035A1, M1035A2, M1037, M1038, M1038A1, M1042, M1097, M1097A1, M1097A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Grease (Appendix C, Item 22)
Two locknuts (Appendix G, Item 70)
Two retaining rings (Appendix G, Item 234)
Two assembled washer screws
(Appendix G, Item 279)
Two locknuts (Appendix G, Item 79)

Personnel Required

One mechanic
One assistant

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

Rear end of cargo shell door raised
(TM 9-2320-280-10).

General Safety Instructions

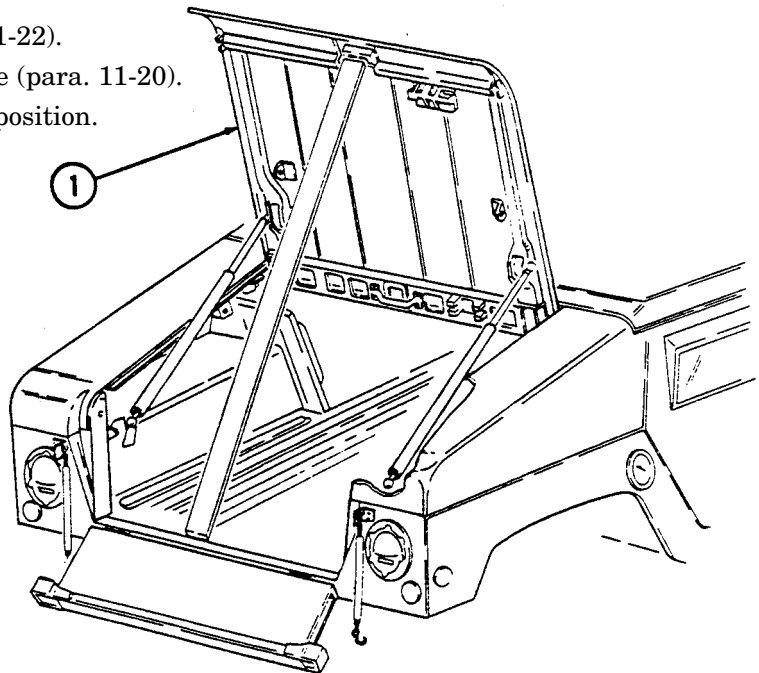
- Do not attempt to remove gas cylinders from spring rods.
- One assistant will be required to hold the cargo door open when either one or both gas springs are being removed or installed.

a. Rotating

NOTE

- Prior to starting any maintenance, ensure forward end of cargo shell door is locked.
- A 2 x 4 x 79.25 inch long board can be used to support cargo door in the open position.

1. Remove cargo shell door strap (para. 11-22).
2. Remove cargo shell door retention cable (para. 11-20).
3. Secure rear cargo door (1) in full open position.



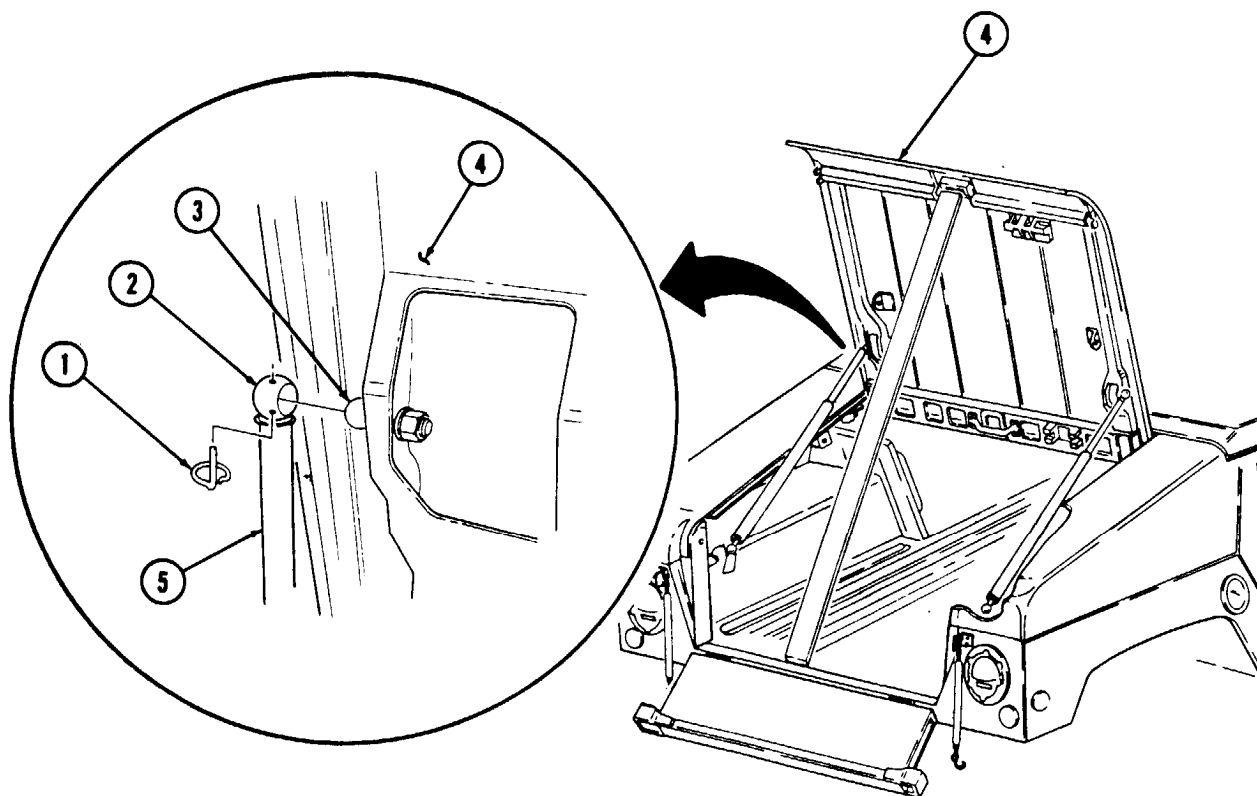
11-21. CARGO SHELL DOOR GAS SPRING MAINTENANCE (Cont'd)

4. Remove four retaining rings (1) from rod sockets (2) on two gas spring assemblies (5).

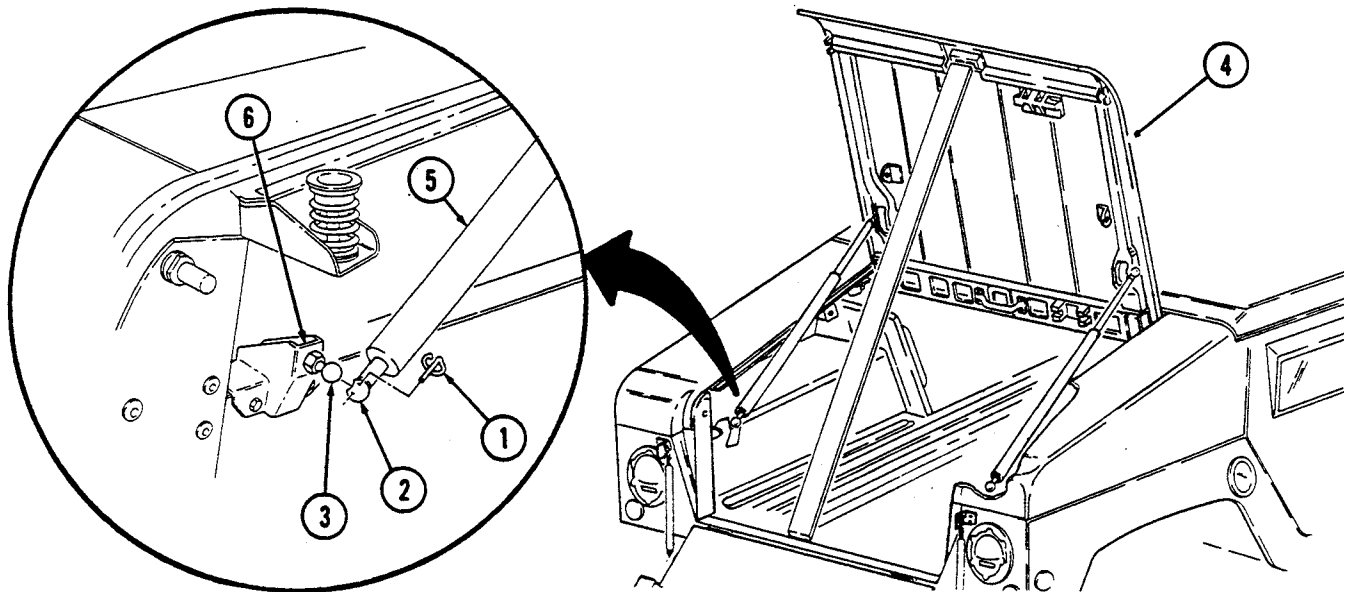
WARNING

Do not attempt to remove gas spring assemblies from ball studs until cargo door is supported in full open position. Failure to do so may result in injury to personnel or damage to equipment.

5. Remove left and right gas spring assemblies (5) from ball studs (3) on cargo door (4) and body bracket (6).
6. Invert left gas spring assembly (5) 180 degrees and position to right side of vehicle.
7. Invert right gas spring assembly (5) 180 degrees and position to left side of vehicle.
8. Install left and right gas spring assemblies (5) over ball studs (3) on cargo door (4) and body brackets (6).
9. Install four retaining rings (1) in rod sockets (2) on two gas springs (5).
10. Remove cargo door support.
11. Install cargo shell retention cable (para. 11-20).
12. Install cargo shell door strap (pars.. 11-22).
13. Check operation of cargo shell door (TM 9-2320-280-10).



11-21. CARGO SHELL DOOR GAS SPRING MAINTENANCE (Cont'd)

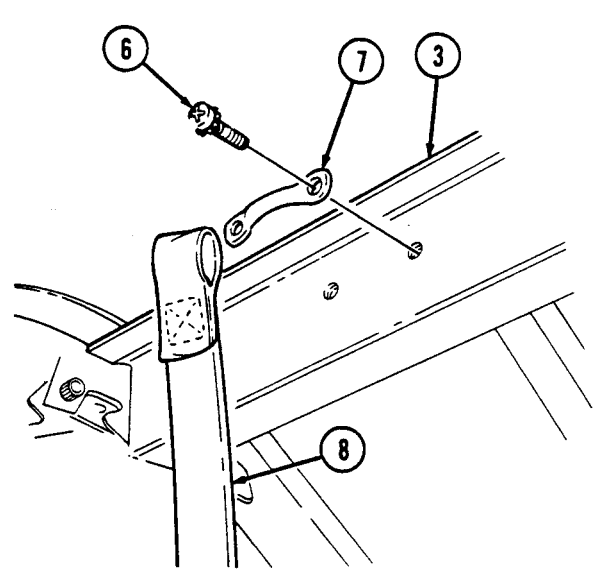
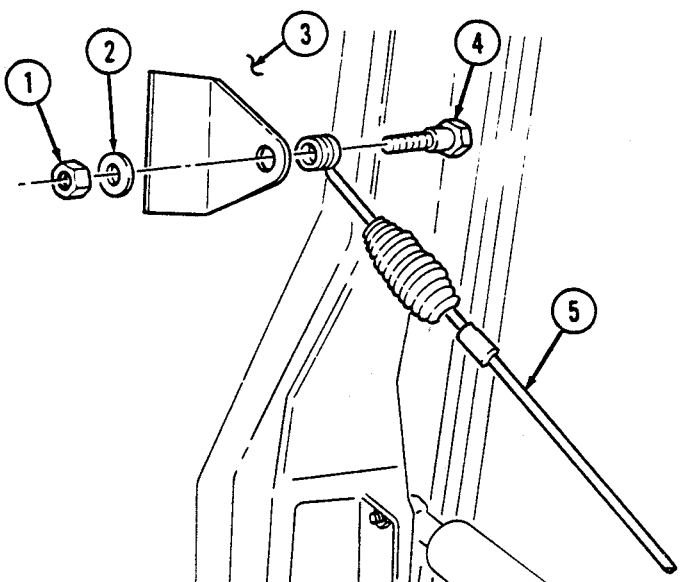


WARNING

One assistant will be required to hold the cargo door open when either one or both gas springs are being removed or installed. Failure to do so may result in injury to personnel or damage to equipment.

b. Removal

1. Remove two locknuts (1), washers (2), shoulder bolts (4), and retention cables (5) from cargo door (3). Discard locknuts (1).
2. Remove two assembled washer screws (6), footman loop (7), and cargo door strap (8) from cargo door (3). Discard assembled washer screws (6).



11-21. CARGO SHELL DOOR GAS SPRING MAINTENANCE (Cont'd)

3. Remove two locknuts (1), washers (2), and gas spring assembly (4) from cargo door (3) and body bracket (5). Discard locknuts (1).

c. Disassembly

1. Remove inner spring tube (6) from outer spring tube (13).
2. Remove two retaining rings (8) from ball studs (11) and rod sockets (12). Remove two ball studs (11) from rod sockets (12). Discard retaining rings (8).
3. Remove two clamps (10) from bushings (9) and spring rods (7) and (14). Pull spring rods (7) and (14) out of tubes (6) and (13) 1-inch (2.54 cm), and remove two bushings (9).

WARNING

Do not attempt to remove gas cylinders from inner spring rod or outer spring rod. High internal pressure will cause cylinder to explode, resulting in injury to personnel.

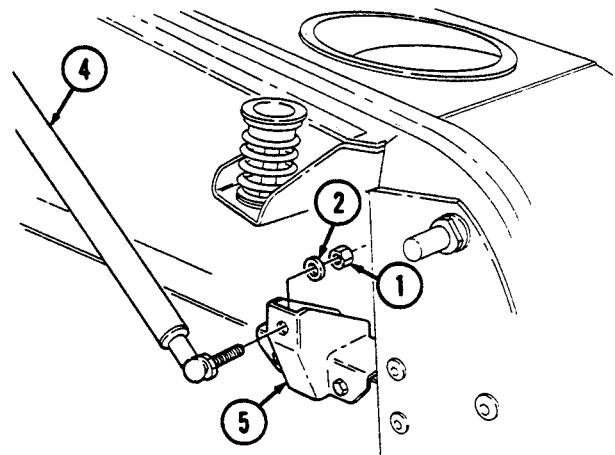
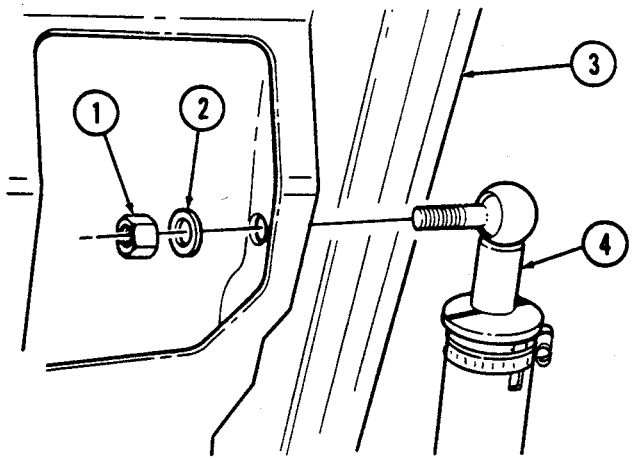
4. Pull inner spring rod (7) from inner tube (6) and outer spring rod (14) from outer tube (13).

d. Assembly

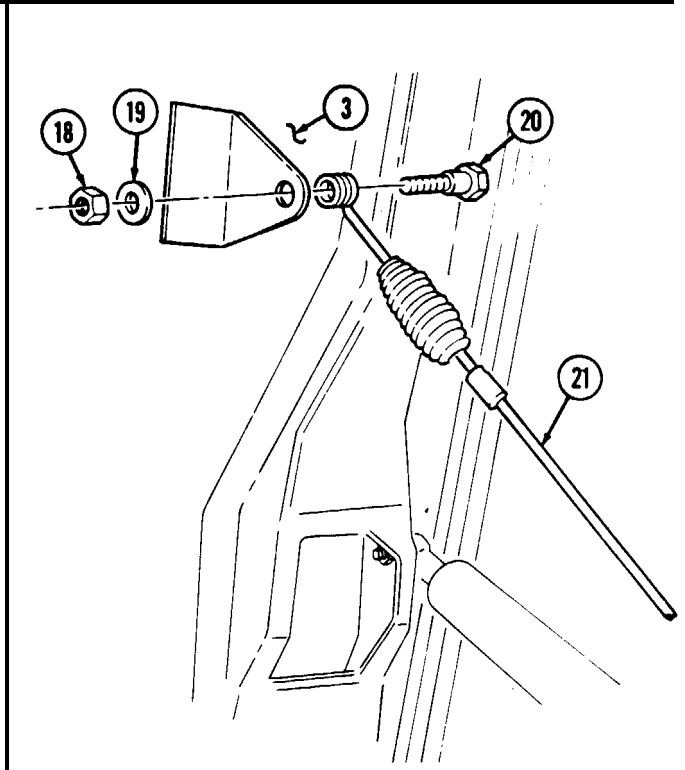
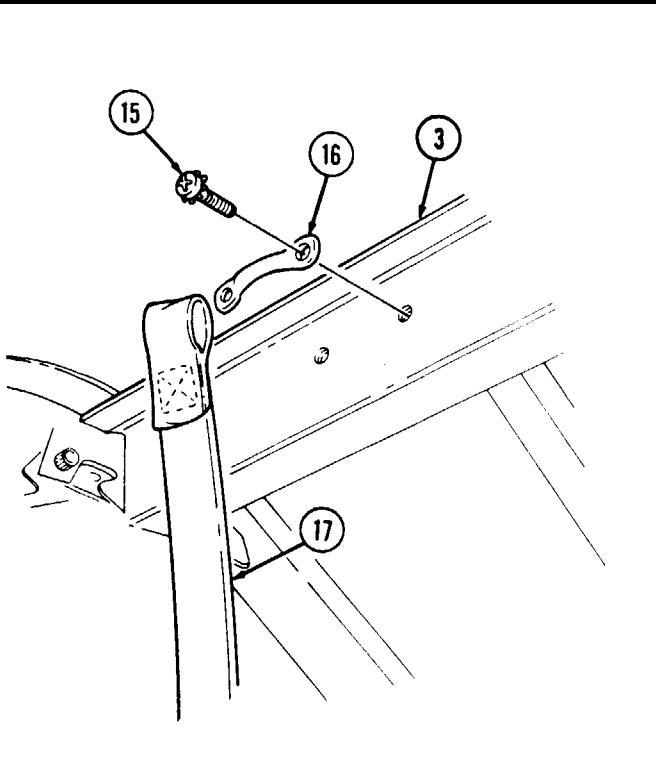
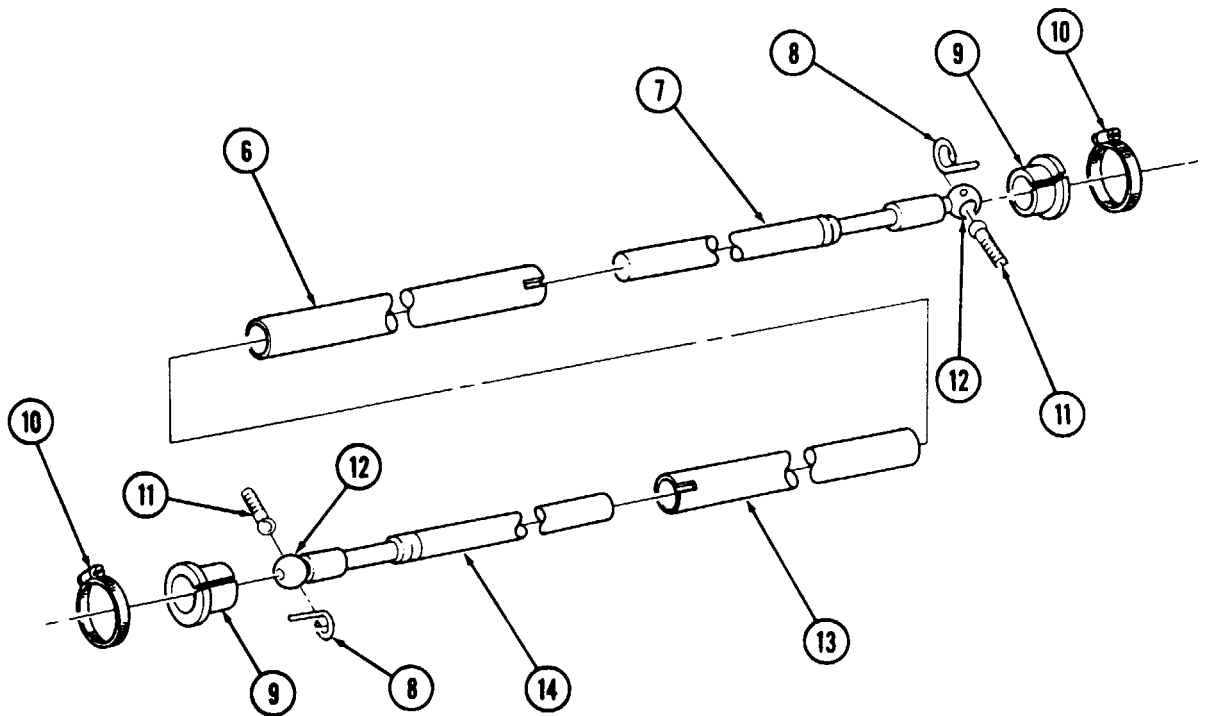
1. Install longer outer spring rod (14) on outer tube (13), leaving about 1-inch (2.54 cm) of the small diameter portion of the rod (14) exposed to install bushing (9).
2. Install bushing (9) on outer spring rod (14). Ensure bushing (9) is fully seated on outer tube (13) and rod socket (12) end is fully seated on bushing (9). Install and tighten clamp (10).
3. Place grease in rod end socket (12), and install ball stud (11) on socket (12) with retaining ring (8).
4. Repeat steps 1-3 for inner tube (6) and inner spring rod (7).
5. Install inner tube (6) into outer tube (13).

e. Installation

1. Install gas spring (4) on body bracket (5) and cargo door (3) with two washers (2) and locknuts (1). Tighten locknuts (1) to 15-20 lb-ft (20-27 N•m).
2. Install footman loop (16) and cargo door strap (17) on cargo door (3) with two assembled washer screws (15).
3. Install two retention cables (21) on cargo door (3) with two shoulder bolts (20), washers (19), and locknuts (18). Tighten locknuts (18) to 85-110 lb-in. (10-12 N•m).



11-21. CARGO SHELL DOOR GAS SPRING MAINTENANCE (Cont'd)



FOLLOW-ON TASK: Check cargo shell door for proper operation (TM 9-2320-280-10).

11-22. CARGO SHELL DOOR STRAP REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

All models except M996, M996A1, M997, M997A1, M997A2, M998, M998A1, M1035, M1035A1, M1035A2, M1037, M1038, M1038A1, M1042, M1097, M1097A1, M1097A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Locknut (Appendix G, Item 128)
Two assembled washer screws
(Appendix G, Item 279)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

Rear end of cargo shell door raised
(TM 9-2320-280-10).

a. Removal

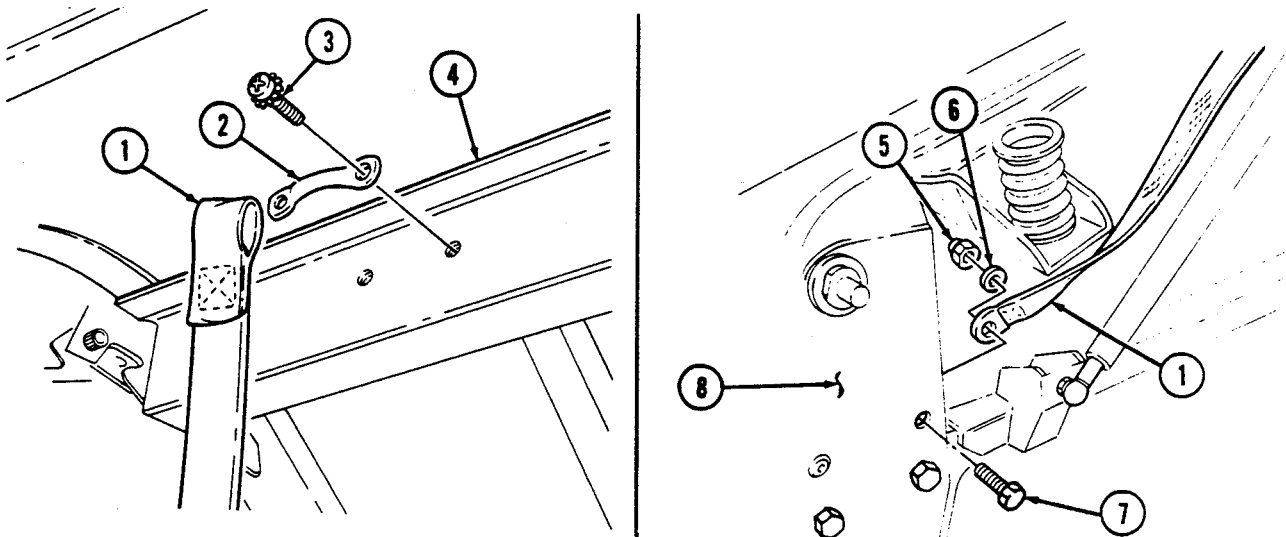
1. Remove two assembled washer screws (3), footman loop (2), and strap (1) from cargo door (4). Discard assembled washer screws (3).
2. Remove locknut (5), washer (6), capscrew (7), and strap (1) from left striker mounting plate (8). Discard locknut (5).

b. Installation

NOTE

To assist closing cargo shell door, a grab loop may be added. Refer to appendix D, figure D-83.

1. Install strap (1) on left striker mounting plate (8) with capscrew (7), washer (6), and locknut (5). Tighten locknut (5) to 25-30 lb-ft (34-41 N•m).
2. Install strap (1) and footman loop (2) on cargo door (4) with two assembled washer screws (3).



FOLLOW-ON TASK: Close cargo shell door (TM 9-2320-280-10).

11-23. CARGO SHELL DOOR SEAL PROTECTOR REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

All models except M996, M996A1, M997, M997A1, M997A2, M998, M998A1, M1035, M1035A1, M1035A2, M1037, M1038, M1038A1, M1042, M1097, M1097A1, M1097A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Thirteen locknuts (Appendix G, Item 70)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

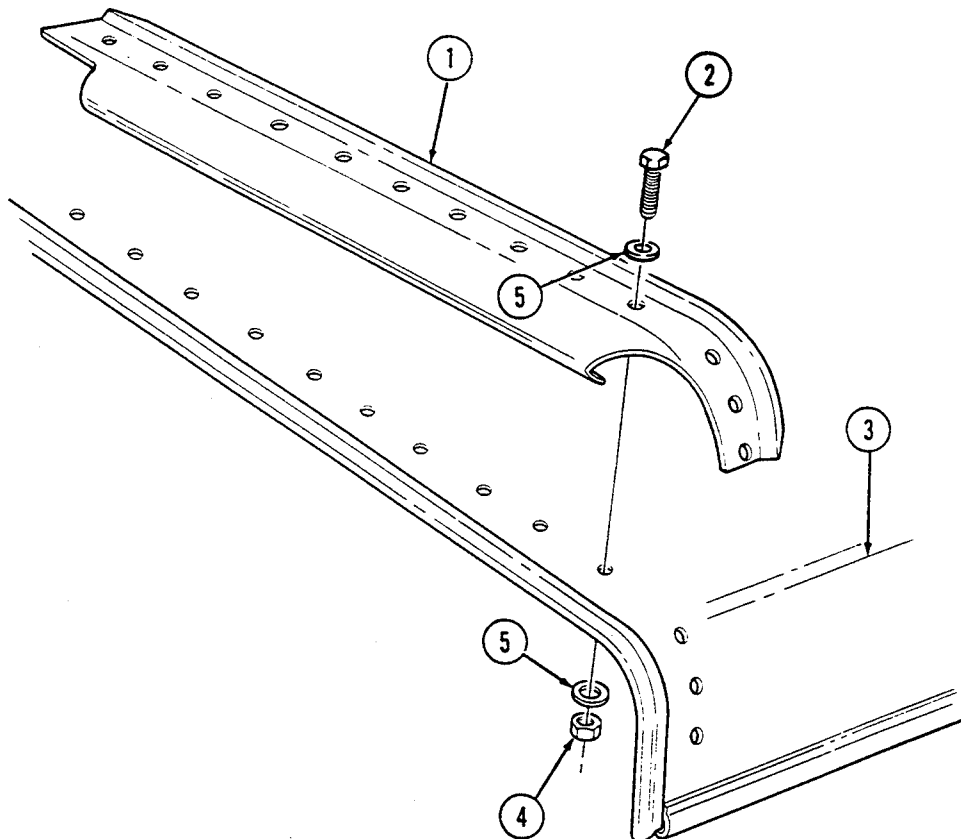
Rear end of cargo shell door raised
(TM 9-2320-280-10).

a. Removal

Remove thirteen locknuts (4), washers (5), capscrews (2), washers (5), and seal protector (1) from cargo door (3). Discard locknuts (4).

b. Installation

Install seal protector (1) on cargo door (3) with thirteen washers (5), capscrews (2), washers (5), and locknuts (4). Tighten locknuts (4) to 85-100 lb-in. (10-12 N·m).



FOLLOW-ON TASK: Close cargo shell door (TM 9-2320-280-10).

11-24. CARGO SHELL DOOR SEAL REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

All models except M998, M998A1, M997, M997A1, M997A2, M998, M998A1, M1035, M1035A1, M1035A2, M1037, M1038, M1038A1, M1042, M1097, M1097A1, M1097A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Sealing compound (Appendix C, Item 40)

Manual References

TM 9-2320-280-24P

Equipment Condition

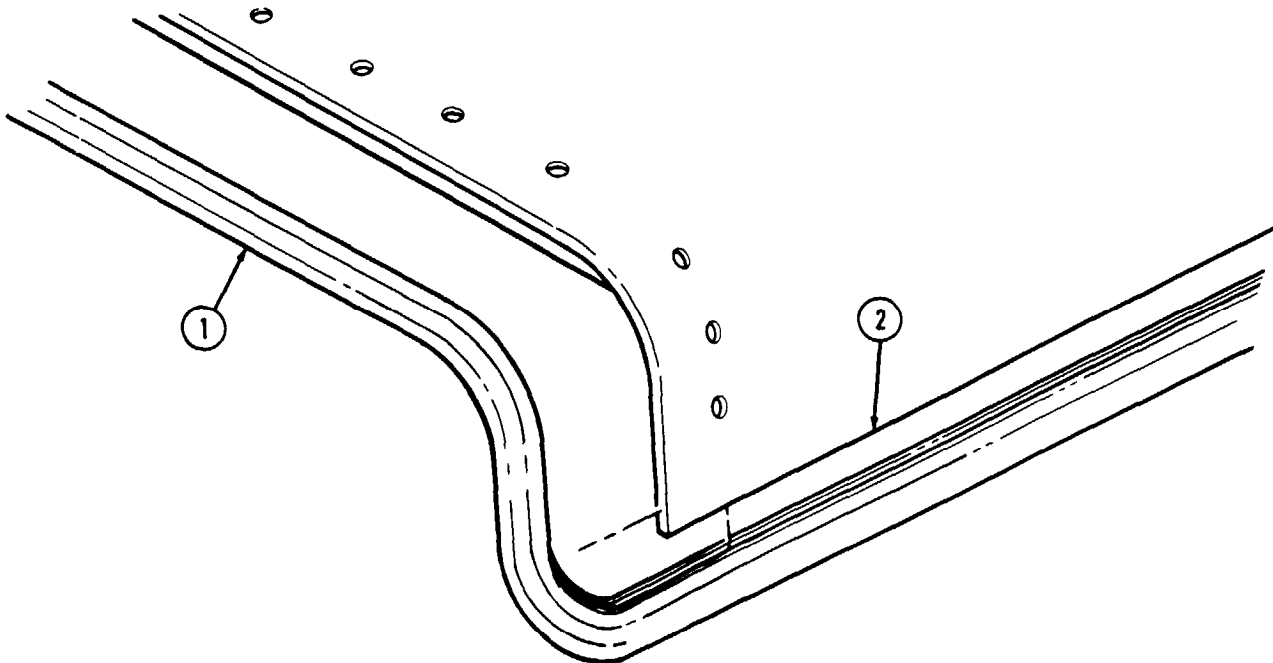
Cargo shell door seal protector removed (para. 11-23).

a. Removal

Remove seal (1) from cargo door (2). Clean edge around cargo door (2) to remove dirt, corrosion, or *remaining* adhesive.

b. Installation

1. Install seal (1) on cargo door (2), making sure seal (1) is fully seated.
2. Detach seal (1) at rear edge of cargo door (2) only, and apply sealing compound in seal (1) channel the entire length of rear edge of cargo door (2).
3. Install seal (1) on rear edge of cargo door (2), making sure seal (1) is fully seated.



FOLLOW-ON TASK: Install cargo shell door seal protector (para. 11-23).

11-25. CARGO SHELL DOOR FRONT STRIKER REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

All models except M996, M996A1, M997, M997A1, M997A2, M998, M998A1, M1035, M1035A1, M1035A2, M1037, M1038, M1038A1, M1042, M1097, M1097A1, M1097A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Locknut (Appendix G, Item 105)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

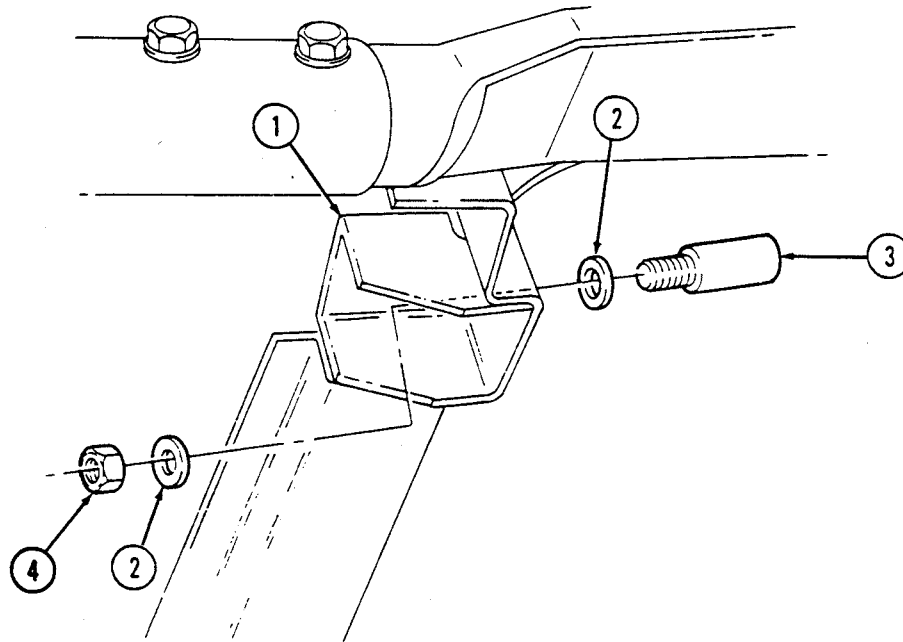
Forward end of cargo shell door raised
(TM 9-2320-280-10).

a. Removal

Remove locknut (4), washer (2), front striker (3), and washer (2) from body bracket (1). Discard locknut (4).

b. Installation

Install washer (2) and front striker (3) on body bracket (1) with washer (2) and locknut (4). Tighten locknut (4) to 35-45 lb-ft (47-61 N•m).



FOLLOW-ON TASK: Adjust cargo shell door (para. 11-13).

11-26. CARGO SHELL DOOR REAR STRIKER REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

All models except M996, M996A1, M997, M997A1, M997A2, M998, M998A1, M1035, M1035A1, M1035A2, M1037, M1038, M1038A1, M1042, M1097, M1097A1, M1097A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Locknut (Appendix G, Item 105)

Personnel Required

One mechanic
One assistant

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

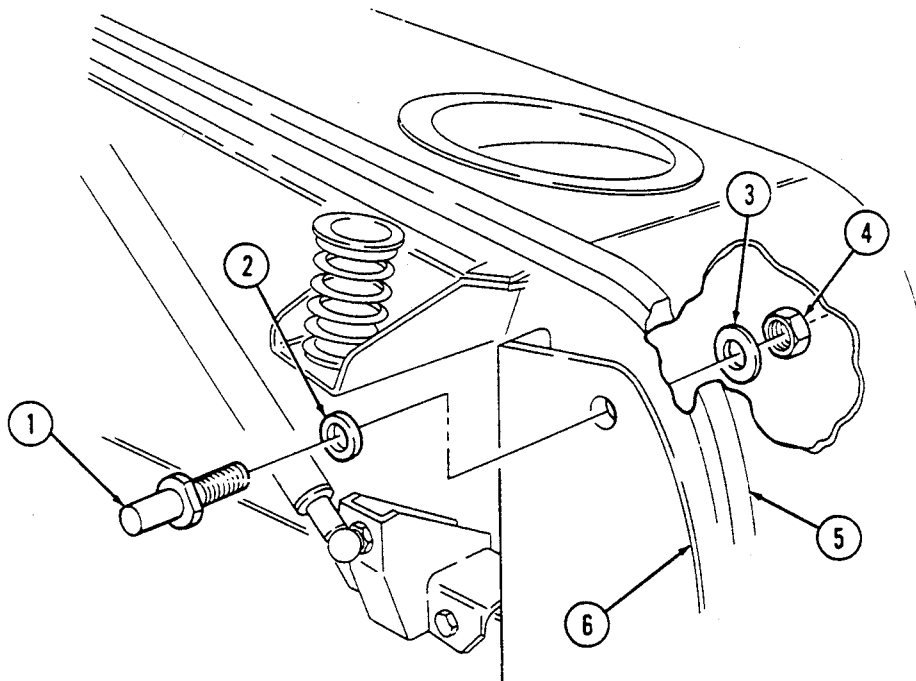
- Tailgate lowered (TM 9-2320-280-10).
- Rear end of cargo shell door raised (TM 9-2320-280-10).

a. Removal

Remove locknut (4), washer (3), striker (1), and spacer (2) from striker plate (6) and wheelhouse (5). Discard locknut (4).

b. Installation

Install spacer (2) and striker (1) on striker plate (6) and wheelhouse (5) with washer (3) and locknut (4). Tighten locknut (4) to 190-210 lb-ft (258-285 N·m).



- FOLLOW-ON TASKS:
- Raise and secure tailgate (TM 9-2320-280-10).
 - Close cargo shell door (TM 9-2320-280-10).

11-27. CARGO SHELL DOOR REAR STRIKER MOUNTING PLATE REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

All models except M996, M996A1, M997, M997A1, M997A2 M998, M998A1, M1035, M1035A1, M1035A2, M1037, M1038, M1038A1, M1042, M1097, M1097A1, M1097A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Six locknuts (Appendix G, Item 128)

Personnel Required

One mechanic
One assistant

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

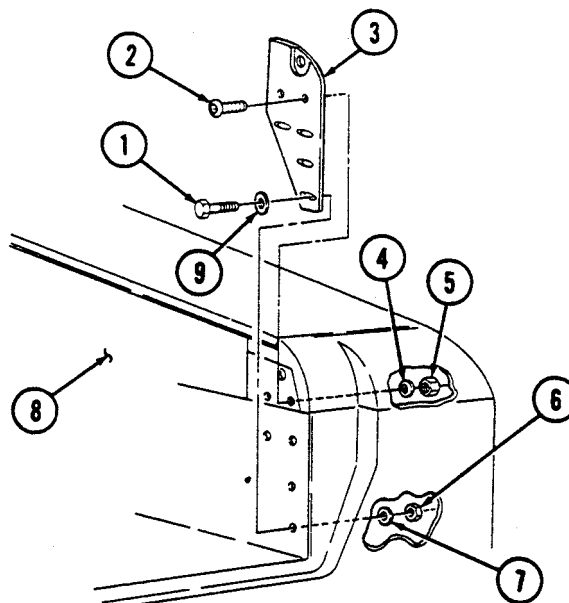
- Rear striker removed (para. 11-26).
- Cargo shell door strap removed (left side only) (para. 11-22).

a. Removal

1. Remove locknut (5), washer (4), and socket head screw (2) from striker mounting plate (3) and wheelhouse (8). Discard locknut (5).
2. Remove five locknuts (6), washers (7), capscrews (1), washers (9), and striker mounting plate (3) from wheelhouse (8). Discard locknuts (6).

b. Installation

1. Install striker mounting plate (3) on wheelhouse (8) with five washers (9), capscrews (1), washers (7), and locknuts (6).
2. Secure striker mounting plate (3) to wheelhouse (8) with socket head screw (2), washer (4), and locknut (5). Tighten locknuts (5) and (6) to 25-30 lb-ft (34-41 N•m).



- FOLLOW-ON TASKS:
- Install cargo shell door strap (left side only) (para. 11-22).
 - Install rear striker (para. 11-26).

11-28. CARGO SHELL DOOR DOVETAIL SPRING REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

All models except M996, M996A1, M997, M997A1, M997A2, M998, M998A1, M1035, M1035A1, M1035A2, M1037, M1038, M1038A1, M1042, M1097, M1097A1, M1097A2

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

- Rear end of cargo shell door raised (TM 9-2320-280-10).
- Tailgate lowered (TM 9-2320-280-10).

Materials/Parts

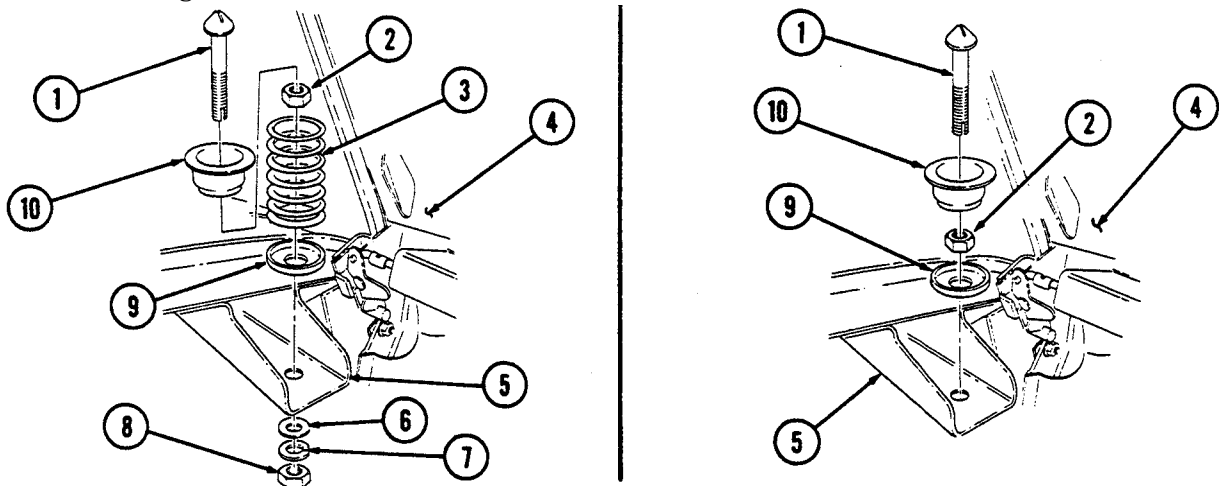
Two locknuts (Appendix G, Item 101)
Lockwasher (Appendix G, Item 178)

a. Removal

Remove locknut (8), lockwasher (7), washer (6), cup (9), spring (3), locknut (2), retainer (10), and head bolt (1) from cargo shell dovetail (5). Discard locknuts (2) and (8) and lockwasher (7).

b. Installation

1. Install retainer (10) and locknut (2) on head bolt (1) and position locknut (2) to end of threads on head bolt (1).
2. Install cup (9) and head bolt (1) on dovetail (5).
3. Lower cargo door.
4. Hold locknut (2) and adjust head bolt (1) up until head bolt (1) touches bottom of cargo door (4).
5. Raise cargo door.
6. Remove head bolt (1) from dovetail (5).
7. Install spring (3), cup (9), and head bolt (1) on dovetail (5) with washer (6), lockwasher (7), and locknut (8). Tighten locknut (8) to 55 lb-ft (75 N•m).



- FOLLOW-ON TASKS:**
- Close cargo shell door (TM 9-2320-280-10).
 - Raise and secure tailgate (TM 9-2320-280-10).

11-29. CARGO SHELL DOOR GAS SPRING MOUNTING BRACKET REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

All models except M996, M996A1, M997, M997A1, M997A2, M998, M998A1, M1035, M1035A1, M1035A2, M1037, M1038, M1038A1, M1042, M1097, M1097A1, M1097A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Tape (Appendix C, Item 50)
Four locknuts (Appendix G, Item 70)

Personnel Required

One mechanic
One assistant

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

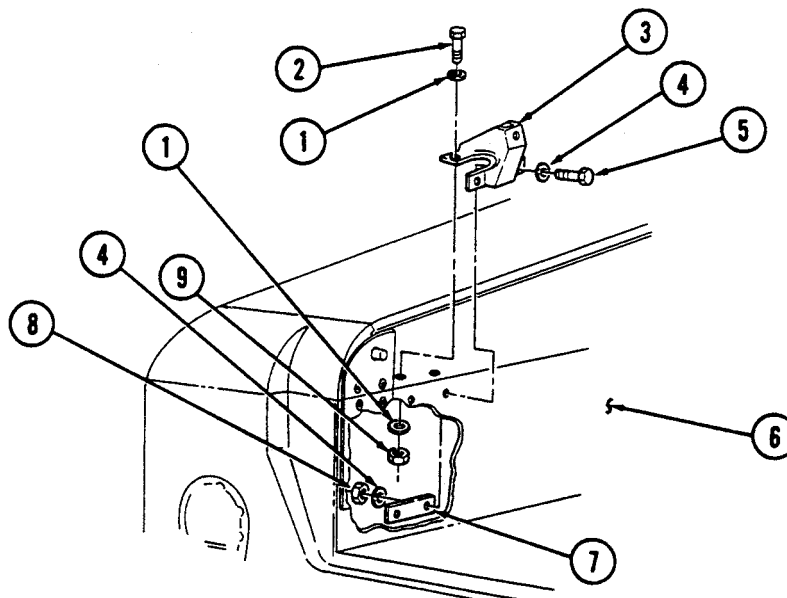
- Tailgate lowered (TM 9-2320-280-10).
- Gas spring removed (para. 11-21).

a. Removal

1. Remove two locknuts (9), washers (1), capscrews (2), and washers (1) from bracket (3) and wheelhouse (6). Discard locknuts (9).
2. Remove two locknuts (8), washers (4), backing plate (7), capscrews (5), washers (4), and bracket (3) from wheelhouse (6). Discard locknuts (8). Remove tape from bracket (3) and discard tape.

b. Installation

1. Apply tape to bracket (3) mounting surfaces. Install bracket (3) on wheelhouse (6) with two washers (4), capscrews (5), backing plate (7), washers (4), and locknuts (8). Tighten locknuts (8) to 8 lb-ft (11 N•m).
2. Secure bracket (3) to wheelhouse (6) with two washers (1), capscrews (2), washers (1), and locknuts (9). Tighten locknuts (9) to 8 lb-ft (11 N•m).



- FOLLOW-ON TASKS:
- Install gas spring (para. 11-21).
 - Raise and secure tailgate (TM 9-2320-280-10).

11-30. CARGO SHELL DOOR LINER REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M966, M966A1, M1025, M1025A1, M1025A2, M1026, M1026A1, M1036

Personnel Required

One mechanic
One assistant

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Materials/Parts

Twelve spring tension fasteners
(Appendix G, Item 30)

Equipment Condition

Rear end of cargo shell door raised
(TM 9-2320-280-10).

a. Removal

1. Remove ten screws (6), washers (5), clips (4), and two retainers (7) from cargo shell door (1).
2. Remove twelve spring tension fasteners (8) from liner (3) and door (1). Discard spring tension fasteners (8).
3. Remove liner (3) and three sound dampeners (2) from door (1).
4. Clean cargo door (1) to remove adhesive.

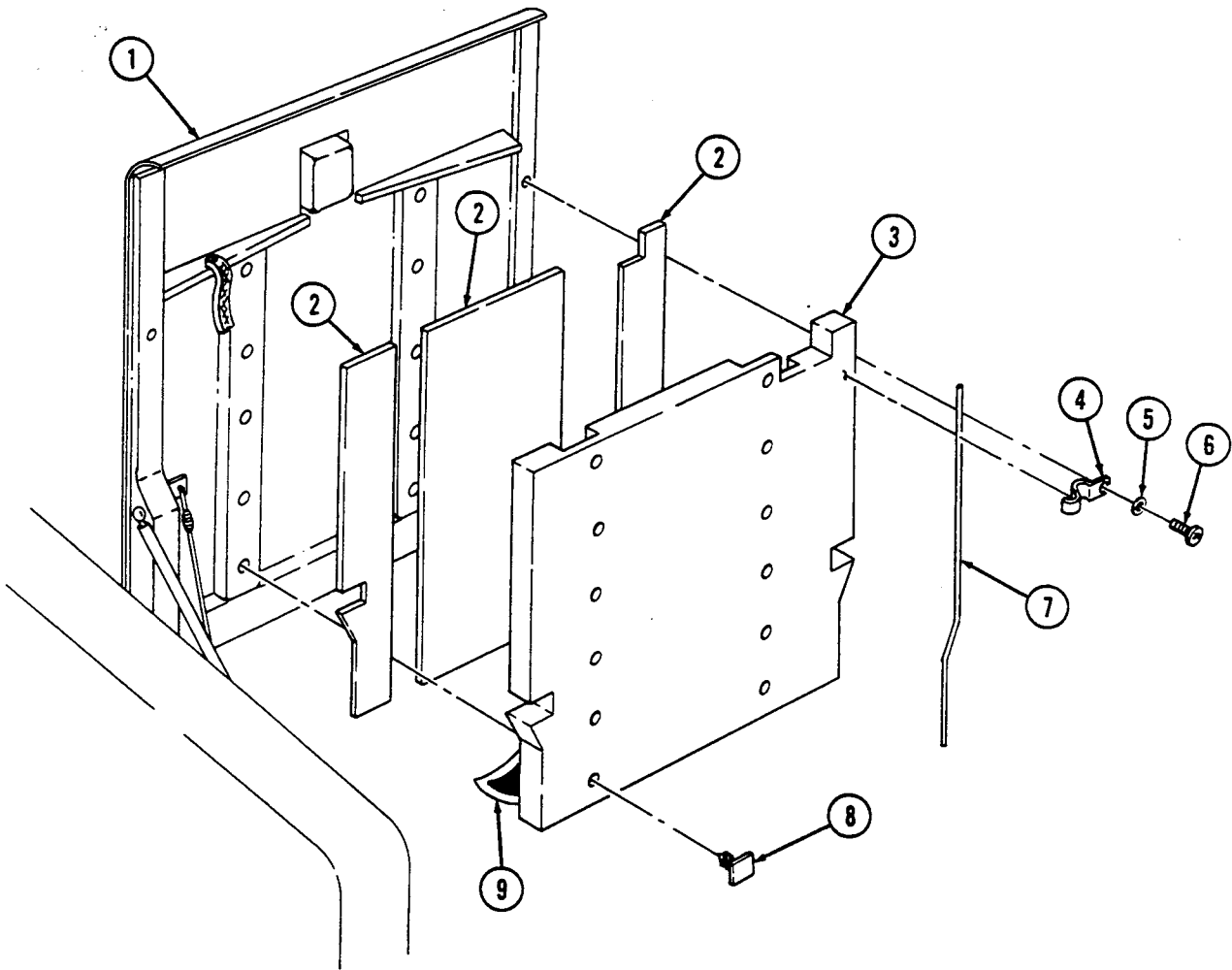
b. Installation

NOTE

Ensure surface is free of dirt and oil before applying adhesive backing.

1. Apply three sound dampeners (2) to door (1).
2. Place four spring tension fasteners (8) in two top and two bottom holes of liner (3). Ensure heads of spring tension fasteners (8) are on side of liner (3) without adhesive.
3. Peel paper backing (9) from liner (3).
4. Align liner (3) with door (1), ensuring top and bottom spring tension fasteners (8) in liner (3) align with top and bottom holes in door (1), and install liner (3) on door (1) with top and bottom spring tension fasteners (8). Press entire surface of liner (3) to ensure adhesion.
5. Install eight remaining spring tension fasteners (8) through liner (3) into door (1).
6. Install two retainers (7) on door (1) with ten clips (4), washers (5), and screws (6).

11-30. CARGO SHELL DOOR LINER REPLACEMENT(Cont'd)



FOLLOW-ON TASK: Close cargo shell door (TM 9-2320-280-10).

11-30.1. "B" PILLAR PADDING REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M966, M1025, M1026, M1036, M1043,
M1044, M1045, M1046, M1121

Materials/Parts

Two locknuts (Appendix G, Item 122)

Manual References

TM 9-2320-280-24P

Equipment Condition

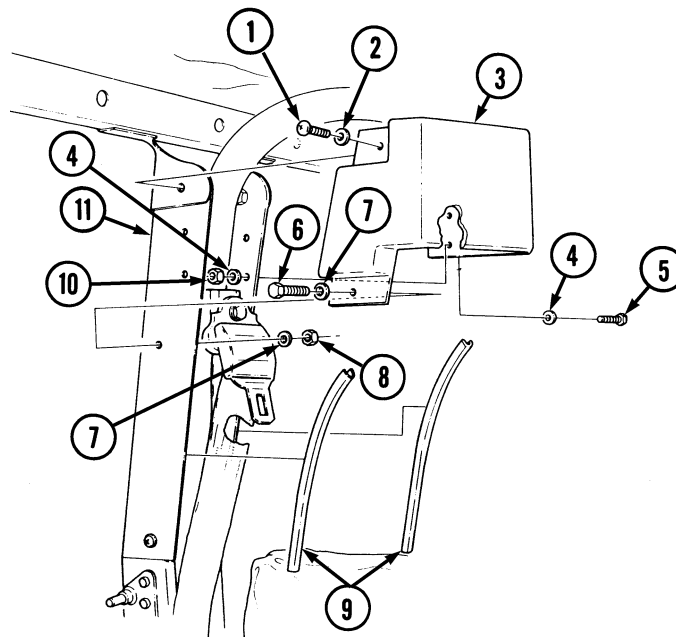
Remove rifle mounting clamp bracket (if equipped)
(para. 11-92).

a. Removal

1. Remove locknut (8), washer (7), capscrew (6), and washer (7) from padding (3) and "B" pillar (11). Discard locknut (8).
2. Remove locknut (10), washer (4), capscrew (5), and washer (4) from padding (3) and "B" pillar (11). Discard locknut (10).
3. Remove screw (1), washer (2), and padding (3) from "B" pillar (11).
4. Remove edge trim (9) from "B" pillar (11).

b. Installation

1. Install edge trim (9) on "B" pillar (11).
2. Install padding (3) on "B" pillar (11) with washer (2) and screw (1).
3. Secure padding (3) to "B" pillar (11) with washer (4), capscrew (5), washer (4), and locknut (10).
4. Secure padding (3) to "B" pillar (11) with washer (7), capscrew (6), washer (7), and locknut (8).



FOLLOW-ON TASK: Install rifle mounting clamp bracket (if removed) (para. 11-92).

11-31. CARGO SHELL ROOF INSULATION PANEL REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M966, M966A1, M1025, M1025A1,
M1025A2, M1026, M1026A1, M1036,
M1121

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Primer adhesive (Appendix C, Item 35)

Manual References

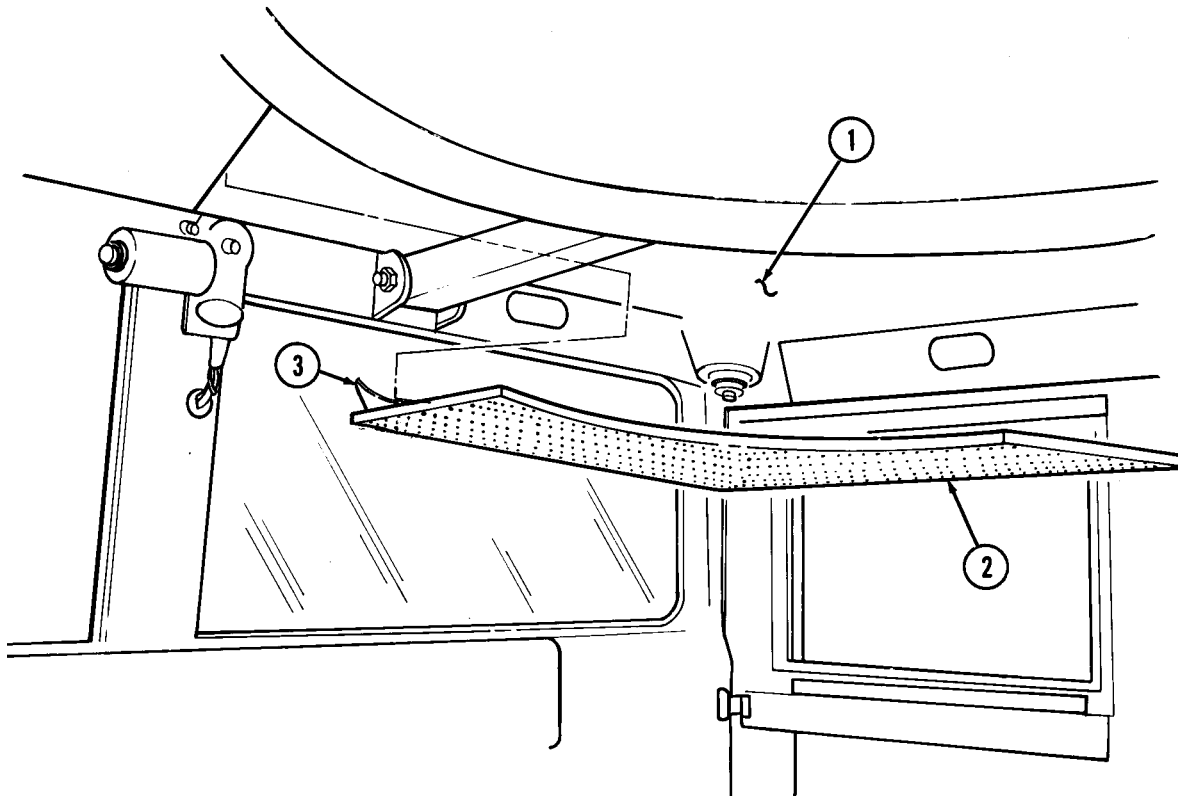
TM 9-2320-280-24P

a. Removal

1. Remove insulation panel (2) from roof (1).
2. Clean roof (1) surface to remove adhesive.

b. Installation

1. Spray primer adhesive on roof (1), peel paper backing (3) from panel (2), and install panel (2) on roof (1).
2. Press panel (2) surface to ensure adhesion.



11-32. HOOD SIDE ARMOR PLATE REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

All models except M998, M998A1, M1035, M1035A1, M1035A2, M1037, M1038, M1038A1, M1042, M1097, M1097A1, M1097A2

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

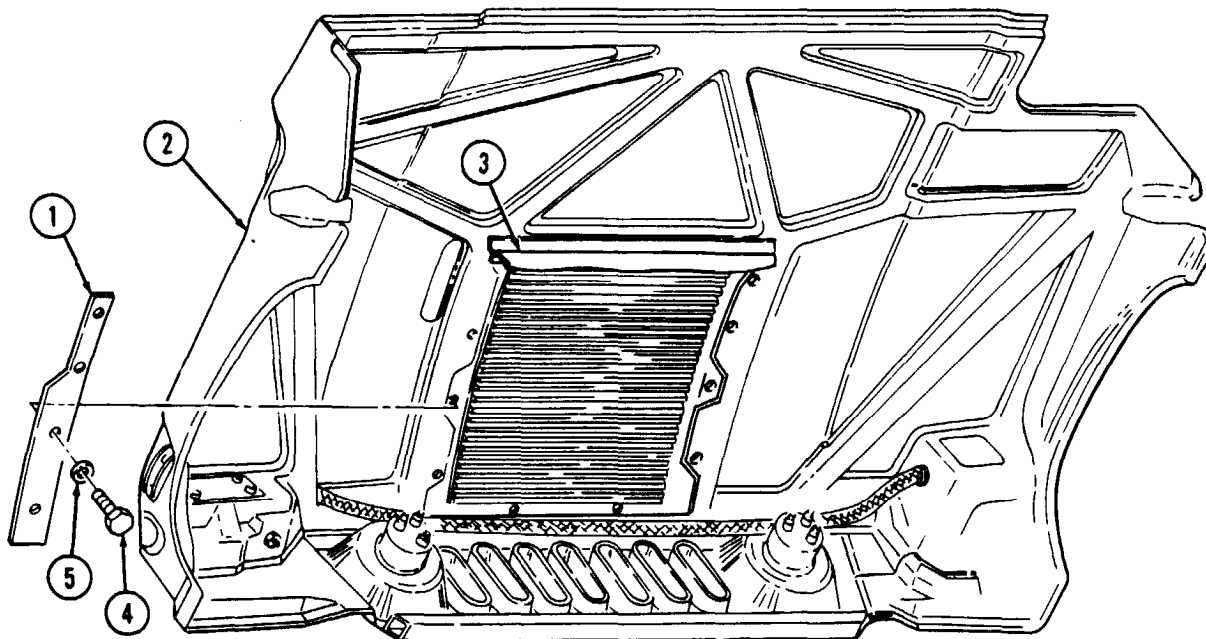
Hood raised and secured (TM 9-2320-280-10).

a. Removal

Remove four capscrews (4), washers (5), and armor plate (1) from hood (2).

b. Installation

Slide narrow end of armor plate (1) between radiator-to-hood seal (3) and hood (2) until holes align, and install on hood (2) with four washers (5) and capscrews (4). Tighten capscrews (4) to 15-20 lb-in. (2 N·m).



FOLLOW-ON TASK: Lower and secure hood (TM 9-2320-280-10).

11-33. HOOD CENTER ARMOR PLATE REPLACEMENT

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP:

Applicable Models

All models except M998, M998A1, M1035, M1035A1, M1035A2, M1037, M1038, M1038A1, M1042, M1097, M1097A1, M1097A2

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

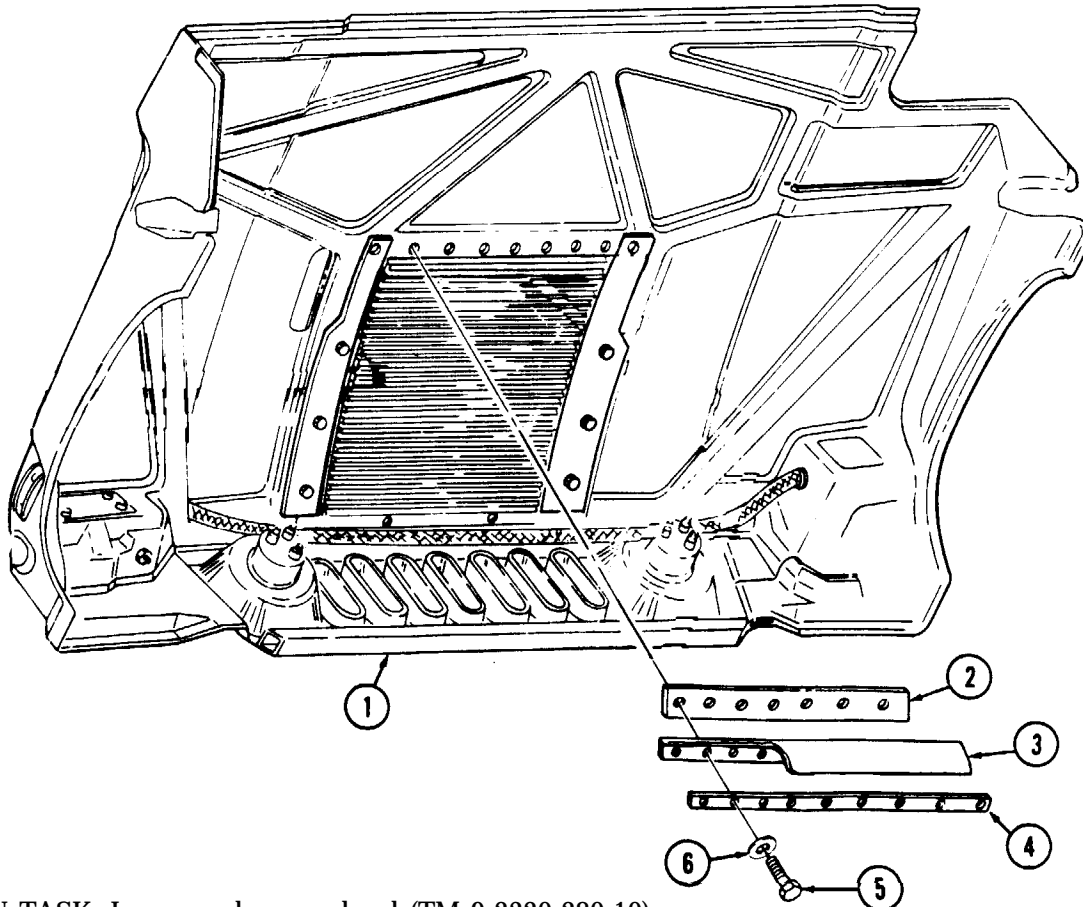
Hood raised and secured (TM 9-2320-280-10).

a. Removal

Remove nine capscrews (5), washers (6), hood seal retainer (4), hood-to-radiator seal (3), and armor plate (2) from hood (1).

b. Installation

Install armor plate (2), hood-to-radiator seal (3), and hood seal retainer (4) on hood (1) with nine washers (6) and capscrews (5). Tighten capscrews (5) to 15-20 lb-in. (2 N•m).



FOLLOW-ON TASK: Lower and secure hood (TM 9-2320-280-10).

11-34. HOOD TOP ARMORED GRILLE REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

All models except M998, M998A1, M1035, M1035A1, M1035A2, M1037, M1038, M1038A1, M1042, M1097, M1097A1, M1097A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Four locknuts (Appendix G, Item 70)

Personnel Required

One mechanic
One assistant

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

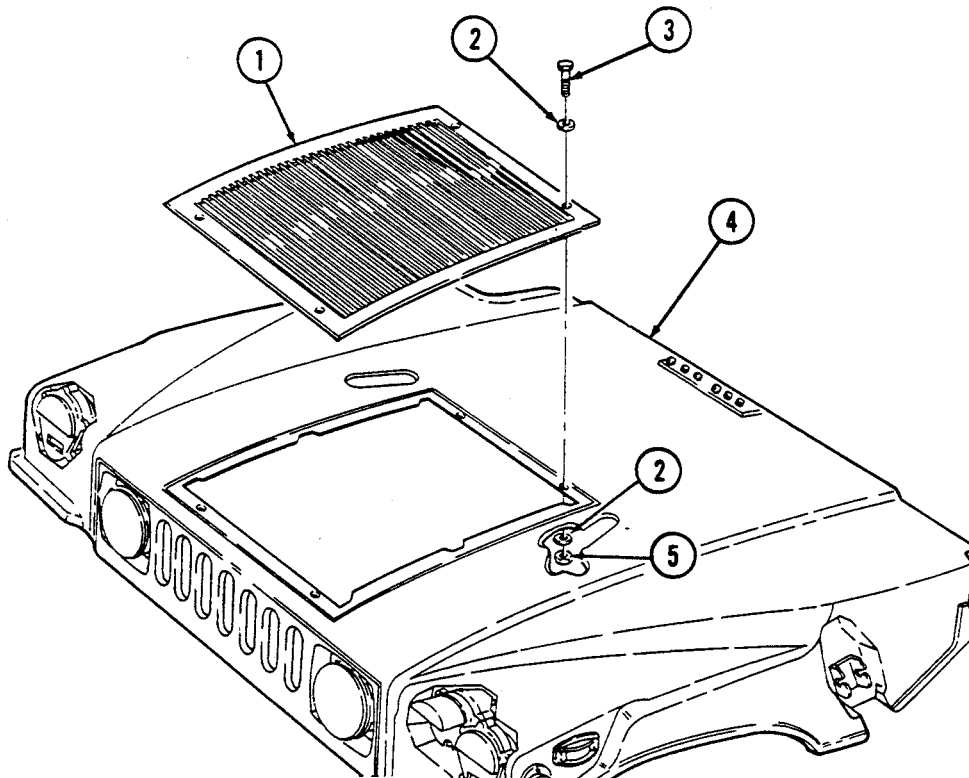
Hood raised and secured (TM 9-2320-280-10).

a. Removal

Remove four locknuts (5), washers (2), capscrews (3), washers (2), and top grille (1) from hood (4). Discard locknuts (5).

b. Installation

Install grille (1) on hood (4) with four washers (2), capscrews (3), washers (2), and locknuts (5). Tighten locknuts (5) to 6 lb-ft (8 N·m).



FOLLOW-ON TASK: Lower and secure hood (TM 9-2320-280-10).

11-35. HOOD FRONT ARMORED GRILLE REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

All models except M998, M998A1, M1035, M1035A1, M1035A2, M1037, M1038, M1038A1, M1042, M1097, M1097A1, M1097A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Three locknuts (Appendix G, Item 83)
Three lockwashers (Appendix G, Item 157)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

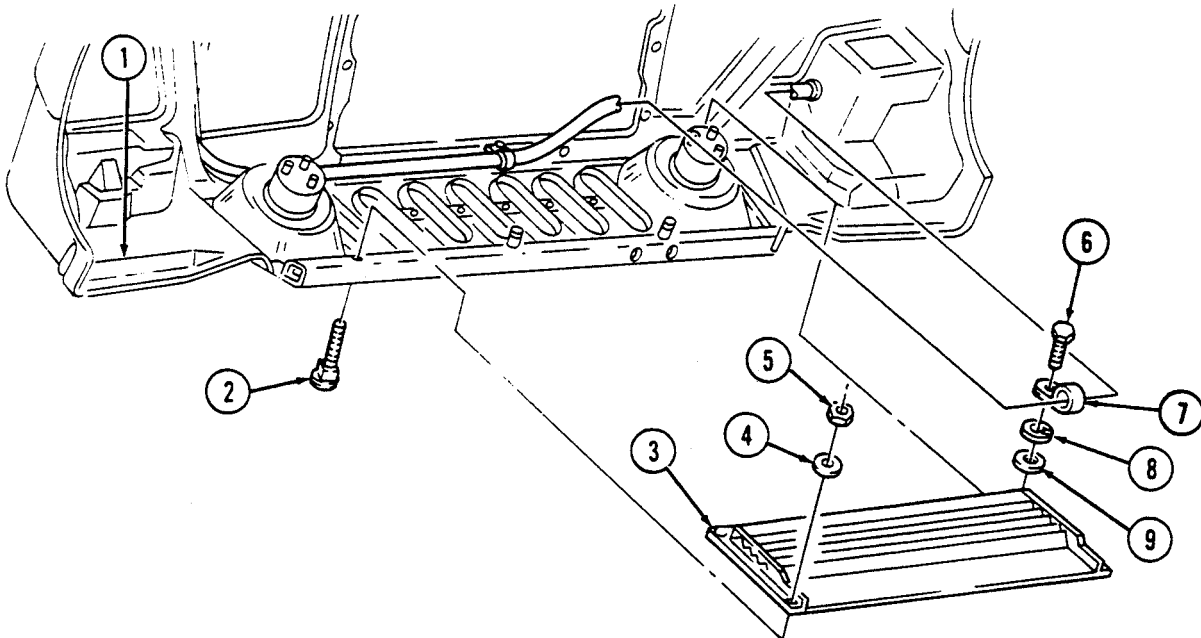
Hood raised and secured (TM 9-2320-280-10).

a. Removal

1. Remove three locknuts (5), washers (4), and carriage bolts (2) from front grille (3) and hood (1). Discard locknuts (5).
2. Remove three capscrews (6), harness clamps (7), lockwashers (8), washers (9), and grille (3) from hood (1). Discard lockwashers (8).

b. Installation

1. Install front grille (3) on hood (1) with three washers (9), lockwashers (8), harness clamps (7), and capscrews (6).
2. Secure grille (3) to hood (1) with three carriage bolts (2), washers (4), and locknuts (5).
3. Tighten locknuts (5) to 21 lb-ft (29 N·m). Tighten capscrews (6) to 20-30 lb-in. (2-3 N·m).



FOLLOW-ON TASK: Lower and secure hood (TM 9-2320-280-10).

11-36. RIGHT COWL ARMOR PLATE REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

All models except M998, M998A1, M1035, M1035A1, M1035A2, M1037, M1038, M1038A1, M1042, M1097, M1097A1, M1097A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Four locknuts (Appendix G, Item 70)

Manual References

TM 9-2320-280-24P

Equipment Condition

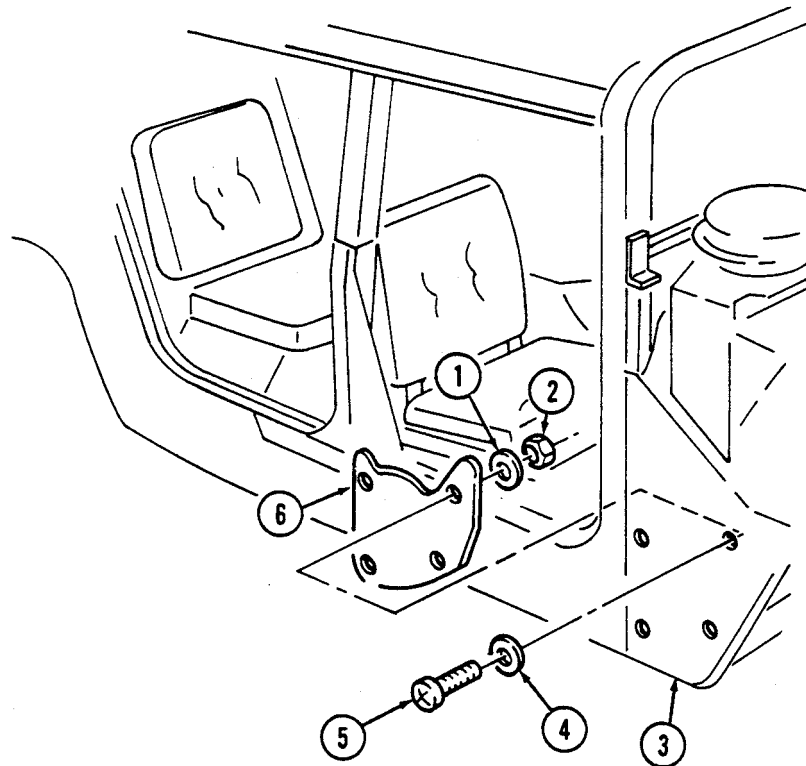
Ballistic crew door removed (para. 11-2).

a. Removal

Remove four locknuts (2), washers (1), screws (5), washers (4), and armor plate (6) from cowl (3). Discard locknuts (2).

b. Installation

Install armor plate (6) on cowl (3) with four washers (4), screws (5), washers (1), and locknuts (2). Tighten locknuts (2) to 6 lb-ft (8 N•m).



FOLLOW-ON TASK: Install ballistic crew door (para. 11-2).

11-37. LEFT COWL ARMOR PLATE REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

All models except M998, M998A1, M1035, M1035A1, M1035A2, M1037, M1038, M1038A1, M1042, M1097, M1097A1, M1097A2

Materials/Parts

Seven locknuts (Appendix G, Item 70)

Manual References

TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

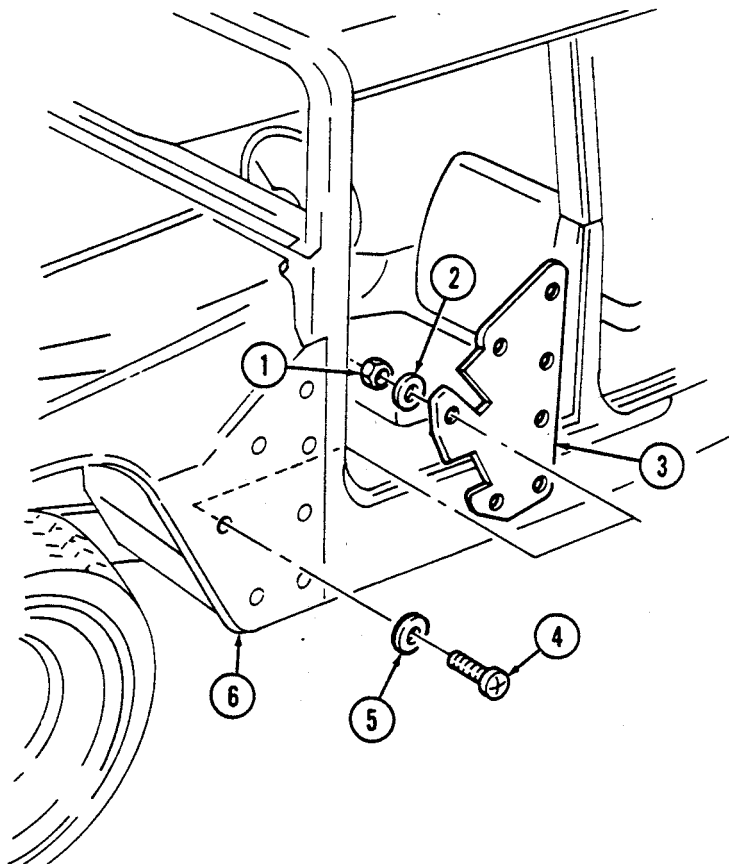
Ballistic crew door removed (para. 11-2).

a. Removal

Remove seven locknuts (1), washers (2), screws (4), washers (5), and armor plate (3) from cowl (6).
Discard locknuts (1).

b. Installation

Install armor plate (3) on cowl (6) with seven washers (5), screws (4), washers (2), and locknuts (1).
Tighten locknuts (1) to 6 lb-ft (8 N•m).



FOLLOW-ON TASK: Install ballistic crew door (para. 11-2).

11-38. FOOTWELL ARMOR PLATE REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

All models except M998, M998A1, M1035, M1035A1, M1035A2, M1037, M1038, M1038A1, M1042, M1097, M1097A1, M1097A2

Materials/Parts

Four locknuts (Appendix G, Item 70)

Manual References

TM 9-2320-280-24P

Tools

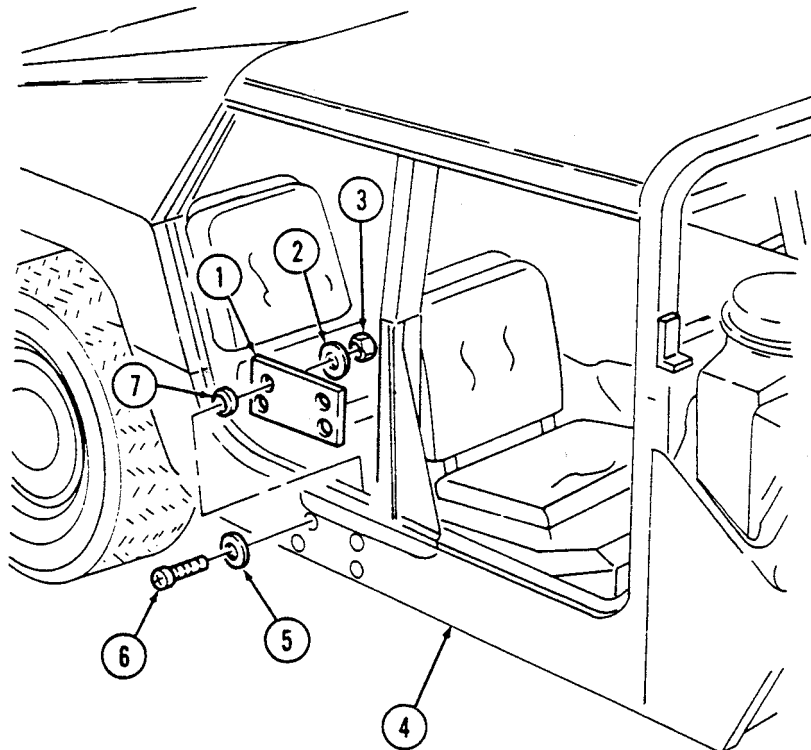
General mechanic's tool kit:
automotive (Appendix B, Item 1)

a. Removal

Remove four locknuts (3), washers (2), screws (6), washers (5), armor plate (1), and four spacers (7) from body (4). Discard locknuts (3).

b. Installation

Install four spacers (7) and armor plate (1) on body (4) with four washers (5), screws (6), washers (2), and locknuts (3). Tighten locknuts (3) to 6 lb-ft (8 N·m).



11-39. RIGHT WHEELHOUSE ARMOR PLATE REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M1025, M1025A1, M1025A2, M1026, M1026A1, M1043, M1043A1, M1043A2, M1044, M1044A1, M1045, M1045A1, M1045A2, M1046, M1046A1

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Fourteen locknuts (Appendix G, Item 70)
Sound dampener (Appendix G, Item 294)

Personnel Required

One mechanic
One assistant

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

- Rear end of cargo shell door raised (TM 9-2320-280-10).
M1045, M1045A1, M1045A2, M1046, and M1046A1 only:
- Night sight support assembly removed (para. 11-82).
M1043, M1043A1, M1043A2, M1044, and M1044A1 only:
- Machine gun stop removed (para. 11-100).

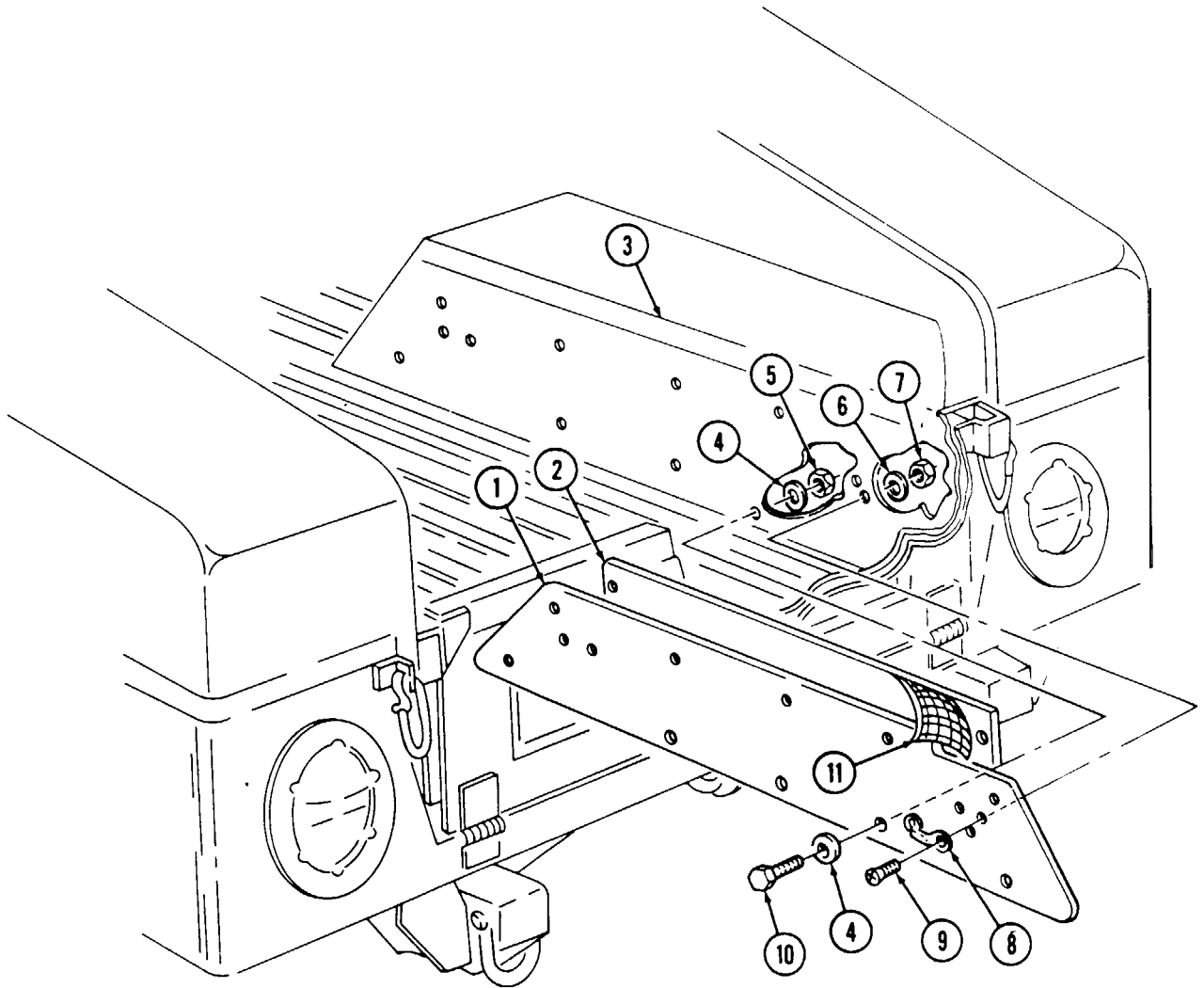
a. Removal

1. Remove four locknuts (7), washers (6), screws (9), and two footman loops (8) from wheelhouse (3). Discard locknuts (7).
2. Remove ten locknuts (5), washers (4), capscrews (10), washers (4), armor plate (1), and sound dampener (2) from wheelhouse (3). Discard locknuts (5) and sound dampener (2).
3. Clean armor plate (1) to remove adhesive.

b. Installation

1. Peel paper backing (11) from sound dampener (2) and install sound dampener (2) on armor plate (1).
2. Install armor plate (1) on wheelhouse (3) with ten washers (4), capscrews (10), washers (4), and locknuts (5). Tighten capscrews (10) to 6 lb-ft (8 N·m).
3. Install two footman loops (8) on wheelhouse (3) with four screws (9), washers (6), and locknuts (7).

11-39. RIGHT WHEELHOUSE ARMOR PLATE REPLACEMENT (Cont'd)



- FOLLOW-ON TASKS:** M1043, M1043A1, M1043A2, M1044, and M1044A1 only:
- Install machine gun stop (para. 11-100).
 - M1045, M1045A1, M1045A2, M1046, and M1046A1 only
 - Install night sight support assembly (para. 11-82).
 - Close cargo shell door (TM 9-2320-280-10).

11-40. LEFT WHEELHOUSE ARMOR PLATE REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M1025, M1025A1, M1025A2, M1026, M1026A1, M1043, M1043A1, M1043A2, M1044, M1044A1, M1045, M1045A1, M1045A2, M1046, M1046A1

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Ten locknuts (Appendix G, Item 70)
Sound dampener (Appendix G, Item 294)

Personnel Required

One mechanic
One assistant

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

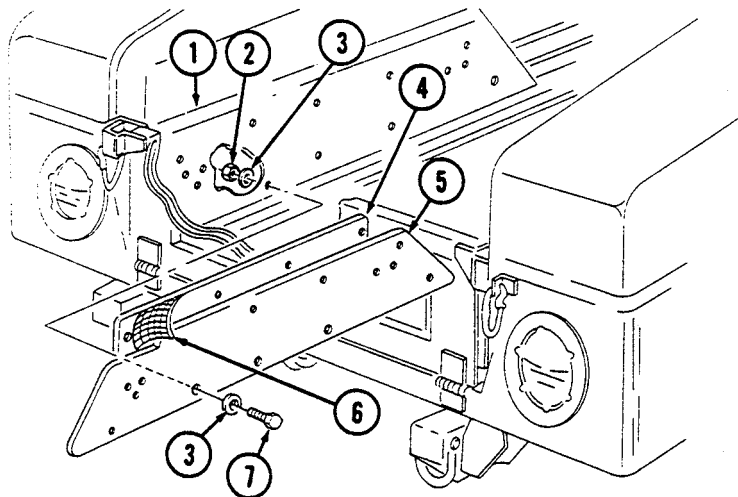
- Rear end of cargo shell door raised (TM 9-2320-280-10).
- M1045, M1045A1, M1045A2, M1046, and M1046A1 only:
- Tripod head mounting bracket removed (para. 11-79).
- M1043, M1043A1, M1043A2, M1044, and M1044A1 only:
- Water can bumper removed (para. 11-109).

a. Removal

1. Remove ten locknuts (2), washers (3), capscrews (7), washers (3), armor plate (5), and sound dampener (4) from wheelhouse (1). Discard locknuts (2) and sound dampener (4).
2. Clean armor plate (5) to remove adhesive.

b. Installation

1. Peel paper backing (6) from sound dampener (4) and install sound dampener (4) on armor plate (5).
2. Install armor plate (5) on wheelhouse (1) with ten washers (3), capscrews (7), washers (3), and locknuts (2). Tighten capscrews (7) to 6 lb-ft (8 N·m).



FOLLOW-ON TASKS: M1043, M1043A1, M1043A2, M1044, and M1044A1 only:

- Install water can bumper (para. 11-109).

M1045, M1045A1, M1045A2, M1046, and M1046A1 only:

- Install tripod head mounting bracket (para. 11-79)
- Close cargo shell door (TM 9-2320-280-10).

11-41. TAILGATE ARMOR PLATE REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

All models except M996, M996A1, M997, M997A1, M997A2, M998, M998A1, M1035, M1035A1, M1035A2, M1037, M1038, M1038A1, M1042, M1097, M1097A1, M1097A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Nine lockwashers (Appendix G, Item 135)
Sound dampener (Appendix G, Item 295)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

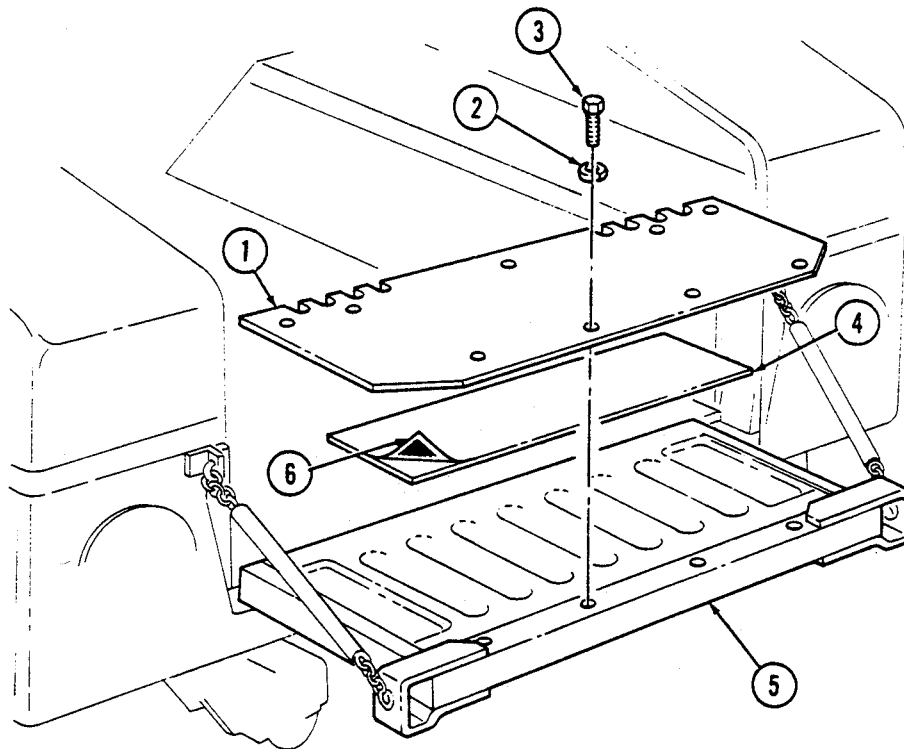
Tailgate lowered (TM 9-2320-280-10).

a. Removal

1. Remove nine capscrews (3), lockwashers (2), armor plate (1), and sound dampener (4) from tailgate (5). Discard lockwashers (2) and sound dampener (4).
2. Clean armor plate (1) to remove adhesive.

b. Installation

1. Peel paper backing (6) from sound dampener (4) and install sound dampener (4) on armor plate (1).
2. Install armor plate (1) on tailgate (5) with nine lockwashers (2) and capscrews (3). Tighten capscrews (3) to 6 lb-ft (8 N·m).



FOLLOW-ON TASK: Raise and secure tailgate (TM 9-2320-280-10).

11-42. WEAPON STATION HATCH REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

All models except M996, M996A1, M997, M997A1, M997A2, M998, M998A1, M1035, M1035A1, M1035A2, M1037, M1038, M1038A1, M1042, M1097, M1097A1, M1097A2

Materials/Parts

RTV Sealant (Appendix C, Item 38)
Locknut (Appendix G, Item 128)

Manual References

TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

a. Removal

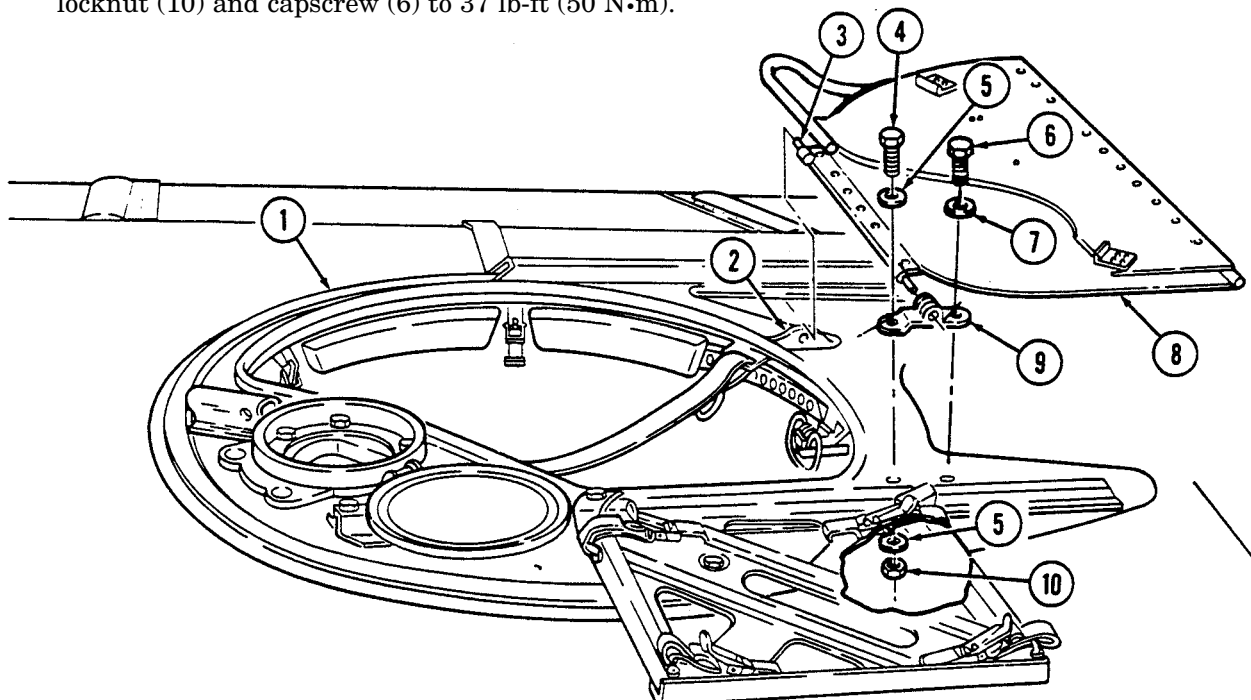
1. Remove capscrew (6) and washer (7) from hatch pivot bracket (9) and weapon station (1).
2. Remove locknut (10), washer (5), capscrew (4), washer (5), and hatch pivot bracket (9) from weapon station (1). Discard locknut (10).
3. Slide hatch hinge pin (3) out from hatch pivot bracket (2) and remove weapon station hatch (8).

b. Installation

NOTE

Some hatches may leak water. To prevent water leaks, install NSN 5330-01-190-2227 seal on hatch with RTV sealant.

1. Install weapon station hatch (8) with hatch hinge pin (3) in hatch pivot bracket (2).
2. Install hatch pivot bracket (9) on weapon station (1) with washer (5), capscrew (4), washer (5), and locknut (10).
3. Install hatch pivot bracket (9) on weapon station (1) with washer (7) and capscrew (6). Tighten locknut (10) and capscrew (6) to 37 lb-ft (50 N·m).



11-43. WEAPON STATION HATCH HANDLE REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

All models except M996, M996A1, M997, M997A1, M997A2, M998, M998A1, M1035, M1035A1, M1035A2, M1037, M1038, M1038A1, M1042, M1097, M1097A1, M1097A2

Materials/Parts

Two locknuts (Appendix G, Item 107)

Manual References

TM 9-2320-280-24P

Tools

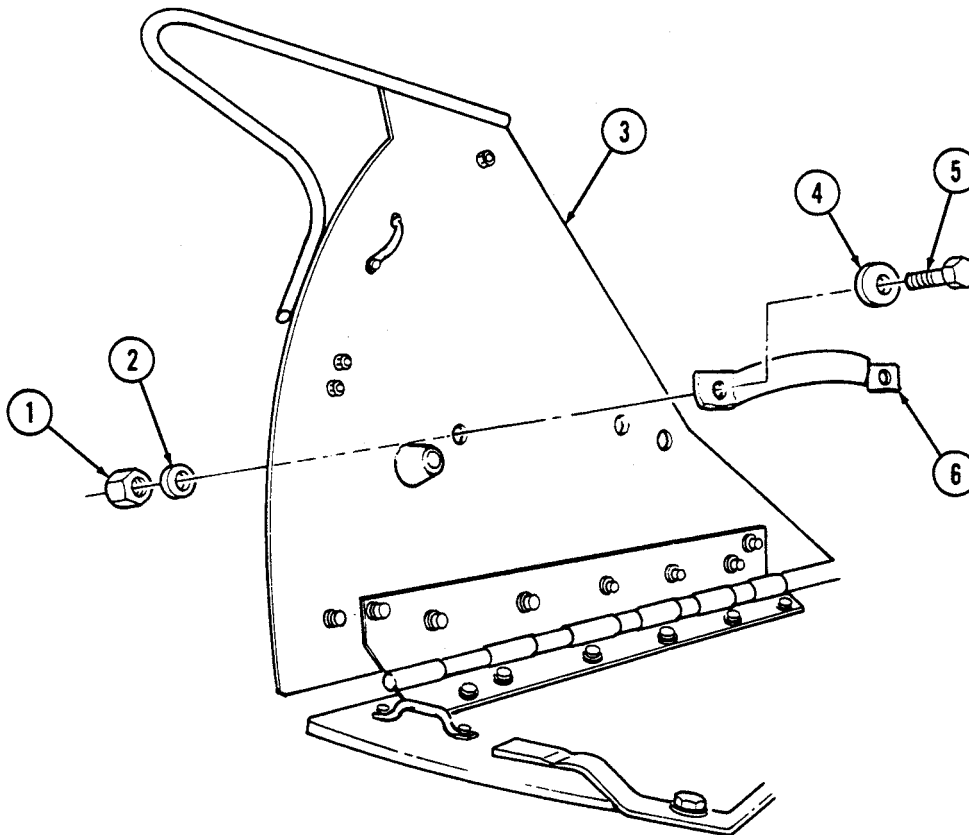
General mechanic's tool kit:
automotive (Appendix B, Item 1)

a. Removal

Remove two locknuts (1), washers (2), capscrews (5), large washers (4), and handle (6) from hatch (3). Discard locknuts (1).

b. Installation

Install handle (6) on hatch (3) with two large washers (4), capscrews (5), washers (2), and locknuts (1). Tighten locknuts to 6 lb-ft (8 N·m).



11-44. WEAPON STATION HATCH HINGE PIN REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

All models except M996, M996A1, M997, M997A1, M997A2, M998, M998A1, M1035, M1035A1, M1035A2, M1037, M1038, M1038A1, M1042, M1097, M1097A1, M1097A2

Materials/Parts

Two locknuts (Appendix G, Item 70)

Manual References

TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

a. Removal

1. Remove two locknuts (3), washers (4), capscrews (7), and washers (4) from hatch hinge pin (5) and hatch panel (1). Discard locknuts (3).

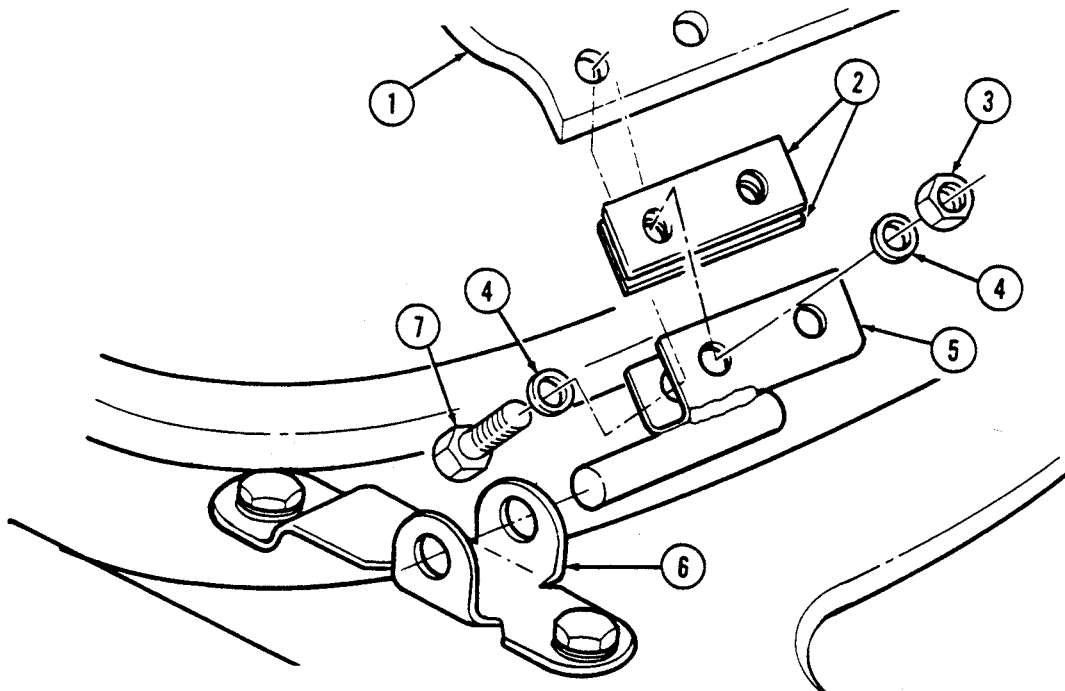
NOTE

Spacer not required on M1043, M1043A1, M1043A2, M1044, M1044A1, M1045, M1045A1, M1045A2, M1046, and M1046A1 vehicles.

2. Remove hatch hinge pin (5) and two spacers (2) from hinge pivot bracket (6) and hatch panel (1).

b. Installation

1. Install hatch hinge pin (5) on hatch panel (1) and slide into hinge pivot bracket (6). Slide two spacers (2) between hatch panel (1) and hinge pin (5) on top side of hatch panel (1).
2. Secure hatch hinge pin (5) to hatch panel (1) with two washers (4), capscrews (7), washers (4), and locknuts (3). Tighten locknuts (3) to 6 lb-ft (8 N•m).



11-45. WEAPON STATION HATCH HINGE REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

All models except M996, M996A1, M997, M997A1, M997A2, M998, M998A1, M1035, M1035A1, M1035A2, M1037, M1038, M1038A1, M1042, M1097, M1097A1, M1097A2

Materials/Parts

Sixteen locknuts (Appendix G, Item 70)

Manual References

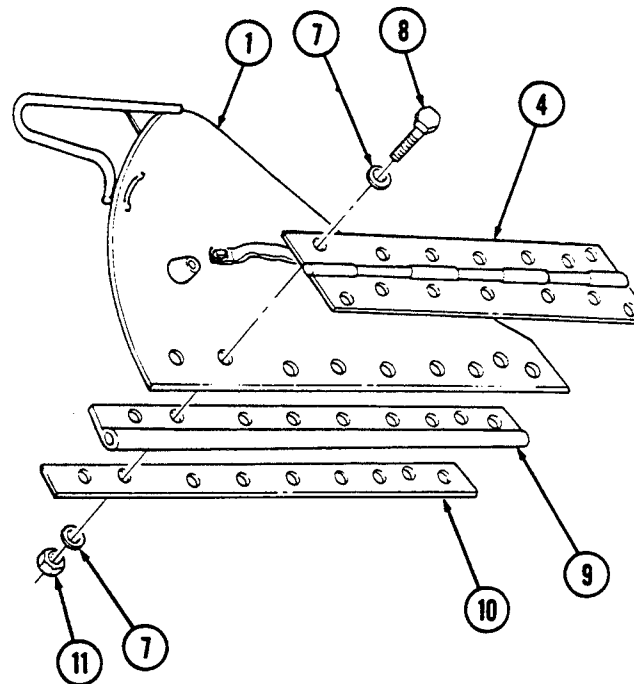
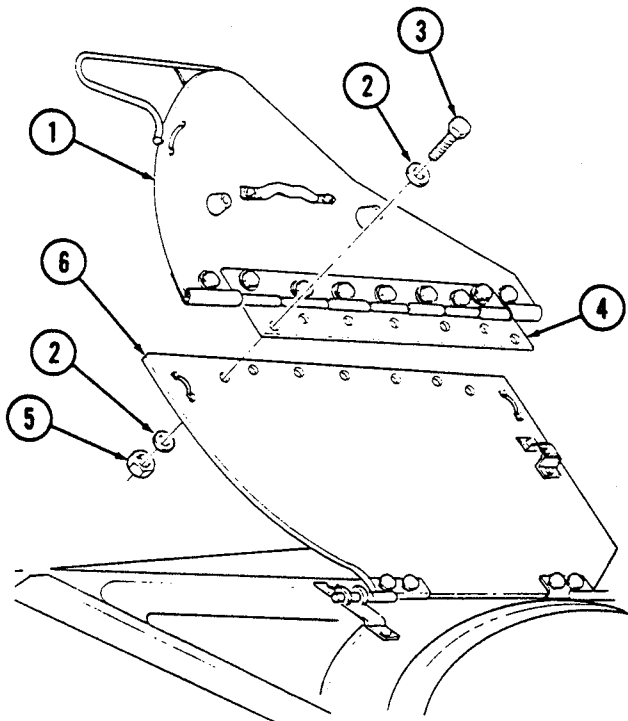
TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

a. Removal

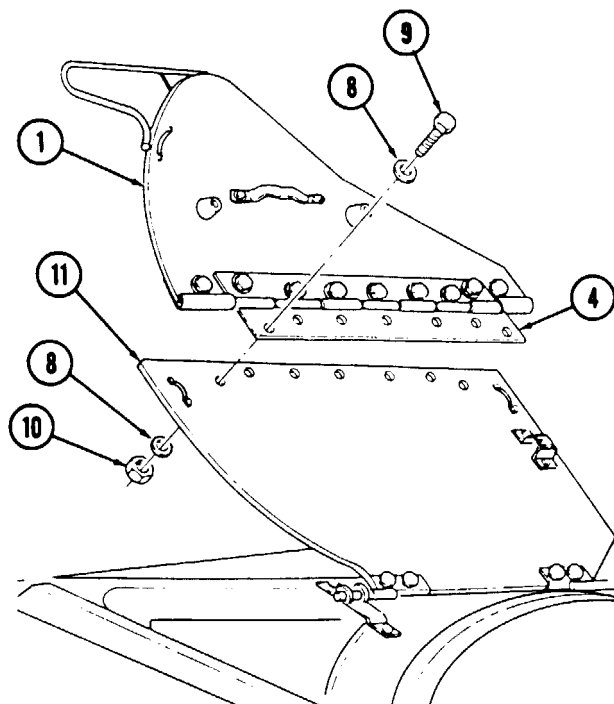
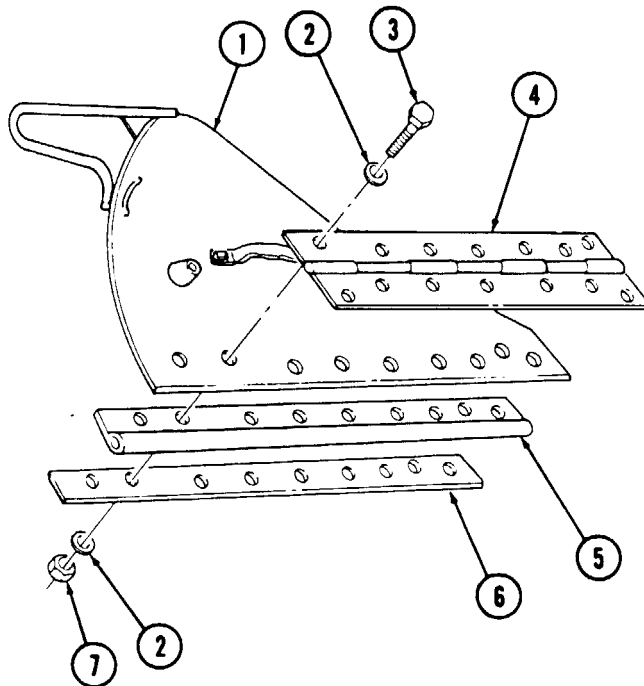
1. Remove seven locknuts (5), washers (2), capscrews (3), washers (2), right hatch panel (1), and hinge (4) from left hatch panel (6). Discard locknuts (5).
2. Remove nine locknuts (11), washers (7), capscrews (8), washers (7), retainer (10), seal (9), and hinge (4) from right hatch panel (1). Discard locknuts (11).
3. Inspect seal (9) for damage. Replace if damaged.



11-45. WEAPON STATION HATCH HINGE REPLACEMENT (Cont'd)

b. Installation

1. Install hinge (4), seal (5), and retainer (6) on right hatch panel (1) with nine washers (2), capscrews (3), washers (2), and locknuts (7). Tighten locknuts (7) to 6 lb-ft (8 N•m).
2. Install hinge (4) and right hatch panel (1) on left hatch panel (11) with seven washers (8), capscrews (9), washers (8), and locknuts (10). Tighten locknuts (10) to 6 lb-ft (8 N•m).



11-46. WEAPON STATION HATCH HOLDDOWN STRIKER REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

All models except M996, M996A1, M997, M997A1, M997A2, M998, M998A1, M1035, M1035A1, M1035A2, M1037, M1038, M1038A1, M1042, M1097, M1097A1, M1097A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Two locknuts (Appendix G, Item 70)
Two locknuts (Appendix G, Item 107)

Manual References

TM 9-2320-280-24P

a. Removal

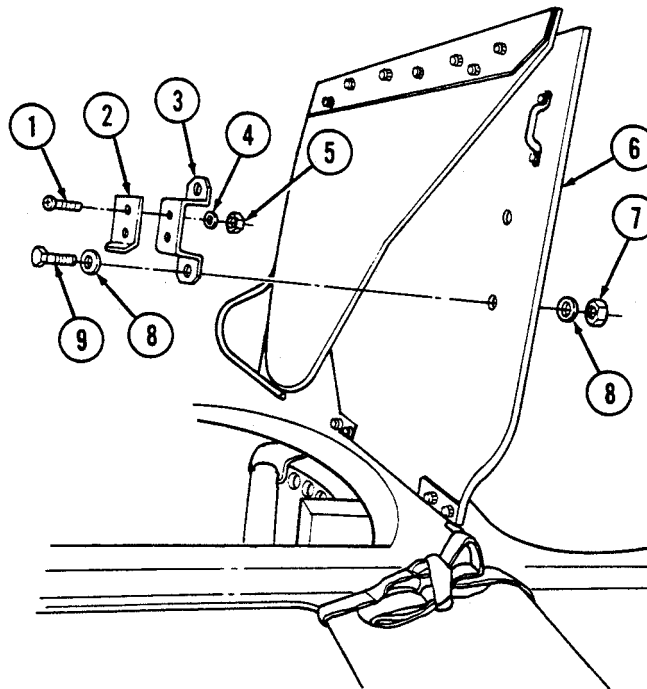
NOTE

This task covers the left hatch panel holddown striker. The right hatch panel holddown striker is mounted directly on the panel.

1. Remove two locknuts (5), washers (4), screws (1), and holddown striker (2) from bracket (3). Discard locknuts (5).
2. Remove two locknuts (7), washers (8), capscrews (9), washers (8), and bracket (3) from left hatch panel (6). Discard locknuts (7).

b. Installation

1. Install striker (2) on bracket (3) with two screws (1), washers (4), and locknuts (5).
2. Install bracket (3) on left hatch panel (6) with two washers (8), capscrews (9), washers (8), and locknuts (7). Tighten locknuts (7) to 6 lb-ft (8 N·m).



11-47. WEAPON STATION TRAY SEAL REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

All models except M996, M996A1, M997, M997A1 M997A2, M998, M998A1, M1035, M1035A1, M1035A2, M1037, M1038, M1038A1, M1042, M1097, M1097A1, M1097A2

Materials/Parts

Adhesive (Appendix C, Item 3)

Manual References

TM 9-2320-280-24P

Tools

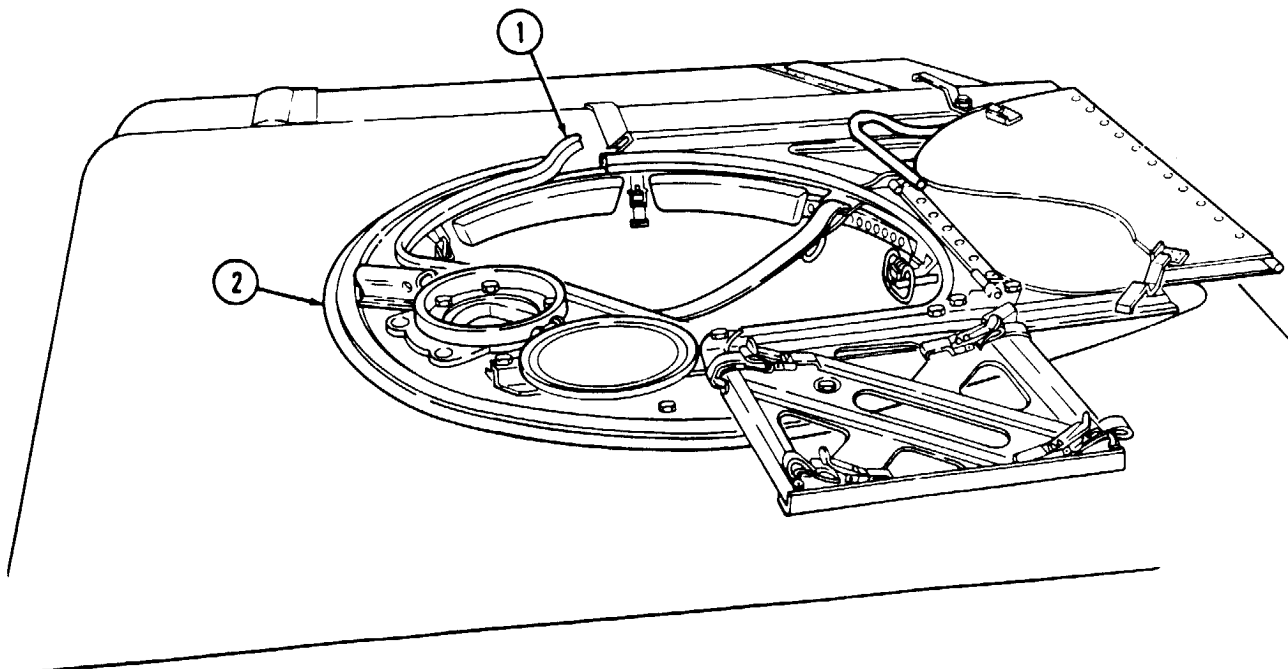
General mechanic's tool kit:
automotive (Appendix B, Item 1)

a. Removal

1. Remove seal (1) from weapon station (2).
2. Thoroughly clean the edge of weapon station (2).

b. Installation

1. Measure and cut required length of seal (1).
2. Apply a 1/16-in. (1.6 mm) to 1/8-in. (3.2 mm) bead of adhesive to seal (1) lip.
3. Starting somewhere other than at a corner, press seal over the lip of the weapon station (2) tray hatch opening.
4. Allow seal (1) to set and cure undisturbed, for about one hour.



11-48. WEAPON STATION BUMPER PAD REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

All models except M996, M996A1, M997, M997A1, M997A2, M998, M998A1, M1035, M1035A1, M1035A2, M1037, M1038, M1038A1, M1042, M1097, M1097A1, M1097A2, M1123

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Locknut (Appendix G, Item 107)

Manual References

TM 9-2320-280-24P

NOTE

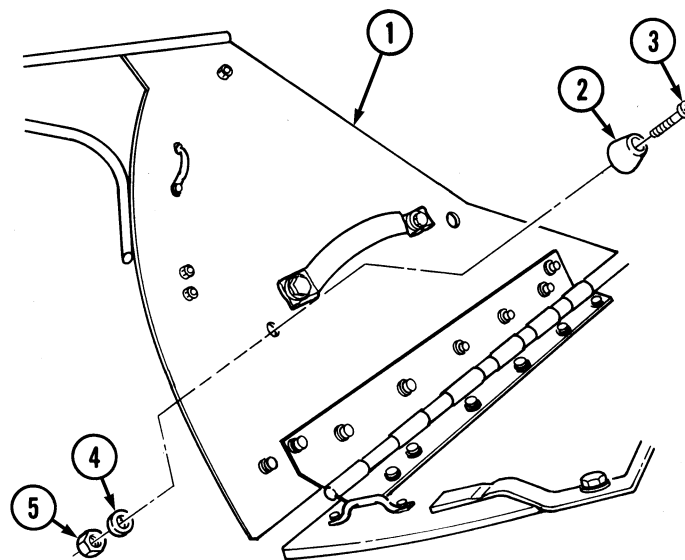
Bumper pads for both sides of hatch are installed basically the same. This procedure covers the right side.

a. Removal

Remove locknut (5), washer (4), screw (3), and bumper pad (2) from hatch (1). Discard locknut (5).

b. Installation

Install bumper pad (2) on hatch (1) with screw (3), washer (4), and locknut (5).



11-49. WEAPON STATION TRAY LEVER REPLACEMENT

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP:

Applicable Models

All models except M996, M996A1, M997, M997A1, M997A2, M998, M998A1, M1035, M1035A1, M1035A2, M1037, M1038, M1038A1, M1042, M1097, M1097A1, M1097A2, M1123

Materials/Parts

Four spring tension washers
 (Appendix G, Item 320)
 Sealing compound (Appendix C, Item 40)

Manual References

TM 9-2320-280-24P

Tools

General mechanic's tool kit:
 automotive (Appendix B, Item 1)

a. Removal

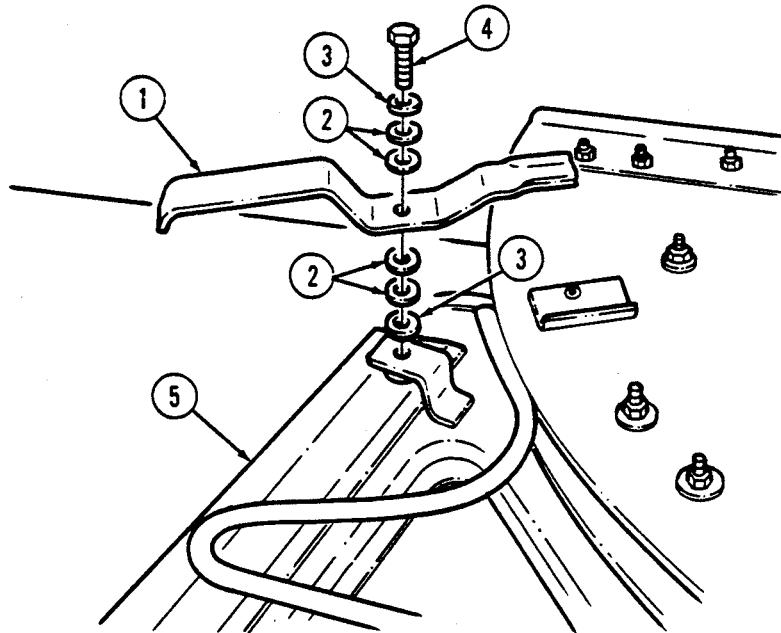
Remove capscrew (4), washer (3), two spring tension washers (2), tray lever (1), two spring tension washers (2), and washer (3) from weapon station (5). Discard spring tension washers (2).

b. Installation

NOTE

Apply sealing compound to threads on capscrew.

Install washer (3), two spring tension washers (2), and tray lever (1) on weapon station (5) with two spring tension washers (2), washer (3), and capscrew (4). Tighten capscrew (4) to 6 lb-ft (8 N·m).



11-50. WEAPON STATION HATCH LATCH REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

All models except M996, M996A1, M997, M997A1, M997A2, M998, M998A1, M1035, M1035A1, M1035A2, M1037, M1038, M1038A1, M1042, M1097, M1097A1, M1097A2

Tools

General mechanic's tool kit
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-24P

NOTE

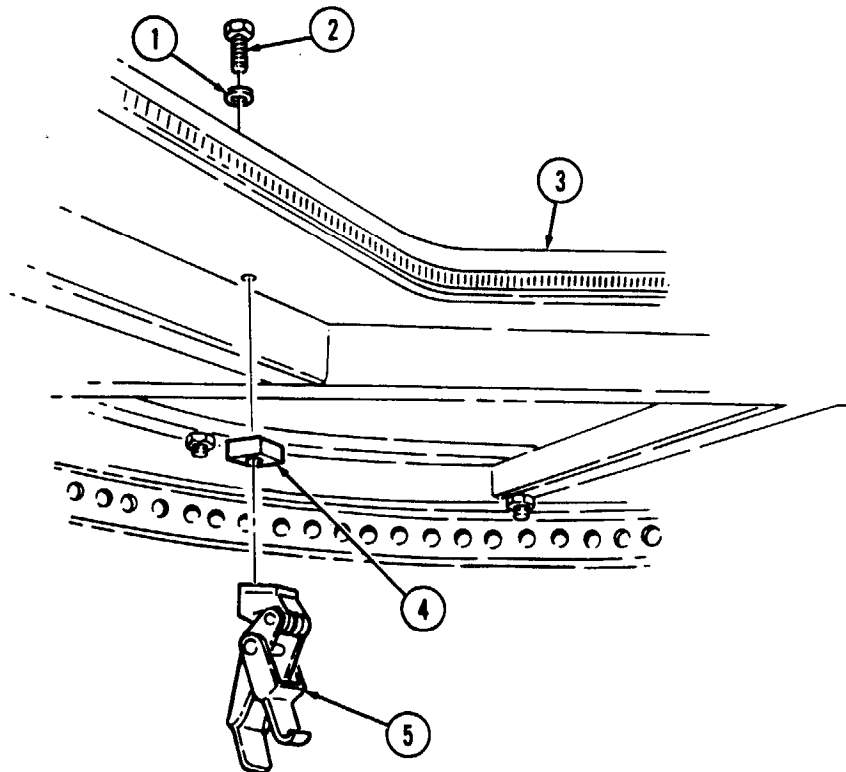
- Procedures for replacing the three hatch latches are basically the same, except the hatch latch opposite the backrest side of weapon station has a spacer. This procedure covers the hatch latch with spacer.
- To increase latch tension, 3/8-in. (9.5 mm) flat washers may be added between bottom of weapon station and any of the three hatch latches.

a. Removal

Remove capscrew (2), washer(1), hatch latch (5), and spacer (4) from weapon station (3).

b. Installation

Install spacer (4) and hatch latch (5) on weapon station (3) with washer (1) and capscrew (2). Tighten capscrew (2) to 37 lb-ft (50 N•m).



11-51. WEAPON STATION HATCH TUBE ASSEMBLY REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

All models except M996, M996A1, M997, M997A1, M997A2, M998, M998A1, M1035, M1035A1, M1035A2, M1037, M1038, M1038A1, M1042, M1097, M1097A1, M1097A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Ten locknuts (Appendix G, Item 128)

Manual References

TM 9-2320-280-24P

a. Removal

NOTE

- Note locations of capscrews for installation.
- Later production vehicles are equipped with spacers.

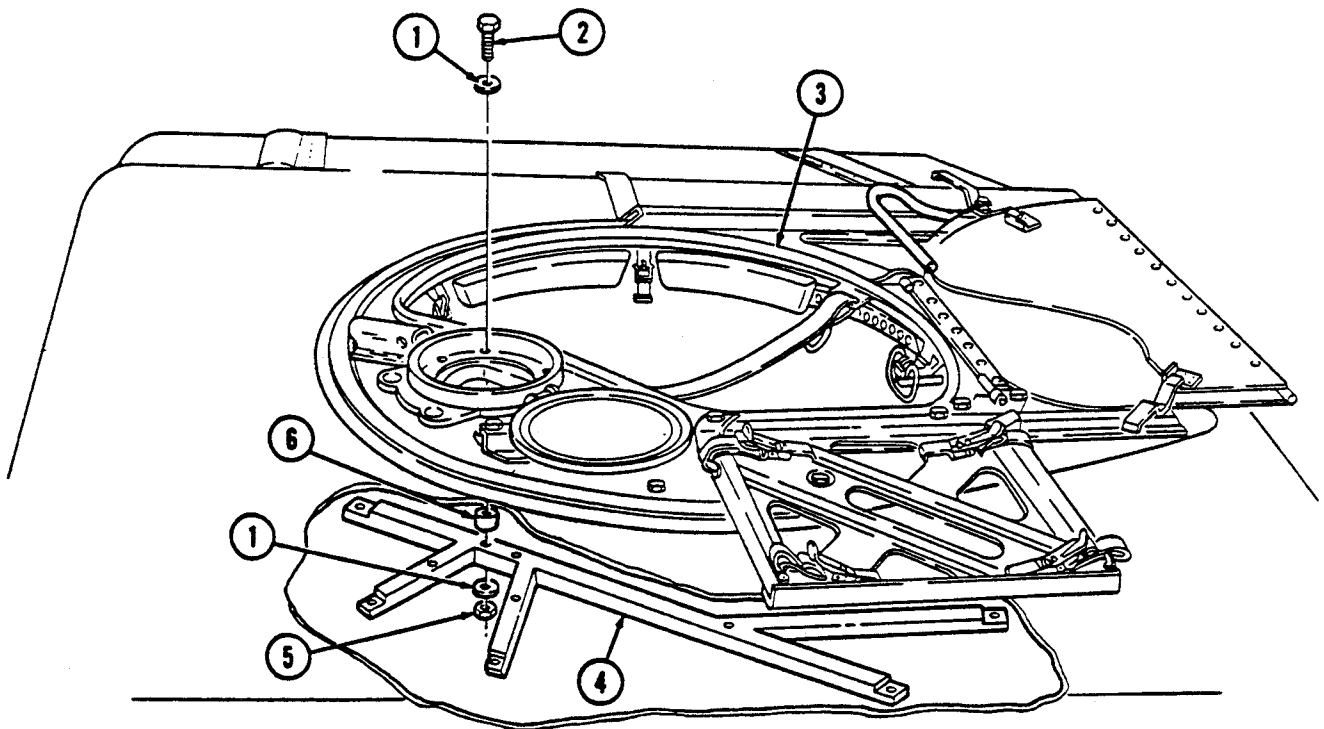
Remove ten locknuts (5), washers (1), capscrews (2), washers (1), hatch tube (4), and five spacers (6), if installed, from weapon station (3). Discard locknuts (5).

b. Installation

NOTE

TOW mount pedestal and TOW MGS pan/armament cover and armament mount panel must be in place prior to installing weapon station hatch tube assembly.

Install five spacers (6), if removed, and hatch tube (4) on weapon station (3) with ten washers (1), capscrews (2), washers (1), and locknuts (5). Tighten locknuts (5) to 37 lb-ft (50 N•m).



11-52. HINGE PIVOT BRACKET AND GUNNER'S SLING REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

All models except M996, M996A1, M997, M997A1, M997A2, M998, M998A1, M1035, M1035A1, M1035A2, M1037, M1038, M1038A1, M1042, M1097, M1097A1, M1097A2

Materials/Parts

Locknut (Appendix G, Item 128)

Manual References

TM 9-2320-280-24P

Tools

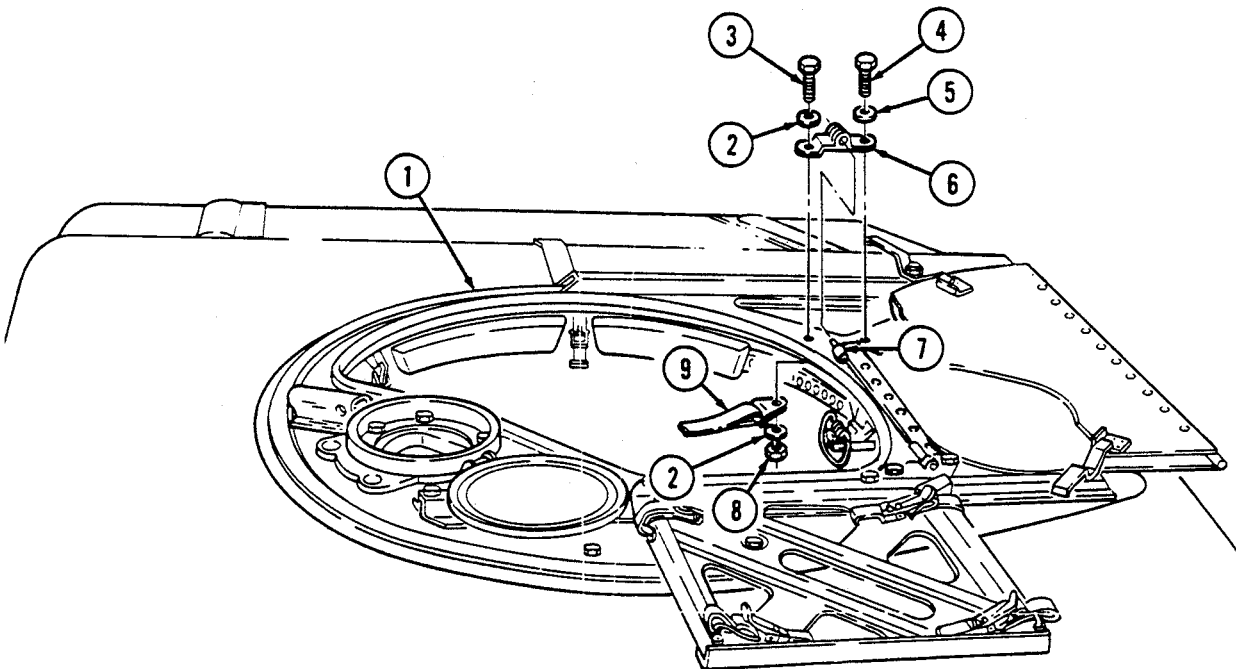
General mechanic's tool kit:
automotive (Appendix B, Item 1)

a. Removal

1. Remove locknut (8), washer (2), capscrew (3), washer (2), gunner's sling (9), and hinge pivot bracket (6) from weapon station (1). Discard locknut (8).
2. Remove capscrew (4), washer (5), and hinge pivot bracket (6) from weapon station (1) and rear hinge pin (7).

b. Installation

1. Install hinge pivot bracket (6) on rear hinge pin (7).
2. Install hinge pivot bracket (6) on weapon station (1) with washer (5) and capscrew (4). Tighten capscrew (4) to 37 lb-ft (50 N·m).
3. Install hinge pivot bracket (6) and gunner's sling (9) on weapon station (1) with washer (2), capscrew (3), washer (2), and locknut (8). Tighten locknut (8) to 37 lb-ft (50 N·m).



11-53. GUNNER'S SLING HOOK REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

All models except M996, M996A1, M997, M997A1, M997A2, M998, M998A1, M1035, M1035A1, M1035A2, M1037, M1038, M1038A1, M1042, M1097, M1097A1, M1097A2

Materials/Parts

Locknut (Appendix G, Item 128)

Manual References

TM 9-2320-280-24P

Tools

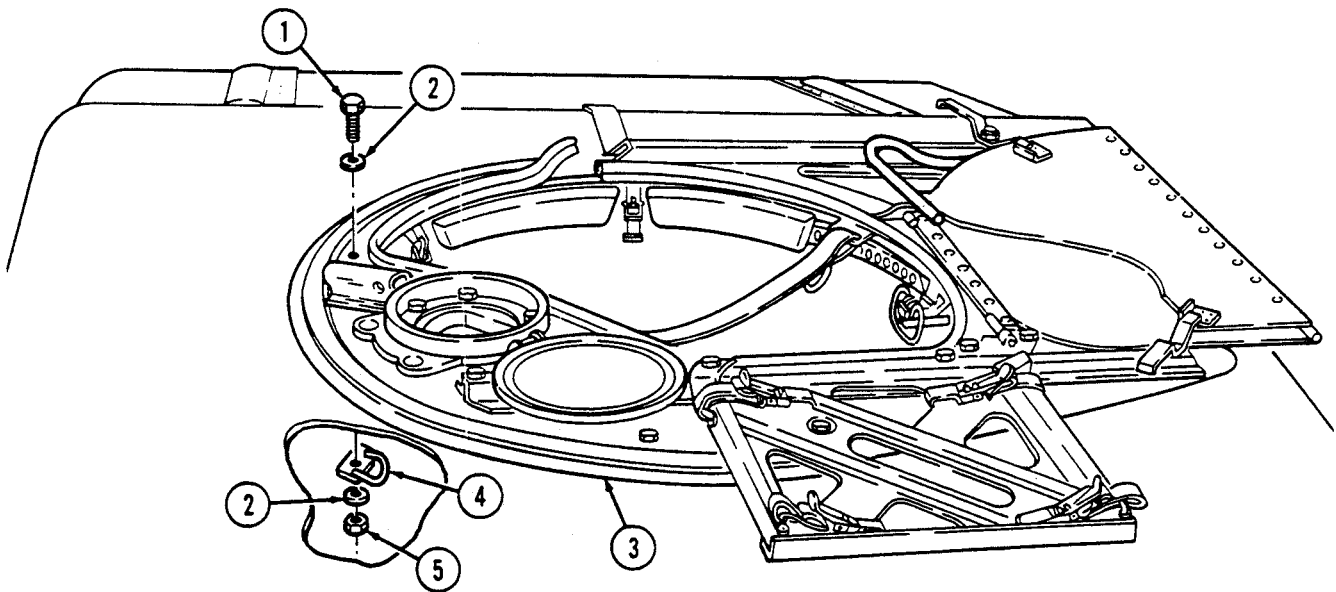
General mechanic's tool kit:
automotive (Appendix B, Item 1)

a. Removal

Remove locknut (5), washer (2), capscrew (1), washer (2), and gunner's sling hook (4) from weapon station (3). Discard locknut (5).

b. Installation

Install gunner's sling hook (4) on weapon station (3) with washer (2), capscrew (1), washer (2), and locknut (5). Tighten locknut (5) to 37 lb-ft (50 N·m).



11-54. WEAPON STATION BACKREST PAD REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

All models except M996, M996A1, M997, M997A1, M997A2, M998, M998A1, M1035, M1035A1, M1035A2, M1037, M1038, M1038A1, M1042, M1097, M1097A1, M1097A2, M1123

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Three locknuts (Appendix G, Item 128)

Manual References

TM 9-2320-280-24P

NOTE

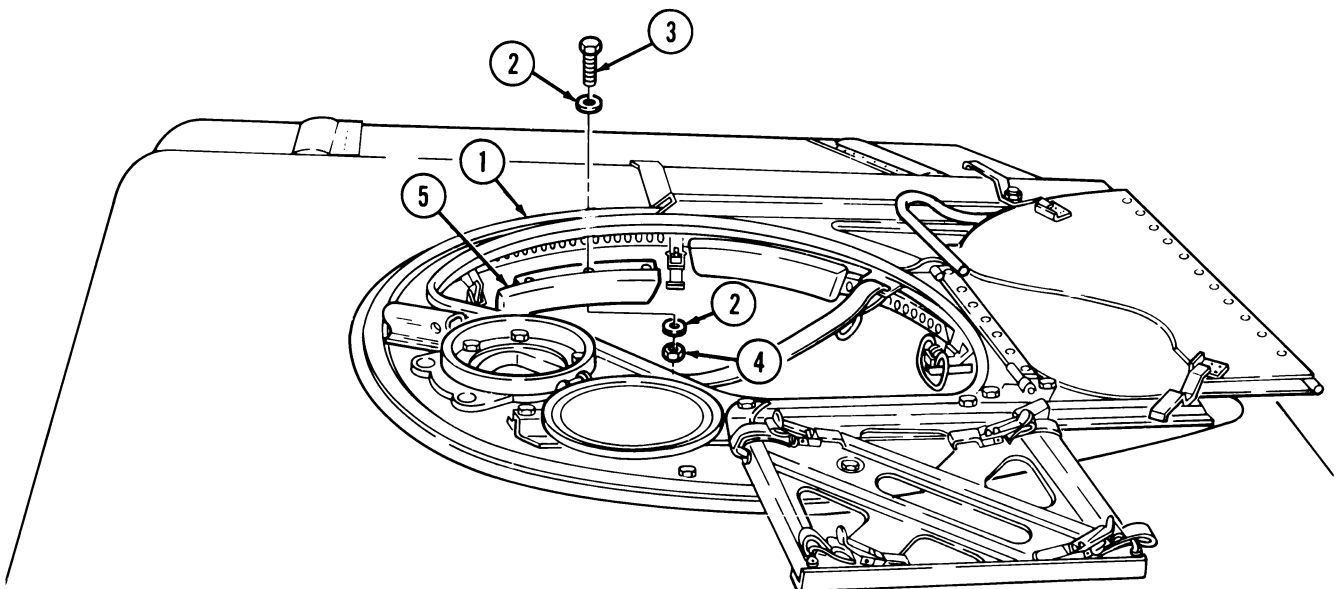
The procedure for removing and installing left and right backrest pads is the same. This procedure covers right backrest pad.

a. Removal

Remove three locknuts (4), washers (2), capscrews (3), washers (2), and backrest pad (5) from weapon station (1). Discard locknuts (4).

b. Installation

Install backrest pad (5) on weapon station (1) with three washers (2), capscrews (3), washers (2), and locknuts (4). Tighten locknuts (4) to 37 lb-ft (50 N·m).



11-55. TURRET HANDLE REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

All models except M996, M996A1, M997, M997A1, M997A2, M998, M998A1, M1035, M1035A1, M1035A2, M1037, M1038, M1038A1, M1042, M1097, M1097A1, M1097A2, M1123

Materials/Parts

Four locknuts (Appendix G, Item 86)

Manual References

TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

NOTE

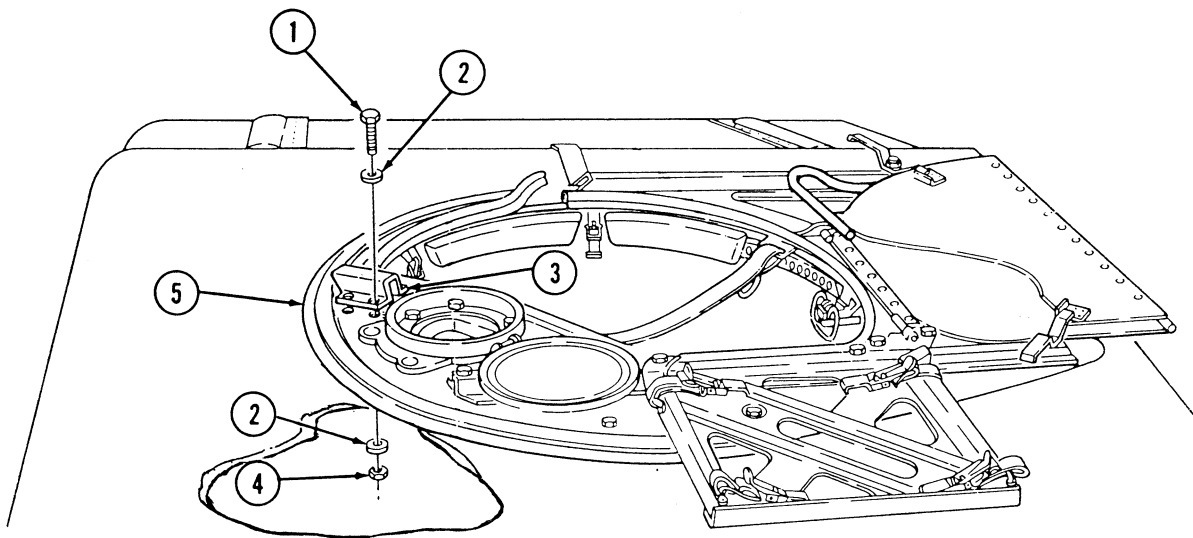
- Fabrication instructions are available to replace the turret handle. Refer to appendix D (fig. D-95).
- The following procedure is for replacement of turret handle that has been previously removed and installed in accordance with the fabrication instructions.

a. Removal

Remove four locknuts (4), washers (2), capscrews (1), washers (2), and turret handle (3) from weapon station tray (5). Discard locknuts (4).

b. Installation

Install turret handle (3) on weapon station tray (5) with four washers (2), capscrews (1), washers (2), and locknuts (4).



11-56. TURRET LOCK REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

All models except M996, M996A1, M997, M997A1, M997A2, M998, M998A1, M1035, M1035A1, M1035A2, M1037, M1038, M1038A1, M1042, M1097, M1097A1, M1097A2

Materials/Parts

Two locknuts (Appendix G, Item 128)

Manual References

TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

a. Removal

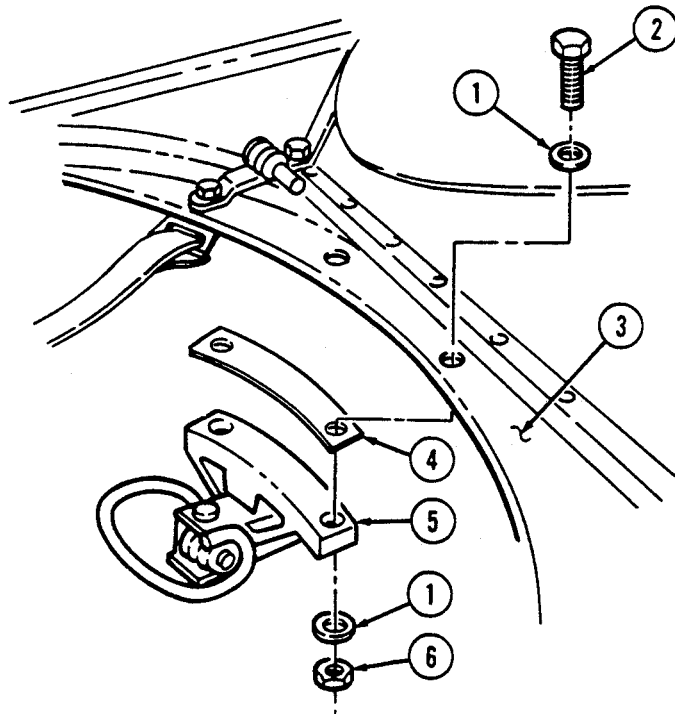
Remove two locknuts (6), washers (1), capscrews (2), washers (1), turret lock (5), and spacer(s) (4) from weapon station (3). Discard locknuts (6).

b. Installation

NOTE

Install same amount of spacers that were removed between bottom of weapon station and turret lock. Amount of spacers may be adjusted to correct lock handle binding. Refer to TM 9-2320-280-24P if more spacers are needed.

Install spacer(s) (4) and turret lock (5) on weapon station (3) with two washers (1), capscrews (2), washers (1), and locknuts (6). Tighten locknuts (6) to 37 lb-ft (50 N·m).



11-57. TOW MOUNT PEDESTAL REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M966, M966A1, M1036, M1045, M1045A1, M1045A2, M1046, M1046A1, M1121

Materials/Part

Eight locknuts (Appendix G, Item 128)

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-24P

a. Removal

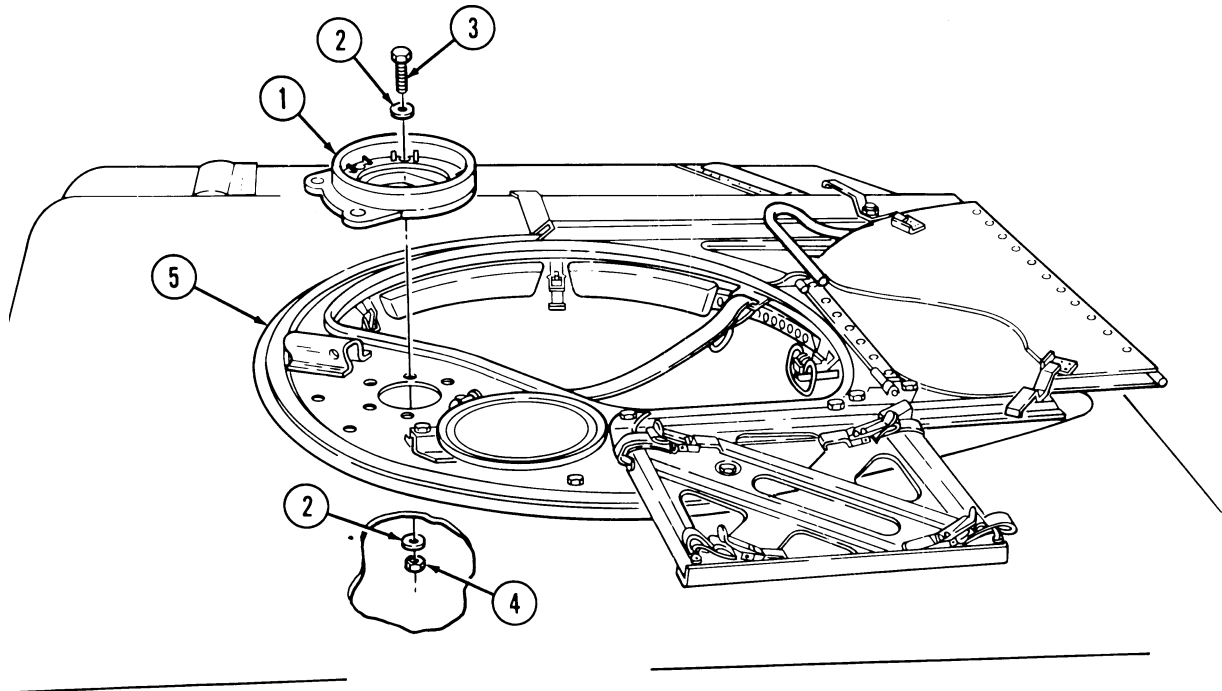
NOTE

Note locations of capscrews for installation.

Remove eight locknuts (4), washers (2), capscrews (3), washers (2), and pedestal mount (1) from weapon station (5). Discard locknuts (4).

b. Installation

Install pedestal mount (1) on weapon station (5) with eight washers (2), capscrews (3), washers (2), and locknuts (4). Tighten locknuts (4) to 37 lb-ft (50 N·m).



11-58. TOW MOUNT PEDESTAL COVER REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M966, M966A1, M1036, M1045,
M1045A1, M1045A2, M1046, M1046A1, M1121

Materials/Parts

Two locknuts (Appendix G, Item 70)

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

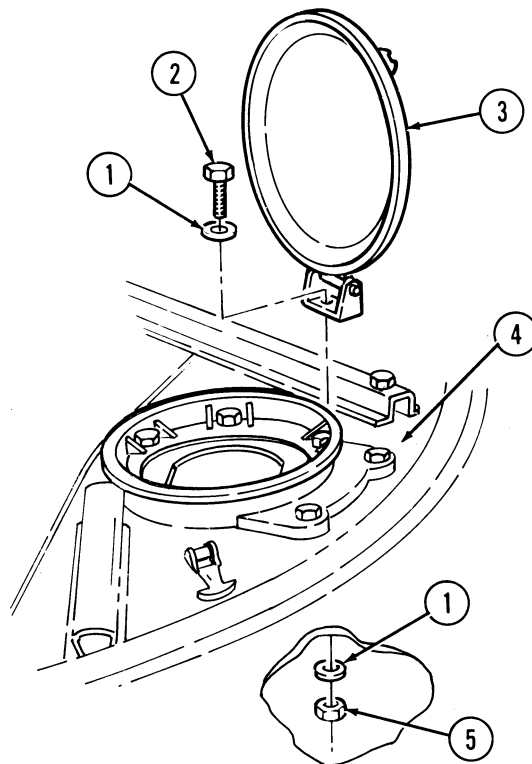
TM 9-2320-280-20P

a. Removal

Remove two locknuts (5), washers (1), capscrews (2), washers (1), and TOW mount pedestal cover (3) from weapon station (4). Discard locknuts (5).

b. Installation

Install TOW mount pedestal cover (3) on weapon station (4) with two washers (1), capscrews (2), washers (1), and locknuts (5). Tighten locknuts (5) to 65 lb-in. (7 N•m).



11-59. TOW MISSILE GUIDANCE SYSTEM PAN REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M966, M966A1, M1036, M1045, M1045A1, M1045A2, M1046, M1046A1, M1121

Materials/Parts

Five locknuts (Appendix G, Item 128)

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-24P

a. Removal

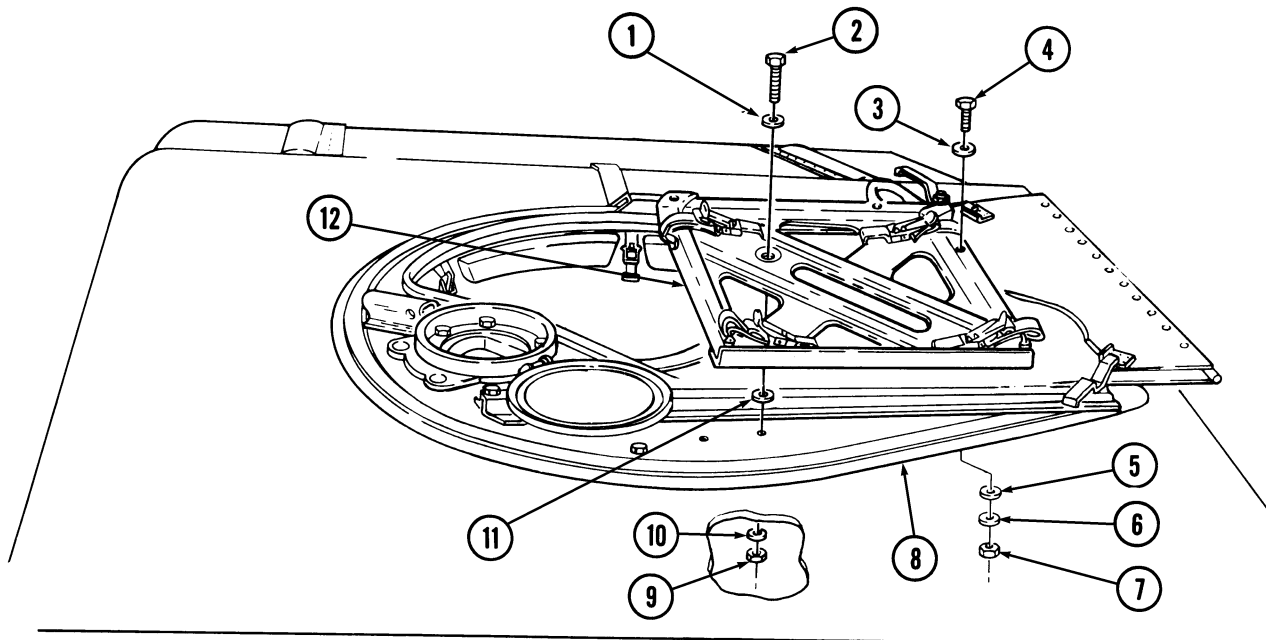
NOTE

Note locations of capscrews for installation.

1. Remove locknut (7), washer (6), washer (5), capscrew (4), and washer (3) from TOW MGS pan (12) and weapon station (8). Discard locknut (7).
2. Remove four locknuts (9), washers (10), capscrews (2), washers (1), TOW MGS pan (12), and three washers (11) from weapon station (8). Discard locknuts (9).

b. Installation

1. Install three washers (11) and TOW MGS pan (12) on weapon station (8) with four washers (1), capscrews (2), washers (10), and locknuts (9).
2. Secure TOW MGS pan (12) to weapon station (8) with washer (3), capscrew (4), washer (5), washer (6), and locknut (7).
3. Tighten locknuts (9) and (7) to 12 lb-ft (16 N·m).



11-60. WEAPON STATION INCLINOMETER REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M966, M966A1, M1036, M1045, M1045A1,
M1045A2, M1046, M1046A1, M1121

Manual References

TM 9-2320-280-24P

Tools

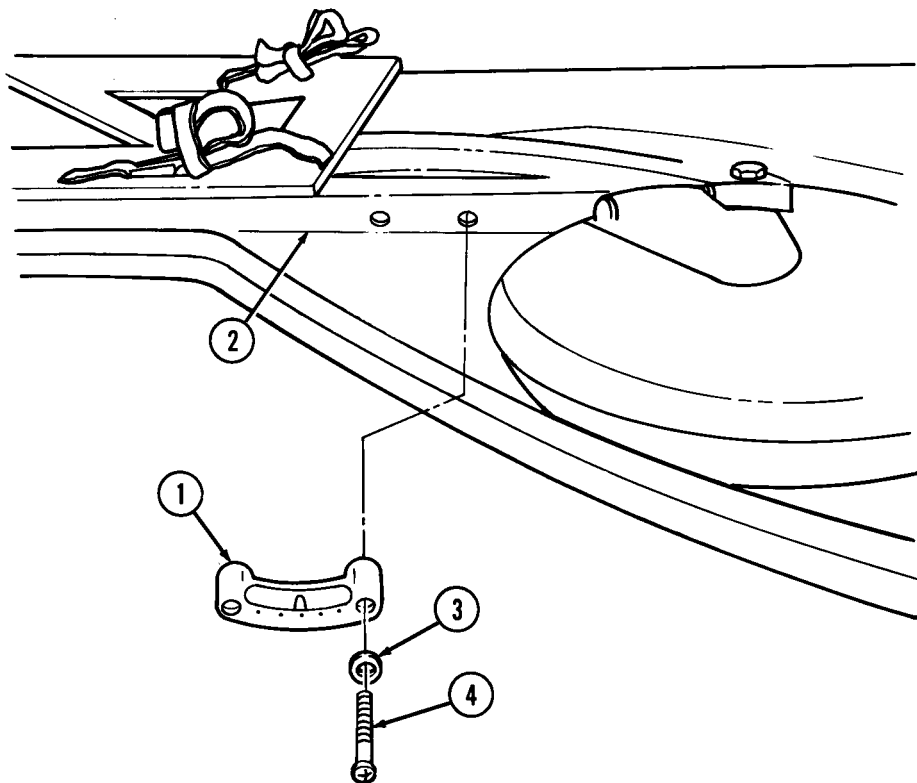
General mechanic's tool kit:
automotive (Appendix B, Item 1)

a. Removal

Remove two screws (4), washers (3), and inclinometer (1) from weapon station (2).

b. Installation

Install inclinometer (1) on weapon station (2) with two washers (3) and screws (4).



11-61. ARMAMENT MOUNTING ASSEMBLY REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M1025, M1025A1, M1025A2, M1026, M1026A1, M1043, M1043A1, M1043A2, M1044, M1044A1

Materials/Parts

Six locknuts (Appendix G, Item 128)

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-24P

a. Removal

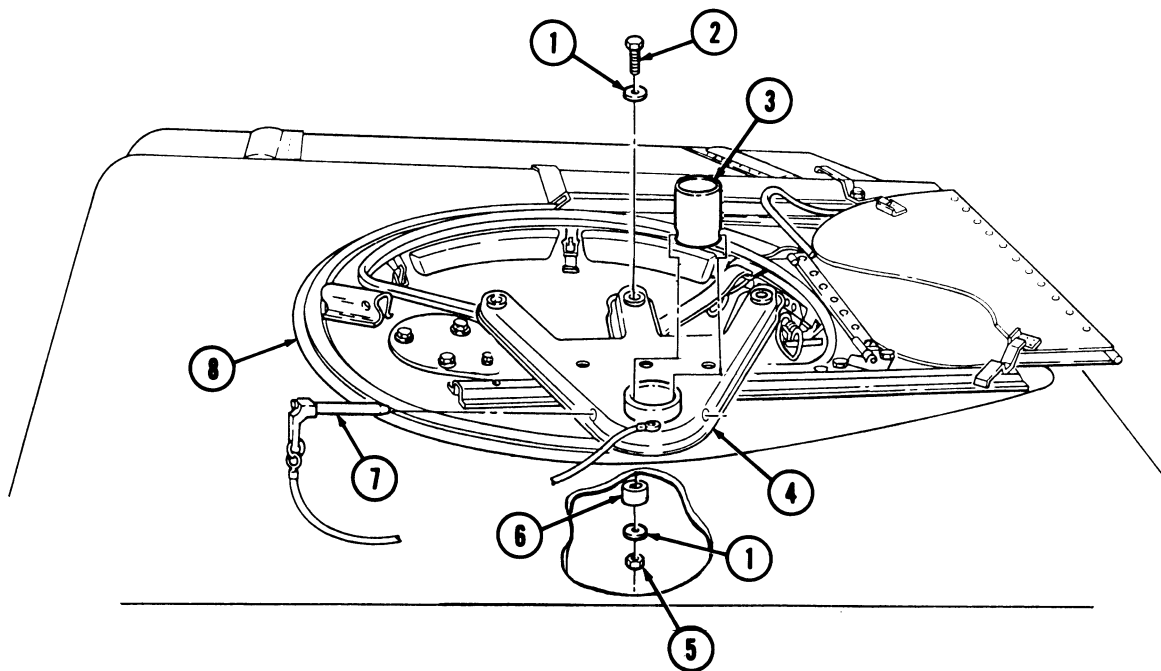
NOTE

- Note locations of capscrews for installation.
- Later production vehicles are equipped with a spacer.

1. Remove pin (7) and adapter (3) from armament mounting assembly (4).
2. Remove six locknuts (5), washers (1), capscrews (2), washers (1), armament mounting assembly (4), and spacers (6), if installed, from weapon station (8). Discard locknuts (5).

b. Installation

1. Install six spacers (6), if removed, and armament mounting assembly (4) on weapon station (8) with six washers (1), capscrews (2), washers (1), and locknuts (5). Tighten locknuts (5) to 37 lb-ft (50 N•m).
2. Install adapter (3) on armament mounting assembly (4) with pin (7).



11-62. ARMAMENT COVER AND SEAL REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M1025, M1025A1, M1025A2, M1026, M1026A1,
M1043, M1043A1, M1043A2, M1044, M1044A1

Materials/Parts

Three locknuts (Appendix G, Item 128)
Locknut (Appendix G, Item 70)

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-24P

a. Removal

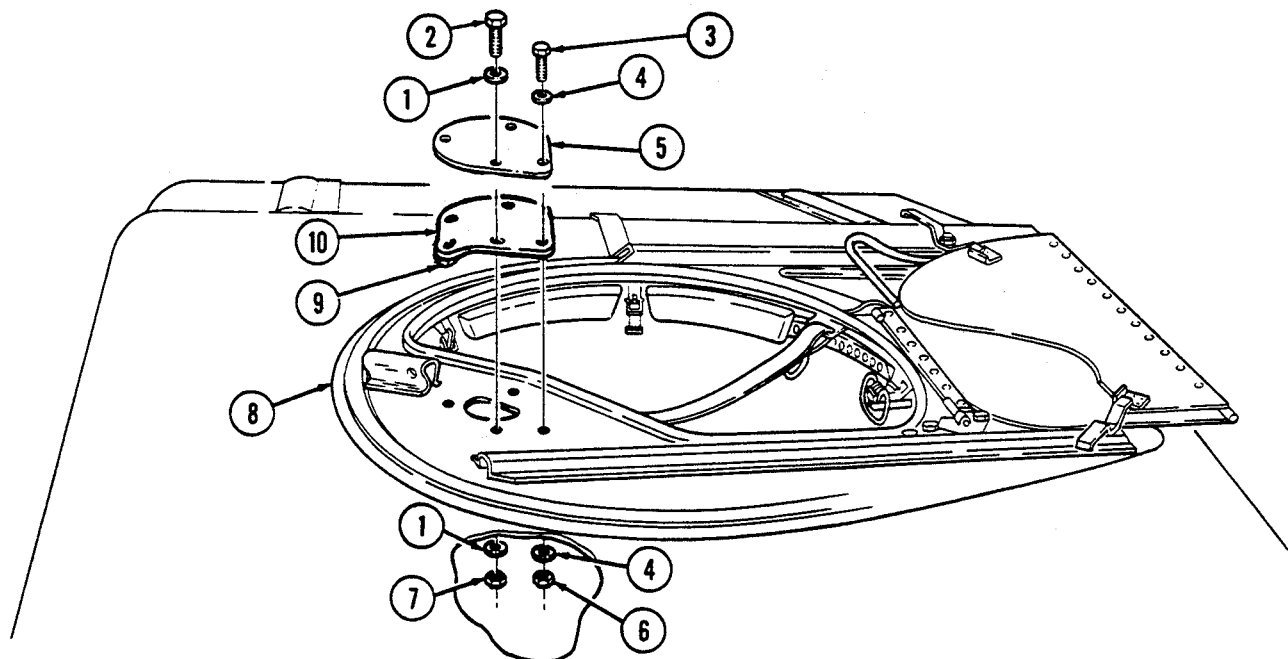
NOTE

Note locations of capscrews for installation.

1. Remove locknut (6), washer (4), capscrew (3), and washer (4) from armament cover (5) and weapon station (8). Discard locknut (6).
2. Remove three locknuts (7), washers (1), capscrews (2), washers (1), and armament cover (5) from weapon station (8). Discard locknuts (7).
3. Remove seal (10) from armament cover (5). Clean armament cover (5) to remove adhesive.

b. Installation

1. Peel paper backing (9) from seal (10) and apply seal (10) to armament cover (5).
2. Install armament cover (5) on weapon station (8) with three washers (1), capscrews (2), washers (1), and locknuts (7).
3. Secure armament cover (5) to weapon station (8) with washer (4), capscrew (3), washer (4), and locknut (6).
4. Tighten locknut (6) to 65 lb-in. (7 N·m). Tighten locknuts (7) to 12 lb-ft (16 N·m).



11-63. GUNNER'S PLATFORM REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

All models except M996, M996A1, M997, M997A1, M997A2, M998, M998A1, M1035, M1035A1, M1035A2, M1037, M1038, M1038A1, M1042, M1097, M1097A1, M1097A2

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

a. Removal

1. Remove four capscrews (3) and washers (2) from two guides (7) and remove four channel nuts (6) from gunner's platform (1).
2. Remove two pins (4) from gunner's platform (1).

NOTE

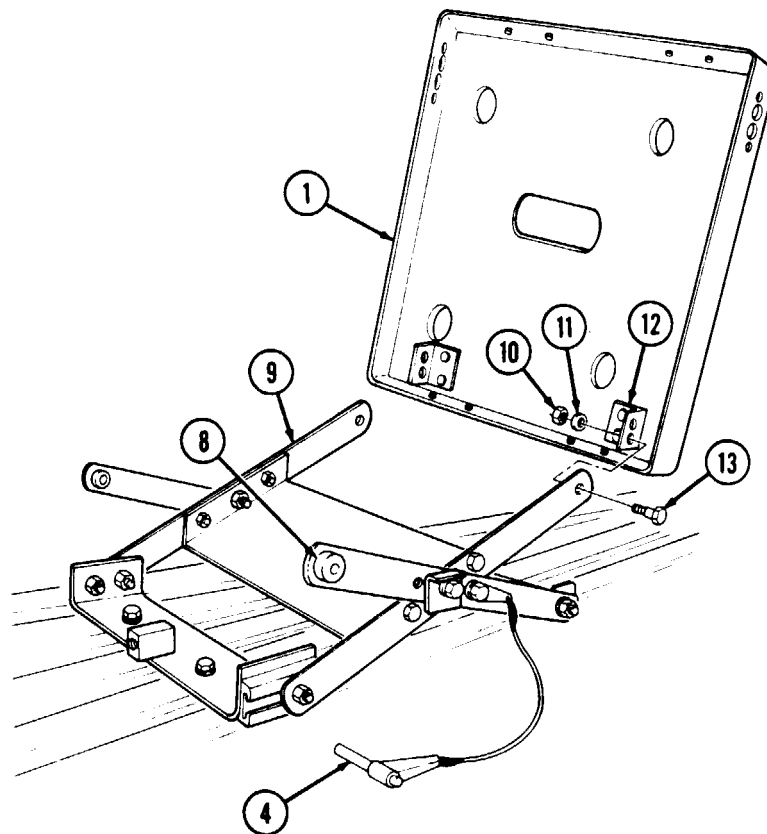
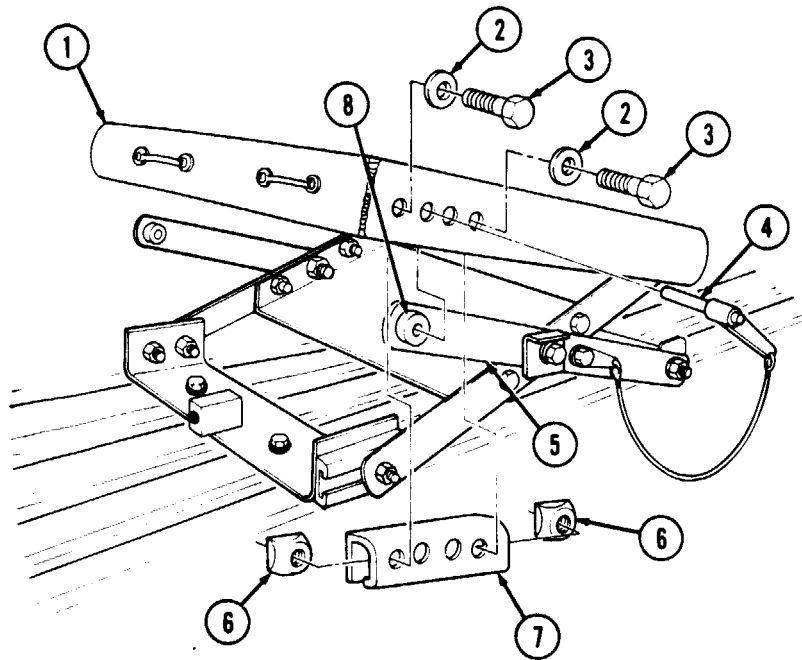
Tag location of guides for installation.

3. Slowly lift front of gunner's platform (1) and remove two guides (7) and four channel nuts (6) from pin receptacles (8) on forward risers (5).
4. Tilt gunner's platform (1) all the way back.
5. Remove two nuts (10), washers (11), and shoulder bolts (13) from rear brackets (12) and rear risers (9) and remove gunner's platform (1).
6. Remove footman loops and straps (para. 10-9) from gunner's platform (1).

b. Installation

1. Install footman loops and straps (para. 10-9) on gunner's platform (1).
2. Install rear brackets (12) on rear risers (9) and install gunner's platform (1) with two shoulder bolts (13), washers (11), and nuts (10). Tighten nuts (10) to 10-15 lb-ft (14-20 N•m).
3. Slide two channel nuts (6) in guides (7), align with front hole in guide (7), and hold in place.
4. Align two guides (7) with front holes in gunner's platform (1). Place two washers (2) on capscrews (3) and install capscrews (3) through front holes in gunner's platform (1) and guides (7) into channel nuts (6). Tighten capscrews (3) finger tight.
5. Slide two pin receptacles (8) into guides (7).
6. Slide two rear channel nuts (6) into rear of guides (7), align with rear holes in gunner's platform (1) by moving front of gunner's platform (1) slightly up and down, and install washers (2) and capscrews (3) in channel nuts (6).
7. Install two pins (4) on rear side holes, and tighten four capscrews (3) to 6 lb-ft (8 N•m).

11-63. GUNNER'S PLATFORM REPLACEMENT (Cont'd)



FOLLOW-ON TASK: Check operation of gunner's platform (TM 9-2320-280-10).

11-64. GUNNER'S PLATFORM ASSEMBLY MAINTENANCE

This task covers:

a. Disassembly

b. Assembly

INITIAL SETUP:

Applicable Models

All models except M996, M996A1, M997, M997A1, M997A2, M998, M998A1, M1035, M1035A1, M1035A2, M1037, M1038, M1038A1, M1042, M1097, M1097A1, M1097A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Six locknuts (Appendix G, Item 111)
Four locknuts (Appendix G, Item 109)
Two locknuts (Appendix G, Item 110)

Personnel Required

One mechanic
One assistant

Manual References

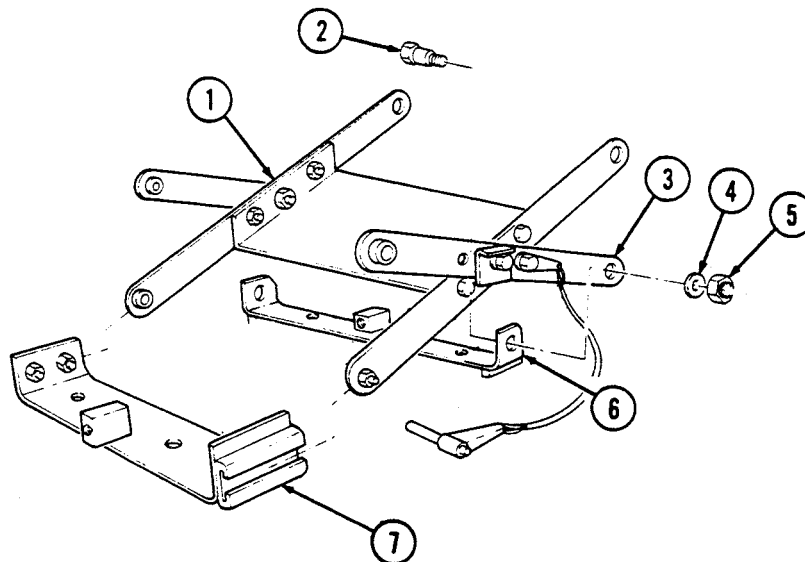
TM 9-2320-280-24P

Equipment Condition

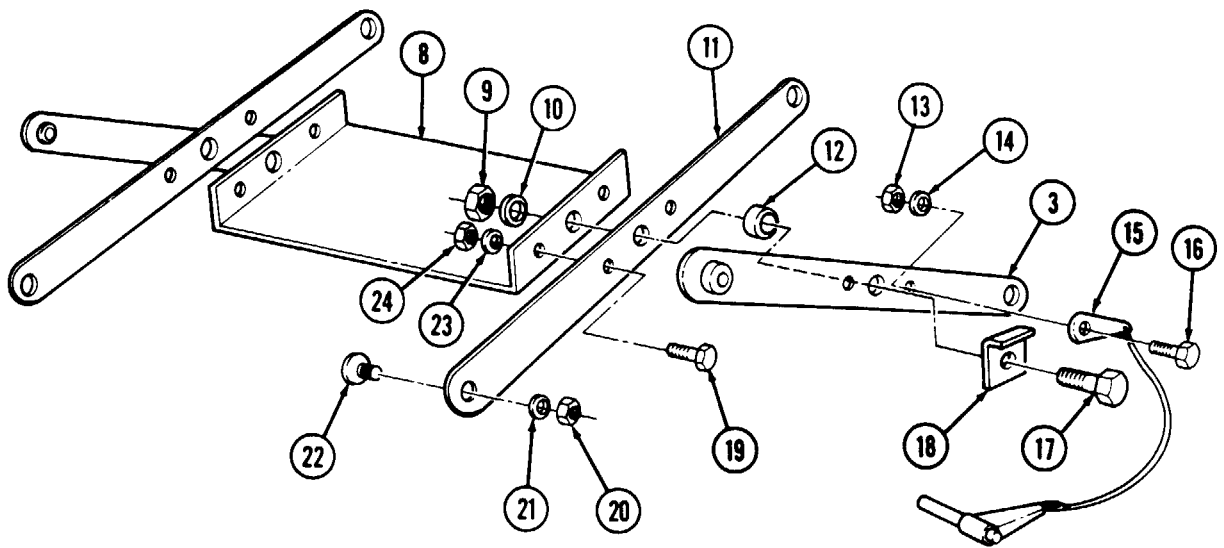
- Gunner's platform removed (para. 11-63).
- Gunner's platform assembly removed (para. 11-65).

a. Disassembly

1. Remove two locknuts (5), washers (4), shoulder bolts (2), and outer risers (3) from rear mounting bracket (6). Discard locknuts (5).
2. Remove riser assembly (1) from front mounting bracket (7).
3. Remove two locknuts (9), washers (10), capscrews (17), spacers (12), outer risers (3), and latches (18) from inner risers (11). Discard locknuts (9).
4. Remove two locknuts (13), washers (14), capscrews (16), and two pin-and-lanyard assemblies (15) from outer risers (3). Discard locknuts (13).
5. Remove four locknuts (24), washers (23), capscrews (19), and inner risers (11) from stiffener plate (8). Discard locknuts (24).
6. Remove two locknuts (20), washers (21), and guide pin bolts (22) from inner risers (11). Discard locknuts (20).



11-64. GUNNER'S PLATFORM ASSEMBLY MAINTENANCE (Cont'd)



11-64. GUNNER'S PLATFORM ASSEMBLY MAINTENANCE (Cont'd)

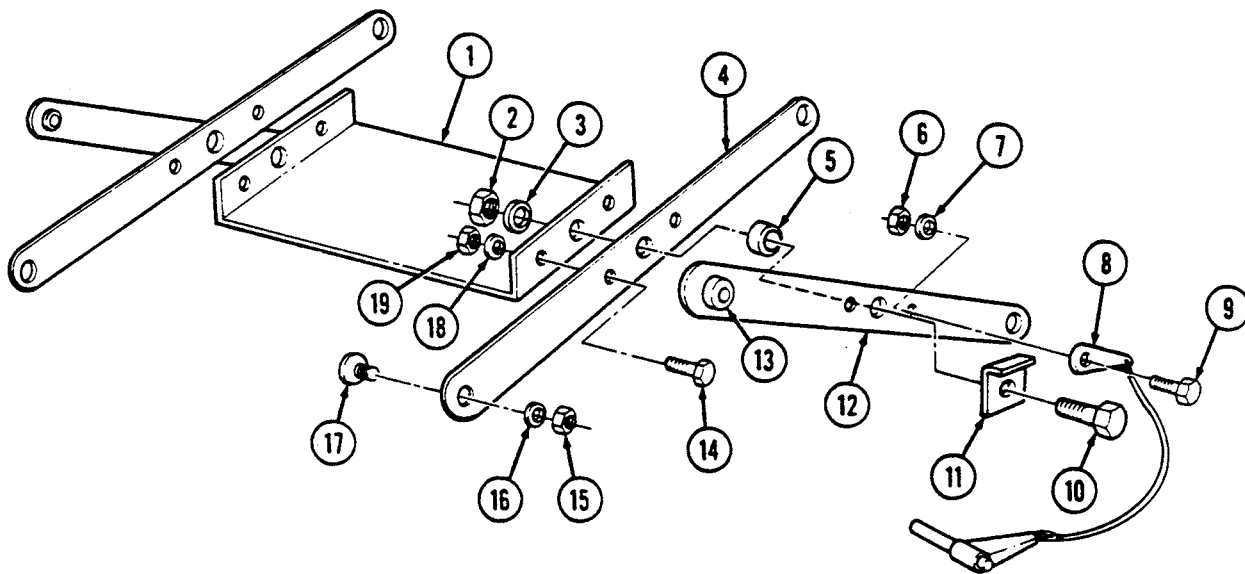
b. Assembly

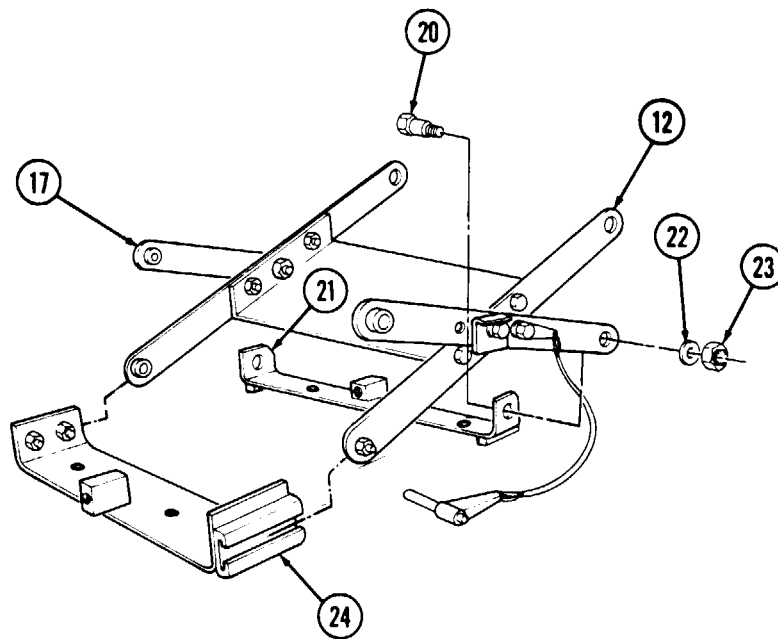
1. Install two guide pin bolts (17) on inner risers (4) with two washers (16) and locknuts (15). Tighten locknuts (15) to 10-15 lb-ft (14-20 N•m).

NOTE

Make sure heads of guide pin bolts are installed inward, facing each other.

2. Install inner risers (4) on stiffener plate (1) with four capscrews (14), washers (18), and locknuts (19). Tighten locknuts (19) to 6 lb-ft (8 N•m).
3. Install two pin-and-lanyard assemblies (8) on outer risers (12), on same side as pin receptacles (13), with two capscrews (9), washers (7), and locknuts (6). Tighten locknuts (6) to 6 lb-ft (8 N•m).
4. Install two spacers (5), outer risers (12), and latches (11) on inner risers (4) ensuring pin receptacles (13) are facing outward, with two capscrews (10), washers (3), and locknuts (2). Tighten locknuts (2) to 6 lb-ft (8 N•m), then back off locknuts 1/4 to 1/2 turn to allow outer risers (12) to pivot freely.
5. Install guide pin bolts (17) on front mounting bracket (24) tracks, and install outer risers (12) on rear mounting bracket (21) with two shoulder bolts (20), washers (22), and locknuts (23). Tighten locknuts (23) to 10-15 lb-ft (14-20 N•m).



11-64. GUNNER'S PLATFORM ASSEMBLY MAINTENANCE (Cont'd)

- FOLLOW-ON TASKS:
- Install gunner's platform (para. 11-63).
 - Install gunner's platform assembly (para. 11-65).

11-65. GUNNER'S PLATFORM ASSEMBLY REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

All models except M996, M996A1, M997, M997A1, M997A2, M998, M998A1, M1035, M1035A1, M1035A2, M1037, M1038, M1038A1, M1042, M1097, M1097A1, M1097A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Five locknuts (Appendix G, Item 90)

Personnel Required

One mechanic
One assistant

Manual References

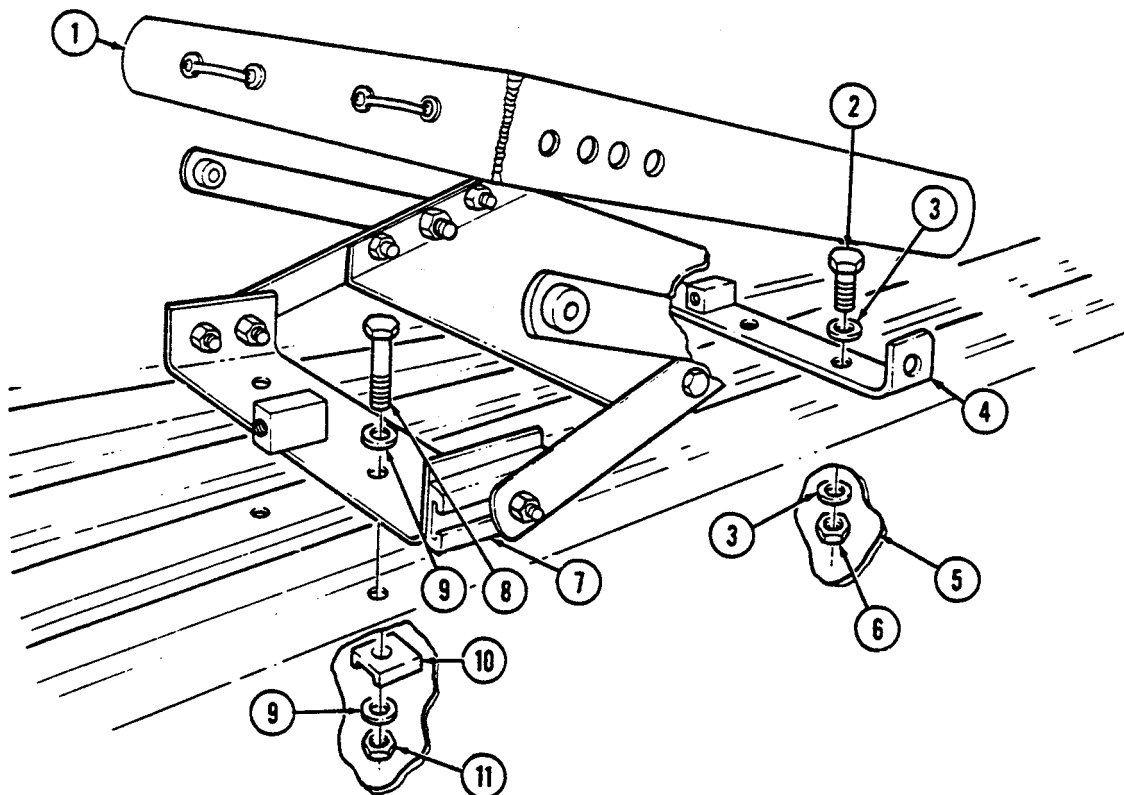
TM 9-2320-280-24P

a. Removal

1. Remove two locknuts (11), washers (9), reinforcement brackets (10), capscrews (8), and washers (9) from front gunner's platform bracket (7) and cargo floor (5). Discard locknuts (11).
2. Remove three locknuts (6), washers (3), capscrews (2), washers (3), gunner's platform assembly (1), and rear gunner's bracket (4) from cargo floor (5). Discard locknuts (6).

b. Installation

1. Install gunner's platform assembly (1) and rear gunner's platform bracket (4) on cargo floor with three washers (3), capscrews (2), washers (3), and locknuts (6).
2. Install front bracket (7) on cargo floor (5) with two washers (9), capscrews (8), reinforcement brackets (10), washers (9), and locknuts (11). Tighten capscrews (2) and (8) to 21 lb-ft (29 N·m).



11-66. VEHICLE POWER CONDITIONER (VPC) MOUNTING BRACKET REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M966, M966A1, M1036, M1045, M1045A1,
M1045A2, M1046, M1046A1

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Four locknuts (Appendix G, Item 96)

Manual References

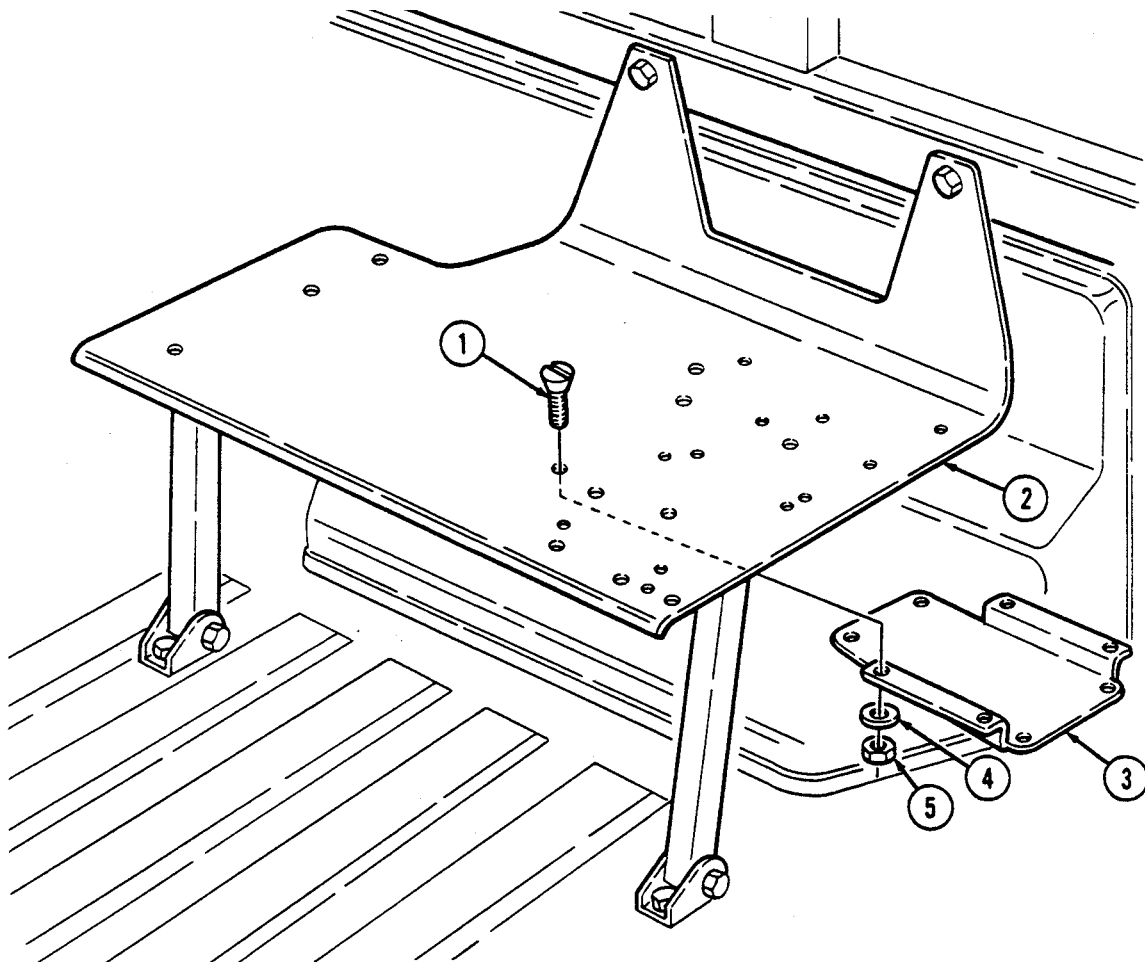
TM 9-2320-280-24P

a. Removal

Remove four locknuts (5), washers (4), screws (1), and vehicle power conditioner (VPC) mounting bracket (3) from underside of radio rack (2). Discard locknuts (5).

b. Installation

Install VPC mounting bracket (3) on underside of radio rack (2) with four screws (1), washers (4), and locknuts (5). Tighten locknuts (5) to 6 lb-ft (8 N·m).



11-67. TOW WIRING HARNESS REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M966, M966A1, M1036, M1045, M1045A1, M1045A2, M1046, M1046A1

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Grease (Appendix C, Item 24)
Two lockwashers (Appendix G, Item 133)
Eight plain-assembled nuts (Appendix G, Item 201)
Lockwasher (Appendix G, Item 148)
Lockwasher (Appendix G, Item 141)
Four plain-assembled nuts (Appendix G, Item 202)

Manual References

TM 43-0139
TM 9-2320-280-24P

Equipment Condition

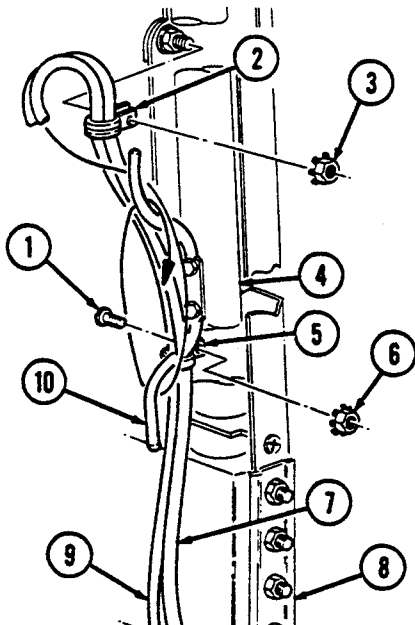
Battery ground cable disconnected (para. 4-73).

a. Removal

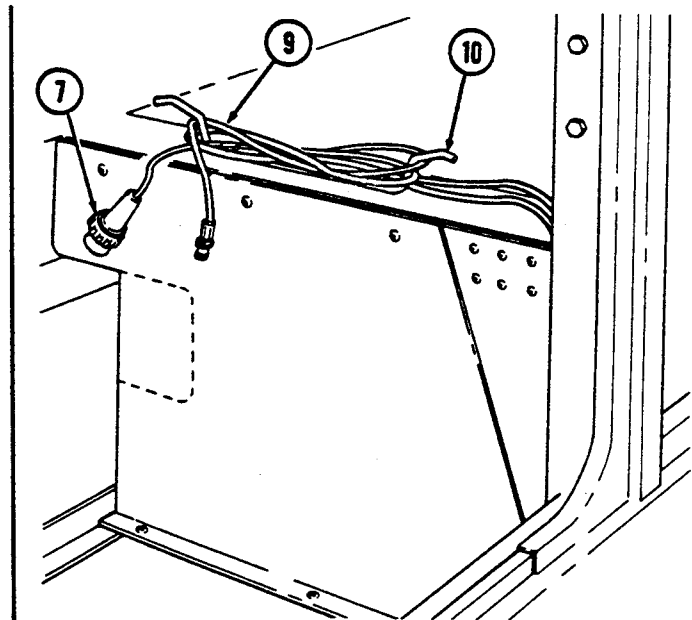
NOTE

Perform steps 1 through 3 for vehicles with serial numbers 99,999 and below and step 4 for vehicles with serial numbers 100,000 and above.

1. Uncoil TOW wiring harness (9) and MGS power cable (7) from cable stowage cleat (10).
2. Remove plain-assembled nut (3) and clamp (2) from TOW wiring harness (9), MGS power cable (7), and support assembly (4). Discard plain-assembled nut (3).
3. Remove two plain-assembled nuts (6), screws (1), and clamps (5) from TOW wiring harness (9), MGS power cable (7), and "B" pillar (8). Discard plain-assembled nuts (6).
4. Uncoil TOW wiring harness (9) and MGS power cable (7) from cable stowage cleat (10).
5. Disconnect VPC cable (11) from connector receptacle (12).
6. Remove four plain-assembled nuts (13), screws (16), cover (15), and connector receptacle (12) from bracket (14). Discard plain-assembled nuts (13).
7. Remove two plain-assembled nuts (17), screws (19), and clamps (18) from TOW wiring harness (9) and battery box (20). Discard plain-assembled nuts (17).

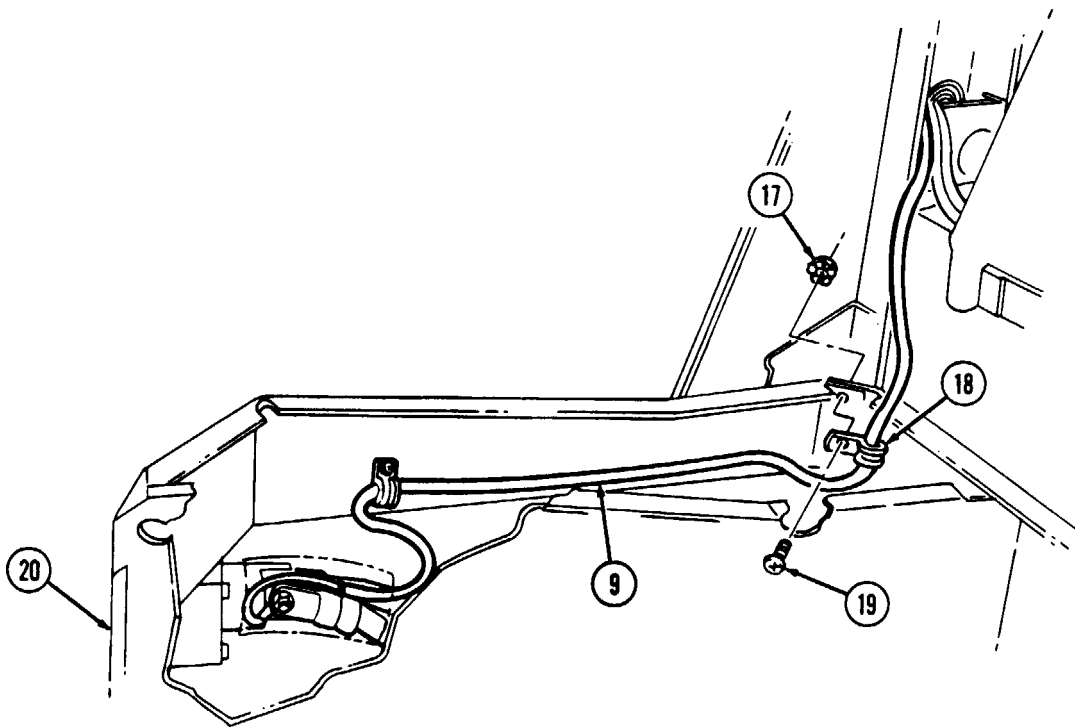
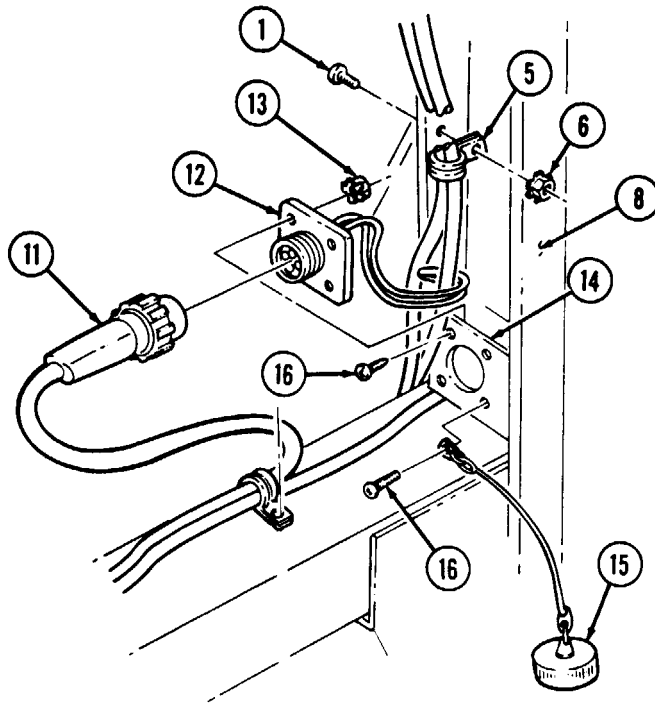


OLD CONFIGURATION



NEW CONFIGURATION

11-67. TOW WIRING HARNESS REPLACEMENT (Cont'd)



11-67. TOW WIRING HARNESS REPLACEMENT (Cont'd)

NOTE

Perform steps 8 through 10 and 14 and 15 for vehicles with serial numbers 99,999 and below, and steps 11 through 15 for vehicles with serial numbers 100,000 and above with kits 5705623 and 5705624 installed.

8. Slide rubber boot (9) back to allow access to slave receptacle (3) connections.
9. Remove capscrew (1), lockwasher (2), slave positive cable (10), and lead 49B (11) from slave receptacle (3). Discard lockwasher (2).
10. Remove capscrew (5), lockwasher (4), slave negative cable (6), and lead 50B (7) from slave receptacle (3). Remove TOW wiring harness (8) from vehicle. Discard lockwasher (4).
11. Remove plain-assembled nut (21), screw (23), and clamp (22) from TOW wiring harness (8) and battery box (18). Discard plain-assembled nut (21).
12. Remove capscrew (12), lockwasher (13), lead 50B (7), slave negative cable (6), and battery negative cable (14) from shunt (15). Discard lockwasher (13).
13. Remove nut (20), lockwasher (19), lead 49B (11), cables (17), and slave positive cable (10) from power stud (16). Discard lockwasher (19).
14. Remove two plain-assembled nuts (32), screws (24), and clamps (25) from MGS power cable (26), VPC cable (31), and body (27). Discard plain-assembled nuts (32).
15. Remove two screws (29) from retainer (30) and body (27) and pull back insulation (28). Remove MGS power cable (26) and VPC cable (31) from vehicle.

b. Installation

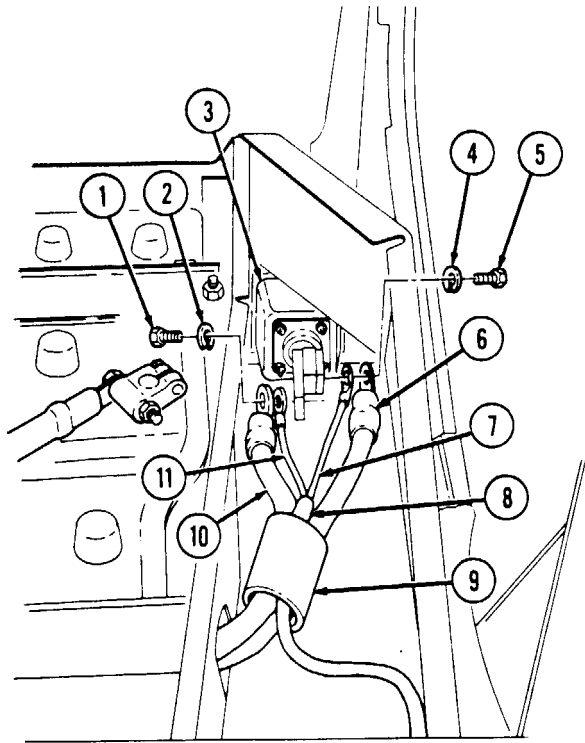
1. Install MGS power cable (26) and VPC cable (31) on approximate mounting location in vehicle.
2. Install insulation (28) over MGS power cable (26) and VPC cable (31) and install retainer (30) to body (27) with two screws (29).
3. Install VPC cable (31) and MGS power cable (26) on body (27) with two clamps (25), screws (24), and plain-assembled nuts (32).
4. Install TOW wiring harness (8) in approximate mounting location on vehicle.

NOTE

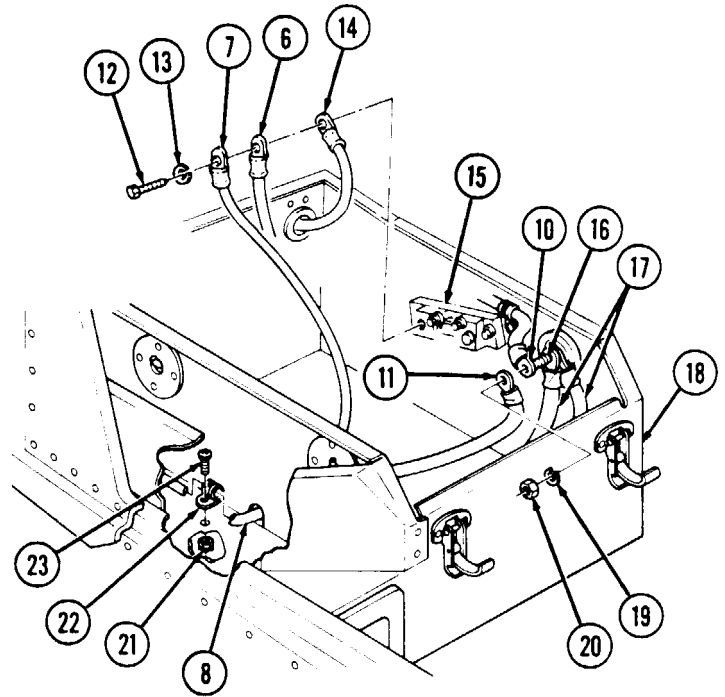
Perform steps 5 through 7 and 11 for vehicles with serial numbers 99,999 and below, and steps 8 through 10 for vehicles with serial numbers 100,000 and above with kits 5705623 and 5705624 installed.

5. Connect lead 50B (7) and slave negative cable (6) to slave receptacle (3) with lockwasher (4) and capscrew (5).
6. Connect lead 49B (11) and slave positive cable (10) to slave receptacle (3) with lockwasher (2) and capscrew (1).
7. Using grease, coat receptacle (3) terminals and all exposed metal on rear of receptacle (3) and area under cap on front of receptacle (3).
8. Install lead 49B (11), slave positive cable (10), and cables (17) on power stud (16) with lockwasher (19) and nut (20). Apply grease to power stud (16) and all exposed metal.
9. Install battery negative cable (14), slave negative cable (6), and lead 50B (7) on shunt (15) with lockwasher (13) and capscrew (12).
10. Install TOW wiring harness (8) on battery box (18) with clamp (22), screw (23), and plain-assembled nut (21).
11. Slide rubber boot (9) to cover slave receptacle (3) connections.

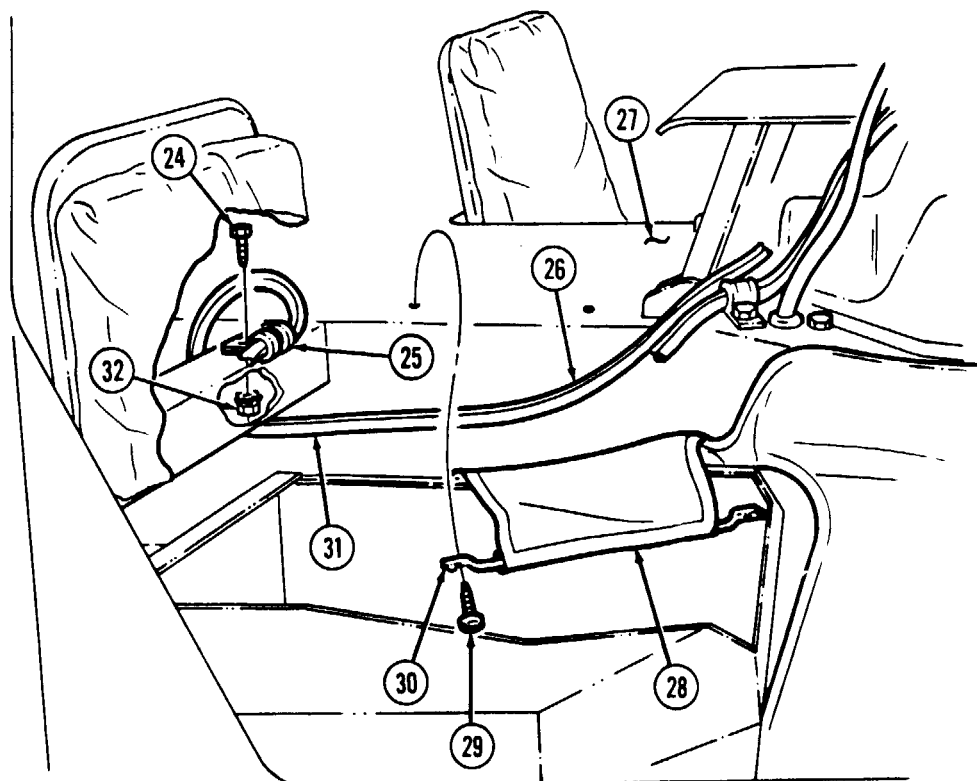
11-67. TOW WIRING HARNESS REPLACEMENT (Cont'd)



OLD CONFIGURATION



NEW CONFIGURATION



11-67. TOW WIRING HARNESS REPLACEMENT (Cont'd)

WARNING

The battery box on some HMMWV TOW carrier models M966, M966A1, M1045, M1045A1, M1045A2, M1046, or M1046A1 with serial numbers 1 through 19,410 has cut through the TOW power cable. A cut TOW power cable can cause a fire or battery explosion.

12. Inspect battery box (5) at corner where TOW wiring harness (2) exits battery box (5).
13. If the top edge of battery box (5) forms two "points" where the wiring harness (2) exits battery box (5), (before), cut off the pointed corners and file round. Spot paint, if necessary (refer to TM 43-0139). Battery box (5) should resemble (after) illustration when completed.
14. Install TOW wiring harness (2) on battery box (5) with two clamps (3), screws (4), and plain-assembled nuts (1).

NOTE

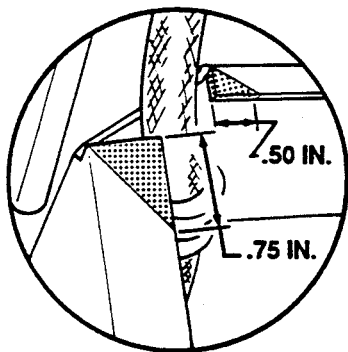
Cover chain is installed under lower right screw.

15. Install connector receptacle (7) and cover (15) on bracket (13) with four screws (16) and plain-assembled nuts (8).
16. Connect VPC cable (6) to connector receptacle (7).

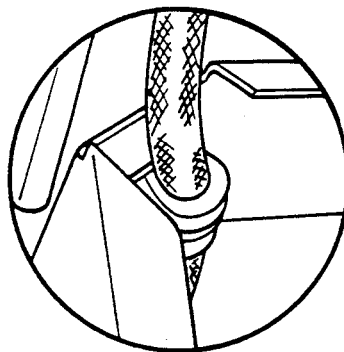
NOTE

Perform steps 18 through 20 for vehicles with serial numbers 99,999 and below and step 17 for vehicles with serial numbers 100,000 and above.

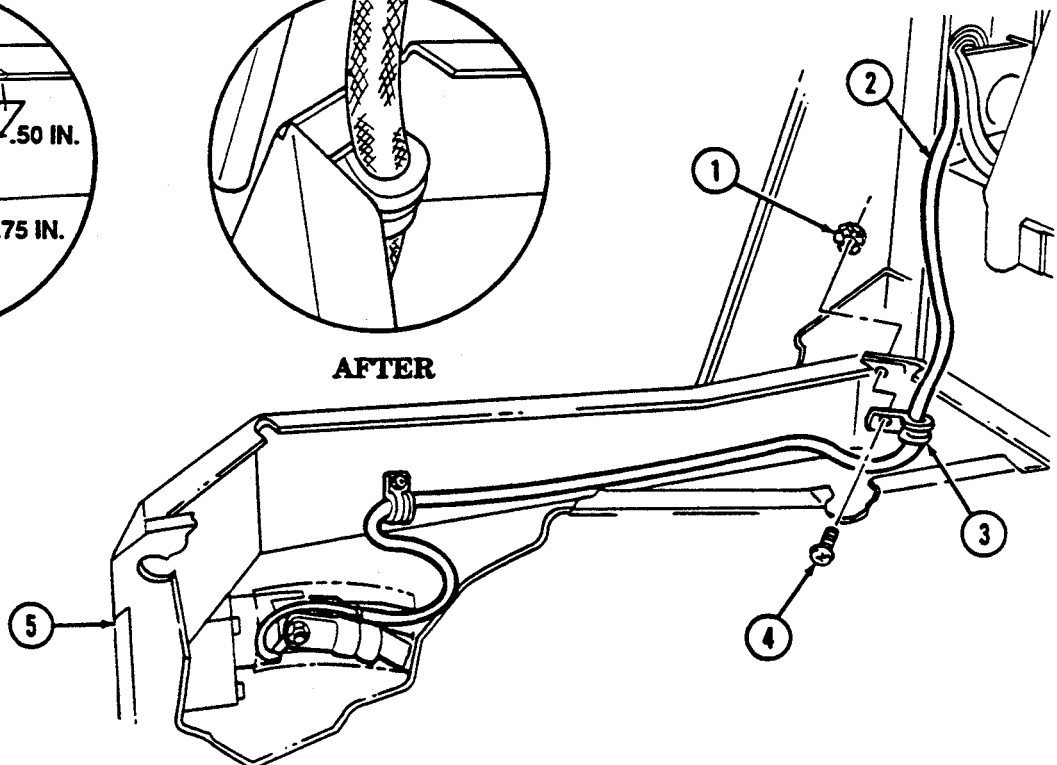
17. Coil TOW wiring harness (2) and MGS power cable (10) around cable cleat (20).
18. Install TOW wiring harness (2) and MGS power cable (10) on "B" pillar (14) with two clamps (11), screws (9), and plain-assembled nuts (12).
19. Install TOW wiring harness (2) and MGS power cable (10) on support assembly (19) with clamp (17) and plain-assembled nut (18).
20. Coil TOW wiring harness (2) and MGS power cable (10) around cable stowage cleat (20).



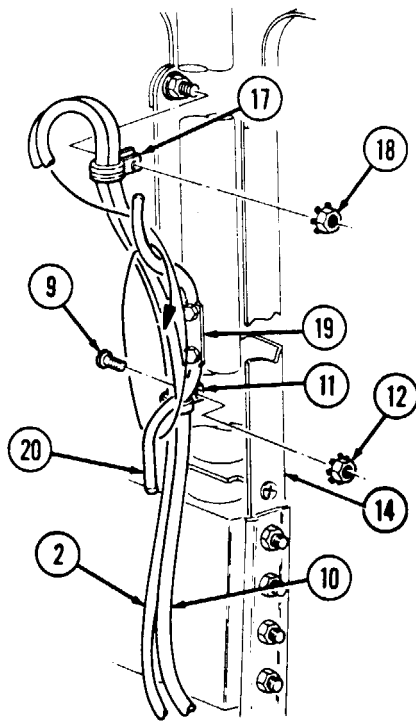
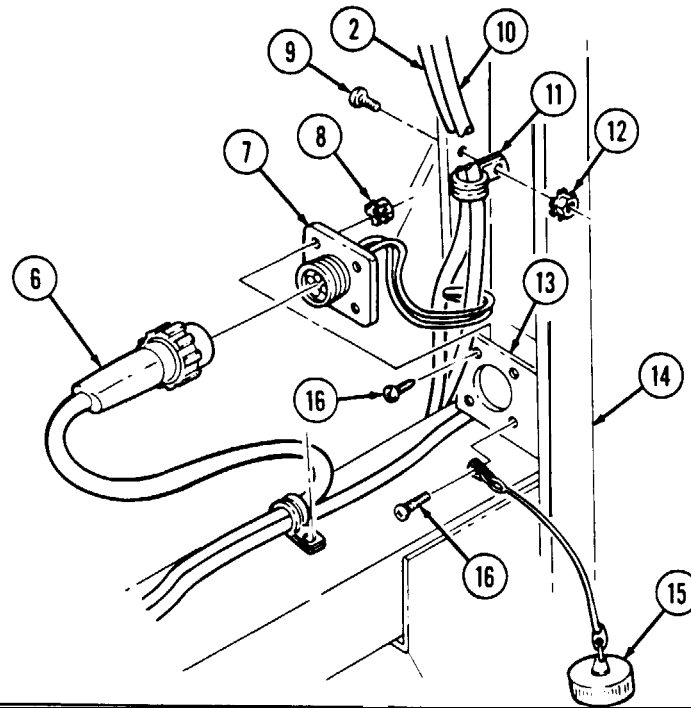
BEFORE



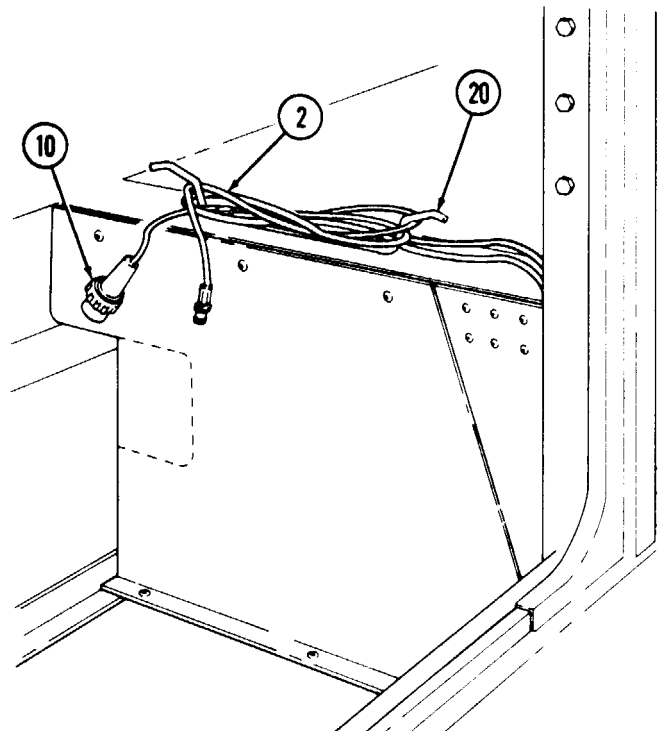
AFTER



11-67. TOW WIRING HARNESS REPLACEMENT (Cont'd)



OLD CONFIGURATION



NEW CONFIGURATION

FOLLOW-ON TASK: Connect battery ground cable (para. 4-73).

11-68. CABLE STORAGE CLEAT REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M966, M966A1, M1036, M1045, M1045A1,
M1045A2, M1046, M1046A1

Manual References

TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

a. Removal

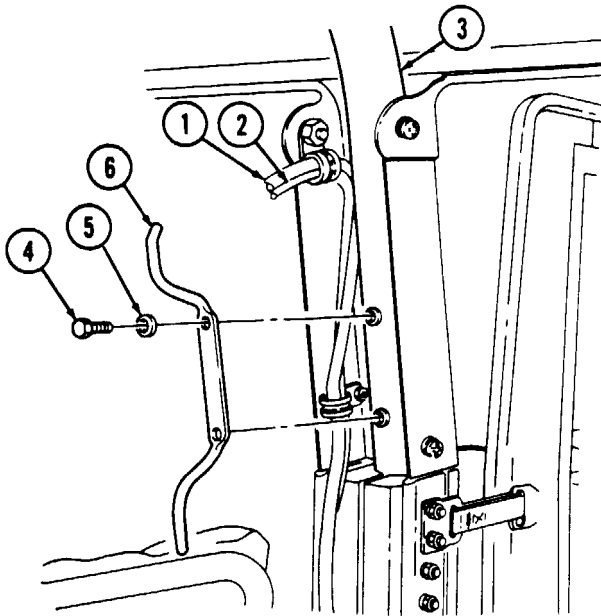
NOTE

The cable storage cleat for vehicles with serial numbers 100,000 and above is located behind the companion seat. Removal and installation procedures are basically the same.

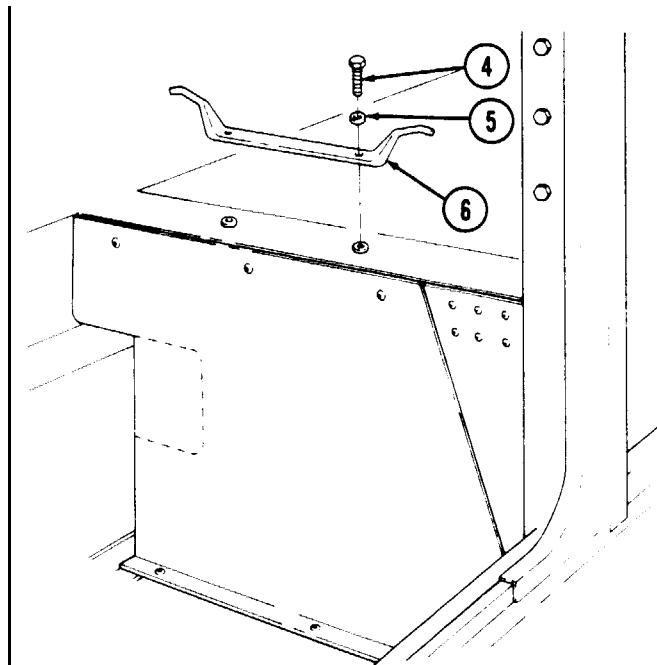
1. Uncoil TOW wiring harness (1) and MGS power cable (2) from cable storage cleat (6).
2. Remove two capscrews (4), washers (5), and cable storage cleat (6) from support assembly (3).

b. Installation

1. Install cable storage cleat (6) on support assembly (3) with two washers (5) and capscrews (4). Tighten capscrews (4) to 6 lb-ft (8 N·m).
2. Coil TOW wiring harness (1) and MGS power cable (2) around cable storage cleat (6).



OLD CONFIGURATION



NEW CONFIGURATION

11-69. FIELD GLASSES BRACKET REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M966, M966A1, M1036, M1045, M1045A1,
M1045A2, M1046, M1046A1

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Three locknuts (Appendix G, Item 96)

Manual References

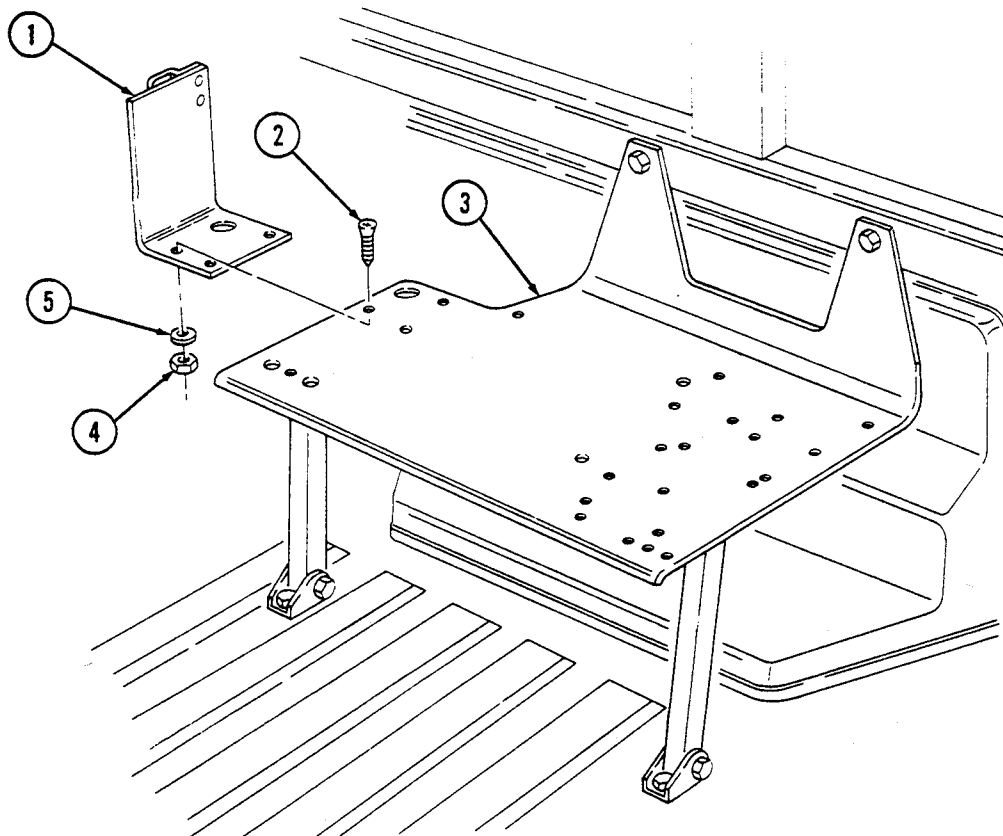
TM 9-2320-280-24P

a. Removal

Remove three locknuts (4), washers (5), screws (2), and field glasses bracket (1) from radio rack assembly (3). Discard locknuts (4).

b. Installation

Install field glasses bracket (1) on radio rack assembly (3) with three screws (2), washers (5), and locknuts (4). Tighten locknuts (4) to 6 lb-ft (8 N•m).



11-70. STOWAGE MOUNT BRACKET REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M966, M966A1, M1036, M1045, M1045A1, M1045A2, M1046, M1046A1

Personnel Required

One mechanic
One assistant

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-24P

Materials/Parts

Two locknuts (Appendix G, Item 70)

Equipment Condition

- Stowage pedestal removed (para. 11-71).
- Fuel tank removed (para. 3-24).

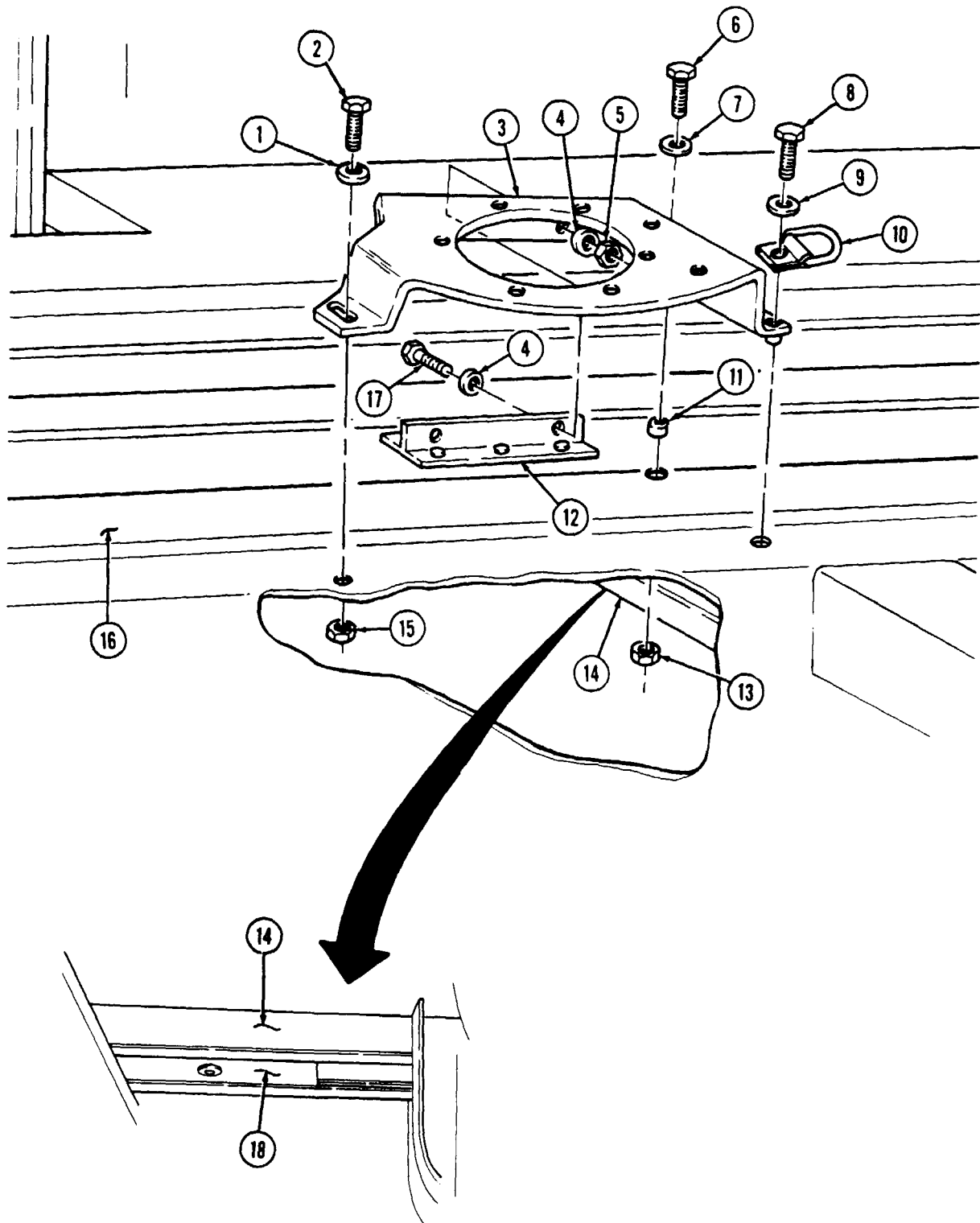
a. Removal

1. Remove two locknuts (5), washers (4), capscrews (17), and washers (4) from stowage mount bracket (3) and support bracket (12). Discard locknuts (5).
2. Remove capscrew (8), washer (9), and tiedown (10) from stowage bracket (3) and cargo floor (16).
3. Slide plate (18) in "B" beam (14) to allow access to nut (13).
4. Remove nut (13), capscrew (6), and washer (7) from stowage bracket (3), spacer (11), and cargo floor (16).
5. Remove nut (15), capscrew (2), washer (1), stowage bracket (3), and spacer (11) from cargo floor (16).

b. Installation

1. Install spacer (11) and stowage bracket (3) on cargo floor (16) with washer (1), capscrew (2), and nut (15). Tighten capscrew (2) to 37 lb-ft (50 N•m).
2. Install stowage bracket (3) on cargo floor (16) with washer (7), capscrew (6), and nut (13). Tighten capscrew (6) to 37 lb-ft (50 N•m).
3. Close plate (18) in "B" beam (14).
4. Secure stowage bracket (3) and tiedown (10) to cargo floor (16) with washer (9) and capscrew (8). Tighten capscrew (8) to 75 lb-ft (102 N•m).
5. Install stowage bracket (3) on support bracket (12) with two washers (4), capscrews (17), washers (4), and locknuts (5). Tighten locknuts (5) to 6 lb-ft (8 N•m).

11-70. STOWAGE MOUNT BRACKET REPLACEMENT (Cont'd)



- FOLLOW-ON TASKS:
- Install fuel tank (para. 3-24).
 - Install stowage pedestal (para. 11-71).

11-71. STOWAGE PEDESTAL REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M966, M966A1, M1036, M1045, M1045A1,
M1045A2, M1046, M1046A1

Manual References

TM 9-1425-450-12
TM 9-1425-472-12
TM 9-2320-280-24P

Tools:

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

Traversing unit mount adapter removed
(TM 9-1425-450-12, TM 9-1425-472-12).

Materials/Parts

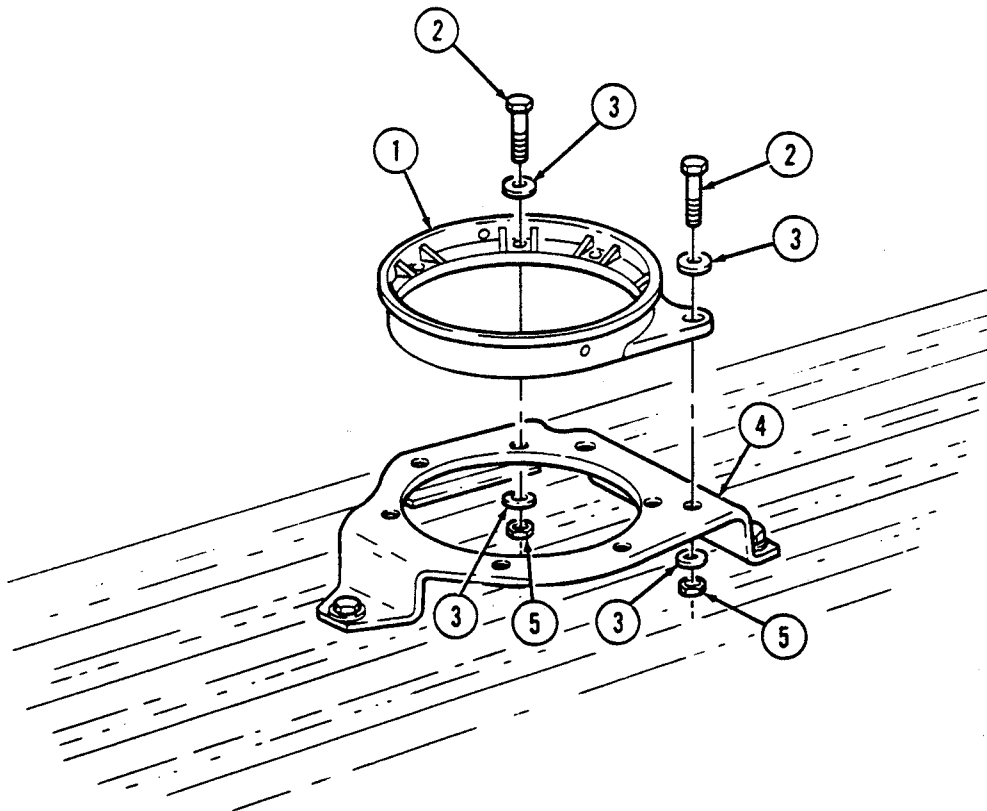
Eight locknuts (Appendix G, Item 128)

a. Removal

Remove eight locknuts (5), washers (3), capscrews (2), washers (3), and stowage pedestal (1) from stowage mount bracket (4). Discard locknuts (5).

b. Installation

Install stowage pedestal (1) on stowage mount bracket (4) with eight washers (3), capscrews (2), washers (3), and locknuts (5). Tighten capscrews (2) to 31 lb-ft (42 N•m).



FOLLOW-ON TASK: Install traversing unit mount adapter (TM 9-1425-450-12, TM 9-1425-472-12).

11-72. TRAVERSING UNIT MOUNT ADAPTER MAINTENANCE

This task covers:

a. Disassembly

b. Assembly

INITIAL SETUP:

Applicable Models

M966, M966A1, M1036, M1045, M1045A1,
M1045A2, M1046, M1046A1

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Six locknuts (Appendix G, Item 70)

Manual References

TM 9-1425-450-12
TM 9-1425-472-12
TM 9-2320-280-24P

Equipment Condition

Traversing unit mount adapter removed
(TM 9-1425-450-12, TM 9-1425-472-12).

NOTE

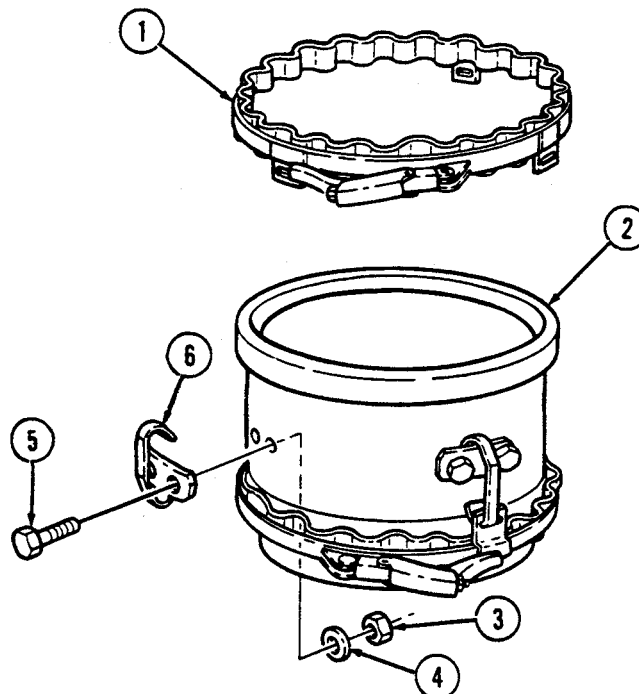
- Upper coupling clamp and lower coupling clamp are removed and installed the same. This procedure covers the upper coupling clamp.
- Note position of coupling clamp for installation.

a. Disassembly

Remove six locknuts (3), washers (4), capscrews (5), three retainers (6), and coupling clamp (1) from traversing unit mount adapter (2). Discard locknuts (3).

b. Assembly

Install coupling clamp (1) on traversing unit mount adapter (2) with three retainers (6), capscrews (5), washers (4), and locknuts (3). Tighten locknuts (3) to 6 lb-ft (8 N·m).



FOLLOW-ON TASK: Install traversing unit mount adapter (TM 9-1425-450-12, TM 9-1425-472-12).

11-73. ELEVATION AND DEPRESSION STOP ASSEMBLY MAINTENANCE

This task covers:

a. Disassembly

b. Assembly

INITIAL SETUP:

Applicable Models

M966, M966A1, M1036, M1045, M1045A1,
M1045A2, M1046, M1046A1

Manual References

TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

General Safety Instructions

Note position of downward stop and upward stop
for assembly.

Materials/Parts

Three retaining rings (Appendix G, Item 235)

WARNING

Note position of elevation and depression downward stop and
upward stop for assembly. Injury to personnel and/or damage to
equipment will result if stops are not properly assembled.

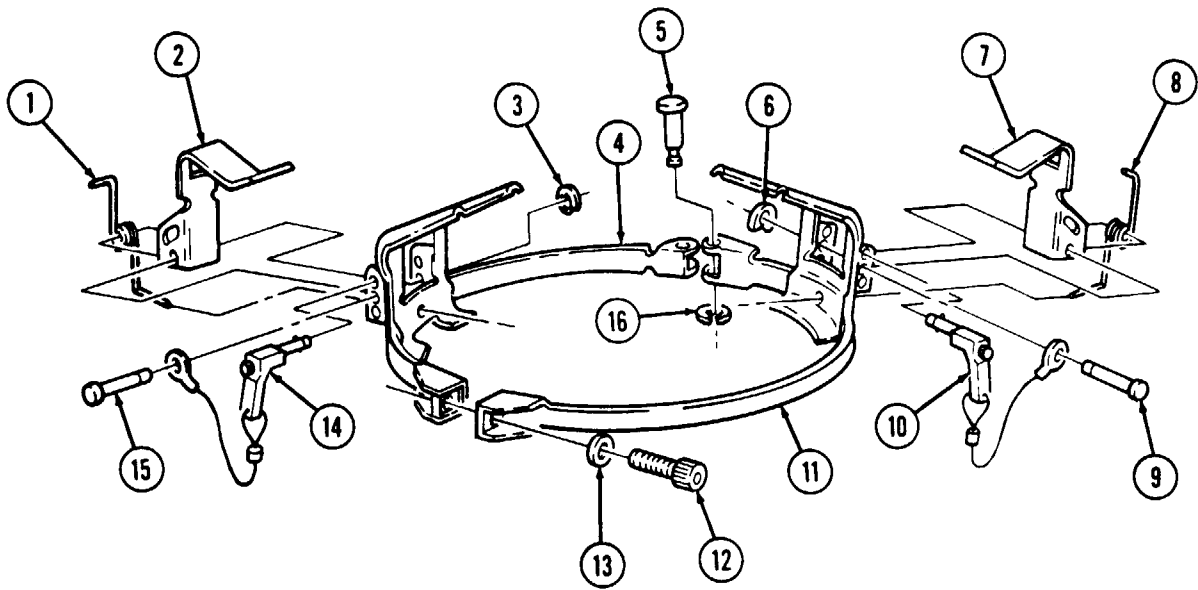
a. Disassembly

1. Remove retaining ring (3), clevis pin (15), cable end of pin assembly (14), and return spring (1) from upward stop strap (4). Discard retaining ring (3).
2. Remove pin assembly (14) and upward stop bracket (2) from upward stop strap (4).
3. Remove retaining ring (6), clevis pin (9), cable end of pin assembly (10), and return spring (8) from downward stop strap (11). Discard retaining ring (6).
4. Remove pin assembly (10) and downward stop bracket (7) from downward stop strap (11).
5. Remove retaining ring (16), clevis pin (5), socket head screw (12), and washer (13) from stop straps (4) and (11). Discard retaining ring (16).

b. Assembly

1. Install stop straps (4) and (11) together with clevis pin (5), retaining ring (16), washer (13), and socket head screw (12).
2. Install downward stop bracket (7) on downward stop strap (11) with pin assembly (10) through upper holes of downward stop bracket (7) and downward stop strap (11).
3. Install return spring (8), downward stop bracket (7), and cable end of pin assembly (10) on downward stop strap (11) with clevis pin (9) and retaining ring (6).
4. Install upward stop bracket (2) on upward stop strap (4) with pin assembly (14) through upper holes of upward stop bracket (2) and upward stop strap (4).
5. Install return spring (1), upward stop bracket (2), and cable end of pin assembly (14) on upward stop strap (4) with clevis pin (15) and retaining ring (3).

11-73. ELEVATION AND DEPRESSION STOP ASSEMBLY MAINTENANCE (Cont'd)



11-74. M16 AMMO RACK ASSEMBLY REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M966, M966A1, M1036, M1045, M1045A1, M1045A2, M1046, M1046A1

Personnel Required

One mechanic
One assistant

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Materials/Parts

Four locknuts (Appendix G, Item 70)
Two locknuts (Appendix G, Item 74)

Equipment Condition

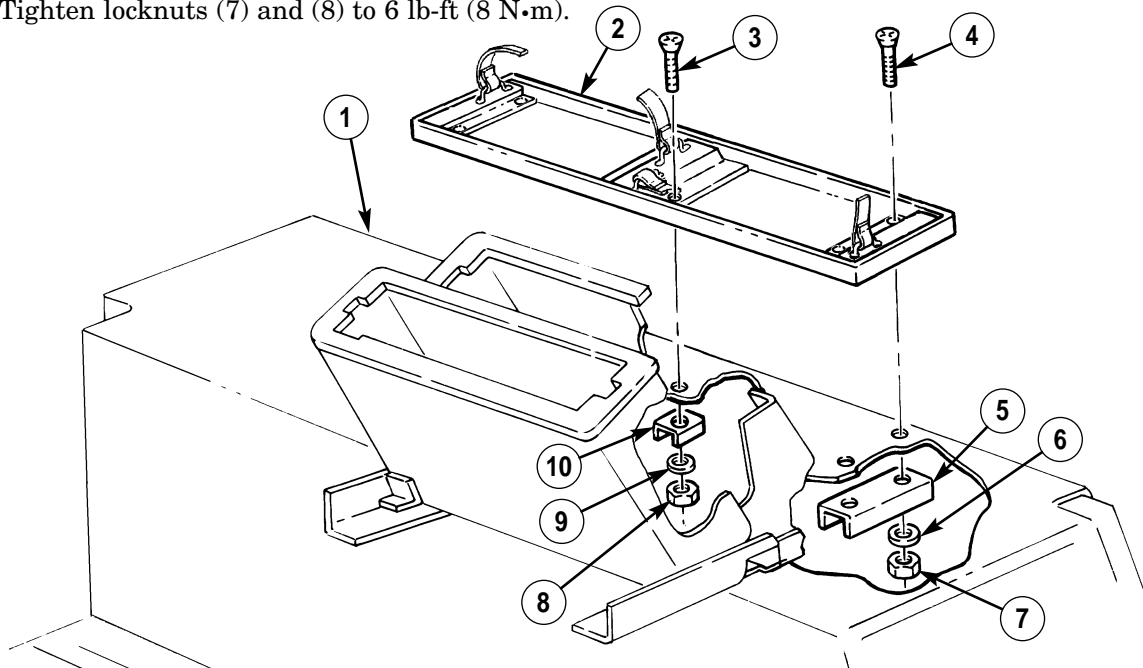
Rear end of cargo shell door raised
(TM 9-2320-280-10).

a. Removal

1. Remove four locknuts (7), washers (6), two reinforcement brackets (5), and four screws (4) from M16 ammo rack (2) and wheelhouse (1). Discard locknuts (7).
2. Remove two locknuts (8), washers (9), reinforcement brackets (10), screws (3), and M16 ammo rack (2) from wheelhouse (1). Discard locknuts (8).

b. Installation

1. Install M16 ammo rack (2) on wheelhouse (1) with two screws (3), reinforcement brackets (10), washers (9), and locknuts (8).
2. Secure M16 ammo rack (2) to wheelhouse (1) with four screws (4), two reinforcement brackets (5), four washers (6), and locknuts (7).
3. Tighten locknuts (7) and (8) to 6 lb-ft (8 N·m).



FOLLOW-ON TASK: Close cargo shell door (TM 9-2320-280-10).

11-75. TOW MISSILE RACK MAINTENANCE

This task covers:

- | | |
|----------------|-----------------|
| a. Removal | d. Assembly |
| b. Disassembly | e. Installation |
| c. Inspection | |

INITIAL SETUP:

Applicable Models

M966, M966A1, M1036, M1045, M1045A1, M1045A2, M1046, M1046A1

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Adhesive (Appendix C, Item 1)
Eight cotter pins (Appendix G, Item 16)
Eighteen locknuts (Appendix G, Item 70)
Three locknuts (Appendix G, Item 81)
Sixteen locknuts (Appendix G, Item 107)
Eight cotter pins (Appendix G, Item 12)
Two locknuts (Appendix G, Item 79)

Personnel Required

One mechanic
One assistant

Manual References

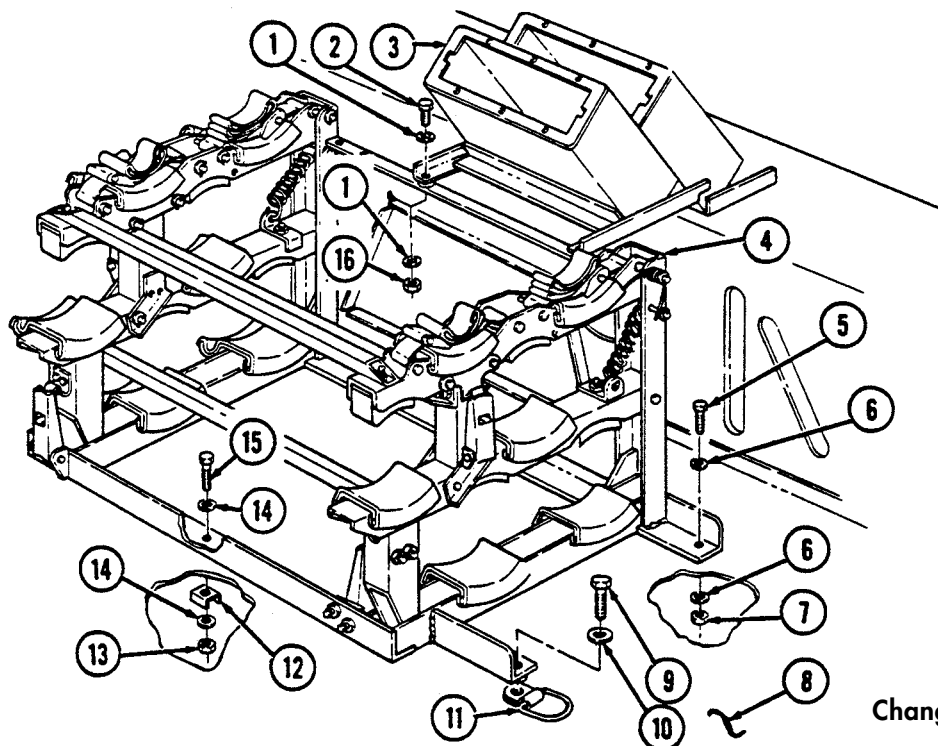
TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

- Rear end of cargo shell door raised (TM 9-2320-280-10).
- Tailgate lowered (TM 9-2320-280-10).
- Footman loop and strap removed (para. 10-9).

a. Removal

1. Remove two locknuts (16), washers (1), capscrews (2), and washers (1) from MGS battery rack (3) and missile rack (4). Discard locknuts (16).
2. Remove three locknuts (7), washers (6), capscrews (5), and washers (6) from missile rack (4) and cargo floor (8). Discard locknuts (7).
3. Remove two locknuts (13), washers (14), reinforcements (12), capscrews (15), and washers (14) from missile rack (4) and cargo floor (8). Discard locknuts (13).
4. Remove capscrew (9), washer (10), missile rack (4), and tiedown (11) from cargo floor (8).



11-75. TOW MISSILE RACK MAINTENANCE (Cont'd)**b. Disassembly**

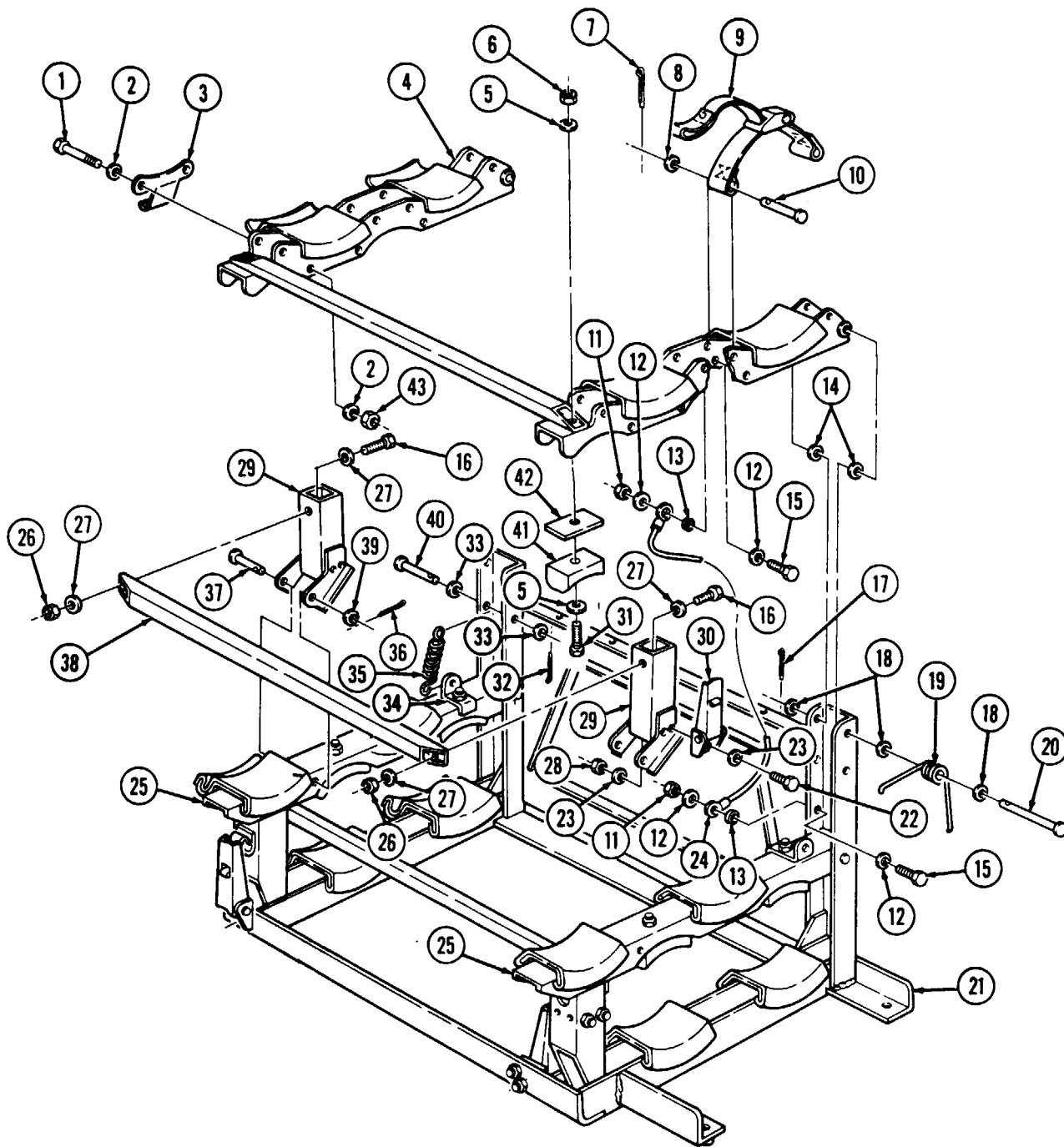
1. Remove eight cotter pins (7), washers (8), pins (10), and four strap assemblies (9) from upper rack assembly (4). Discard cotter pins (7).
2. Remove two locknuts (11), washers (12), capscrews (15), washers (12), spacers (13), and lanyard (24) from upper rack assembly (4) and base assembly (21). Discard locknuts (11).
3. Release two tension latches (30) and raise upper rack assembly (4). Remove two cotter pins (17), washers (18), pins (20), washers (18), torsion springs (19), washers (18), four washers (14), and upper rack assembly (4) from base assembly (21). Discard cotter pins (17).

NOTE

Shims are installed under each bumper on front end of missile rack, but only as needed under bumpers on rear end of missile rack.

4. Remove four locknuts (6), washers (5), capscrews (31), washers (5), four bumpers (41), and shims (42) from upper rack assembly (4). Discard locknuts (6).
5. Remove four locknuts (43), washers (2), screws (1), washers (2), and two latch strikes (3) from upper rack assembly (4). Discard locknuts (43).
6. Remove two cotter pins (32), washers (33), pins (40), and washers (33) from extension springs (35) and base assembly (21). Disconnect extension springs (35) from spring brackets (34). Discard cotter pins (32).
7. Remove two cotter pins (36), washers (39), pins (37), and upper supports (29) from intermediate rack assemblies (25). Discard cotter pins (36).
8. Remove four locknuts (28), washers (23), screws (22), washers (23), and two tension latches (30) from upper supports (29). Discard locknuts (28).
9. Remove two locknuts (26), washers (27), capscrews (16), washers (27), and connector bar (38) from upper supports (29). Discard locknuts (26).

11-75. TOW MISSILE RACK MAINTENANCE (Cont'd)



11-75. TOW MISSILE RACK MAINTENANCE (Cont'd)

10. Remove two cotter pins (16), washers (17), and pins (18) from intermediate supports (6). Release two tension latches (21) and remove intermediate supports (6) and washers (13) from base assembly (27). Discard cotter pins (16).

NOTE

Shims are installed under each bumper on front end of missile rack, but only as needed under bumpers on rear end of missile rack.

11. Remove four locknuts (7), washers (8), capscrews (12), washers (8), bumpers (11), shims (10), and two spring brackets (9) (outer side only) from intermediate supports (6). Discard locknuts (7).
12. Remove four locknuts (29), washers (2), screws (1), washers (2), and two latch strikes (3) from intermediate rack assemblies (6). Discard locknuts (29).
13. Remove two locknuts (14), washers (5), capscrews (4), washers (5), and connector bar (15) from intermediate rack assemblies (6). Discard locknuts (14).
14. Remove two locknuts (26), washers (24), capscrews (23), washers (24), and bracket (22) from base assembly (27). Discard locknuts (26).
15. Remove four locknuts (19), washers (20), screws (25), washers (20), and two tension latches (21) from base assembly (27) and bracket (22). Discard locknuts (19).

NOTE

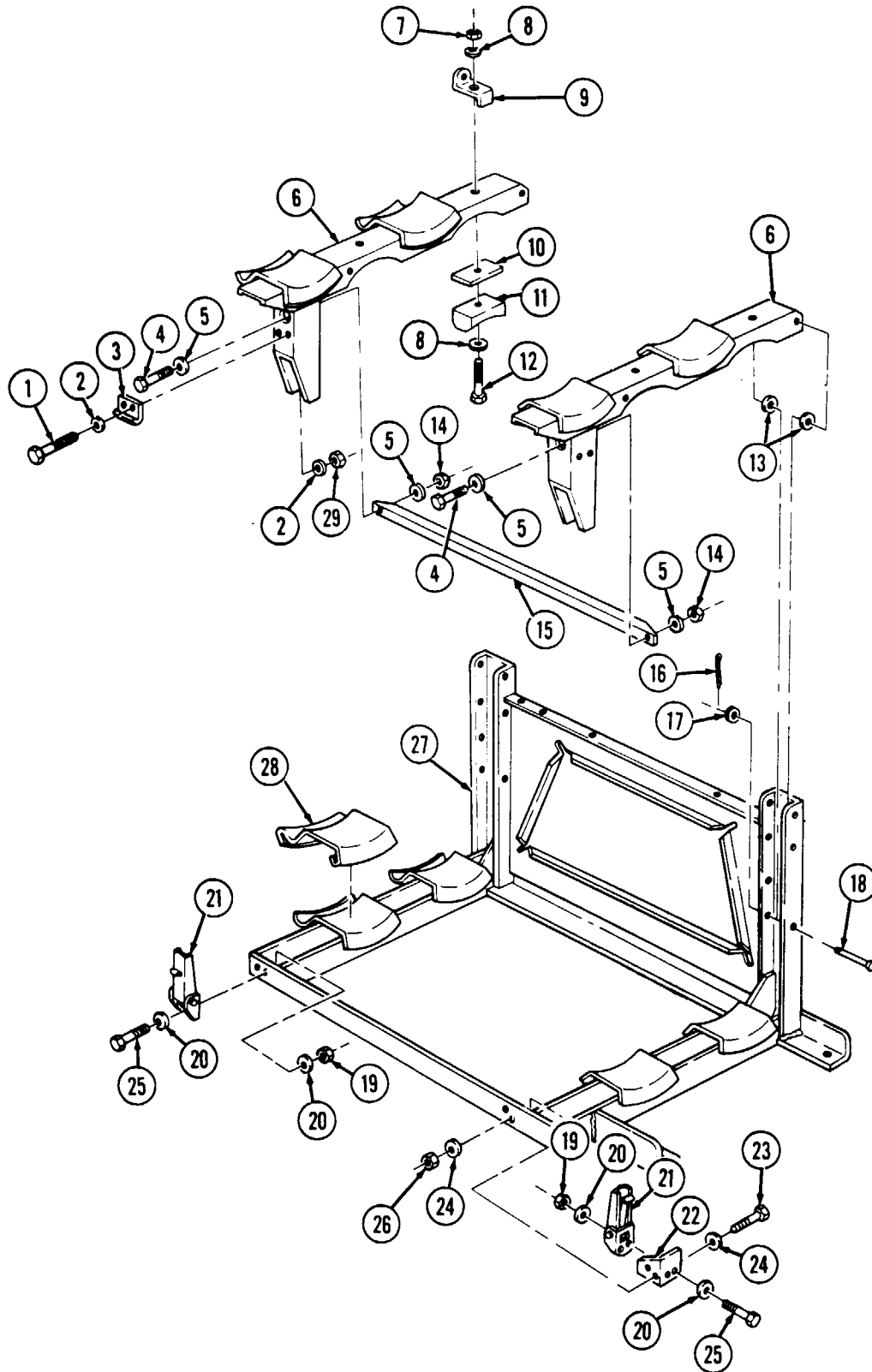
- Perform steps b. 16 and d. 1 if replacing missile pads.
- Procedures for replacing all missile pads are the same. Steps b. 16 and d. 1 cover replacement of one base assembly missile pad,

16. Remove pad (28) from base assembly (27), and clean remaining adhesive from base assembly (27) mounting surface.

c. Inspection

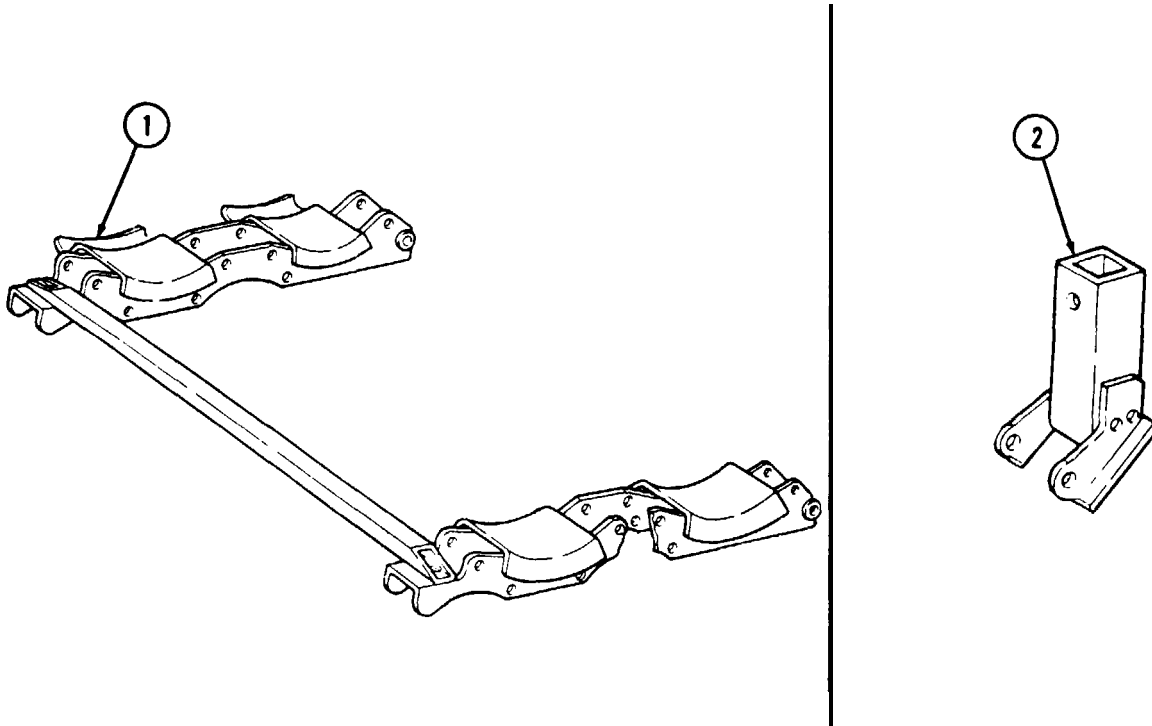
1. Inspect base assembly (27), intermediate rack assemblies (6), and connector bars (15) for cracks, broken welds, and damage. Replace any component if damaged.
2. Inspect bumpers (11) and missile pads (28) for cracks, tears, and deterioration. Replace any component if damaged.

11-75. TOW MISSILE RACK MAINTENANCE (Cont'd)



11-75. TOW MISSILE RACK MAINTENANCE (Cont'd)

3. Inspect upper rack assembly (1) and upper supports (2) for cracks, broken welds, and damage. Replace any component if damaged.



d. Assembly

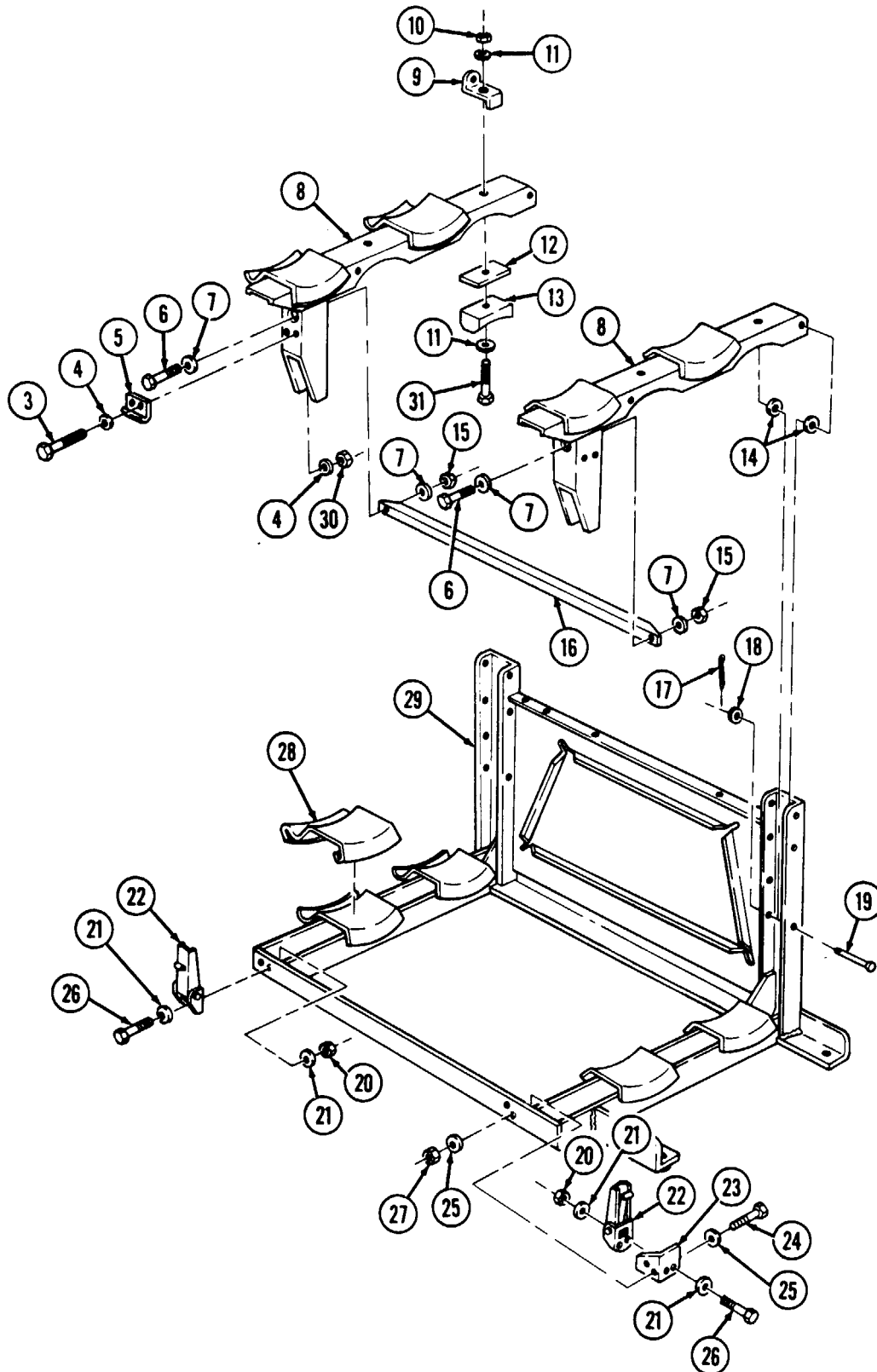
1. Apply adhesive to base assembly (29) pad mounting surface and install missile pad (28) on base assembly (29).
2. Install two tension latches (22) on base assembly (29) and bracket (23) with four washers (21), screws (26), washers (21), and locknuts (20).
3. Install bracket (23) on base assembly (29) with two washers (25), capscrews (24), washers (25), and locknuts (27). Tighten locknuts (27) to 6 lb-ft (8 N•m).
4. Install connector bar (16) on two intermediate rack assemblies (8) with washers (7), capscrews (6), washers (7), and locknuts (15). Tighten locknuts (15) to 6 lb-ft (8 N•m).
5. Install two latch strikes (5) on intermediate rack assemblies (8) with four washers (4), screws (3), washers (4), and locknuts (30).

NOTE

Shims are installed under each bumper on front end of missile rack, but only as needed under bumpers on rear end of missile rack.

6. Install shims (12), four bumpers (13), and two spring brackets (9) (outer side only) on intermediate rack assemblies (8) with four washers (11), capscrews (31), washers (11), and locknuts (10).
7. Install intermediate rack assemblies (8) and four washers (14) on base assembly (29) with two pins (19), washers (18), and cotter pins (17). It maybe necessary to slowly install pins (19) while installing washers (14) between intermediate rack assembly (8) sides and base assembly (29) channels.

11-75. TOW MISSILE RACK MAINTENANCE (Cont'd)



11-75. TOW MISSILE RACK MAINTENANCE (Cont'd)

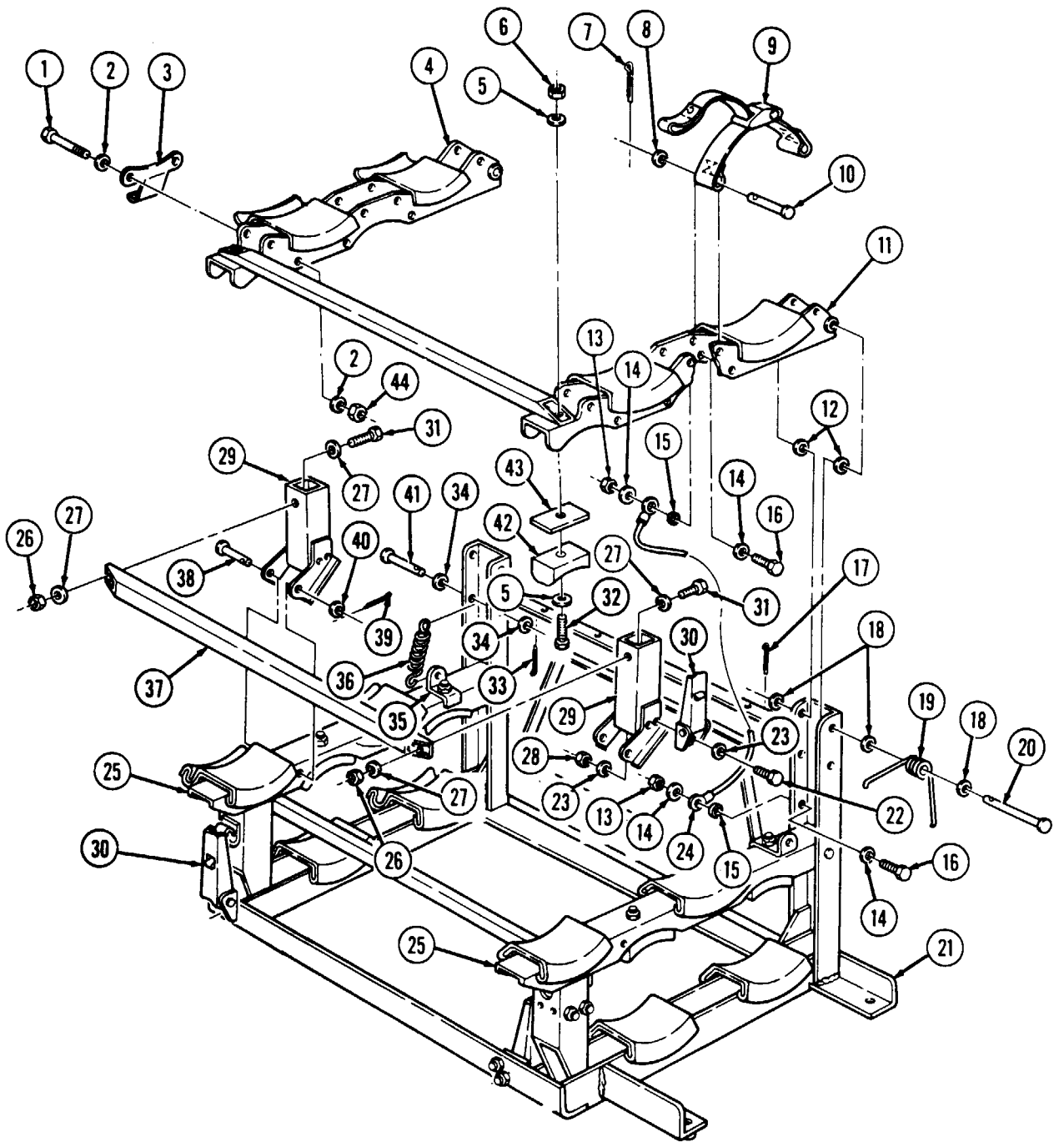
8. Connect two extension springs (36) to spring brackets (35). Extend springs (36) to base assembly (21) and install with two washers (34), pins (41), washers (34), and cotter pins (33). Install intermediate supports (25) on base assembly (21) with two lower tension latches (30).
9. Install connector bar (37) on upper supports (29) with two washers (27), capscrews (31), washers (27), and locknuts (26). Tighten locknuts (26) to 6 lb-ft (8 N•m).
10. Install two tension latches (30) on upper supports (29) with four washers (23), screws (22), washers (23), and locknuts (28).
11. Install upper supports (29) on intermediate rack assemblies (25) with two pins (38), washers (40), and cotter pins (39).

NOTE

Shims are installed under each bumper on front end of missile rack, but only as needed under bumpers on rear end of missile rack.

12. Install shims (43) and four bumpers (42) on upper rack assembly (4) with four washers (5), capscrews (32), washers (5), and locknuts (6).
13. Install two latch strikes (3) on upper rack assembly (4) with four washers (2), screws (1), washers (2), and locknuts (44).
14. Install upper rack assembly (4) and four washers (12) on base assembly (21) with two washers (18), pins (20), torsion springs (19), washers (18), and cotter pins (17). It may be necessary to slowly install pins (20) while installing washers (12) between upper rack assembly (4) sides and base assembly (21) channels.
15. Install lanyard (24) on upper rack assembly (4) and base assembly (21) with two washers (14), capscrews (16), spacers (15), washers (14), and locknuts (13).
16. Install four strap assemblies (9) on upper rack assembly (4) with eight pins (10), washers (8), and cotter pins (7).
17. Lift upper rack assembly (4) all the way up, and place one end of torsion springs (19) underneath pad supports (11), and other end of torsion springs (19) on inner rack side of pins (41), ensuring washers (34) are on outside of spring (19) ends. Lower upper rack assembly (4) and secure with two tension latches (30).

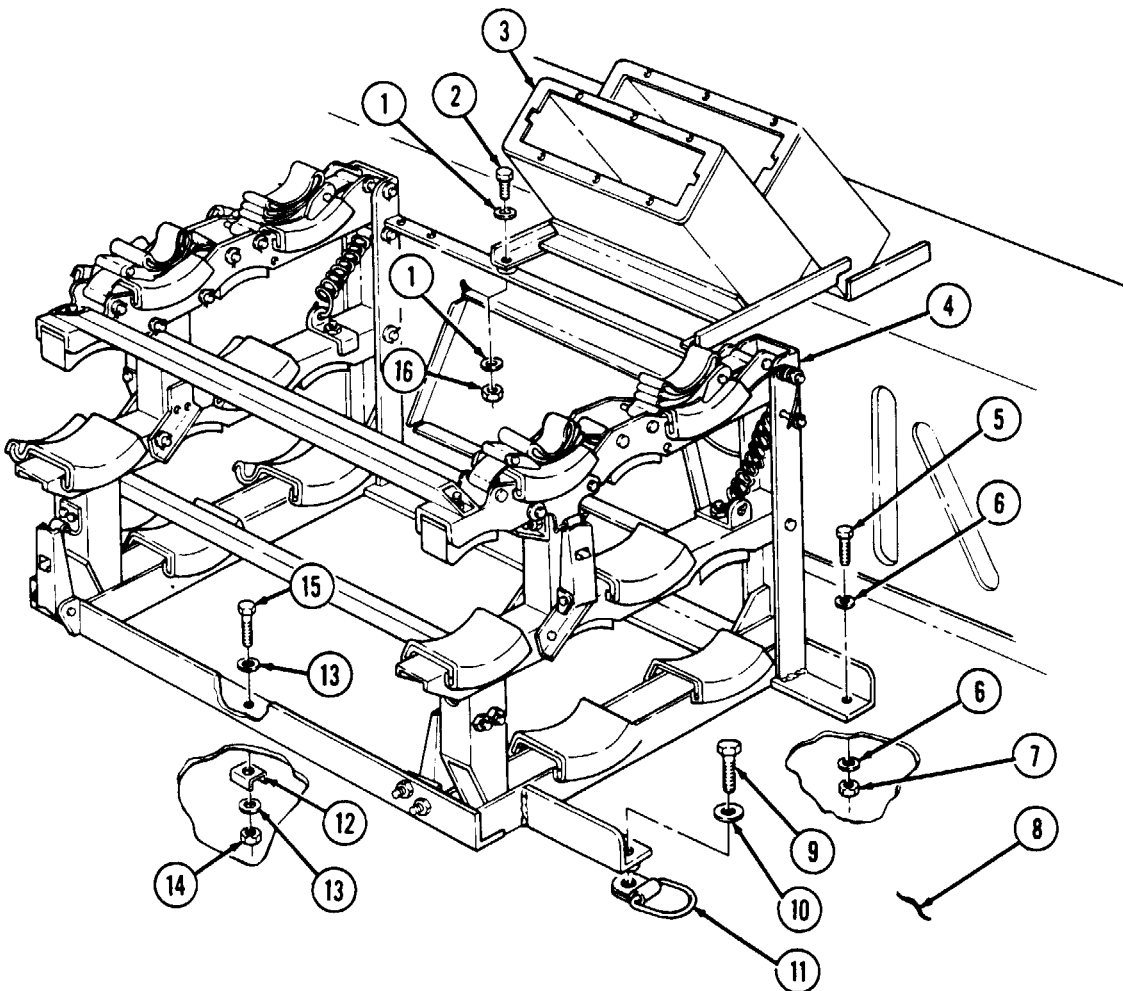
11-75. TOW MISSILE RACK MAINTENANCE (Cont'd)



11-75. TOW MISSILE RACK MAINTENANCE (Cont'd)

e. Installation

1. Install tiedown (11) and missile rack (4) on cargo floor (8) with washer (10) and capscrew (9). Do not tighten capscrew (9).
2. Secure missile rack (4) to cargo floor (8) with three washers (6), capscrews (5), washers (6), and locknuts (7). Do not tighten capscrews (5).
3. Secure missile rack (4) to cargo floor (8) with two washers (13), capscrews (15), reinforcements (12), washers (13), and locknuts (14). Do not tighten capscrews (15).
4. Install MGS battery rack (3) on missile rack (4) with two washers (1), capscrews (2), washers (1), and locknuts (16). Tighten capscrews (2) to 6 lb-ft (8 N•m).
5. Tighten capscrews (5) and (15) to 21 lb-ft (28 N•m). Tighten capscrew (9) to 90 lb-ft (122 N•m).



- FOLLOW-ON TASKS:
- Install footman loop and strap (para. 10-9).
 - Raise and secure tailgate (TM 9-2320-280-10).
 - Close cargo shell door (TM 9-2320-280-10).

11-76. WATER CAN BUMPER REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M966, M966A1, M1036, M1045, M1045A1,
M1045A2, M1046, M1046A1

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

Rear end of cargo shell door raised
(TM 9-2320-280-10).

Materials/Parts

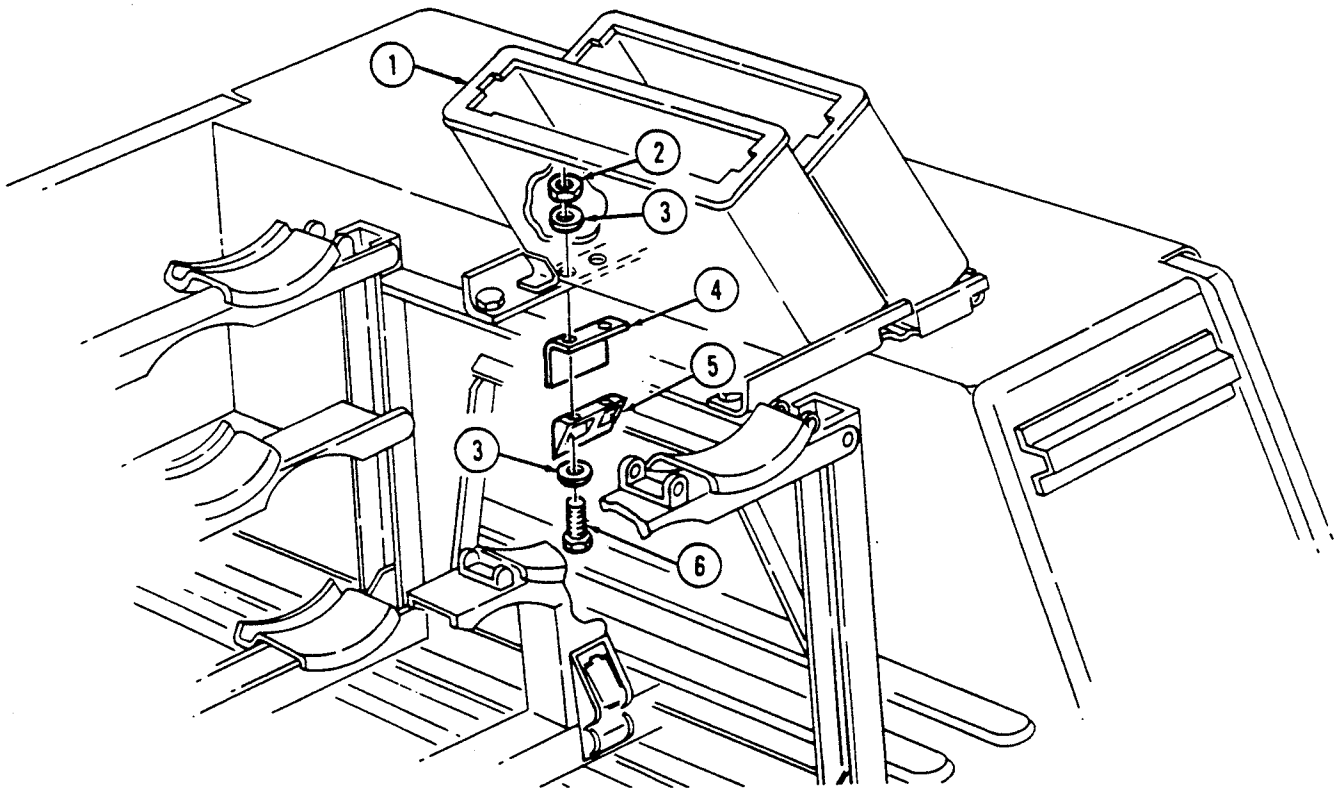
Two locknuts (Appendix G, Item 70)

a. Removal

Remove two locknuts (2), washers (3), capscrews (6), washers (3), water can bumper (5), and water can bumper bracket (4) from MGS battery rack assembly (1). Discard locknuts (2).

b. Installation

Install water can bumper bracket (4) and water can bumper (5) on MGS battery rack assembly (1) with two washers (3), capscrews (6), washers (3), and locknuts (2). Tighten locknuts (2) to 6 lb-ft (8 N·m).



FOLLOW-ON TASK: Close cargo shell door (TM 9-2320-280-10).

11-77. MISSILE GUIDANCE SET (MGS) BATTERY RACK ASSEMBLY REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M966, M966A1, M1036, M1045, M1045A1, M1045A2, M1046, M1046A1

Personnel Required

One mechanic
One assistant

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Materials/Parts

Six locknuts (Appendix G, Item 70)

Equipment Condition

- Rear end of cargo shell door raised (TM 9-2320-280-10).
- Water can bumper removed (para. 11-76).

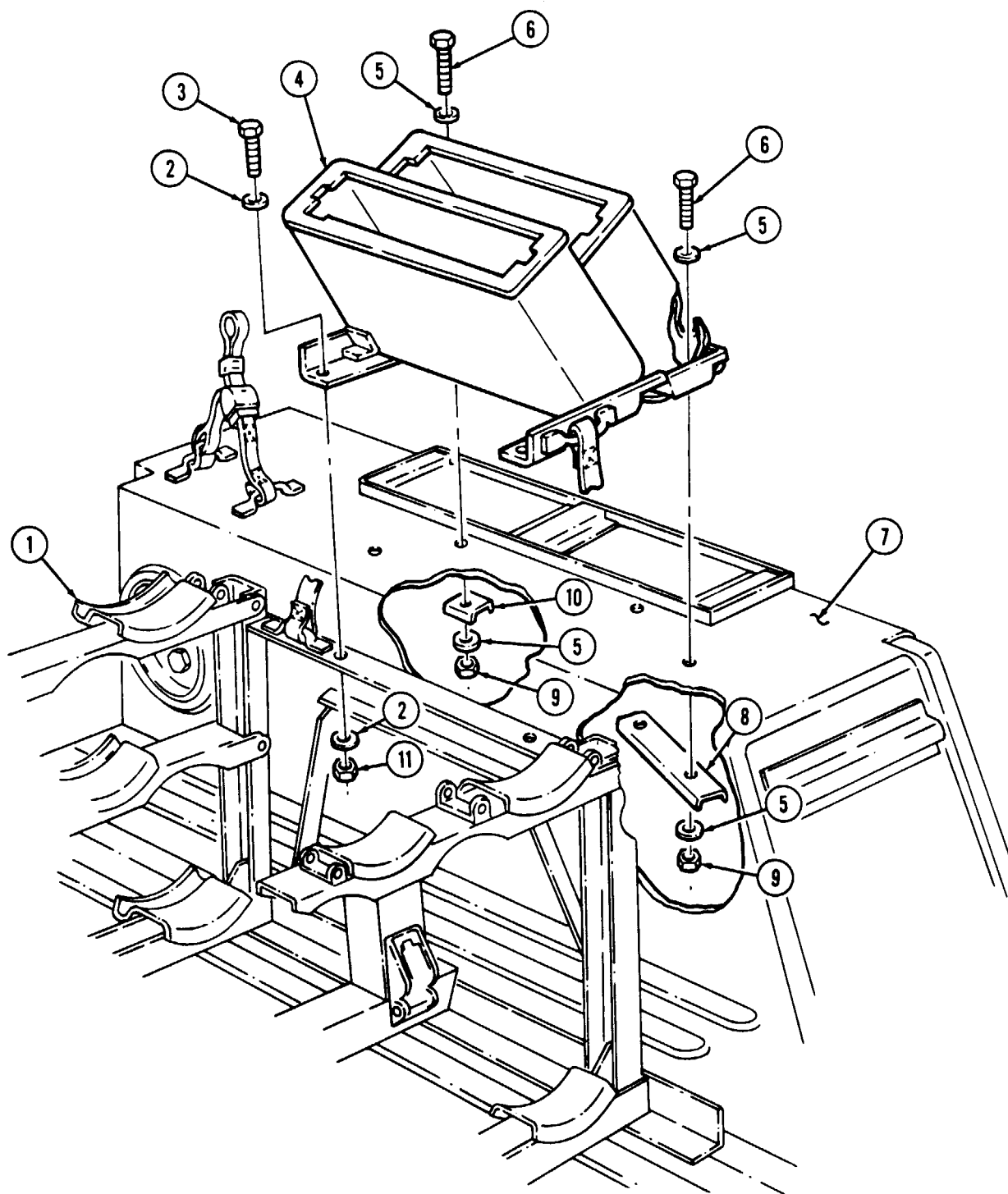
a. Removal

1. Remove two locknuts (11), washers (2), capscrews (3), and washers (2) from MGS battery rack (4) and missile rack (1). Discard locknuts (11).
2. Remove four locknuts (9), washers (5), reinforcement brackets (8) and (10), capscrews (6), washers (5), and MGS battery rack (4) from wheelhouse (7). Discard locknuts (9).
3. Remove footman loop and strap (para. 10-9) from MGS battery rack (4).

b. Installation

1. Install footman loop and strap (para. 10-9) on MGS battery rack (4).
2. Install MGS battery rack (4) on wheelhouse (7) with four washers (5), capscrews (6), reinforcement brackets (8) and (10), washers (5), and locknuts (9).
3. Install MGS battery rack (4) on missile rack (1) with two washers (2), capscrews (3), washers (2), and locknuts (11). Tighten capscrews (3) and locknuts (9) to 6 lb-ft (8 N•m).

11-77. MISSILE GUIDANCE SET (MGS) BATTERY RACK ASSEMBLY REPLACEMENT (Cont'd)



- FOLLOW-ON TASKS:
- Close cargo shell door (TM 9-2320-280-10).
 - Install water can bumper (para. 11-76).

11-78. TRIPOD LEG MOUNTING BRACKET REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M966, M966A1, M1036, M1045, M1045A1, M1045A2, M1046, M1046A1

Personnel Required

One mechanic
One assistant

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Materials/Parts

Three locknuts (Appendix G, Item 70)

Equipment Condition

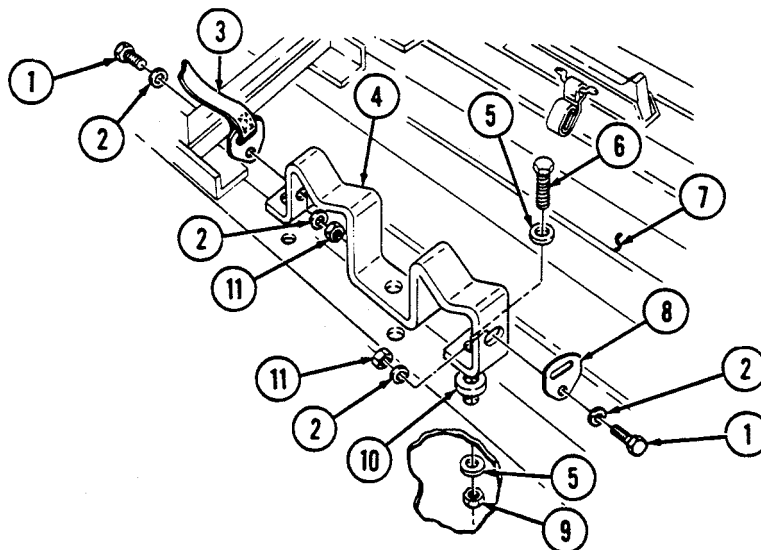
- Rear end of cargo shell door raised (TM 9-2320-280-10).
- Pioneer tool rack removed (TM 9-2320-280-10).

a. Removal

1. Remove three locknuts (9), washers (5), capscrews (6), washers (5), tripod leg bracket (4), and spacers (10) from cargo floor (7). Discard locknuts (9).
2. Remove two nuts (11), washers (2), capscrews (1), washers (2), strap bracket (8), and strap (3) from tripod leg bracket (4).

b. Installation

1. Install strap bracket (8) and strap (3) on tripod leg bracket (4) with two washers (2), capscrews (1), washers (2), and nuts (11).
2. Install three spacers (10) and tripod leg bracket (4) on cargo floor (7) with three washers (5), capscrews (6), washers (5), and locknuts (9).
3. Tighten front and rear locknuts (9) and center capscrew (6) to 6 lb-ft (8 N·m).



- FOLLOW-ON TASKS:**
- Close cargo shell door (TM 9-2320-280-10).
 - Install pioneer tool rack (TM 9-2320-280-10).

11-79. TRIPOD HEAD MOUNTING BRACKET REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M966, M966A1, M1036, M1045, M1045A1,
M1045A2, M1046, M1046A1

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

- Rear end of cargo shell door raised (TM 9-2320-280-10).
- Tailgate lowered (TM 9-2320-280-10).

Materials/Parts

Three locknuts (Appendix G, Item 70)

a. Removal

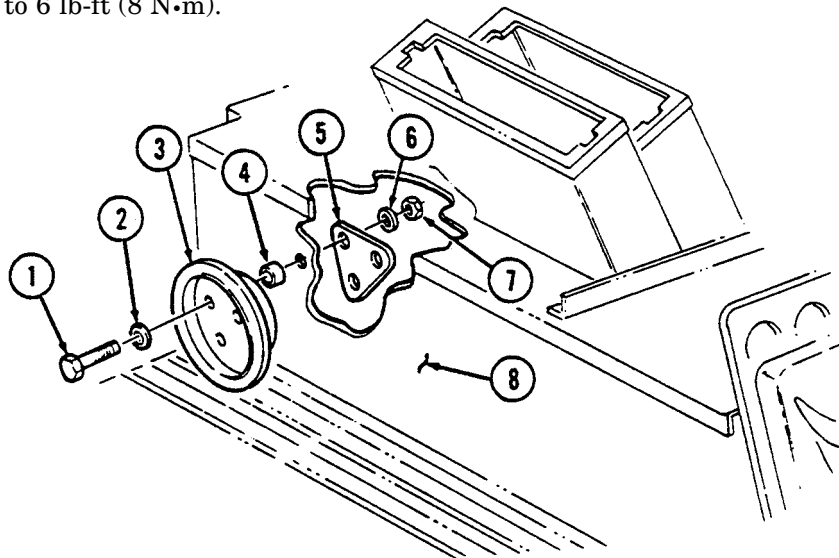
NOTE

On M1045, M1045A1, M1045A2, M1046, and M1046A1 models, there is an additional washer between the wheelhouse and the wheelhouse armor.

1. Remove three locknuts (7), washers (6), and plate assembly (5) from wheelhouse (8). Discard locknuts (7).
2. Remove three capscrews (1), washers (2), tripod head bracket (3), and three spacers (4) from wheelhouse (8)

b. Installation

1. Install three spacers (4) and tripod head bracket (3) on wheelhouse (8) with three washers (2) and capscrews (1).
2. Install plate assembly (5) on wheelhouse (8) with three washers (6) and locknuts (7). Tighten locknuts (7) to 6 lb-ft (8 N•m).



- FOLLOW-ON TASKS:
- Raise and secure tailgate (TM 9-2320-280-10).
 - Close cargo shell door (TM 9-2320-280-10).

11-80. FUEL CAN TRAY AND HOSE REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M966, M966A1, M1036, M1045, M1045A1, M1045A2, M1046, M1046A1

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

Rear of cargo shell door raised
(TM 9-2320-280-10).

Materials/Parts

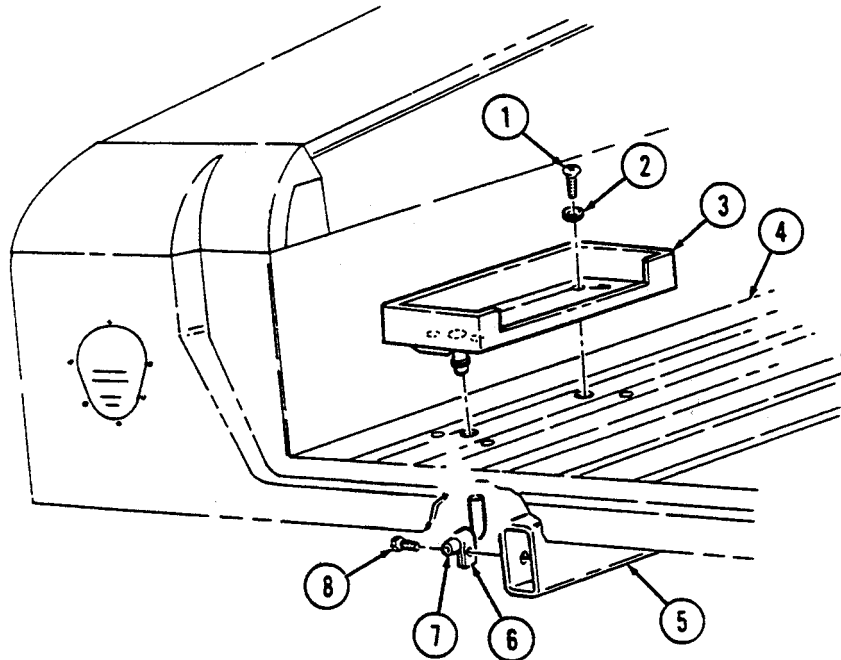
Screw (Appendix G, Item 284)

a. Removal

1. Remove screw (8) and hose clamp (6) from frame (5) and remove hose (7) from fuel can tray (3). Discard screw (8).
2. Remove four screws (1), washers (2), and fuel can tray (3) from cargo floor (4).

b. Installation

1. Install fuel can tray (3) on cargo floor (4) with four washers (2) and screws (1). Tighten screws (1) to 6 lb-ft (8 N·m).
2. Connect hose (7) to fuel can tray (3).
3. Install hose (7) on frame (5) with clamp (6) and screw (8). Tighten screw (8) to 7 lb-ft (10 N·m).



FOLLOW-ON TASK: Close cargo shell door (TM 9-2320-280-10).

11-81. DAY SIGHT STOWAGE BRACKET REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M966, M966A1, M1036, M1045, M1045A1,
M1045A2, M1046, M1046A1

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1))

Materials/Parts

Detergent (Appendix C, Item 17)
Four locknuts (Appendix G, Item 70)
Seven locknuts (Appendix G, Item 76)

Personnel Required

One mechanic
One assistant

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

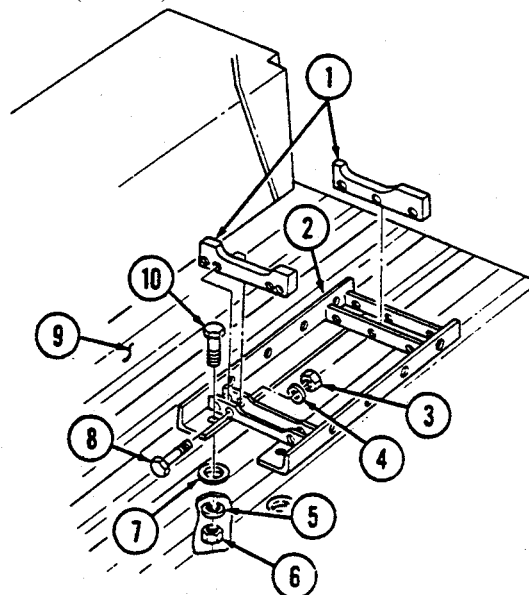
Rear end of cargo shell door raised
(TM 9-2320-280-10).

a. Removal

1. Remove four locknuts (6), washers (5), capscrews (10), and bracket (2) from cargo floor (9). Discard locknuts (6).
2. Remove seven locknuts (3), washers (4), capscrews (8), and two pads (1) from bracket (2). Discard locknuts (3).
3. Inspect four spacers (7) in cargo floor (9) for damage. Replace any spacer (7) if damaged.

b. Installation

1. Lubricate pads (1) with detergent and install on bracket (2) with seven capscrews (8), washers (4), and locknuts (3). Tighten locknuts (3) to 6 lb-ft (8 N•m).
2. Install bracket (2) on cargo floor (9) with four capscrews (10), washers (5), and locknuts (6). Tighten locknuts (6) to 6 lb-ft (8 N•m).



FOLLOW-ON TASK: Close cargo shell door (TM 9-2320-280-10).

11-82. NIGHT SIGHT SUPPORT REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M966, M966A1, M1036, M1045, M1045A1, M1045A2, M1046, M1046A1

Personnel Required

One mechanic
One assistant

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Materials/Parts

Two locknuts (Appendix G, Item 70)

Equipment Condition

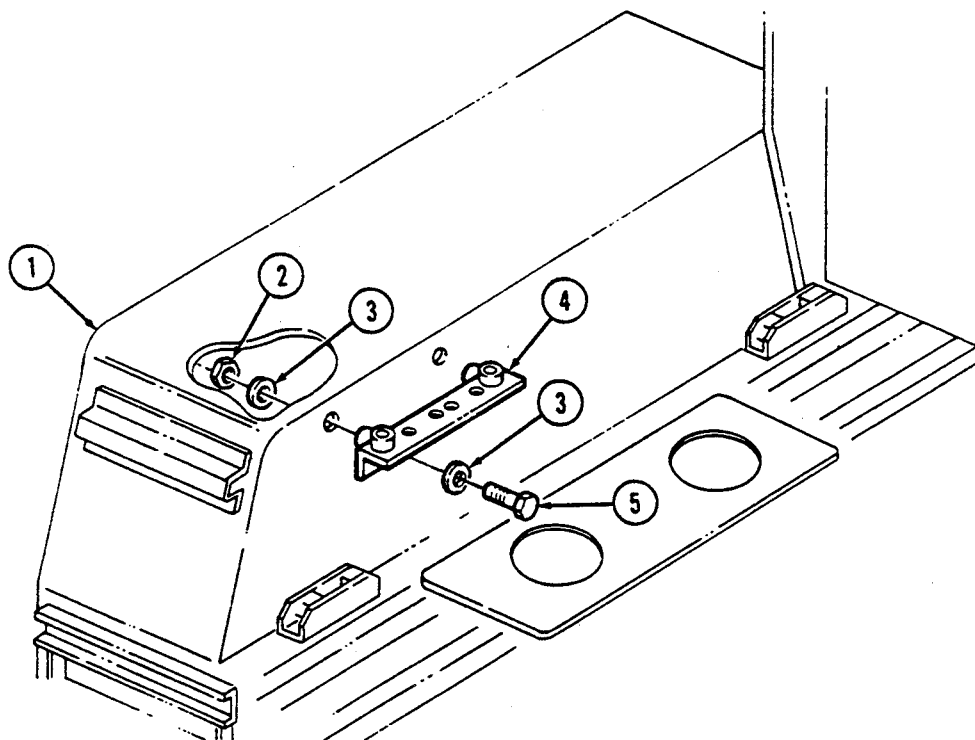
Rear end of cargo shell door raised
(TM 9-2320-280-10).

a. Removal

Remove two locknuts (2), washers (3), capscrews (5), washers (3), and night sight support (4) from wheelhouse (1). Discard locknuts (2).

b. Installation

Install night sight support (4) on wheelhouse (1) with two washers (3), capscrews (5), washers (3), and locknuts (2). Tighten locknuts (2) to 6 lb-ft (8 N·m).



FOLLOW-ON TASK: Close cargo shell door (TM 9-2320-280-10).

11-83. NIGHT SIGHT COOLANT BASE REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M966, M966A1, M1036, M1045, M1045A1,
M1045A2, M1046, M1046A1

Personnel Required

One mechanic
One assistant

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Materials/Parts

Six locknuts (Appendix G, Item 70)

Equipment Condition

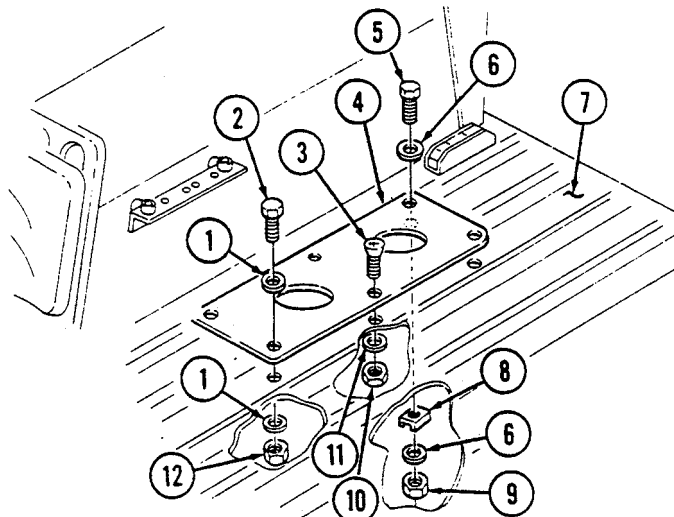
Rear end of cargo shell door raised
(TM 9-2320-280-10).

a. Removal

1. Remove two locknuts (9), washers (6), spacers (8), capscrews (5), and washers (6) from night sight coolant base (4) and cargo floor (7). Discard locknuts (9).
2. Remove two locknuts (10), washers (11), and screws (3) from coolant base (4) and cargo floor (7). Discard locknuts (10).
3. Remove two locknuts (12), washers (1), capscrews (2), washers (1), and coolant base (4) from cargo floor (7). Discard locknuts (12).

b. Installation

1. Install coolant base (4) on cargo floor (7) with two washers (1), capscrews (2), washers (1), and locknuts (12).
2. Secure coolant base (4) to cargo floor (7) with two screws (3), washers (11), and locknuts (10).
3. Secure coolant base (4) to cargo floor (7) with two washers (6), capscrews (5), spacers (8), washers (6), and locknuts (9).
4. Tighten locknuts (10) to 50 lb-in. (6 N·m). Tighten locknuts (9) and (12) to 72 lb-in. (8 N·m).



FOLLOW-ON TASK: Close cargo shell door (TM 9-2320-280-10).

11-84. FRONT NIGHT SIGHT BATTERY BRACKET REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M966, M966A1, M1036, M1045, M1045A1, M1045A2, M1046, M1046A1

Personnel Required

One mechanic
One assistant

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Materials/Parts

Locknut (Appendix G, Item 70)
Lockwasher (Appendix G, Item 177)

Equipment Condition

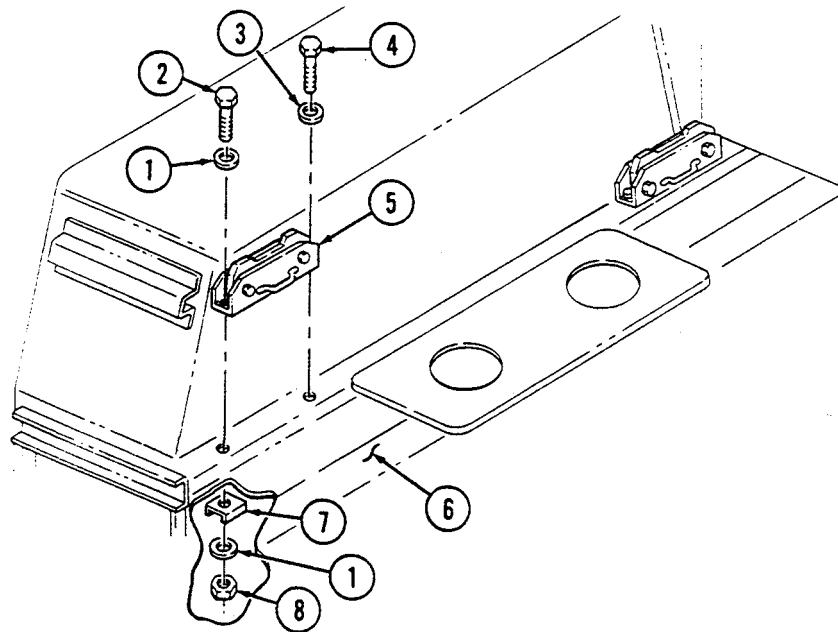
Rear end of cargo shell door raised
(TM 9-2320-280-10).

a. Removal

1. Remove locknut (8), washer (1), reinforcement bracket (7), capscrew (2), and washer (1) from bracket (5) and cargo floor (6). Discard locknut (8).
2. Remove capscrew (4), lockwasher (3), and bracket (5) from cargo floor (6). Discard lockwasher (3).

b. Installation

1. Install bracket (5) on cargo floor (6) with washer (1), capscrew (2), reinforcement bracket (7), washer (1), and locknut (8).
2. Secure bracket (5) to cargo floor (6) with lockwasher (3) and capscrew (4).
3. Tighten capscrew (4) to 4 lb-ft (5 N·m). Tighten locknut (8) to 6 lb-ft (8 N·m).



FOLLOW-ON TASK: Close cargo shell door (TM 9-2320-280-10).

11-85. REAR NIGHT SIGHT BATTERY BRACKET REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M966, M966A1, M1036, M1045, M1045A1,
M1045A2, M1046, M1046A1

Personnel Required

One mechanic
One assistant

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Materials/Parts

Two locknuts (Appendix G, Item 70)

Equipment Condition

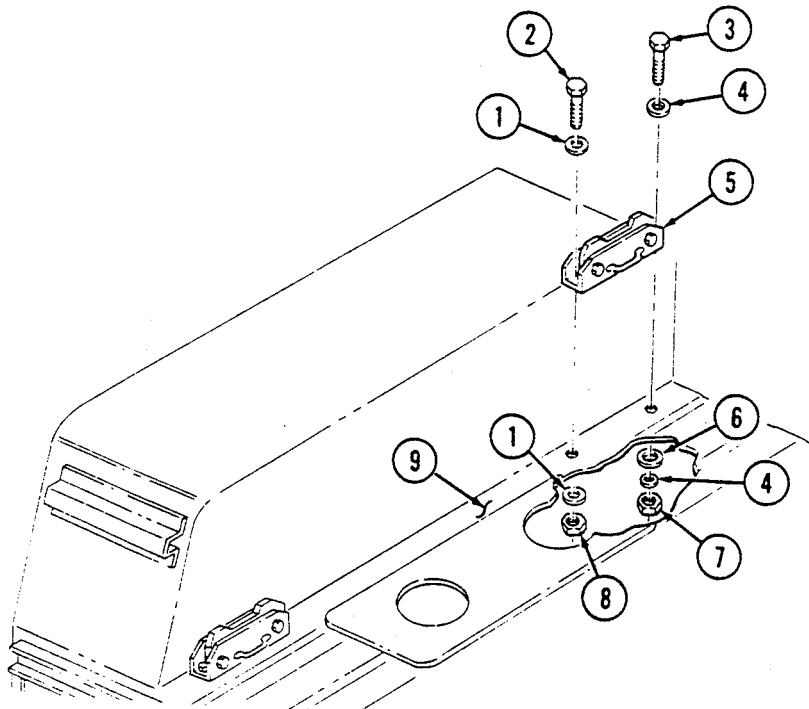
Rear end of cargo shell door raised
(TM 9-2320-280-10).

a. Removal

1. Remove locknut (7), washer (4), large washer (6), capscrew (3), and washer (4) from bracket (5) and cargo floor (9). Discard locknut (7).
2. Remove locknut (8), washer (1), capscrew (2), washer (1), and bracket (5) from cargo floor (9). Discard locknut (8).

b. Installation

1. Install bracket (5) on cargo floor (9) with washer (1), capscrew (2), washer (1), and locknut (8).
2. Secure bracket (5) to cargo floor (9) with washer (4), capscrew (3), large washer (6), washer (4), and locknut (7). Tighten locknuts (7) and (8) to 6 lb-ft (8 N·m).



FOLLOW-ON TASK: Close cargo shell door (TM 9-2320-280-10).

11-86. BORESIGHT COLLIMATOR OR NIGHT SIGHT MOUNTING SPACERS REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M966, M966A1, M1036, M1045, M1045A1, M1045A2, M1046, M1046A1

Personnel Required

One mechanic
One assistant

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Materials/Parts

Four locknuts (Appendix G, Item 70)

Equipment Condition

Rear end of cargo shell door raised
(TM 9-2320-280-10).

NOTE

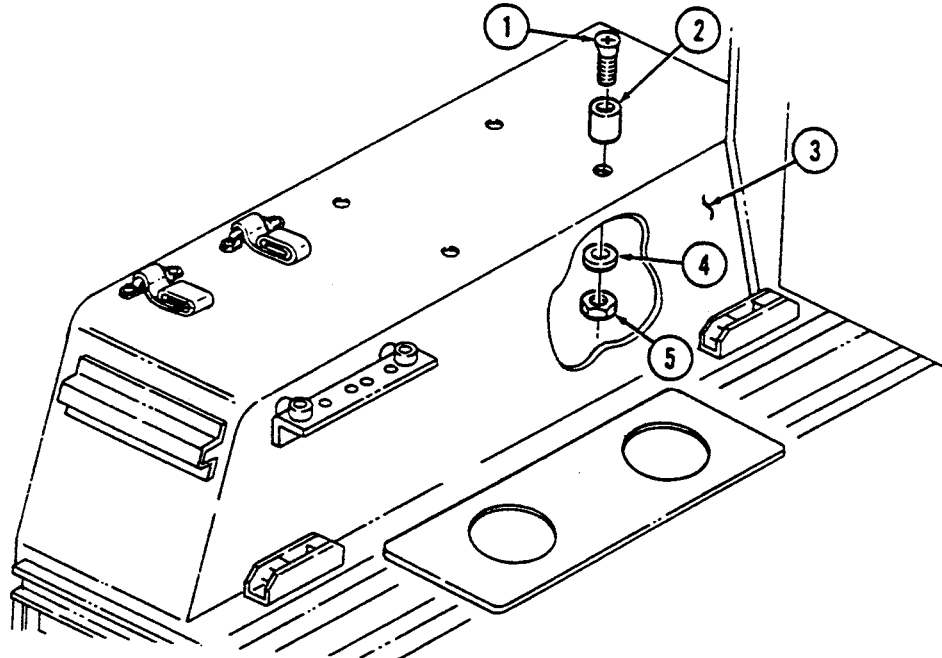
Boresight collimator mounting spacers and night sight support assembly mounting spacers are replaced the same. This procedure covers the boresight collimator mounting spacers.

a. Removal

Remove four locknuts (5), washers (4), screws (1), and boresight collimator mounting spacers (2) from wheelhouse (3). Discard locknuts (5).

b. Installation

Install four boresight collimator mounting spacers (2) on wheelhouse (3) with screws (1), washers (4), and locknuts (5). Tighten locknuts (5) to 6 lb-ft (8 N·m).



FOLLOW-ON TASK: Close cargo shell door (TM 9-2320-280-10).

11-87. LAUNCH TUBE STOWAGE BRACKETS REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M966, M966A1, M1036, M1045, M1045A1,
M1045A2, M1046, M1046A1

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

Rear end of cargo shell door raised
(TM 9-2320-280-10).

Materials/Parts

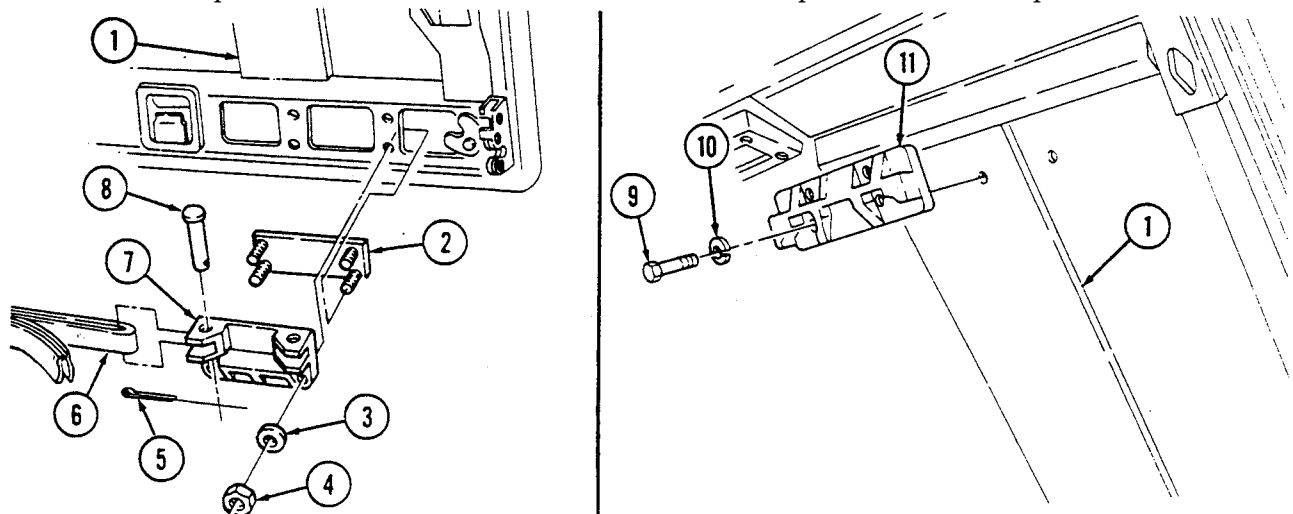
Sealing compound (Appendix C, Item 45)
Four lockwashers (Appendix G, Item 134)
Two cotter pins (Appendix G, Item 23)
Four locknuts (Appendix G, Item 79)

a. Removal

1. Remove two cotter pins (5), pins (8), and strap (6) from front launch tube bracket (7). Discard cotter pins (5).
2. Remove four locknuts (4), washers (3), front launch tube bracket (7), and plate (2) from cargo door (1). Discard locknuts (4).
3. Remove four capscrews (9), lockwashers (10), and rear launch tube bracket (11) from cargo door (1). Discard lockwashers (10).

b. Installation

1. Apply sealing compound to threads of four capscrews (9). Install rear launch tube bracket (11) on cargo door (1) with four lockwashers (10) and capscrews (9). Tighten capscrews (9) to 10 lb-ft (14 N·m).
2. Install plate (2) and front launch tube bracket (7) on cargo door (1) with four washers (3) and locknuts (4). Tighten locknuts (4) to 10 lb-ft (14 N·m).
3. Install strap (6) on front launch tube bracket (7) with two pins (8) and cotter pins (5).



FOLLOW-ON TASK: Close cargo shell door (TM 9-2320-280-10).

11-88. ANTENNA BLAST SHIELD REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M966, M966A1, M1036, M1045, M1045A1, M1045A2, M1046, M1046A1

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

Rear end of cargo shell door raised
(TM 9-2320-280-10).

Materials/Parts

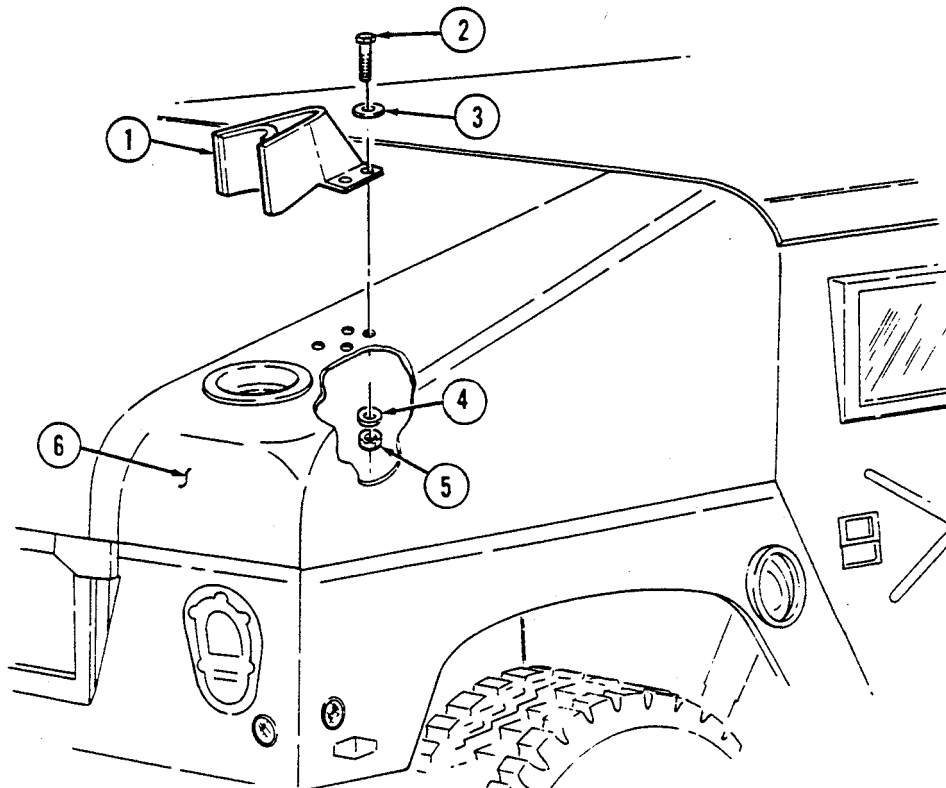
Four locknuts (Appendix G, Item 70)

a. Removal

Remove four locknuts (5), washers (4), capscrews (2), washers (3), and blast shield (1) from cargo shell (6). Discard locknuts (5).

b. Installation

Install blast shield (1) on cargo shell (6) with four washers (3), capscrews (2), washers (4), and locknuts (5). Tighten locknuts (5) to 85-110 lb-in. (10-12 N·m).



FOLLOW-ON TASK: Close cargo shell door (TM 9-2320-280-10).

11-89. GASOLINE COOK STOVE BRACKET ASSEMBLY REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M966, M966A1, M1025, M1025A1, M1025A2,
M1026, M1026A1, M1036, M1045, M1045A1,
M1045A2, M1046, M1046A1

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Sealing compound (Appendix C, Item 45)

Manual References

TM 9-2320-280-24P

Equipment Condition

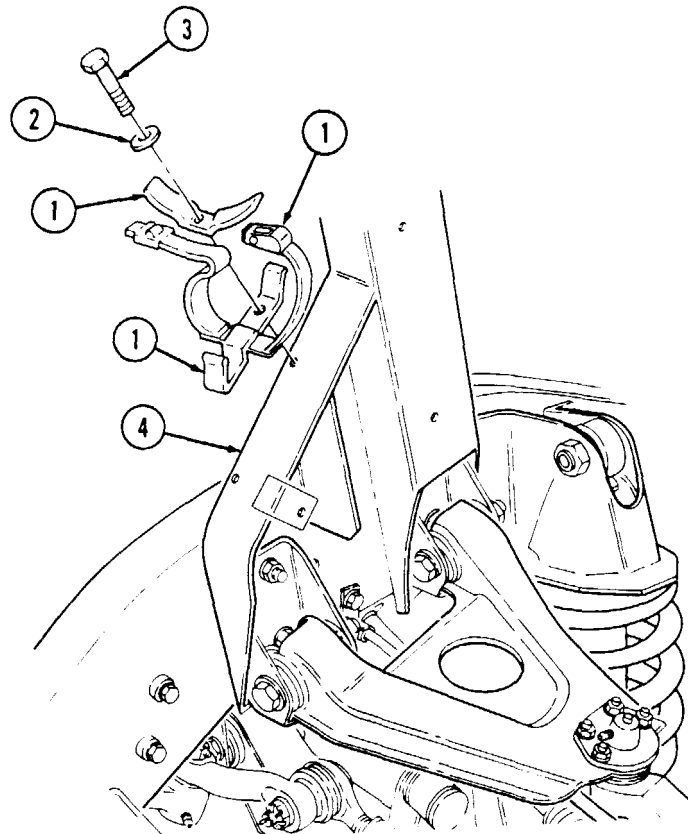
Remove engine right splash shield (para. 10-20).

a. Removal

Remove two capscrews (3), washers (2), and bracket assembly (1) from right airlift bracket (4).

b. Installation

1. Apply sealing compound to threads of two capscrews (3).
2. Install bracket assembly (1) on right airlift bracket (4) with two washers (2) and capscrews (3).
Tighten capscrews (3) to 6 lb-ft (8 N•m).



FOLLOW-ON TASK: Install engine right splash shield (para. 10-20).

11-90. RIFLE SUPPORT REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

All models except M996, M996A1, M997, M997A1, M997A2, M998, M998A1, M1035, M1035A1, M1035A2, M1037, M1038, M1038A1, M1042, M1097, M1097A1, M1097A2, M1123

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Three locknuts (Appendix G, Item 79)

Personnel Required

One mechanic
One assistant

Manual References

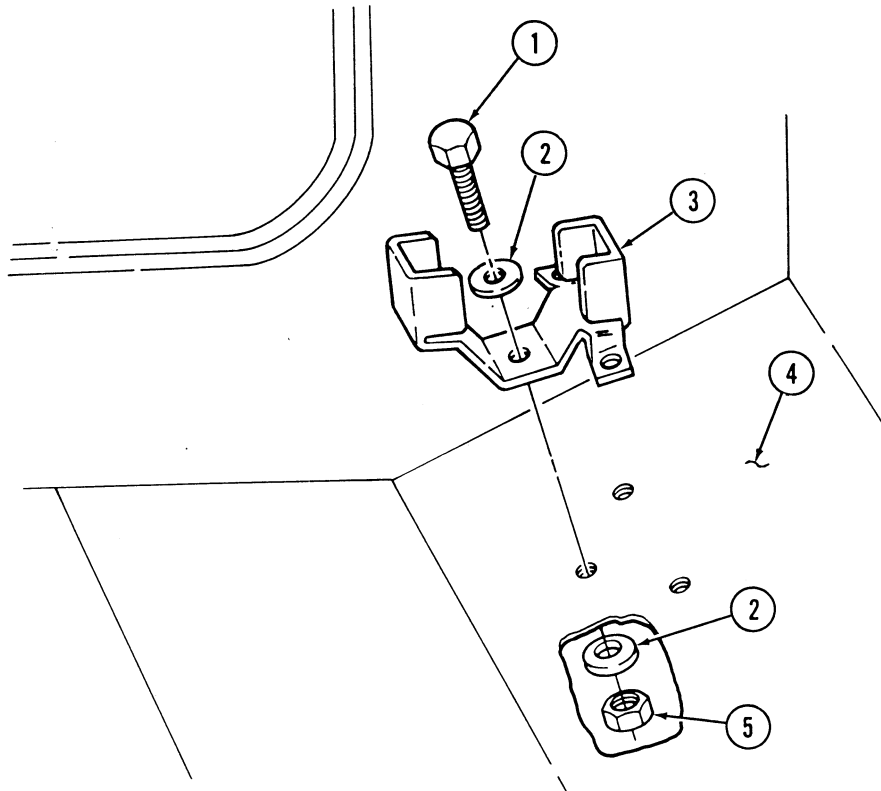
TM 9-2320-280-24P

a. Removal

Remove three locknuts (5), washers (2), capscrews (1), washers (2), and rifle support (3) from floor panel (4). Discard locknuts (5).

b. Installation

Install rifle support (3) on floor panel (4) with three washers (2), capscrews (1), washers (2), and locknuts (5). Tighten locknuts (5) to 12-17 lb-ft (16-23 N·m).



11-91. RIFLE MOUNTING CLAMP REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

All models except M996, M996A1, M997, M997A1, M997A2, M998, M998A1, M1035, M1035A1, M1035A2, M1037, M1038, M1038A1, M1042, M1097, M1097A1, M1097A2, M1123

Materials/Parts

Two locknuts (Appendix G, Item 91)
Two locknuts (new configuration) (Appendix G, Item 92)

Manual References

TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

NOTE

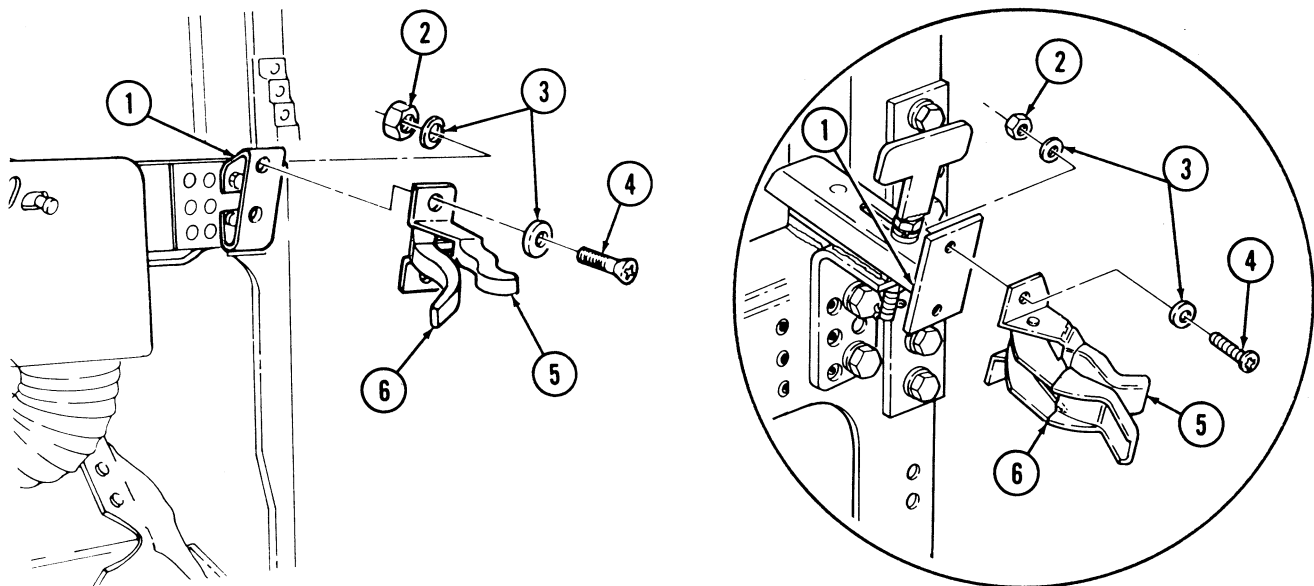
- Procedures for replacing the left and right rifle mounting clamps are basically the same. This procedure covers the right rifle mounting clamp.
- Vehicle may be equipped with new rifle mounting clamp bracket configuration for M16 rifle or M203 grenade launcher.

a. Removal

Remove two locknuts (2), washers (3), screws (4), washers (3), and clamp (5) from clamp bracket (1). Discard locknuts (2).

b. Installation

Install clamp (5) on clamp bracket (1), with moveable finger (6) inboard, with two washers (3), screws (4), washers (3), and locknuts (2).



11-92. RIFLE MOUNTING CLAMP BRACKET REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

All models except M996, M996A1, M997, M997A1, M997A2, M998, M998A1, M1035, M1035A1, M1035A2, M1037, M1038, M1038A1, M1042, M1097, M1097A1, M1097A2, M1123

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Two locknuts (Appendix G, Item 70)
Two locknuts (Appendix G, Item 122)

Manual References

TM 9-2320-280-24P

Equipment Condition

Rifle mounting clamp removed (para. 11-91).

NOTE

Replacement procedures for the front and rear (rear bracket installed on M1025, M1025A1, M1025A2, M1026, M1026A1, M1043, M1043A1, M1043A2, M1044, and M1044A1 vehicles only) rifle mounting clamp brackets are basically the same. This procedure covers the right front and right rear bracket (M1025A2 only).

a. Removal

1. Remove two locknuts (5), washers (3), capscrews (4), washers (3), and clamp bracket (2) from "A" beam (1). Discard locknuts (5).

NOTE

Perform step 2 for M1025A2 vehicles only.

2. Remove two locknuts (6), washers (7), capscrews (9), washers (7), and clamp bracket (8) from "B" pillar (10). Discard locknuts (6).

b. Installation

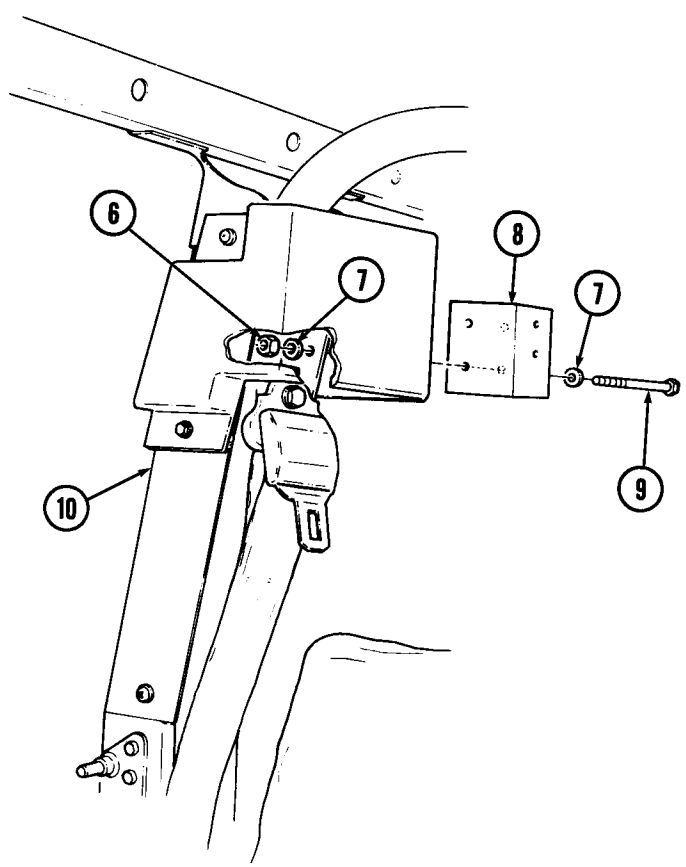
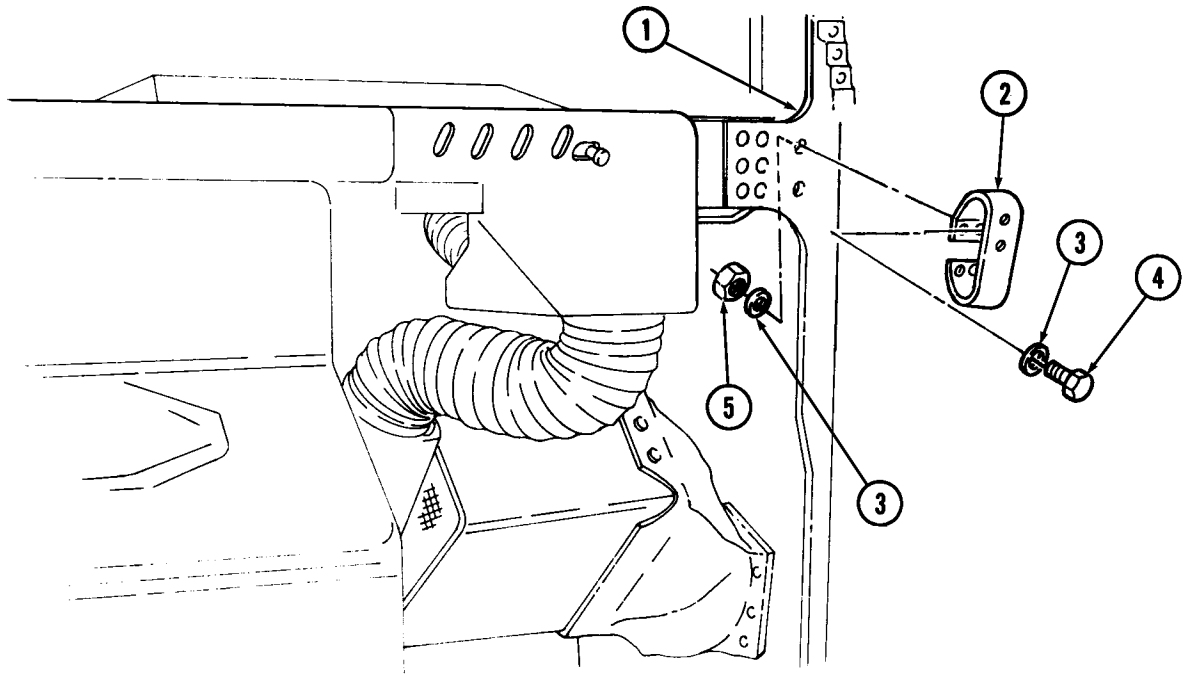
1. Install clamp bracket (2) on "A" beam (1) with two washers (3), capscrews (4), washers (3), and locknuts (5).

NOTE

Perform step 2 for M1025A2 vehicles only.

2. Install clamp bracket (8) on "B" pillar (10) with two washers (7), capscrews (9), washers (7), and locknuts (6).

11-92. RIFLE MOUNTING CLAMP BRACKET REPLACEMENT (Cont'd)



FOLLOW-ON TASK: Install rifle mounting clamp (para. 11-91).

11-93. RIFLE MOUNTING CLAMP BRACKET REPLACEMENT (M16 A1 RIFLE/M203 GRENADE LAUNCHER)

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

All models except M996, M996A1, M997, M997A1, M997A2, M998, M998A1, M1035, M1035A1, M1035A2, M1037, M1038, M1038A1, M1042, M1097, M1097A1, M1097A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Cotter pin (Appendix G, Item 24)
Lockwasher (Appendix G, Item 135)
Two locknuts (Appendix G, Item 70)

Manual References

TM 9-2320-280-24P

Equipment Condition

Rifle mounting clamp removed (para. 11-91).

NOTE

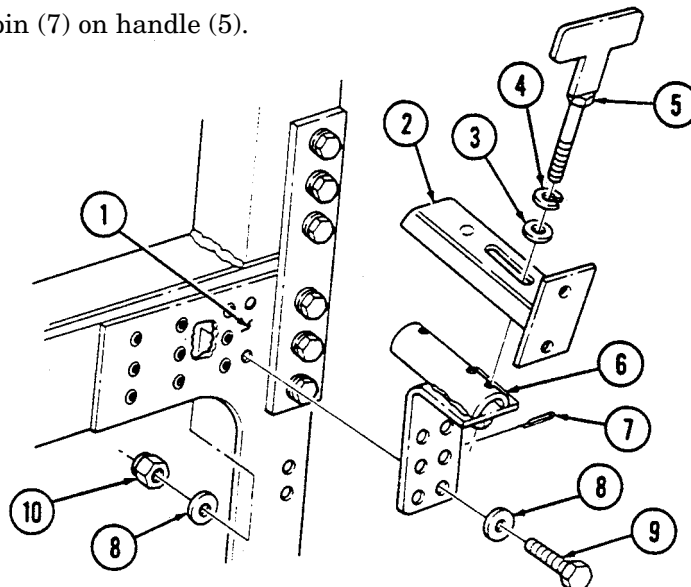
Replacement procedures for left and right rifle mounting clamp brackets are basically the same. This procedure covers the right rifle mounting clamp bracket.

a. Removal

1. Remove cotter pin (7) from handle (5). Discard cotter pin (7).
2. Remove handle (5), lockwasher (4), washer (3), and clamp bracket (2) from mounting bracket (6).
3. Remove two locknuts (10), washers (8), capscrews (9), washers (8), and mounting bracket (6) from "A" beam (1). Discard locknuts (10).

b. Installation

1. Install mounting bracket (6) on "A" beam (1) with two washers (8), capscrews (9), washers (8), and locknuts (10).
2. Install clamp bracket (2) on mounting bracket (6) with washer (3), lockwasher (4), and handle (5).
3. Install cotter pin (7) on handle (5).



FOLLOW-ON TASK: Install rifle mounting clamp (para. 11-91).

11-94. LOWER RIFLE MOUNT BRACKET REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M1025, M1025A1, M1025A2, M1026,
M1026A1, M1043, M1043A1, M1043A2,
M1044, M1044A1,

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

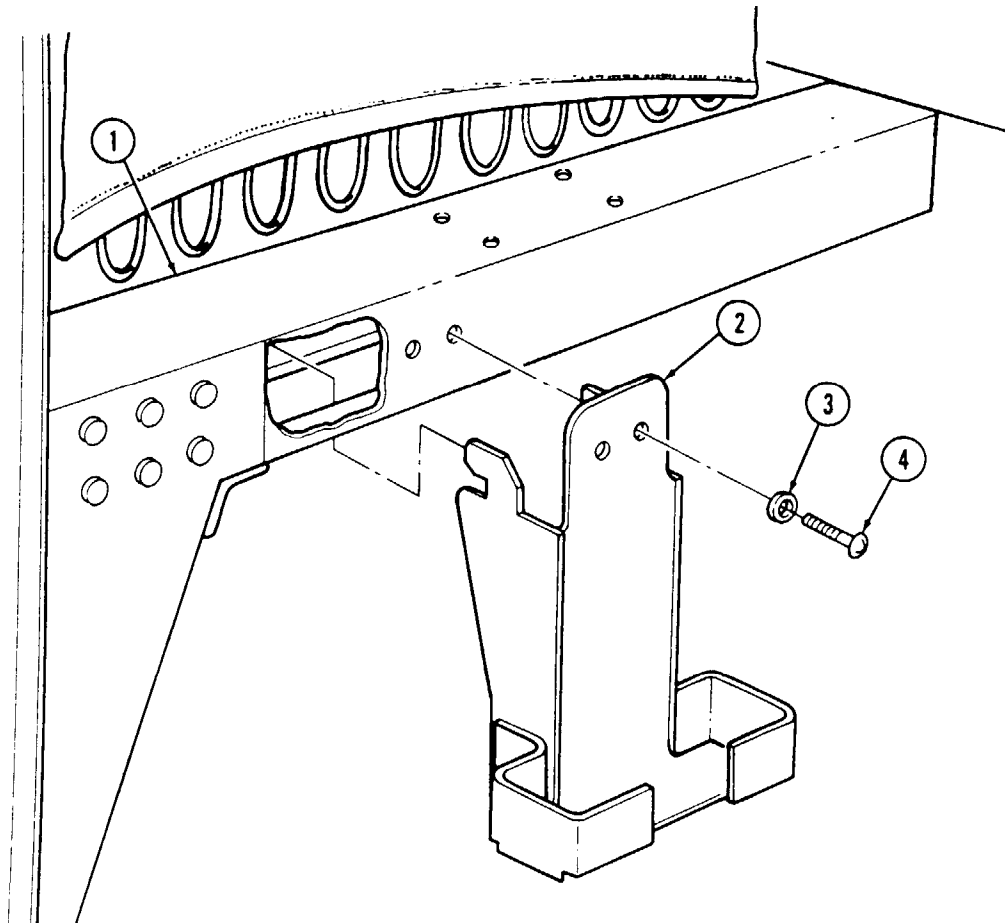
TM 9-2320-280-24P

a. Removal

Remove two screws (4), washers (3), and lower rifle mount bracket (2) from "B" beam (1).

b. Installation

Install rifle mount bracket (2) on "B" beam (1) with two washers (3) and screws (4).



11-95. GUN ADAPTER PLATE ASSEMBLY REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M1043, M1043A1, M1043A2, M1044,
M1044A1

Personnel Required

One mechanic
One assistant

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-24P

Materials/Parts

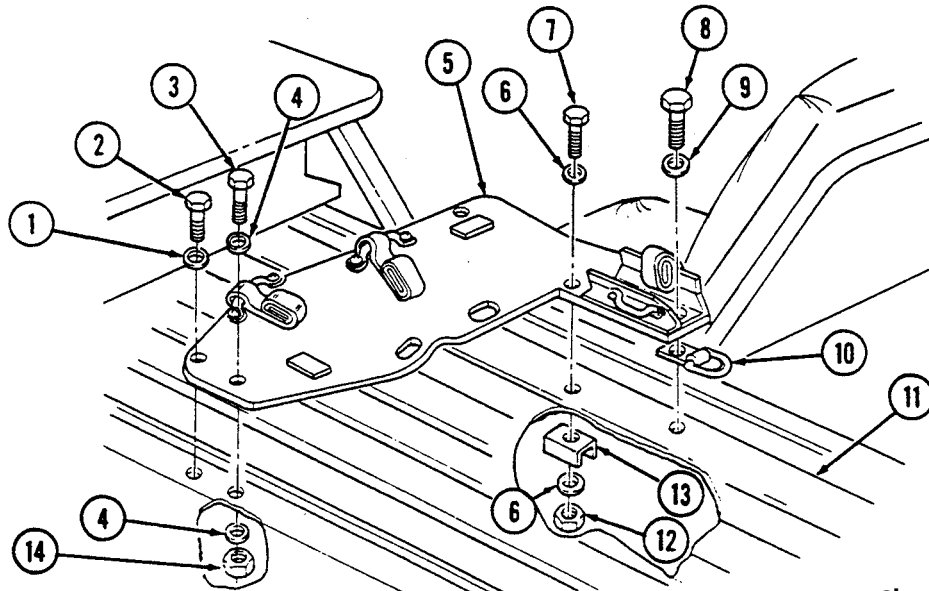
Two locknuts (Appendix G, Item 70)

a. Removal

1. Remove two capscrews (2) and washers (1) from adapter plate (5) and cargo floor (11).
2. Remove locknut (14), washer (4), capscrew (3), and washer (4) from adapter plate (5) and cargo floor (11). Discard locknut (14).
3. Remove locknut (12), washer (6), reinforcement bracket (13), capscrew (7), and washer (6) from adapter plate (5) and cargo floor (11). Discard locknut (12).
4. Remove capscrew (8), washer (9), adapter plate (5), and cargo tiedown (10) from cargo floor (11).

b. Installation

1. Install cargo tiedown (10) and adapter plate (5) on cargo floor (11) with washer (9) and capscrew (8).
2. Install adapter plate (5) on cargo floor (11) with washer (6), capscrew (7), reinforcement bracket (13), washer (6), and locknut (12).
3. Secure adapter plate (5) to cargo floor (11) with washer (4), capscrew (3), washer (4), and locknut (14).
4. Secure adapter plate (5) to cargo floor (11) with two washers (1) and capscrews (2).
5. Tighten capscrews (2), (7), and (3) to 6 lb-ft (8 N·m). Tighten capscrew (8) to 75 lb-ft (102 N·m).



11-96. FRONT GUN MOUNT PLATE ASSEMBLY REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M1025, M1025A1, M1025A2, M1026,
M1026A1, M1043, M1043A1, M1043A2,
M1044, M1044A1

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Five locknuts (Appendix G, Item 128)

Personnel Required

One mechanic
One assistant

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

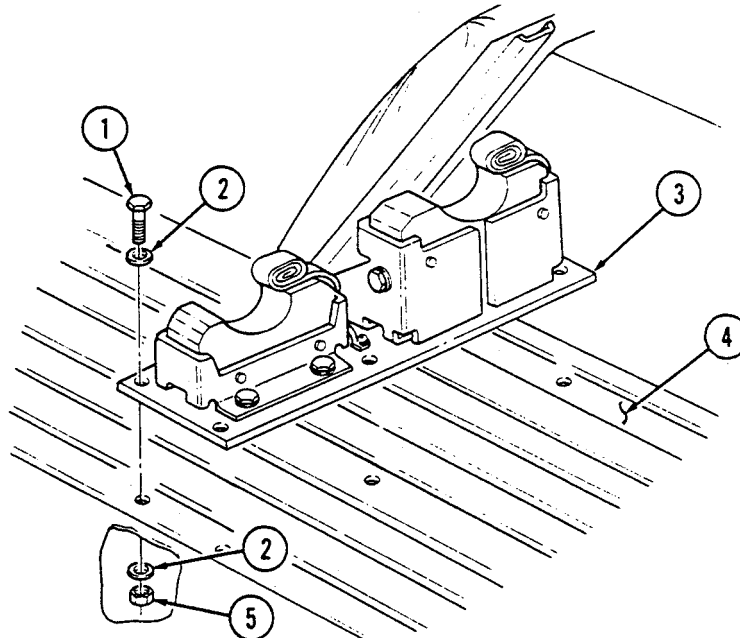
- Rear end of cargo shell door raised (TM 9-2320-280-10).
- Fuel tank removed (para 3-24).

a. Removal

1. Remove five locknuts (5), washers (2), capscrews (1), washers (2), and front plate assembly (3) from cargo floor (4). Discard locknuts (5).
2. Remove 40 mm gun mount support (para. 11-99) and caliber .50 gun mount support (para. 11-98) from front plate assembly (3).

b. Installation

1. Install caliber .50 gun mount support (para. 11-98) and 40 mm gun mount support (para. 11-99) on front plate assembly (3).
2. Install front plate assembly (3) on cargo floor (4) with five washers (2), capscrews (1), washers (2), and locknuts (5). Tighten capscrews (1) to 26 lb-ft (35 N•m).



FOLLOW-ON TASKS:

- Close cargo shell door (TM 9-2320-280-10).
- Install fuel tank (para. 3-24).

11-97. REAR GUN MOUNT PLATE ASSEMBLY REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M1025, M1025A1, M1025A2, M1026,
M1026A1, M1043, M1043A1, M1043A2,
M1044, M1044A1

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Six locknuts (Appendix G, Item 128)

Personnel Required

One mechanic
One assistant

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

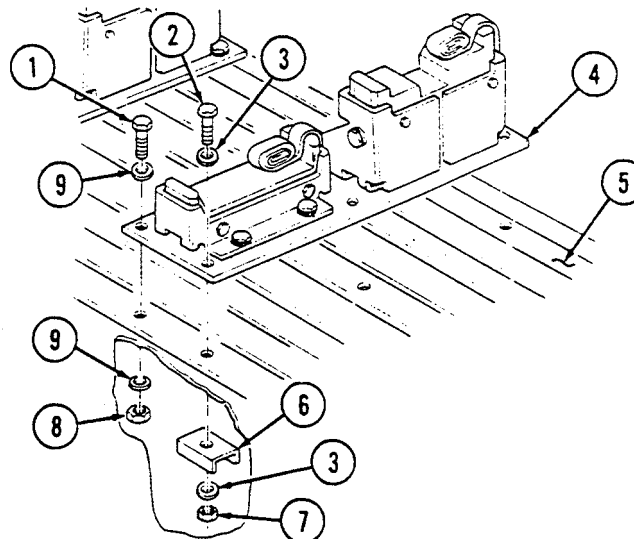
Rear end of cargo shell door raised
(TM 9-2320-280-10).

a. Removal

1. Remove three locknuts (7), washers (3), reinforcement brackets (6), capscrews (2), and washers (3) from rear plate assembly (4) and cargo floor (5). Discard locknuts (7).
2. Remove three locknuts (8), washers (9), capscrews (1), washers (9), and rear plate assembly (4) from cargo floor (5). Discard locknuts (8).
3. Remove 40 mm gun mount support (para. 11-99) and caliber .50 gun mount support (para. 11-98) from rear plate assembly (4).

b. Installation

1. Install caliber .50 gun mount support (para. 11-98) and 40 mm gun mount support (para. 11-99) on rear plate assembly (4).
2. Install rear plate assembly (4) on cargo floor (5) with three washers (3), capscrews (2), reinforcement brackets (6), washers (3), and locknuts (7).
3. Secure rear plate assembly (4) to cargo floor (5) with three washers (9), capscrews (1), washers (9), and locknuts (8). Tighten capscrews (1) and (2) to 26 lb-ft (35 N·m).



FOLLOW-ON TASK: Close cargo shell door (TM 9-2320-280-10).

11-98. GUN MOUNT SUPPORT (CALIBER .50) REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M1025, M1025A1, M1025A2, M1026,
M1026A1, M1043, M1043A1, M1043A2,
M1044, M1044A1

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Two locknuts (Appendix G, Item 70)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

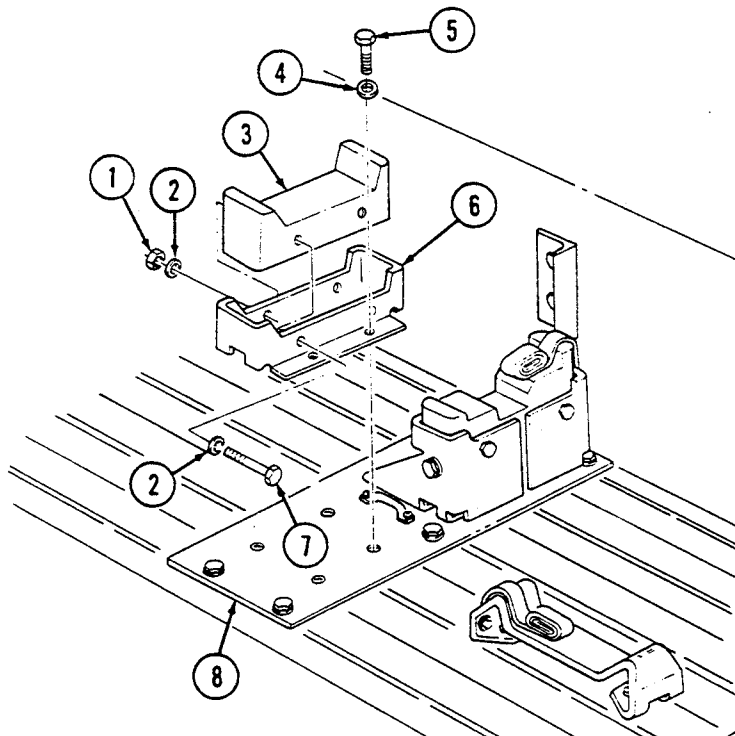
Rear end of cargo shell door raised
(TM 9-2320-280-10).

a. Removal

1. Remove two locknuts (1), washers (2), capscrews (7), washers (2), and pad (3) from bracket (6). Discard locknuts (1).
2. Remove four capscrews (5), washers (4), and bracket (6) from mounting plate (8).

b. Installation

1. Install bracket (6) on mounting plate (8) with four washers (4) and capscrews (5). Tighten capscrews (5) to 26 lb-ft (35 N·m).
2. Install pad (3) on bracket (6) with two washers (2), capscrews (7), washers (2), and locknuts (1). Tighten locknuts (1) to 6 lb-ft (8 N·m).



FOLLOW-ON TASK: Close cargo shell door (TM 9-2320-280-10).

11-99. GUN MOUNT SUPPORT (40 MM) REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M1025, M1025A1, M1025A2, M1026,
M1026A1, M1043, M1043A1, M1043A2,
M1044, M1044A1

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Four locknuts (Appendix G, Item 70)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

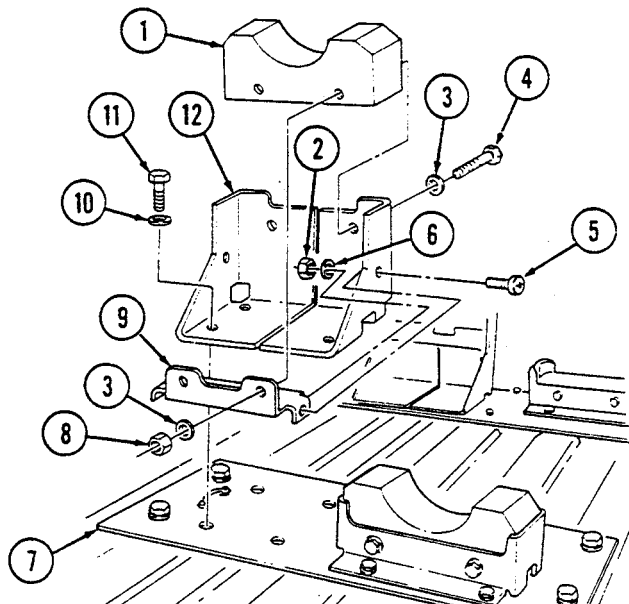
Rear end of cargo shell door raised
(TM 9-2320-280-10).

a. Removal

1. Remove four capscrews (11), washers (10), and bracket (12) from mounting plate (7).
2. Remove two locknuts (8), washers (3), capscrews (4), washers (3), and pad (1) from brace (9) and bracket (12). Discard locknuts (8).
3. Remove two locknuts (2), washers (6), screws (5), and brace (9) from bracket (12). Discard locknuts (2).

b. Installation

1. Install brace (9) on bracket (12) with two screws (5), washers (6), and locknuts (2). Tighten locknuts (2) to 6 lb-ft (8 N·m).
2. Install pad (1) on bracket (12) and brace (9) with two washers (3), capscrews (4), washers (3), and locknuts (8). Tighten locknuts (8) to 6 lb-ft (8 N·m).
3. Install bracket (12) on mounting plate (7) with four washers (10) and capscrews (11). Tighten capscrews (11) to 26 lb-ft (35 N·m).



FOLLOW-ON TASK: Close cargo shell door (TM 9-2320-280-10).

11-100. MACHINE GUN STOP REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M1025, M1025A1, M1025A2, M1026,
M1026A1, M1043, M1043A1, M1043A2,
M1044, M1044A1

Personnel Required

One mechanic
One assistant

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Materials/Parts

Two locknuts (Appendix G, Item 70)

Equipment Condition

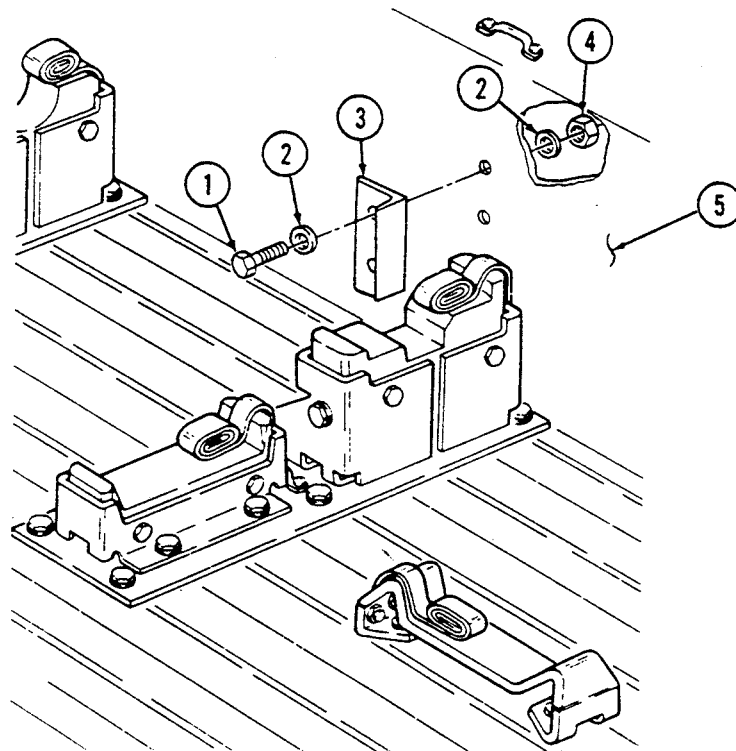
Rear end of cargo shell door raised
(TM 9-2320-280-10).

a. Removal

Remove two locknuts (4), washers (2), capscrews (1), washers (2), and stop (3) from wheelhouse (5). Discard locknuts (4).

b. Installation

Install stop (3) on wheelhouse (5) with two washers (2), capscrews (1), washers (2), and locknuts (4). Tighten locknuts (4) to 6 lb-ft (8 N•m).



FOLLOW-ON TASK: Close cargo shell door (TM 9-2320-280-10).

11-101. NIGHT SIGHT RETAINER REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M1025, M1025A1, M1025A2, M1026,
M1026A1, M1043, M1043A1, M1043A2,
M1044, M1044A1

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

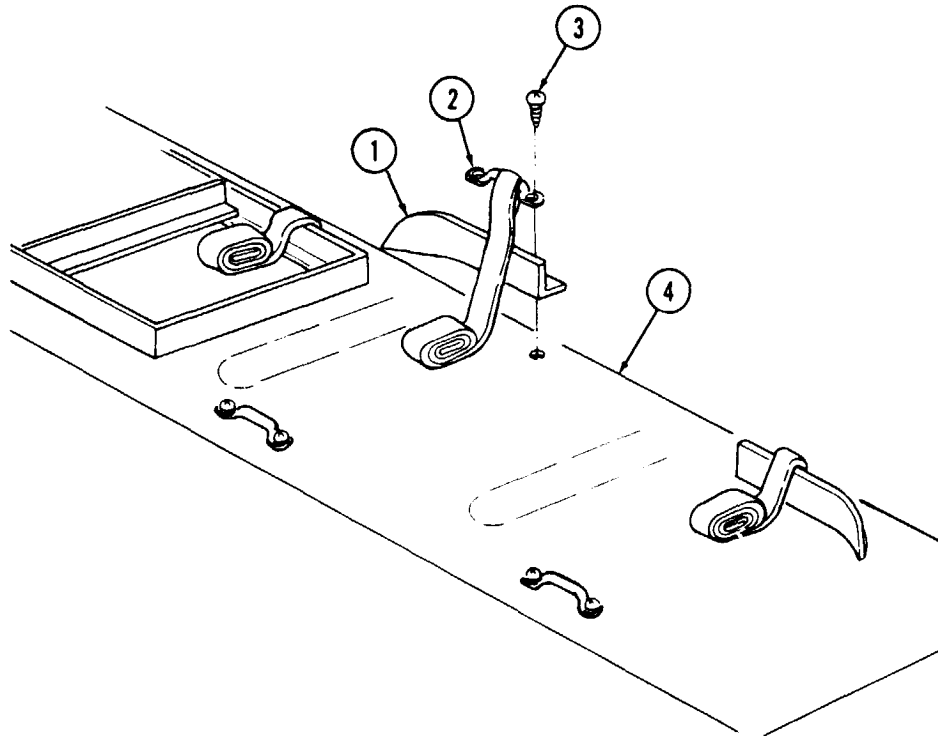
Rear end of cargo shell door raised
(TM 9-2320-280-10).

a. Removal

Remove two screws (3), footman loop (2), and retainer (1) from wheelhouse (4).

b. Installation

Install retainer (1) and footman loop (2) on wheelhouse (4) with two screws (3).



FOLLOW-ON TASK: Close cargo shell door (TM 9-2320-280-10).

11-102. TRIPOD BRACKET REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M1025, M1025A1, M1025A2, M1026,
M1026A1, M1043, M1043A1, M1043A2,
M1044, M1044A1

Personnel Required

One mechanic
One assistant

Tools

General mechanic's tool kit:
automotive (appendix B, Item 1)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Materials/Parts

Two locknuts (Appendix G, Item 70)

Equipment Condition

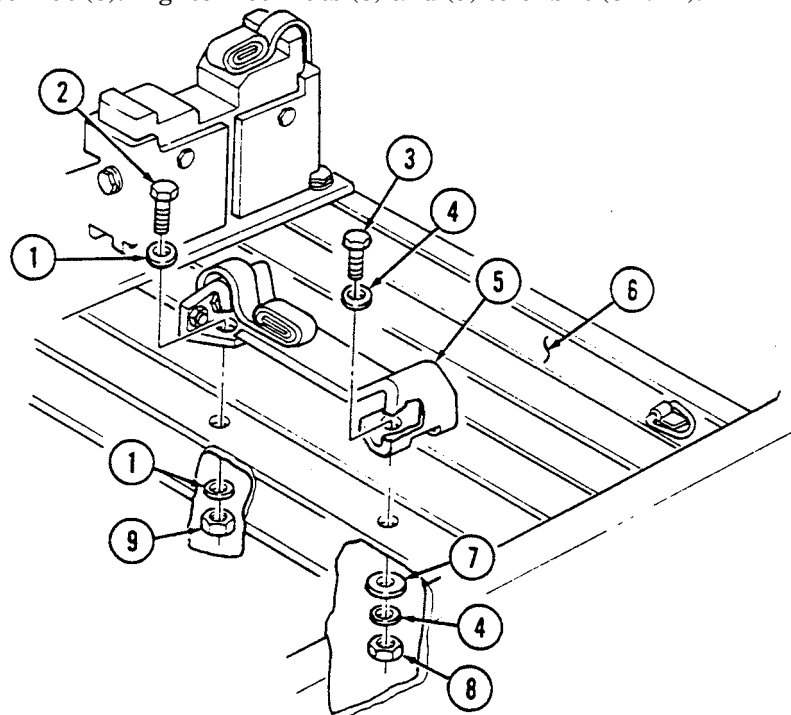
Rear end of cargo shell door raised
(TM 9-2320-280-10).

a. Removal

1. Remove locknut (8), washer (4), large washer (7), capscrew (3), and washer (4) from tripod bracket (5) and cargo floor (6). Discard locknut (8).
2. Remove locknut (9), washer (1), capscrew (2), washer (1), and tripod bracket (5) from cargo floor (6). Discard locknut (9).

b. Installation

1. Install tripod bracket (5) on cargo floor (6) with washer (1), capscrew (2), washer (1), and locknut (9).
2. Secure tripod bracket (5) to cargo floor (6) with washer (4), capscrew (3), large washer (7), washer (4), and locknut (8). Tighten locknuts (8) and (9) to 6 lb-ft (8 N·m).



FOLLOW-ON TASK: Close cargo shell door (TM 9-2320-280-10).

11-103. DOUBLE AMMO BOX TRAY (CALIBER .50) REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M1025, M1025A1, M1025A2, M1026,
M1026A1, M1043, M1043A1, M1043A2,
M1044, M1044A1

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Four locknuts (Appendix G, Item 70)

Personnel Required

One mechanic
One assistant

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

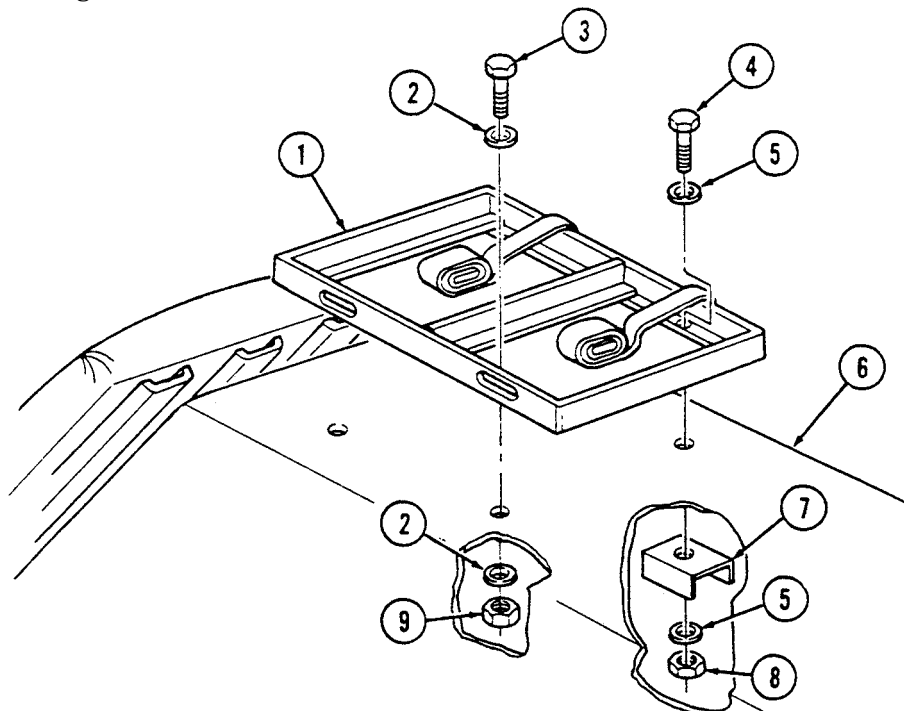
Rear end of cargo shell door raised
(TM 9-2320-280-10).

a. Removal

1. Remove two locknuts (9), washers (2), capscrews (3), and washers (2) from ammo box tray (1) and wheelhouse (6). Discard locknuts (9).
2. Remove two locknuts (8), washers (5), reinforcement brackets (7), capscrews (4), washers (5), and ammo box tray (1) from wheelhouse (6). Discard locknuts (8).

b. Installation

1. Install ammo box tray (1) on wheelhouse (6) with two washers (5), capscrews (4), reinforcement brackets (7), washers (5), and locknuts (8).
2. Secure ammo box tray (1) to wheelhouse (6) with two washers (2), capscrews (3), washers (2), and locknuts (9). Tighten locknuts (9) and (8) to 6 lb-ft (8 N·m).



FOLLOW-ON TASK: Close cargo shell door (TM 9-2320-280-10).

11-104. AMMO BOX TRAY (CALIBER .50) REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M1025, M1025A1, M1025A2, M1026,
M1026A1, M1043, M1043A1, M1043A2,
M1044, M1044A1

Personnel Required

One mechanic
One assistant

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Materials/Parts

Four locknuts (Appendix G, Item 70)

Equipment Condition

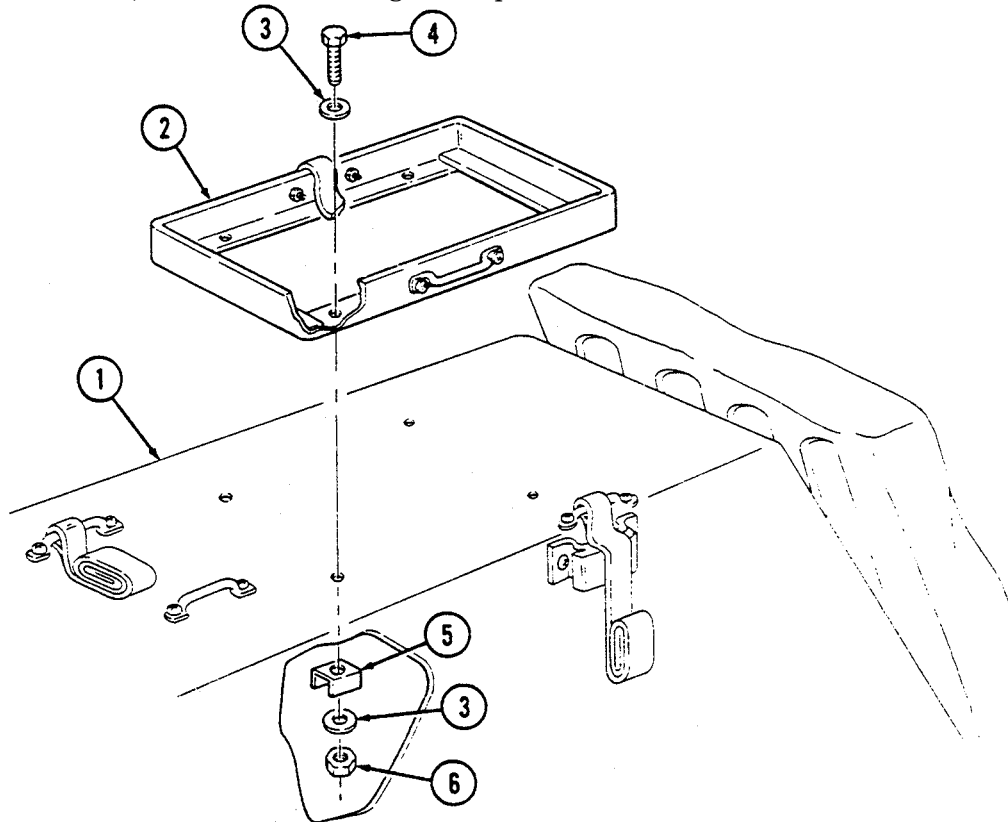
Rear end of cargo shell door raised
(TM 9-2320-280-10).

a. Removal

Remove four locknuts (6), washers (3), reinforcement brackets (5), capscrews (4), washers (3), and ammo box tray (2) from wheelhouse (1). Discard locknuts (6).

b. Installation

Install ammo box tray (2) on wheelhouse (1) with four washers (3), capscrews (4), reinforcement brackets (5), washers (3), and locknuts (6). Tighten capscrews (4) to 6 lb-ft (8 N•m).



FOLLOW-ON TASK: Close cargo shell door (TM 9-2320-280-10).

11-105. AMMO BOX TRAY (40 MM AND CALIBER .50) REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M1025, M1025A1, M1025A2, M1026,
M1026A1, M1043, M1043A1, M1043A2,
M1044, M1044A1

Tools

General mechanic's tool kit:
automotive (appendix B, item 1)

Materials/Parts

Four locknuts (Appendix G, Item 70)

Personnel Required

One mechanic
One assistant

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

Rear end of cargo shell door raised
(TM 9-2320-280-10).

a. Removal

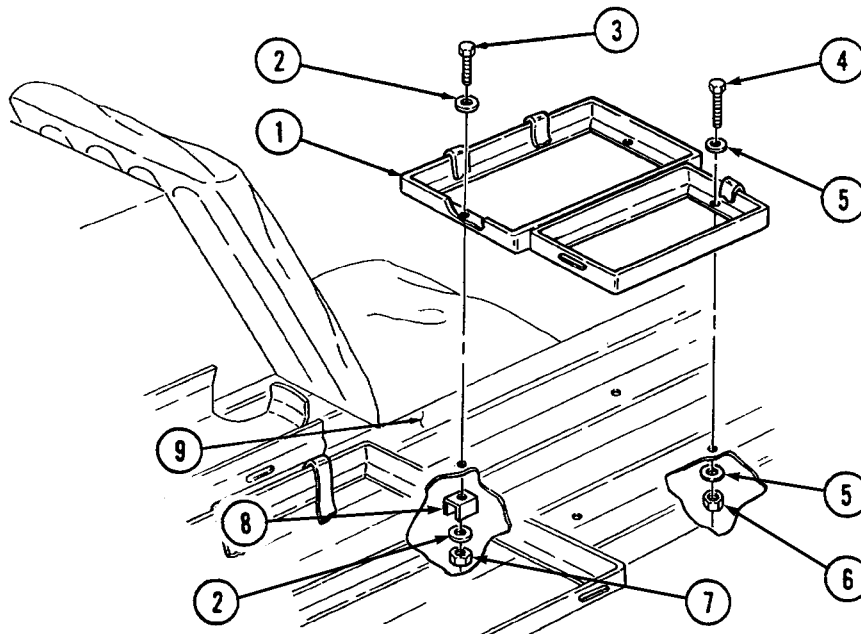
1. Remove locknut (7), washer (2), reinforcement bracket (8), capscrew (3), and washer (2) from ammo box tray (1) and cargo floor (9). Discard locknut (7).
2. Remove three locknuts (6), washers (5), capscrews (4), washers (5), and ammo box tray (1) from cargo floor (9). Discard locknuts (6).

b. Installation

NOTE

Longer capscrews go in right side mounting holes.

1. Install ammo box tray (1) on cargo floor (9) with washer (2), capscrew (3), reinforcement bracket (8), washer (2), and locknut (7).
2. Secure ammo box tray (1) to cargo floor (9) with three washers (5), capscrews (4), washers (5), and locknuts (6). Tighten capscrews (4) and (3) to 6 lb-ft (8 N•m).



FOLLOW-ON TASK: Close cargo shell door (TM 9-2320-280-10).

11-106. DOUBLE AMMO BOX TRAY (40 MM) REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M1025, M1025A1, M1025A2, M1026,
M1026A1, M1043, M1043A1, M1043A2,
M1044, M1044A1

Personnel Required

One mechanic
One assistant

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Materials/Parts

Eight locknuts (Appendix G, Item 70)

Equipment Condition

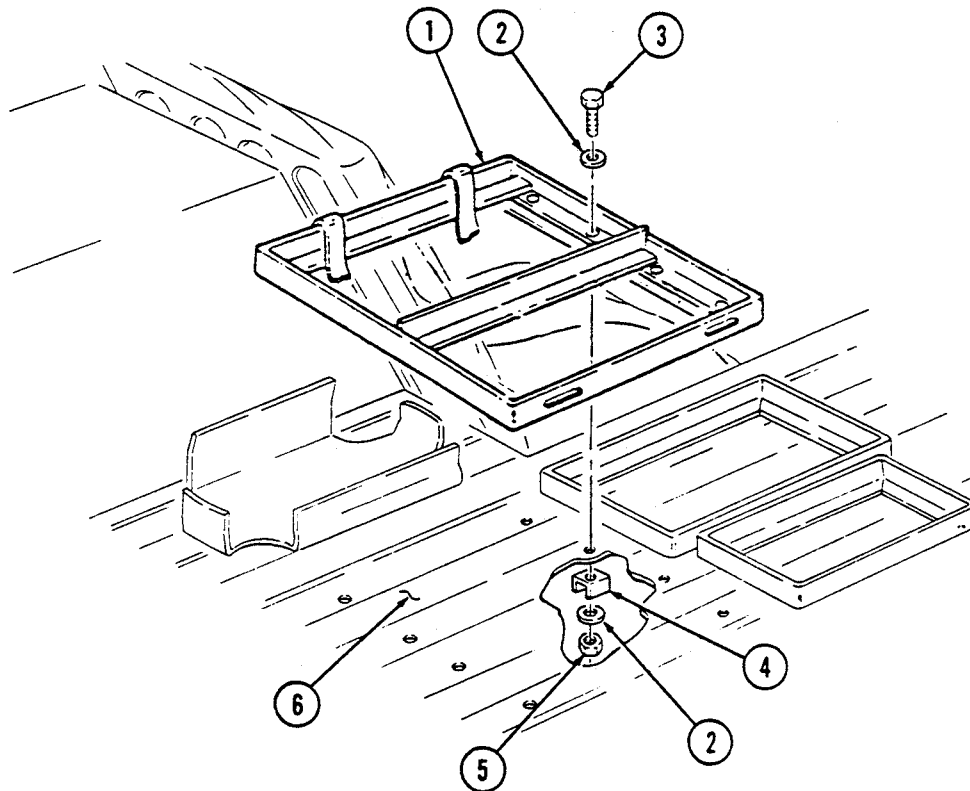
Rear end of cargo shell door raised
(TM 9-2320-280-10).

a. Removal

Remove eight locknuts (5), washers (2), reinforcement brackets (4), capscrews (3), washers (2), and ammo box tray (1) from cargo floor (6). Discard locknuts (5).

b. Installation

Install ammo box tray (1) on cargo floor (6) with eight washers (2), capscrews (3), reinforcement brackets (4), washers (2), and locknuts (5). Tighten capscrews (3) to 6 lb-ft (8 N·m).



FOLLOW-ON TASK: Close cargo shell door (TM 9-2320-280-10).

11-107. TRIPLE AMMO BOX TRAY (40 MM) REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M1025, M1025A1, M1025A2, M1026,
M1026A1, M1043, M1043A1, M1043A2,
M1044, M1044A1

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Six locknuts (Appendix G, Item 70)

Personnel Required

One mechanic
One assistant

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

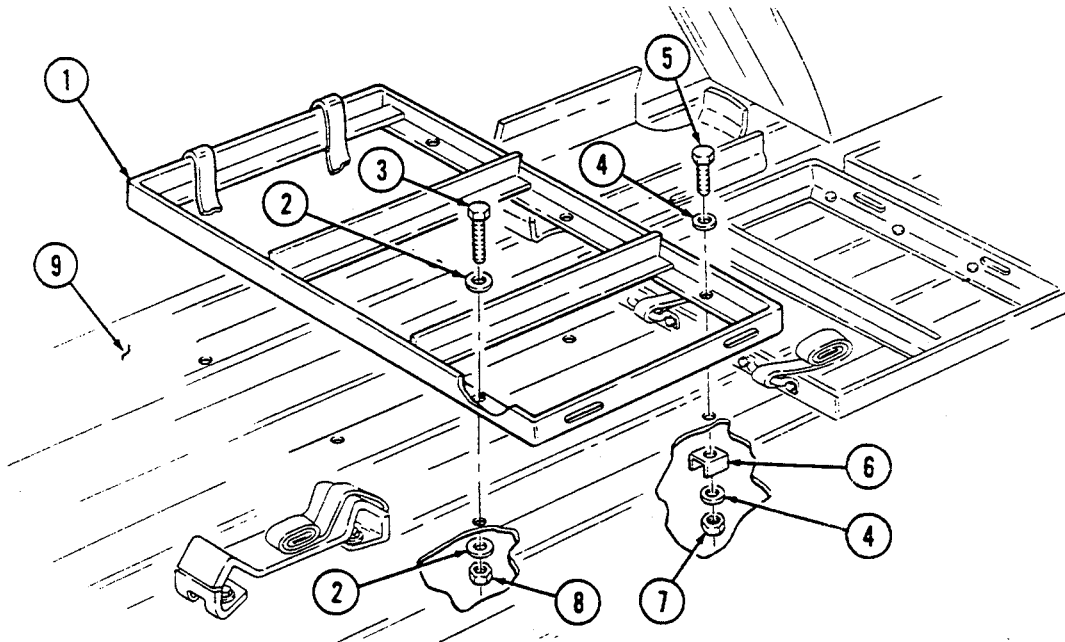
Rear end of cargo shell door raised
(TM 9-2320-280-10).

a. Removal

1. Remove three locknuts (8), washers (2), capscrews (3), and washers (2) from ammo box tray (1) and cargo floor (9). Discard locknuts (8).
2. Remove three locknuts (7), washers (4), reinforcement brackets (6), capscrews (5), washers (4), and ammo box tray (1) from cargo floor (9). Discard locknuts (7).

b. Installation

1. Install ammo box tray (1) on cargo floor (9) with three washers (4), capscrews (5), reinforcement brackets (6), washers (4), and locknuts (7).
2. Secure ammo box tray (1) to cargo floor (9) with three washers (2), capscrews (3), washers (2), and locknuts (8). Tighten capscrews (3) and (5) to 6 lb-ft (8 N•m).



FOLLOW-ON TASK: Close cargo shell door (TM 9-2320-280-10).

11-108. WATER CAN TRAY REPLACEMENT

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP:

Applicable Models

M1025, M1025A1, M1025A2, M1026,
M1026A1, M1043, M1043A1, M1043A2,
M1044, M1044A1

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Personnel Required

One mechanic
One assistant

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

Rear of cargo shell door raised
(TM 9-2320-280-10).

a. Removal

NOTE

For M1025; M1025A1, M1025A2, M1026, and M1026A1 vehicles,
go to step 2.

1. Remove four screws (2), washers (3), and water can tray (1) from cargo floor (5).
2. Remove three screws (2), washers (3), and water can tray (1) from cargo floor (5).
3. Inspect rivnuts (4) for damage. Replace if damaged.

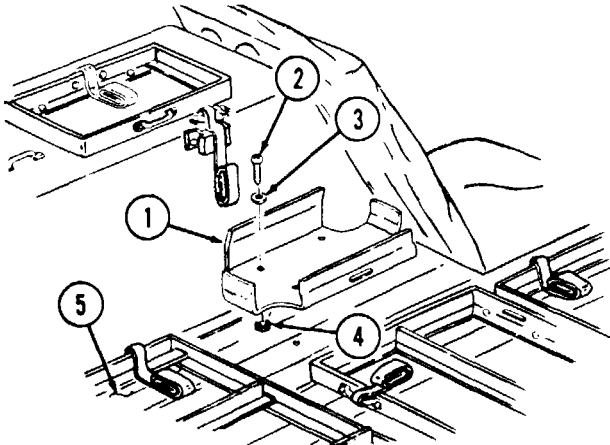
b. Installation

NOTE

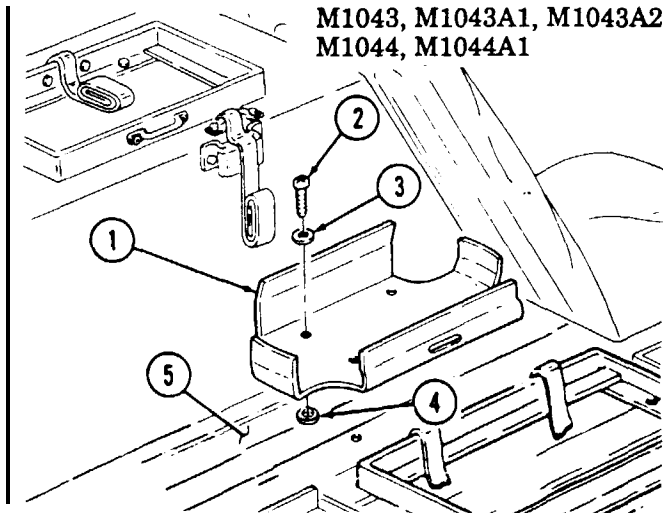
For M1025, M1025A1, M1025A2, M1026, and M1026A1 vehicles,
go to step 2.

1. Install water can tray (1) on cargo floor (5) with four washers (3) and screws (2). Tighten screws (2) to 6 lb-ft (8 N·m).
2. Install water can tray (1) on cargo floor (5) with three washers (3) and screws (2). Tighten screws (2) to 6 lb-ft (8 N·m).

M1025, M1025A1, M1025A2,
M1026, M1026A1



M1043, M1043A1, M1043A2,
M1044, M1044A1



FOLLOW-ON TASK: Close cargo shell door (TM 9-2320-280-10).

11-109. WATER CAN/M13 DECON CAN BUMPER REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M1025, M1025A1, M1025A2, M1026,
M1026A1, M1043, M1043A1, M1043A2,
M1044, M1044A1

Tools

General mechanic's tool kit:
automotive (appendix B, Item 1)

Materials/Parts

Two plain-assembled nuts
(Appendix G, Item 201)

Personnel Required

One mechanic
One assistant

Manual References

TM 9-2320-280-24P
TM 9-2320-280-10

Equipment Condition

Rear of cargo shell door raised
(TM 9-2320-280-10).

NOTE

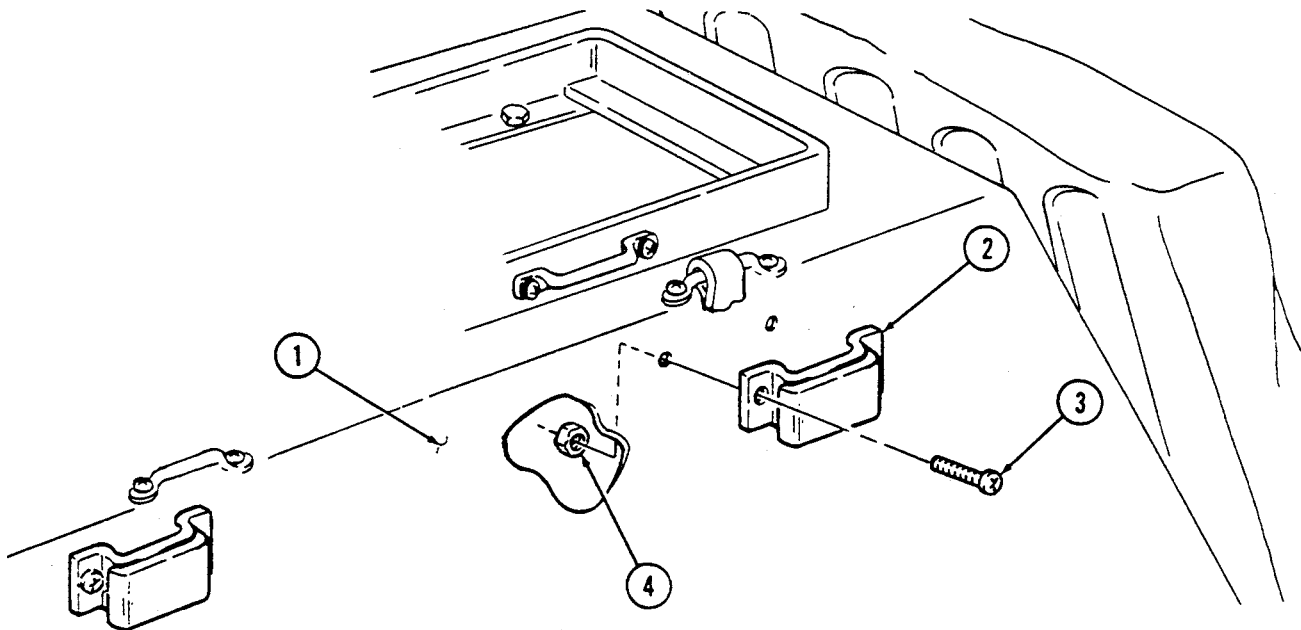
- M1025, M1025A1, M1025A2, M1026, and M1026A1 vehicles have both a water can and M13 decon can bumpers.
- M1043, M1043A1, M1043A2, M1044, and M1044A1 vehicles have only a water can bumper.

a. Removal

Remove two plain-assembled nuts (4), screws (3), and water can bumper (2) from wheelhouse (1). Discard plain-assembled nuts (4).

b. Installation

Install water can bumper (2) on wheelhouse (1) with two screws (3) and plain-assembled nuts (4).



FOLLOW-ON TASK: Close cargo shell door (TM 9-2320-280-10).

11-110. REAR SEAT STOWAGE COMPARTMENT NET BRACKETS REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M1025A2, M1043A2

Tools

General mechanic's tool kit:
 automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-10
 TM 9-2320-280-24P

Equipment Condition

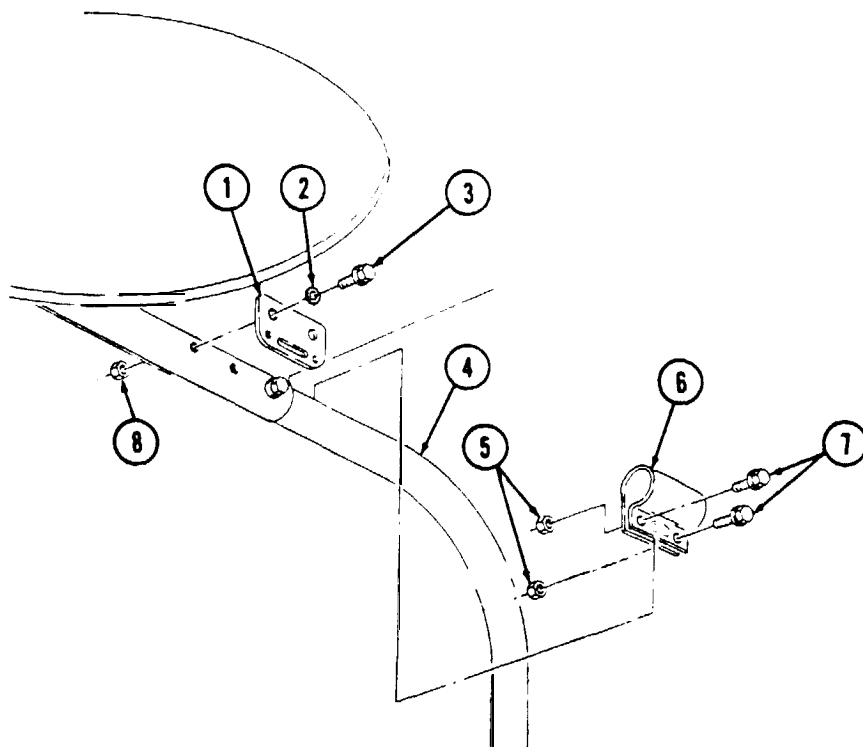
Rear seat stowage compartment net removed
 (TM-9-2320-280-10).

a. Removal

1. Remove two nuts (5), capscrews (7), and bracket (6) from support (4).
2. Remove two nuts (8), capscrews (3), washers (2), and bracket (1) from support (4).

b. Installation

1. Install bracket (1) on support (4) with two washers (2), capscrews (3), and nuts (8).
2. Install bracket (6) on support (4) with two capscrews (7) and nuts (5).



FOLLOW-ON TASK: Install rear seat stowage compartment net (TM-9-2320-280-10).

11-111. CARGO BULKHEAD REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M1025A2, M1043A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Four locknuts (Appendix G, Item 128)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

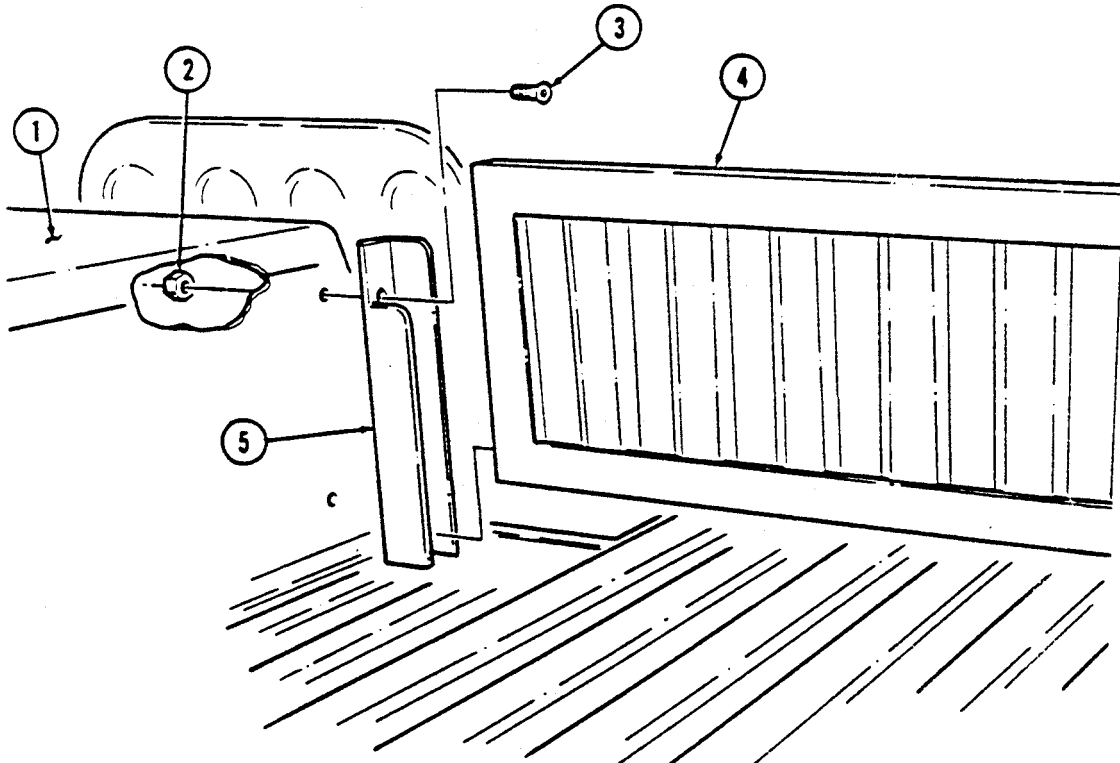
Stowage compartment net removed
(TM 9-2320-280-10).

a. Removal

1. Remove cargo bulkhead (4) from two channels (5).
2. Remove four locknuts (2), hex head screws (3), and two channels (5) from wheel housings (1). Discard locknuts (2).

b. Installation

1. Install two channels (5) on wheel housings (1) with four hex head screws (3) and locknuts (2).
2. Tighten locknuts (2) to 15 lb-ft (20 N•m).
3. Install cargo bulkhead (4) in two channels (5).



FOLLOW-ON TASK: Install stowage compartment net (TM 9-2320-280-10).

11-112. WEAPON STATION TRAY AND BEARING SEALS MAINTENANCE

This task covers:

- | | |
|--|----------------------|
| <p>a. Removal</p> <p>b. Installation</p> | <p>c. Adjustment</p> |
|--|----------------------|

INITIAL SETUP:

Applicable Models

All models except M996, M996A1, M997, M997A1, M997A2, M998, M998A1, M1035, M1035A1, M1035A2, M1037, M1038, M1038A1, M1042, M1097, M1097A1, M1097A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Adhesive (Appendix C, Item 3)
Three locknuts (Appendix G, Item 128)
Seal (Appendix G, Item 285)

Personnel Required

One mechanic
One assistant

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

- Weapon station hatch removed (para. 11-42).
- Hinge pivot bracket and gunner's sling removed (para. 11-52).
- Gunner's sling hook removed (para. 11-53).
- Weapon station backrest pads removed (para. 11-54).
- Weapon station hatch latch removed (para. 11-50).
- Weapon station hatch tube removed (para. 11-51).
- Turret lock removed (para. 11-56).

M966, M966A1, M1036, M1045, M1045A1, M1045A2, M1046, and M1046A1 Only:

- TOW mount pedestal removed (para. 11-57).
- TOW mount pedestal cover removed (para. 11-58).
- Weapon station inclinometer removed (para. 11-60).
- TOW MGS pan removed (para. 11-59).

M1025, M1025A1, M1025A2, M1026, M1026A1, M1043, M1043A1, M1043A2, M1044, and M1044A1 only:

- Armament cover and seal removed (para. 11-62).
- Armament mount panel removed (para. 11-61).

M1043, M1043A1, M1043A2, M1044, and M1044A1 only:

- Traversing bar removed (para. 12-161).

NOTE

Note location of attaching hardware for installation.

a. Removal

1. Remove three locknuts (7), washers (3), capscrews (2), washers (3), and weapon station tray (1) from bearing (5). Discard locknuts (7).

NOTE

- The upper and lower turret bearing seals are basically the same. Steps 2 and 3 apply to the lower bearing seal.
- Replace turret bearing seals that are damaged, separated, or peeled out.

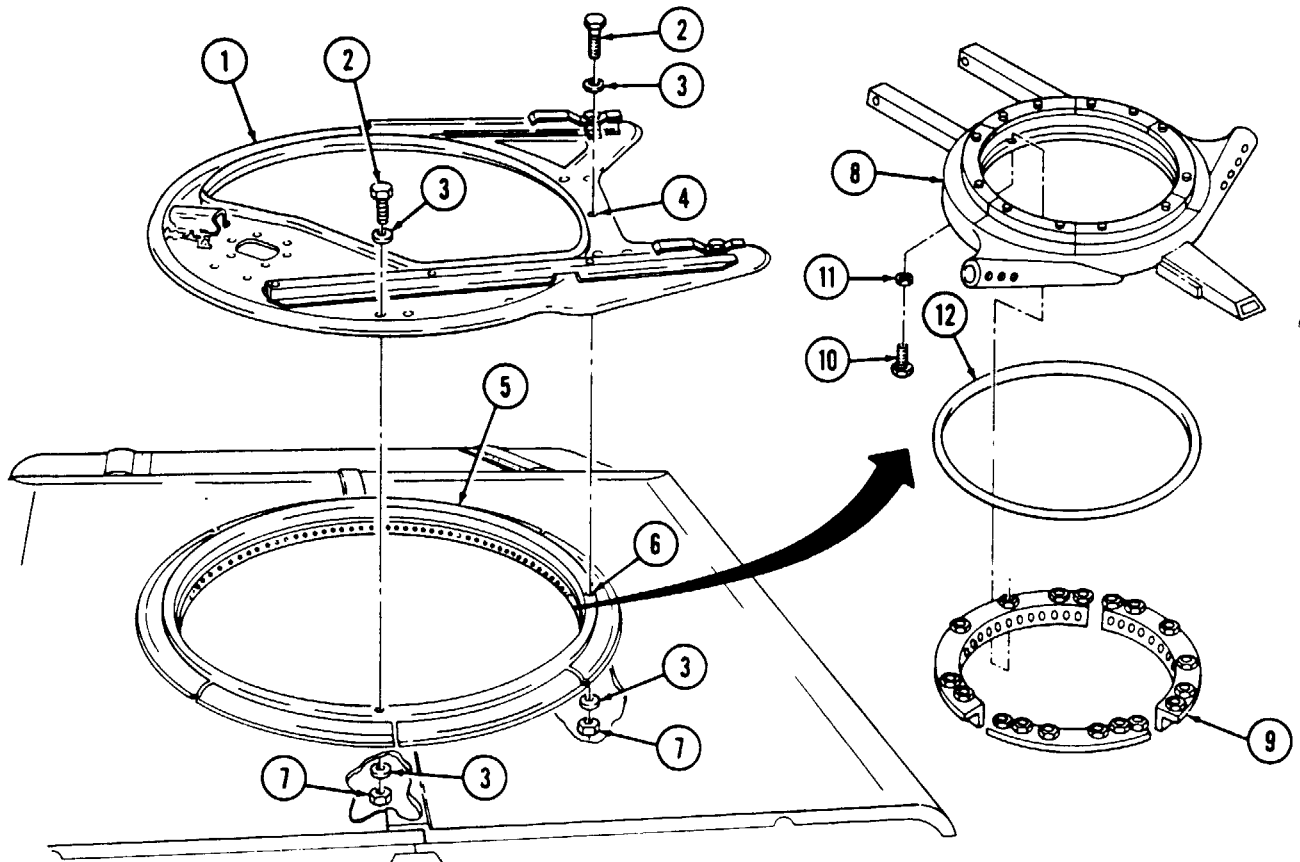
2. Remove eighteen capscrews (10), washers (11), and three turret locking sections (9) from support assembly (8).
3. Remove turret bearing seal (12) from support assembly (8) and remove remains of adhesive from grooves in support assembly (8).

11-112. WEAPON STATION TRAY AND BEARING SEALS MAINTENANCE (Cont'd)

b. Installation

NOTE

- Perform steps 1 and 2 only if installing new turret bearing seals.
 - New seal broad side fits into groove.
1. Apply adhesive to grooves in support assembly (8) and install turret bearing seal (12) into support assembly (8).
 2. Install three turret **lockring** sections (9) on support assembly (8) with eighteen washers (11) and capscrews (10). Tighten capscrews (10) to 37 lb-ft (50 N·m).
 3. Install weapon station tray (1) on bearing (5).
 4. Ensure all mounting hardware capscrew holes (4) in weapon station tray (1) are aligned with mounting hardware capscrew holes (6) in bearing (5).
 5. Install weapon station tray (1) on bearing (5) with three washers (3), capscrews (2), washers (3), and locknuts (7). Tighten locknuts (7) to 37 lb-ft (50 N·m).



11-112. WEAPON STATION TRAY AND BEARING SEALS MAINTENANCE (Cont'd)

c. Adjustment

NOTE

- Do not adjust weapon station tray if loose or damaged.
- Weapon station tray needs adjustment if it binds, sticks, or does not rotate freely.

1. Loosen capscrew (6) securing support ring (1) to "C" pillar support bracket (7).
2. Check the gap between "C" pillar support bracket (7) and support ring (1).

NOTE

- If gap is the thickness of a slotted washer or greater, proceed to step 4.
- If no gap exists, proceed to step 3.

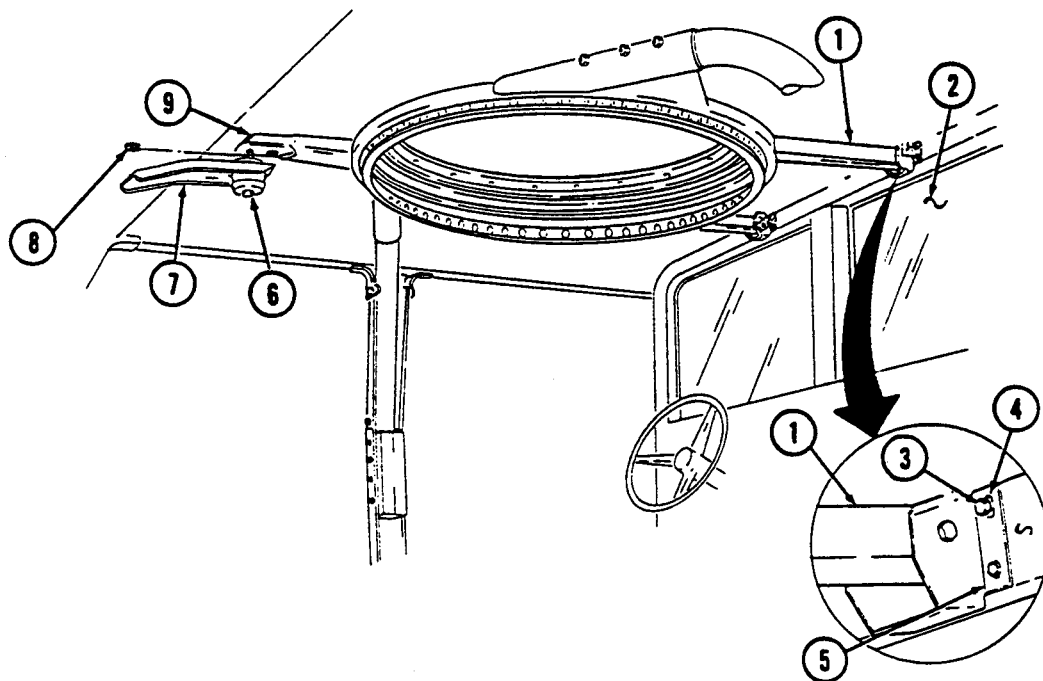
3. Remove one slotted washer (8) at a time, as required, and rotate weapon station tray (9) to check for binding. If there is no improvement, proceed to step 5.
4. Add one slotted washer (8) at a time, as required, and rotate weapon station tray (9) to check for binding. If there is no improvement, proceed to step 5.
5. Loosen eight capscrews (3) securing two clevises (5) to windshield (2). Rotate weapon station tray (9) to check for binding.
6. If weapon station tray (9) rotation has improved, position adjustment slots (4) in clevises (5) where weapon station tray (9) operated freely and tighten eight capscrews (3) and capscrew (6).

NOTE

If weapon station tray rotation has not improved after adjustment procedures, remove turret bearing assembly.

7. Install primary weapon system and check operation of weapon station tray (10). Refer to TM 9-2320-280-10.

11-112. WEAPON STATION TRAY AND BEARING SEALS MAINTENANCE (Cont'd)



- FOLLOW-ON TASKS:**
- Install weapon station hatch tube (para. 11-51).
 - Install weapon station hatch latch (para. 11-50).
 - Install weapon station backrest pads (para. 11-54).
 - Install gunner's sling hook (para. 11-53).
 - Install hinge pivot bracket and gunner's sling (para. 11-52).
 - Install weapon station hatch (para. 11-42).
 - Install turret lock (para. 11-56).
 - Check weapon station for proper operation (TM 9-2320-280-10).

M966, M966A1, M1036, M1045, M1045A1, M1045A2, M1046, M1046A1, and M1121 Only:

- Install TOW mount pedestal (para. 11-57).
- Install TOW mount pedestal cover (para. 11-58).
- Install TOW MGS pan (para. 11-59).
- Install weapon station inclinometer (para. 11-60).

M1025, M1025A1, M1025A2, M1026, M1026A1, M1043, M1043A1, M1043A2, M1044, and M1044A1 Only:

- Install armament cover and seal (para. 11-62).
- Install armament mount panel (para. 11-61).

M1043, M1043A1, M1043A2, M1044, and M1044A1 Only:

- Install traversing bar (para. 12-161).

11-112.1. TURRET CLEANING

This task covers:

a. Turret Modification

b. Cleaning

INITIAL SETUP:

Applicable Models

All models except M996, M996A1, M997, M997A1, M997A2, M998, M998A1, M1035, M1035A1, M1035A2, M1037, M1038, M1038A1, M1042, M1097, M1097A1, M1097A2, M1123

Materials/Parts

Hose (Appendix D, Fig. D-119)
 Fixture (Appendix D, Fig. D-117)
 Bushing (Appendix D, Fig. D-118)

Manual References

TM 9-2320-280-24P

Tools

General mechanic's tool kit:
 automotive (Appendix B, Item 1)

NOTE

If not previously accomplished, perform task a. to allow use of hose to clean turret.

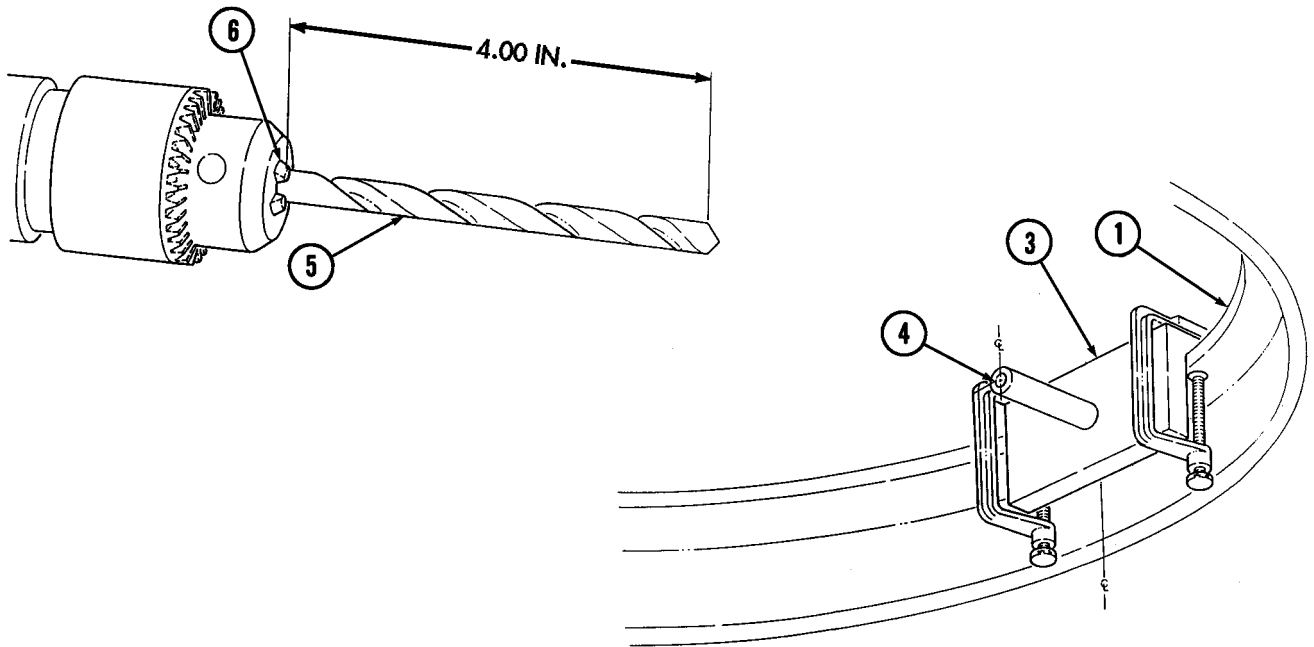
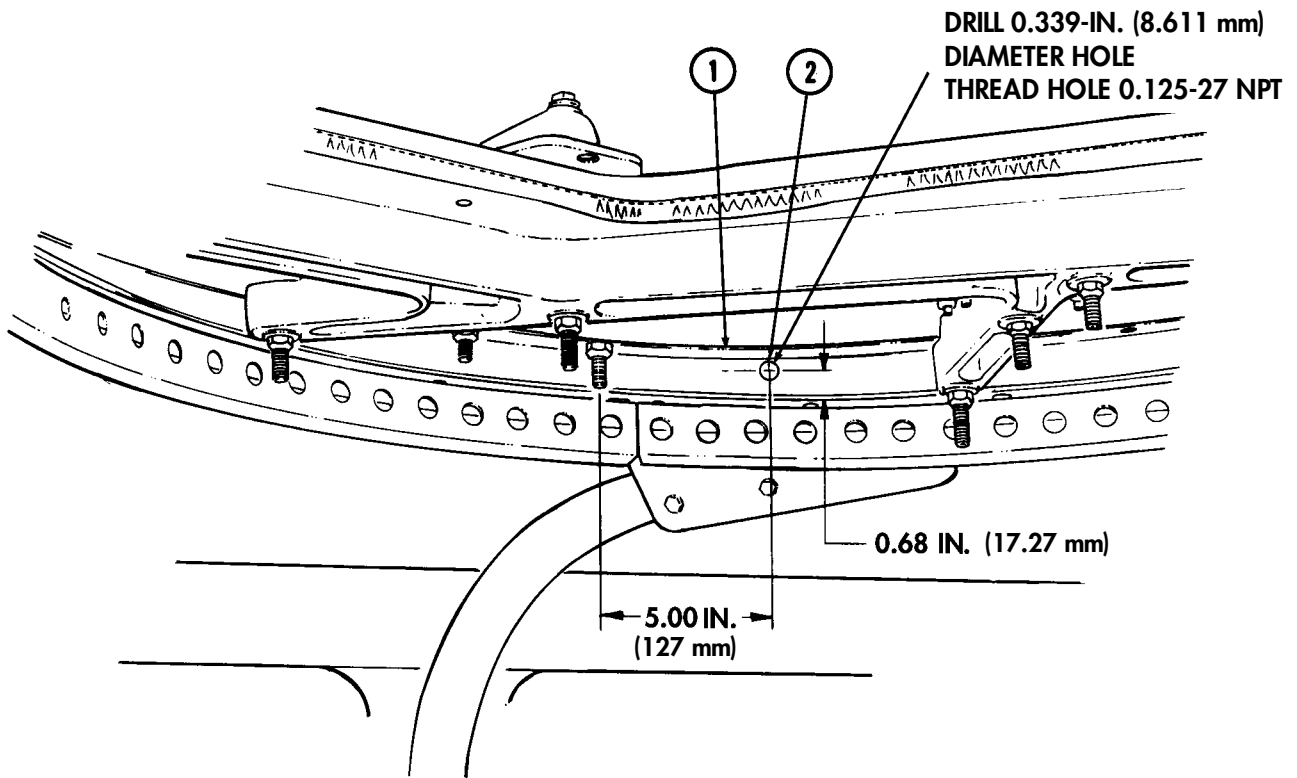
a. Turret Modification

NOTE

The following optional procedure will aid in turret cleaning. Have your commander's concurrence before performing any modification to the vehicle.

1. Locate and mark the position to drill hole (2) in inner bearing (1).
2. Remove weapon station tray and seal (para. 11-112).
3. Secure fixture (3) to inner bearing (1) with centerline of hole (4) aligned with mark on inner bearing (1).
4. Position 0.339-in. drill bit (5) (letter R drill bit) four inches from drill chuck jaws (6).

11-112.1. TURRET CLEANING (Cont'd)



11-112.1. TURRET CLEANING (Cont'd)

5. Using fixture (2), drill 0.339-in. (8.611mm) diameter hole (3) in inner bearing (1).
6. Remove fixture (2) from inner bearing (1).

CAUTION

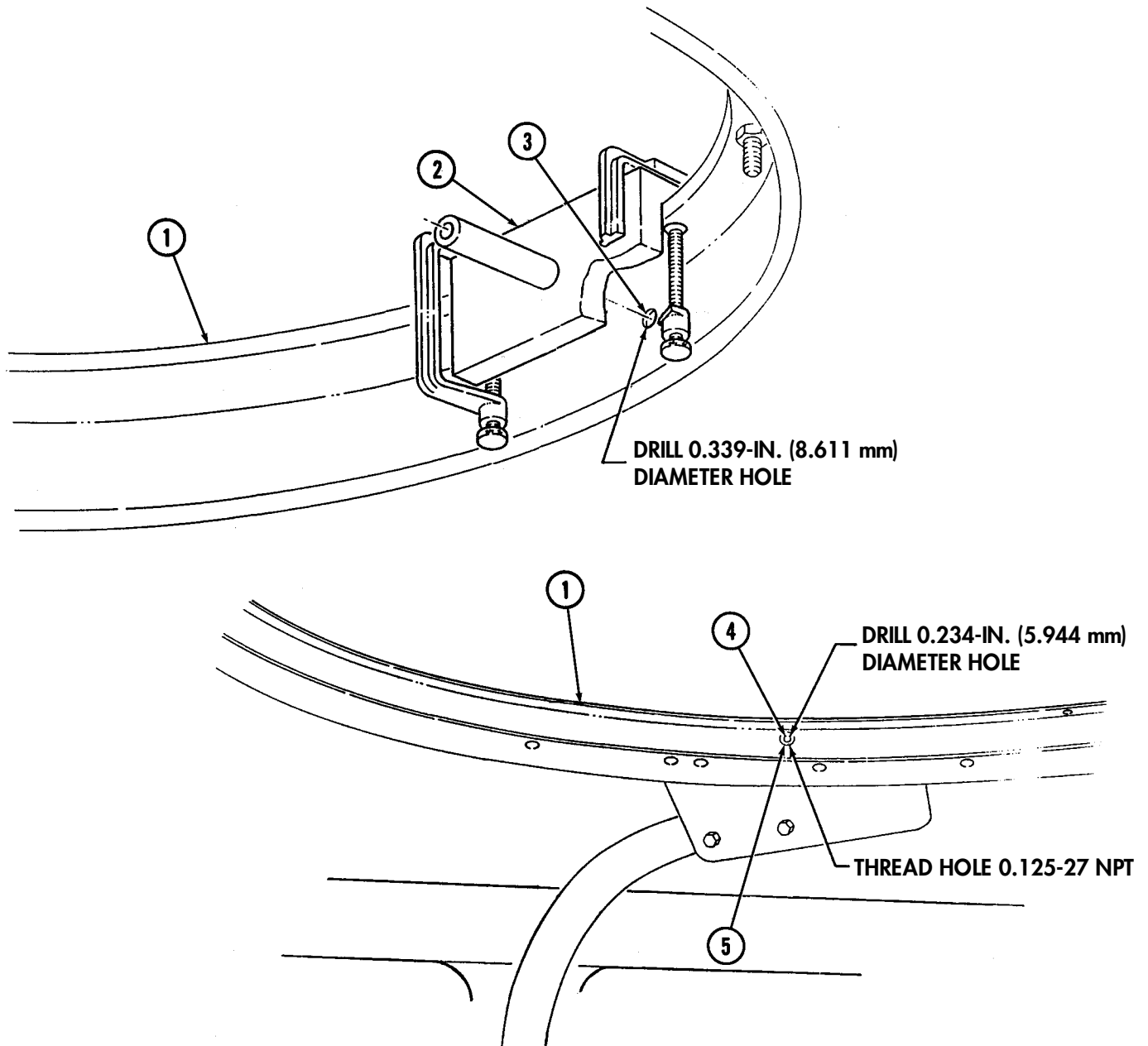
Ensure bearings are spread apart where drill bit will come through inner bearing, or drill bit may damage bearing

7. Using hole drilled in step 5, drill 0.234-in. (5.944 mm) diameter hole (4) through inner bearing (1) only.

NOTE

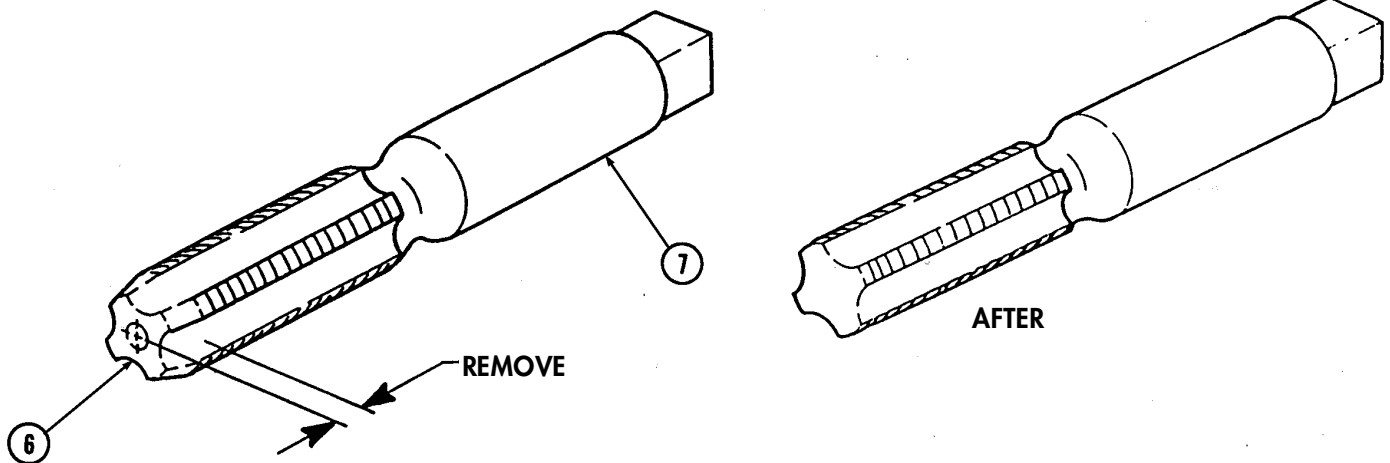
After threading inner bearing hole, clean metal shavings

8. Using 0.125-27 NPT standard tap, thread hole (5).



11-112.1. TURRET CLEANING (Cont'd)

9. Remove tapered end (6) on 0.125-27 NPT standard tap (7).
10. Using modified 0.125-27 NPT tap, finish threading hole (5).
11. Install weapon station tray and seal (para. 11-112).



11-112.1. TURRET CLEANING (Cont'd)

b. Cleaning

1. Install hose (4) in hole (2) on inner bearing (1).
2. Connect low-pressure water hose (5) to hose (4).
3. Turn water on and rotate weapon station tray (3) several full rotations.

NOTE

Allow water to force out any dirt or grit within turret bearing.

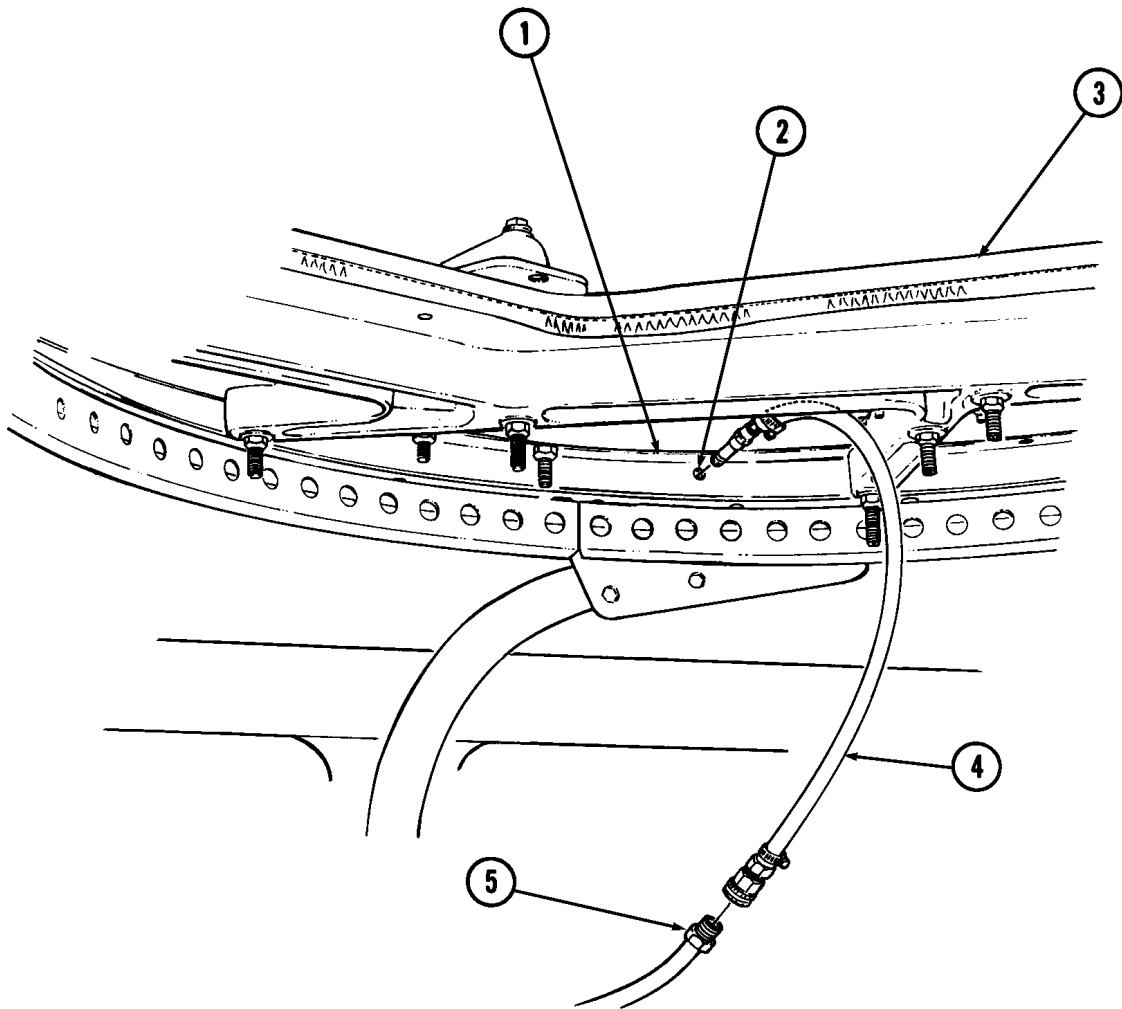
4. Turn water off when cleaning is completed.
5. Disconnect low-pressure water hose (5) from hose (4).

NOTE

Hose assembly may either be stowed in place on weapon station tray or removed.

6. Remove hose (4) from hole (2) on inner bearing (1).

11-112.1. TURRET CLEANING (Cont'd)



11-113. TURRET BEARING MAINTENANCE

This task covers:

- | | |
|--|--|
| <ul style="list-style-type: none"> a. Removal b. Cleaning and Inspection | <ul style="list-style-type: none"> c. Installation d. Adjustment |
|--|--|

INITIAL SETUP:

Applicable Models

All vehicles except: M996, M996A1, M997, M997A1, M997A2, M998, M998A1, M1035, M1035A1, M1035A2, M1037, M1038, M1038A1, M1042, M1097, M1097A1, M1097A2, M1123

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Drycleaning solvent (Appendix C, Item 18)
Sealant (Appendix C, Item 38)
Detergent (Appendix C, Item 17)
Two turret bearing seals
(Appendix D, Fig. D-90)
Twelve locknuts (Appendix G, Item 128)
Seal (Appendix G, Item 285)

Personnel Required

One mechanic
One assistant

Manual References

TM 9-2320-280-24P

Equipment Condition

Weapon station tray and bearing seals removed
(para. 11-112).

General Safety Instructions

- Drycleaning solvent is flammable and will not be used near an open flame. A fire extinguisher will be kept nearby when the solvent is used. Use only in well-ventilated places.
- Compressed air used for cleaning purposes will not exceed 30 psi (207 kPa). Use only with effective chip guarding and personal protective equipment (goggles/shield, gloves, etc.).

WARNING

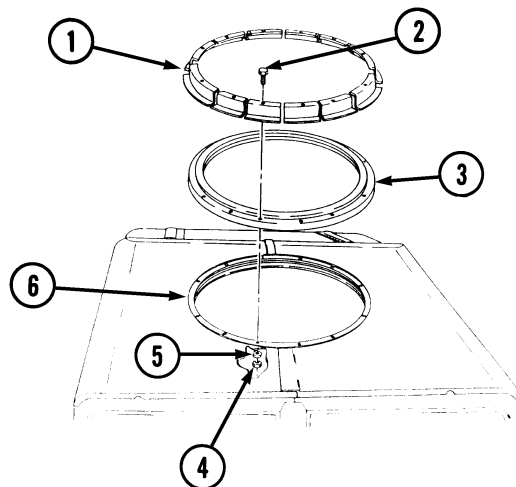
Drycleaning solvent is flammable and will not be used near an open flame. A fire extinguisher will be kept nearby when the solvent is used. Use only in well-ventilated places. Failure to do this will result in injury to personnel and/or damage to equipment.

NOTE

Drycleaning solvent may be used to assist in loosening the sealant during removal.

a. Removal

1. Remove twelve locknuts (4), washers (5), and capscrews (2) from roof retainers (1), bearing assembly (3), and support ring (6). Discard locknuts (4).
2. Remove twelve roof retainers (1) and bearing assembly (3) from support ring (6).



11-113. TURRET BEARING MAINTENANCE (Cont'd)

b. Cleaning and Inspection

1. Remove two seals (7) from grooves (8) in bearing assembly (3). Discard seals (7).
2. Remove old sealant from grooves (8) and surface of races (9) on bearing assembly (3).
3. Using high pressure water or steam directed between races (9), clean ball bearings (10) in bearing assembly (3) with mild detergent.

WARNING

Compressed air used for cleaning purposes will not exceed 30 psi (207 kPa). Use only with effective chip guarding and personal protective equipment (goggles/shield, gloves, etc.).

4. Using compressed air, blow out moisture from ball bearings (10) in bearing assembly (3).
5. Place and rotate bearing assembly (3) on a flat surface, and ensure it rotates freely with a maximum of 6 lb pull on the outer race (9).
6. If bearing assembly (3) does not rotate freely, send bearing assembly (3) to direct support maintenance.
7. If bearing assembly (3) rotates freely, proceed to step 8.
8. Cut an 11-foot piece of seal (7).

NOTE

- Stretch seal during installation to ensure seal is fully installed in groove.
 - The broad side of new seal fits into the groove.
 - Ensure sealant is not used on ball bearings or races.
9. Place bearing assembly (3) on a flat surface, apply sealant into groove (8), and install seal (7).
 10. Apply sealant to ends of seal (7) on bearing assembly (3).

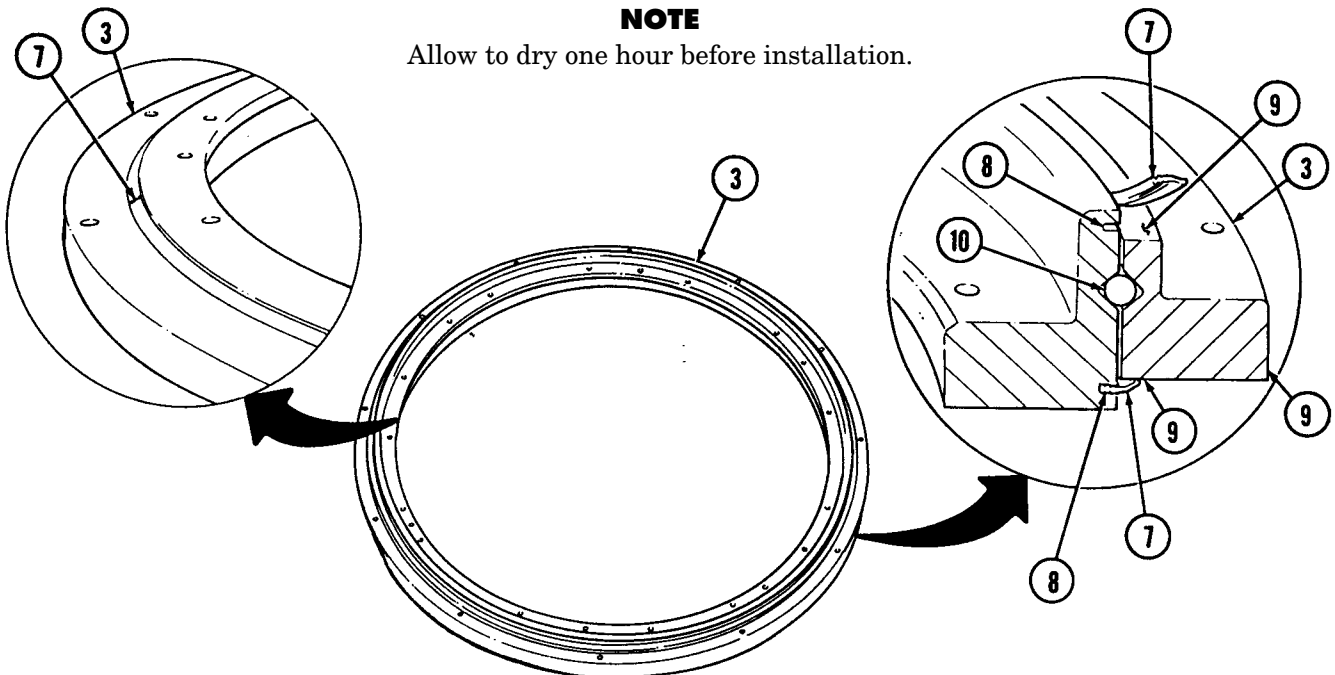
NOTE

Allow to dry approximately 15 minutes before handling bearing assembly.

11. Turn bearing assembly (3) over, apply sealant into groove (8), and install second seal (7).
12. Apply sealant to ends of seal (7) on bearing assembly (3).

NOTE

Allow to dry one hour before installation.



11-113. TURRET BEARING MAINTENANCE (Cont'd)

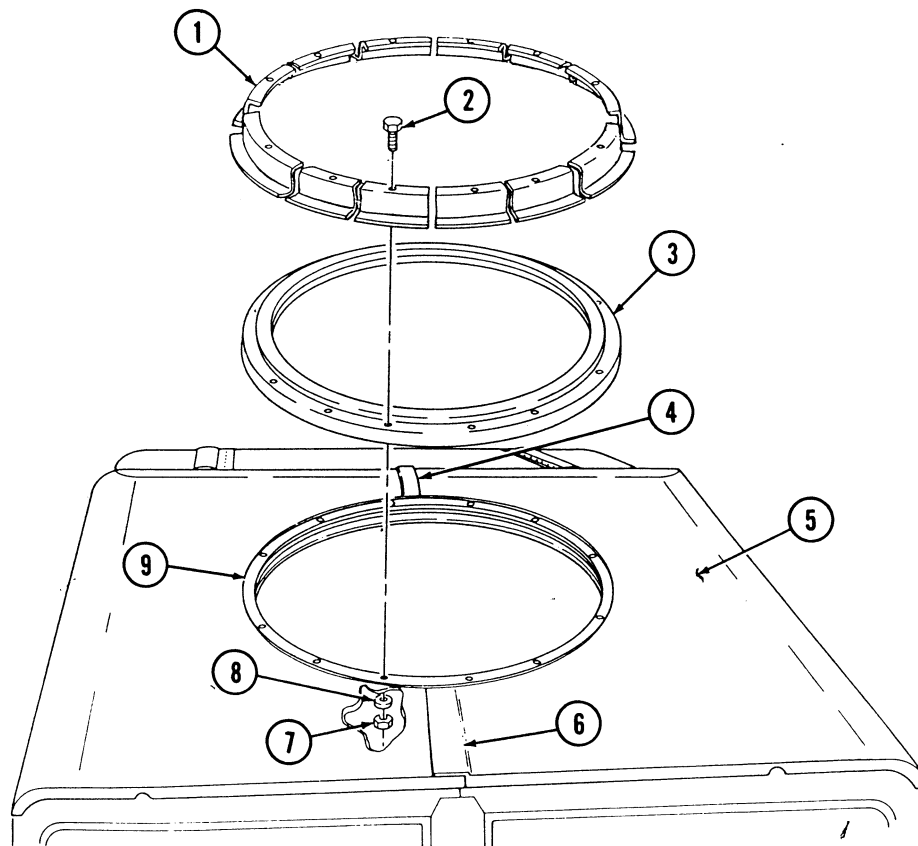
c. Installation

1. Install bearing assembly (3) on support ring (9).

NOTE

Step 2 is to prevent roof leaks.

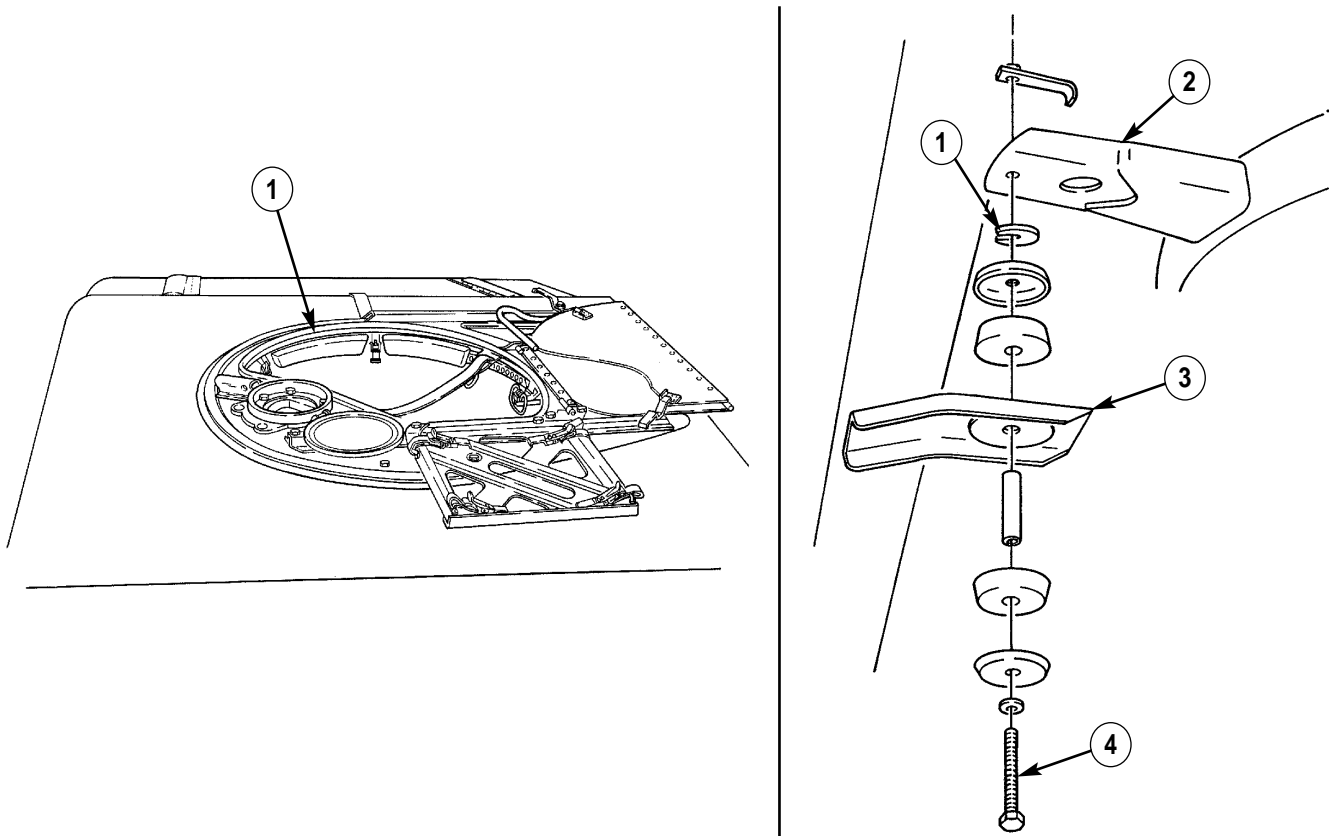
2. Using sealant, fill front and rear roof seams (6) and (4) (where left and right roof halves join together and overlap).
3. Secure bearing assembly (3) to support ring (9) with twelve roof retainers (1), capscrews (2), washers (8), and locknuts (7). Tighten locknuts (7) to 37 lb-ft (50 N•m).
4. Inside vehicle, apply sealant along area where support ring (9) and roof (5) meet.



11-113. TURRET BEARING MAINTENANCE (Cont'd)

d. Adjustment

1. Inspect, tighten, or replace any loose, missing, or damaged parts on weapon station turret (1) area.



2. If weapon station turret rotation has not improved, loosen bolt (4), securing rear of support ring (2) to "C" pillar support bracket (3).
3. Check gap between "C" pillar support bracket (3) and rear support ring (2).

NOTE

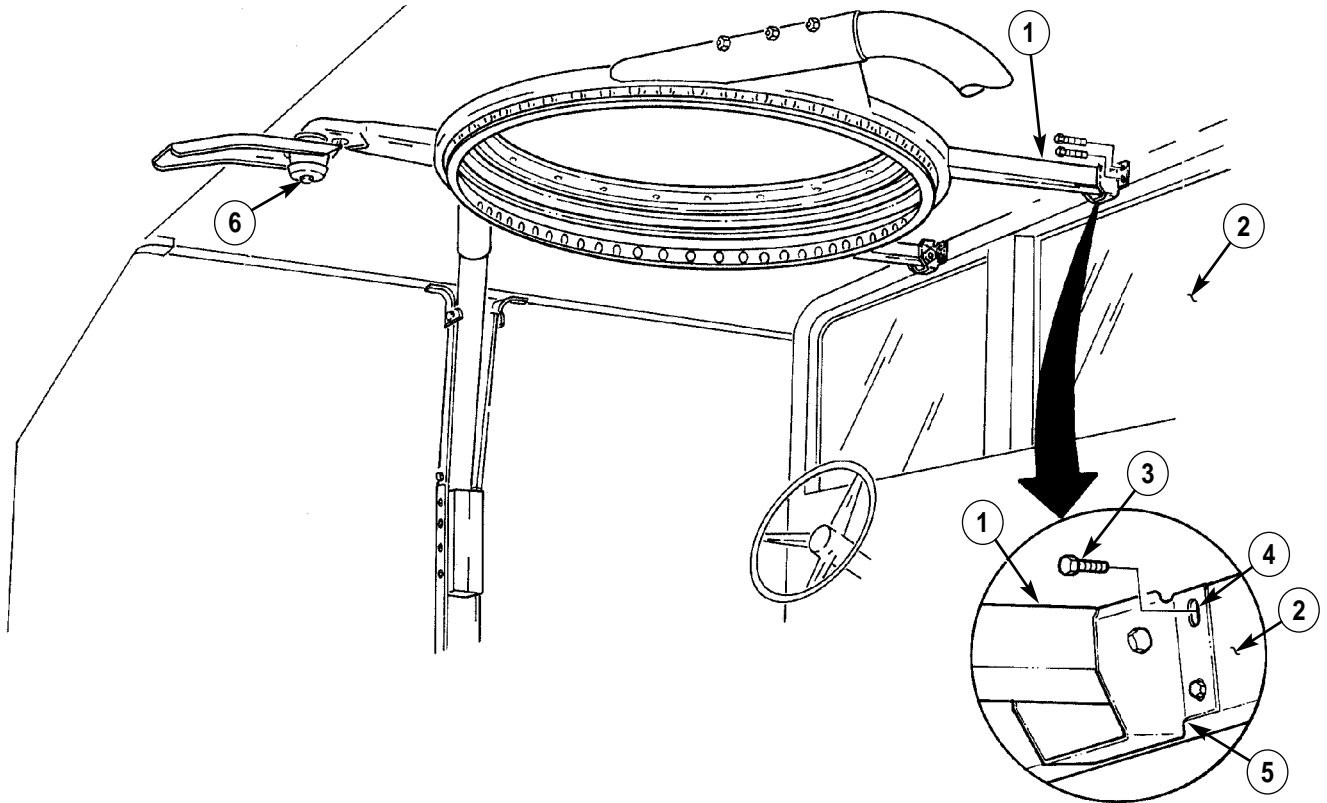
If no gap exists, proceed to step 4.

If gap is the thickness of a slotted washer or greater, proceed to step 5.

4. Remove slotted washers (1), one at a time, as required, and rotate turret to check for binding. If there is no improvement, proceed to step 6.
5. Add slotted washers (1), one at a time, as required, and rotate turret to check to see if it rotates freely. If there is no improvement, proceed to step 6.

11-113. TURRET BEARING MAINTENANCE (Cont'd)

6. Loosen eight clevis retaining bolts (3), securing front ring assembly supports (1) to windshield assembly (2). Rotate turret and check to see if it rotates freely.



7. If turret rotation has improved, position adjustment slots (4) in clevis (5) where turret operates freely, and tighten eight clevis retaining bolts (3) and rear support ring bolt (6).
8. Install weapon station tray and bearing seals (para. 11-112).
9. Install primary weapon system and check operation of weapon station turret (TM 9-2320-280-10).
10. If turret rotation has not improved as a result of adjustment, replace turret bearing assembly.

Section II. S250 SHELTER CARRIER BODY MAINTENANCE

11-114. S250 SHELTER CARRIER BODY MAINTENANCE TASK SUMMARY

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11-122.	Cab Enclosure Panel Replacement	11-172

11-115. SHELTER SUPPORT REINFORCEMENT REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M1037, M1042, M1097, M1097A1, M1097A2

Manual References

TM 9-2320-280-10
 TM 9-2320-280-24P

Tools

General mechanic's tool kit:
 automotive (Appendix B, Item 1)

Equipment Condition

Tailgate lowered (TM 9-2320-280-10).

Materials/Parts

Two lockbolts (Appendix G, Item 69)
 Two lockwashers (Appendix G, Item 179)

a. Removal

NOTE

It may be necessary to detach cab rear panel straps and turnbuttons and roll cab rear panel upward to gain access to front support reinforcements.

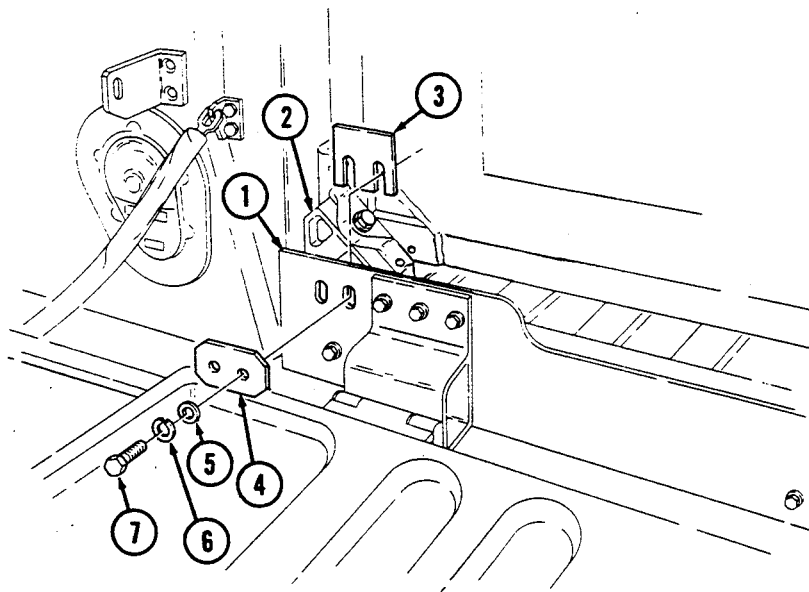
Remove two lockbolts (7), lockwashers (6), washers (5), reinforcement (4), and shims (3) (if installed) from mounting bracket (2). Discard lockbolts (7) and lockwashers (6).

b. Installation

NOTE

Ensure correct positioning of shims, if installed, upon installation of lockbolts.

Install shims (3) (if installed) and reinforcement (4) on support assembly (1) and mounting bracket (2) with two lockbolts (7), lockwashers (6), and washers (5). Tighten lockbolts (7) to 90 lb-ft (122 N·m).



FOLLOW-ON TASK: Raise and secure tailgate (TM 9-2320-280-10).

11-116. SHELTER MOUNTING BRACKET REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M1037, M1042, M1097, M1097A1, M1097A2

Manual References

TM 9-2320-280-24P

Tools

General mechanic's tool kit: automotive
(Appendix B, Item 1)

Equipment Condition

Shelter removed (para. 11-120).

Materials/Parts

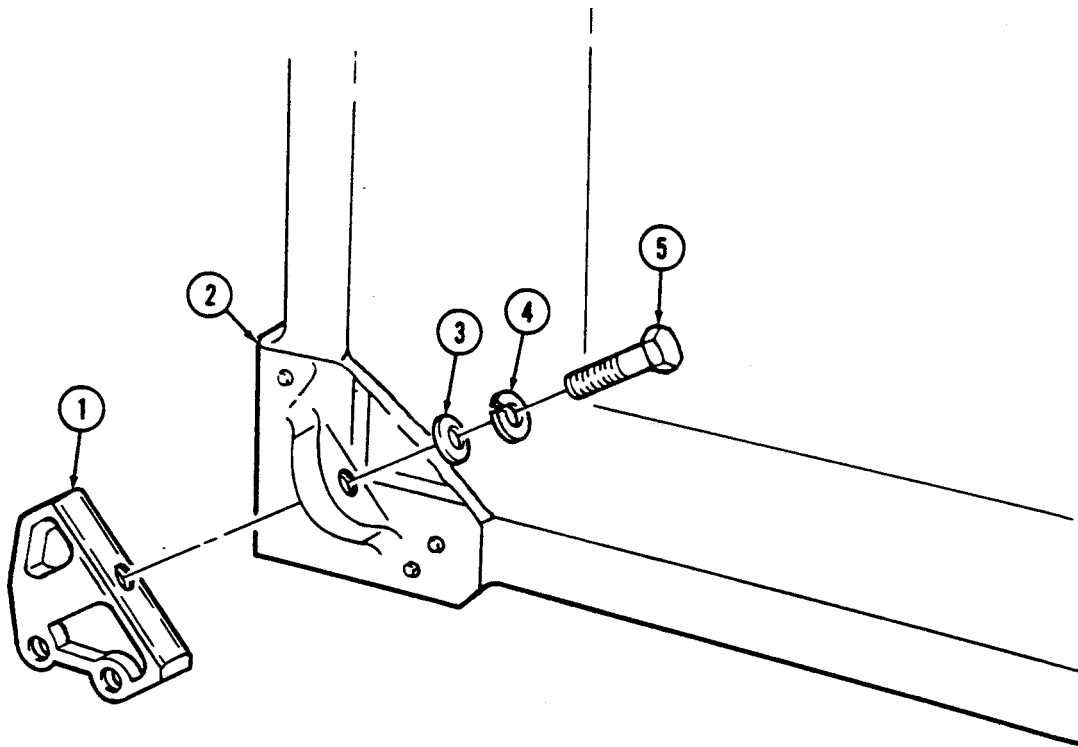
Bolt (Appendix G, Item 6)
Lockwasher (Appendix G, Item 180)

a. Removal

Remove bolt (5), lockwasher (4), washer (3), and mounting bracket (1) from shelter (2). Discard bolt (5) and lockwasher (4).

b. Installation

Install mounting bracket (1) on shelter (2) with bolt (5), lockwasher (4), and washer (3). Do not tighten bolt (5) until shelter (2) is installed.



FOLLOW-ON TASK: Install shelter (para. 11-120).

11-117. SHELTER CARRIER TAILGATE REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M1037, M1042, M1097, M1097A1, M1097A2

Personnel Required

One mechanic
One assistant

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-24P

Materials/Parts

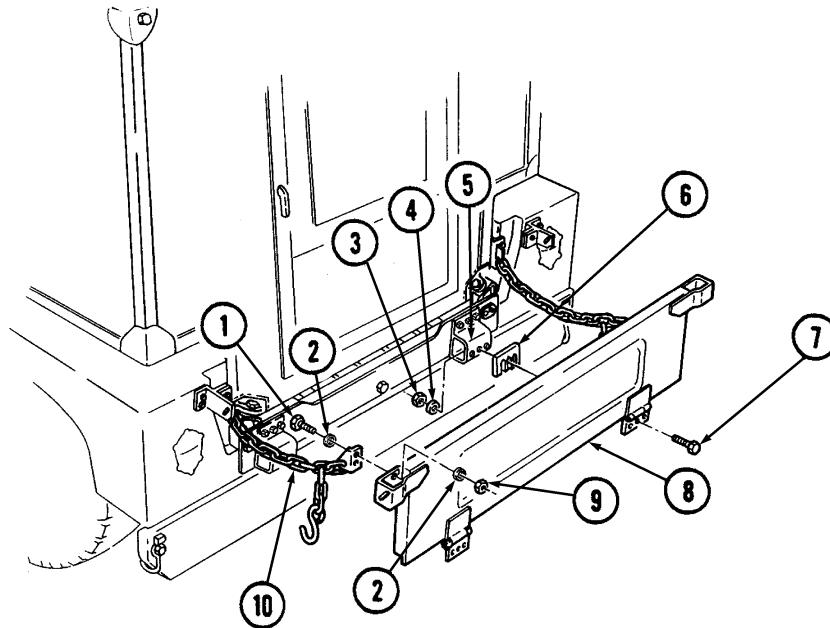
Four locknuts (Appendix G, Item 79)

a. Removal

1. Remove four locknuts (9), washers (2), capscrews (1), and washers (2) from right and left tailgate chain assemblies (10) and tailgate (8). Discard locknuts (9).
2. Remove six nuts (3), washers (4), capscrews (7), tailgate (8), and shims (6) from tailgate mounting brackets (5).

b. Installation

1. Install shims (6) and tailgate (8) on tailgate mounting brackets (5) with six capscrews (7), washers (4), and nuts (3). Tighten capscrews (7) to 26 lb-ft (35 N•m).
2. Install right and left tailgate chain assemblies (10) on tailgate (8) with four washers (2), capscrews (1), washers (2), and locknuts (9). Tighten capscrews (1) to 15 lb-ft (20 N•m).



11-118. SHELTER CARRIER TAILGATE BRACKET REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M1037, M1042, M1097, M1097A1, M1097A2

Manual References

TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

Shelter carrier tailgate removed (para. 11-117).

Materials/Parts

Three locknuts (Appendix G, Item 128)

NOTE

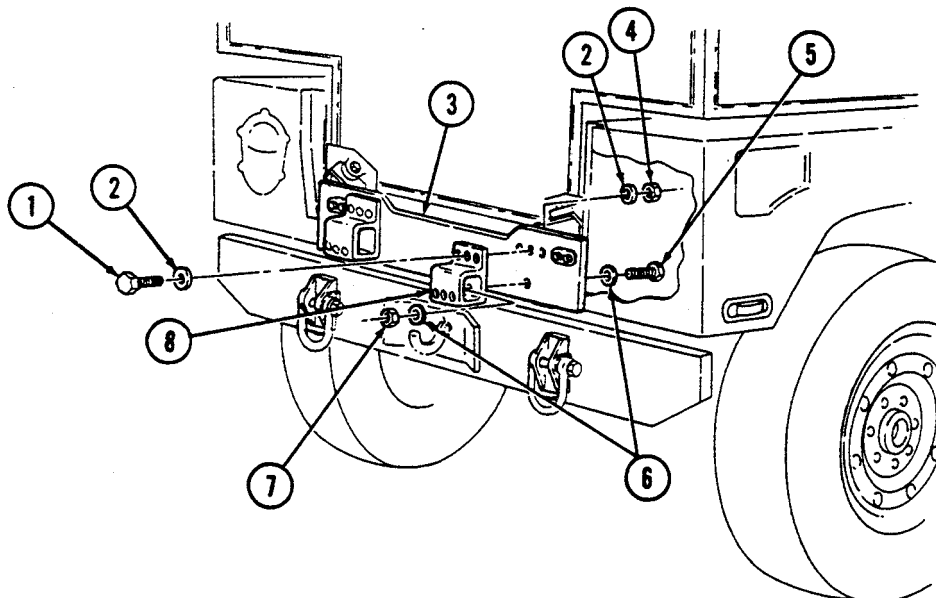
The procedure for replacement of right and left tailgate brackets is basically the same. This procedure covers the right bracket.

a. Removal

1. Remove nut (7), washer (6), capscrew (5), and washer (6) from tailgate bracket (8) and shelter support assembly (3).
2. Remove three locknuts (4), washers (2), capscrews (1), washers (2), and tailgate bracket (8) from shelter support assembly (3). Discard locknuts (4).

b. Installation

1. Install tailgate bracket (8) on shelter support assembly (3) with three washers (2), capscrews (1), washers (2), and locknuts (4).
2. Secure tailgate bracket (8) to shelter support assembly (3) with washer (6), capscrew (5), washer (6), and nut (7). Tighten nut (7) to 65 lb-ft (88 N·m). Tighten capscrews (1) to 26 lb-ft (35 N·m).



FOLLOW-ON TASK: Install shelter carrier tailgate (para. 11-117).

11-119. SHELTER CARRIER TAILGATE CHAIN MAINTENANCE

This task covers:

- | | |
|--|--|
| <ul style="list-style-type: none"> a. Removal b. Disassembly | <ul style="list-style-type: none"> c. Assembly d. Installation |
|--|--|

INITIAL SETUP:

Applicable Models

M1037, M1042, M1097, M1097A1, M1097A2

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

Tailgate lowered (TM 9-2320-280-10).

Materials/Parts

Four locknuts (Appendix G, Item 79)

NOTE

The procedure for replacement of right and left tailgate chain assemblies is basically the same. This procedure covers the left tailgate assembly.

a. Removal

1. Remove two locknuts (1), washers (2), capscrews (5), washers (2), reinforcing bracket (3), and tailgate chain assembly (10) from body (11). Discard locknuts (1).
2. Remove two locknuts (9), washers (7), capscrews (6), washers (7), and tailgate chain assembly (10) from tailgate (8). Discard locknuts (9).

b. Disassembly

1. Pry two chain links (12) apart and remove two chain mounting brackets (4) from chain (16).
2. Pry apart "S" hook (15) and remove "S" hook (15) from chain (14).
3. Pry apart chain link (13) and remove chain (14) from chain (16).

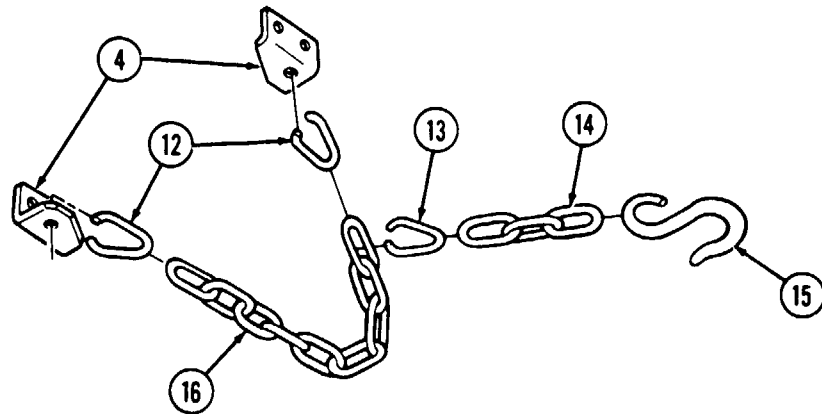
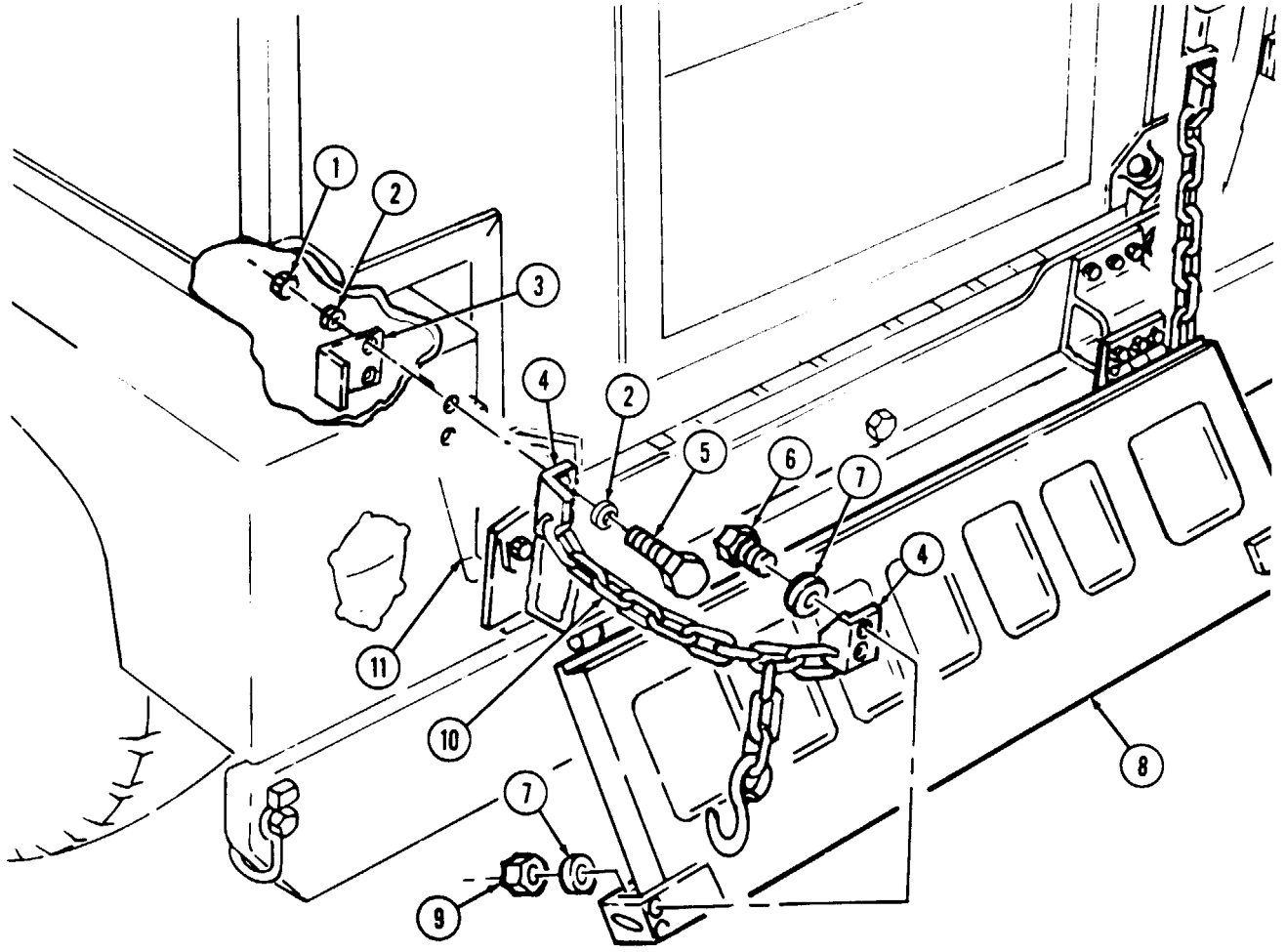
c. Assembly

1. Install chain (14) on chain (16) with chain link (13).
2. Install "S" hook (15) on chain (14) and bend "S" hook (15) closed.
3. Install two chain mounting brackets (4) to chain (16) with two chain links (12).

d. Installation

1. Install tailgate chain assembly (10) and reinforcing bracket (3) on body (11) with two washers (2), capscrews (5), washers (2), and locknuts (1). Tighten locknuts (1) to 15 lb-ft (20 N•m).
2. Install tailgate chain assembly (10) on tailgate (8) with two washers (7), capscrews (6), washers (7), and locknuts (9). Tighten capscrews (6) to 15 lb-ft (20 N•m).

11-119. SHELTER CARRIER TAILGATE CHAIN MAINTENANCE (Cont'd)



FOLLOW-ON TASK: Raise and secure tailgate (TM 9-2320-280-10).

11-120. SHELTER REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M1037, M1042, M1097, M1097A1, M1097A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Eight lockbolts (Appendix G, Item 69)
Eight lockwashers (Appendix G, Item 179)

Personnel Required

One mechanic
One assistant

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

Tailgate lowered (TM 9-2320-280-10).

General Safety Instructions

Direct all personnel to stand clear during hoisting operations.

a. Removal

WARNING

Direct all personnel to stand clear during hoisting operations. A heavy, swinging load can be extremely dangerous.

1. Position chain hoist (2) over top of shelter (3).
2. Connect lifting chains (1) to chain hoist (2) and four corners of shelter (3).

NOTE

It may be necessary to detach cab rear panel straps and turnbuttons and roll cab rear panel upward to gain access to front mounting brackets.

3. Remove eight lockbolts (12), lockwashers (11), washers (10), and four reinforcements (9) from four mounting brackets (6) and support assembly (4), and remove shims (7), if present. Discard lockbolts (12) and lockwashers (11).
4. Remove shelter (3) from support assembly (4) and vehicle body with chain hoist (2).
5. Remove mounting brackets (para. 11-116).

b. Installation

WARNING

Direct all personnel to stand clear during hoisting operations. A heavy, swinging load can be extremely dangerous.

1. Install mounting brackets (para. 11-116).
2. Install shelter (3) over support assembly (4) and gradually lower shelter (3) into position on support assembly (4).

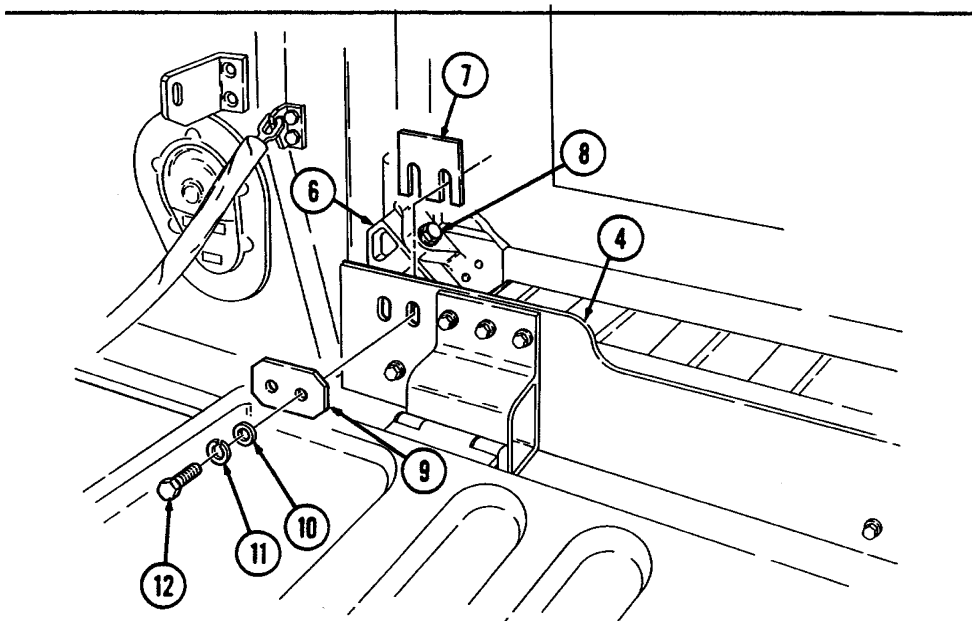
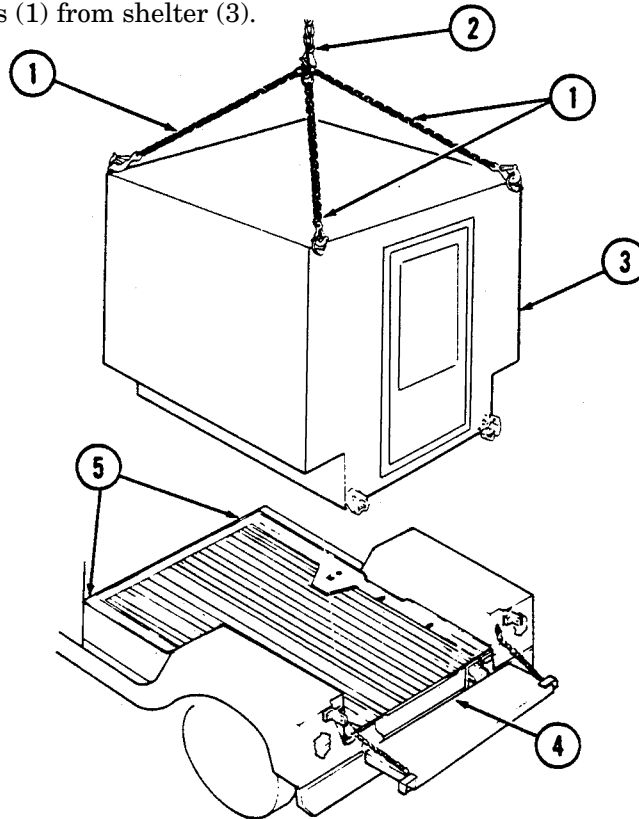
NOTE

Shelter should be tightly fitted to front of support assembly and centered from side to side. Shims should only be added to rear shelter mounts.

3. Position shelter (3) on support assembly (4) and front mounting points (5) and install front of shelter (3) on front of support assembly (4) with two reinforcements (9), four washers (10), lockwashers (11), and lockbolts (12). Tighten lockbolts (12) to 90 lb-ft (122 N•m) and bolts (8) to 60 lb-ft (81 N•m).

11-120. SHELTER REPLACEMENT (Cont'd)

4. Install rear of shelter (3) on support assembly (4) with two reinforcements (9), four washers (10), lockwashers (11), and lockbolts (12). Do not tighten lockbolts (12).
5. Add shims (7), as necessary, to rear shelter mounts to ensure snug fit between mounting brackets (6) and support assembly (4). Tighten lockbolts (12) to 90 lb-ft (122 N•m) and bolts (8) to 60 lb-ft (81 N•m).
6. Disconnect lifting chains (1) from shelter (3).



FOLLOW-ON TASK: Raise and secure tailgate (TM 9-2320-280-10).

11-121. SHELTER SUPPORT ASSEMBLY REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M1037, M1042, M1097, M1097A1, M1097A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Locknut (Appendix G, Item 70)
Thirteen locknuts (Appendix G, Item 81)
Four locknuts (Appendix G, Item 128)

Personnel Required

One mechanic
One assistant

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

- Shelter carrier tailgate brackets removed (para. 11-118).
- Cab enclosure panels removed (para. 11-122).
- Fuel filler housing removed (para. 10-2).
- Rear soft top curtain rolled up (TM 9-2320-280-10).
- Shelter removed (para. 11-120).

a. Removal

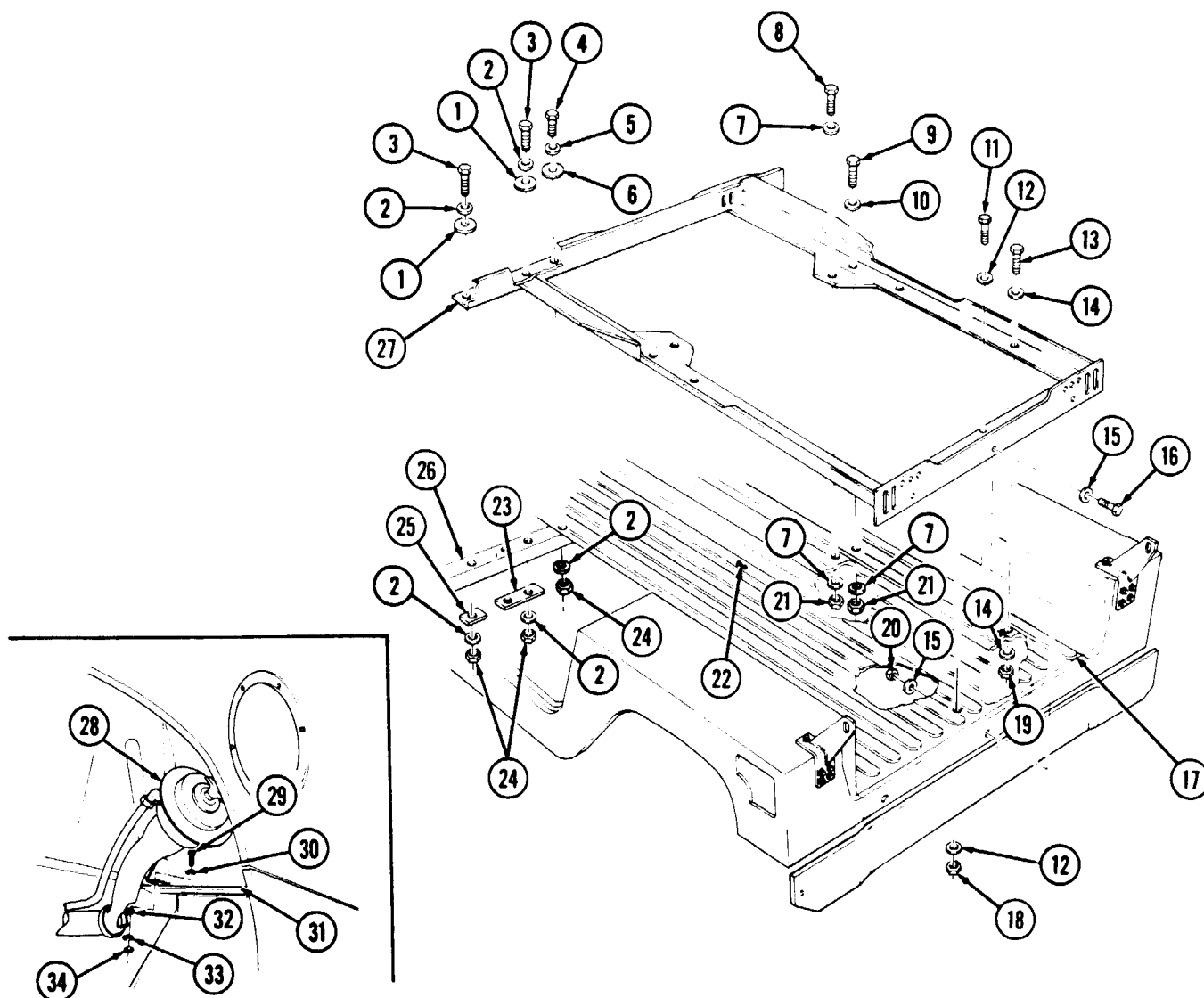
1. Remove two locknuts (24), washers (2), capscrews (4), washers (5), and spacers (6) from support assembly (27) and cargo floor (22). Discard locknuts (24)
2. Remove six locknuts (24), washers (2), reinforcement plates (23) and (25), six capscrews (3), washers (2), and spacers (1) from support assembly (27) and "B" beam (26). Discard locknuts (24).
3. Remove two locknuts (21), washers (7), capscrews (9), and washers (10) from support assembly (27) and cargo floor (22). Discard locknuts (21).
4. Remove locknut (34), washer (33), capscrew (29), washer (30), clamp (32), and fuel filler spout (28) from body (31) and pull fuel filler spout (28) away for access to locknut (21). Discard locknut (34).
5. Remove two locknuts (21), washers (7), capscrews (8), and washers (7) from support assembly (27) and cargo floor (22). Discard locknuts (21).
6. Remove four locknuts (19), washers (14), capscrews (13), and washers (14) from support assembly and cargo floor (22). Discard locknuts (19).
7. Remove three nuts (20), washers (15), capscrews (16), and washers (15) from support assembly (27) and "D" beam (17).
8. Remove locknut (18), washer (12), capscrew (11), washer (12), and support assembly (27) from cargo floor (22) and "D" beam (17). Discard locknut (18).

b. Installation

1. Install support assembly (27) on cargo floor (22) and "D" beam (17) with washer (12), capscrew (11), washer (12), and locknut (18).
2. Secure support assembly (27) to "D" beam (17) with three washers (15), capscrews (16), washers (15), and nuts (20).
3. Secure support assembly (27) to cargo floor (22) with four washers (14), capscrews (13), washers (14), and locknuts (19).
4. Secure support assembly (27) to cargo floor (22) with two washers (7), capscrews (8), washers (7), and locknuts (21).
5. Install support assembly (27) on "B" beam (26) with six spacers (1), washers (2), capscrews (3), two reinforcement plates (23) and (25), six washers (2), and locknuts (24).

11-121. SHELTER SUPPORT ASSEMBLY REPLACEMENT (Cont'd)

6. Secure support assembly (27) to cargo floor (22) with two spacers (6), washers (5), capscrews (4), washers (2), and locknuts (24).
7. Secure support assembly (27) to cargo floor (22) with two washers (10), capscrews (9), washers (7), and locknuts (21).
8. Tighten four locknuts (19) to 26 lb-ft (35 N•m).
9. Tighten capscrews (3), (4), (8), (9), (11), and (16) to 65 lb-ft (88 N•m).
10. Install fuel filler spout (28) and clamp (32) on body (31) with washer (30), capscrew (29), washer (33), and locknut (34).



- FOLLOW-ON TASKS:**
- Install cab enclosure panels (para. 11-122).
 - Install shelter carrier tailgate brackets (para. 11-118).
 - Install fuel filler housing (para. 10-2).
 - Roll down rear soft top curtain (TM 9-2320-280-10).
 - Install shelter (para. 11-120).

11-122. CAB ENCLOSURE PANEL REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M1037, M1042, M1097, M1097A1, M1097A2

Personnel Required

One mechanic
One assistant

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-24P

Materials/Parts

Three lockwashers (Appendix G, Item 113)

Equipment Condition

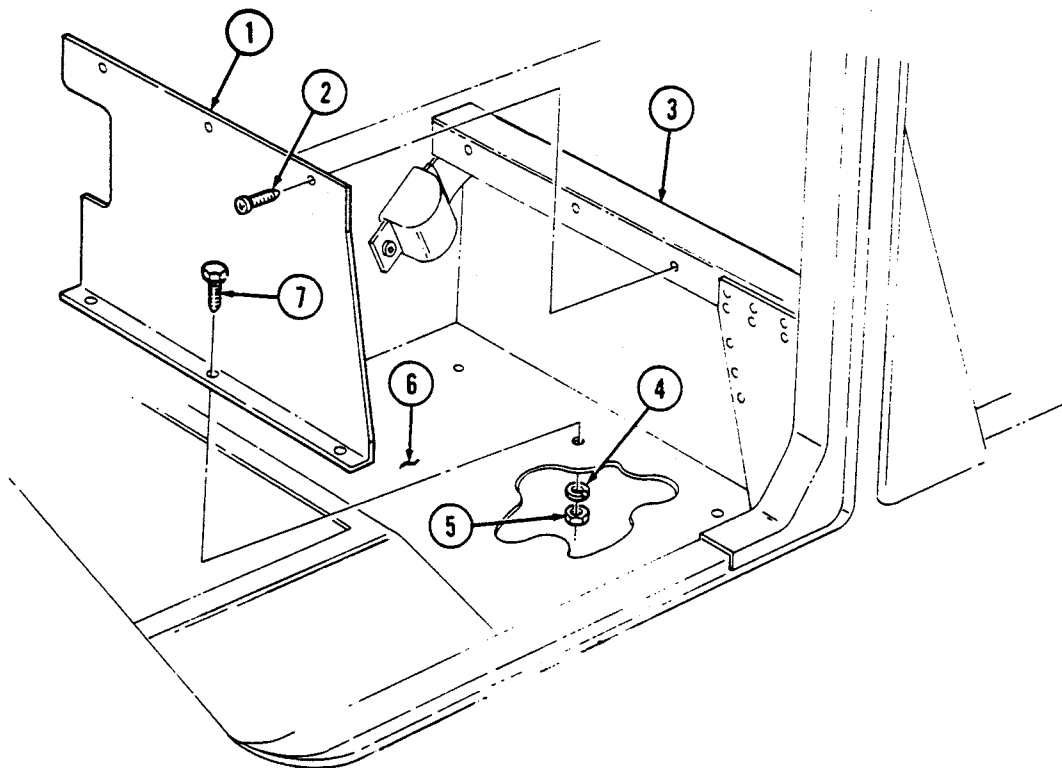
Fixed rear door removed (para. 10-14).

a. Removal

1. Remove three nuts (5), lockwashers (4), and capscrews (7) from panel (1) and footwell (6). Discard lockwashers (4).
2. Remove three screws (2) and panel (1) from "B" beam (3).

b. Installation

1. Install panel (1) on "B" beam (3) with three screws (2).
2. Install panel (1) on footwell (6) with three capscrews (7), lockwashers (4), and nuts (5). Tighten nuts (5) to 15-20 lb-in. (2 N·m).



FOLLOW-ON TASK: Install fixed rear door (para. 10-14).

Section III. AMBULANCE BODY MAINTENANCE

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11-207.	Heater Exhaust Pipe Replacement (M996, M996A1)	11-313
11-208.	Heater Mounting Bracket Assembly Replacement (M996, M996A1)	11-314
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11-213.	Air Diverter Replacement (M996, M996A1)	11-323
11-214.	Panel Insulation Replacement	11-324
11-215.	Ambulance Spreader Bar Maintenance	11-325

11-124. SOFT TOP AMBULANCE LITTER ASSEMBLY MAINTENANCE

This task covers:

- | | |
|---|--|
| <ul style="list-style-type: none"> a. Removal b. Disassembly c. Inspection | <ul style="list-style-type: none"> d. Assembly e. Installation |
|---|--|

INITIAL SETUP:

Applicable Models

M1035, M1035A1, M1035A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Special Tools

Torque adapter (Appendix B, Item 145)

Materials/Parts

Eleven locknuts (Appendix G, Item 70)
Twenty-two locknuts (Appendix G, Item 128)
Six lockwashers (Appendix G, Item 133)
Eight locknuts (Appendix G, Item 112)
Eight blind rivets (Appendix G, Item 245)
Two lockwashers (Appendix G, Item 135)

Personnel Required

One mechanic
One assistant

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

Tailgate lowered (TM 9-2320-280-10).

NOTE

For instructions on replacement of rivets, refer to para. 10-66.

a. Removal

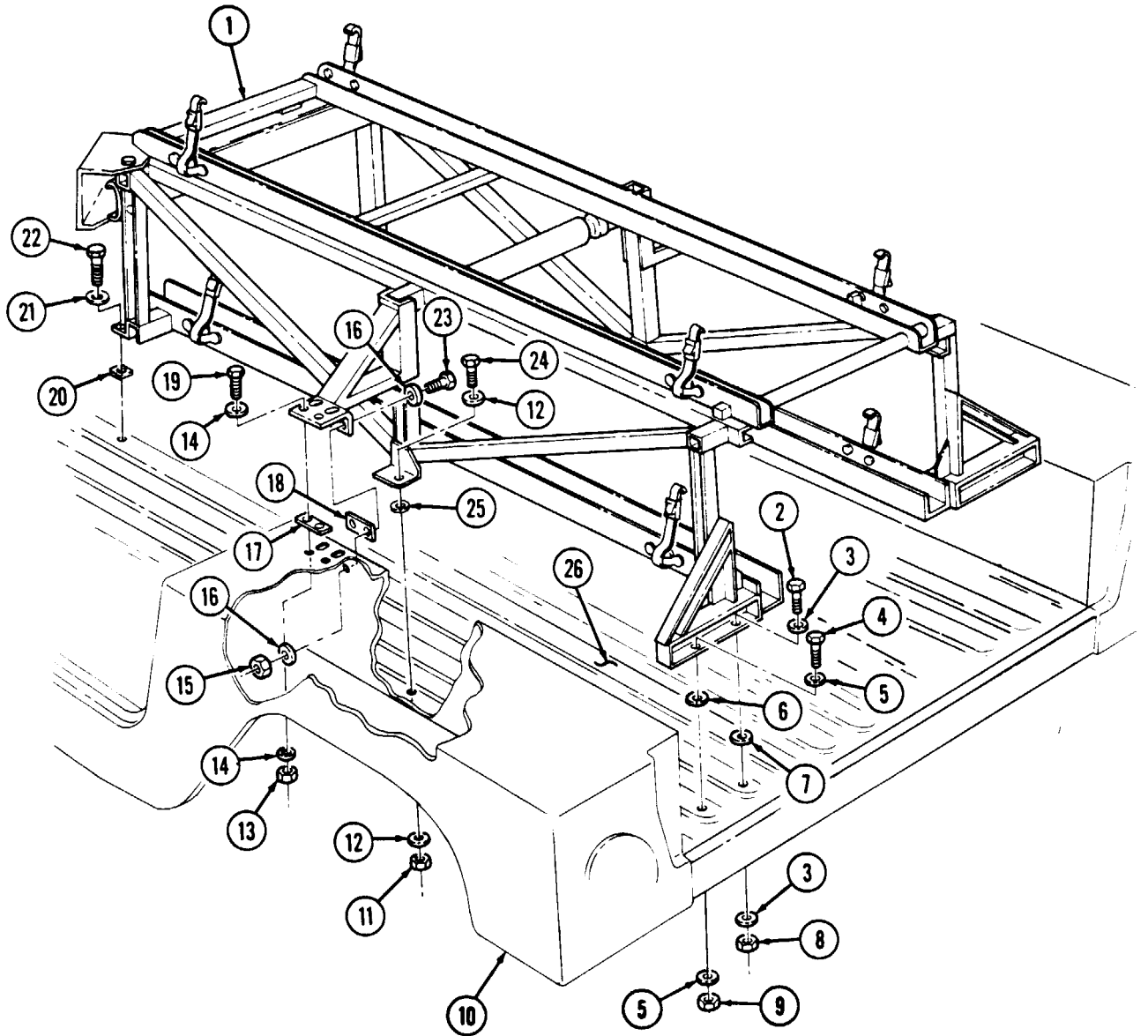
1. Remove two capscrews (22) and washers (21) from litter assembly (1), spacers (20), and cargo floor (26).
2. Remove two locknuts (11), washers (12), capscrews (24), and washers (12) from litter assembly (1), spacers (25), and cargo floor (26). Discard locknuts (11).
3. Remove four locknuts (13), washers (14), capscrews (19), washers (14), and shims (17) from litter assembly (1) and wheelhouses (10). Discard locknuts (13).
4. Remove four locknuts (15), washers (16), capscrews (23), washers (16), and shims (18) from litter assembly (1) and wheelhouses (10). Discard locknuts (15).
5. Remove two nuts (9), washers (5), capscrews (4), and washers (5) from spacers (6), litter assembly (1), and cargo floor (26).
6. Remove two locknuts (8), washers (3), capscrews (2), and washers (3) from spacers (7), litter assembly (1), and cargo floor (26). Discard locknuts (8).
7. Remove litter assembly (1) from vehicle.

NOTE

Note position of spacers for installation.

8. Remove spacers (6), (7), (20), and (25) from cargo floor (26).

11-124. SOFT TOP AMBULANCE LITTER ASSEMBLY MAINTENANCE (Cont'd)



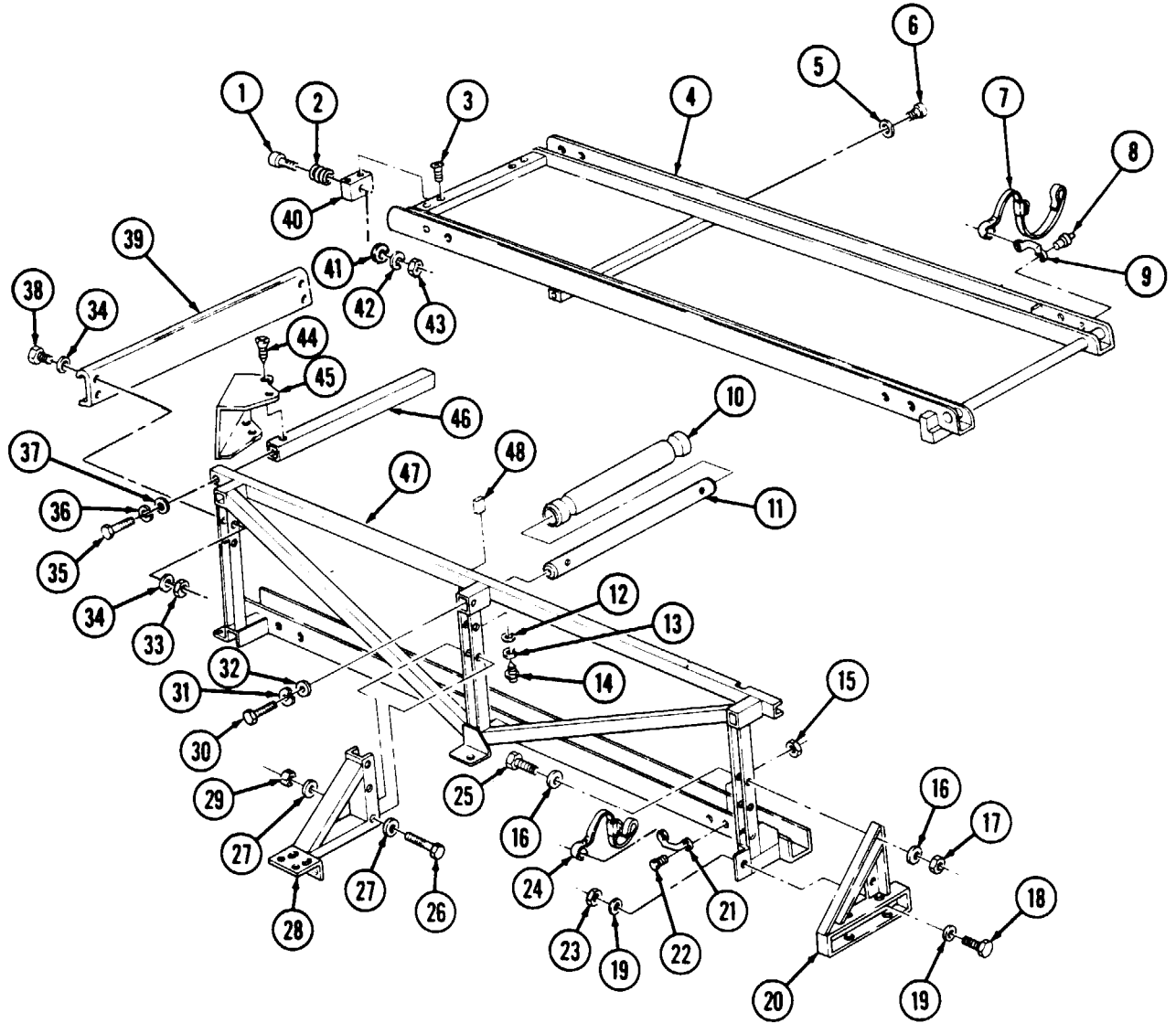
11-124. SOFT TOP AMBULANCE LITTER ASSEMBLY MAINTENANCE (Cont'd)**b. Disassembly**

1. Remove six locknuts (17), washers (16), capscrews (25), and washers (16) from rear gusset supports (20) and track assemblies (47). Discard locknuts (17).
2. Remove two locknuts (23), washers (19), capscrews (18), washers (19), and rear gusset supports (20) from track assemblies (47). Discard locknuts (23).
3. Remove six locknuts (29), washers (27), capscrews (26), washers (27), and two wheelhouse gusset supports (28) from track assemblies (47). Discard locknuts (29).
4. Remove two capscrews (14), lockwashers (13), and washers (12) from camrol stops (48) and track assemblies (47). Unlatch and raise litter tray (4) to remove camrol stops (48) from track assemblies (47). Discard lockwashers (13).
5. Remove litter tray (4) from track assemblies (47).
6. Remove two camrols (6) and washers (5) from litter tray (4).
7. Remove two nuts (43), lockwashers (42), washers (41), socket head shoulder bolts (1), and torsion springs (2) from bumper support plates (40). Discard lockwashers (42).
8. Remove four screws (3) and two bumper support plates (40) from litter tray (4).
9. Remove two capscrews (30), lockwashers (31), washers (32), round support (11), and tube roller (10) from track assemblies (47). Discard lockwashers (31).
10. Remove eight screws (44) and two shields (45) from tray assembly bumper (46) and track assemblies (47).
11. Remove three locknuts (52), washers (51), capscrews (50), and stop (49) from track assembly (47) (right side only). Discard locknuts (52).
12. Remove two capscrews (35), lockwashers (36), washers (37), and tray assembly bumper (46) from track assemblies (47). Discard lockwashers (36).
13. Remove four locknuts (33), washers (34), capscrews (38), washers (34), and cross gusset bracket (39) from track assemblies (47). Discard locknuts (33).
14. Remove eight rivets (8), four footman loops (9), and straps (7) from litter tray (4).
15. Remove eight locknuts (15), screws (22), four footman loops (21), and straps (24) from track assemblies (47). Discard locknuts (15).

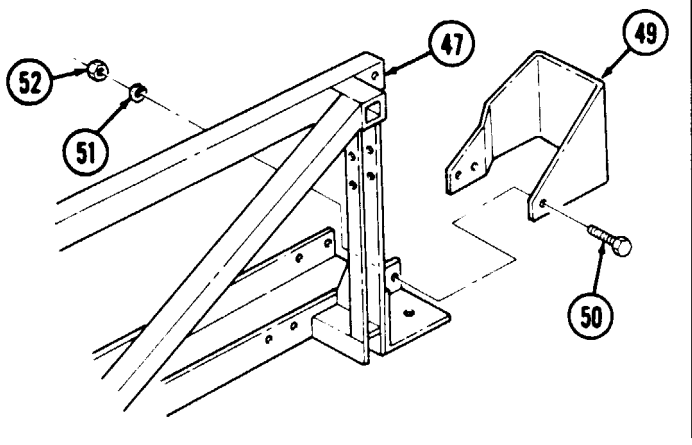
c. Inspection

1. Inspect litter tray (4), track assemblies (47), rear gusset supports (20), and wheelhouse gusset supports (28) for cracks, broken welds, and distortion. Replace any component if damaged.
2. Inspect tube roller (10), round support (11), and camrols (6) for warping and damage. Replace any component if damaged.
3. Inspect torsion springs (2), socket head shoulder bolts (1), footman loops (9) and (21), and straps (24) and (7) for damage. Replace any component if damaged.

11-124. SOFT TOP AMBULANCE LITTER ASSEMBLY MAINTENANCE (Cont'd)



RIGHT FRONT LOWER CORNER



11-124. SOFT TOP AMBULANCE LITTER ASSEMBLY MAINTENANCE (Cont'd)
--

d. Assembly

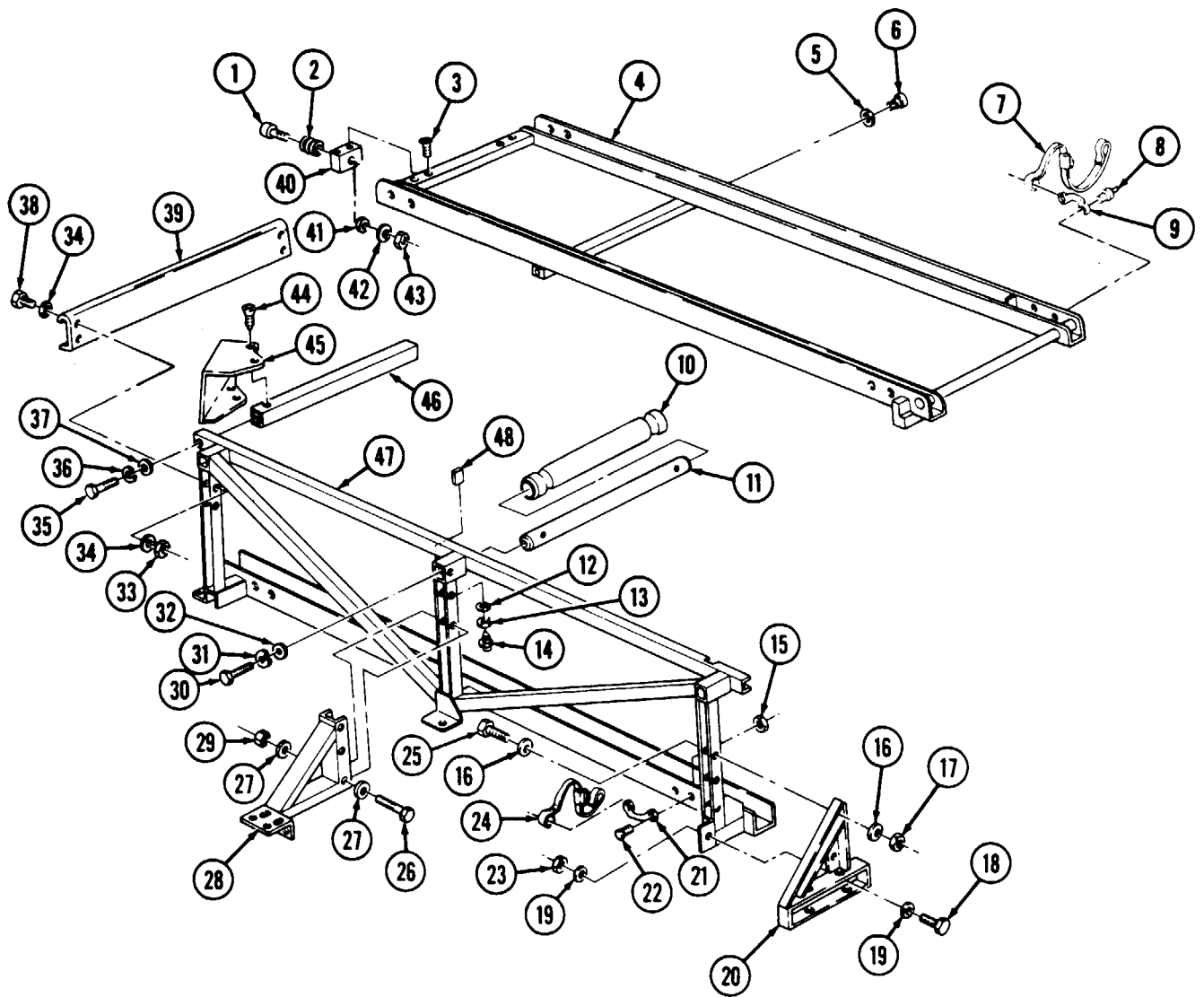
1. Install four straps (24) and footman loops (21) on two track assemblies (47) with eight screws (22) and locknuts (15).
2. Install four straps (7) and footman loops (9) on litter tray (4) with eight rivets (8).
3. Install cross gusset bracket (39) on two track assemblies (47) with four washers (34), capscrews (38), washers (34), and locknuts (33). Tighten capscrews (38) to 31 lb-ft (42 N•m).
4. Install tray assembly bumper (46) on two track assemblies (47) with two washers (37), lockwashers (36), and capscrews (35). Tighten capscrews (35) to 31 lb-ft (42 N•m).
5. Install stop (49) on track assembly (47) (right side only) with three capscrews (50), washers (51), and locknuts (52). Tighten capscrews (50) to 6 lb-ft (8 N•m).
6. Install two shields (45) on track assemblies (47) and tray assembly bumper (46) with eight screws (44).
7. Install tube roller (10) on round support (11). Install round support (11) on two track assemblies (47) with washers (32), lockwashers (31), and capscrews (30). Tighten capscrews (30) to 31 lb-ft (42 N•m).
8. Install two wheelhouse gusset supports (28) on track assemblies (47) with six washers (27), capscrews (26), washers (27), and locknuts (29). Tighten locknuts (29) to 31 lb-ft (42 N•m).
9. Install two rear gusset supports (20) on track assemblies (47) with six washers (16), capscrews (25), washers (16), and locknuts (17). Do not tighten locknuts (17).
10. Secure rear gusset supports (20) to track assemblies (47) with two washers (19), capscrews (18), washers (19), and locknuts (23). Tighten capscrews (18) and locknuts (17) to 31 lb-ft (42 N•m).
11. Install two bumper support plates (40) on litter tray (4) with four screws (3).

CAUTION

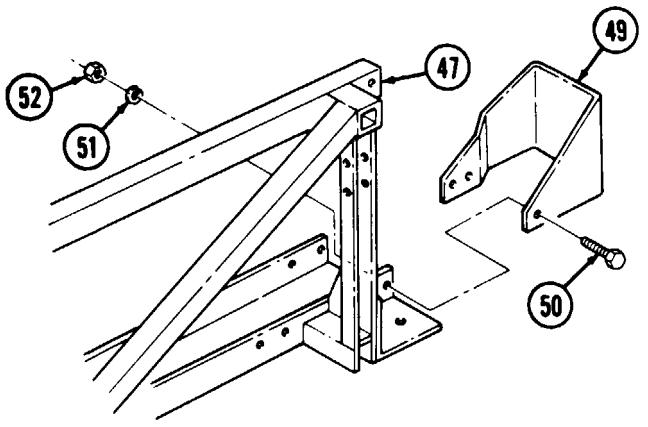
Do not overtighten shoulder bolts.

12. Install two torsion springs (2) on socket head shoulder bolts (1) and install two socket head shoulder bolts (1) on bumper support plates (40) with two washers (41), lockwashers (42), and nuts (43). Tighten nuts (43) to end threads on socket head shoulder bolts (1).
13. Install two washers (5) and camrols (6) on litter tray (4).
14. Install litter tray (4) on track assembly (47) channels, and slide litter tray (4) toward tray assembly bumper (46) until camrols (6) are past wheelhouse gusset supports (28).
15. Raise litter tray (4) to install two camrol stops (48) on track assemblies (47) and install camrol stops (48) with two washers (12), lockwashers (13), and capscrews (14). Tighten capscrews (14) to 6 lb-ft (8 N•m).

11-124. SOFT TOP AMBULANCE LITTER ASSEMBLY MAINTENANCE (Cont'd)



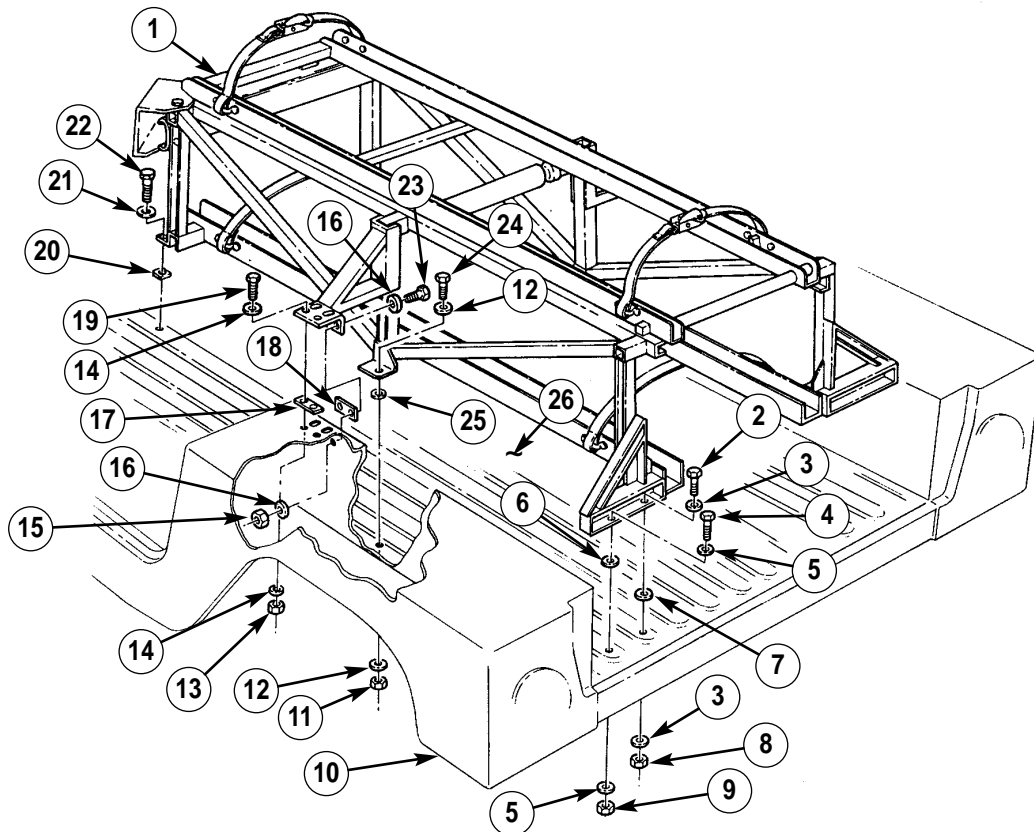
RIGHT FRONT LOWER CORNER



11-124. SOFT TOP AMBULANCE LITTER ASSEMBLY MAINTENANCE (Cont'd)

e. Installation

1. Install litter assembly (1) in vehicle and install spacers (25), (20), (7), and (6) on mounting locations between cargo floor (26) and litter assembly (1).
2. Secure litter assembly (1) to cargo floor (26) with two washers (3), capscrews (2), washers (3), and locknuts (8). Do not tighten capscrews (2).
3. Secure litter assembly (1) to cargo floor (26) with two washers (5), capscrews (4), washers (5), and nuts (9). Do not tighten capscrews (4).
4. Secure litter assembly (1) to cargo floor (26) with two washers (12), capscrews (24), washers (12), and locknuts (11). Do not tighten capscrews (24).
5. Install shims (18) between litter assembly (1) and side of wheelhouses (10) and install litter assembly (1) on wheelhouses (10) with four washers (16), capscrews (23), washers (16), and locknuts (15). Do not tighten capscrews (23).
6. Install shims (17) between litter assembly (1) and top of wheelhouses (10) and install litter assembly (1) on wheelhouses (10) with four washers (14), capscrews (19), washers (14), and locknuts (13). Do not tighten capscrews (19).
7. Secure litter assembly (1) to cargo floor (26) with two washers (21) and capscrews (22). Tighten capscrews (22) to 75 lb-ft (102 N·m).
8. Tighten capscrews (19) and (23) to 6 lb-ft (8 N·m). Tighten capscrews (24) and (2) to 31 lb-ft (42 N·m). Using torque adapter, tighten capscrews (4) to 75 lb-ft (102 N·m).



FOLLOW-ON TASK: Raise and secure tailgate (TM 9-2320-280-10).

11-125. REAR DOOR MAINTENANCE

This task covers:

- a. Removal
- b. Installation
- c. Adjustment

INITIAL SETUP:

Applicable Models

M996, M996A1, M997, M997A1, M997A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Six locknuts (Appendix G, Item 79)

Personnel Required

One mechanic
One assistant

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

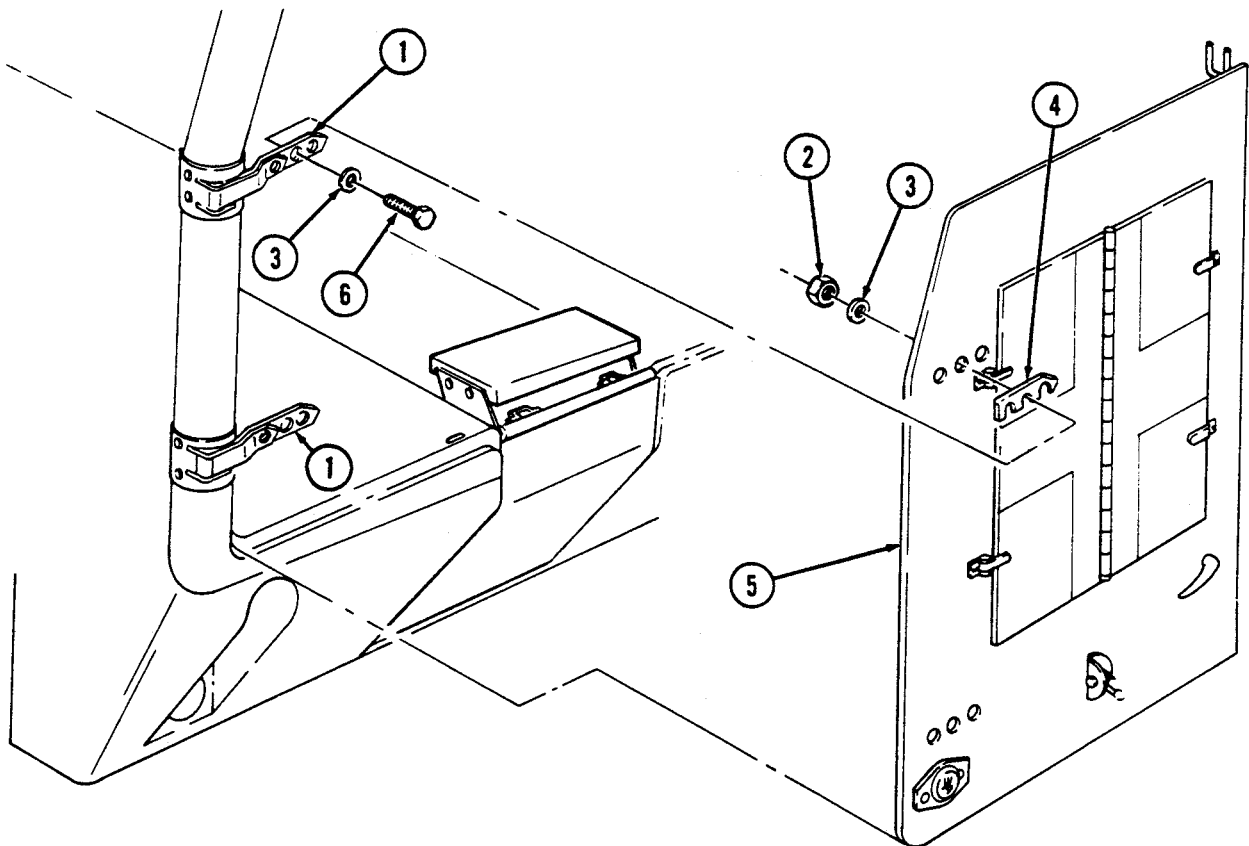
Rear doors opened (TM 9-2320-280-10).

a. Removal

Remove six locknuts (2), washers (3), capscrews (6), washers (3), door (5), and shims (4), if present, from hinges (1). Discard locknuts (2).

b. Installation

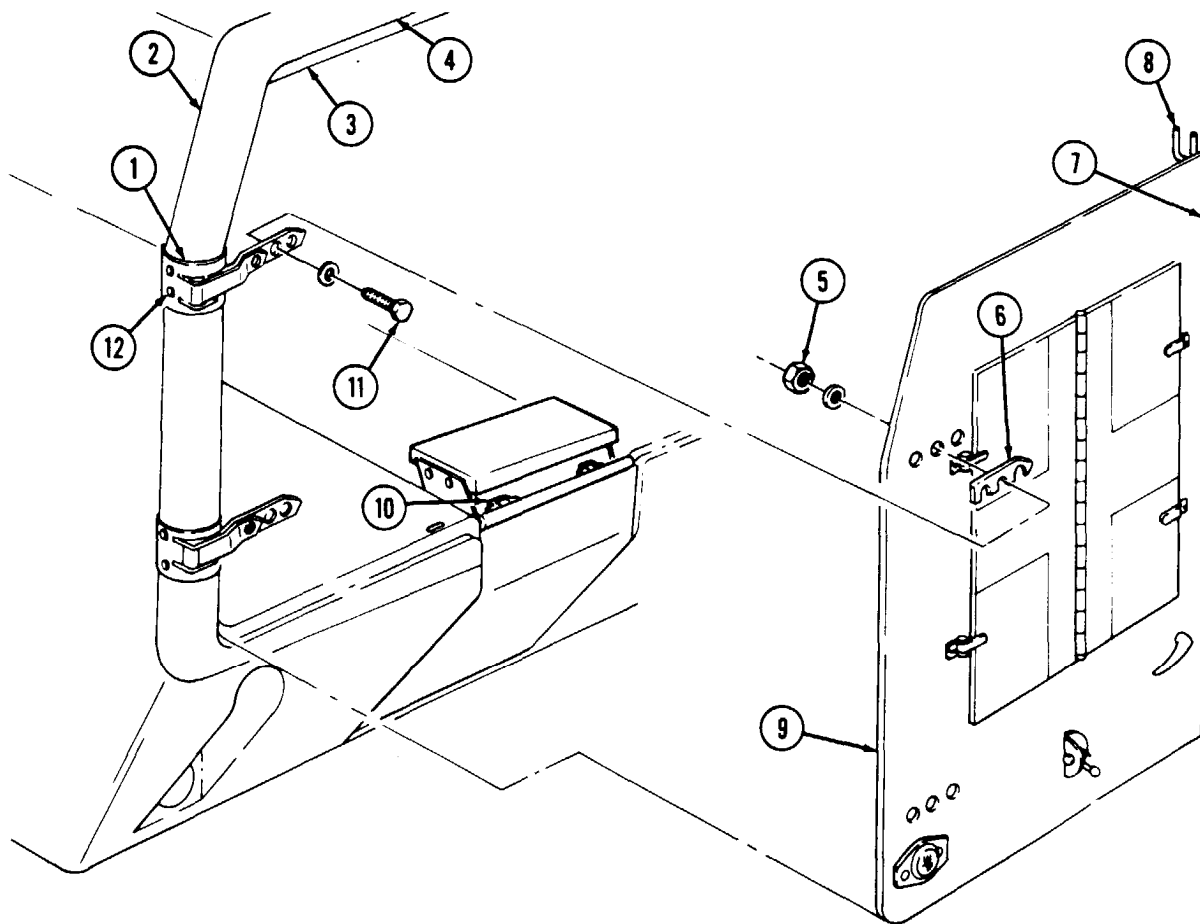
Install door (5) and shims (4), if removed, on two hinges (1) with six washers (3), capscrews (6), washers (3), and locknuts (2). Tighten locknuts (2) to 15 lb-ft (20 N·m).



11-125. REAR DOOR MAINTENANCE (Cont'd)

c. Adjustment

1. Check adjustment and sealing of door (9) by inserting a sheet of paper between bottom edge of door (9) and seal (3) on door frame (4), and closing both doors (9). Door seal (3) should offer resistance when pulling out paper. If door seal (3) does not offer resistance, proceed to step 3.
2. Open door (9). Repeat step 1 for top edge and both side edges of door (9). If door seal (3) offers resistance at all four sides of door (9), doors are adjusted correctly.
3. For vertical adjustment of door (9), loosen eight capscrews (12) securing hinges (1) to body (2). Slide door (9) and hinges (1) up or down as required, hold door (9) in place, and tighten capscrews (12) to 15 lb-ft (20 N•m).
4. For outer edge of door (9) adjustment, loosen six locknuts (5) and capscrews (11) and remove or add shims (6) as required between door (9) and hinge (1). Tighten locknuts (5) to 15 lb-ft (20 N•m).
5. If inner edges of doors (9) do not seal properly check for worn or damaged latch assembly rods (8), left door seal (7), or latch rod catches (10). Replace latch rod catches (10) (para. 11-131), door seal (7) (para. 11-130), or latch assembly (8) (para. 11-128) if damaged or worn.
6. Repeat steps 1 and 2 to ensure proper adjustment and sealing.



FOLLOW-ON TASKS: • Adjust latch rod catches (para. 11-131).
 • Close rear doors (TM 9-2320-280-10).

11-126. REAR DOOR HINGE REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M996, M996A1, M997, M997A1, M997A2

Manual References

TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

Rear door removed (para. 11-125).

Materials/Parts

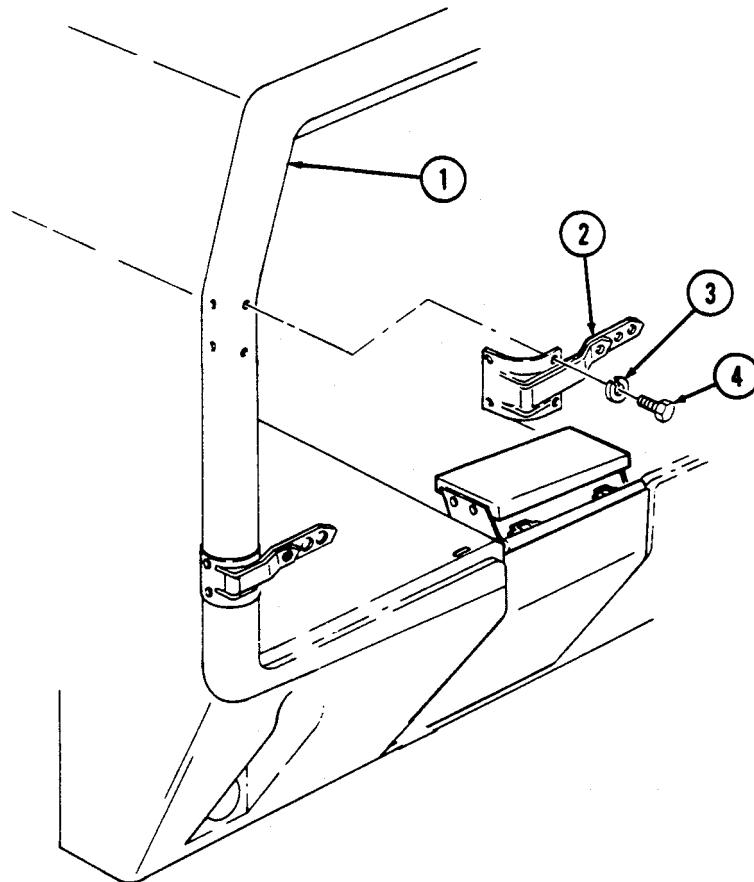
Four lockwashers (Appendix G, Item 134)

a. Removal

Remove four capscrews (4), lockwashers (3), and hinge (2) from body (1). Discard lockwashers (3).

b. Installation

Install hinge (2) on body (1) with four lockwashers (3) and capscrews (4). Tighten capscrews (4) to 15 lb-ft (20 N·m).



FOLLOW-ON TASK: Install rear door (para. 11-125).

11-127. REAR DOOR HANDLES REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M996, M996A1, M997, M997A1, M997A2

Manual References

TM 9-2320-280-10
 TM 9-2320-280-24P

Tools

General mechanic's tool kit:
 automotive (Appendix B, Item 1)

Equipment Condition

Rear door opened (TM 9-2320-280-10).

Materials/Parts

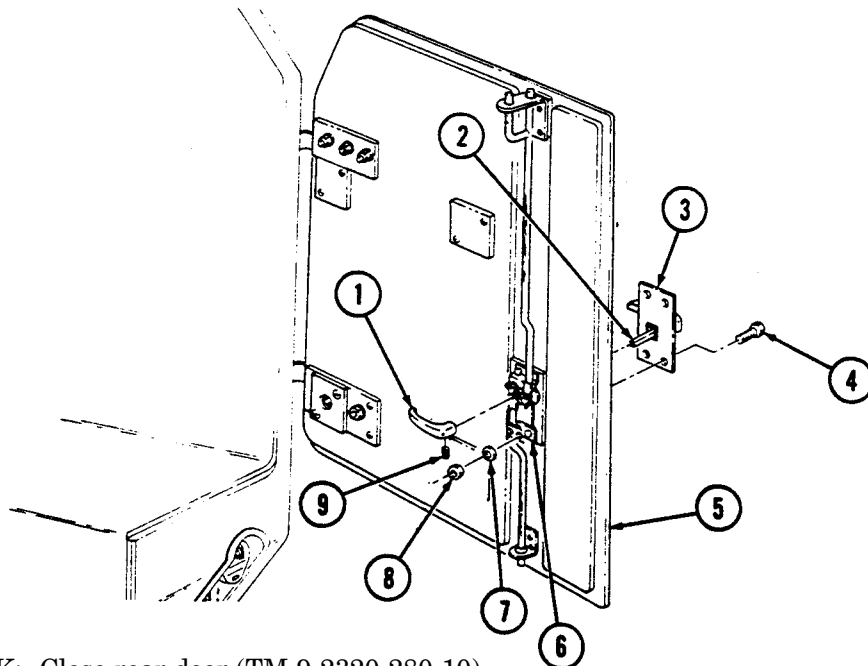
Grease (Appendix C, Item 25)
 Sealing compound (Appendix C, Item 41)
 Four locknuts (Appendix G, Item 70)

a. Removal

1. Remove setscrew (9) and inner handle (1) from outer handle assembly (3) and door (5).
2. Remove four locknuts (8), washers (7), capscrews (4), and outer handle assembly (3) from latch assembly (6). Discard locknuts (8).

b. Installation

1. Apply a thin bead of sealing compound around inner plate of outer handle assembly (3).
2. Lubricate outer handle shaft (2) with grease.
3. Install outer handle assembly (3) on door (5) and latch assembly (6) with four capscrews (4), washers (7), and locknuts (8). Tighten locknuts (8) to 10 lb-ft (14 N•m).
4. Install inner handle (1) on outer handle assembly (3) with setscrew (9).



FOLLOW-ON TASK: Close rear door (TM 9-2320-280-10).

11-128. REAR DOOR LATCH ASSEMBLY AND GUIDE REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M996, M996A1, M997, M997A1, M997A2

Manual References

TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

Rear door handles removed (para. 11-127).

Materials/Parts

Four solid rivets (Appendix G, Item 269)

NOTE

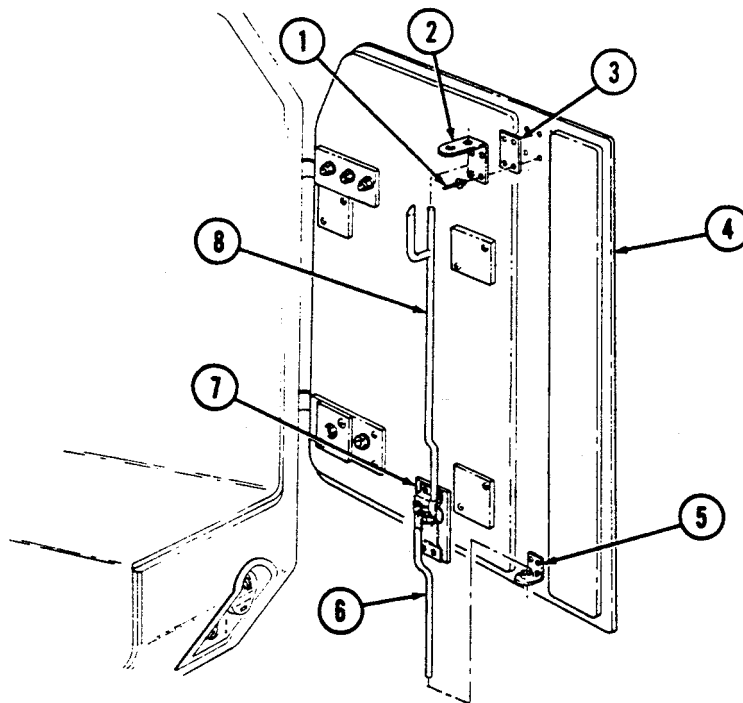
For instructions in replacement of rivets, refer to para. 10-66.

a. Removal

1. Slide latch assembly (7) down until upper latch rod (8) is out of upper guide (2). Slide latch assembly (7) up until lower latch rod (6) is out of lower guide (5).
2. Remove four rivets (1), latch guide (2), and shims (3), if present, from door (4).

b. Installation

1. Install latch guide (2) and shims (3), if removed, on door (4) with four rivets (1).
2. Slide lower latch rod (6) into lower guide (5).
3. Insert upper latch rod (8) into upper guide (2) and slide latch assembly (7) up to mounting position.



FOLLOW-ON TASKS:

- Install rear door handles (para. 11-127).
- Adjust latch rod brackets (para. 11-131).

11-129. REAR DOOR SEAL PROTECTOR REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M996, M996A1, M997, M997A1, M997A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Five blind rivets (Appendix G, Item 242)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

Rear doors opened (TM 9-2320-280-10).

NOTE

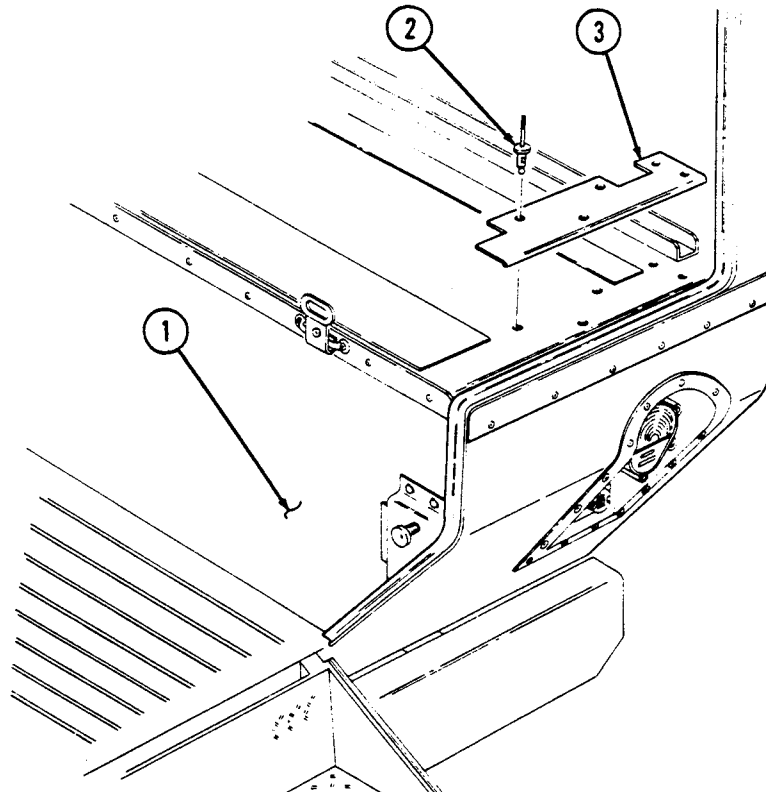
For instructions on replacement of rivets, refer to para. 10-66.

a. Removal

Remove five rivets (2) and seal protector (3) from body (1).

b. Installation

Install seal protector (3) on body (1) with five rivets (2).



FOLLOW-ON TASK: Close rear doors (TM 9-2320-280-10).

11-130. REAR DOOR SEALS REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M996, M996A1, M997, M997A1, M997A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Two blind rivets (Appendix G, Item 257)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

- Rear steps lowered (TM 9-2320-280-10).
- Rear door seal protector removed (para. 11-129).

NOTE

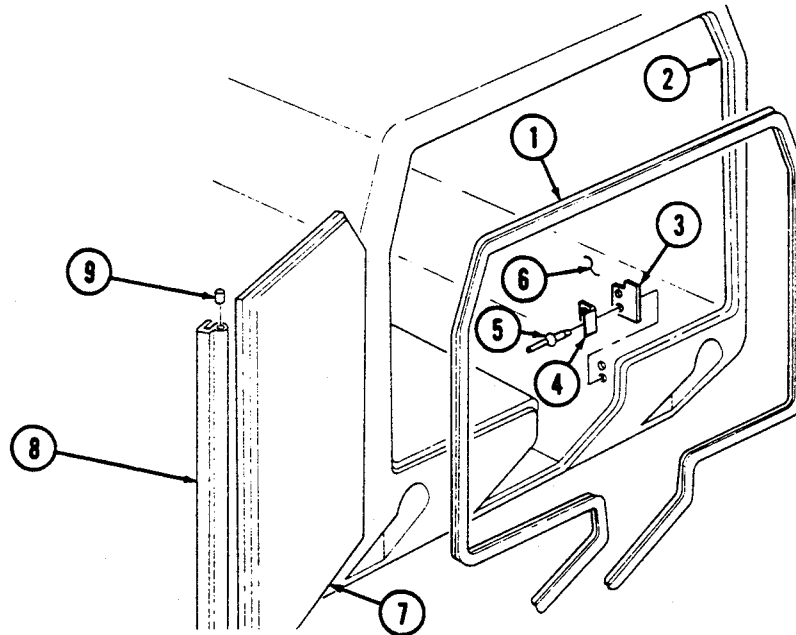
For instructions on replacement of rivets, refer to para. 10-66.

a. Removal

1. Pry seal (1) from body channel (2) and remove seal (1).
2. Remove two rivets (5), step seal (3), and retainer (4) from body (6).
3. Pry seal (8) from door (7) and remove plug (9) from seal (8).

b. Installation

1. Install plug (9) into seal (8) and install seal (8) on door (7).
2. Install step seal (3) and retainer (4) on body (6) with two rivets (5).
3. Install seal (1) by seating seal (1) into body channel (2).



- FOLLOW-ON TASKS:**
- Raise rear steps (TM 9-2320-280-10).
 - Install rear door seal protector (para. 11-129).
 - Adjust rear door (para. 11-125).

11-131. REAR DOOR LATCH ROD STRIKER GUIDES AND BRACKETS MAINTENANCE

This task covers:

- | | |
|---|--|
| <ul style="list-style-type: none"> a. Striker Guide Removal b. Striker Guide Installation c. Bracket Removal | <ul style="list-style-type: none"> d. Bracket Installation e. Striker Guide Adjustment |
|---|--|

INITIAL SETUP:

Applicable Models

M996, M996A1, M997, M997A1, M997A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Three blind rivets (Appendix G, Item 259)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

- Rear doors opened (TM 9-2320-280-10).
- Rear door blackout switch bracket removed (para. 4-93).

NOTE

Upper and lower striker guides and brackets are replaced basically the same. This procedure covers the upper striker guide and bracket.

a. Striker Guide Removal

Remove two nuts (7), washers (5), screws (4), washers (5), and striker guide (6) from bracket (2).

b. Striker Guide Installation

1. Install striker guide (6) on bracket (2) with two washers (5), screws (4), washers (5), and nuts (7). Do not tighten nuts (7).
2. Proceed to Adjustment, e.2.

c. Bracket Removal

NOTE

For instructions on replacement of rivets, refer to para. 10-66.

1. Remove striker guide (step a. above).
2. Remove three rivets (3) and bracket (2) from body (1).

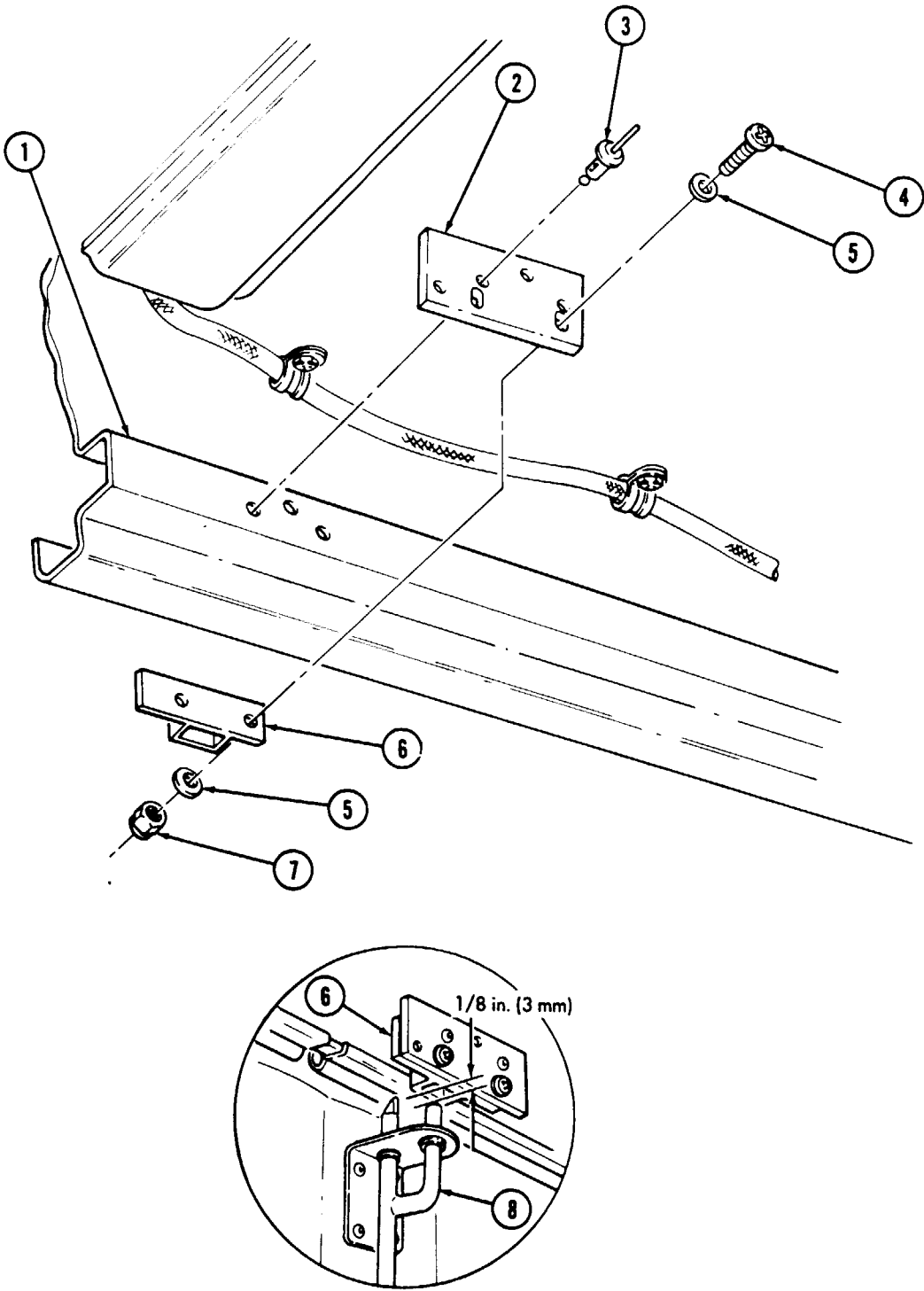
d. Bracket Installation

1. Install bracket (2) on body (1) with three rivets (3).
2. Install striker guide (step b. above).

e. Striker Guide Adjustment

1. Check all four striker guides (6) for proper clearance from latch rods (8). Clearance should be 1/8 in. (3 mm) from end of latch rods (8) to surface of striker guides (6). If clearance of any striker guide (6) is not within specifications, loosen two locknuts (7) from striker guide (6) and bracket (2).
2. Install striker guide (6) 1/8 in. (3 mm) from end of latch rod (8), hold in place, and tighten two nuts (7).

11-131. REAR DOOR LATCH ROD STRIKER GUIDES AND BRACKETS
MAINTENANCE (Cont'd)



FOLLOW-ON TASKS • Install rear door blackout light switch bracket (para. 4-93).
• Close rear doors (TM 9-2320-280-10).

11-132. REAR DOOR HOLDER ASSEMBLY REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M996, M996A1, M997, M997A1, M997A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Two solid rivets (Appendix G, Item 269) (M996 series)
Two blind rivets (Appendix G, Item 260) (M997 series)

Manual References

TM 9-2320-280-24P

NOTE

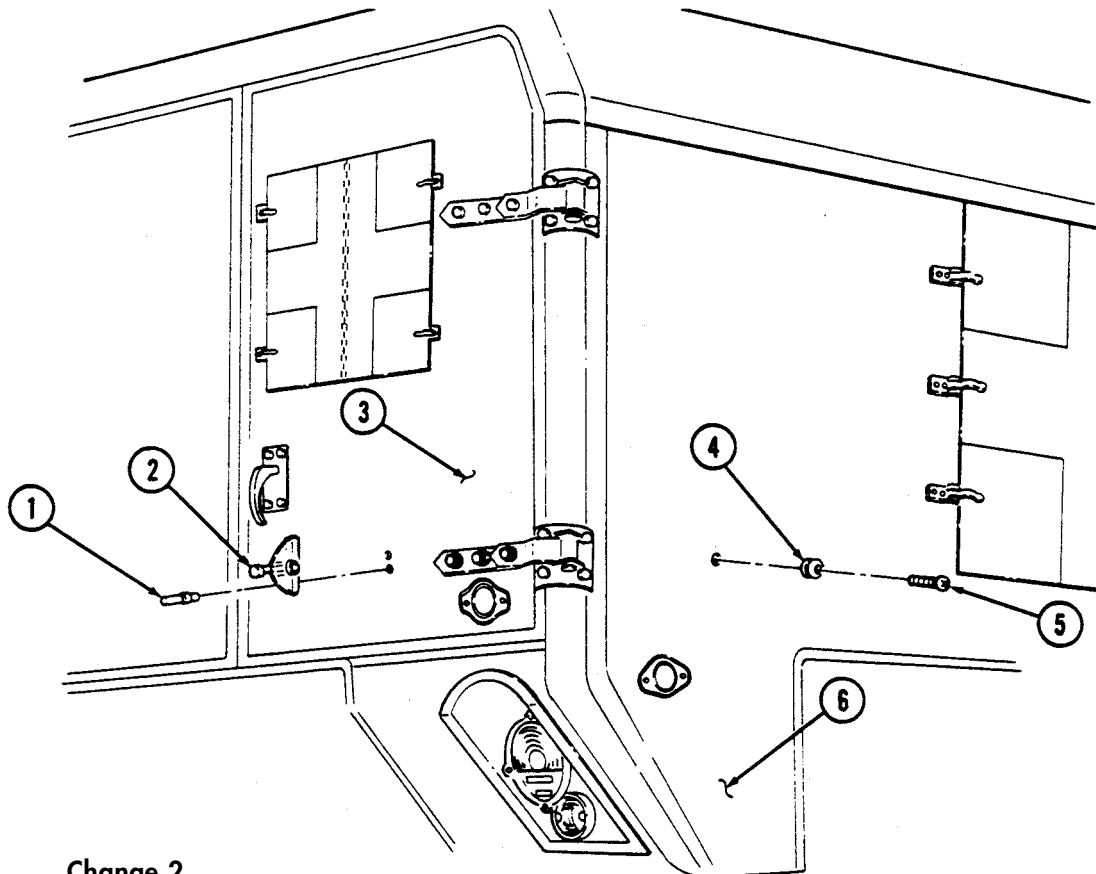
- For instructions on replacement of rivets, refer to para. 10-66.
- Holder and guide must be replaced together; both parts are considered to be one assembly.

a. Removal

1. Remove two rivets (1) and guide (2) from door (3).
2. Remove screw (5) and holder (4) from body (6).

b. Installation

1. Install holder (4) on body (6) with screw (5).
2. Install guide (2) on door (3) with two rivets (1).



11-133. REAR STEPS HINGE REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M996, M996A1, M997, M997A1, M997A2

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

Rear steps lowered (TM 9-2320-280-10).

Materials/Parts

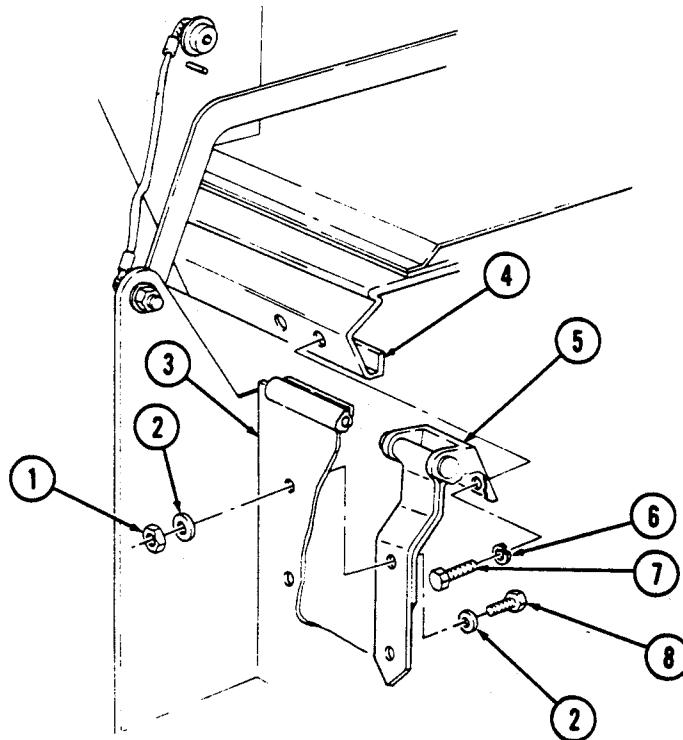
Two locknuts (Appendix G, Item 79)

a. Removal

1. Remove two locknuts (1), washers (2), capscrews (8), and washers (2) from hinge (5) and rear steps (3). Discard locknuts (1).
2. Remove two capscrews (7), washers (6), and hinge (5) from doorsill (4).

b. Installation

1. Install hinge (5) on doorsill (4) with two capscrews (7) and washers (6). Tighten capscrews (7) to 15 lb-ft (20 N·m).
2. Install hinge (5) on rear steps (3) with two washers (2), capscrews (8), washers (2), and locknuts (1). Tighten locknuts (1) to 15 lb-ft (20 N·m).



FOLLOW-ON TASK: Raise rear steps (TM 9-2320-280-10).

11-134. REAR STEPS STRIKER AND BRACKET MAINTENANCE

This task covers:

- | | |
|-------------------------|-------------------------|
| a. Striker Removal | d. Bracket Installation |
| b. Striker Installation | e. Bracket Adjustment |
| c. Bracket Removal | |

INITIAL SETUP:

Applicable Models

M996, M996A1, M997, M997A1, M997A2

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

Rear steps lowered (TM 9-2320-280-10).

Personnel Required

One mechanic
One assistant

a. Striker Removal

Remove striker (5) from bracket (4).

b. Striker Installation

Install striker (5) on bracket (4). Tighten striker (5) to 60 lb-ft (81 N•m).

c. Bracket Removal

Remove four capscrews (1), washers (2), and bracket (4) from body (3).

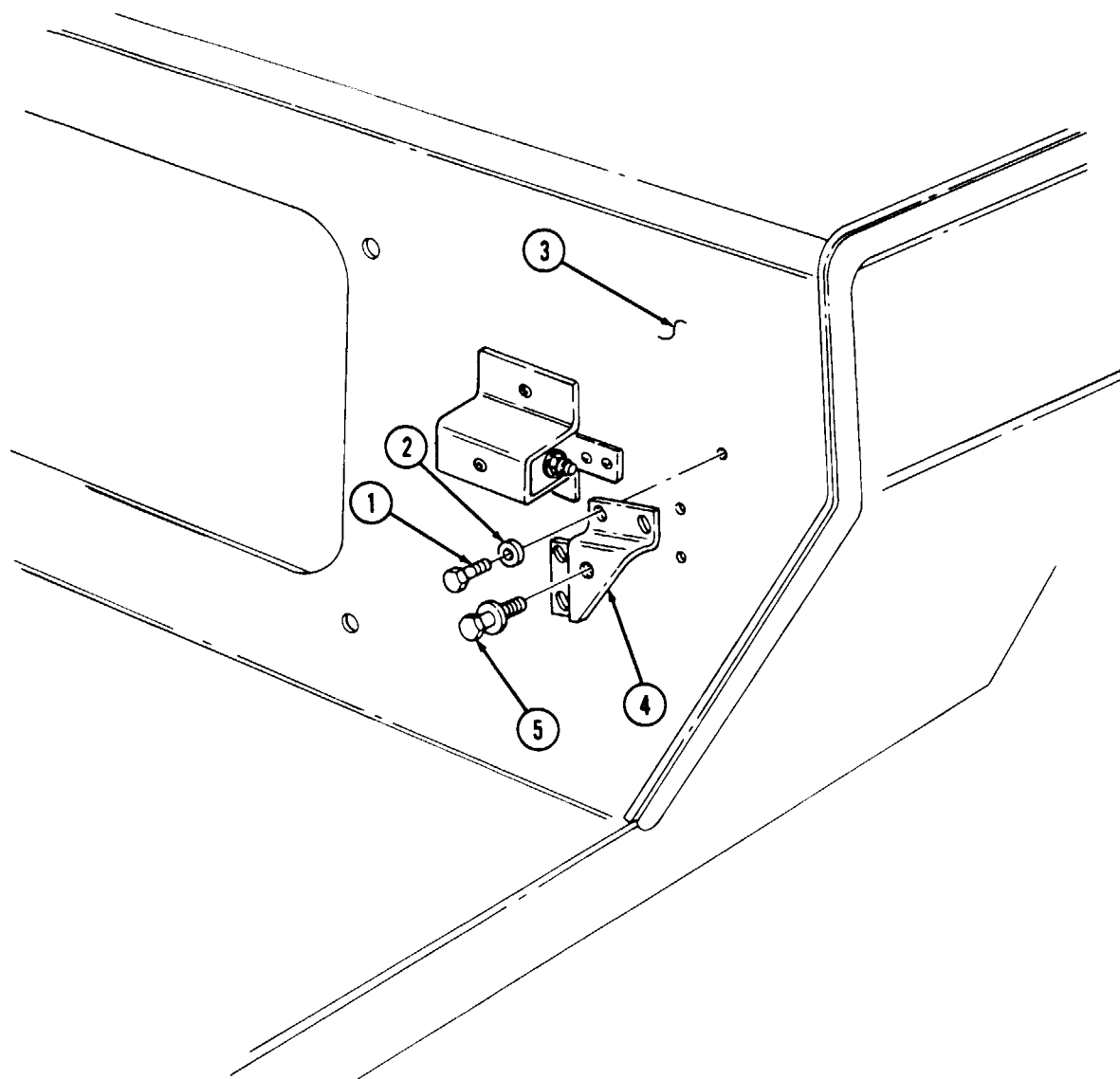
d. Bracket Installation

Install bracket (4) on body (3) with four capscrews (1) and washers (2). Do not tighten capscrews (1).

e. Bracket Adjustment

1. Loosen four capscrews (1) from bracket (4) and body (3) on opposite bracket (4) replaced.
2. Raise rear steps (TM 9-2320-280-10) and ensure rear step latches are engaged on strikers (5).
3. Press rear step assembly firmly against body (3), hold in place, and tighten eight capscrews (1) on two brackets (4) and body (3).
4. Lower rear steps (TM 9-2320-280-10). Tighten eight capscrews (1) to 6 lb-ft (8 N•m).

11-134. REAR STEPS STRIKER AND BRACKET MAINTENANCE (Cont'd)



FOLLOW-ON TASK: Raise rear steps (TM 9-2320-280-10).

11-135. REAR STEPS LATCH ASSEMBLY MAINTENANCE

This task covers:

- | | |
|---|---|
| <ul style="list-style-type: none"> a. Removal b. Installation | <ul style="list-style-type: none"> c. Adjustment |
|---|---|

INITIAL SETUP:

Applicable Models

M996, M996A1, M997, M997A1, M997A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Three locknuts (Appendix G, Item 70)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

Rear steps lowered (TM 9-2320-280-10).

NOTE

The procedure for replacing left and right latch assemblies is basically the same. This procedure covers the right latch assembly.

a. Removal

1. Open split ring (7) from release cable (8) and latch (5).
2. Remove three locknuts (2), washers (3), capscrews (6), shim (4), and latch (5) from step frame (9). Discard locknuts (2).

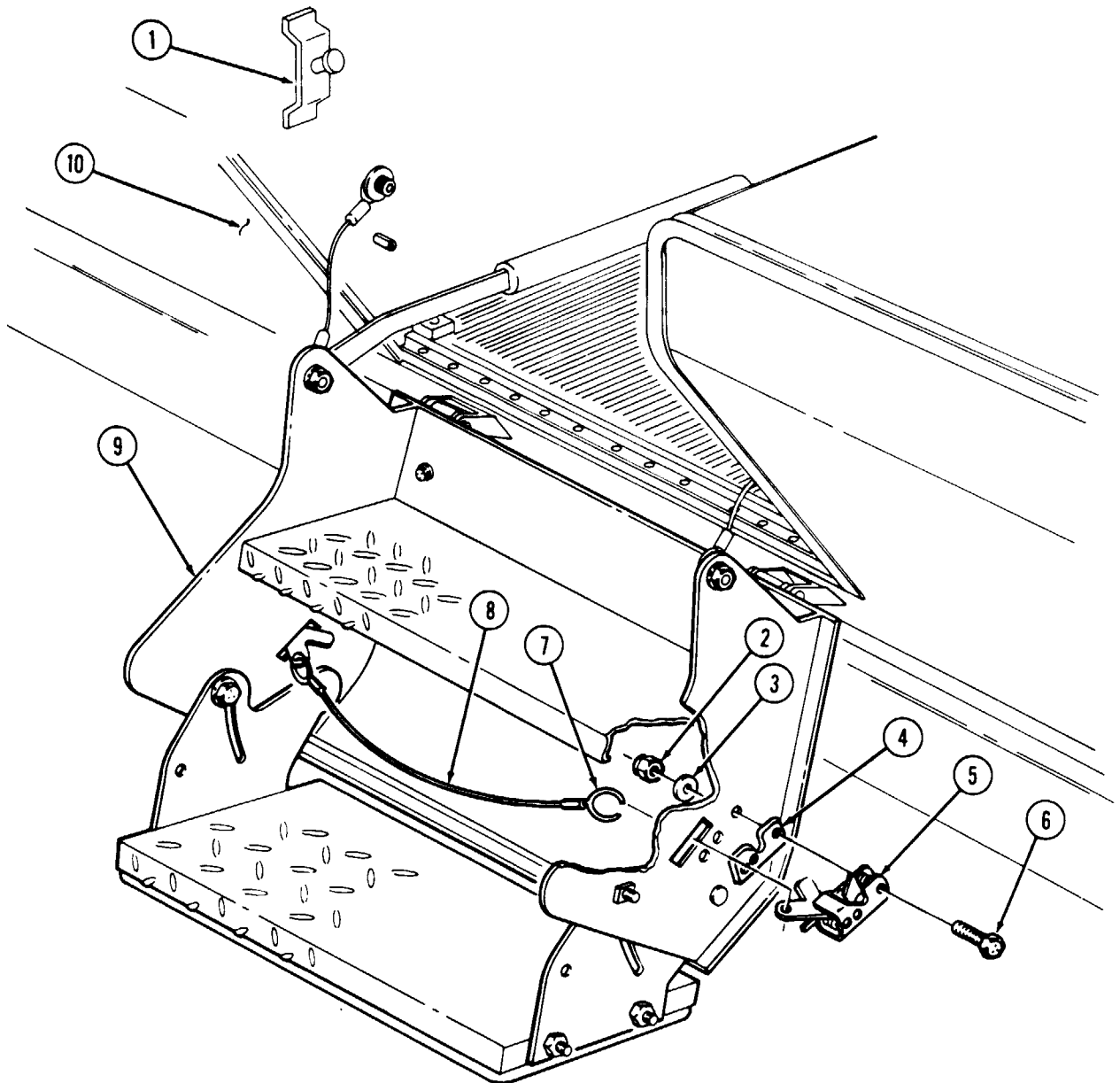
b. Installation

1. Install shim (4) and latch (5) on step frame (9) with three capscrews (6), washers (3), and locknuts (2). Tighten locknuts (2) to 6 lb-ft (8 N•m).
2. Install release cable (8) on latch (5) with split ring (7) and close split ring (7).

c. Adjustment

1. Loosen six locknuts (2) on latch (5) from step frame (9).
2. Raise rear steps (TM 9-2320-280-10) and ensure step latches (5) are engaged on strikers (1).
3. Press rear step assembly firmly against body (10), hold in place, and tighten six locknuts (2) on latches (5) and step frame (9).
4. Lower rear steps (TM 9-2320-280-10) and tighten six locknuts (2) to 6 lb-ft (8 N•m).
5. If latches (5) do not center on strikers (1), add or remove shims (4).

11-135. REAR STEPS LATCH ASSEMBLY MAINTENANCE (Cont'd)



FOLLOW-ON TASK: Raise rear steps (TM 9-2320-280-10).

11-136. REAR STEPS RETAINING CABLE REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M996, M996A1, M997, M997A1, M997A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Two locknuts (Appendix G, Item 128)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

- Rear steps raised (TM 9-2320-280-10).
- Litter stowage door open (TM 9-2320-280-10).

General Safety Instructions

Rear steps must be raised before disconnecting retractor lever from rear steps.

WARNING

Rear steps must be raised before disconnecting retractor lever from rear steps. Failure to do this may cause injury to personnel and damage to equipment.

NOTE

The procedure for replacing left and right retaining cables are basically the same. This procedure covers the left retaining cable.

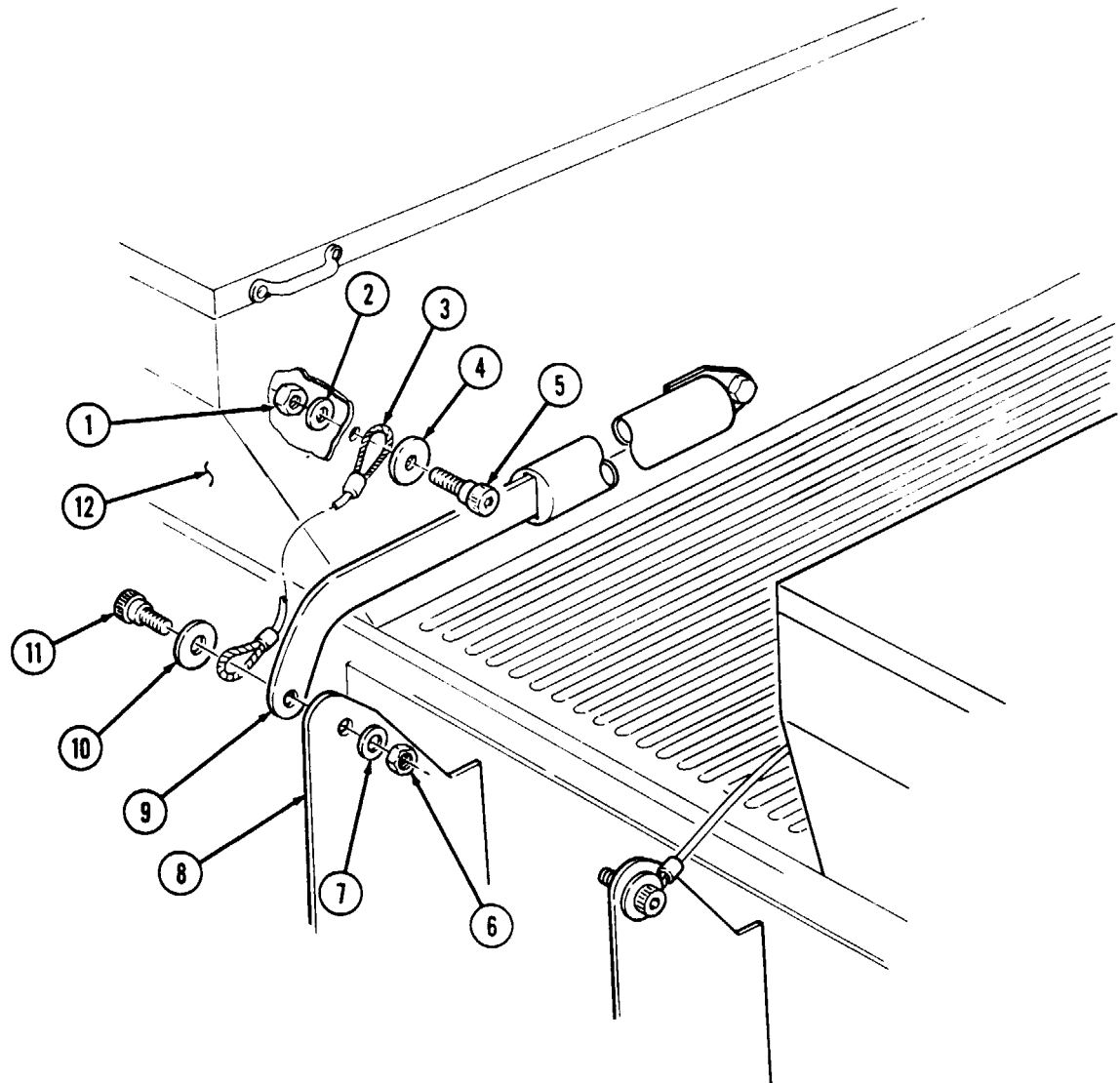
a. Removal

1. Remove locknut (6), washer (7), socket head screw (11), large washer (10), retaining cable (3), and retractor lever (9) from rear steps (8). Discard locknut (6).
2. Lower rear steps (TM 9-2320-280-10).
3. Remove locknut (1), washer (2), socket head screw (5), large washer (4), and retaining cable (3) from body (12). Discard locknut (1).

b. Installation

1. Install retaining cable (3) on body (12) with large washer (4), socket head screw (5), washer (2), and locknut (1). Tighten screw (5) to 37 lb-ft (50 N•m).
2. Raise rear steps (TM 9-2320-280-10).
3. Install retractor lever (9) and retaining cable (3) on rear steps (8) with large washer (10), socket head screw (11), washer (7), and locknut (6). Tighten screw (11) to 31 lb-ft (42 N•m).

11-136. REAR STEPS RETAINING CABLE REPLACEMENT (Cont'd)



FOLLOW-ON TASK: Close litter stowage door (TM 9-2320-280-10).

11-137. REAR STEPS RETRACTOR REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M996, M996A1, M997, M997A1, M997A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Two locknuts (Appendix G, Item 128)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

- Rear steps raised (TM 9-2320-280-10). M997, M997A1, and M997A2 only:
- Litter rail extension and litters removed from stowage compartment (TM 9-2320-280-10).

General Safety Instructions

Rear steps must be raised before disconnecting retractor lever from rear steps.

WARNING

Rear steps must be raised before disconnecting retractor lever from rear steps. Failure to do this may cause injury to personnel and damage to equipment.

NOTE

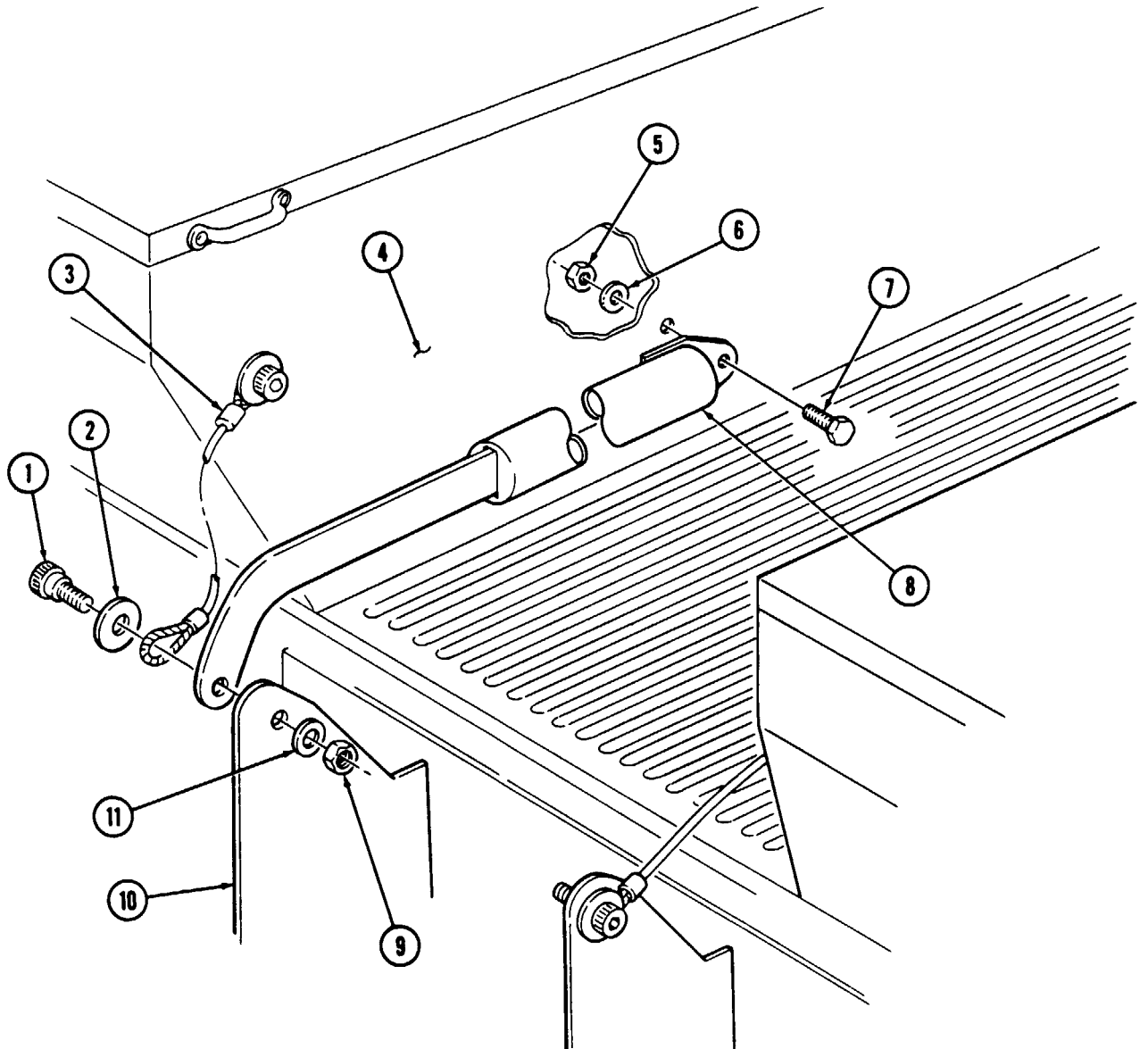
The procedure for replacing rear steps retractor is similar for M996, M996A1, M997, M997A1, and M997A2 ambulances.

a. Removal

1. Remove locknut (9), washer (11), socket head screw (1), large washer (2), retractor (8), and retaining cable (3) from rear steps (10). Discard locknut (9).
2. Lower rear steps (TM 9-2320-280-10).
3. Remove locknut (5), washer (6), capscrew (7), and retractor (8) from body (4). Discard locknut (5).

b. Installation

1. Install retractor (8) and retaining cable (3) on rear steps (10) with large washer (2), socket head screw (1), washer (11), and locknut (9). Tighten screw (1) to 31 lb-ft (42 N•m).
2. Raise rear steps (TM 9-2320-280-10).
3. Install retractor (8) on body (4) with capscrew (7), washer (6), and locknut (5). Tighten capscrew (7) to 37 lb-ft (50 N•m).

11-137. REAR STEPS RETRACTOR REPLACEMENT (Cont'd)

FOLLOW-ON TASK: M997, M997A1, and M997A2 only

Install litter rail extension and litters in stowage compartment (TM 9-2320-280-10).

11-138. REAR STEPS MAINTENANCE

This task covers:

- | | |
|--|--|
| <ul style="list-style-type: none"> a. Removal b. Disassembly | <ul style="list-style-type: none"> c. Assembly d. Installation |
|--|--|

INITIAL SETUP:

Applicable Models

M996, M996A1, M997, M997A1, M997A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Adhesive (Appendix C, Item 3)
Ten locknuts (Appendix G, Item 128)
Four locknuts (Appendix G, Item 79)
Three cotter pins (Appendix G, Item 16)
Cotter pin (Appendix G, Item 25)
Six blind rivets (Appendix G, Item 259)
Two blind rivets (Appendix G, Item 250)

Personnel Required

One mechanic
One assistant

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

Rear steps raised (TM 9-2320-280-10).

General Safety Instructions

Rear steps must be raised before disconnecting retractor lever from rear steps.

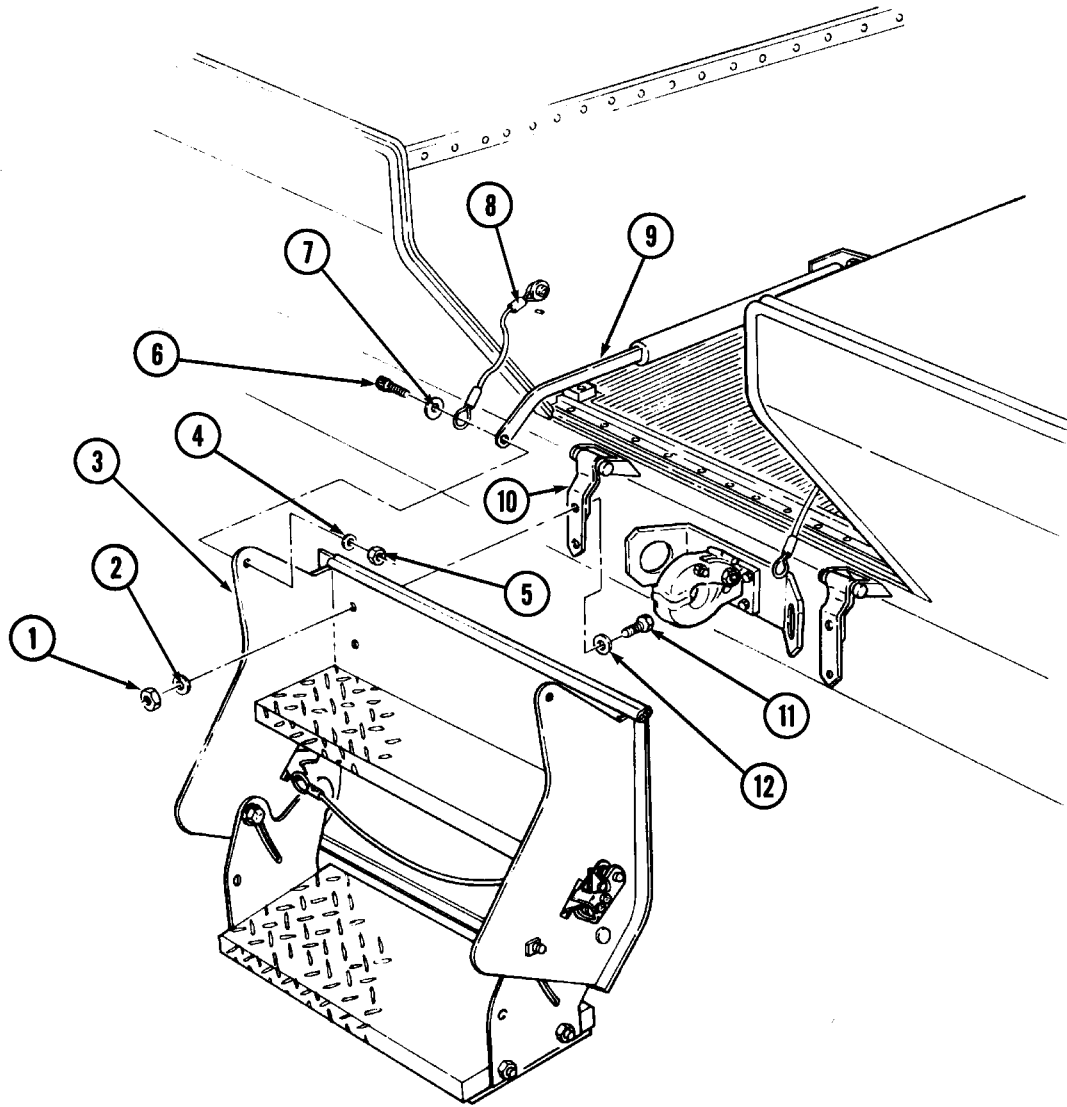
WARNING

Rear steps must be raised before disconnecting retractor lever from rear steps. Failure to do this may cause injury to personnel and damage to equipment.

a. Removal

1. Remove two locknuts (5), washers (4), socket head screws (6), large washers (7), retaining cables (8), and retractor lever (9) from rear step (3). Discard locknuts (5).
2. Lower rear steps (TM 9-2320-280-10).
3. Remove rear steps latches (para. 11-135).
4. Remove four locknuts (1), washers (2), capscrews (11), washers (12), and rear step (3) from two hinges (10). Discard locknuts (1).

11-138. REAR STEPS MAINTENANCE(Cont'd)



11-138. REAR STEPS MAINTENANCE (Cont'd)

NOTE

For instructions on replacement of rivets, refer to para. 10-66.

b. Disassembly

1. If damaged, remove two rubber seals (25), from sides of step frame (2).
2. Remove two seals (1) from edges of step frame (2).
3. Remove four screws (20) from seat (18) and lower tread plate (19), and pry up on seat (18) to remove from tread plate (19). Clean remaining adhesive from lower tread plate (19).
4. Remove four locknuts (6), washers (5), capscrews (12), washers (5), and upper tread plate (21) from step frame (2). Discard locknuts (6).
5. Remove four locknuts (14), washers (15), capscrews (17), washers (15), and lower tread plate (19) from step frame (2) and two side plates (16). Discard locknuts (14).

NOTE

Cotter pins and washers may not be installed on all vehicles.

6. Remove cotter pin (23), washer (24), and knob (22) from side plate (16) and step frame (2). Discard cotter pin (23).
7. Remove three cotter pins (7), washers (9), spring washers (10), clevis pins (13), and washers (9) from two side plates (16) and step frame (2). Discard cotter pins (7).
8. Remove two rivets (3) and angle bracket (4) from step frame (2).
9. Remove six rivets (11) and two latch striker guide support brackets (8) from step frame (2).

c. Assembly

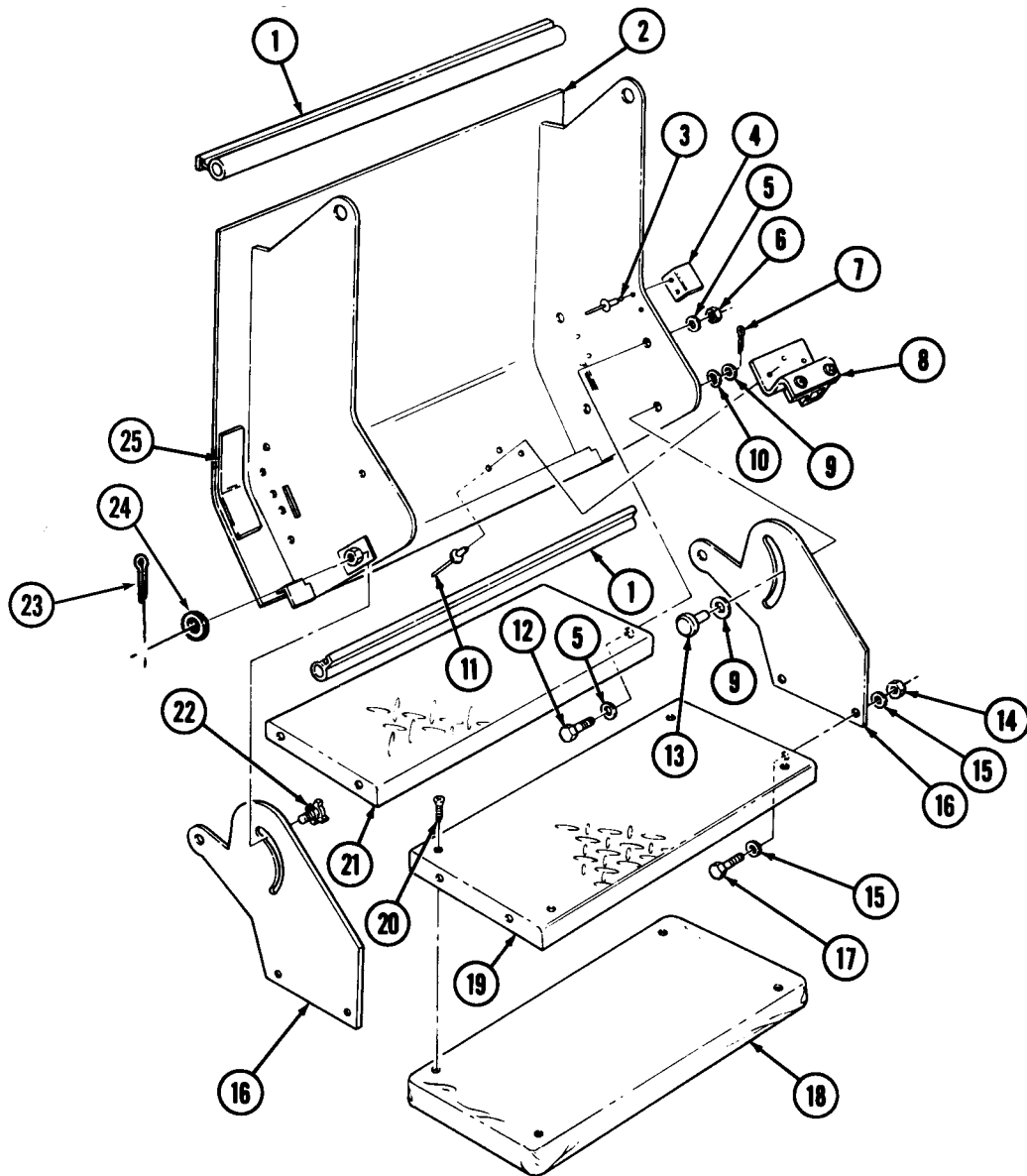
1. Install two latch striker guide support brackets (8) on step frame (2) with six rivets (11).
2. Install angle bracket (4) on step frame (2) with two rivets (3).

NOTE

Cotter pins and washers may not be installed on all vehicles.

3. Install two side plates (16) on step frame (2) with three washers (9), clevis pins (13), spring washers (10), washers (9), and cotter pins (7).
4. Install side plate (16) on step frame (2) with knob (22), washer (24), and cotter pin (23).
5. Install upper tread plate (21) on step frame (2) with four washers (5), capscrews (12), washers (5), and locknuts (6). Tighten locknuts (6) to 26 lb-ft (35 N•m).
6. Install lower tread plate (19) on side plates (16) with four washers (15), capscrews (17), washers (15), and locknuts (14). Tighten locknuts (14) to 26 lb-ft (35 N•m).
7. Apply adhesive to back of seat (18). Install seat (18) on lower tread plate (19) with four screws (20).
8. Install two seals (1) on edges of step frame (2).
9. Install two rubber seals (25) on step frame (2) sides, if removed.

11-138. REAR STEPS MAINTENANCE (Cont'd)

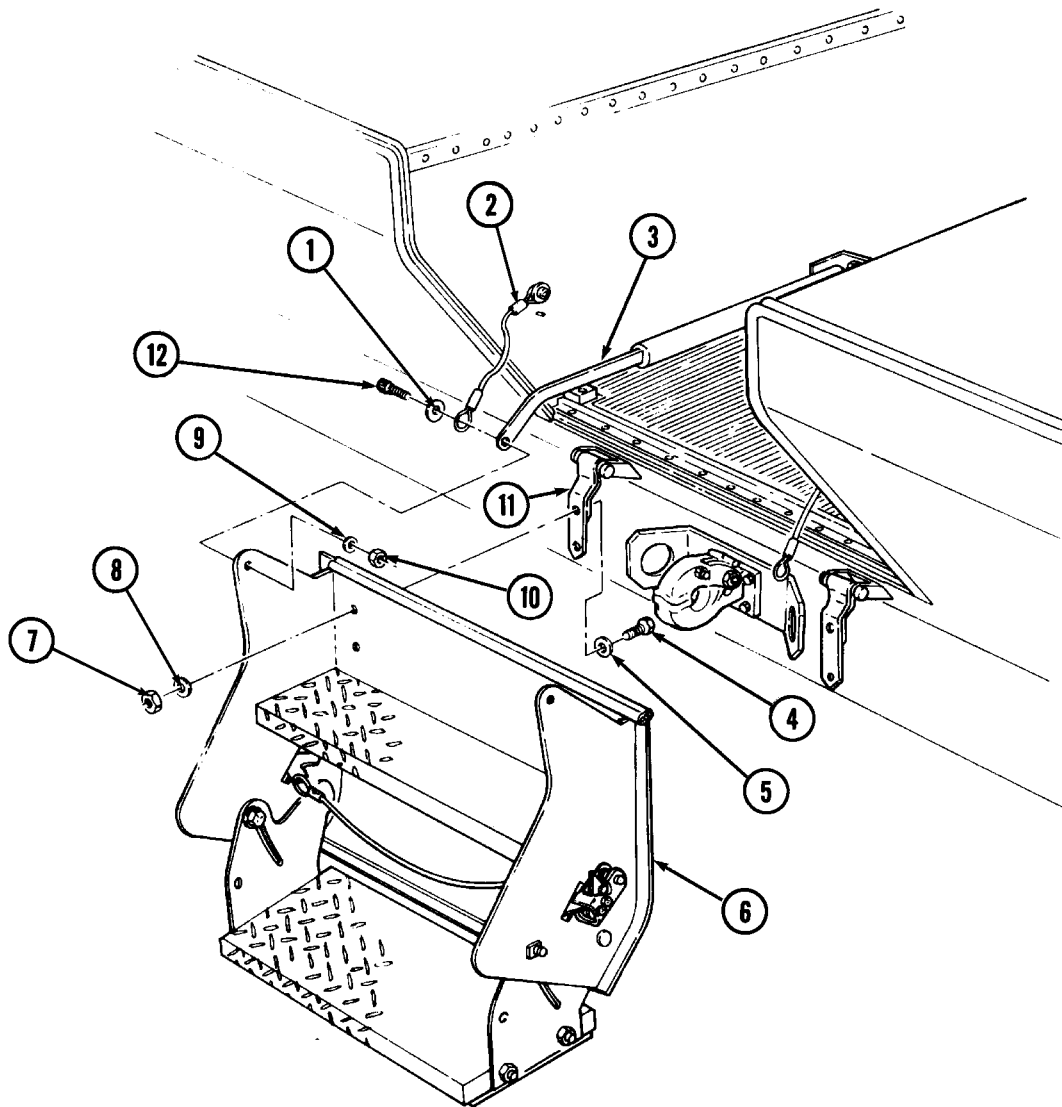


11-138. REAR STEPS MAINTENANCE (Cont'd)

d. Installation

1. Install rear step (6) on two hinges (11) with four washers (5), capscrews (4), washers (8), and locknuts (7). Raise steps and push in and down on steps while tightening capscrews (4).
2. Lower steps (TM 9-2320-280-10) and tighten locknuts (7) to 15 lb-ft (20 N·m).
3. Install and adjust rear step latches (para. 11-135).
4. Raise rear steps (TM 9-2320-280-10).
5. Install retractor lever (3) and two retaining cables (2) on rear step (6) with two large washers (1), socket-head screws (12), washers (9), and locknuts (10). Tighten screws (12) to 31 lb-ft (42 N·m).

11-138. REAR STEPS MAINTENANCE (Cont'd)



11-139. UPPER LITTER RACK STRIKER REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M997, M997A1, M997A2

Tools

General mechanic's tool kit
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

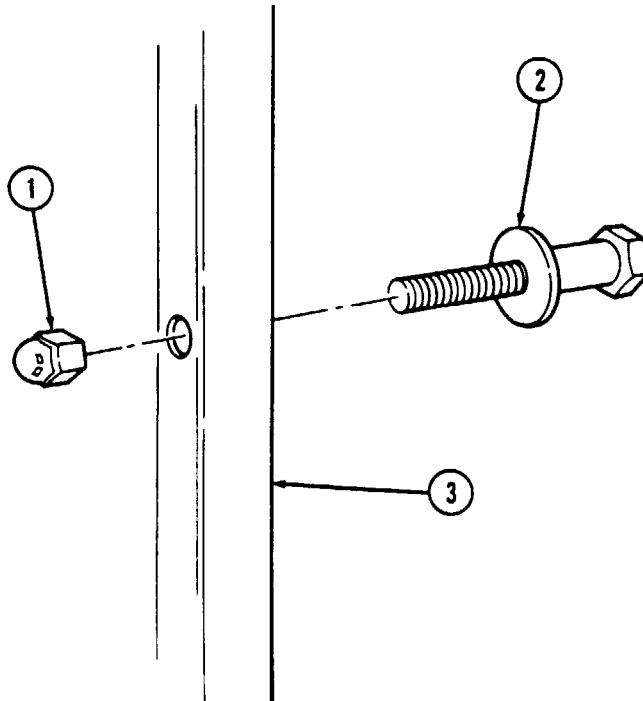
Upper litter rack placed in backrest position
(TM 9-2320-280-10).

a. Removal

Remove nut (1) and striker (2) from support (3).

b. Installation

Install striker (2) on support (3) with nut (1).



FOLLOW-ON TASK: Raise upper litter rack (TM 9-2320-280-10).

11-140. UPPER LITTER RACK REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M997, M997A1, M997A2

Manual References

TM 9-2320-280-10

TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

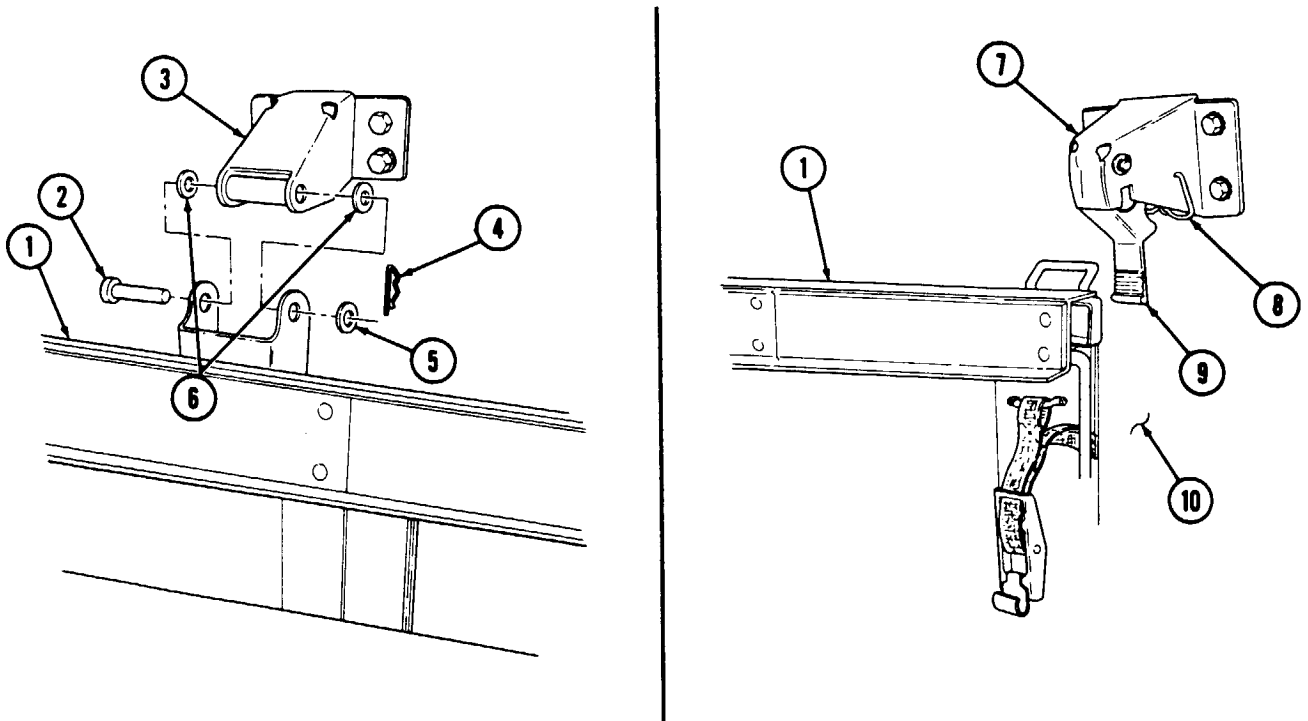
Upper litter rack placed in the backrest position
(TM 9-2320-280-10).

a. Removal

1. Remove two hitch pins (4), washers (5), retaining pins (2), four nylon washers (6), and upper litter rack (1) from front and middle support brackets (3).
2. Release latch lock (8) and latch (9), and remove upper litter rack (1) from rear litter bracket (7) and ambulance body (10).

b. Installation

1. Install upper litter rack (1) on ambulance body (10) and rear litter bracket (7) by locking latch (9) and latch lock (8).
2. Install upper litter rack (1) on front and middle support brackets (3) with four nylon washers (6), two retaining pins (2), washers (5), and hitch pins (4).



FOLLOW-ON TASK: Raise upper litter rack (TM 9-2320-280-10).

11-141. UPPER LITTER RACK STRIKER SUPPORT BRACKETS REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M997, M997A1, M997A2

Manual References

TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

Upper litter rack striker removed (para. 11-139).

Materials/Parts

Two blind rivets (Appendix G, Item 260)
Four blind rivets (Appendix G, Item 259)
Eight blind rivets (Appendix G, Item 244)

NOTE

For instructions on replacement of rivets, refer to para. 10-66.

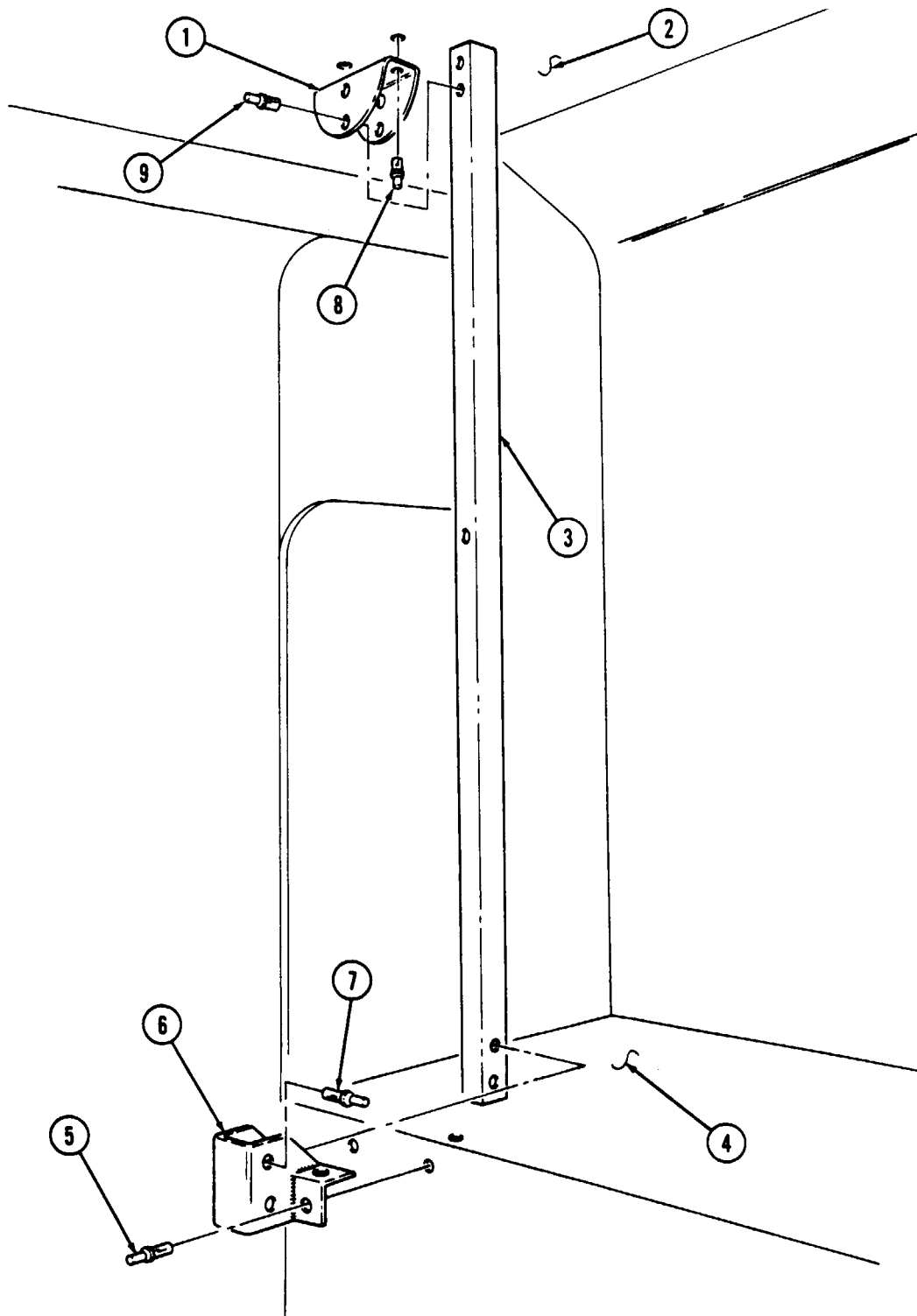
a. Removal

1. Remove two rivets (8) from upper bracket (1) and roof (2).
2. Remove four rivets (5) and support (3) with brackets (1) and (6) from roof (2) and body (4).
3. Remove four rivets (9) and upper bracket (1) from support (3).
4. Remove four rivets (7) and lower bracket (6) from support (3).

b. Installation

1. Install lower bracket (6) on support (3) with four rivets (7).
2. Install upper bracket (1) on support (3) with four rivets (9).
3. Install upper bracket (1) and support (3) on roof (2) with two rivets (8).
4. Install lower bracket (6) and support (3) on body (4) with four rivets (5).

11-141. UPPER LITTER RACK STRIKER SUPPORT BRACKETS REPLACEMENT (Cont'd)



FOLLOW-ON TASK: Install upper litter rack striker (para. 11-139).

11-142. UPPER LITTER RACK LATCH MAINTENANCE

This task covers:

- a. Removal
- b. Installation
- c. Adjustment

INITIAL SETUP:

Applicable Models

M997, M997A1, M997A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Three locknuts (Appendix G, Item 70)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

Upper litter rack placed in backrest position
(TM 9-2320-280-10).

a. Removal

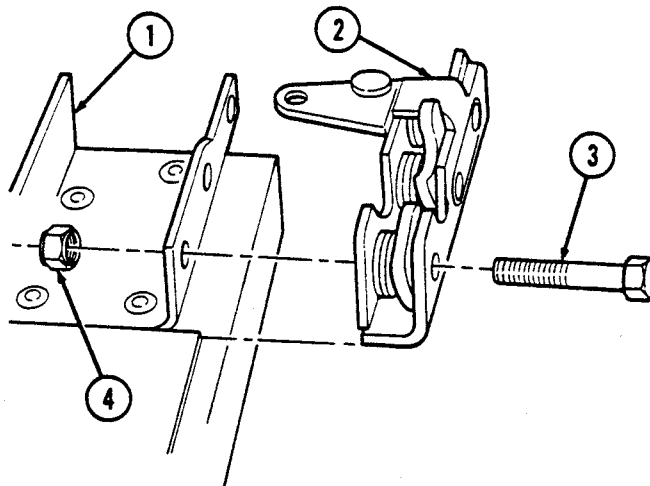
Remove three locknuts (4), capscrews (3), and latch (2) from litter rack (1). Discard locknuts (4).

b. Installation

Install latch (2) on litter rack (1) with three capscrews (3) and locknuts (4). Do not tighten capscrews (3).

c. Adjustment

1. Raise upper litter rack (1) (TM 9-2320-280-10), and ensure latch (2) is engaged on striker.
2. Hold litter rack (1) in place, and tighten three capscrews (3) to 10 lb-ft (14 N•m).



11-143. UPPER LITTER RACK LATCH BRACKET REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M997, M997A1, M997A2

Manual References

TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

Upper litter rack latch removed (para. 11-142).

Materials/Parts

Four blind rivets (Appendix G, Item 244)

NOTE

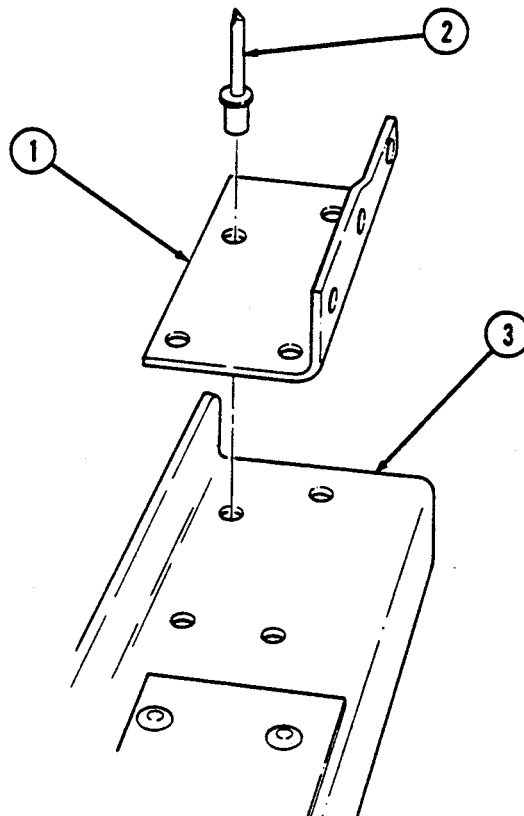
For instructions on replacement of rivets, refer to para. 10-66.

a. Removal

Remove four rivets (2) and bracket (1) from upper litter tray (3).

b. Installation

Install bracket (1) on upper litter tray (3) with four rivets (2).



FOLLOW-ON TASK: Install upper litter rack latch (para. 11-142).

11-144. UPPER LITTER RACK SUPPORT BRACKET REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M997, M997A1, M997A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Four lockwashers (Appendix G, Item 134)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

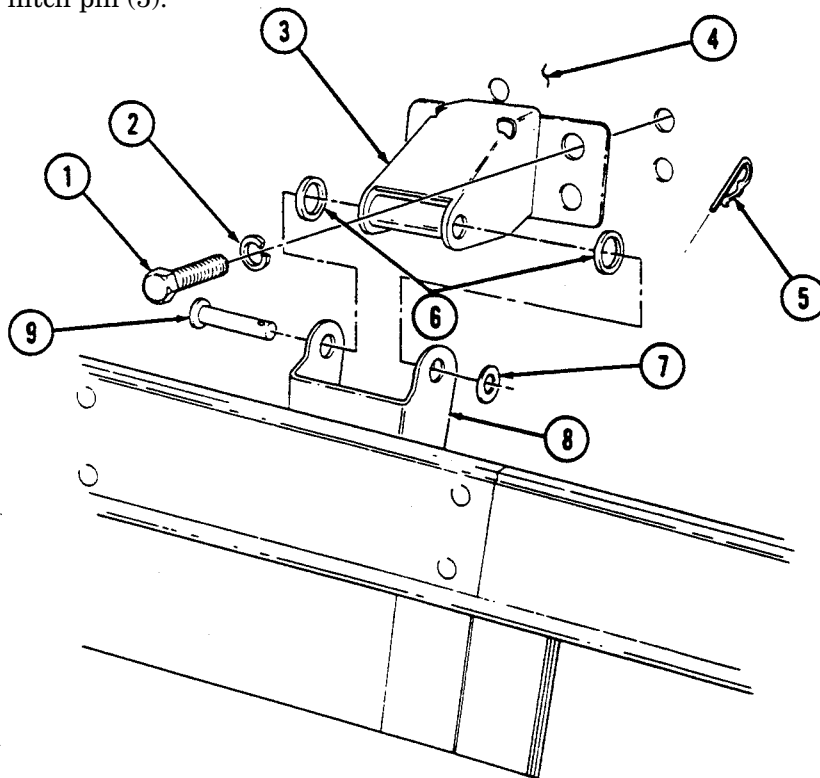
Upper litter rack placed in backrest position
(TM 9-2320-280-10).

a. Removal

1. Remove hitch pin (5), washer (7), retaining pin (9), two nylon washers (6), and litter rack (8) from support bracket (3).
2. Remove four capscrews (1), lockwashers (2), and support bracket (3) from body (4). Discard lockwashers (2).

b. Installation

1. Install support bracket (3) on body (4) with four lockwashers (2) and capscrews (1). Tighten capscrews (1) to 21 lb-ft (29 N·m).
2. Install litter rack (8) on support bracket (3) with two nylon washers (6), retaining pin (9), washer (7), and hitch pin (5).



FOLLOW-ON TASK: Raise litter rack (TM 9-2320-280-10).

11-145. UPPER LITTER RACK STRAP AND RING REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M997, M997A1, M997A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Two lockwashers (Appendix G, Item 135)

Materials/Parts (Cont'd)

Two plain-assembled nuts (Appendix G, Item 201)
Two capscrews (Appendix G, Item 9)
Two solid rivets (Appendix G, Item 270)

Manual References

TM 9-2320-280-24P

Equipment Condition

Remove duct assembly (para. 4-103).

a. Removal

1. Remove two capscrews (4), lockwashers (3), and strap bracket (2) from roof (1). Discard lockwashers (3).
2. Remove strap (5) from upper litter rack (6).

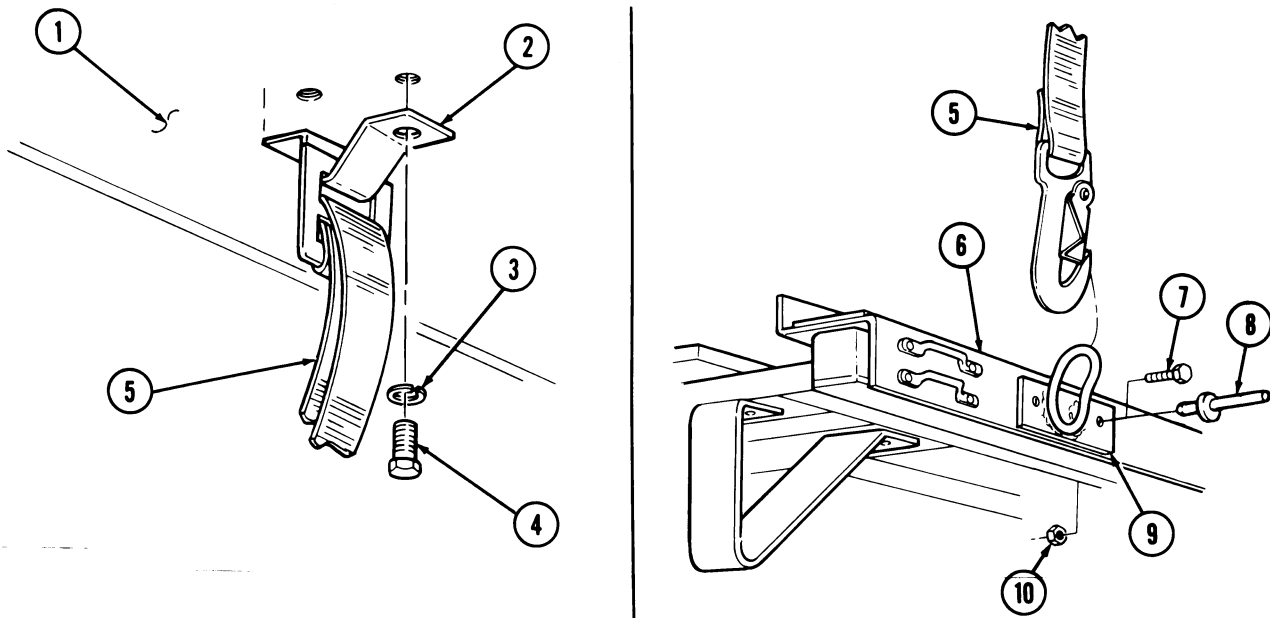
NOTE

- Some vehicles may have capscrews and plain-assembled nuts instead of rivets securing the ring assembly.
- For replacement of rivets, refer to para. 10-66.

3. Remove two rivets (8) and ring assembly (9) from upper litter rack (6).

b. Installation

1. Install ring assembly (9) on upper litter rack (6) with two capscrews (7) and plain-assembled nuts (10).
2. Install strap bracket (2) on roof (1) with two lockwashers (3) and capscrews (4). Tighten capscrews (4) to 10 lb-ft (14 N·m).
3. Connect strap (5) to upper litter rack (6) and tighten strap (5) to support upper litter rack (6).



FOLLOW-ON TASK: Install duct assembly (para. 4-103).

11-145.1. LITTER SKID TRACKS EDGE TRIM REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M996, M996A1, M997, M997A1, M997A2, M1035, M1035A1, M1035A2

Materials/Parts

Sealant, RTV (Appendix C, Item 3)

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-24P

NOTE

- No NSN is assigned to edge trim. It will need to be ordered directly from the vendor (2L480). The part number (SD1276) is for 500-feet (150 m) bulk edging. When ordering, specify how many feet are needed.
- M996 and M996A1 vehicles require approximately 30 ft (19 m) of trim; M997, M997A1, and M997A2 vehicles require approximately 58 ft (18 m) of trim; and M1035, M1035A1, and M1035A2 vehicles require approximately 59 ft (18 m) of trim.

a. Removal

1. Remove edge trim (2) from track edge (3).
2. Clean any remaining adhesive from track edge (3).

b. Installation

NOTE

- Edge trim must be cut to allow for interferences along tracks.
 - Edge trim length must be shortened .50 in. (12.7 mm) at each end to allow room for adhesive sealant application.
1. Measure length of skid track (1) and cut edge trim (2) to size.

NOTE

To prevent drying of adhesive sealant before edge trim can be installed, install edge trim to only one track at a time.

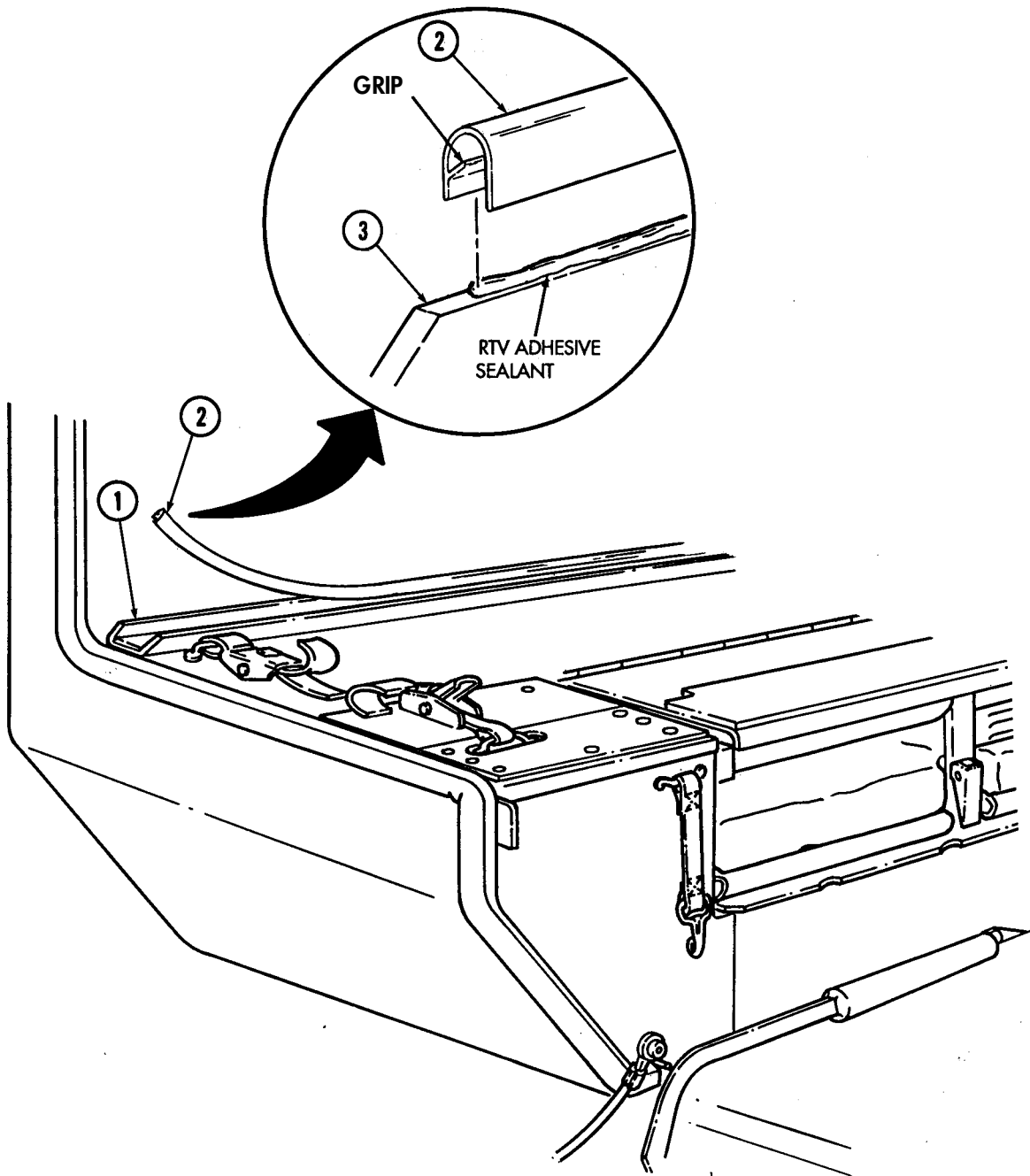
2. Apply thin bead of adhesive sealant along full length of litter skid track edge (3).

NOTE

When installing edge trim sections on litter track edges, ensure grip is positioned on outside of track edge to prevent edge trim from loosening when litter is being used.

3. Install edge trim (2) on track edge (3).
4. Apply adhesive sealant to ends of edge trim (2) and smooth between track (1) and edge trim (2).

11-145.1. LITTER SKID TRACKS EDGE TRIM REPLACEMENT (Cont'd)



11-146. LITTER SKID PAD REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M996, M996A1, M997, M997A1, M997A2

Manual References

TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

Litter strap removed (para. 11-160).

Materials/Parts

Nineteen blind rivets (Appendix G, Item 261)

NOTE

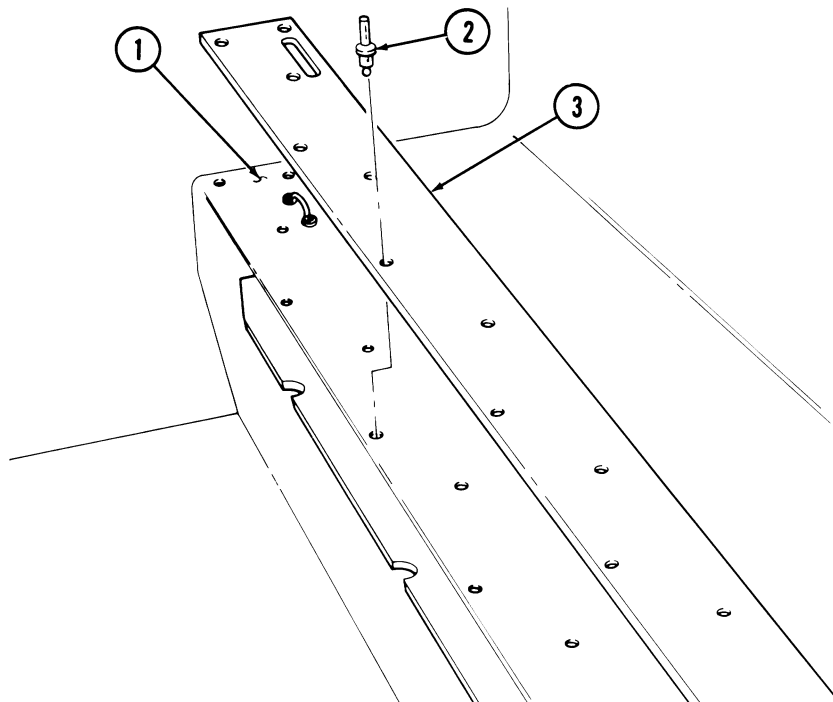
- Skid pads are removed and installed basically the same for both M996, M996A1, M997, M997A1, and M997A2 ambulances. This procedure covers lower skid pad replacement for M997, M997A1, and M997A2 ambulances.
- For instructions on replacement of rivets, refer to para. 10-66.

a. Removal

Remove nineteen rivets (2) and skid pad (3) from body (1).

b. Installation

Install skid pad (3) on body (1) with nineteen rivets (2).



FOLLOW-ON TASK: Install litter strap (para. 11-160).

11-147. LITTER HANDLE BUMPER REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M996, M996A1, M997, M997A1, M997A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Two blind rivets (Appendix G, Item 258)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

Rear door opened (TM 9-2320-280-10).

NOTE

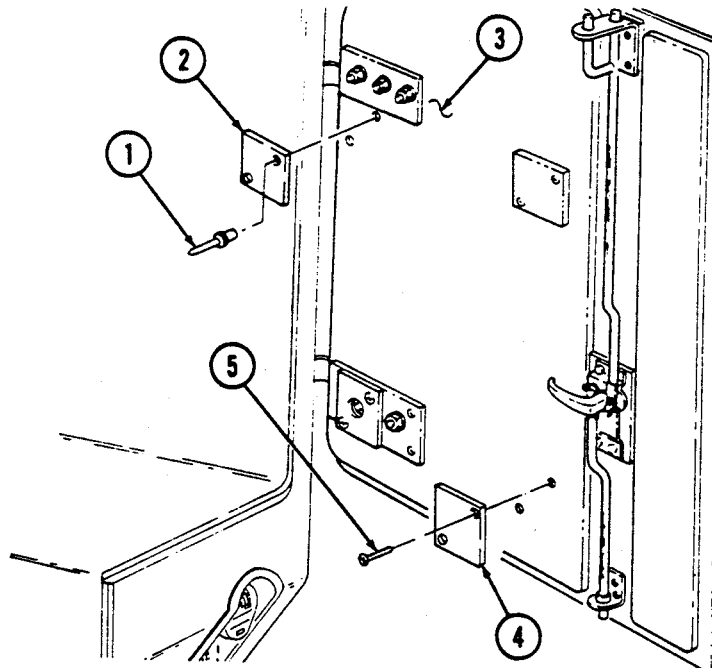
- The procedure for replacing litter handle bumpers are basically the same for M996, M996A1, M997, M997A1, and M997A2 ambulances. This procedure covers the rear door litter handle bumpers replacement for M997, M997A1, and M997A2 ambulances.
- For instructions on replacement of rivets, refer to para. 10-66.

a. Removal

1. Remove two rivets (1) and upper bumper (2) from rear door (3).
2. Remove two screws (5) and lower bumper (4) from rear door (3).

b. Installation

1. Install lower bumper (4) on rear door (3) with two screws (5).
2. Install upper bumper (2) on rear door (3) with two rivets (1).



FOLLOW-ON TASK: Close rear door (TM 9-2320-280-10).

11-148. SPINEBOARD MOUNTING BRACKET REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M996, M996A1, M997, M997A1, M997A2

Materials/Parts

Two lockwashers (Appendix G, Item 138)

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-24P

NOTE

The procedure for replacing the left and right spineboard mounting brackets are basically the same for M996, M996A1, M997, M997A1, and M997A2 ambulances. This procedure covers replacement of a right spineboard bracket on M997, M997A1, and M997A2 ambulances.

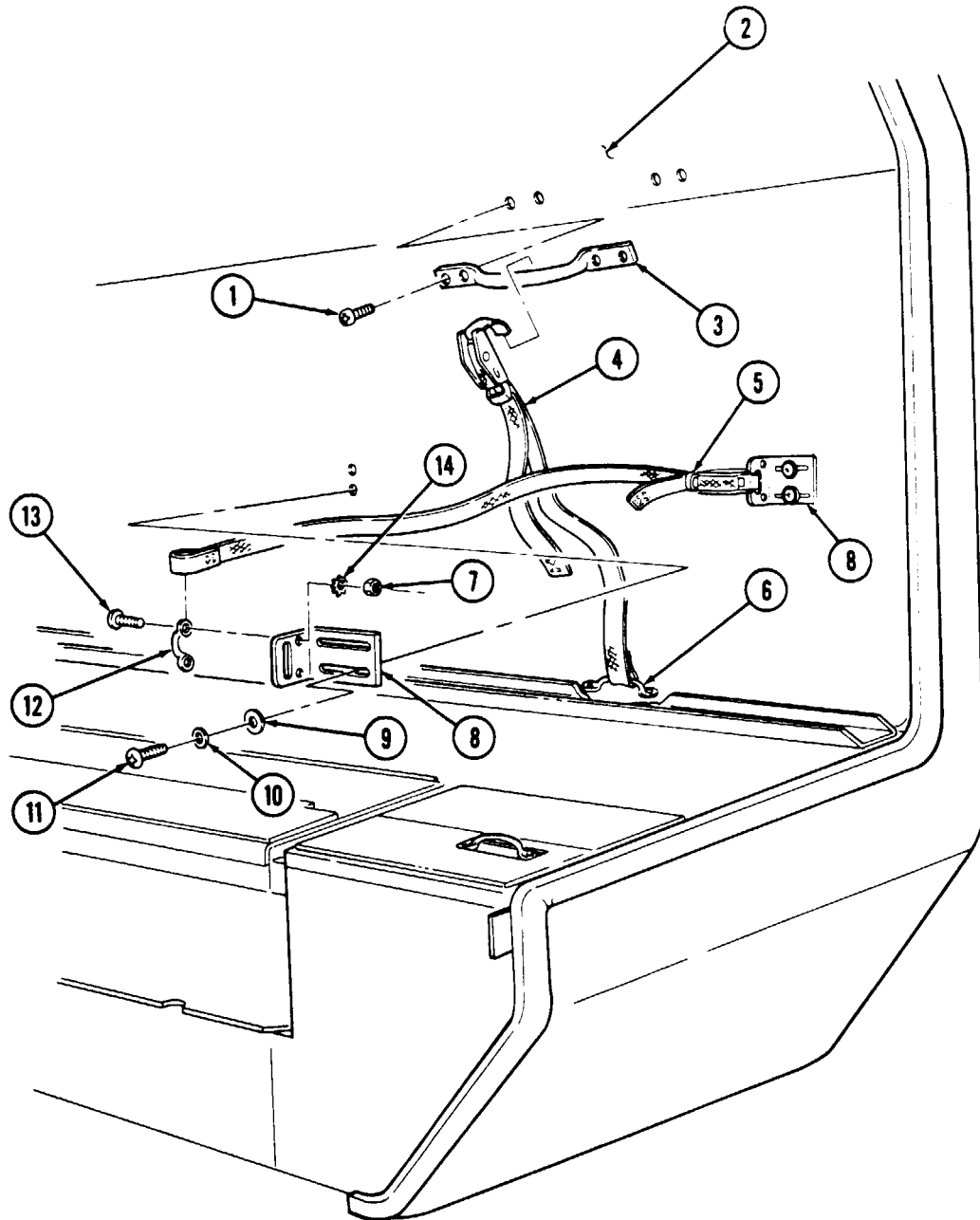
a. Removal

1. Remove spineboard from stowage position.
2. Remove six screws (1), footman loops (3) and (6), and vertical strap assembly (4) from body (2).
3. Remove four screws (11), washers (10), washers (9), and two brackets (8) from body (2).
4. Remove two nuts (7), lockwashers (14), screws (13), footman loop (12), and horizontal strap assembly (5) from bracket (8). Discard lockwashers (14).

b. Installation

1. Install horizontal strap assembly (5) and footman loop (12) on bracket (8) with two screws (13), lockwashers (14), and nuts (7).
2. Install two brackets (8) on body (2) with four screws (11), washers (10), and washers (9).
3. Install vertical strap (4), footman loop (6), and footman loop (3) on body (2) with six screws (1).
4. Install spineboard and adjust brackets (8) by loosening screws (11) and sliding brackets (8) so that spineboard is held securely and tighten screws (11). Install and tighten strap assemblies (5) and (4) on spineboard.

11-148. SPINEBOARD MOUNTING BRACKET REPLACEMENT (Cont'd)



11-149. IV BAG STRAP REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M996, M996A1, M997, M997A1, M997A2

Manual References

TM 9-2320-280-24P

Tools

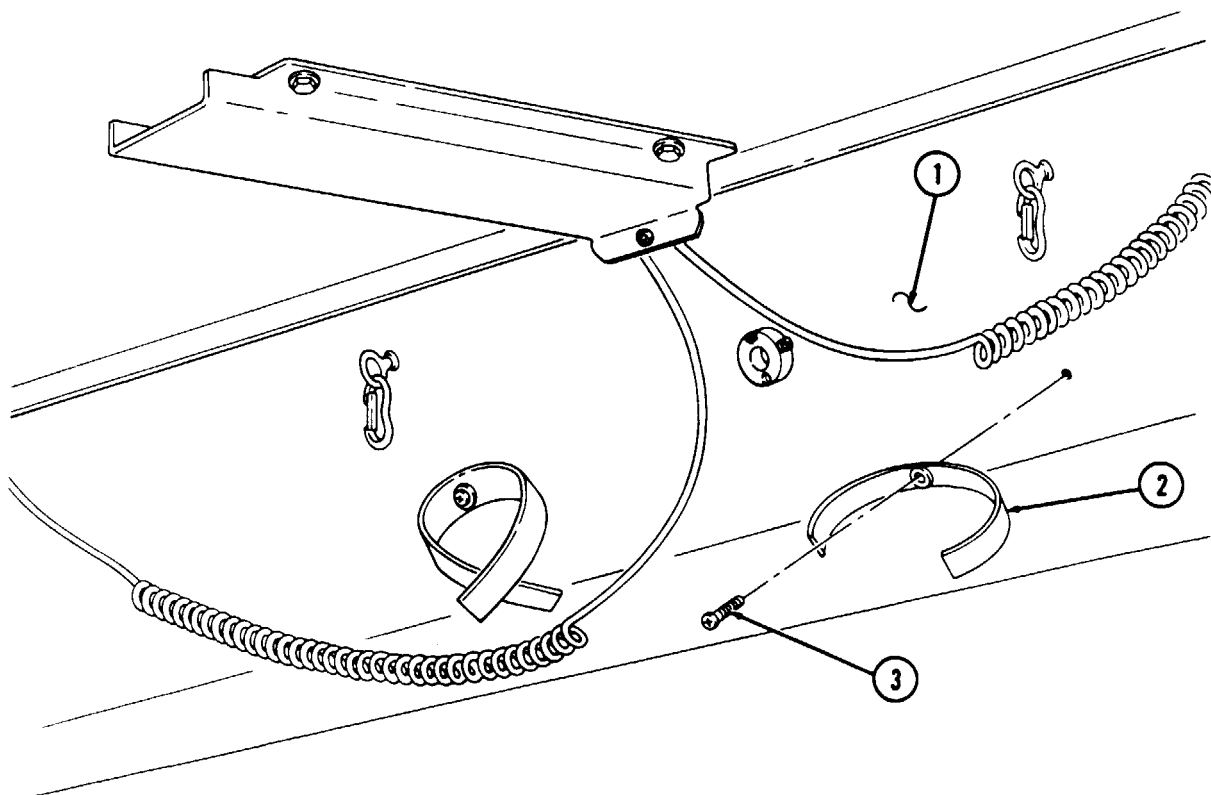
General mechanic's tool kit:
automotive (Appendix B, Item 1)

a. Removal

Remove screw (3) and strap (2) from body (1).

b. Installation

Install strap (2) on body (1) with screw (3).



11-150. IV BAG HOOK REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M996, M996A1, M997, M997A1, M997A2

Manual References

TM 9-2320-280-24P

Tools

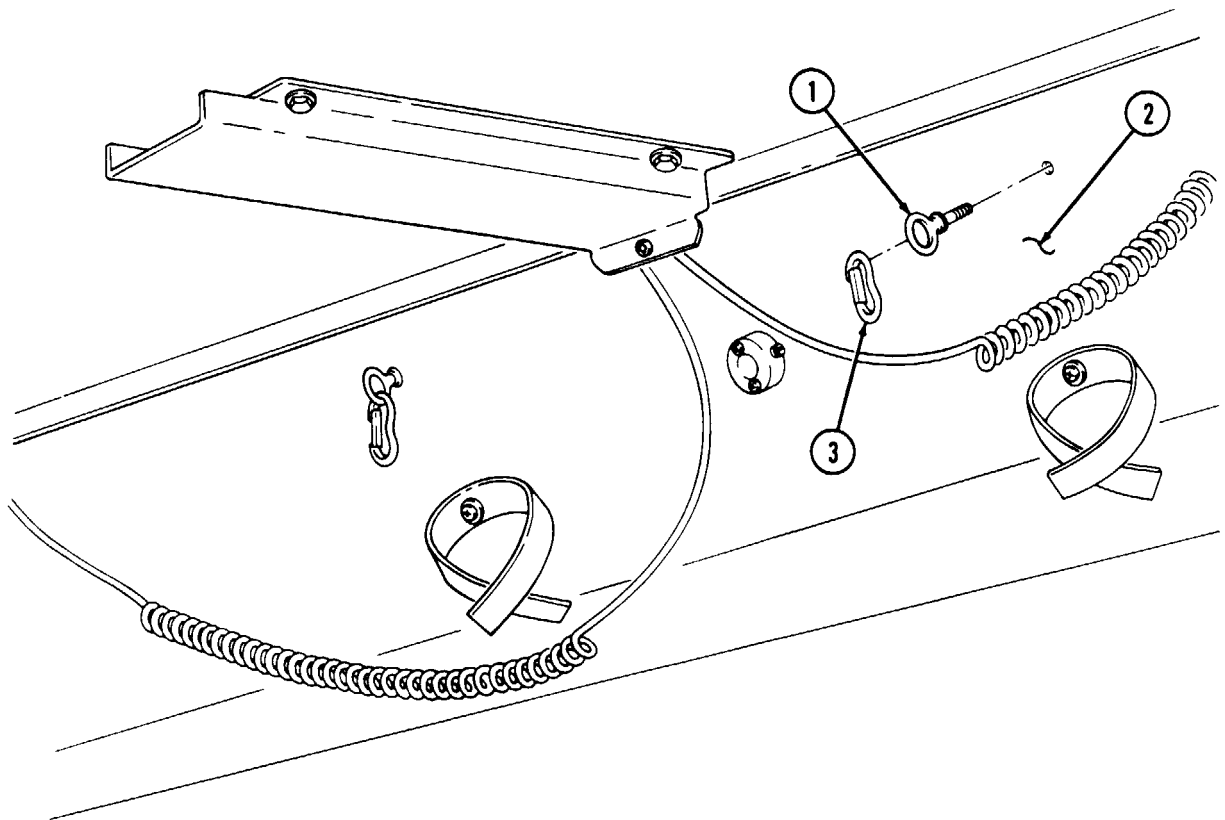
General mechanic's tool kit:
automotive (Appendix B, Item 1)

a. Removal

Remove eyebolt (1) from body (2) and remove hook (3) from eyebolt (1).

b. Installation

Install hook (3) on eyebolt (1) and install eyebolt (1) into body (2).



11-151. STOWAGE BOX TURNBUTTON REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M997, M997A1, M997A2

Manual References

TM 9-2320-280-24P

Tools

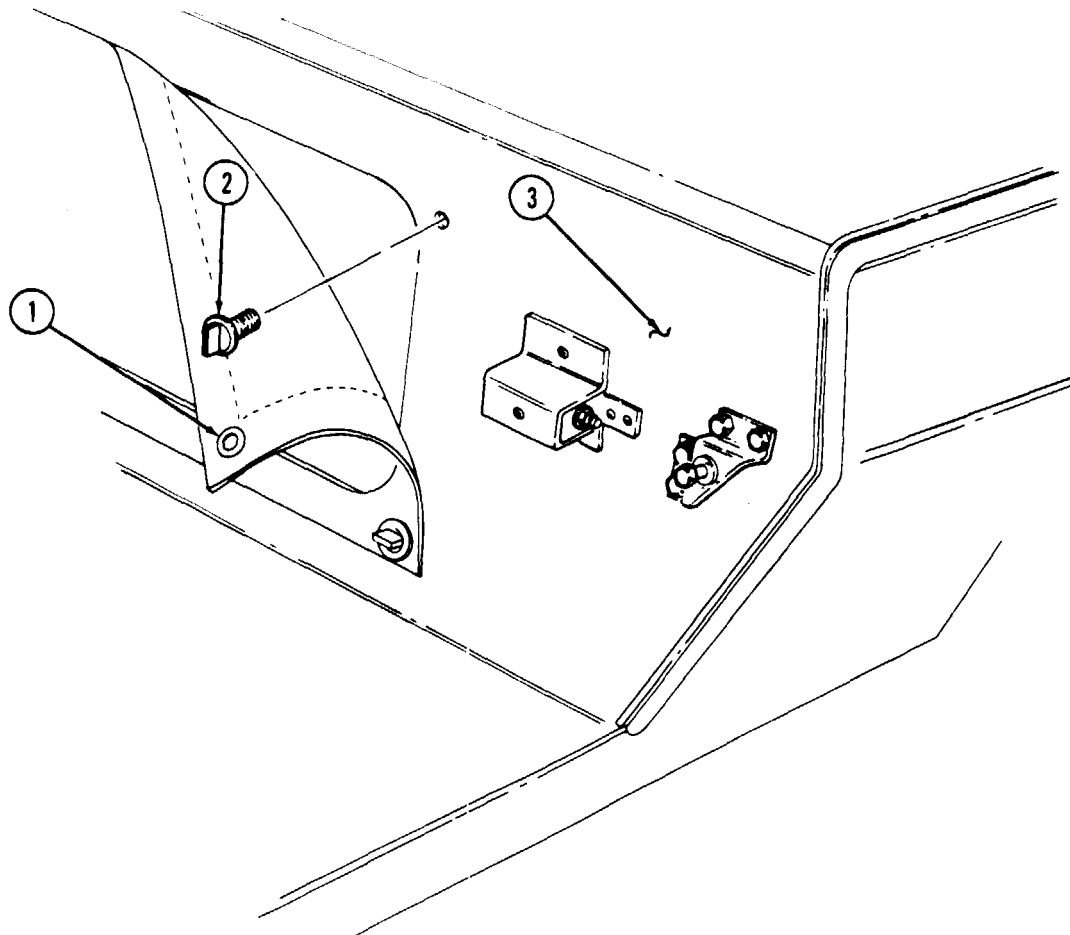
General mechanic's tool kit:
automotive (Appendix B, Item 1)

a. Removal

1. Remove curtain eyelet (1) from turnbutton (2) on stowage box (3).
2. Remove turnbutton (2) from stowage box (3).

b. Installation

1. Install turnbutton (2) on stowage box (3).
2. Install curtain eyelet (1) on turnbutton (2) on stowage box (3).



11-152. STOWAGE DOOR REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M997, M997A1, M997A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Five solid rivets (Appendix G, Item 271)
Three blind rivets (Appendix G, Item 260)
Four solid rivets (Appendix G, Item 272)

Manual References

TM 9-2320-280-24P

NOTE

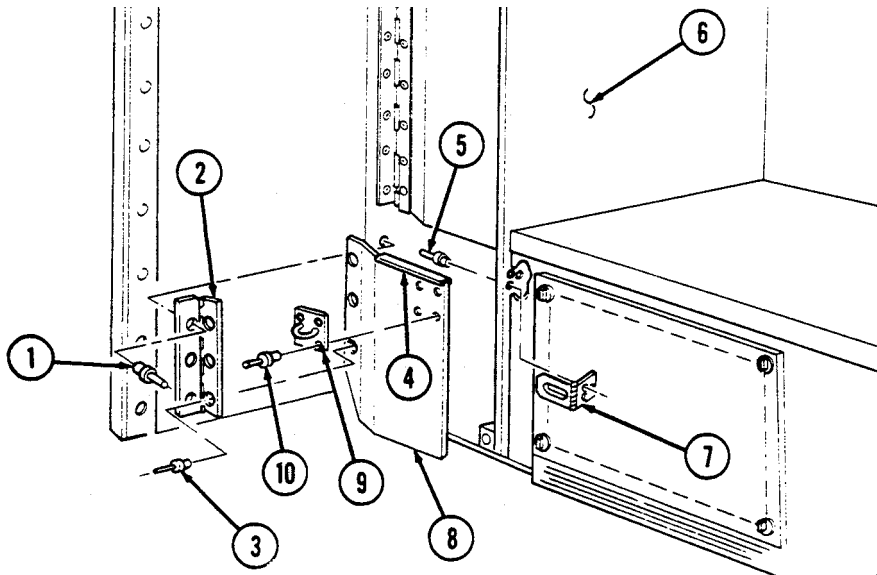
- Upper and lower stowage doors are removed and installed basically the same. This procedure covers the lower stowage door.
- For instructions on replacement of rivets, refer to para. 10-66.

a. Removal

1. Remove seal (4), if damaged, from door (8).
2. Remove three rivets (3) and door (8) from hinge (2).
3. Remove three rivets (1) and hinge (2) from bulkhead (6).
4. Remove two rivets (5) and hasp (7) from bulkhead (6).
5. Remove four rivets (10) and staple (9) from door (8).

b. Installation

1. Install hasp (7) on bulkhead (6) with two rivets (5).
2. Install staple (9) on door (8) with four rivets (10).
3. Install hinge (2) on bulkhead (6) with three rivets (1).
4. Install door (8) on hinge (2) with three rivets (3).
5. Install seal (4) on door (8), if removed.



11-153. AMBULANCE COMPARTMENT MAT REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M996, M996A1, M997, M997A1, M997A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Nine blind rivets (Appendix G, Item 244)
Nine blind rivets (Appendix G, Item 254)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

Rear steps lowered (TM 9-2320-280-10).

NOTE

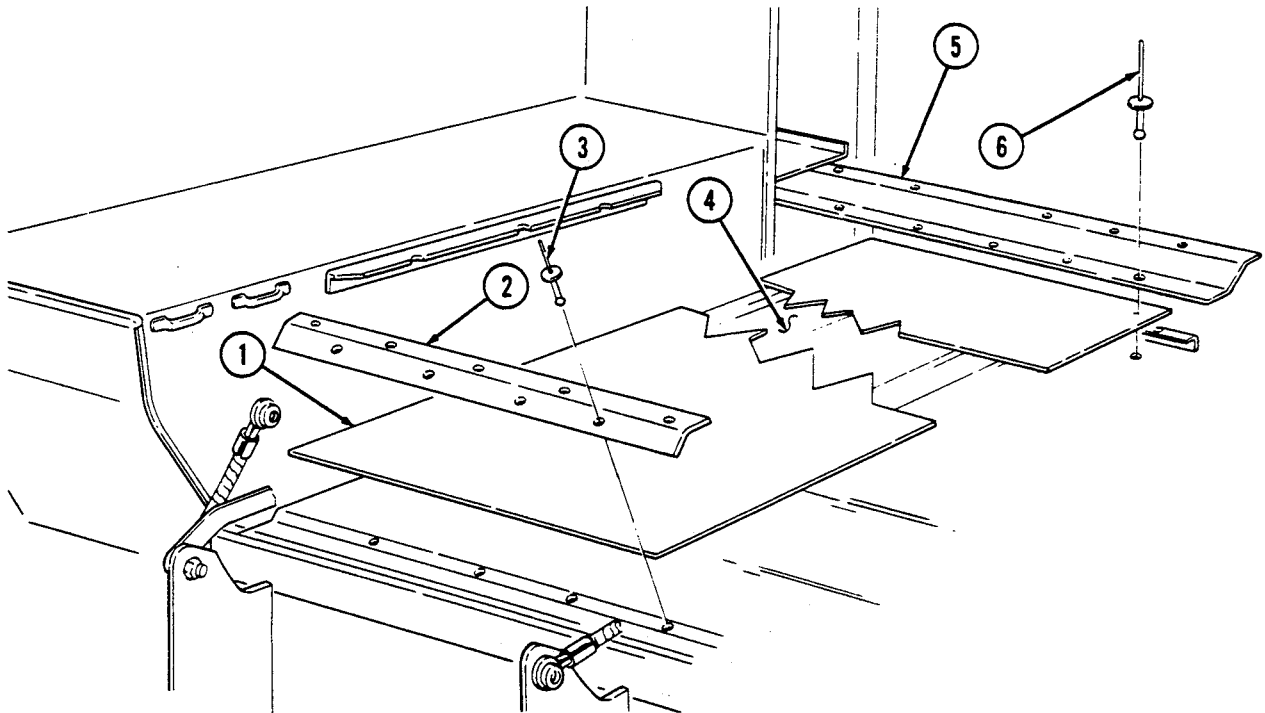
For instructions on replacement of rivets, refer to para. 10-66.

a. Removal

1. Remove nine rivets (6) and front mat retainer (5) from mat (1) and floor (4).
2. Remove nine rivets (3), rear mat retainer (2), and floor mat (1) from floor (4).

b. Installation

1. Install floor mat (1) and front mat retainer (5) on floor (4) with nine rivets (6).
2. Install rear mat retainer (2) on floor (4) with nine rivets (3).



FOLLOW-ON TASK: Raise rear steps (TM 9-2320-280-10).

11-154. FRONT FLOORBOARD REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M996, M996A1, M997, M997A1, M997A2,
M998, M998A1, M1038, M1038A1

Manual References

TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

NOTE

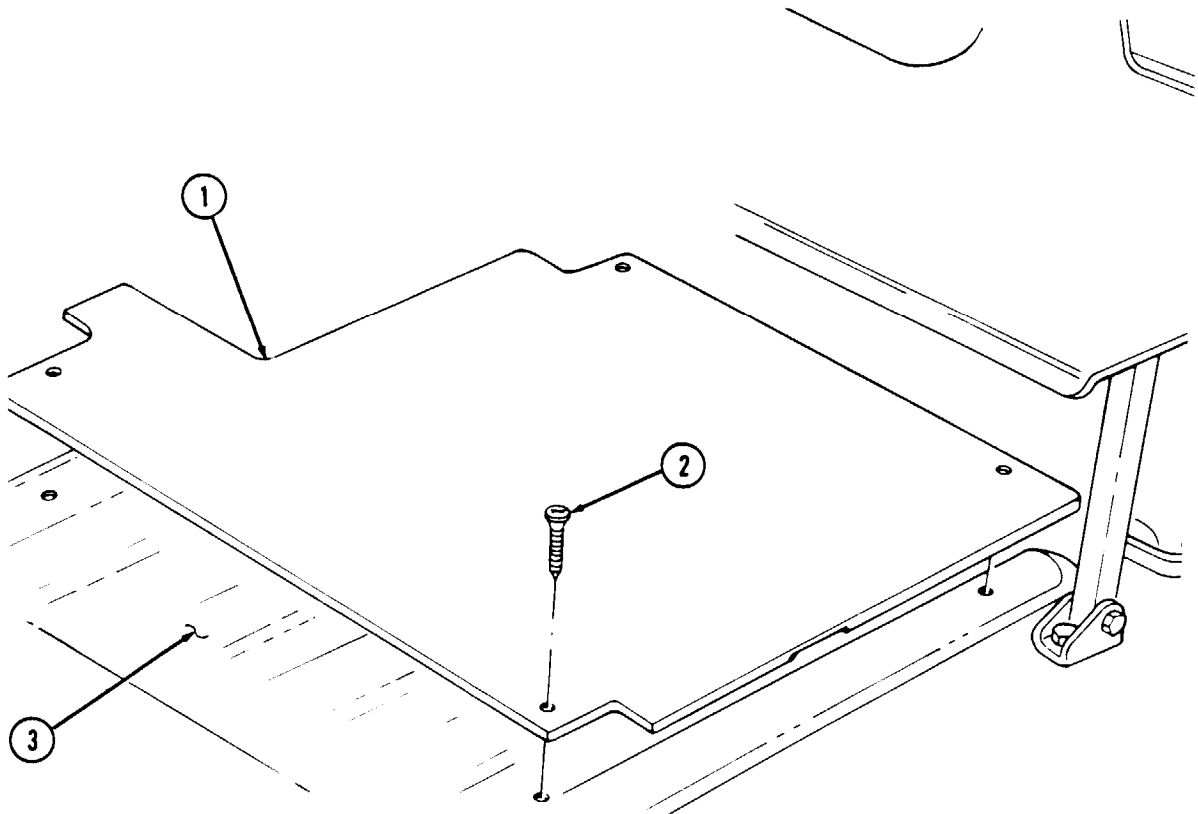
The procedure to remove and install the front and rear floorboards are basically the same. The following procedure is for the front floorboard.

a. Removal

Remove four screws (2) and floorboard (1) from floor (3).

b. Installation

Install floorboard (1) on floor (3) with four screws (2).



11-155. BULKHEAD DOOR REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M996, M996A1, M997, M997A1, M997A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Twenty blind rivets (Appendix G, Item 237)
Twenty-four blind rivets (Appendix G, Item 257)
Twelve blind rivets (Appendix G, Item 243)
Fourteen blind rivets (Appendix G, Item 250)
Twenty blind rivets (Appendix G, Item 244)

Manual References

TM 9-2320-280-24P

NOTE

- For instructions on replacement of rivets, refer to para. 10-66.
- M996, M996A1, M997, M997A1, and M997A2 bulkhead doors are replaced basically the same, except for the following:
 - Forty-eight rivets are used to mount M996 and M996A1 bulkhead doors to bulkhead.
 - Ten rivets are used to mount M996 and M996A1 door retainer to door.
 - Bulkhead door striker placement is different for M996, M996A1, M997, M997A1, and M997A2 ambulances.
- This procedure covers M997, M997A1, and M997A2 bulkhead door replacement.

a. Removal

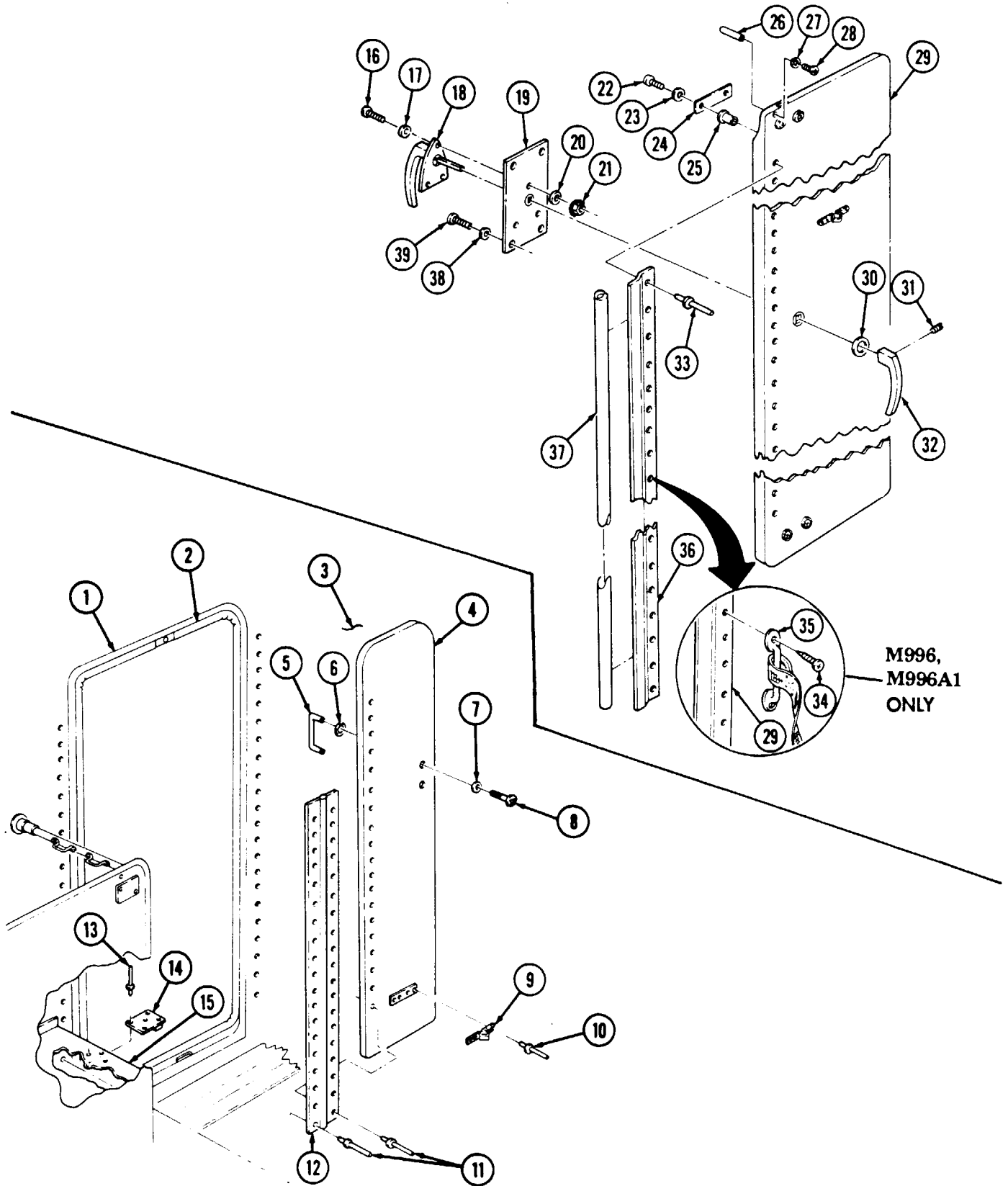
1. Starting at top of door opening (1), pry seal (2) from around door opening (1) and remove seal (2).
2. Pry seal (37) from right door retainer (36) and remove seal (37).

NOTE

Step 3 applies to M996 and M996A1 vehicles only.

3. Remove two screws (34) from strap assembly (35) and right door (29).
4. Remove thirty-four rivets (11), two hinges (12), and doors (4) and (29) from body (3).
5. Remove thirty-four rivets (11) and two hinges (12) from doors (4) and (29).
6. Remove two screws (8), doughnut washers (7), handle (5), and doughnut washers (6) from left door (4).
7. Remove eight rivets (10) and two strikers (9) from doors (4) and (29).
8. Remove fourteen rivets (33) and door retainer (36) from right door (29).
9. Remove four screws (22), washers (23), two rod guide cover plates (24), and plusnuts (25) from right door (29).
10. Remove screw (28), washer (27), and blackout switch pin (26) from right door (29).
11. Remove setscrew (31), handle (32), and washer (30) from right door (29).
12. Remove four screws (39), washers (38), and handle cover plate (19) from right door (29).
13. Remove three nuts (21), washers (20), screws (16), washers (17), and handle (18) from cover plate (19).
14. Remove four rivets (13) and two catch assemblies (14) from stowage shelves (15).

11-155. BULKHEAD DOOR REPLACEMENT (Cont'd)



11-155. BULKHEAD DOOR REPLACEMENT (Cont'd)

b. Installation

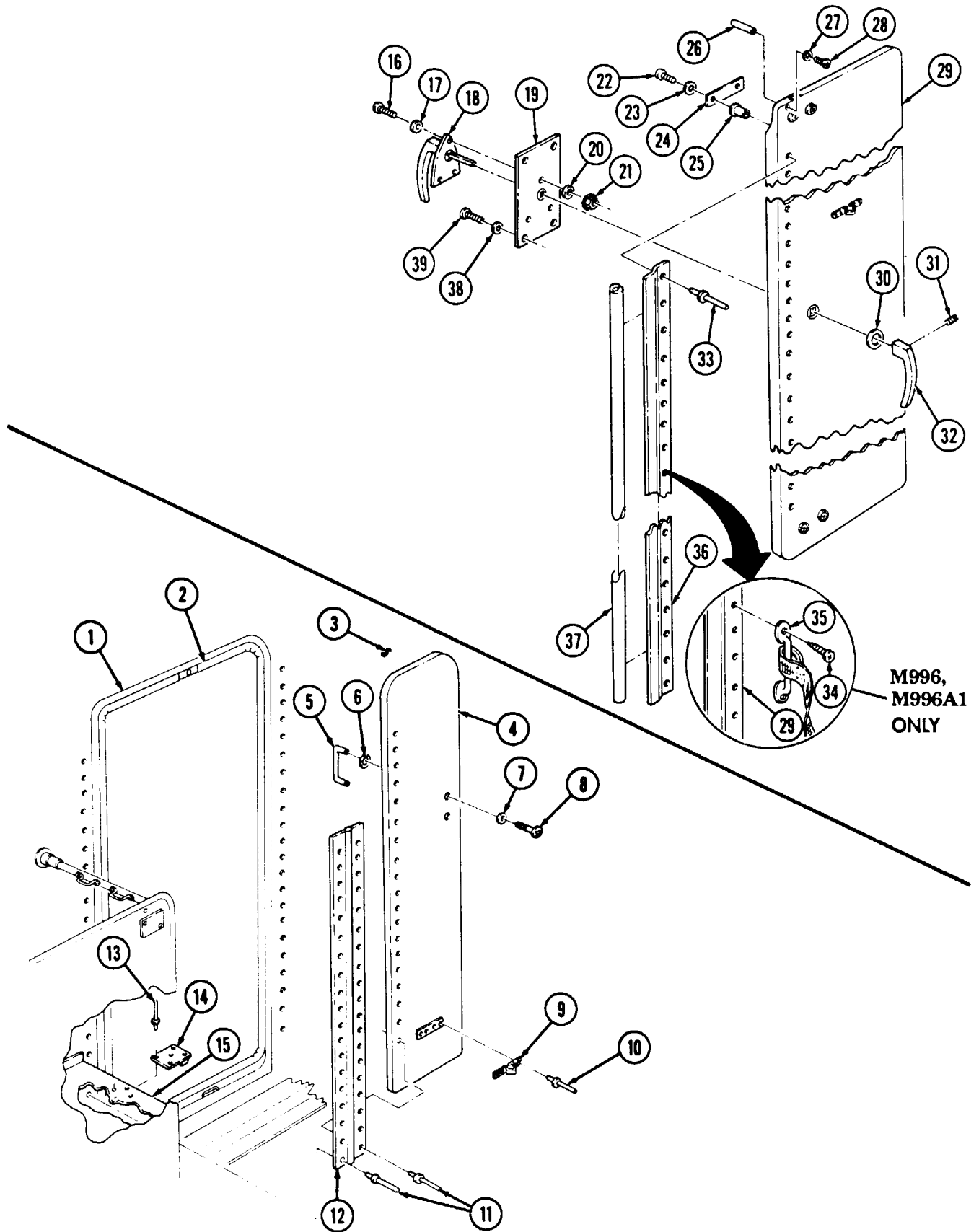
1. Install handle (18) on handle cover plate (19) with three washers (17), screws (16), washers (20), and nuts (21).
2. Install handle cover plate (19) on right door (29) with four washers (38) and screws (39).
3. Install washer (30) and handle (32) on right door (29) with setscrew (31).
4. Install blackout switch pin (26) on right door (29) with washer (27) and screw (28).
5. Install two plusnuts (25) and rod guide cover plates (24) on right door (29) with four washers (23) and screws (22).
6. Install door retainer (36) on right door (29) with fourteen rivets (33).
7. Install two strikers (9) on doors (4) and (29) with eight rivets (10).
8. Install handle (5) and two doughnut washers (6) on left door (4) with two screws (8) and doughnut washers (7).
9. Install two hinges (12) on doors (4) and (29) with thirty-four rivets (11).

NOTE

Step 10 applies to M996 and M996A1 vehicles only.

10. Install strap assembly (35) on right door (29) with two screws (34).
11. Install hinges (12) on body (3) with thirty-four rivets (11).
12. Install two catch assemblies (14) on stowage shelves (15) with four rivets (13).
13. Install seal (37) on right door retainer (36) by pushing into place.
14. Install seal (2) by starting at top of door opening (1) and pushing seal (2) into place around door opening (1).

11-155. BULKHEAD DOOR REPLACEMENT (Cont'd)



11-156. BULKHEAD DOOR LATCH REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M996, M996A1, M997, M997A1, M997A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Twelve blind rivets (Appendix G, Item 243)

Manual References

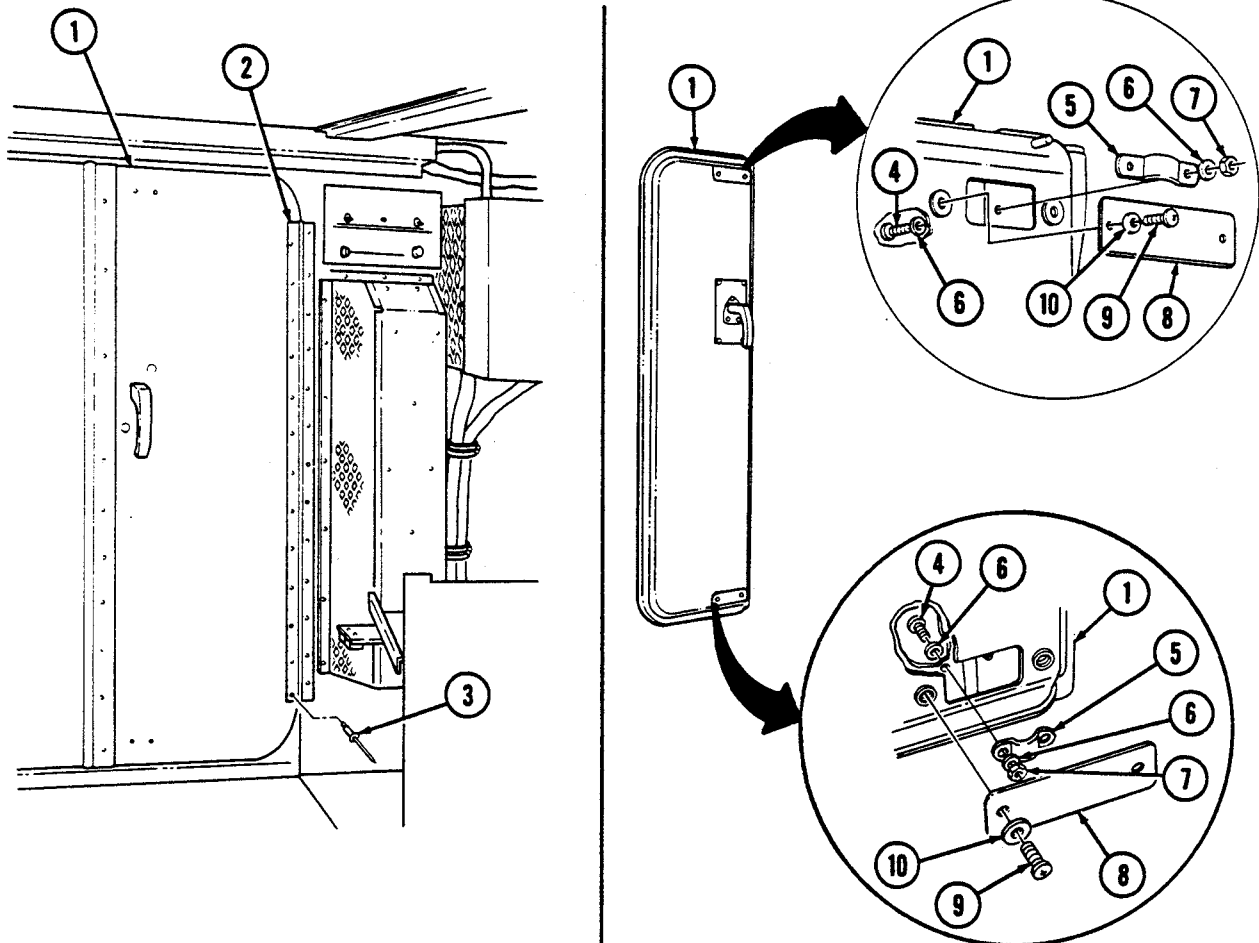
TM 9-2320-280-24P

a. Removal

NOTE

- For instructions on replacement of rivets, refer to para. 10-66.
- Perform step 1 for M996 and M996A1 vehicles.

1. Remove twelve rivets (3) and right bulkhead door (1) from hinge (2).
2. Remove four screws (9), washers (10), and two rod guide cover plates (8) from door (1).
3. Remove four nuts (7), washers (6), screws (4), washers (6), and two rod guides (5) from door (1).



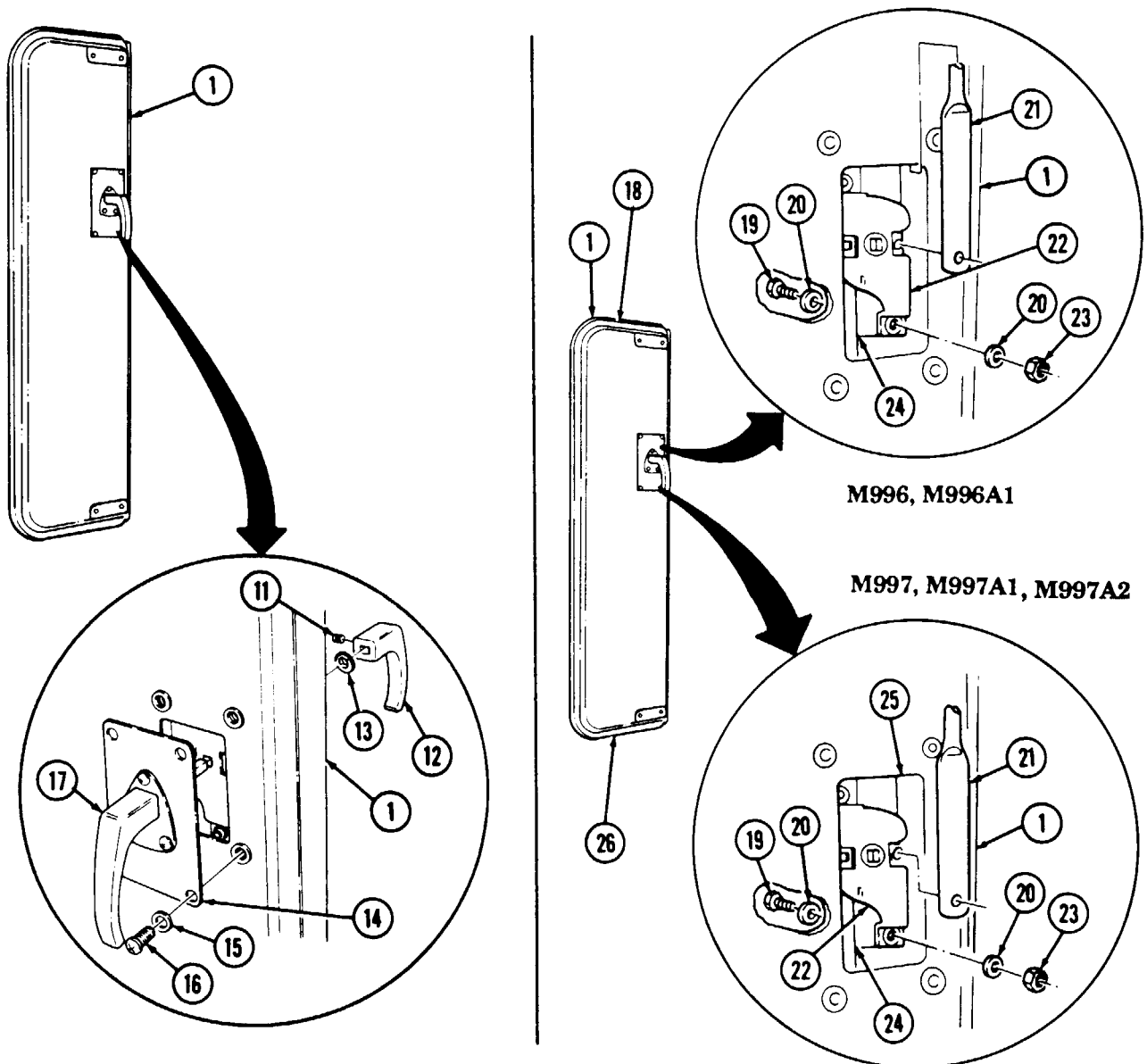
11-156. BULKHEAD DOOR LATCH REPLACEMENT (Cont'd)

4. Remove setscrew (11), handle (12), and washer (13) from door (1).
5. Remove four screws (16), washers (15), cover plate (14), and handle (17) from door (1).
6. Remove four nuts (23), washers (20), screws (19), and washers (20) from latch assembly (22) and door (1).
7. Rotate latch assembly (22) to horizontal position and disconnect rods (21) and (24), then remove latch assembly (22).

NOTE

Perform step 8 for M996 and M996A1 vehicles. Perform step 9 for M997, M997A1, and M997A2 vehicles.

8. Remove upper rod (21) through rod opening (18) at top of door (1), and lower rod (24) through rod opening (26) at bottom of door (1).
9. Remove upper rod (21) and lower rod (24) through latch opening (25) in door (1),



11-156. BULKHEAD DOOR LATCH REPLACEMENT (Cont'd)

b. Installation

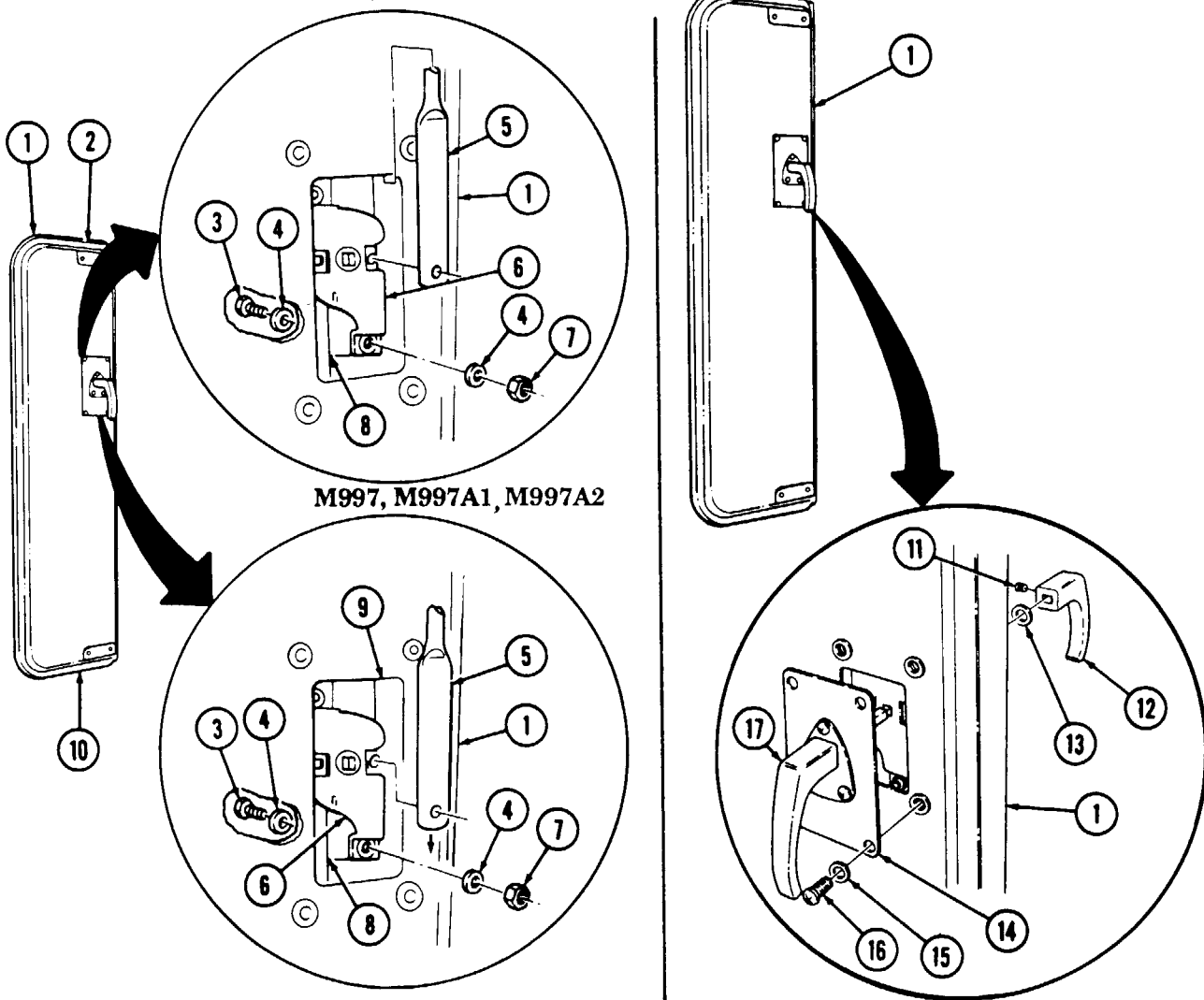
NOTE

Perform step 1 for M996 and M996A1 vehicles. Perform step 2 for M997, M997A1, and M997A2 vehicles.

1. Install upper rod (5) through rod opening (2) at top of bulkhead door (1), and lower rod (8) through rod opening (10) at bottom of door (1).
2. Install upper rod (5) and lower rod (8) through latch opening (9) in door (1).
3. Install latch assembly (6) through latch opening in door (1), rotate latch assembly (6) to a horizontal position, and connect rods (5) and (8) to latch assembly (6).
4. Rotate latch assembly (6) to a vertical position and install two washers (4), screws (3), washers (4), and nuts (7).
5. Install cover plate (14) and handle (17) on door (1) with four washers (15) and screws (16).
6. Install washer (13) and handle (12), on handle (17) with setscrew (11).

M996, M996A1

M997, M997A1, M997A2



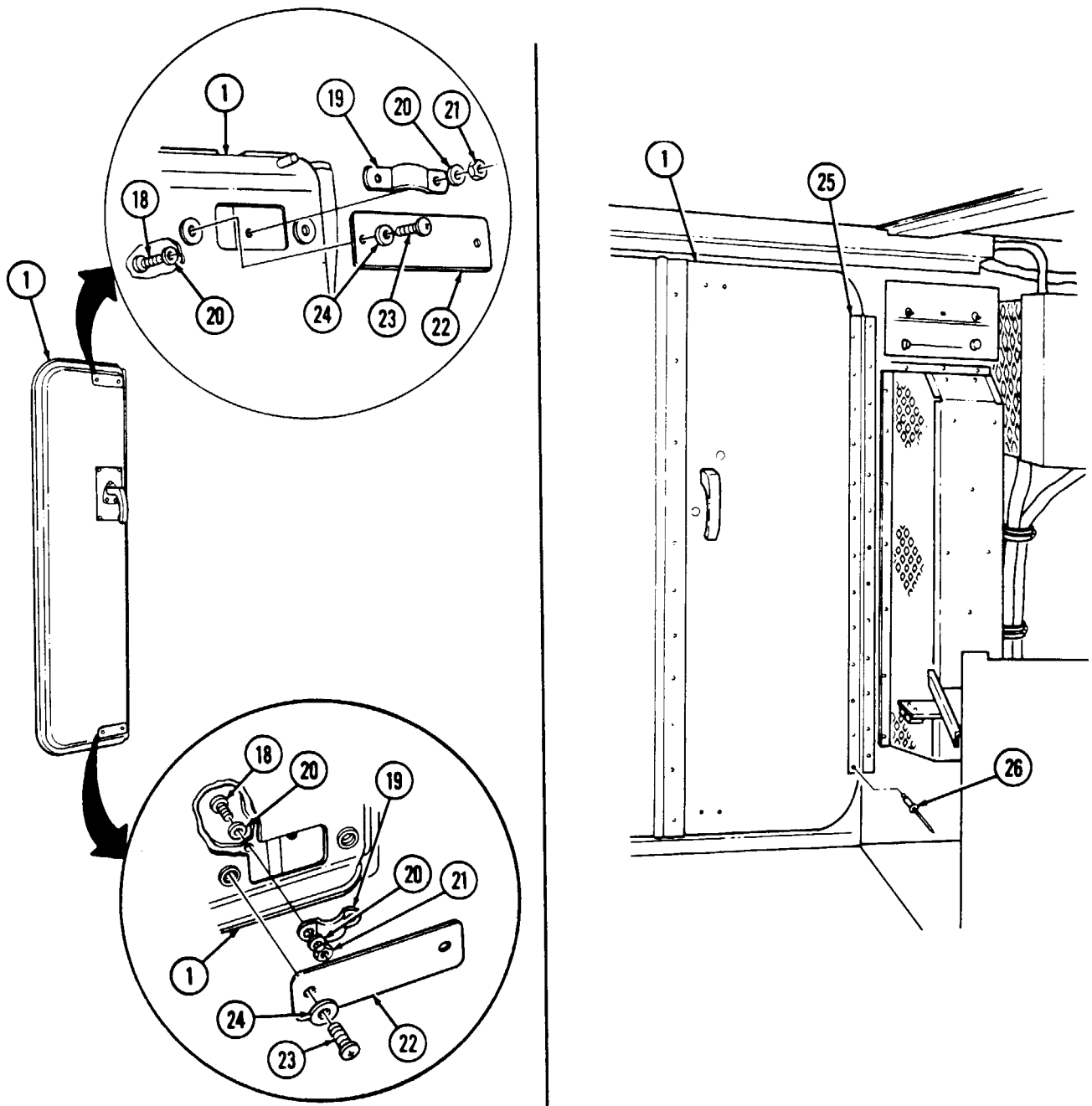
11-156. BULKHEAD DOOR LATCH REPLACEMENT (Cont'd)

7. Install two rod guides (19) on door (1) with four washers (20), screws (18), washers (20), and nuts (21).
8. Install two rod guide cover plates (22) on door (1) with four washers (24) and screws (23).

NOTE

Perform step 9 for M996 and M996A1 vehicles.

9. Install door (1) on hinge (25) with twelve rivets (26).



11-157. ATTENDANT SEAT MAINTENANCE

This task covers:

- | | |
|---|---|
| <p>a. Removal</p> <p>b. Disassembly</p> | <p>c. Assembly</p> <p>d. Installation</p> |
|---|---|

INITIAL SETUP:

Applicable Models

M996, M996A1, M997, M997A1, M997A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Two cotter pins (Appendix G, Item 24)
Two locknuts (Appendix G, Item 93)

Manual References

TM 9-2320-280-24P

a. Removal

NOTE

- The attendant seat assemblies are similar for M996, M996A1, M997, M997A1, and M997A2 ambulances with the following exceptions:
 - The M996 and M996A1 ambulance attendant seat must be removed from forward ends of attendant seat rails.
 - The M997, M997A1, and M997A2 ambulance attendant seat must be removed from rearward ends of attendant seat rails.

Push seat latch (3) to release locking mechanism and slide seat (1) to end of seat rails (2). Remove seat (1) from rails (2).

b. Disassembly

1. Remove two locknuts (7), capscrews (6), and seatbelt (4) from seat base (8). Discard locknuts (7).
2. Remove socket head screw (15), washer (16), washer (17), handle (18), and nylon washer (11) from seat base (8).
3. Remove two cotter pins (12), washers (14), clevis pins (10), and handle (18) from latch rods (9). Discard cotter pins (12).
4. Disconnect spring (13) from handle (18) and seat base (8) and remove spring (13).
5. Remove four screws (19) and cushion (5) from seat base (8).

c. Assembly

1. Install cushion (5) on seat base (8) with four screws (19).
2. Install latch rods (9) on seat base (8).
3. Connect latch rods (9) to handle (18) with two clevis pins (10), washers (14), and cotter pins (12).
4. Install handle (18) and nylon washer (11) on seat base (8) with washer (17), washer (16), and socket head screw (15).
5. Connect spring (13) to handle (18) and seat base (8).
6. Install seatbelt (4) on seat base (8) with two capscrews (6) and locknuts (7). Tighten locknuts (7) to 60 lb-ft (81 N•m).

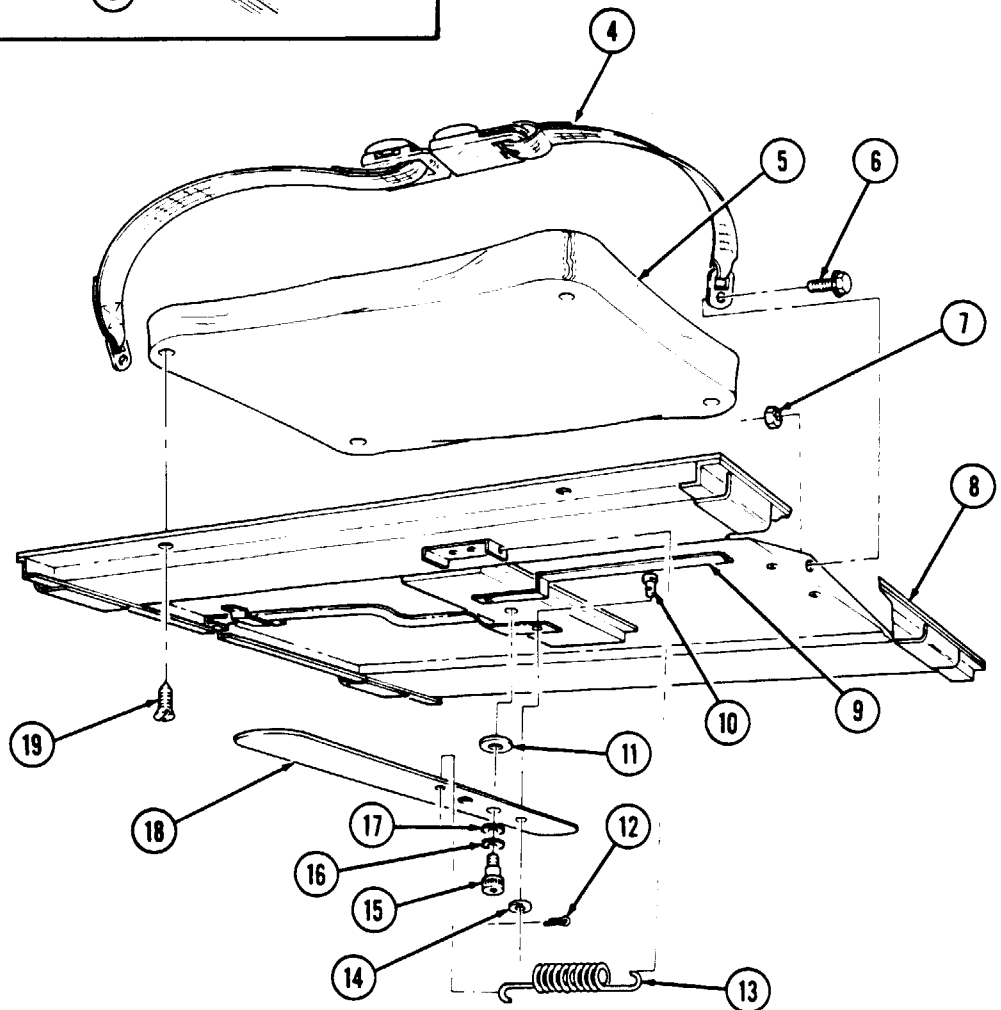
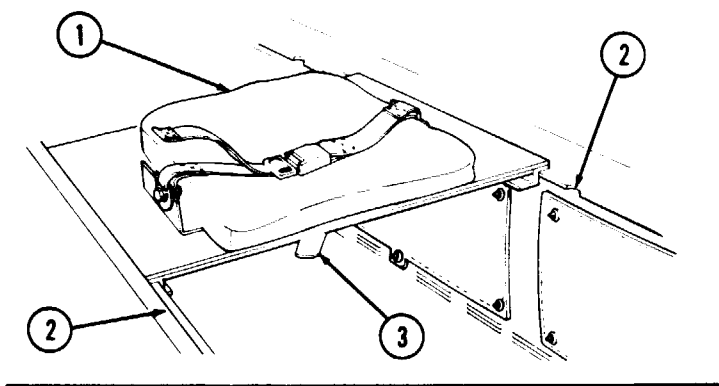
11-157. ATTENDANT SEAT MAINTENANCE (Cont'd)

d. Installation

NOTE

- The M996 and M996A1 ambulance attendant seat must be installed at forward ends of attendant seat rails.
- The M997, M997A1, and M997A2 ambulance attendant seat must be installed at rearward ends of attendant seat rails.

Install seat (1) on ends of seat rails (2) and slide seat (1) onto seat rails (2).



11-158. ATTENDANT SEAT GUIDE RAIL REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M996, M996A1, M997, M997A1, M997A2

Manual References

TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

Attendant seat removed (para. 11-157).

Materials/Parts

Twenty solid rivets (Appendix G, Item 271)

NOTE

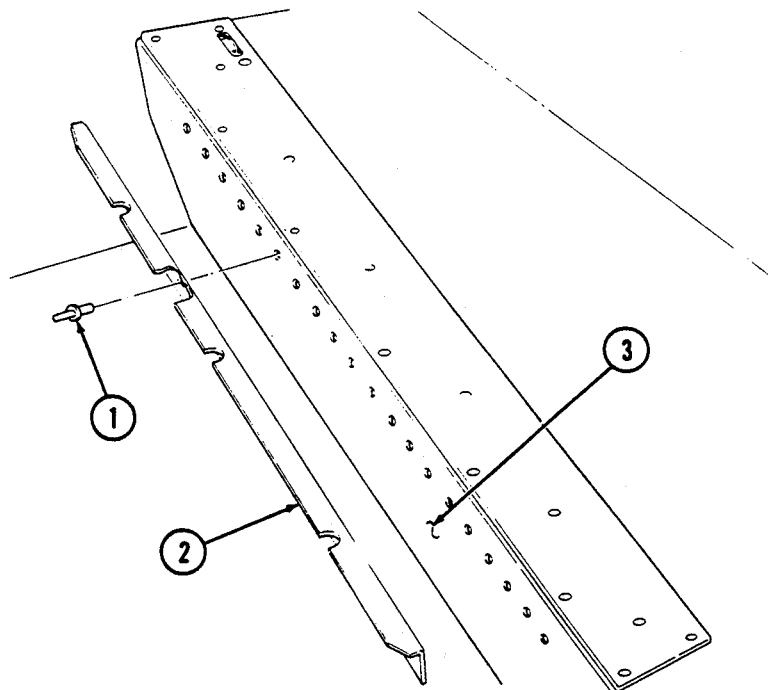
- For instructions on replacement of rivets, refer to para. 10-66.
- The procedures for replacing the left and right attendant seat guide rails are basically the same for M996, M996A1, M997, M997A1, and M997A2 ambulances. This procedure covers replacement of the left attendant seat guide rail on M997, M997A1, and M997A2 ambulance.
- M996 and M996A1 have seventeen rivets securing guide rail.

a. Removal

Remove twenty rivets (1) and guide rail (2) from ambulance body (3).

b. Installation

Install guide rail (2) on ambulance body (3) with twenty rivets (1).



FOLLOW-ON TASK: Install attendant seat (para. 11-157).

11-159. LITTER STOWAGE DOOR REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M996, M996A1, M997, M997A1, M997A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Seven blind rivets (Appendix G, Item 251)
Seven blind rivets (Appendix G, Item 250)

Manual References

TM 9-2320-280-24P

NOTE

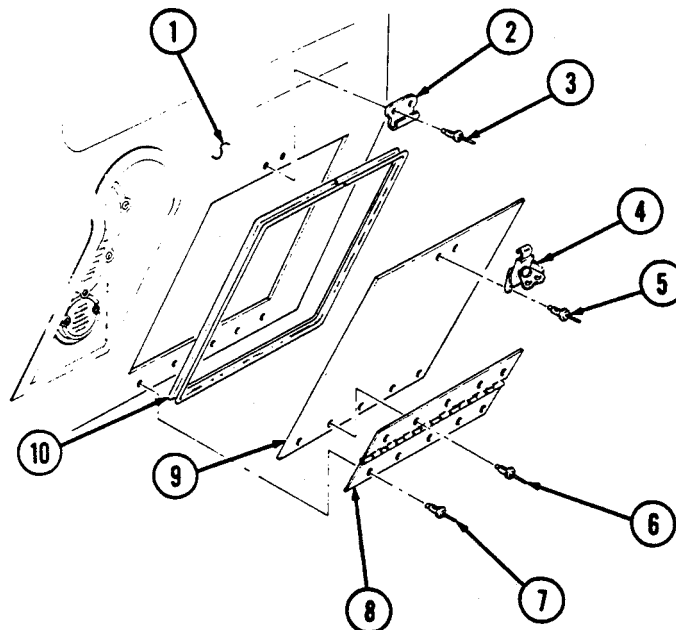
For instructions on replacement of rivets, refer to para. 10-66.

a. Removal

1. Remove five rivets (6) and door (9) from hinge (8).
2. Remove two rivets (5) and latch (4) from door (9).
3. Remove five rivets (7) and hinge (8) from body (1).
4. Remove two rivets (3) and catch (2) from body (1).
5. Remove seal (10), if damaged, from body (1).

b. Installation

1. Install seal (10), if removed, on body (1).
2. Install catch (2) on body (1) with two rivets (3).
3. Install hinge (8) on body (1) with five rivets (7).
4. Install latch (4) on door (9) with two rivets (5).
5. Install door (9) on hinge (8) with five rivets (6).



11-160. LITTER STOWAGE TRAY SUPPORT AND STRAP REPLACEMENT

This task covers:

- | | |
|---|---|
| <ul style="list-style-type: none"> a. Leg Removal b. Leg Installation | <ul style="list-style-type: none"> c. Straps Removal d. Straps Installation |
|---|---|

INITIAL SETUP:

Applicable Models

M996, M996A1, M997, M997A1, M997A2

Manual References

TM 9-2320-280-10
 TM 9-2320-280-24P

Tools

General mechanic's tool kit:
 automotive (Appendix B, Item 1)

Equipment Condition

Litter stowage door opened (TM 9-2320-280-10).

Materials/Parts

Four blind rivets (Appendix G, Item 257)

NOTE

Steps a. and b. apply to M997, M997A1, and M997A2 vehicles only.

a. Leg Removal

1. Remove spring (5) from litter tray support (3) and litter tray (2).

NOTE

For instruction on replacement of rivets, refer to para. 10-66.

2. Remove four rivets (1), two brackets (4), and litter tray support (3) from litter tray (2).

b. Leg Installation

1. Install litter tray support (3) and two brackets (4) on litter tray (2) with four rivets (1).
2. Install spring (5) on litter tray (2) and support (3).

NOTE

Steps c. and d. apply to M996 and M996A1 vehicles only.

c. Straps Removal

Remove two screws (7), footman loop (9), and straps (8) from body (6).

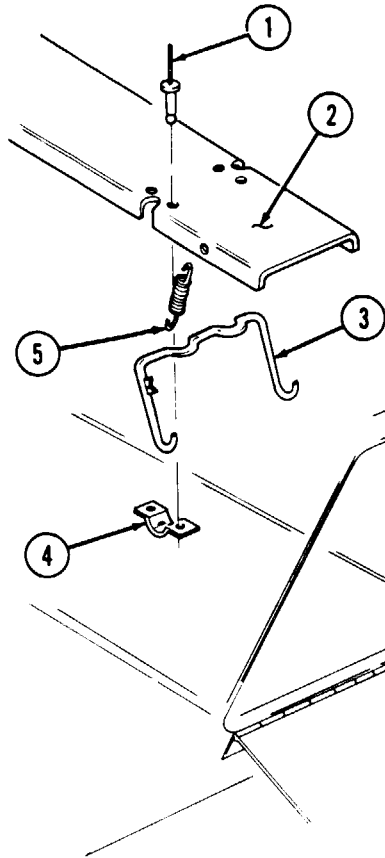
NOTE

If rivnuts are damaged, refer to para. 10-66 for replacement.

d. Straps Installation

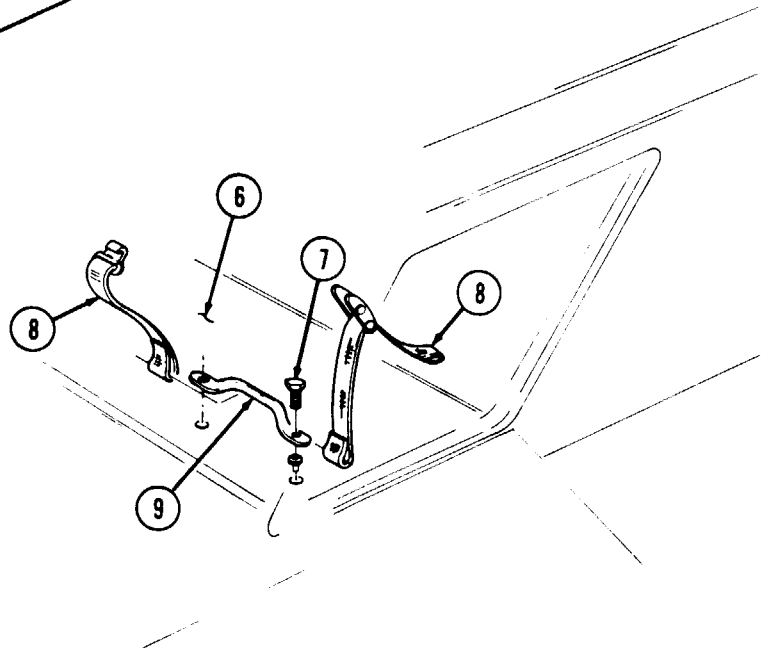
Install straps (8) and footman loop (9) on body (6) with two screws (7).

11-160. LITTER STOWAGE TRAY SUPPORT AND STRAP REPLACEMENT (Cont'd)



M997, M997A1, M997A2

M996, M996A1



FOLLOW-ON TASK: Close litter stowage door (TM 9-2320-280-10).

11-161. LITTER RAIL EXTENSION REPLACEMENT

This task covers:

a. Disassembly

b. Assembly

INITIAL SETUP:

Applicable Models

M996, M996A1, M997, M997A1, M997A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Four locknuts (Appendix G, Item 128)
Eight locknuts (Appendix G, Item 70)
Twenty-two solid rivets (Appendix G, Item 267)
Four solid rivets (Appendix G, Item 268)
Four locknuts (Appendix G, Item 79)
Eight blind rivets (Appendix G, Item 261)
Eight solid rivets (Appendix G, Item 273)

Manual References

TM 9-2321-280-10
TM 9-2320-280-24P

Equipment Condition

Litter rail extension removed from stowage compartment (TM 9-2320-280-10).

NOTE

For instructions on replacement of rivets, refer to para. 10-66.

a. Disassembly

1. Remove two locknuts (18), washers (15), capscrews (14), washers (15), support feet (17), and tubes (16) from support legs (12). Discard locknuts (18).
2. Remove four locknuts (21), washers (22), capscrews (24), washers (22), and strap assembly (23) from two support legs (12). Discard locknuts (21).

NOTE

Note locations of capscrews for installation.

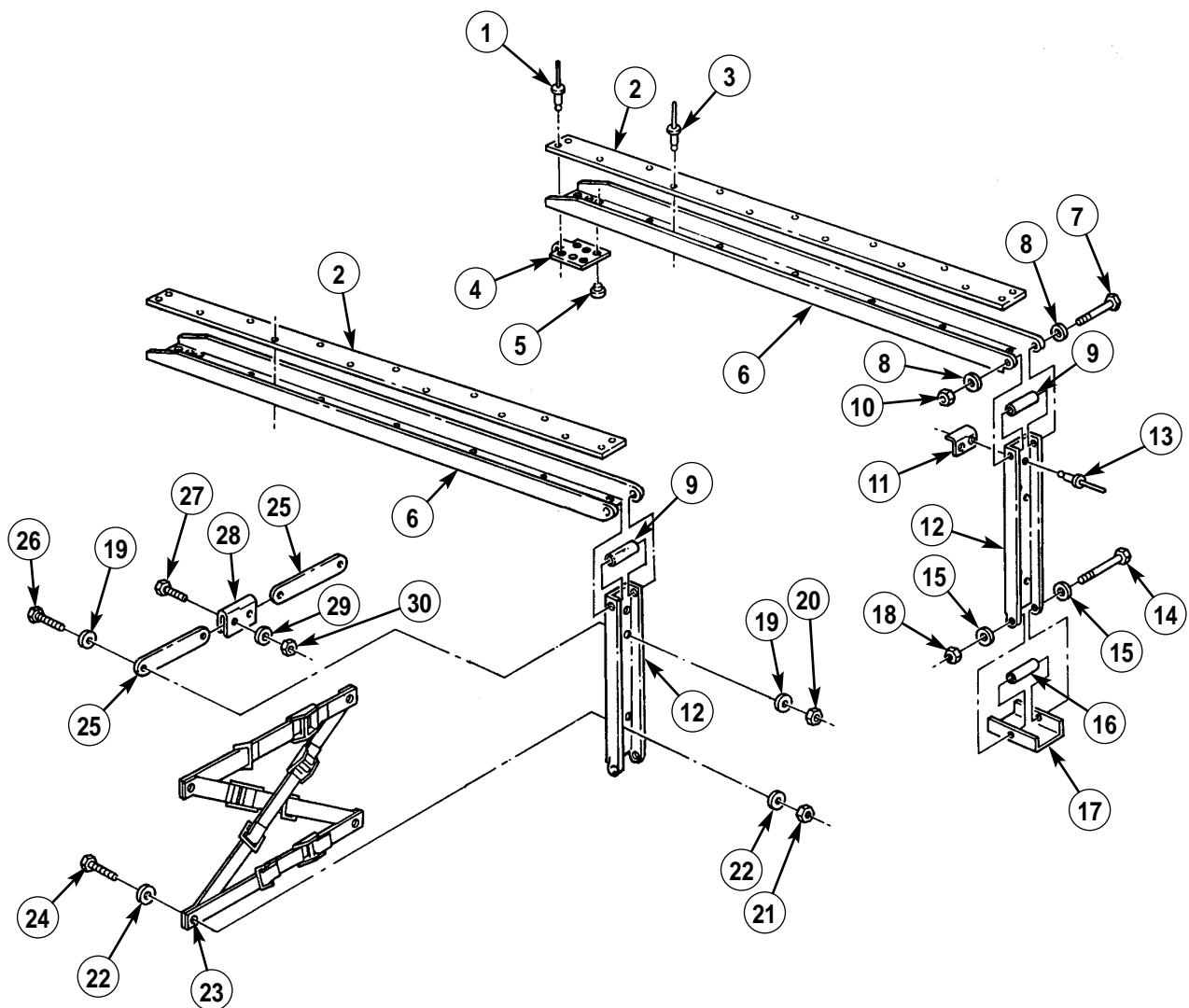
3. Remove four locknuts (20), washers (19), capscrews (26), washers (19), and hinge braces (25) from support legs (12). Discard locknuts (20).
4. Remove four locknuts (30), washers (29), capscrews (27), and two hinges (28) from four hinge braces (25). Discard locknuts (30).
5. Remove two locknuts (10), washers (8), capscrews (7), washers (8), support legs (12), and tubes (9) from rails (6). Discard locknuts (10).
6. Remove four rivets (13) and two leg stops (11) from support legs (12).
7. Remove eight rivets (1) from ends of two extension rail skids (2). Remove twenty-two rivets (3) and two skids (2) from extension rails (6).
8. Remove eight rivets (5) and two hooks (4) from extension rails (6).

b. Assembly

1. Install two hooks (4) and ends of skids (2) on extension rails (6) with eight rivets (5).
2. Install two skids (2) to extension rails (6) and secure to ends with eight rivets (1).
3. Install skids (2) on extension rails (6) with twenty-two rivets (3).
4. Install two leg stops (11) on support legs (12) with four rivets (13).
5. Install two support legs (12) and tubes (9) on rails (6) with two washers (8), capscrews (7), washers (8), and locknuts (10). Tighten locknuts (10) to 6 lb-ft (8 N•m).

11-161. LITTER RAIL EXTENSION REPLACEMENT (Cont'd)

6. Install four hinge braces (25) on two hinges (28) with four capscrews (27), washers (29), and locknuts (30).
7. Install four hinge braces (25) on two support legs (12) with four washers (19), capscrews (26), washers (19), and locknuts (20). Tighten locknuts (20) to 15 lb-ft (20 N•m).
8. Install strap assembly (23) on two support legs (12) with four washers (22), capscrews (24), washers (22), and locknuts (21). Tighten locknuts (21) to 6 lb-ft (8 N•m).
9. Install two support feet (17) and tubes (16) on support legs (12) with two washers (15), capscrews (14), washers (15), and locknuts (18). Tighten locknuts (18) to 6 lb-ft (8 N•m).



FOLLOW-ON TASK: Install litter rail extension in stowage compartment (TM 9-2320-280-10).

11-162. NBC COMPARTMENT DOOR REPLACEMENT (M997, M997A1, M997A2)

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M997, M997A1, M997A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Lockwasher (Appendix G, Item 144)
Eighteen blind rivets (Appendix G, Item 250)

Manual References

TM 9-2320-280-24P

NOTE

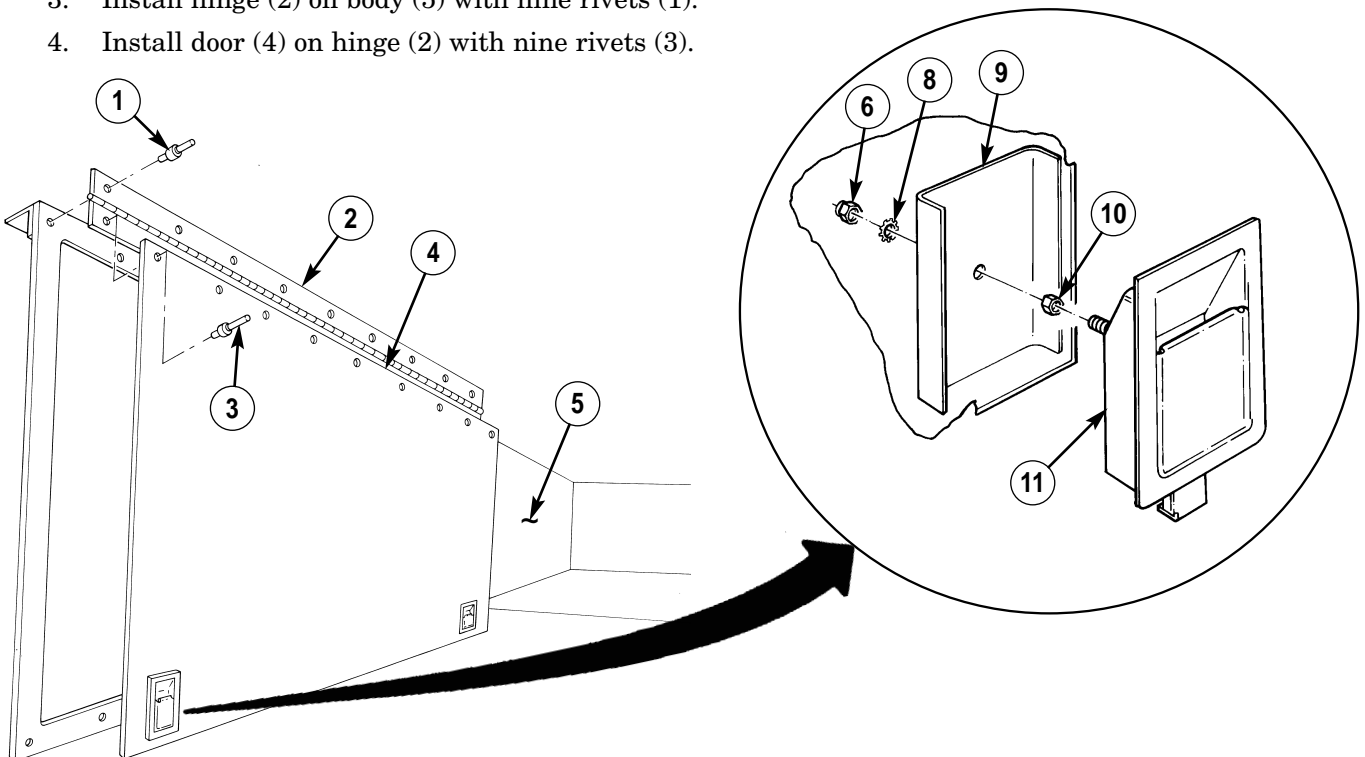
For instructions on replacement of rivets, refer to para. 10-66.

a. Removal

1. Remove nine rivets (3) and door (4) from hinge (2).
2. Remove nine rivets (1) and hinge (2) from body (5).
3. Remove nut (6), lockwasher (8), retainer (9), and paddle lock (11) from door (4). Discard lockwasher (8).
4. Remove jamnut (10) from paddle lock (11).

b. Installation

1. Install jamnut (10) on paddle lock (11).
2. Install paddle lock (11) on door (4) with retainer (9), lockwasher (8), and nut (6).
3. Install hinge (2) on body (5) with nine rivets (1).
4. Install door (4) on hinge (2) with nine rivets (3).



11-163. NBC COMPARTMENT DOOR LATCH REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M997, M997A1, M997A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Four assembled washer screws
(Appendix G, Item 278)

Manual References

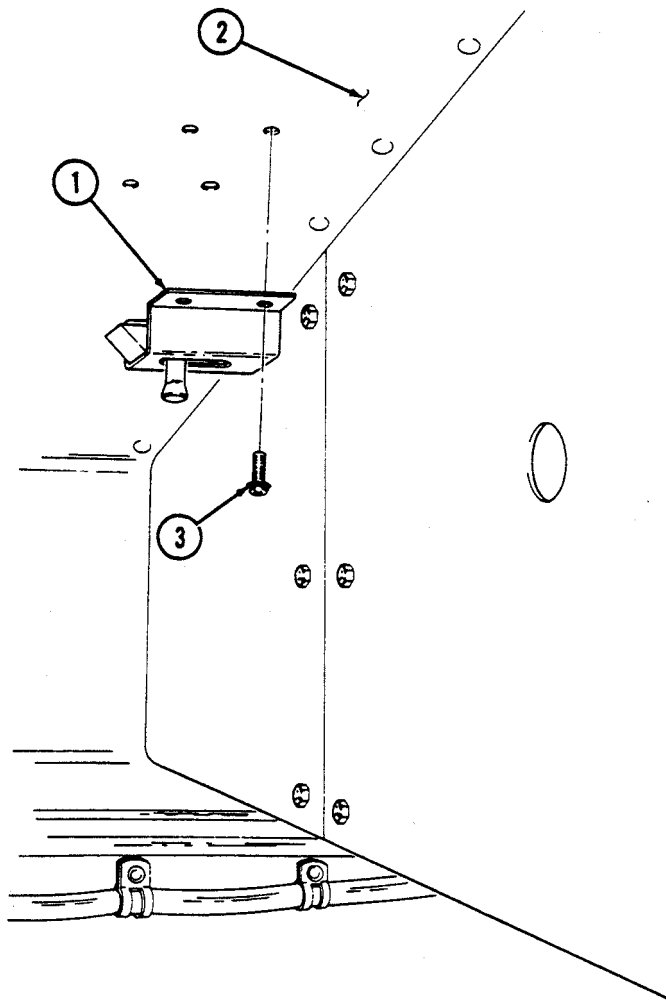
TM 9-2320-280-24P

a. Removal

Remove four assembled washer screws (3) and latch (1) from ceiling (2). Discard assembled washer screws (3).

b. Installation

Install latch (1) on ceiling (2) with four assembled washer screws (3).



11-164. NBC HEATER REPLACEMENT

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP:

Applicable Models

M996, M996A1, M997, M997A1, M997A2

Manual References

TM 9-2320-280-10
 TM 9-2320-280-24P

Tools

General mechanic's tool kit
 automotive (Appendix B, Item 1)

Equipment Condition

Battery ground cable disconnected (para. 4-73).

NOTE

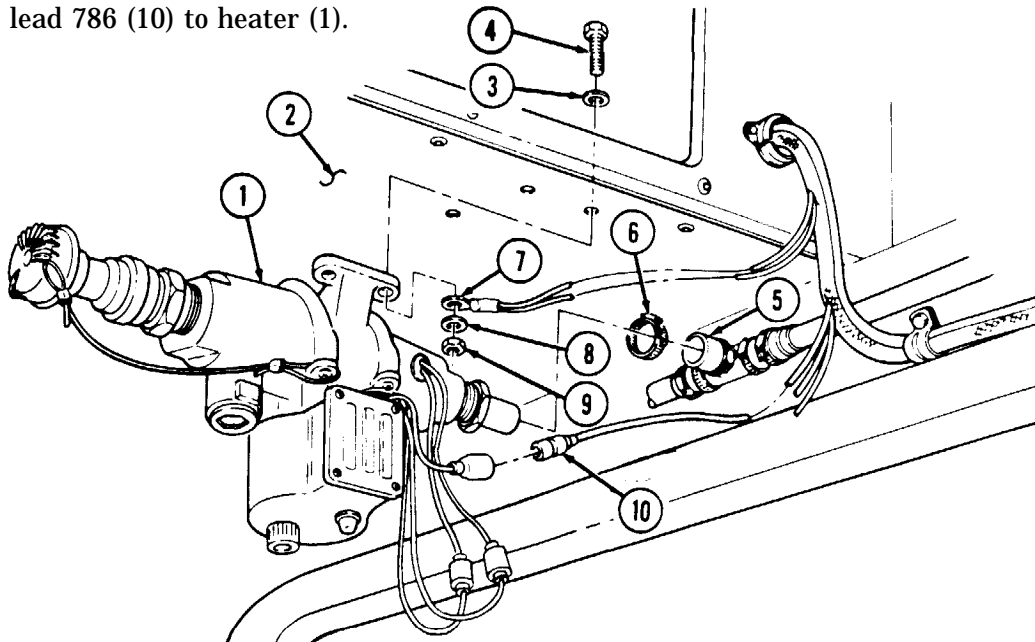
- The procedure for replacing NBC heaters in M996, M996A1, M997, M997A1, and M997A2 ambulances is basically the same. This procedure covers the driver's NBC heater in the M997, M997A1, and M997A2 ambulances.
- Prior to removal, tag all leads for installation.

a. Removal

1. Disconnect lead 786 (10) from heater (1).
2. Loosen clamp (6) on heater (1) and NBC pipe connector (5).
3. Remove four nuts (9), washers (8), capscrews (4), washers (3), heater (1), and ground lead (7) from body (2).

b. Installation

1. Install heater (1) and ground lead (7) on body (2) with four washers (3), capscrews (4), washers (8), and nuts (9).
2. Install NBC pipe connector (5) to heater (1) with clamp (6).
3. Install lead 786 (10) to heater (1).



- FOLLOW-ON TASKS:**
- Check operation of NBC heater (TM 9-2320-280-10).
 - Connect battery ground cable (para. 4-73).

11-165. NBC HEATER BRACKETS REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M997, M997A1, M997A2

Manual References

TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

NBC heaters removed (para. 11-164).

NOTE

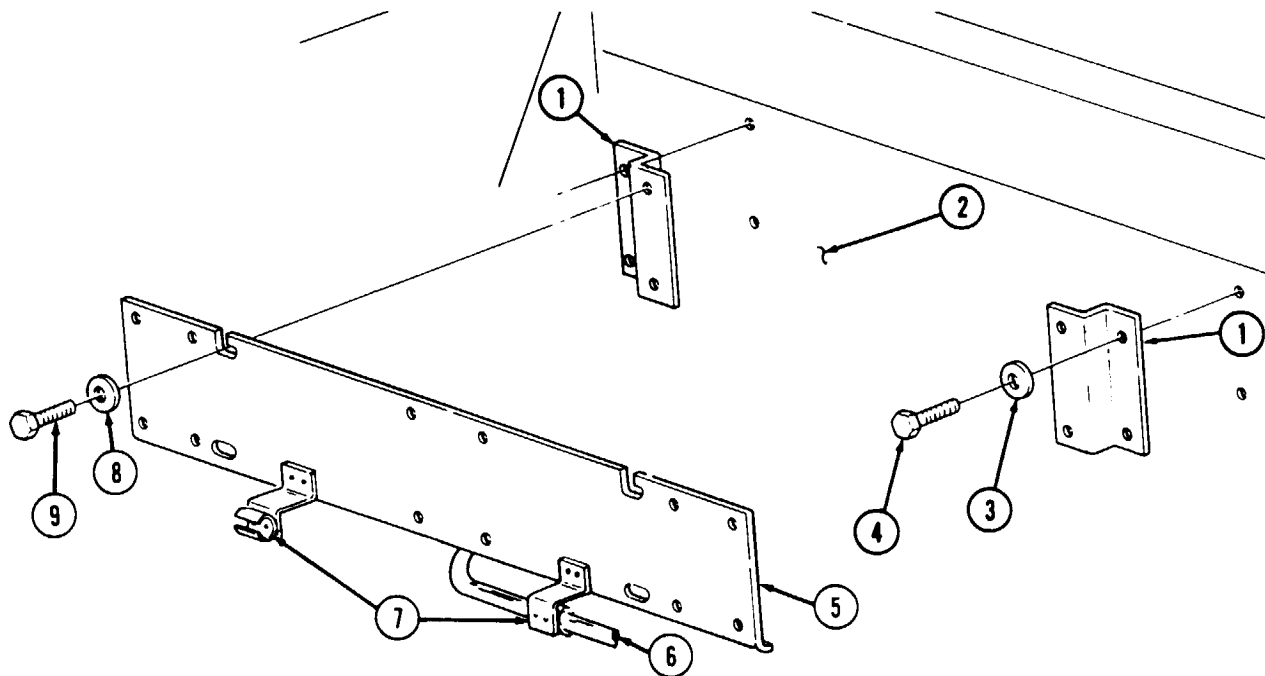
Left and right NBC heater brackets are replaced basically the same. This procedure covers replacement of left heater brackets.

a. Removal

1. Remove NBC piping (6) from two clamps (7).
2. Remove four capscrews (9), washers (8), and NBC heater mounting bracket (5) from bulkhead brackets (1).
3. Remove four capscrews (4), washers (3), and two bulkhead brackets (1) from bulkhead (2).

b. Installation

1. Install two bulkhead brackets (1) on bulkhead (2) with four washers (3) and capscrews (4).
2. Install NBC heater mounting bracket (5) on two bulkhead brackets (1) with four washers (8) and capscrews (9).
3. Install NBC piping (6) in two clamps (7).



FOLLOW-ON TASK: Install NBC heaters (para. 11-164).

11-166. NBC AIR LINE PIPING MAINTENANCE

This task covers:

- | | |
|--------------------------------|-----------------|
| a. Removal | c. Installation |
| b. Air Line Piping Fabrication | |
-

INITIAL SETUP:

Applicable Models

M996, M996A1, M997, M997A1, M997A2

Materials/Parts

Adhesive (Appendix C, Item 6)

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

NOTE

- Replacement and repair for NBC air lines in M996, M996A1, M997, M997A1, and M997A2 ambulances are basically the same. This procedure gives general guidelines for repair or replacement of PVC pipe.
- The PVC pipe used in ambulance NBC air lines is made up of tees, elbows, connectors, and miscellaneous lengths of straight pipe. All of these are connected and sealed with PVC adhesive. Before beginning a repair or replacement procedure, ensure that you have all necessary pipe, connectors, and PVC adhesive.

a. Removal

Remove section of damaged pipe (6). Damaged pipe section (6) will have to be cut from system because pipe joints cannot be separated without damaging components.

b. Air Line Piping Fabrication

1. Cut a section of new pipe (2) 1/16 in. (1.6 mm) smaller than damaged pipe section (6).

NOTE

Perform steps 2 and 3 before applying PVC adhesive.

2. Install two connectors (3) on new pipe section (2).
3. Install connectors (3) and new pipe section (2) on pipe ends (4) to ensure correct fit and then remove connectors (3) and new pipe section (2).

NOTE

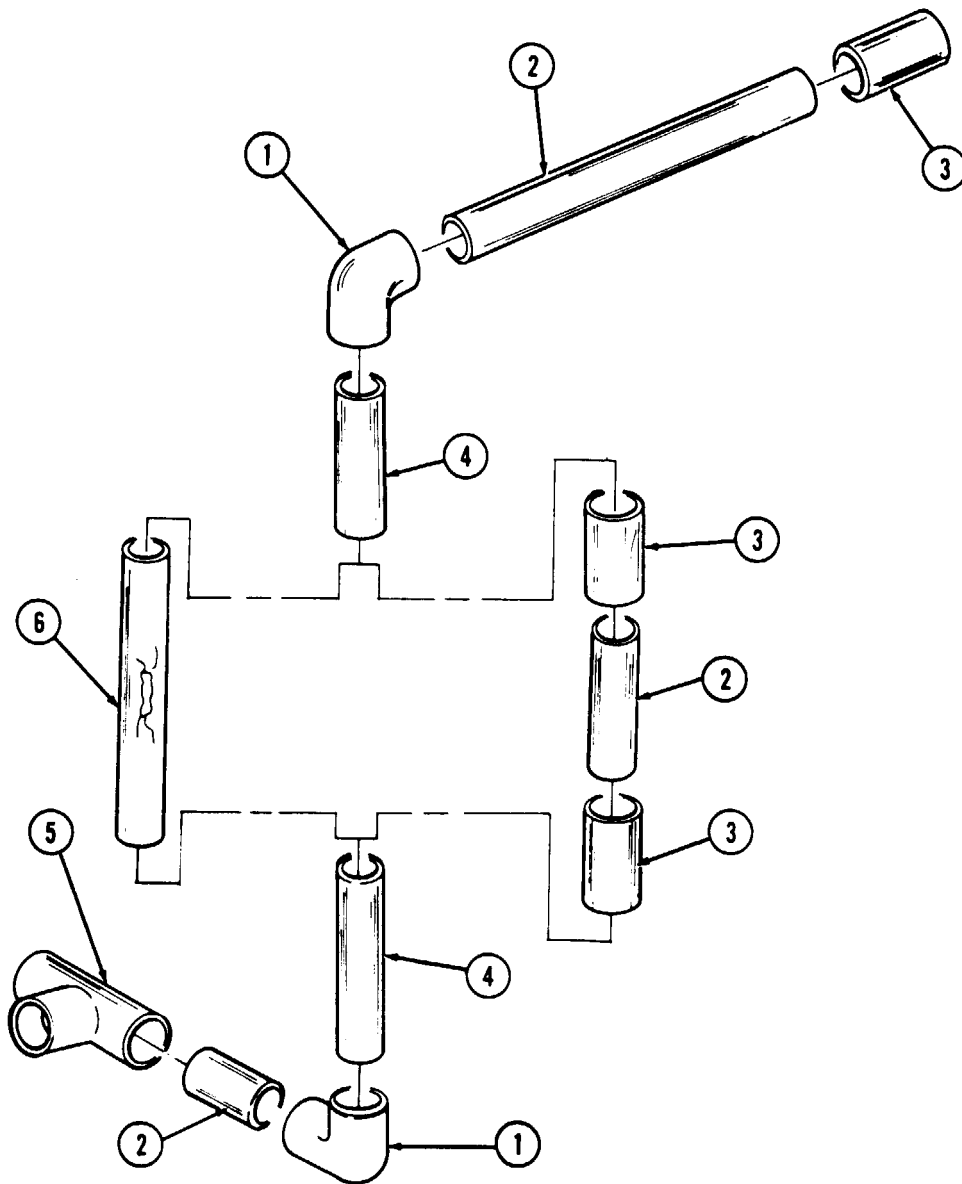
Clean ends of pipe with emery cloth before applying adhesive.

4. Apply PVC adhesive to one end of connectors (3) and both ends of new pipe section (2).
5. Install two connectors (3) with PVC adhesive coated ends inward, to new pipe section (2) and twist components 70-90°. If an elbow (1) or tee (5) is being installed, twist components together 70-90° and then turn components to their proper orientation. Allow PVC adhesive to dry.
6. Apply PVC adhesive to connectors (3) and pipe ends (4).

c. Installation

Install connectors (3) and new pipe section (2) on pipe ends (4) and twist 70-90°. Allow PVC adhesive to dry.

11-166. NBC AIR LINE PIPING MAINTENANCE (Cont'd)



FOLLOW-ON TASK: Operate NBC system and check for leaks (TM 9-2320-280-10).

11-167. NBC GAS FILTER AND BRACKET REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M996, M996A1, M997, M997A1, M997A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Four lockwashers (Appendix G, Item 135)
Four blind rivets (Appendix G, Item 251)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P
FM 3-4
FM 3-5

Equipment Condition

NBC access door opened (TM 9-2320-280-10).

General Safety Instructions

If filter has been used in a nuclear, biological, or chemical (NBC) environment, special precautions must be taken.

WARNING

NBC contaminated filters must be handled and disposed of only by authorized and trained personnel. The unit commander or senior officer in charge of maintenance personnel must ensure that prescribed protective clothing (FM 3-4) is used, and prescribed safety measures and decontamination procedures (FM 3-5) are followed. The local unit SOP is responsible for final disposal of contaminated air filters.

NOTE

- For instructions on replacement of rivets, refer to para. 10-66.
- The procedures for replacing the NBC gas filter and bracket are basically the same for M996, M996A1, M997, M997A1, and M997A2 ambulances. This procedure covers NBC filter and bracket in M997, M997A1, and M997A2 ambulances. The basic differences in M996 and M996A1 ambulances are:
 - PVC air line is replaced by flex tube.
 - Bracket is installed on NBC door and secured with four rivets and eight washers.
- Note direction of gas filter air flow arrow for installation.

a. Removal

1. Loosen two clamps (1) on ends of gas filter (9) and connectors (2).
2. Unhook two latches (8) from bracket (5) on gas filter (9).
3. Remove gas filter (9) from connectors (2) and bracket (5).

NOTE

Perform step 4 for M997, M997A1, and M997A2 vehicles only.

4. Remove four capscrews (7), lockwashers (6), bracket (5), and two spacers (4) from body (3). Discard lockwashers (6).

11-167. NBC GAS FILTER AND BRACKET REPLACEMENT (Cont'd)

NOTE

Perform step 5 for M996 and M996A1 vehicles only.

- Remove four rivets (10), eight washers (11), and bracket (5) from NBC door (12).

b. Installation

NOTE

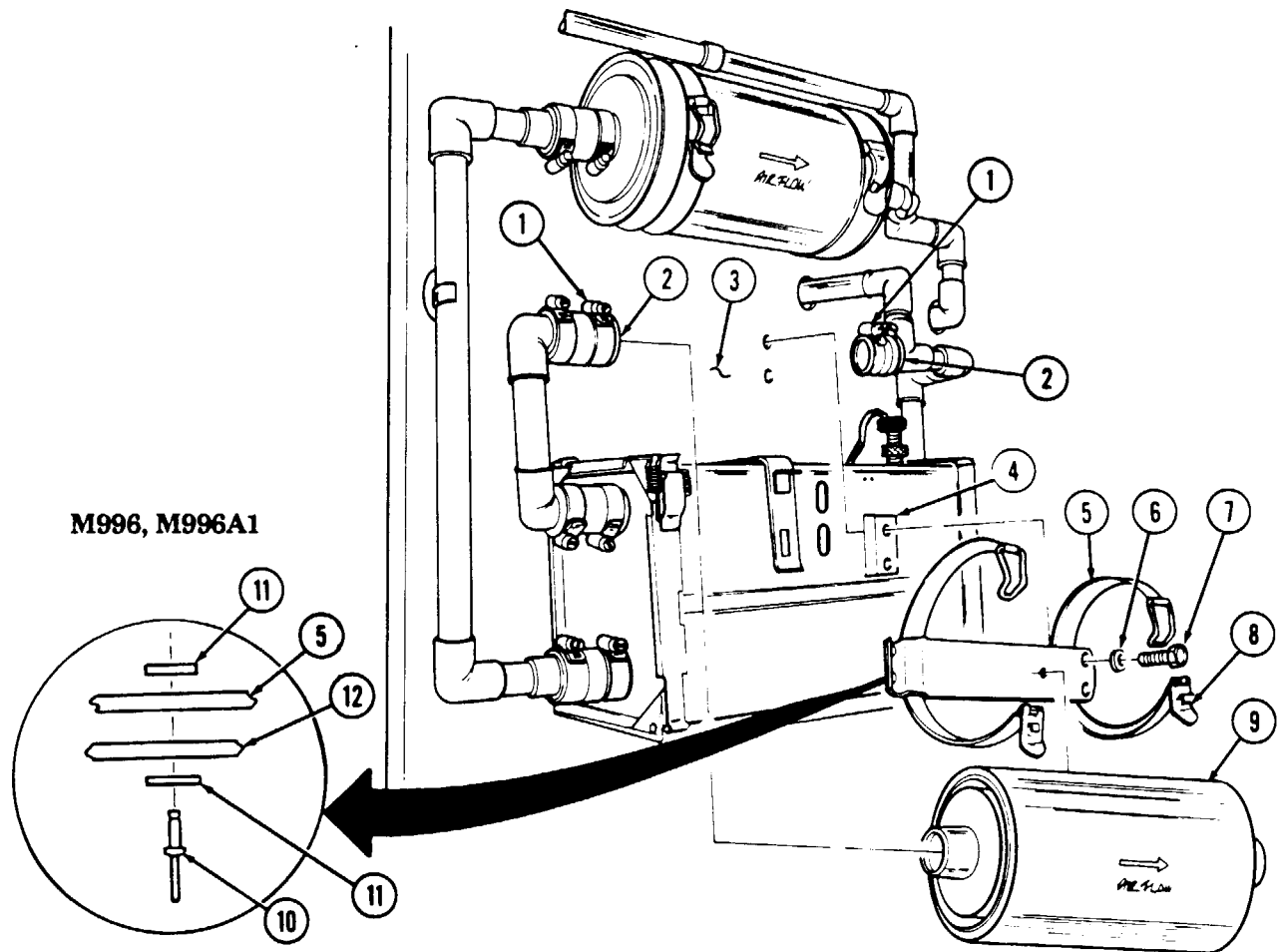
Perform step 1 for M996 and M996A1 vehicles only.

- Install bracket (5) on NBC door (12) with eight washers (11) and four rivets (10).

NOTE

Perform step 2 for M997, M997A1, and M997A2 vehicles only.

- Install two spacers (4) and bracket (5) on body (3) with four lockwashers (6) and capscrews (7).
- Install gas filter (9) on connectors (2) and bracket (5) with latches (8).
- Install ends of gas filter (9) on connectors (2) and tighten two clamps (1).



FOLLOW-ON TASK: Close NBC access door (TM 9-2320-280-10).

11-168. NBC PRECLEANER, PARTICULATE FILTER ASSEMBLY, AND BRACKET REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M996, M996A1, M997, M997A1, M997A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Four lockwashers (Appendix G, Item 181)
Four lockwashers (Appendix G, Item 135)
Four lockwashers (Appendix G, Item 185)
Filter (Appendix G, Item 34)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P
FM 3-4
FM 3-5

Equipment Condition

NBC access door opened (TM 9-2320-280-10).

General Safety Instructions

NBC contaminated filters must be handled and disposed of only by trained personnel.

WARNING

MNBC contaminated filters must be handled and disposed of only by authorized and trained personnel. The unit commander or senior officer in charge of maintenance personnel must ensure that prescribed protective clothing (FM 3-4) is used, and prescribed safety measures and decontamination procedures (FM 3-5) are followed. The local unit SOP is responsible for final disposal of contaminated air filters.

NOTE

The procedures for replacing precleaner and particulate filter and filter assembly and bracket are basically the same for M996, M996A1, M997, M997A1, and M997A2 ambulances. This procedure covers precleaner and particulate filter and bracket in M997, M997A1, and M997A2 ambulances. The basic differences in M996 and M996A1 ambulance are:

- The rigid PVC air line is replaced by flex tube and plastic clamps.
- Bracket is mounted on the floor of the NBC compartment and is secured by four capscrews, washers, lockwashers, and nuts.

a. Removal

1. Disconnect lead and connector (para. 4-101).
2. Loosen two clamps (1) on precleaner and particulate filter assembly (7) and connectors (2).
3. Remove latch (9) and arms (10) on precleaner and particulate filter assembly (7) from bracket (6).
4. Remove precleaner and particulate filter assembly (7) from connectors (2) and bracket (6).

NOTE

Perform step 5 for M997, M997A1, and M997A2 vehicles only.

5. Remove four capscrews (5), lockwashers (4), and bracket (6) from body (3). Discard lockwashers (4).

NOTE

Perform step 6 for M996 and M996A1 vehicles only.

6. Remove four nuts (11), lockwashers (12), capscrews (14), washers (13), and bracket (6) from floor (15) of NBC compartment. Discard lockwashers (12).
7. For shipping or decontamination purposes, slide clip (8) over intake holes in precleaner and particulate filter assembly (7).

11-168. NBC PRECLEANED, PARTICULATE FILTER ASSEMBLY, AND BRACKET REPLACEMENT (Cont'd)

8. Remove four screws (19), lockwashers (20), and manifold (16) from housing (18). Discard lockwashers (20).
9. Remove filter (17) from filter housing (18).

b. Installation

NOTE

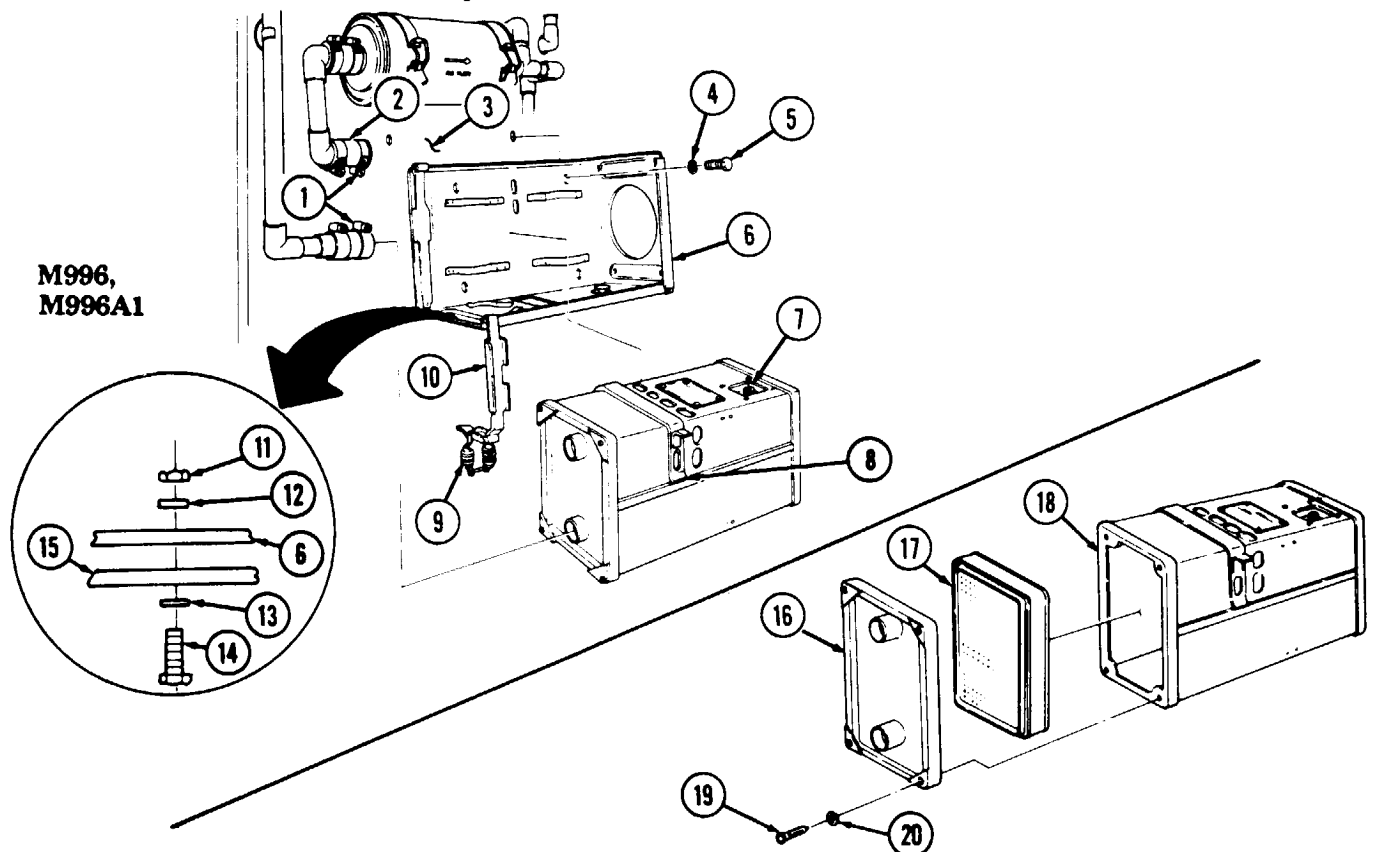
Perform step 1 for M997, M997A1, and M997A2 vehicles only.

1. Install bracket (6) on body (3) with four lockwashers (4) and capscrews (5).

NOTE

Perform step 2 for M996 and M996A1 vehicles only.

2. Install bracket (6) on floor (15) of NBC compartment with four washers (13), capscrews (14), lockwashers (12), and nuts (11).
3. Install filter (17) into filter housing (18).
4. Install manifold (16) on filter housing (18) with four lockwashers (20) and screws (19).
5. Slide clip (8) away from air intake holes in precleaned and particulate filter assembly (7).
6. Install precleaned and particulate filter assembly (7) on connectors (2) and bracket (6) with arms (10) and latch (9).
7. Tighten two clamps (1) on precleaned and particulate assembly (7) and connectors (2).
8. Connect lead and connector (para. 4-101).



FOLLOW-ON TASK: Close NBC access door (TM 9-2320-280-10).

11-169. INTERCOM AND BRACKETS REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M996, M996A1, M997, M997A1, M997A2

Manual References

TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

a. Removal

1. Disconnect intercom cable (11) from intercom control (10).
2. Remove two nuts (17), washers (16), capscrews (12), washers (13), and intercom control (10) from intercom mounting bracket (6).
3. Disconnect cable (7) from audio amplifier (8).
4. Remove four nuts (3), washers (4), capscrews (9), washers (4), and audio amplifier (8) from intercom mounting bracket (6).
5. Remove two nuts (14), washers (15), capscrews (20), and washers (21) from intercom mounting bracket (6) and radio rack support (5).
6. Remove two nuts (18), washers (19), screws (2), and intercom mounting bracket (6) from radio rack (1).

NOTE

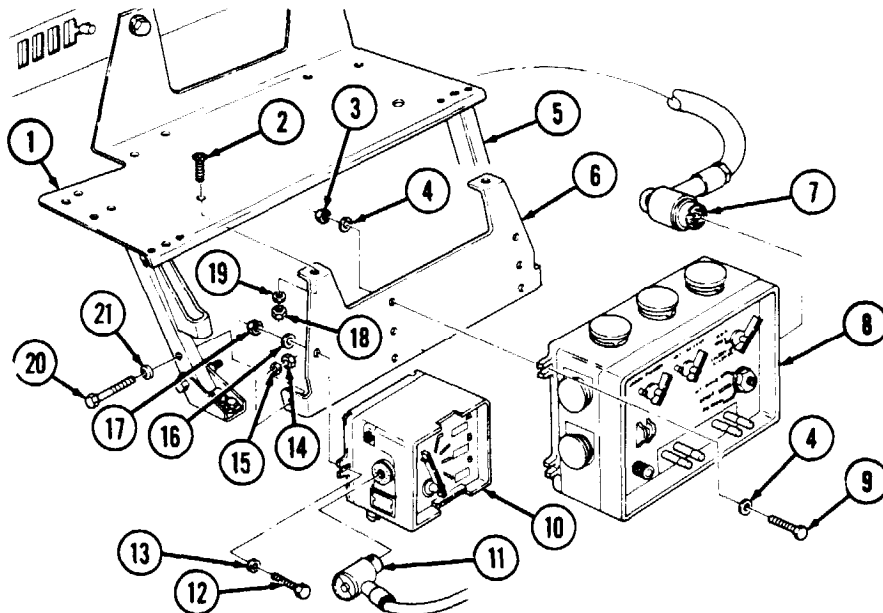
Perform step 7 for M996 and M996A1 vehicles only.

7. Disconnect intercom cable (11) from intercom control (22). Remove two capscrews (24), washers (25), and intercom control (22) from wall (23).

NOTE

Perform step 8 for M997, M997A1, and M997A2 vehicles only.

8. Disconnect intercom cable (11) from intercom control (26). Remove two nuts (29), washers (28), reinforcement bracket (27), two capscrews (32), washers (31), and intercom control (26) from body (30).



11-169. INTERCOM AND BRACKETS REPLACEMENT (Cont'd)

b. Installation

NOTE

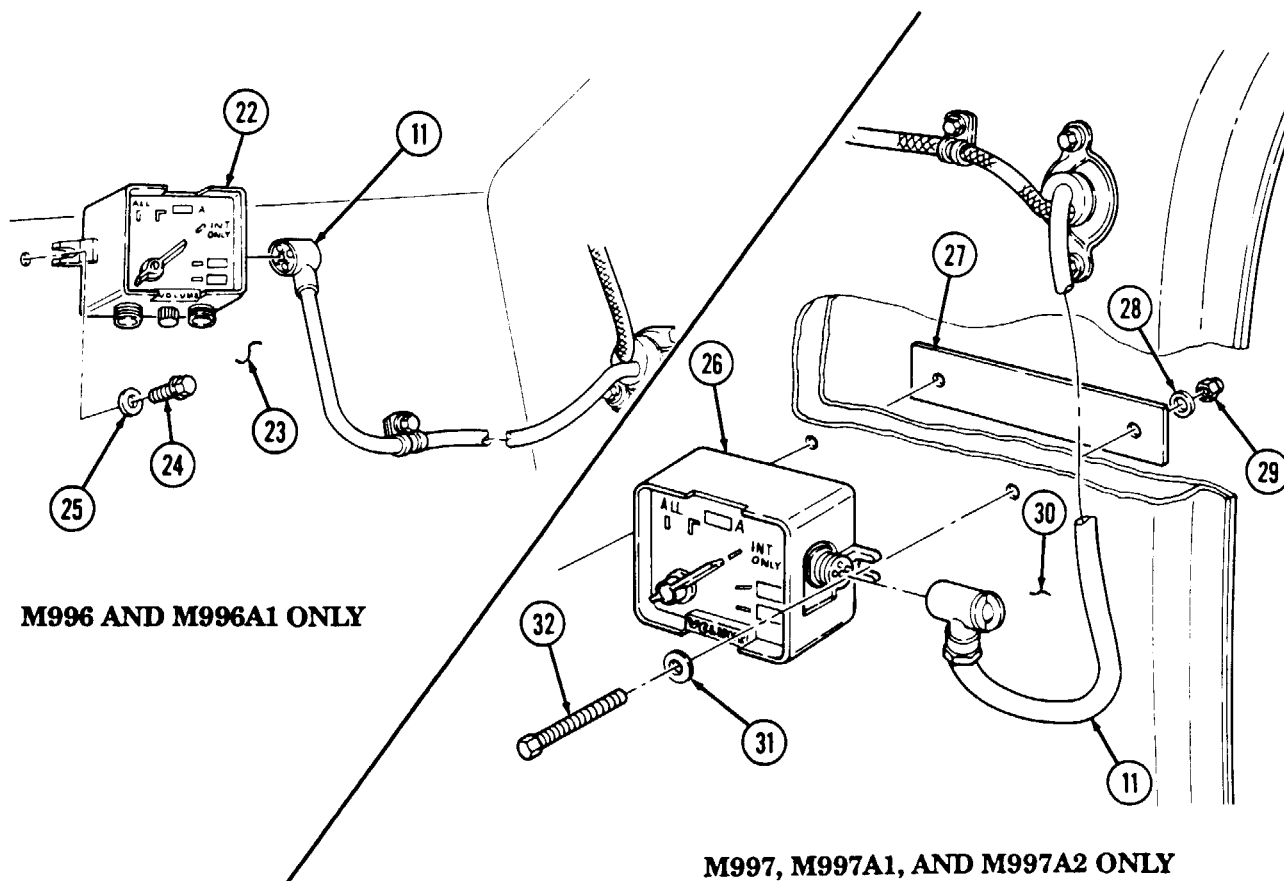
Perform step 1 for M997, M997A1, and M997A2 vehicles only.

1. Install intercom control (26) and reinforcement bracket (27) on body (30) with two washers (31), capscrews (32), washers (28), and nuts (29). Connect intercom cable (11) to intercom control (26).

NOTE

Perform step 2 for M996 and M996A1 vehicles only.

2. Install intercom control (22) on body (23) with two washers (25) and capscrews (24). Connect intercom cable (11) to intercom control (22).
3. Install intercom mounting bracket (6) on radio rack support (5) with two washers (21), capscrews (20), washers (15), and nuts (14).
4. Install intercom mounting bracket (6) on radio rack (1) with two screws (2), washers (19), and nuts (18).
5. Install audio amplifier (8) on intercom mounting bracket (6) with four washers (4), capscrews (9), washers (4), and nuts (3). Connect cable (7) to audio amplifier (8).
6. Install intercom control (10) on intercom mounting bracket (6) with two washers (13), capscrews (12), washers (16), and nuts (17). Connect intercom cable (11) to intercom control (10).



11-170. REAR DRIP RAIL REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M996, M996A1, M997, M997A1, M997A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Sealant (Appendix C, Item 38)
Nine blind rivets (Appendix G, Item 254)

Manual References

TM 9-2320-280-24P

NOTE

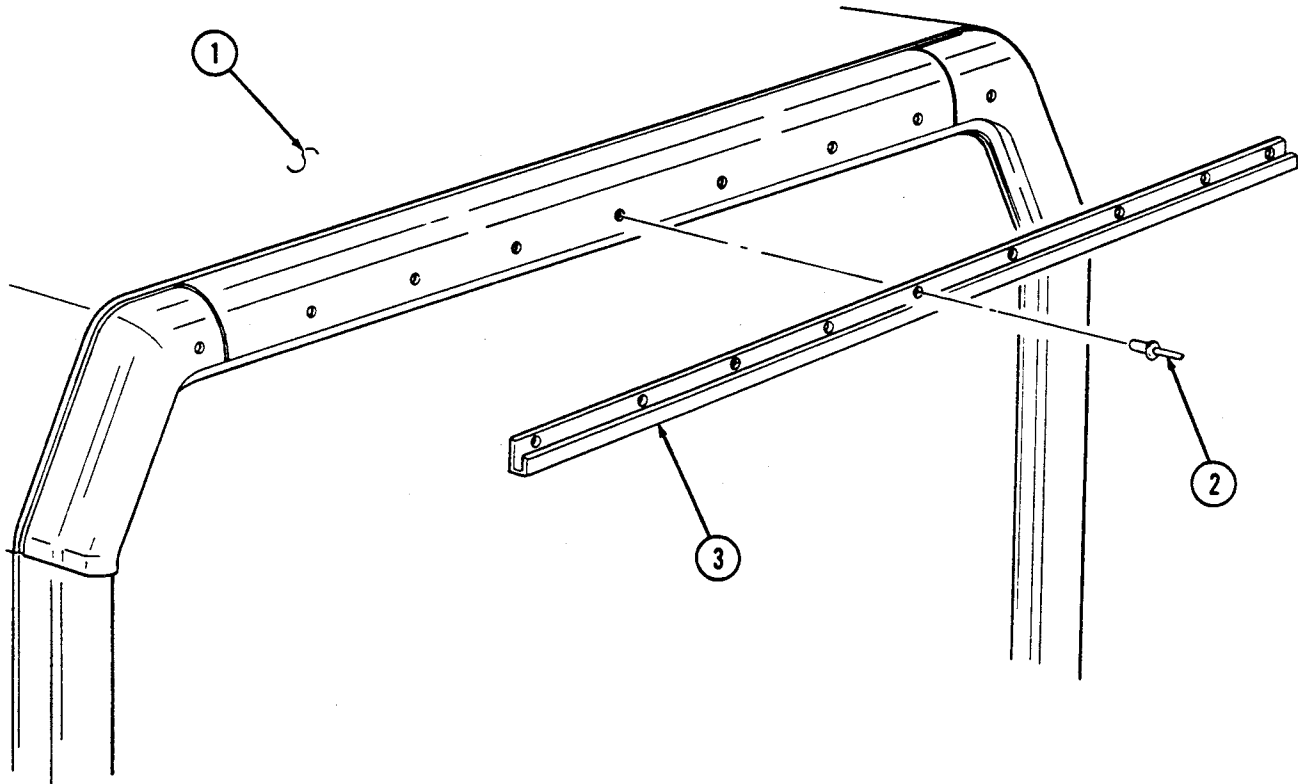
For instructions on replacement of rivets, refer to para. 10-66.

a. Removal

Remove nine rivets (2) and drip rail (3) from body (1).

b. Installation

Apply sealant to drip rail (3) and install drip rail (3) on body (1) with nine rivets (2).



11-171. RADIO ANTENNA MOUNT REPLACEMENT (M996, M996A1)

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M996, M996A1

Manual References

TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

Antenna removed (para. 12-137).

Materials/Parts

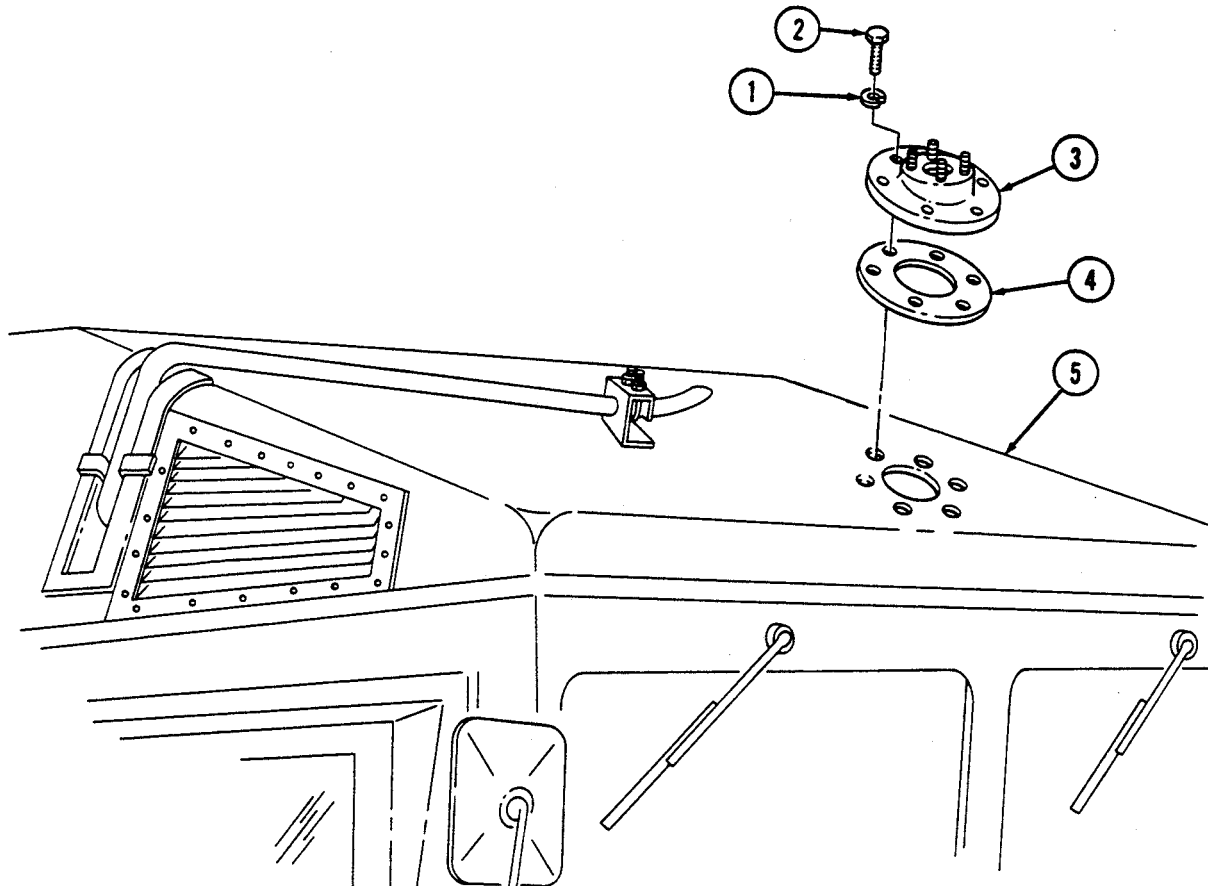
Six lockwashers (Appendix G, Item 134)

a. Removal

Remove six capscrews (2), lockwashers (1), antenna mount (3), and seal (4) from roof (5). Discard lockwashers (1).

b. Installation

Install seal (4) and antenna mount (3) on roof (5) with six lockwashers (1) and capscrews (2).



FOLLOW-ON TASK: Install antenna (para. 12-137).

11-172. RADIO ANTENNA MOUNT REPLACEMENT (M997, M997A1, M997A2)

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M997, M997A1, M997A2

Manual References

TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

Antenna removed (para. 12-137).

Materials/Parts

Two lockwashers (Appendix G, Item 158)
Lockwasher (Appendix G, Item 144)

a. Removal

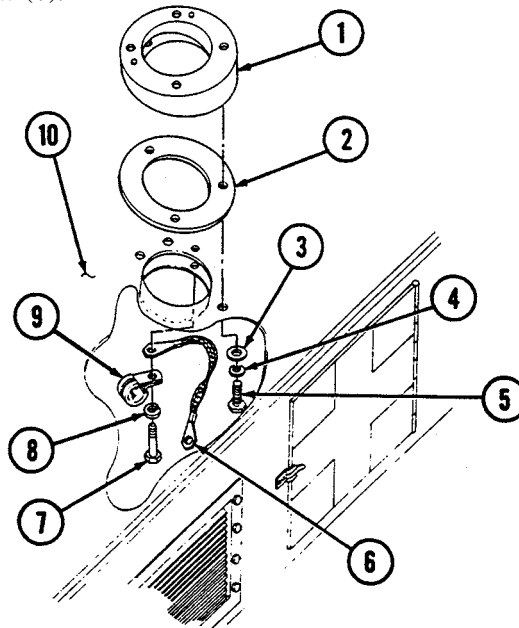
1. Remove capscrew (7), lockwasher (8), seal (2), cable clip (9), and ground strap (6) from antenna mount (1) and roof (10). Discard lockwasher (8).
2. Remove two capscrews (5), lockwashers (4), washers (3), antenna mount (1), and seal (2) from roof (10). Discard lockwashers (4).

b. Installation

NOTE

Clean ground strap at point of interior body contact to bare metal to ensure good antenna ground.

1. Install seal (2) and antenna mount (1) on roof (10) with two washers (3), lockwashers (4), and capscrews (5).
2. Install cable clip (9), ground strap (6), seal (2), and antenna mount (1) on roof (10) with lockwasher (8) and capscrew (7).



FOLLOW-ON TASK: Install antenna (para. 12-137).

11-173. STOWAGE NET ASSEMBLY REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M997, M997A1, M997A2

Manual References

TM 9-2320-280-24P

Tools

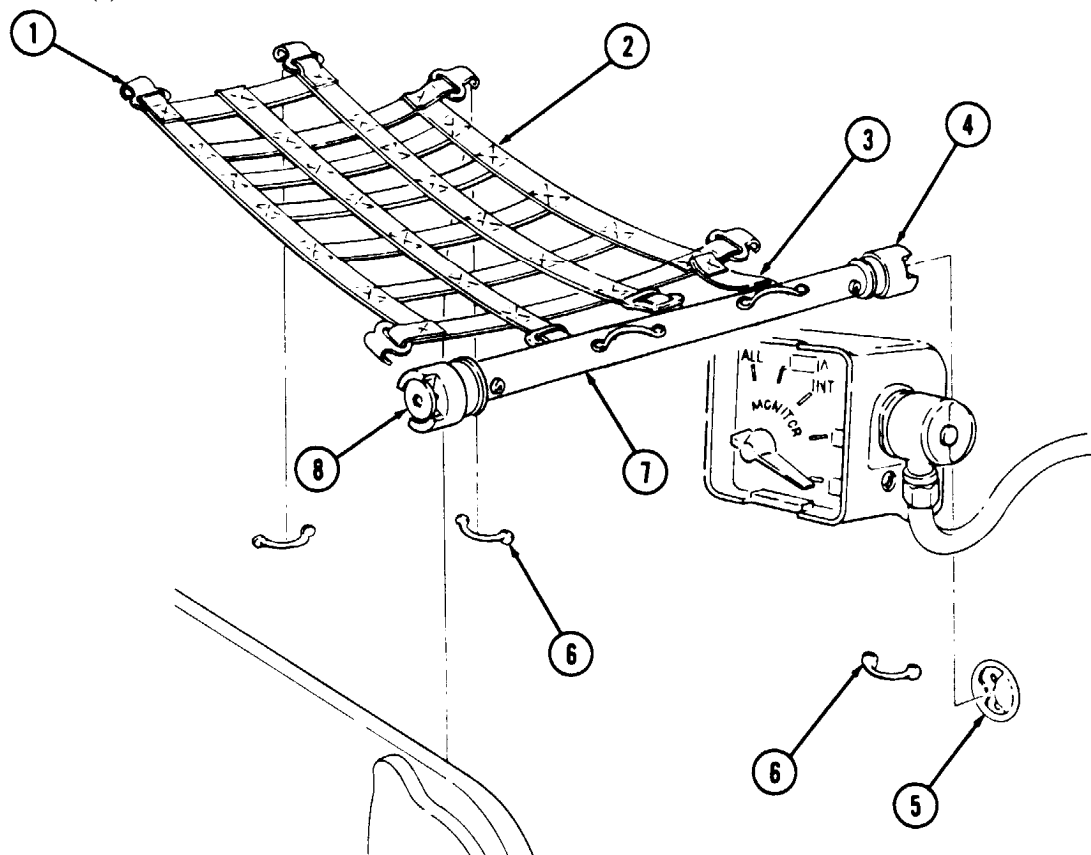
General mechanic's tool kit:
automotive (Appendix B, Item 1)

a. Removal

1. Slide two spring-loaded caps (4) on front support bar (7) inward, away from wall mounts (5), and slide flange (8) up and out of wall mounts (5).
2. Remove five stowage strap hooks (1) from footman loops (6) and remove stowage net (2) and front support bar (7).
3. Unfasten two straps (3) and remove stowage net (2) from front support bar (7).

b. Installation

1. Install stowage net (2) on front support bar (7) with two straps (3).
2. Install five stowage strap hooks (1) on footman loops (6).
3. Slide two spring-loaded caps (4) inward, along front support bar (7), and install flange (8) on wall mounts (5).



11-174. RED CROSS PLACARD RETAINING CLIP REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M996, M996A1, M997, M997A1, M997A2

Manual References

TM 9-2320-280-24P

Tools

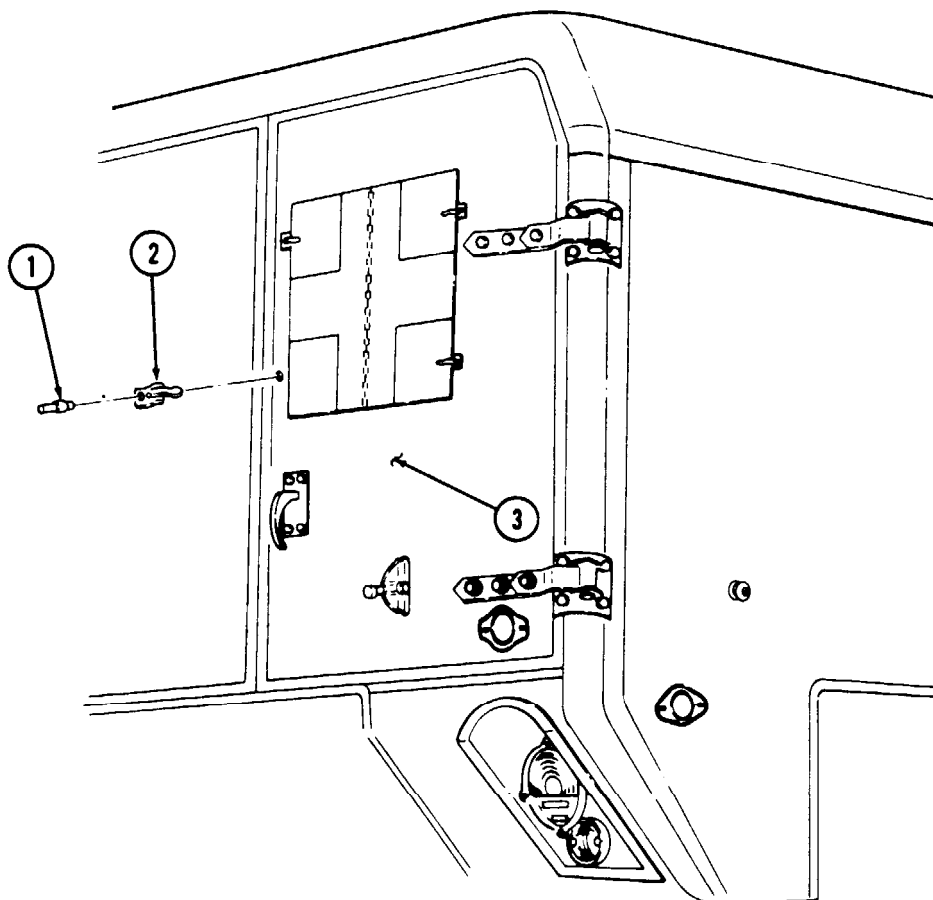
General mechanic's tool kit:
automotive (Appendix B, Item 1)

a. Removal

Remove two capscrews (1) and retaining clip (2) from body (3).

b. Installation

Install retaining clip (2) on body (3) with two capscrews (1).



11-175. RED CROSS PLACARD REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M996, M996A1, M997, M997A1, M997A2

Materials/Parts

Seven blind rivets (Appendix G, Item 251)

Five blind rivets (Appendix G, Item 250)

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-24P

NOTE

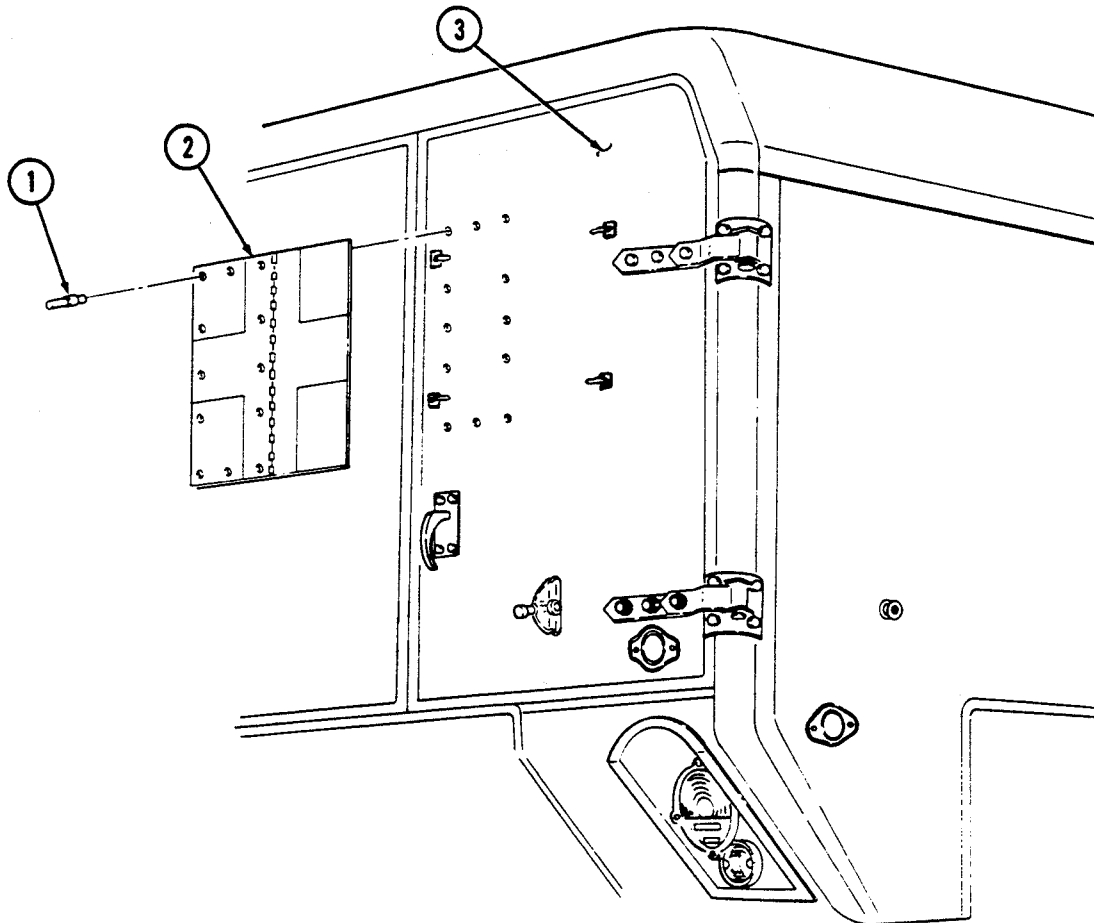
- Rear door, body side, body top, and front red cross placards are removed and installed basically the same. This procedure covers an M997, M997A1, and M997A2 rear door red cross placard.
- For instructions on replacement of rivets, refer to para. 10-66.

a. Removal

Remove twelve rivets (1) and red cross placard (2) from rear door (3).

b. Installation

Install red cross placard (2) to rear door (3) with twelve rivets (1).



11-176. EXTERIOR STOWAGE DOOR REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M996, M996A1, M997, M997A1, M997A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Adhesive (Appendix C, Item 3)
Fourteen blind rivets (Appendix G, Item 250)
Twelve blind rivets (Appendix G, Item 253)

Manual References

TM 9-2320-280-24P

NOTE

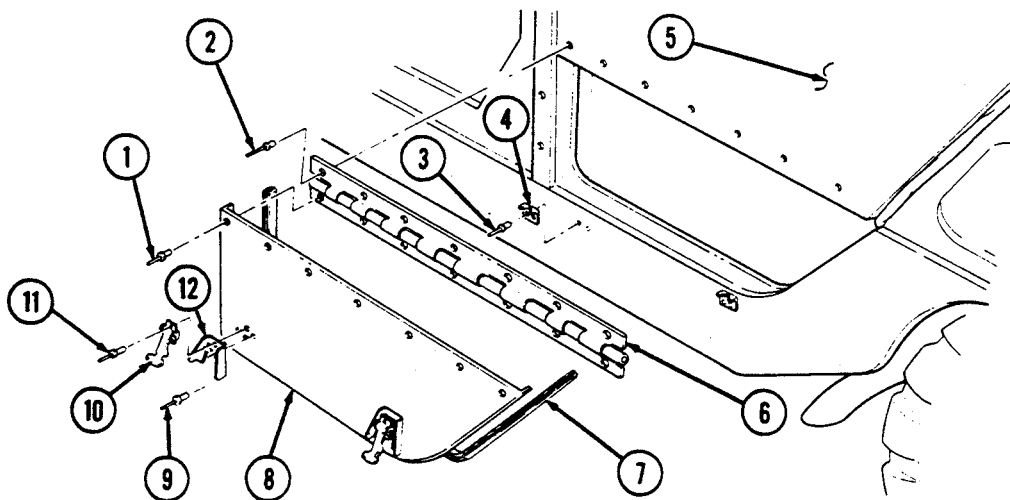
- For instructions on replacement of rivets, refer to para. 10-66.
- Replacement procedures for left and right exterior stowage doors are basically the same. This procedure covers the left stowage door.

a. Removal

1. Remove seven rivets (2), hinge (6), and door (8) from body (5).
2. Remove seven rivets (1) and hinge (6) from door (8).
3. Remove four rivets (11) and two rubber latches (10) from door (8).
4. Remove four rivets (9) and two brushguards (12) from door (8).
5. Remove four rivets (3) and two catches (4) from body (5).
6. Remove seal (7) from door (8). Discard seal (7) if damaged.

b. Installation

1. Apply adhesive to seal (7) and install seal (7) on door (8).
2. Install two catches (4) on body (5) with four rivets (3).
3. Install two brushguards (12) on door (8) with four rivets (9).
4. Install two rubber latches (10) on door (8) with four rivets (11).
5. Install hinge (6) on door (8) with seven rivets (1).
6. Install hinge (6) and door (8) on body (5) with seven rivets (2).



11-177. ATTENDANT SEAT STOWAGE BRACKETS REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M996, M996A1, M997, M997A1, M997A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Eight blind rivets (Appendix G, Item 251)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

Attendant seat removed from stowed position
(TM 9-2320-280-10).

NOTE

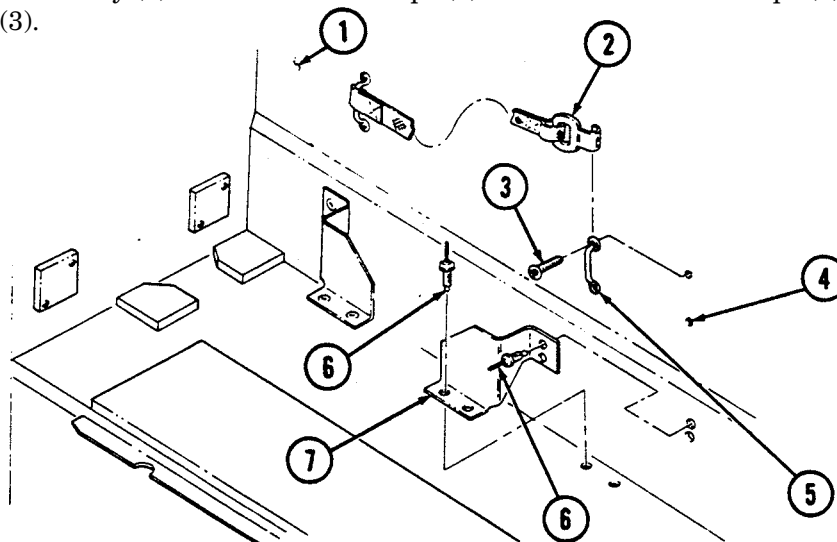
- For instructions on replacement of rivets, refer to para. 10-66.
- Replacement procedures for attendant seat stowage brackets are basically the same for M996, M996A1, M997, M997A1, and M997A2 ambulances, with the exception of the strap assembly. The strap assembly is mounted in a vertical position on the body of the M996 and M996A1 ambulance. This procedure covers the attendant seat stowage brackets in the M997, M997A1, and M997A2 ambulances.

a. Removal

1. Remove four screws (3) and two footman loops (5) from body (1), and remove strap assembly (2) from footman loops (5).
2. Remove eight rivets (6) and two brackets (7) from body (1).
3. Inspect blind rivet (4) for damage. Replace if damaged.

b. Installation

1. Install two brackets (7) on body (1) with eight rivets (6).
2. Install strap assembly (2) on two footman loops (5) and install footman loops (5) on body (1) with four screws (3).



FOLLOW-ON TASK: Stow attendant seat (TM 9-2320-280-10).

11-178. REAR DOOR VENT ASSEMBLY REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M996, M996A1

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Fourteen blind rivets (Appendix G, Item 250)
Blind rivet (Appendix G, Item 257)
Blind rivet (Appendix G, Item 253)

Manual References

TM 9-2320-280-24P

NOTE

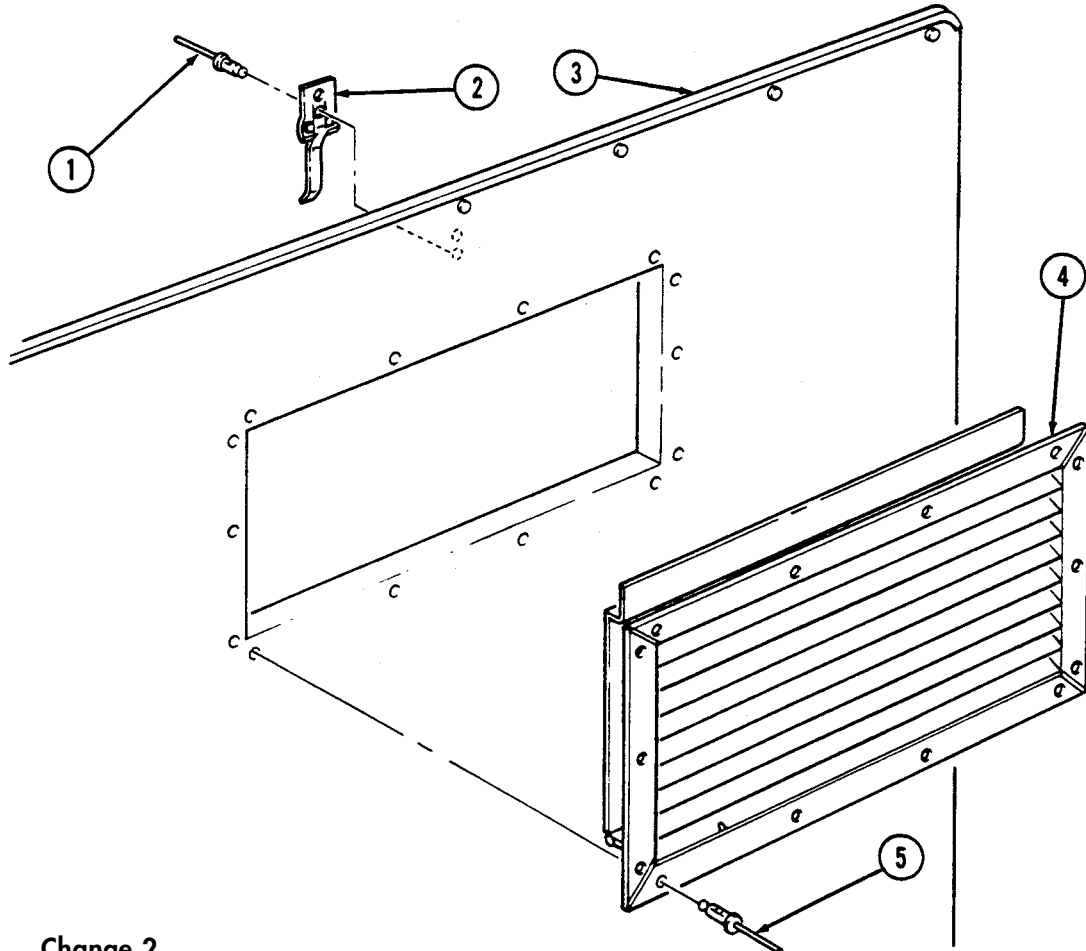
For instructions on replacement of rivets, refer to para. 10-66.

a. Removal

1. Remove two rivets (1) and retaining clip (2) from door (3).
2. Remove fourteen rivets (5) and vent assembly (4) from door (3).

b. Installation

1. Install vent assembly (4) on door (3) with fourteen rivets (5).
2. Install retaining clip (2) on door (3) with two rivets (1).



11-179. MEDICAL STOWAGE COVER AND LATCH REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M996, M996A1

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Nine blind rivets (Appendix G, Item 237)
Two blind rivets (Appendix G, Item 240)
Two blind rivets (Appendix G, Item 250)

Manual References

TM 9-2320-280-24P

NOTE

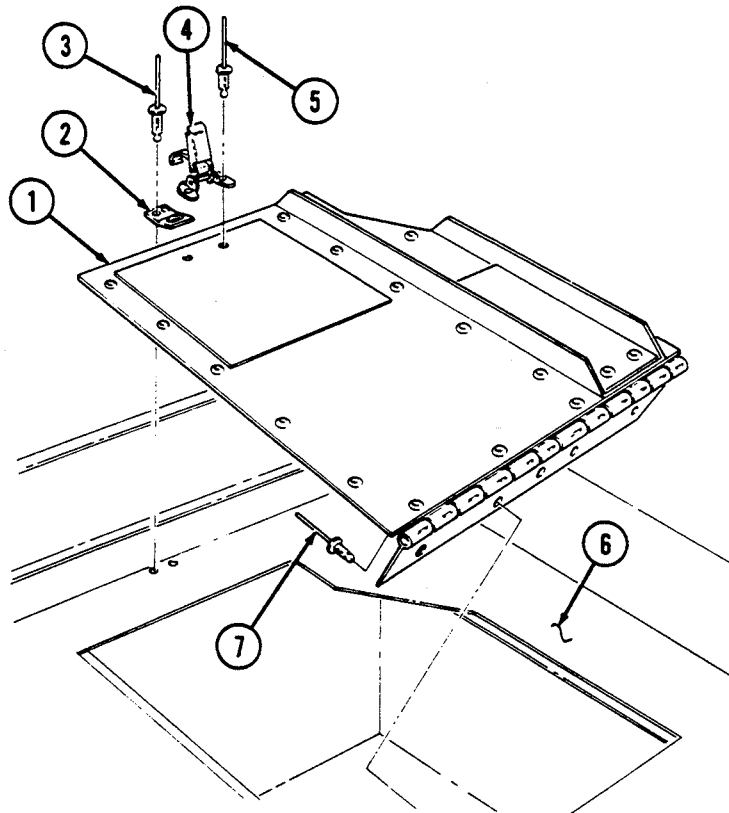
For instructions on replacement of rivets, refer to para. 10-66.

a. Removal

1. Remove nine rivets (7) and cover and hinge assembly (1) from body (6).
2. Remove two rivets (3) and catch (2) from body (6).
3. Remove two rivets (5) and latch (4) from cover and hinge assembly (1).

b. Installation

1. Install latch (4) on cover and hinge assembly (1) with two rivets (5).
2. Install catch (2) on body (6) with two rivets (3).
3. Install cover and hinge assembly (1) on body (6) with nine rivets (7).



11-180. EDGE PROTECTOR REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M996, M996A1, M997, M997A1, M997A2

Manual References

TM 9-2320-280-24P

Tools

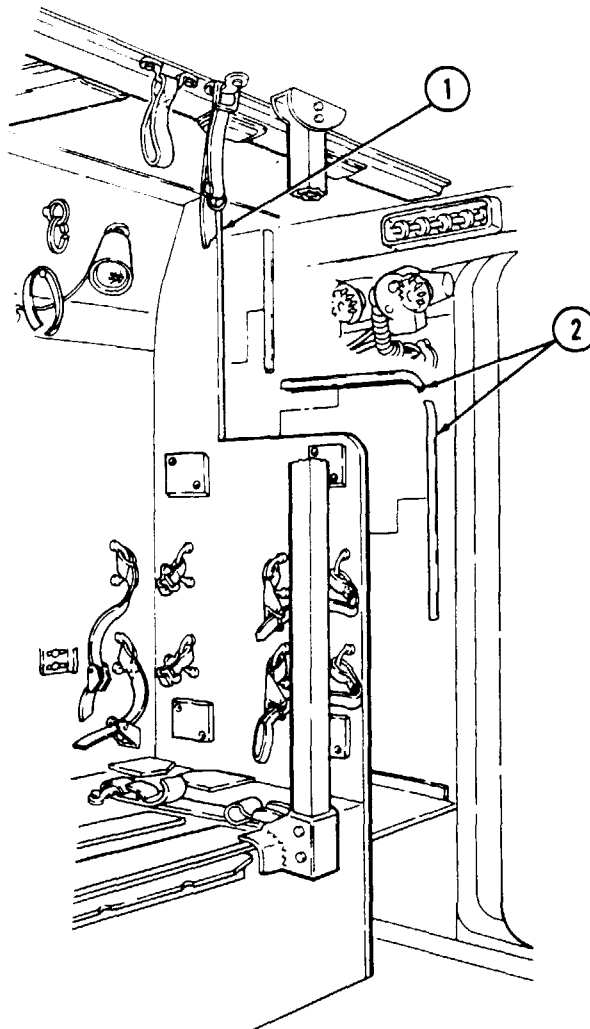
General mechanic's tool kit:
automotive (Appendix B, Item 1)

a. Removal

Pry edge protector (2) from bulkhead (1) and remove edge protector (2).

b. Installation

Install edge protector (2) by pressing edge protector (2) onto bulkhead (1).



11-180.1. SPREADER BAR TIEDOWN REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M996, M996A1, M997, M997A1, M997A2

Materials/Parts

Lockwasher (Appendix G, Item 140)
 Adhesive sealant (Appendix C, Item 38)

Tools

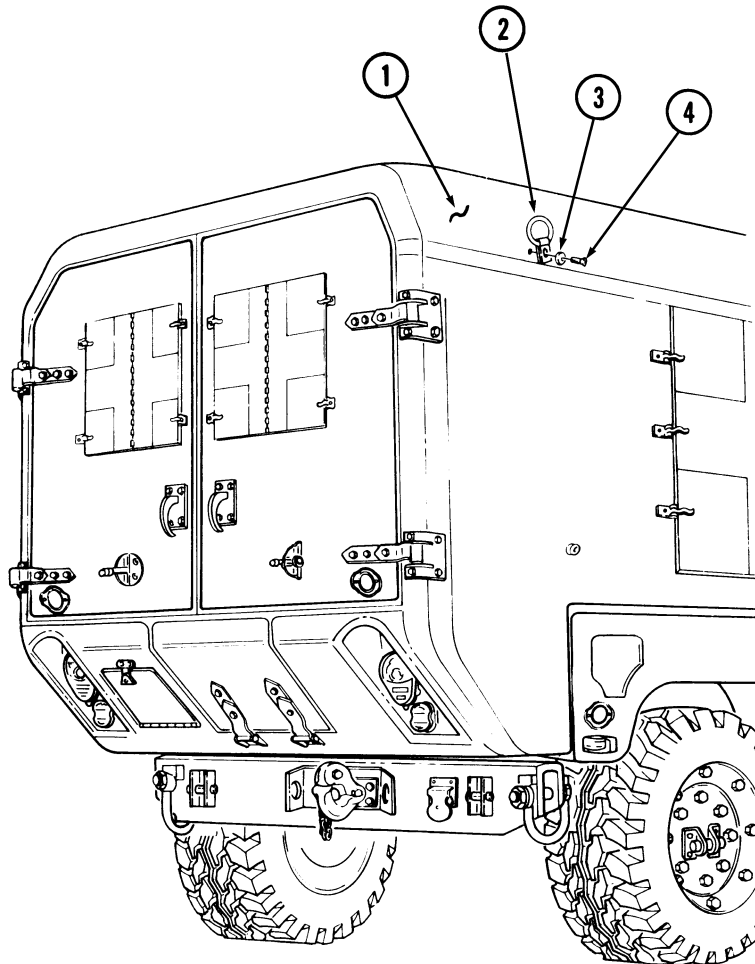
General mechanic's tool kit automotive (Appendix B, Item 1)

a. Removal

Remove capscrew (4), lockwasher (3), and spreader bar tiedown (2) from body (1). Discard lockwasher (3).

b. Installation

Apply adhesive sealant to capscrew (4) and install spreader bar tiedown (2) on body (1) with lockwasher (3) and capscrew (4). Tighten capscrew (4) to 45-55 lb-ft (61-75 N·m).



11-181. AMBULATORY PATIENT SEAT REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M996, M996A1

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Four blind rivets (Appendix G, Item 252)
Two locknuts (Appendix G, Item 70)
Two solid rivets (Appendix G, Item 271)
Blind rivnut (Appendix G, Item 274)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

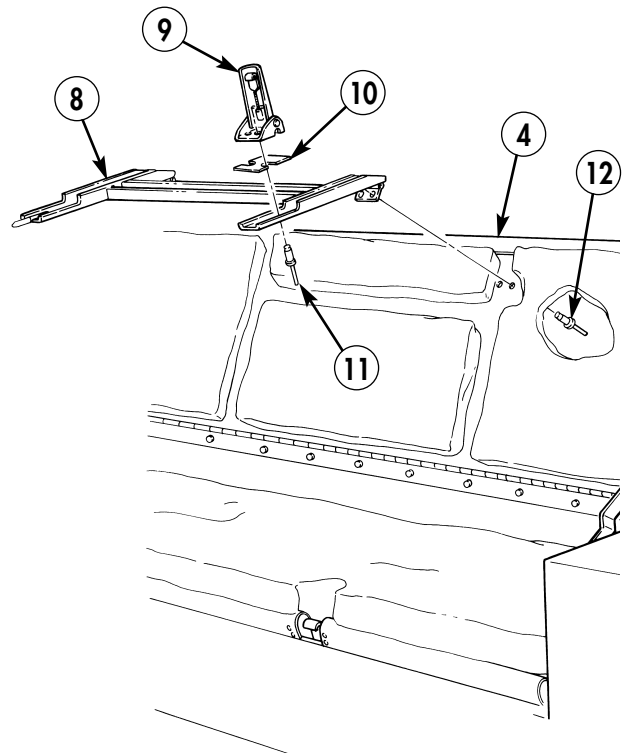
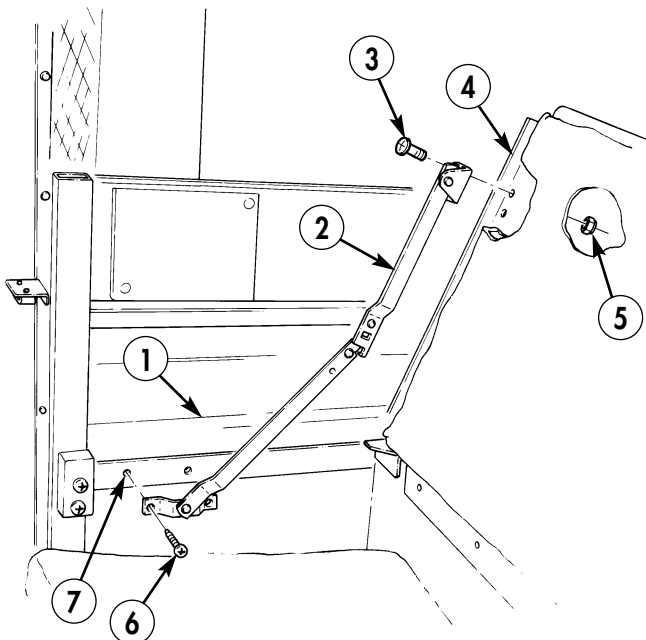
Ambulatory patient seat opened
(TM 9-2320-280-10).

NOTE

For instructions on replacement of rivets, refer to para. 10-66.

a. Removal

1. Remove two screws (6) from seat brace (2) and seat frame (1).
2. Remove two locknuts (5), screws (3), and seat brace (2) from seatback (4). Discard locknuts (5).
3. Inspect blind rivnut (7) for damage. Replace if damaged.
4. Remove four blind rivets (12) and seat support (8) from seatback (4).
5. Remove two solid rivets (11), latch (9), and shim (10) from seat support (8).

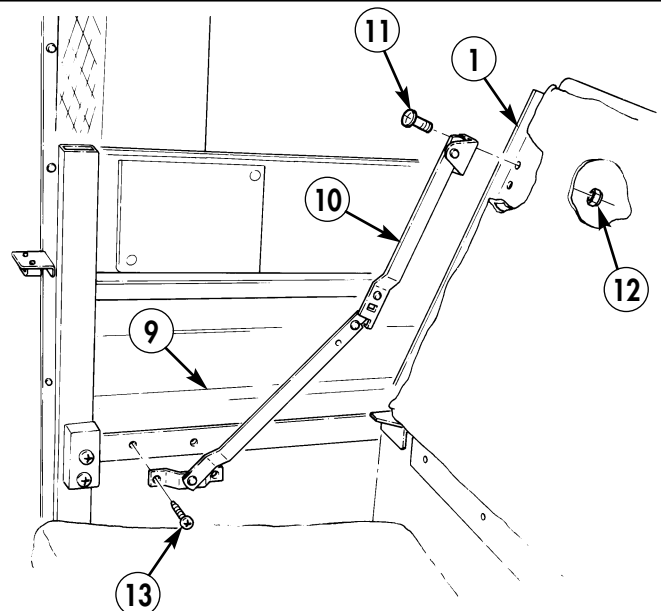
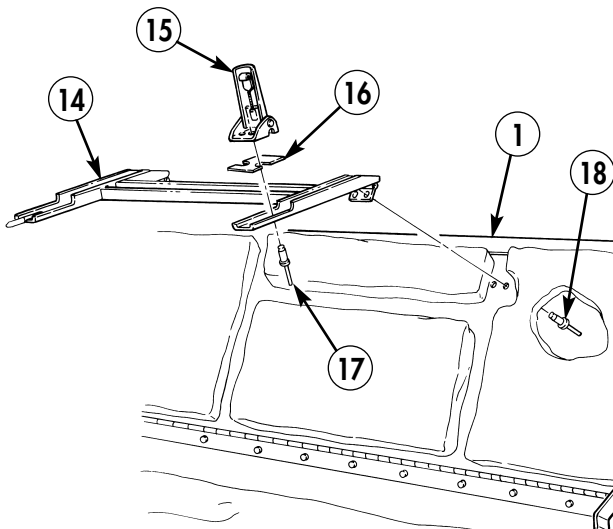
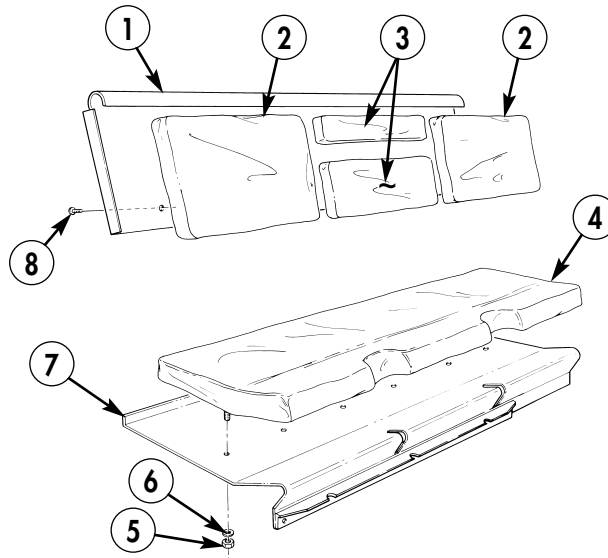


11-181. AMBULATORY PATIENT SEAT REPLACEMENT (Cont'd)

6. Remove eight screws (8) and two end cushions (2) from seatback (1).
7. Remove four screws (8) and two middle cushions (3) from seatback (1).
8. Remove twelve nuts (5), washers (6), and seat cushion (4) from seat base (7).

b. Installation

1. Install seat cushion (4) on seat base (7) with twelve washers (6) and nuts (5).
2. Install two middle cushions (3) on seatback (1) with four screws (8).
3. Install two end cushions (2) on seatback (1) with eight screws (8).
4. Install latch (15) and shim (16) on seat support (14) with two solid rivets (17).
5. Install seat support (14) on seatback (1) with four blind rivets (18).
6. Install seat brace (10) on seatback (1) with two screws (11) and locknuts (12).
7. Install seat brace (10) on seat frame (9) with two screws (13).



FOLLOW-ON TASK: Close ambulatory patient seat (TM 9-2320-280-10).

11-182. AMBULATORY PATIENT SEAT REAR CLOSEOUT PANEL REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M996, M996A1

Manual References

TM 9-2320-280-24P

Tools

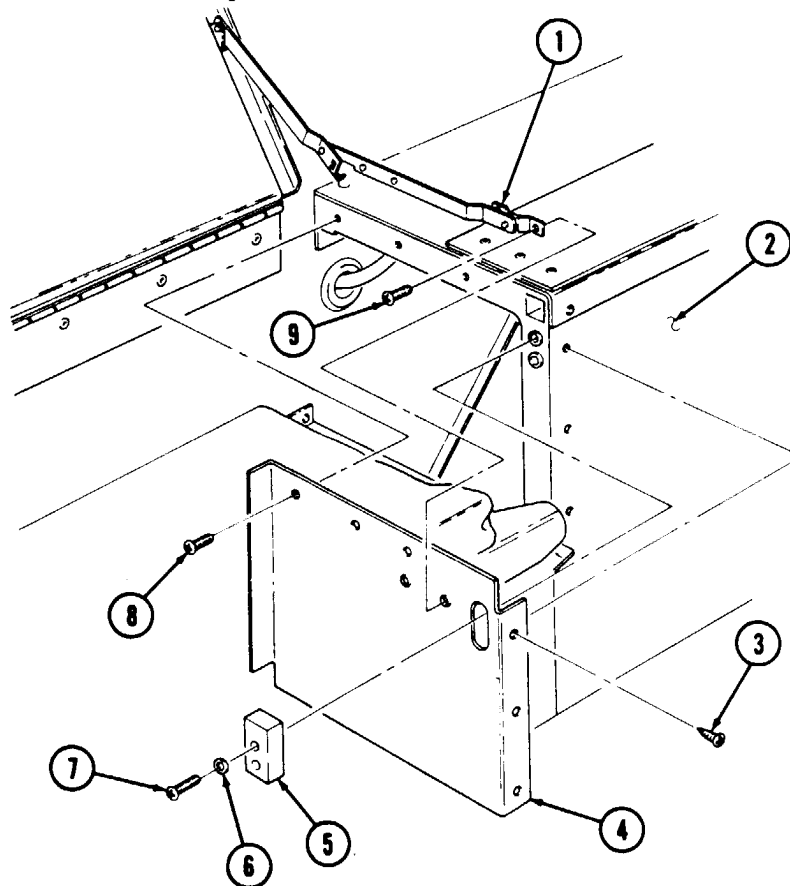
General mechanic's tool kit:
automotive (Appendix B, Item 1)

a. Removal

1. Remove two screws (9) from seat brace assembly (1) and closeout panel (4). Push seat brace assembly (1) up and out of way.
2. Remove two screws (7), washers (6), and seat stop (5) from closeout panel (4) and litter rack (2).
3. Remove three screws (8) and (3) and closeout panel (4) from litter rack (2).

b. Installation

1. Install closeout panel (4) on litter rack (2) with three screws (8) and (3).
2. Install seat stop (5) on closeout panel (4) with two washers (6) and screws (7).
3. Install seat brace (1) on closeout panel (4) with two screws (9).



11-183. NBC DOOR REPLACEMENT (M996, M996A1)
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This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M996, M996A1

Manual References

TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

NBC gas filters and brackets removed
(para. 11-167).

Materials/Parts

Ten blind rivets (Appendix G, Item 250)

NOTE

For instructions on replacement of rivets, refer to para. 10-66.

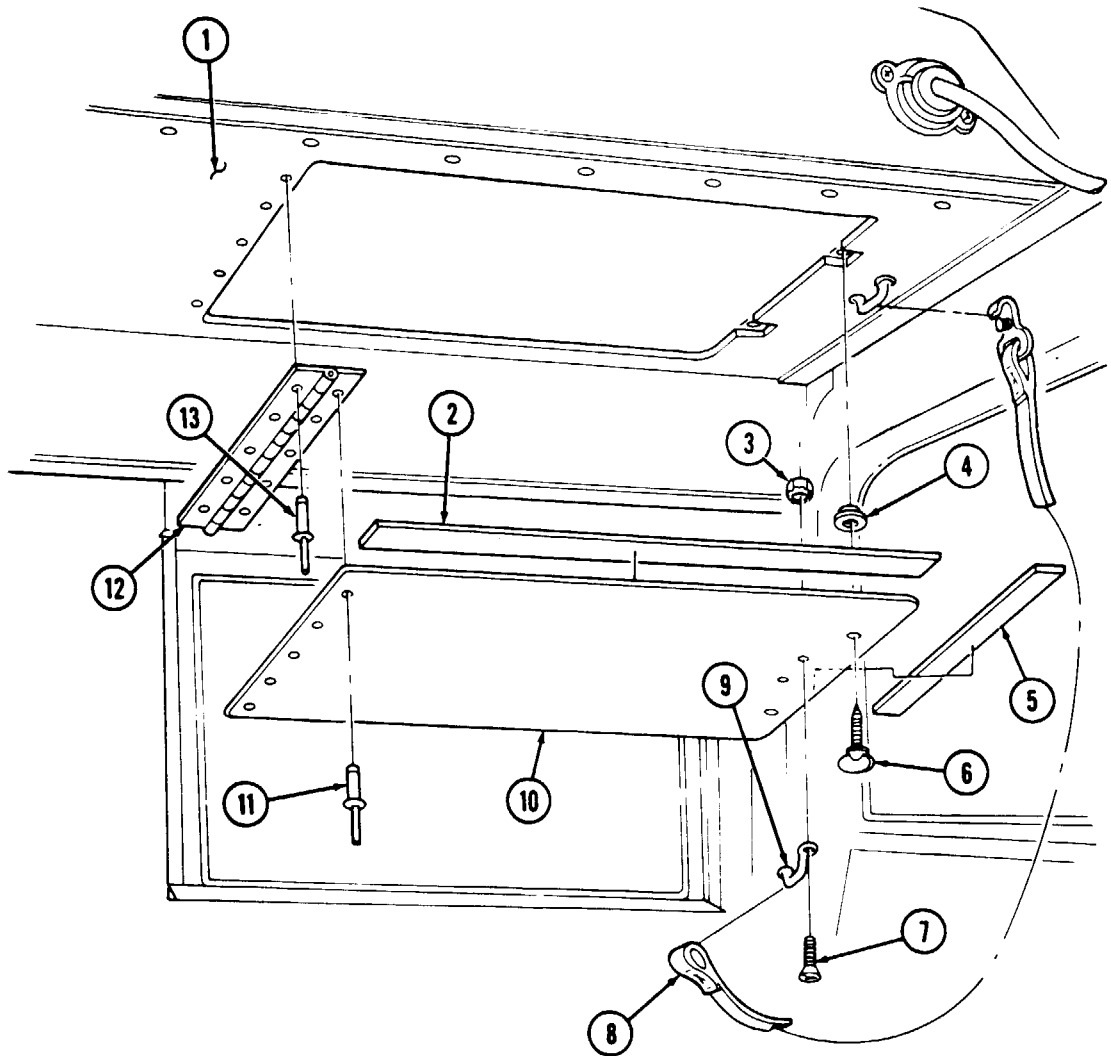
a. Removal

1. Remove five rivets (13), door (10), and hinge (12) from body (1).
2. Remove five rivets (11) and hinge (12) from door (10).
3. Remove two screws (7), nut (3), footman loop (9), and strap (8) from door (10).
4. Remove two wing head screws (6) and retainers (4) from door (10). Inspect retainers (4) for damage, replace if damaged.
5. Remove seals (2) and (5) from door (10).

b. Installation

1. Install seals (2) and (5) on door (10).
2. Install two wing head screws (6) on door (10) with retainers (4).
3. Install strap (8) and footman loop (9) on door (10) with two screws (7) and nut (3).
4. Install hinge (12) on door (10) with five rivets (11).
5. Install door (10) and hinge (12) on body (1) with five rivets (13).

11-183. NBC DOOR REPLACEMENT (M996, M996A1) (Cont'd)



FOLLOW-ON TASK: Install NBC gas filters and brackets (para. 11-167).

11-184. AIR INTAKE COMPARTMENT PANELS REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M997, M997A1, M997A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Two lockwashers (Appendix G, Item 182)
Two tapping screws (Appendix G, Item 283)

Manual References

TM 9-2320-280-24P

Equipment Condition

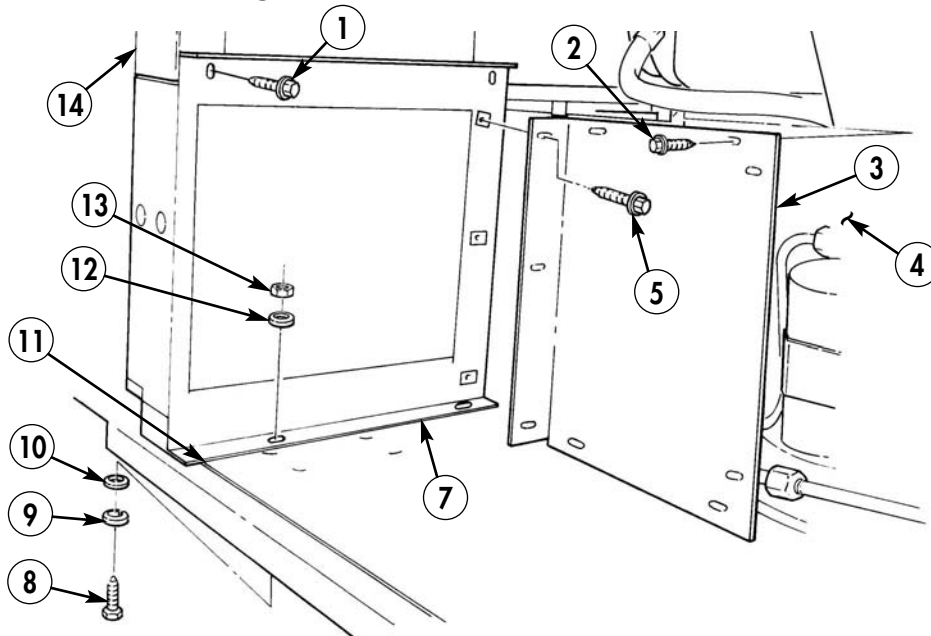
- Blower housing opened (para. 11-198).
- Front cover panel removed (para. 11-187).

a. Removal

1. Remove six screws (2) from panel (3) and condenser fan housing (4).
2. Remove three screws (5) and panel (3) from panel (7).
3. Remove two tapping screws (1) from panel (7) and air intake assembly (14). Discard tapping screws (1).
4. Remove two nuts (13), washers (12), screws (8), washers (10), lockwashers (9), and panel (7) from body (11). Discard lockwashers (9).

b. Installation

1. Install panel (7) on body (11) and air intake assembly (14) with two washers (10), lockwashers (9), screws (8), washers (12), and nuts (13).
2. Install panel (7) on air intake assembly (14) with two tapping screws (1).
3. Install panel (3) on panel (7) and fan housing (4) with three screws (5).
4. Secure panel (3) to fan housing (4) with six screws (2).



FOLLOW-ON TASKS: • Close blower housing (para. 11-198).
• Install front cover panel (para. 11-187).

11-185. AIR INTAKE DUCT DOOR REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M997, M997A1, M997A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Push on nut (Appendix G, Item 227)
Two lockwashers (Appendix G, Item 134)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

- Air intake filter removed (TM 9-2320-280-10).
- Blower housing opened (para. 11-198).

NOTE

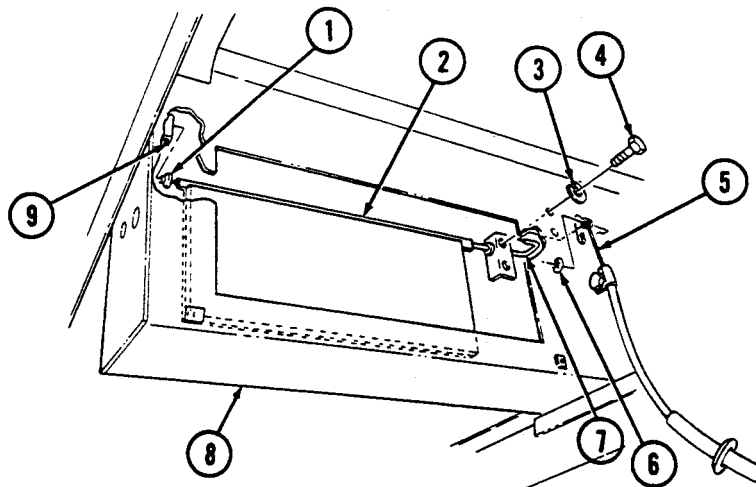
Evaporator intake duct door and heater intake duct door are replaced basically the same. This procedure covers the evaporator duct door.

a. Removal

1. Remove push on nut (6) and slide control cable (5) off arm (7). Discard push on nut (6).
2. Remove two capscrews (4) and lockwashers (3) from duct door (2) and intake duct (8). Discard lockwashers (3).
3. Slide duct door (2) right, and remove duct door (2) and bushing (1) from intake duct (8) and bracket (9).

b. Installation

1. Install bushing (1) on bracket (9).
2. Install arm (7) through intake duct (8) and slide duct door (2) left into bushing (1).
3. Install duct door (2) on intake duct (8) with two lockwashers (3) and capscrews (4).
4. Slide control cable (5) onto arm (7) with push on nut (6).



- FOLLOW-ON TASKS:
- Install air intake filter (TM 9-2320-280-10).
 - Adjust duct door control cable (para. 11-199).

11-186. AIR INLET/OUTLET GRILLE REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M997, M997A1, M997A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Adhesive (Appendix C, Item 3)
Gasket (Appendix G, Item 49)
Ten lockwashers (Appendix G, Item 144)

Manual References

TM 9-2320-280-24P

NOTE

Procedures for replacing inlet and outlet grilles are basically the same. This procedure covers the outlet grille.

a. Removal

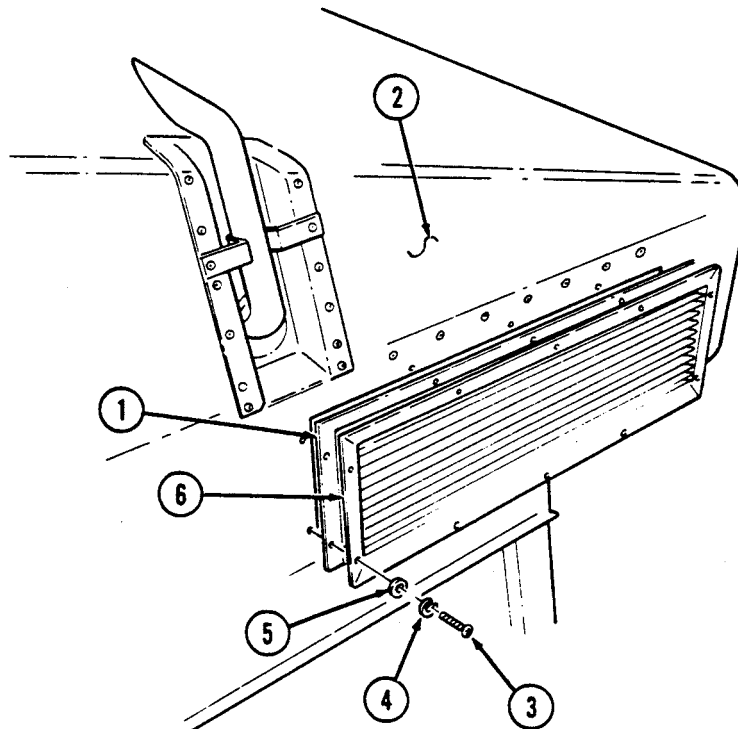
Remove ten screws (3), lockwashers (4), washers (5), grille (6), and gasket (1) from body (2). Discard gasket (1) and lockwashers (4). Clean grille (6) to remove remaining adhesive.

b. Installation

NOTE

Ensure outer louvers on grille are angled downward for installation.

Apply adhesive to grille (6) at gasket (1) mating surface. Install gasket (1) and grille (6) on body (2) with ten washers (5), lockwashers (4), and screws (3).



11-187. FRONT COVER PANEL REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M997, M997A1, M997A2

Materials/Parts

Six lockwashers (Appendix G, Item 144)

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

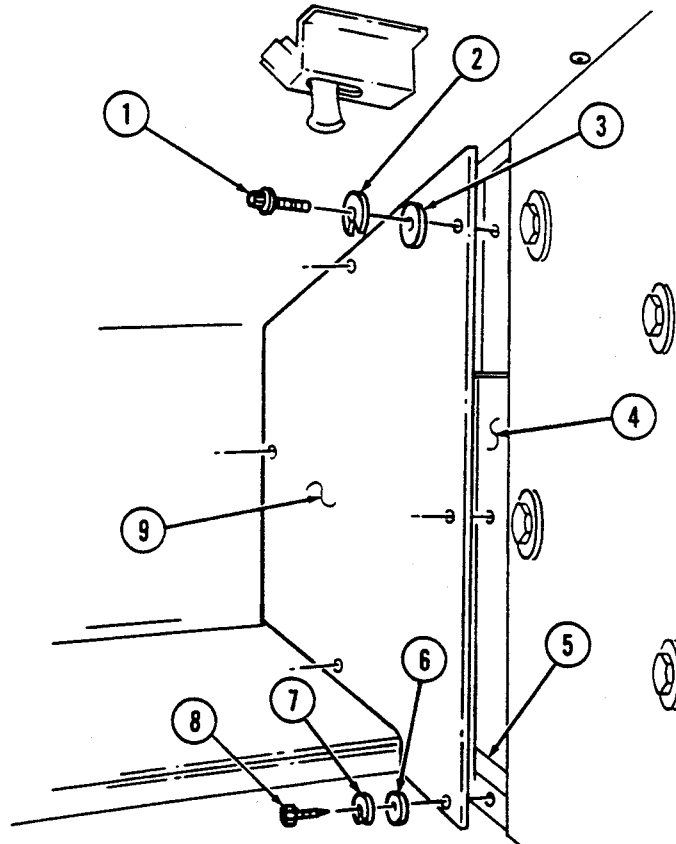
TM 9-2320-280-24P

a. Removal

1. Remove two capscrews (1), lockwashers (2), and washers (3) from panel (9) and panel (4). Discard lockwashers (2).
2. Remove four screws (8), lockwashers (7), washers (6), and panel (9) from body (5). Discard lockwashers (7).

b. Installation

1. Install panel (9) on body (5) with four washers (6), lockwashers (7), and screws (8).
2. Install panel (9) on panel (4) with two washers (3), lockwashers (2), and capscrews (1).



11-188. REAR COVER PANEL REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M997, M997A1, M997A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Nine lockwashers (Appendix G, Item 144)

Manual References

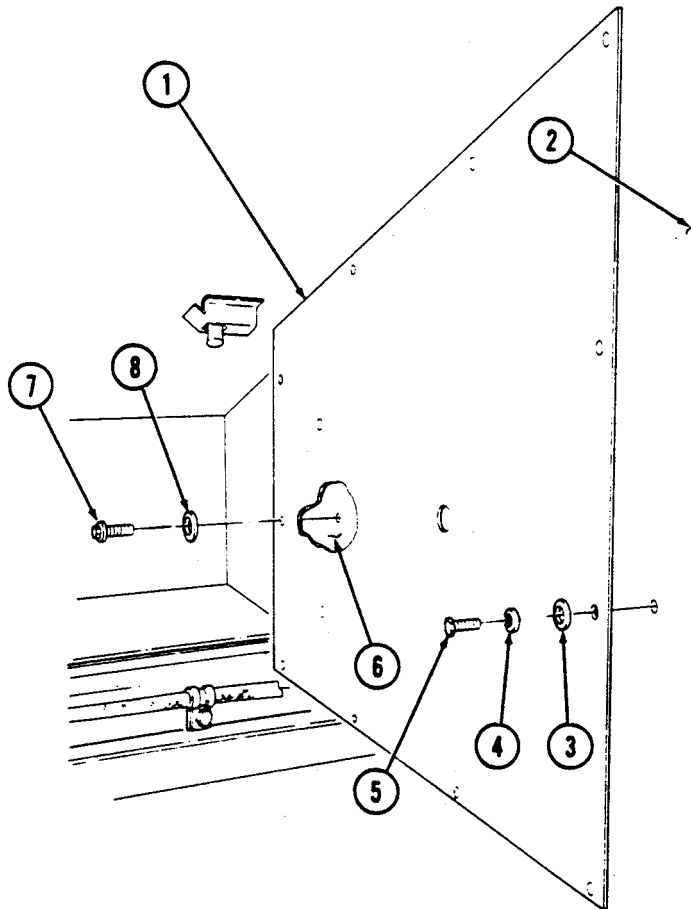
TM 9-2320-280-24P

a. Removal

1. Remove four capscrews (7) and washers (8) from panel (1) and blower housing (6).
2. Remove nine screws (5), lockwashers (4), washers (3), and panel (1) from body (2). Discard lockwashers (4).

b. Installation

1. Install panel (1) on body (2) with nine washers (3), lockwashers (4), and screws (5).
2. Install panel (1) on blower housing (6) with four washers (8) and capscrews (7).



11-189. HEATER EXHAUST PIPE REPLACEMENT (M997, M997A1, M997A2)

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M997, M997A1, M997A2

Manual References

TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

General Safety Instructions

Do not touch hot exhaust system with bare hands.

Materials/Parts

Two blind rivets (Appendix G, Item 250)

WARNING

Do not touch hot exhaust system components with bare hands.
Severe injury will result.

NOTE

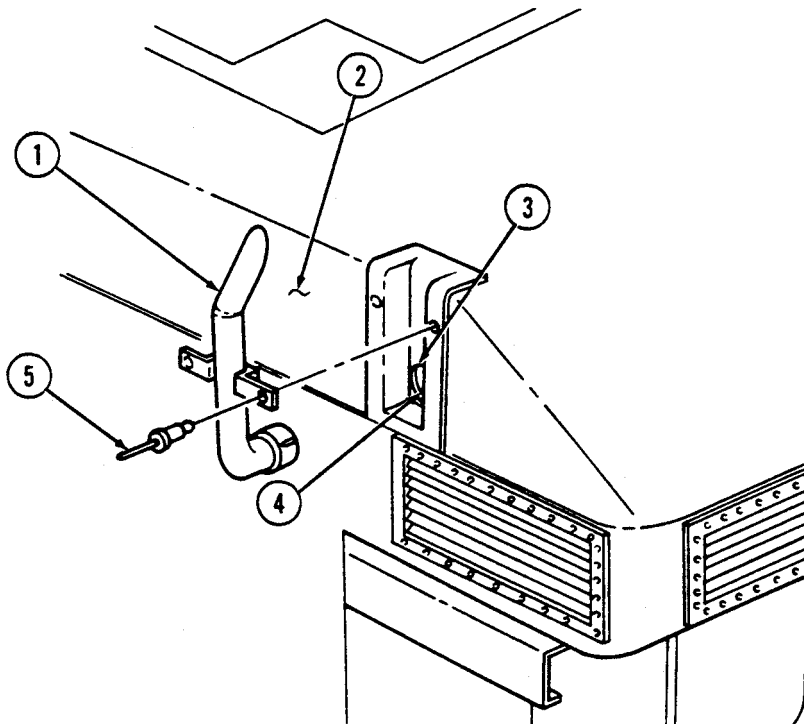
For instructions on replacement of rivets, refer to para. 10-66.

a. Removal

1. Remove two rivets (5) from exhaust pipe (1) and body (2).
2. Remove exhaust pipe (1) from opening (3) in body (2)

b. Installation

1. Install exhaust pipe (1) on opening (3) in body (2) and onto heater exhaust outlet (4).
2. Install exhaust pipe (1) on body (2) with two rivets (5).



11-190. HEATER REPLACEMENT (M997, M997A1, M997A2)

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M997, M997A1, M997A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Personnel Required

One mechanic
One assistant

Manual References

TM 9-2320-280-24P

Equipment Condition

- Blower housing open (para. 11-198).
- Battery ground cable disconnected (para. 4-73).

General Safety Instructions

Diesel fuel is highly flammable. Do not perform this procedure near fire, flames, or sparks.

WARNING

Diesel fuel is highly flammable. Do not perform this procedure near fire, flames, or sparks. Severe injury or death may result.

NOTE

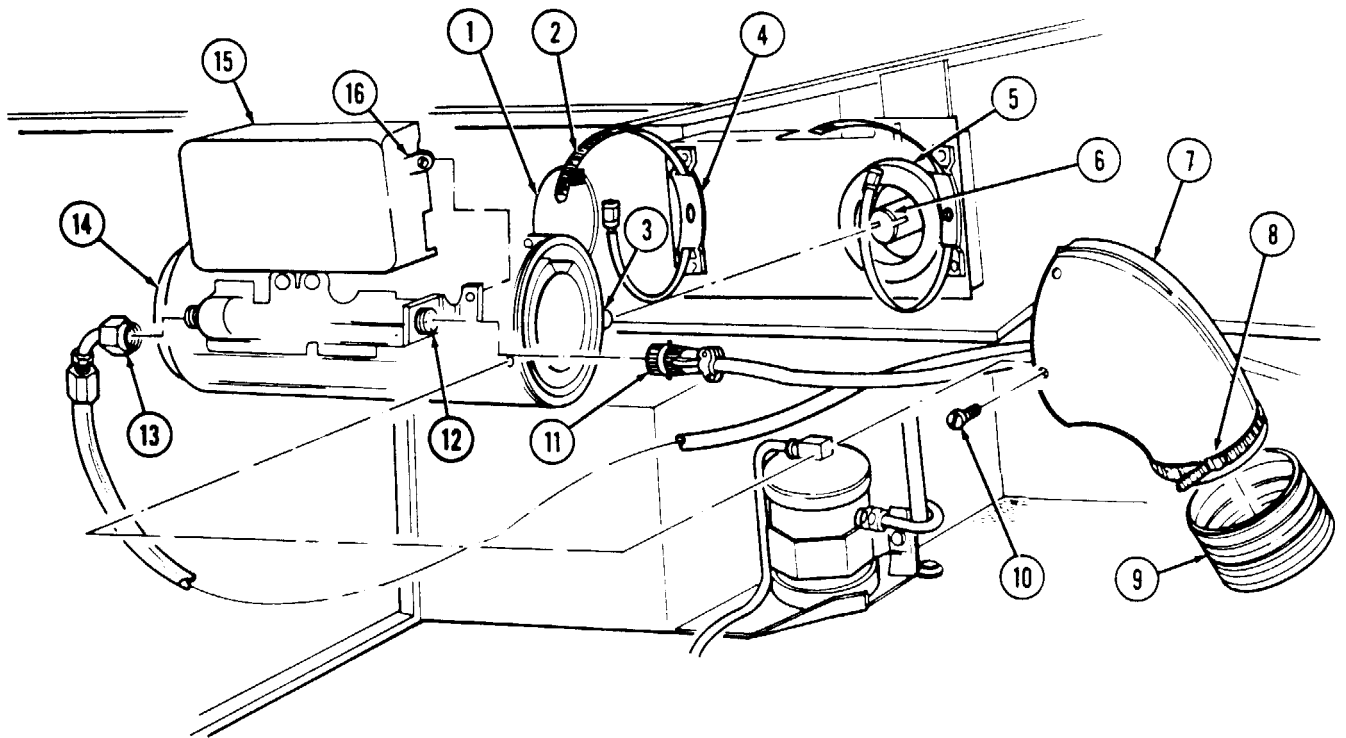
- Have drainage container ready to catch fuel.
- Cover or plug all open connections immediately after disconnection to prevent contamination. Remove all covers or plugs prior to connection.

a. Removal

1. Disconnect plug (11) from heater receptacle (12).
2. Loosen clamp (8) and disconnect hose (9) from heater outlet (7).
3. Disconnect fuel line (13) from heater (14) and allow fuel to drain into container.
4. Remove two clamps (2) from heater (14) and mounting brackets (4).
5. Turn two dzus fasteners (16) and remove cover (15) from heater (14).
6. Remove heater (14) by lifting rear of heater (14) up and pulling heater (14) out from exhaust pipe (6) and sliding heater (14) to the right and out of intake assembly (1).
7. Inspect seal (5) for presence and damage. Replace if missing or damaged.
8. Remove four screws (10) and outlet (7) from heater (14).

b. Installation

1. Install outlet (7) on heater (14) with four screws (10).
2. Install two clamps (2) on mounting brackets (4).
3. Install heater (14) on mounting brackets (4), ensuring heater exhaust outlet (3) is installed into exhaust pipe (6), and clamps (2) are wrapped around heater (14).
4. Slide heater (14) into intake assembly (1) opening and on mounting brackets (4) with two clamps (2).
5. Connect fuel line (13) to heater (14).
6. Connect hose (9) to heater outlet (7) and tighten clamp (8).
7. Connect plug (11) to heater receptacle (12).
8. Install cover (15) on heater (14) with two dzus fasteners (16).

11-190. HEATER REPLACEMENT (M997, M997A1, M997A2) (Cont'd)

FOLLOW-ON TASKS:

- Close blower housing (para 11-198).
- Connect battery ground cable (para. 4-73).

11-191. HEATER OUTLET HOSE REPLACEMENT (M997, M997A1, M997A2)

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M997, M997A1, M997A2

Manual References

TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

Blower housing open (para. 11-198).

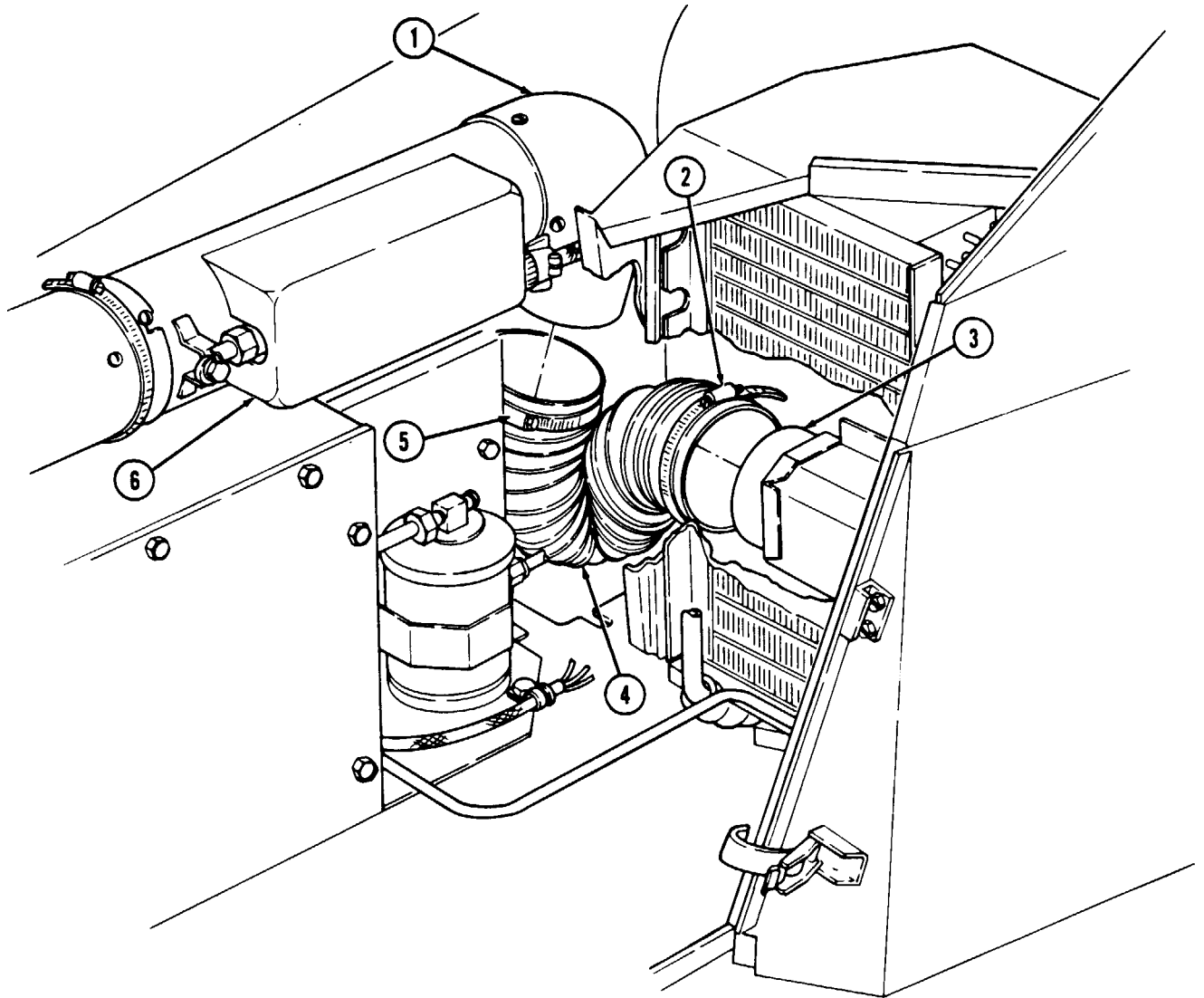
a. Removal

1. Loosen clamp (5) and disconnect hose (4) from heater outlet (1).
2. Loosen clamp (2) and disconnect hose (4) from heat duct (3).
3. Remove hose (4) by pulling out from behind and over top of heater (6).
4. Remove clamps (2) and (5) from hose (4).

b. Installation

1. Install clamps (2) and (5) on hose (4).
2. Route hose (4) over top of and behind heater (6) in mounting position.
3. Connect hose (4) to heat duct (3) and tighten clamp (2).
4. Connect hose (4) to heater outlet (1) and tighten clamp (5).

11-191. HEATER OUTLET HOSE REPLACEMENT (M997, M997A1, M997A2) (Cont'd)



FOLLOW-ON TASK: Close blower housing (para. 11-198).

11-192. HEATER FUEL FILTER REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M996, M996A1, M997, M997A1, M997A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Sealing compound (Appendix C, Item 44)
Two lockwashers (Appendix G, Item 138)

Manual Reference

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

- Stowage compartment door open (TM 9-2320-280-10).
- Close fuel shut-off valve (TM 9-2320-280-10).

General Safety Instructions

Diesel fuel is highly flammable. Do not perform this procedure near fire, flames, or sparks.

WARNING

Diesel fuel is highly flammable. Do not perform this procedure near fire, flames, or sparks. Severe injury or death will result.

NOTE

- Have drainage container ready to catch fuel.
- Cover or plug all open connections immediately after disconnection to prevent contamination. Remove all covers or plugs prior to connection.

a. Removal

1. Disconnect two fuel lines (5) from filter (7) and allow fuel to drain.
2. Remove two nuts (4), lockwashers (3), washers (2), screws (8), filter (7), and spacers (1) from panel (6). Discard lockwashers (3).

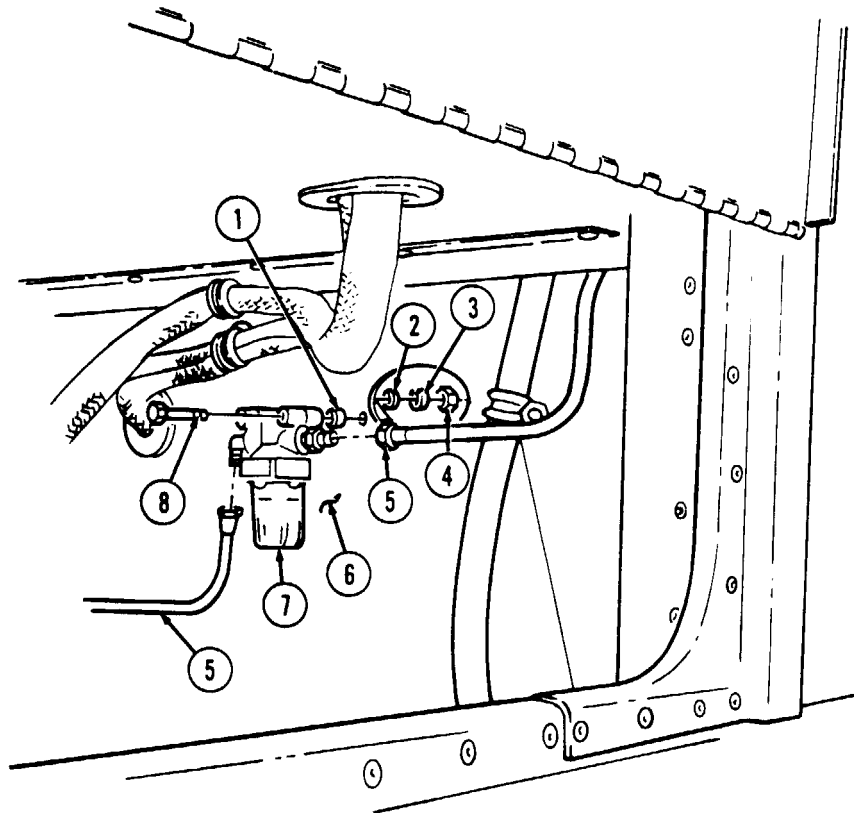
b. Installation

NOTE

Apply sealing compound to threads of all fuel line joints before installation.

1. Install two spacers (1) and filter (7) on panel (6) with two screws (8), washers (2), lockwashers (3), and nuts (4).
2. Connect two fuel lines (5) to filter (7).

11-192. HEATER FUEL FILTER REPLACEMENT (Cont'd)



- FOLLOW-ON TASKS:**
- Open fuel shut-off valve (TM 9-2320-280-10).
 - Bleed heater fuel system (para. 11-195).
 - Close stowage compartment door (TM 9-2320-280-10).

11-193. HEATER FUEL LINES REPLACEMENT

This task covers:

- | | |
|---|---|
| <ul style="list-style-type: none"> a. Heater Fuel Line Replacement b. Cab Fuel Line Replacement c. Shutoff Valve Replacement d. "B" Beam Fuel Line Replacement e. Filter Fuel Line Replacement | <ul style="list-style-type: none"> f. Bulkhead Coupling Replacement g. Bulkhead Fuel Line Replacement h. Pump Fuel Line Replacement i. Tank Fuel Line and Supply Tube Replacement |
|---|---|

INITIAL SETUP:

Applicable Models

M996, M996A1, M997, M997A1, M997A2

Manual References

TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

General Safety Instructions

Do not perform this procedure near fire, flames, or sparks.

Materials/Parts

Sealing compound (Appendix C, Item 44)
Tiedown strap (Appendix G, Item 308)

WARNING

Diesel fuel is highly flammable. Do not perform this procedure near fire, flames, or sparks. Severe injury or death will result.

NOTE

- Fuel line replacement is basically the same on M996, M996A1, M997, M997A1, and M997A2 vehicles. This procedure covers M997, M997A1, and M997A2 vehicles.
- Have drainage container ready to catch fuel.
- Apply sealing compound to threads of all fuel line joints before installation.
- Cover or plug all open connections immediately after removal to prevent contamination. Remove all covers or plugs prior to connection.

a. Heater Fuel Line Replacement

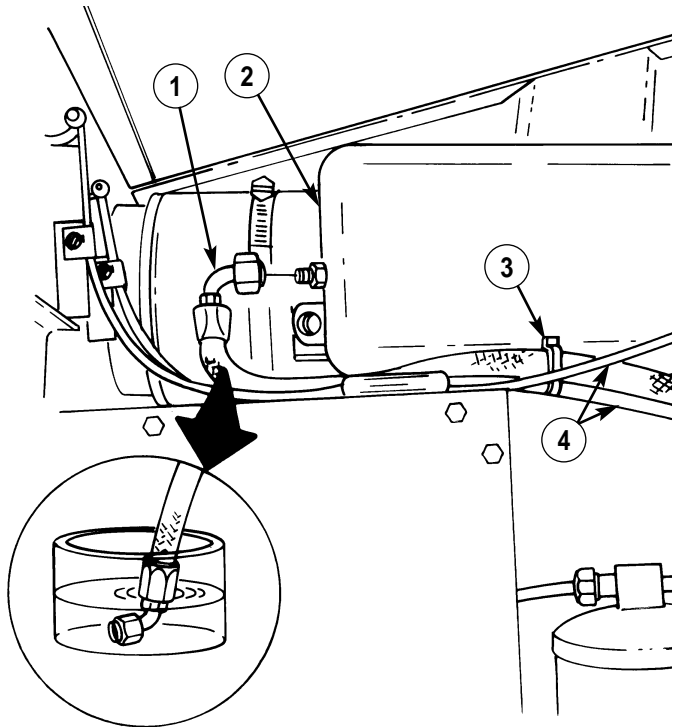
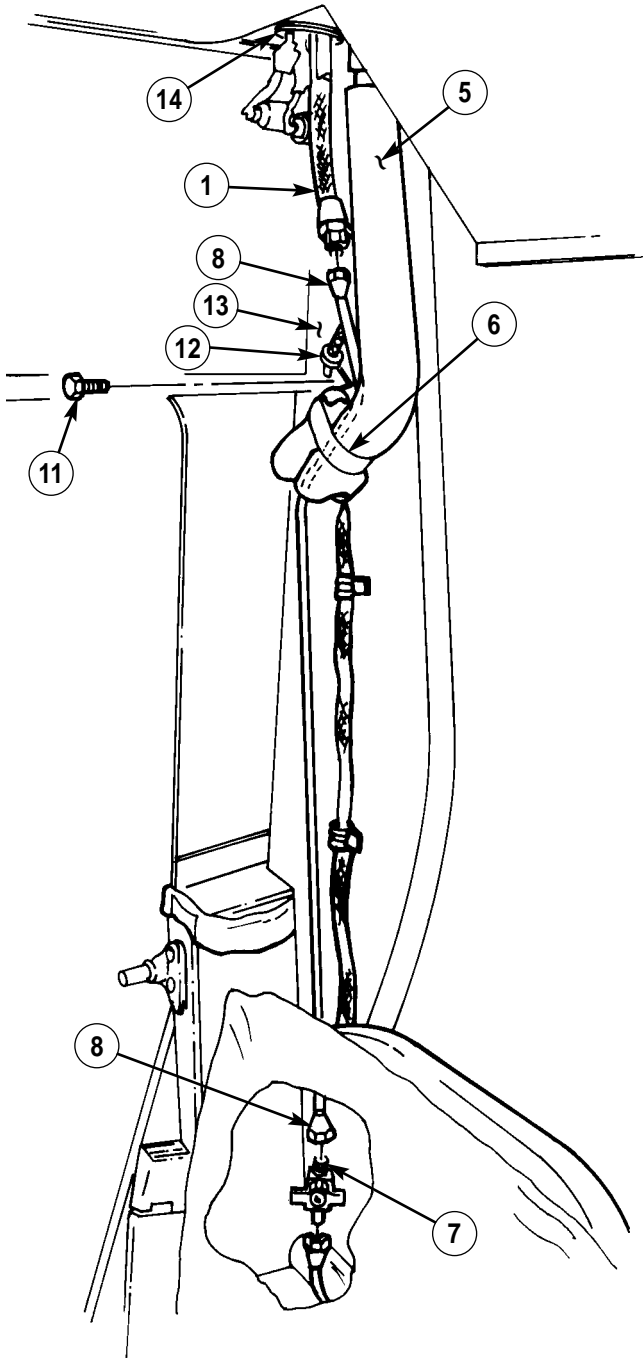
1. Open blower housing (para. 11-198).
2. Disconnect fuel line (1) from heater (2) and allow fuel to drain. Remove tiedown strap (3) from fuel line (1) and control cables (4). Discard tiedown strap (3).
3. Disconnect fuel line (1) from cab fuel line (8), allow fuel to drain, and remove fuel line (1).
4. Install fuel line (1) through grommet (14) and connect to cab fuel line (8).
5. Connect fuel line (1) to heater (2).
6. Install fuel line (1) on control cables (4) with tiedown strap (3).
7. Close blower housing (para. 11-198).

b. Cab Fuel Line Replacement

1. Remove capscrew (11), harness clamp (12), and clamp (6) from A/C lines (5), body (13), and fuel line (8).
2. Disconnect fuel line (8) from shutoff valve (7) and allow fuel to drain.
3. Disconnect fuel line (8) from heater fuel line (1) and remove fuel line (8) from vehicle.
4. Install fuel line (8) in vehicle and connect to heater fuel line (1).

11-193. HEATER FUEL LINES REPLACEMENT (Cont'd)

5. Connect fuel line (8) to shutoff valve (7).
6. Install clamp (6) on A/C lines (5), fuel line (8), and body (13) with harness clamp (12) and capscrew (11).



11-193. HEATER FUEL LINES REPLACEMENT (Cont'd)

c. Shutoff Valve Replacement

1. Disconnect cab fuel line (1) from shutoff valve (2) and allow fuel to drain.
2. Close shutoff valve (2), disconnect "B" beam fuel line (3) from shutoff valve (2), and remove shutoff valve (2).
3. Connect "B" beam fuel line (3) to shutoff valve (2).
4. Connect cab fuel line (1) to shutoff valve (2) and open valve (2).

d. "B" Beam Fuel Line Replacement

1. Close shutoff valve (2) and disconnect fuel line (3) from shutoff valve (2).
2. Disconnect fuel line (3) from filter (6), allow fuel to drain, and remove fuel line (3).
3. Connect fuel line (3) between "B" beam (5) and seal (4) and connect to filter (6).
4. Connect fuel line (3) to shutoff valve (2) and open valve (2).

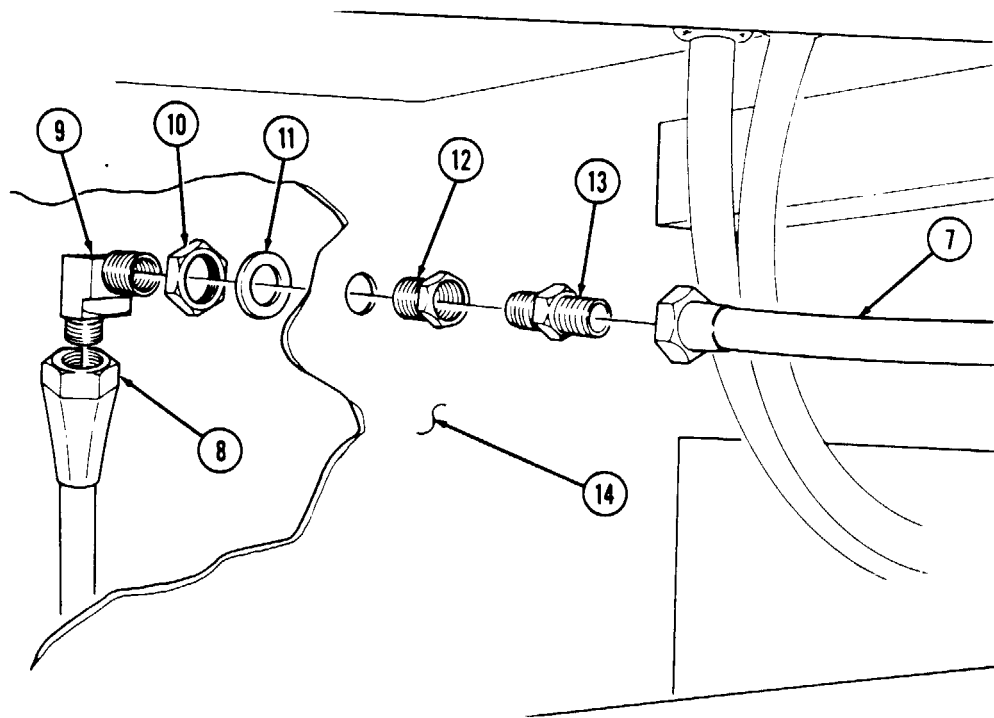
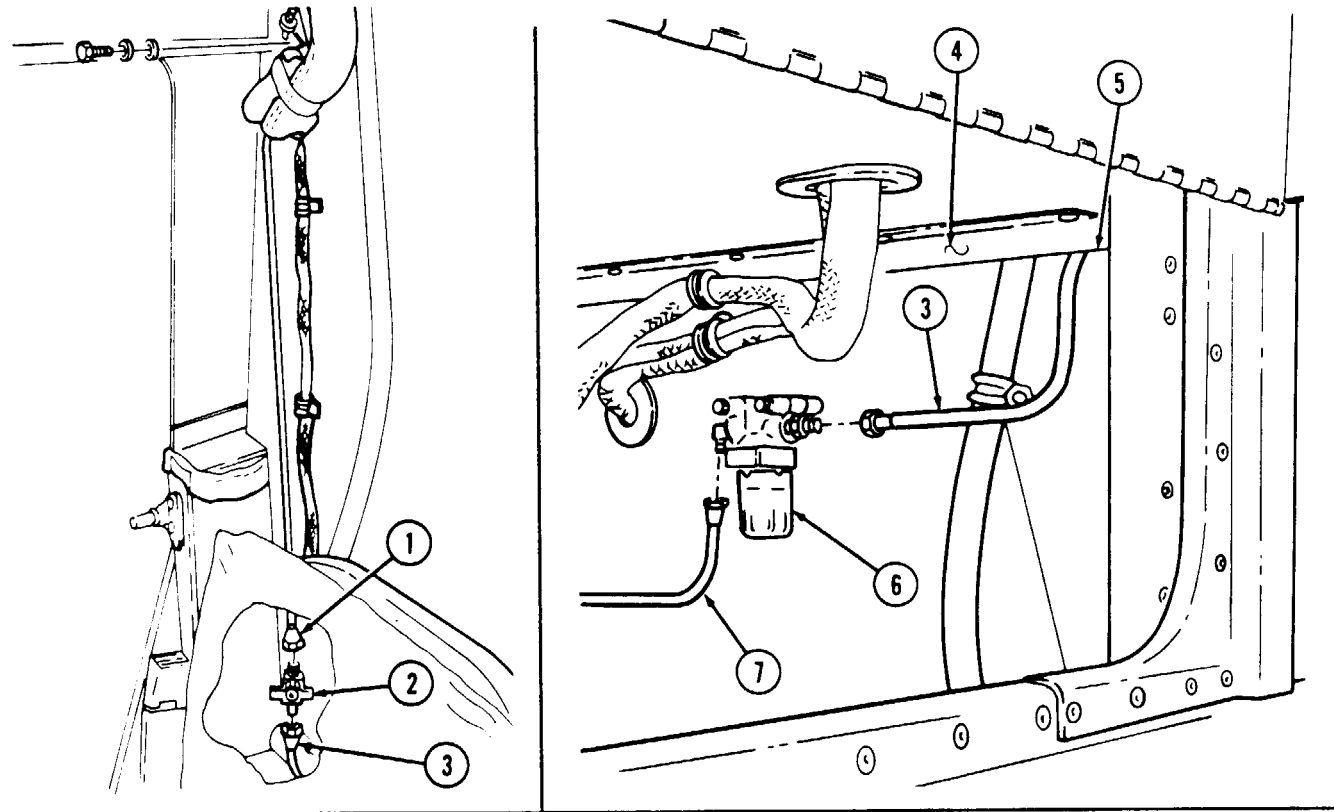
e. Filter Fuel Line Replacement

1. Disconnect fuel line (7) from filter (6) and allow fuel to drain.
2. Disconnect fuel line (7) from bulkhead connector (13).
3. Connect fuel line (7) to bulkhead connector (13).
4. Connect fuel line (7) to filter (6).

f. Bulkhead Coupling Replacement

1. Remove fuel tank (para. 3-24).
2. Disconnect filter fuel line (7) from bulkhead connector (13) and allow fuel to drain.
3. Disconnect bulkhead fuel line (8) from elbow (9).
4. Remove elbow (9) from coupling half (12).
5. Remove coupling nut (10), washer (11), and coupling half (12) from tunnel (14).
6. Remove bulkhead connector (13) from coupling half (12).
7. Install bulkhead connector (13) on coupling half (12).
8. Install coupling half (12) to tunnel (14) with washer (11) and coupling nut (10).
9. Install elbow (9) on coupling half (12).
10. Connect bulkhead fuel line (8) to elbow (9).
11. Connect filter fuel line (7) to bulkhead connector (13).
12. Install fuel tank (para. 3-24).

11-193. HEATER FUEL LINES REPLACEMENT (Cont'd)



11-193. HEATER FUEL LINES REPLACEMENT (Cont'd)

1

g. Bulkhead Fuel Line Replacement

1. Remove fuel tank (para. 3-24).
2. Disconnect fuel line (2) from elbow (6) and allow fuel to drain.
3. Disconnect fuel line (2) from pump (1) and remove fuel line (2).
4. Connect fuel line (2) to pump (1).
5. Connect fuel line (2) to elbow (6).
6. Install fuel tank (para. 3-24).

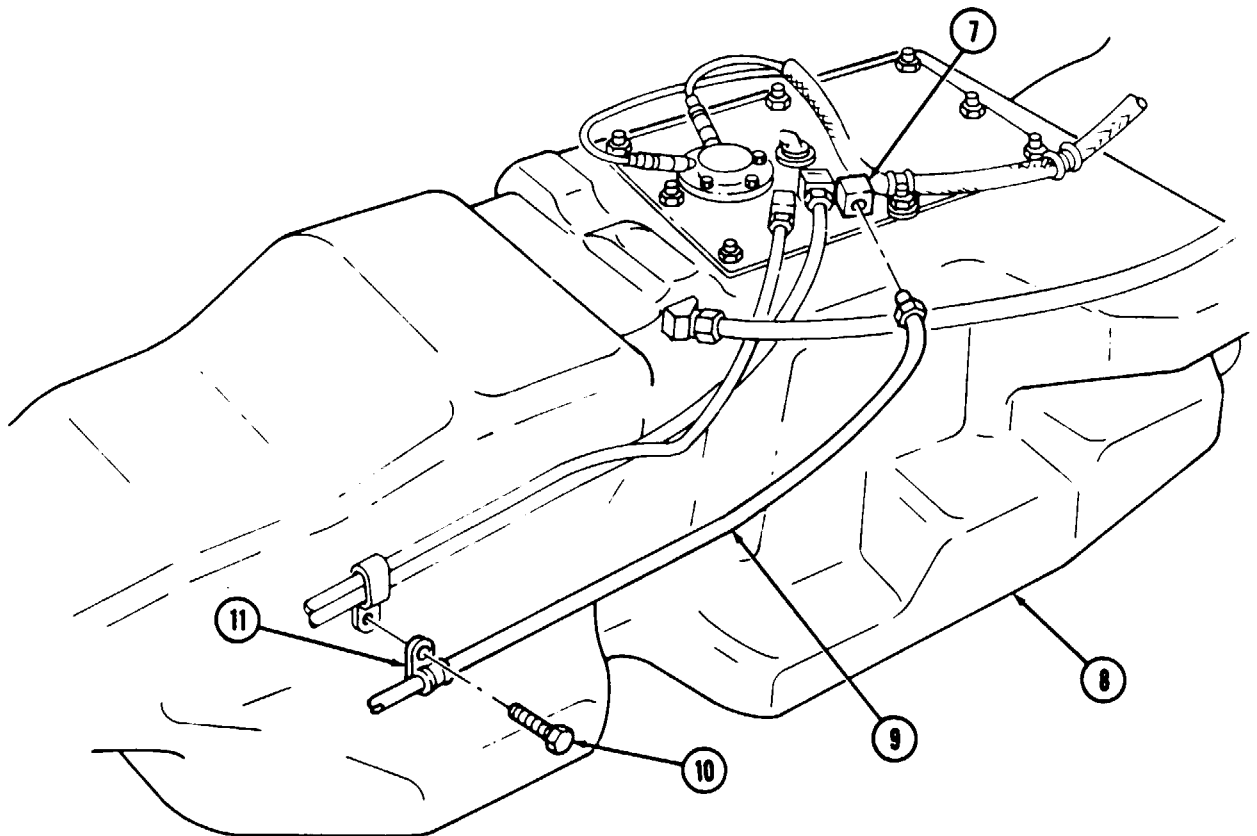
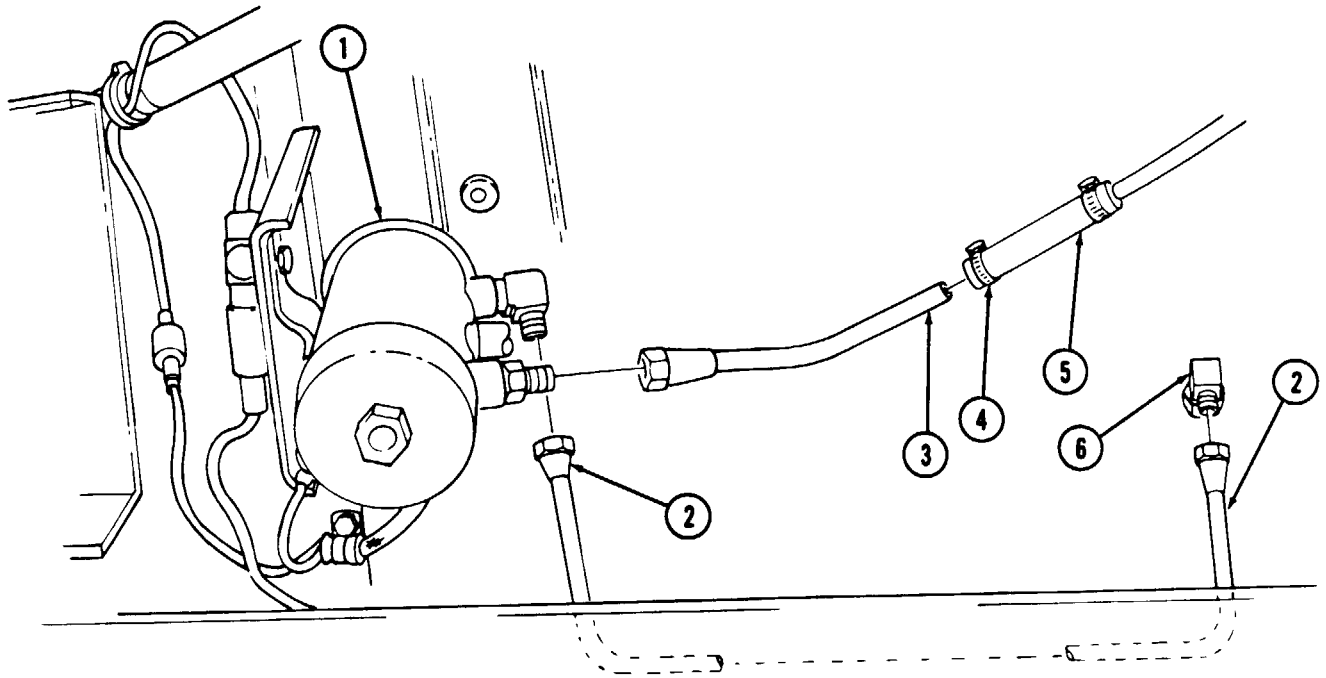
h. Pump Fuel Line Replacement

1. Loosen clamp (4) and disconnect hose (5) from fuel line (3). Allow fuel to drain.
2. Disconnect fuel line (3) from pump (1).
3. Connect fuel line (3) to pump (1).
4. Connect hose (5) to fuel line (3) and tighten clamp (4).

i. Tank Fuel Line and Supply Tube Replacement

1. Remove fuel tank (para. 3-24).
2. Remove capscrew (10) clamp (11) and fuel line (9) from tank (8).
3. Remove fuel line (9) from supply tube (7).
4. Remove supply tube (7) from tank (8).
5. Install supply tube (7) on tank (8).
6. Connect fuel line (9) to supply tube (7).
7. Install clamp (11) on fuel line (9) and tank (8) with capscrew (10).
8. Install fuel tank (para. 3-24).

11-193. HEATER FUEL LINES REPLACEMENT (Cont'd)



FOLLOW-ON TASK: Bleed heater fuel system (para. 11-195).

11-194. HEATER FUEL PUMP REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M996, M996A1, M997, M997A1, M997A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Sealing compound (Appendix C, Item 44)
Two locknuts (Appendix G, Item 70)
Tiedown strap (Appendix G, Item 308)

Manual References

TM 9-2320-280-24P

Equipment Condition

Battery ground cable disconnected (para. 4-73).

General Safety Instructions

Do not perform this procedure near fire, flames, or sparks.

WARNING

Diesel fuel is highly flammable. Do not perform this procedure near fire, flames, or sparks. Severe injury or death will result.

NOTE

- Have drainage container ready to catch fuel.
- Cover or plug all open connections immediately after disconnection to prevent contamination. Remove covers or plugs prior to connection.
- Apply sealing compound to threads of all fuel line joints before installation.

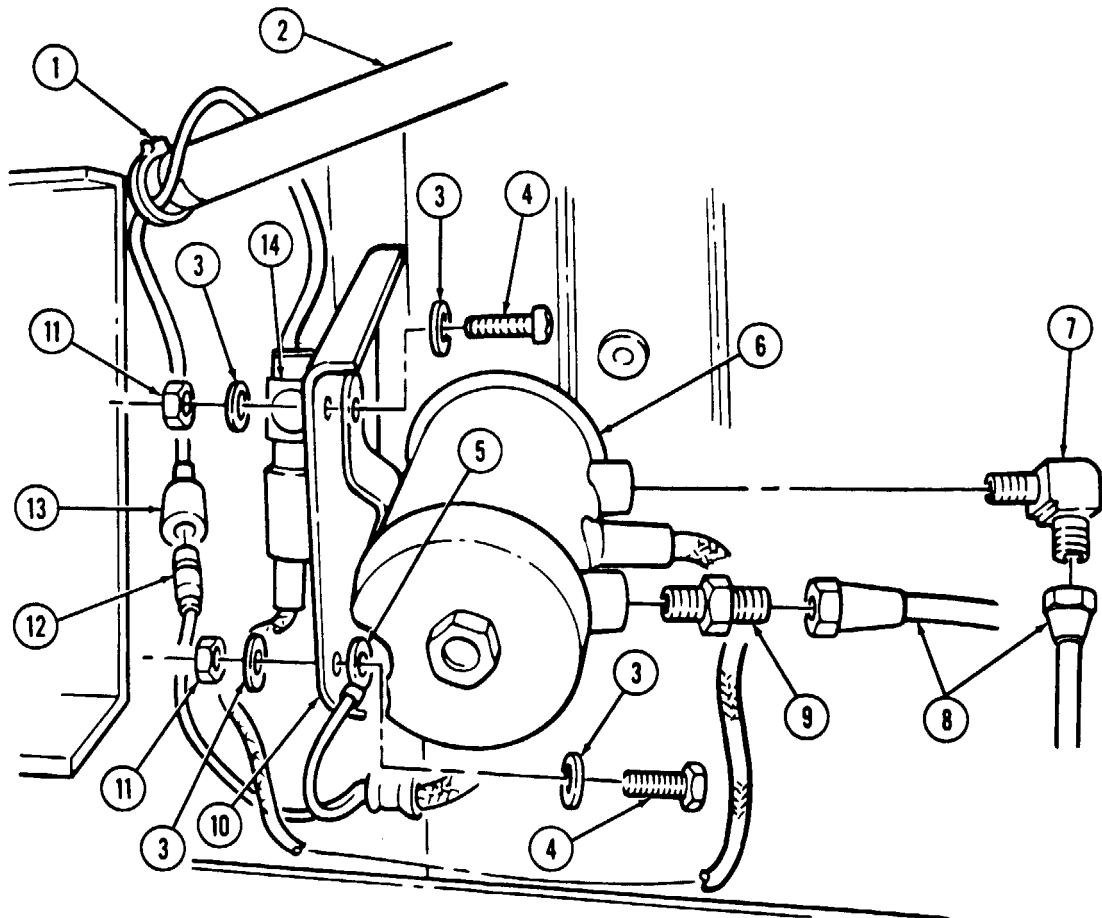
a. Removal

1. Disconnect two fuel lines (8) from elbow (7) and fitting (9) and allow fuel to drain.
2. Remove tiedown strap (1) from fuel pump lead (13) and dipstick tube (2). Discard tiedown strap (1).
3. Disconnect fuel pump lead (13) from control box lead (12).
4. Remove two locknuts (11), washers (3), capscrews (4), washers (3), fuel pump (6), and ground terminal (5) from capacitor clamp (14) and bracket (10). Discard locknuts (11).
5. Remove elbow (7) and fitting (9) from fuel pump (6).

b. Installation

1. Install elbow (7) and fitting (9) on fuel pump (6).
2. Install fuel pump (6) on bracket (10) and capacitor clamp (14) with ground terminal (5), two washers (3), capscrews (4), washers (3), and locknuts (11).
3. Connect two fuel lines (8) to elbow (7) and fitting (9).
4. Connect fuel pump lead (13) to control box lead (12) and install fuel pump lead (13) on dipstick tube (2) with tiedown strap (1).

11-194. HEATER FUEL PUMP REPLACEMENT (Cont'd)



- FOLLOW-ON TASKS:
- Connect battery ground cable (para. 4-73).
 - Bleed heater fuel system (para. 11-195).

11-195. HEATER FUEL SYSTEM BLEEDING

This task covers:

Bleeding

INITIAL SETUP:

Applicable Models

M997, M997A1, M997A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Sealing compound (Appendix C, Item 45)

Personnel Required

One mechanic
One assistant

Manual References

TM 9-2320-280-24P

Equipment Condition

Blower housing open (para. 11-198).

General Safety Instructions

Do not perform this procedure near fire, flames, or sparks.

WARNING

Diesel fuel is highly flammable. Do not perform this procedure near fire, flames, or sparks. Severe injury or death will result.

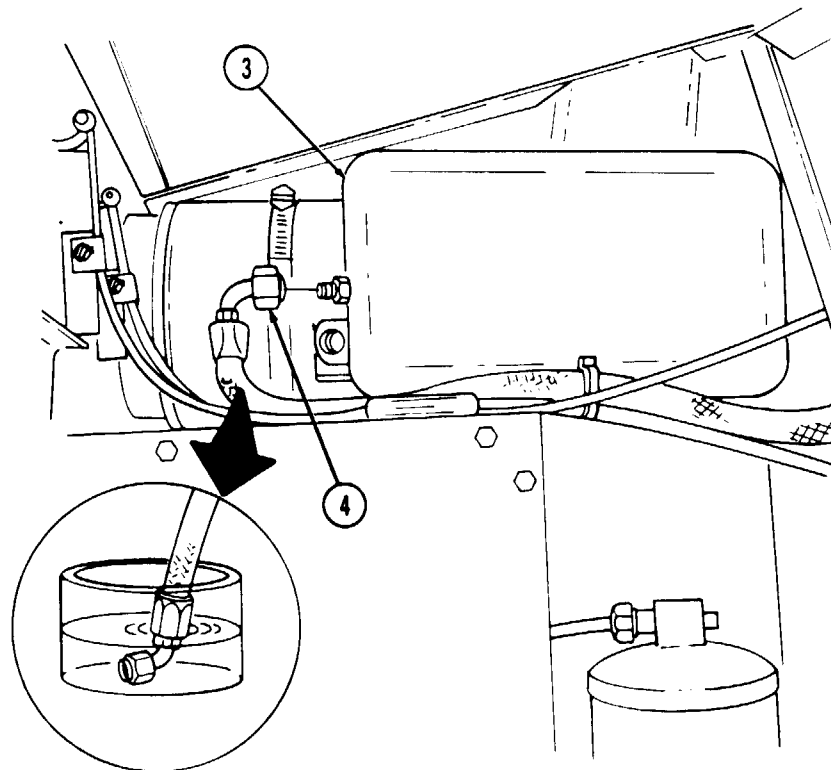
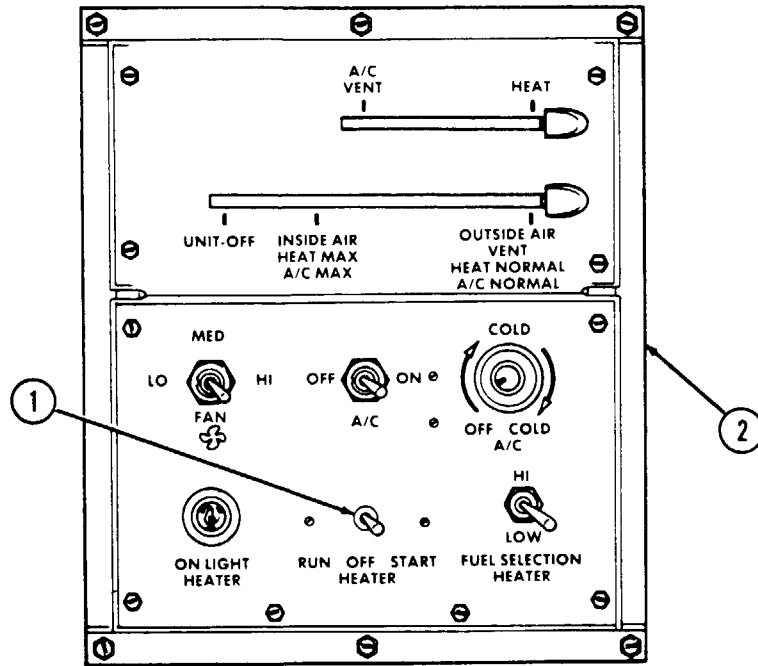
NOTE

- Have drainage container ready to catch fuel.
- Apply compound to threads of all fuel line joints before **installation**.

Bleeding

1. Disconnect heater fuel line (4) from heater (3).
2. Place end of fuel line (4) in drainage container.
3. Place heater rotary switch (1) on control box (2) to "RUN" position. Hold switch (1) in "RUN" position until fuel flows free of air bubbles.
4. Place switch (1) to "OFF" position.
5. Connect fuel line (4) to heater (3).

11-195. HEATER FUEL SYSTEM BLEEDING (Cont'd)



FOLLOW-ON TASK: Close blower housing (para. 11-198).

11-196. FLOOR HEAT DUCT LOUVER REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M997, M997A1, M997A2

Manual Reference

TM 9-2320-280-24P

Tools

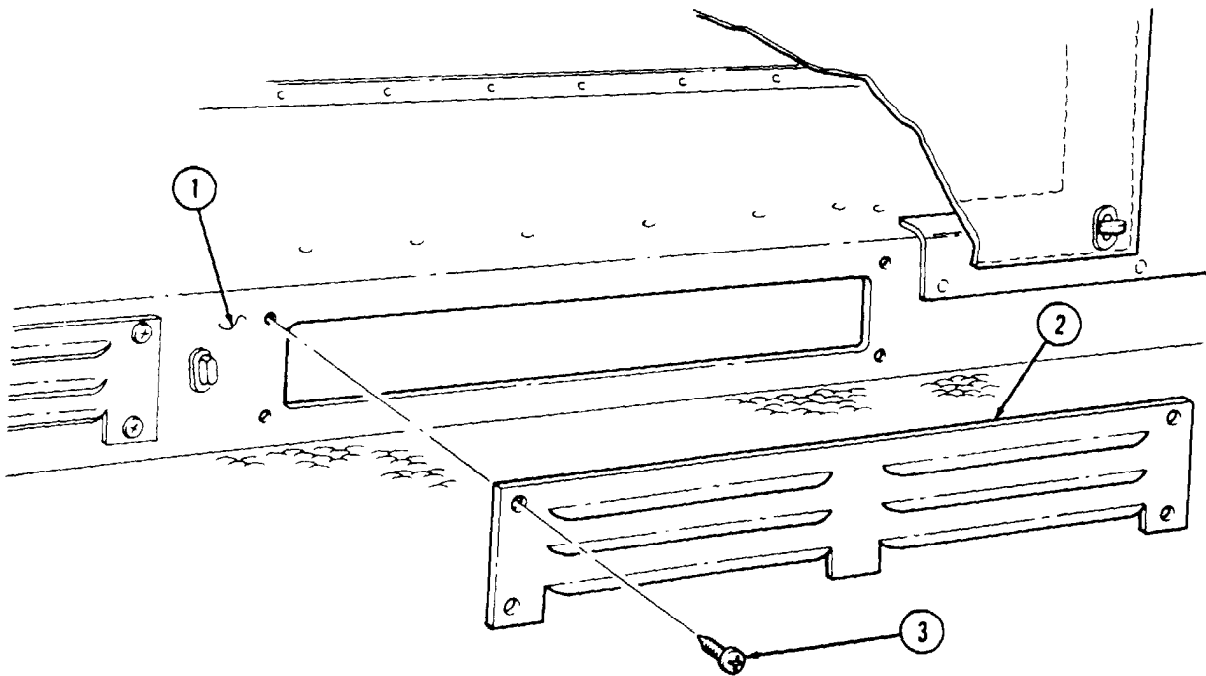
General mechanic's tool kit:
automotive (Appendix B, Item 1)

a. Removal

Remove four screws (3) and louver (2) from floor heat duct (1).

b. Installation

Install louver (2) on floor heat duct (1) with four screws (3).



11-197. BLOWER MOTOR RESISTOR REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M996, M996A1, M997, M997A1, M997A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-24P

Equipment Condition

- Battery ground cable disconnected (para. 4-73).
- Blower housing open (para. 11-198).
- Heater compartment panel removed (M996 and M996A1 vehicles only) (para. 11-204).

NOTE

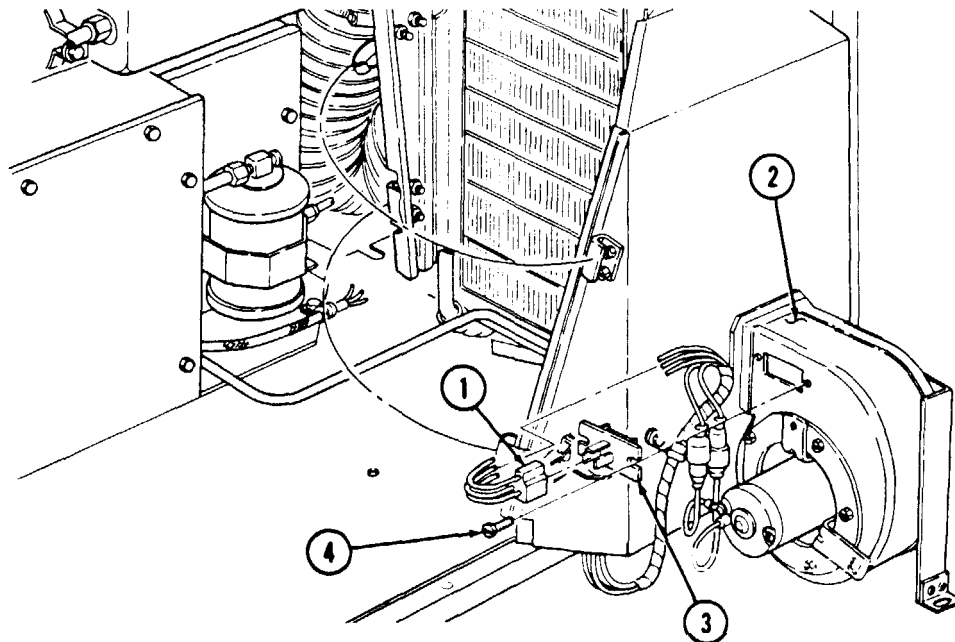
M996, M996A1, M997, M997A1, and M997A2 blower motor resistors are replaced basically the same. This procedure covers M997, M997A1, and M997A2 vehicles only.

a. Removal

1. Disconnect plug (1) from resistor (3).
2. Remove two screws (4) and resistor (3) from blower housing (2).

b. Installation

1. Install resistor (3) on blower housing (2) with two screws (4).
2. Connect plug (1) to resistor (3).



- FOLLOW-ON TASKS:
- Close blower housing (para. 11-198).
 - Connect battery ground cable (para. 4-73).
 - Heater compartment panel installed (M996 and M996A1 vehicles only) (para. 11-204).

11-198. BLOWER MOTOR AND HOUSING MAINTENANCE

This task covers:

- | | |
|---|---|
| <ul style="list-style-type: none"> a. Opening Blower Housing b. Closing Blower Housing c. Blower Housing Removal | <ul style="list-style-type: none"> d. Blower Housing Installation e. Blower Motor Removal f. Blower Motor Installation |
|---|---|

INITIAL SETUP:

Applicable Models

M997, M997A1, M997A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Six lockwashers (Appendix G, Item 159)
Plain-assembled nut (Appendix G, Item 201)
Plain-assembled nut (Appendix G, Item 204)

Manual References

TM 9-2320-280-24P

Equipment Condition

- Rear cover panel removed (para. 11-188).
- Battery ground cable disconnected (para. 4-73).

a. Opening Blower Housing

1. Remove plain-assembled nut (3) and capscrew (11) from blower housing (2) and body (13). Discard plain-assembled nut (3).
2. Release two latches (14) from blower housing (2) and evaporator duct (1) and swing blower housing (2) open.

b. Closing Blower Housing

1. Swing blower housing (2) closed and secure to evaporator duct (1) with two latches (14).
2. Install blower housing (2) on body (13) with capscrew (11) and plain-assembled nut (3).

c. Blower Housing Removal

1. Perform step a.

NOTE

Prior to removal, tag leads for installation.

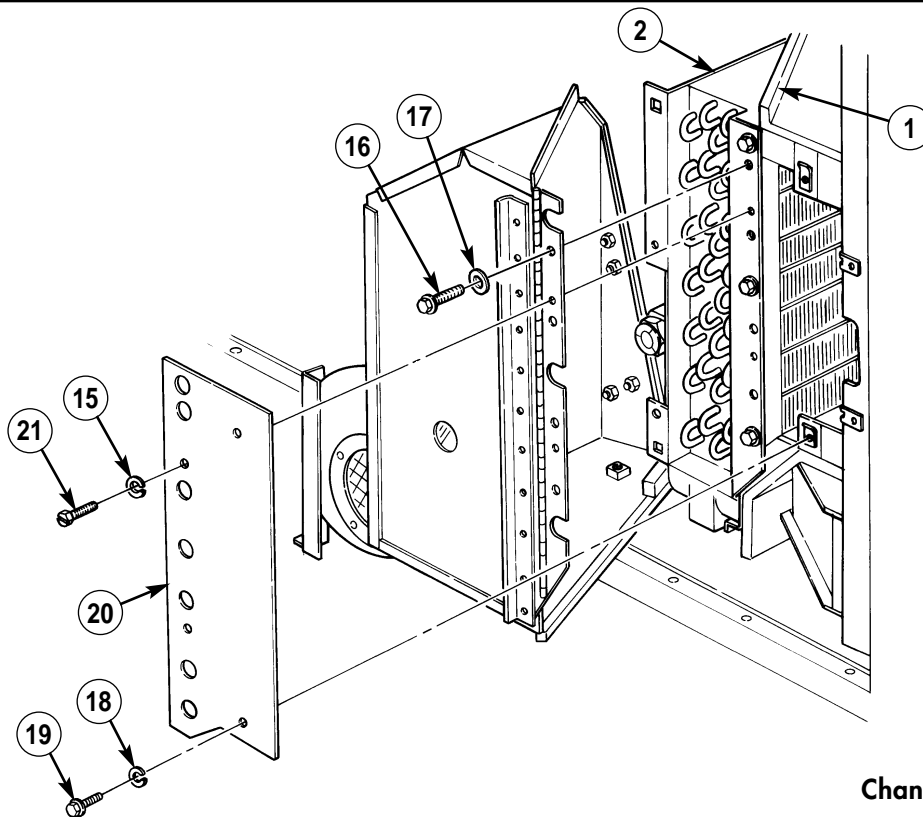
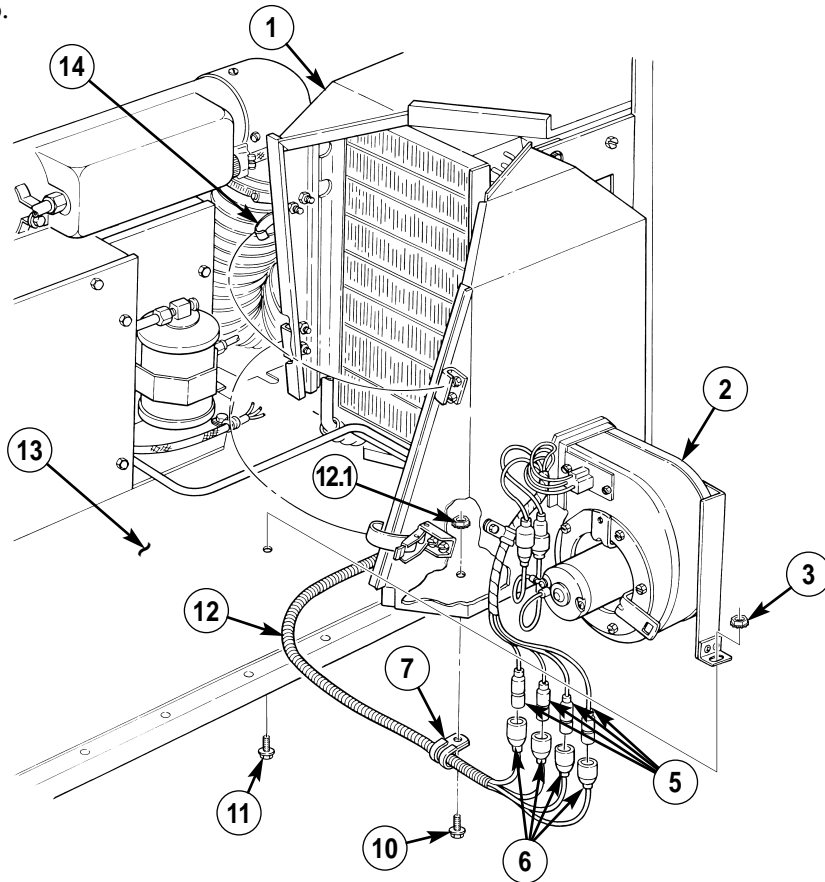
2. Disconnect four control box leads (6) from blower motor leads (5).
3. Remove plain-assembled nut (12.1), capscrew (10), and clamp (7) from blower housing (2). Discard plain-assembled nut (12.1).
4. Remove two capscrews (19) and lockwashers (18) from plate (20) and evaporator duct (1). Discard lockwashers (18).
5. Remove two screws (21), lockwashers (15), and plate (20) from blower housing (2) and evaporator duct (1). Discard lockwashers (15).
6. Remove four capscrews (16), washers (17), and blower housing (2) from evaporator duct (1).

d. Blower Housing Installation

1. Install blower housing (2) on evaporator duct (1) with four lockwashers (17) and capscrews (16).
2. Install plate (20) on blower housing (2) and evaporator duct (1) with two lockwashers (15) and screws (21).
3. Install plate (20) on evaporator duct (1) with two lockwashers (18) and capscrews (19).
4. Install clamp (7) and control box harness (12) on blower housing (2) with capscrew (10) and plain-assembled nut (12.1).

11-198. BLOWER MOTOR AND HOUSING MAINTENANCE (Cont'd)

5. Connect four control box leads (6) to blower motor leads (5).
6. Perform step b.



11-198. BLOWER MOTOR AND HOUSING MAINTENANCE (Cont'd)

a Blower Motor Removal

1. Perform step a.

NOTE

Prior to removal, tag leads for installation.

2. Disconnect two blower motor leads (10) from leads (1).
3. Remove five screws (8), blower motor (9), and bracket (7) from housing (2).
4. Remove setscrew (4) and fan (3) from motor (9).
5. Remove two nuts (5), lockwashers (6), and motor (9) from motor bracket (7). Discard lockwashers (6).

f. Blower Motor Installation

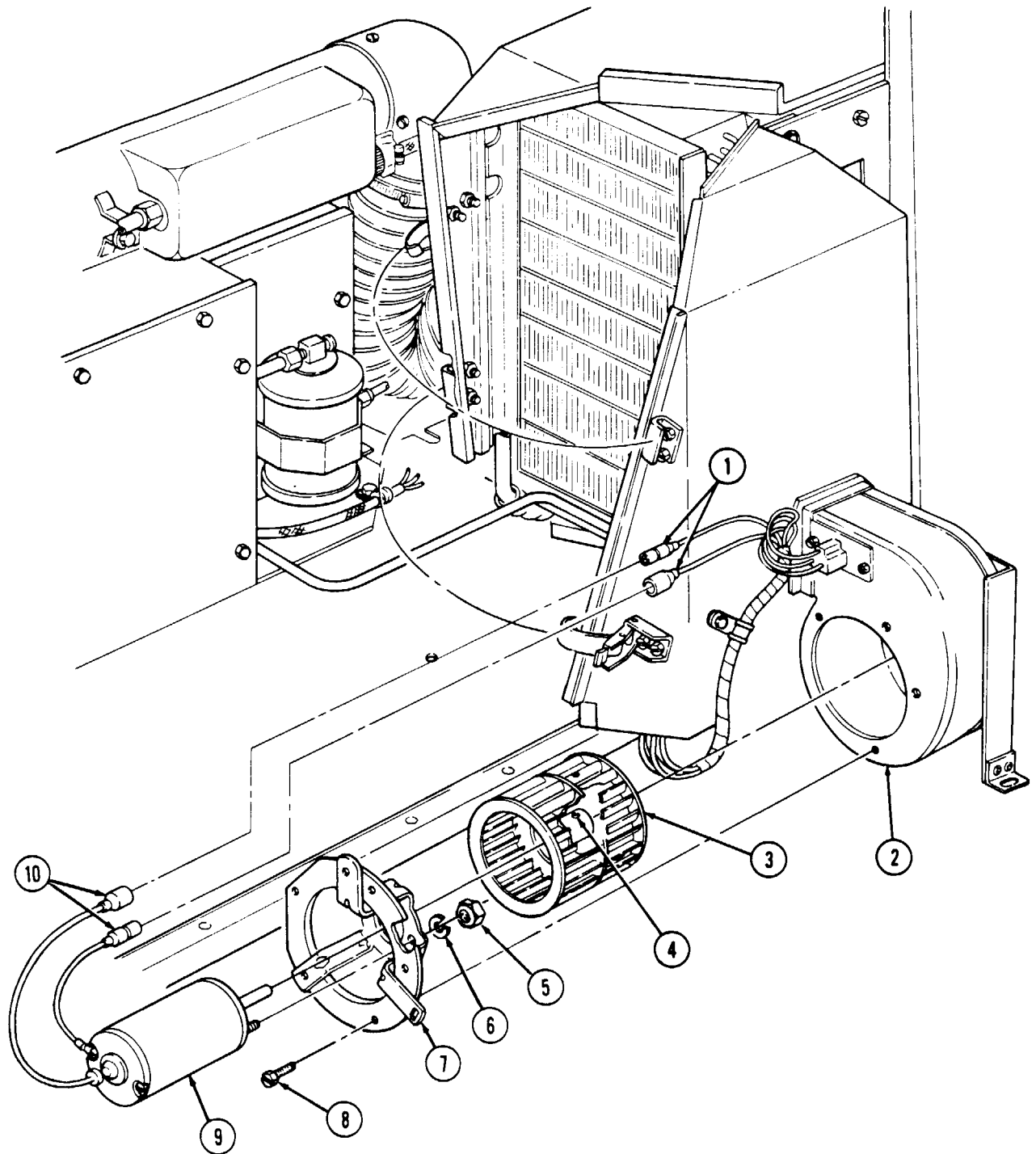
1. Install motor (9) on motor bracket (7) with two lockwashers (6) and nuts (5).
2. Install fan (3) on motor (9) with setscrew (4).

NOTE

Ensure fan rotates freely before securing.

3. Install blower motor (9) on housing (2) with five screws (8).
4. Connect two blower motor leads (10) to leads (1).
5. Perform step b.

11-198. BLOWER MOTOR AND HOUSING MAINTENANCE (Cont'd)



FOLLOW-ON TASKS:

- Install rear cover panel (para. 11-188).
- Connect battery ground cable (para. 4-73).

11-199. DUCT DOOR CONTROL CABLES MAINTENANCE

This task covers:

- | | |
|--|--|
| <ul style="list-style-type: none"> a. Evaporator Intake Cable Removal b. Evaporator Intake Cable Installation c. Heater/Air-Conditioning Outlet Cable Removal d. Heater/Air-Conditioning Outlet Cable Installation | <ul style="list-style-type: none"> e. Heater Intake Cable Removal f. Heater Intake Cable Installation g. Cable Adjustment |
|--|--|

INITIAL SETUP:

Applicable Models

M997, M997A1, M997A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Six lockwashers (Appendix G, Item 138)
Two push on nuts (Appendix G, Item 226)
Four lockwashers (Appendix G, Item 159)
Four push on nuts (Appendix G, Item 227)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

- Blower housing open (para. 11-198).
- Battery ground cable disconnected (para. 4-73).
- Control box levers positioned to UNIT OFF and A/C-VENT (TM 9-2320-280-10).

a. Evaporator Intake Cable Removal

1. Remove push on nut (3) and disconnect cable loop (5) from duct door arm (6). Discard push on nut (3).
2. Remove screw (1), lockwasher (2), and cable (7) from intake assembly (4). Discard lockwasher (2).
3. Remove push on nut (9) from cable loop (8) and control lever pin (10). Discard push on nut (9).
4. Remove screw (12), lockwasher (13), and cable (7) from control box bracket (11), and disconnect cable loop (8) from control lever pin (10). Discard lockwasher (13).

b. Evaporator Intake Cable Installation

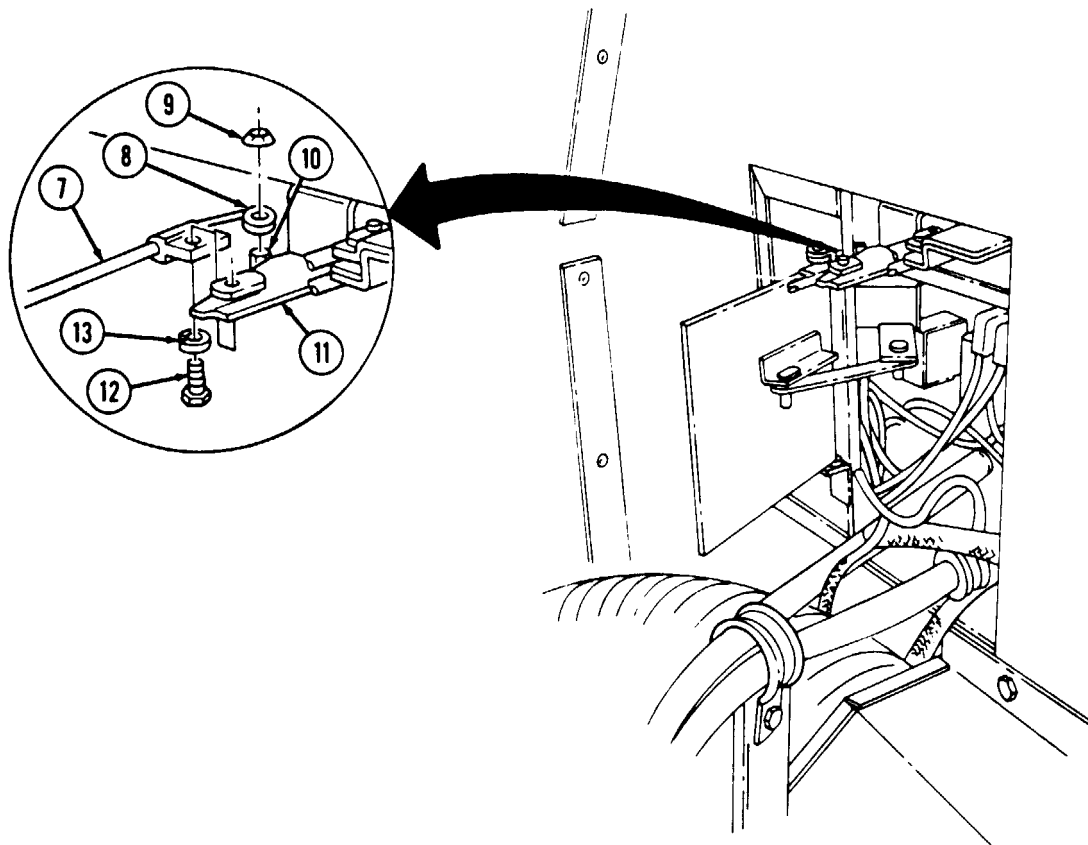
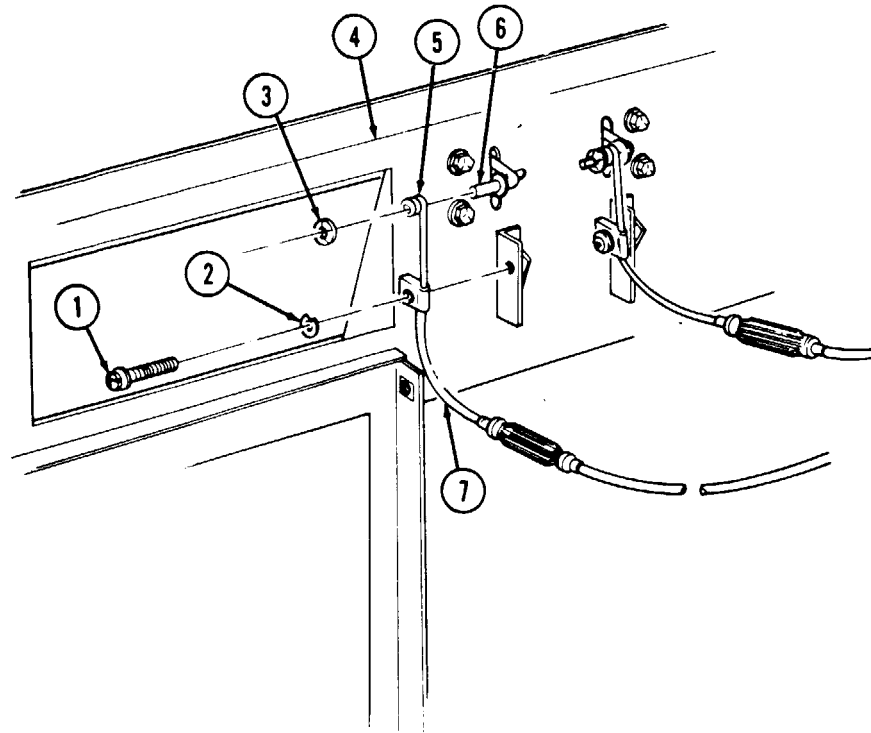
1. Connect cable loop (8) on control lever pin (10) with push on nut (9).

NOTE

It may be necessary to adjust turnbuckle on cable to align control cable clamp with control box bracket.

2. Install cable (7) on control box bracket (11) with lockwasher (13) and screw (12).
3. Connect cable loop (5) on duct door arm (6) with push on nut (3).
4. Install cable (7) on intake assembly (4) with lockwasher (2) and screw (1).
5. Proceed to Cable Adjustment, g. 2.

11-199. DUCT DOOR CONTROL CABLES MAINTENANCE (Cont'd)



11-199. DUCT DOOR CONTROL CABLES MAINTENANCE (Cont'd)

c. Heater/Air-Conditioning Outlet Cable Removal

1. Remove two screws (4) and lockwashers (3) from plate (2) and evaporator duct (1). Discard lockwashers (3).
2. Remove two capscrews (7), lockwashers (8), and plate (2) from evaporator duct (1). Discard lockwashers (8).
3. Remove screw (6) and lockwasher (9) from cable (10) and evaporator duct (1). Discard lockwasher (9).
4. Remove push on nut (5) and cable loop (11) from duct door arm (12). Discard push on nut (5).
5. Remove push on nut (23) from cable loop (22) and control lever pin (21). Discard push on nut (23).
6. Remove screw (25) and lockwasher (24) from cable (10) and control box bracket (20), and disconnect cable loop (22) from control lever pin (21). Discard lockwasher (24).

d. Heater/Air-Conditioning Outlet Cable Installation

1. Connect cable loop (22) on control lever pin (21) with push on nut (23).

NOTE

It may be necessary to adjust turnbuckle on cable to align control cable clamp with control box bracket.

2. Install cable (10) on control box bracket (20) with lockwasher (24) and screw (25).
3. Install cable (10) on evaporator duct (1) with lockwasher (9) and screw (6).
4. Connect cable loop (11) on duct door arm (12) with push on nut (5).
5. Proceed to Cable Adjustment, g. 3 (c).

e. Heater Intake Cable Removal

1. Remove push on nut (13) and cable loop (14) from duct door arm (15). Discard push on nut (13).
2. Remove screw (19), lockwasher (18), and cable (17) from intake assembly (16). Discard lockwasher (18).
3. Remove push on nut (23) and cable loop (22) from control lever pin (21). Discard push on nut (23).
4. Remove screw (25), lockwasher (24), and cables (10) and (17) from control box bracket (20) and disconnect cable loop (22) from control lever pin (21). Discard lockwasher (24).
5. Disconnect cable loop (26) from control lever pin (21) and slide cable (17) out from bracket (20).

f. Heater Intake Cable Installation

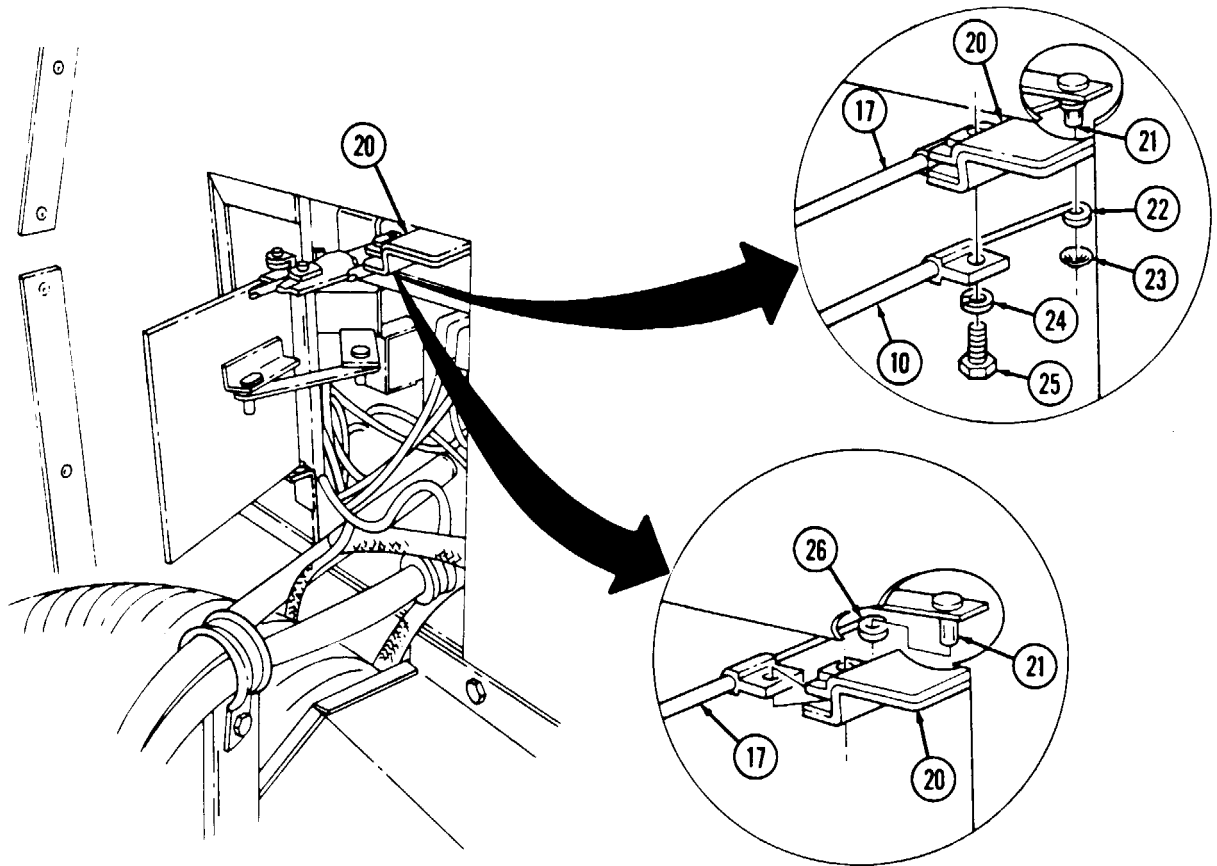
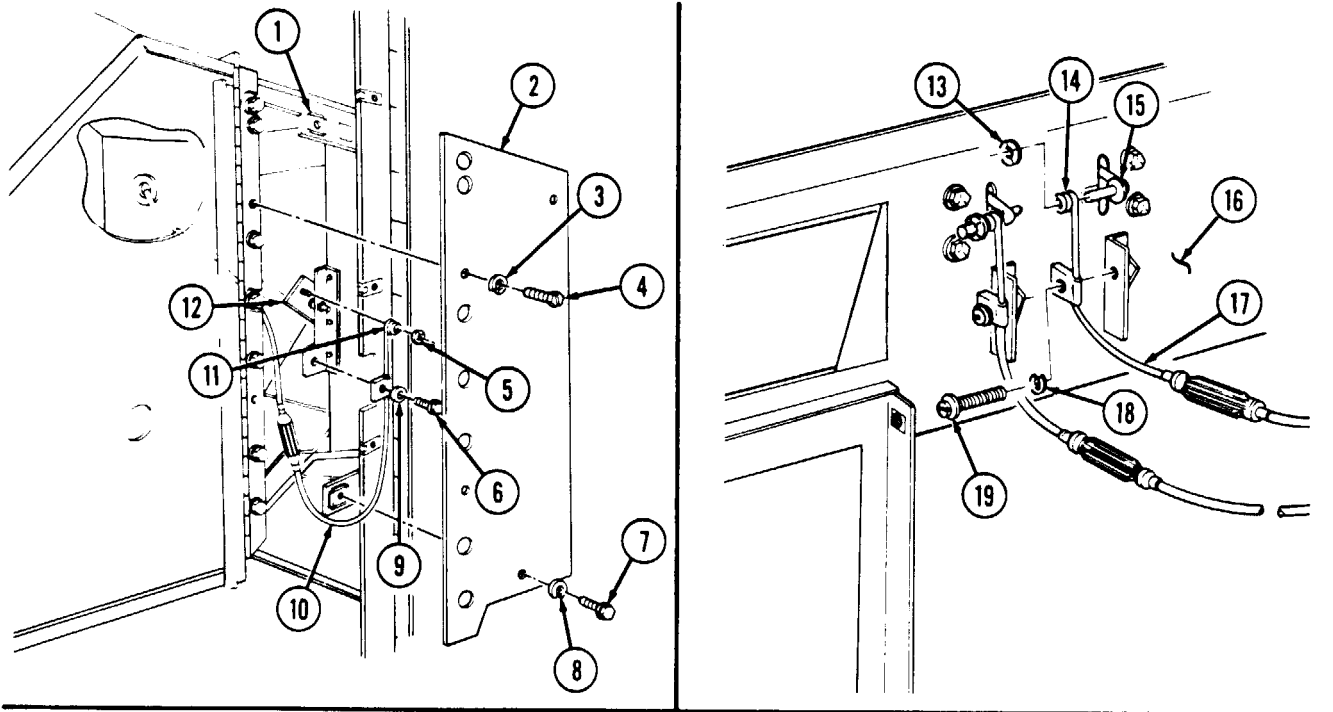
1. Slide cable (17) through bracket (20) and connect cable loop (26) on control lever pin (21).
2. Connect cable loop (22) to control lever pin (21) with push on nut (23).

NOTE

It may be necessary to adjust turnbuckle on cable to align control cable clamp with control box bracket.

3. Install cable (10) on control box bracket (20) and install cables (10) and (17) with lockwasher (24) and screw (25).
4. Connect cable loop (14) on duct door arm (15) with push on nut (13).
5. Install cable (17) on intake assembly (16) with lockwasher (18) and screw (19).
6. Proceed to Cable Adjustment, g. 1.

11-199. DUCT DOOR CONTROL CABLES MAINTENANCE (Cont'd)



11-199. DUCT DOOR CONTROL CABLES MAINTENANCE (Cont'd)

g. Cable Adjustment

1. Heater intake cable adjustment.

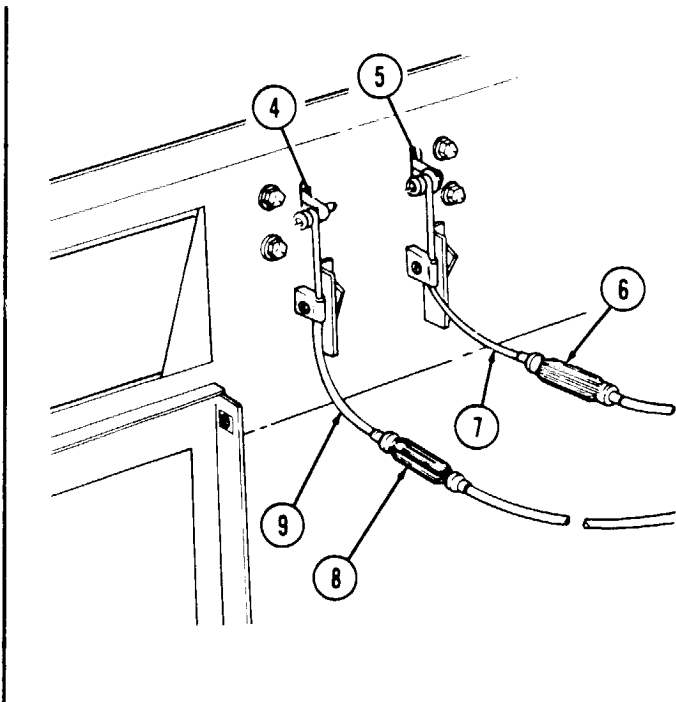
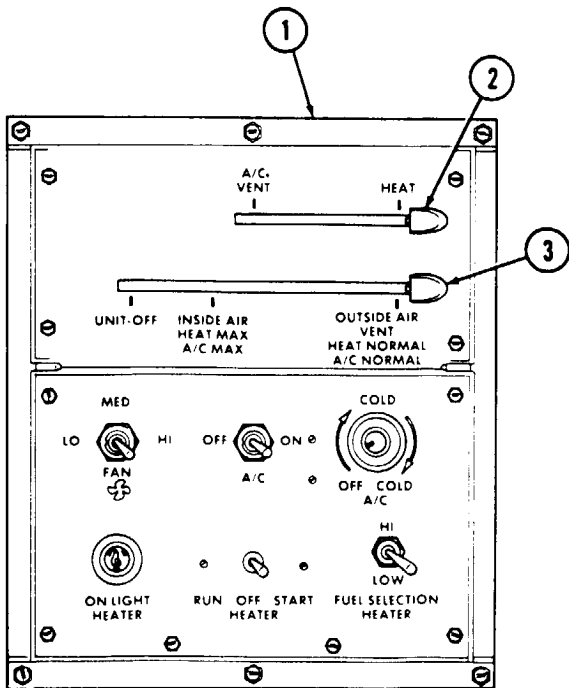
- (a) Place top lever (2) on control box (1) in A/C-VENT position.
- (b) Adjust turnbuckle (6) on cable (7) until duct door arm (5) is all the way up (duct door fully closed).

2. Evaporator intake cable adjustment.

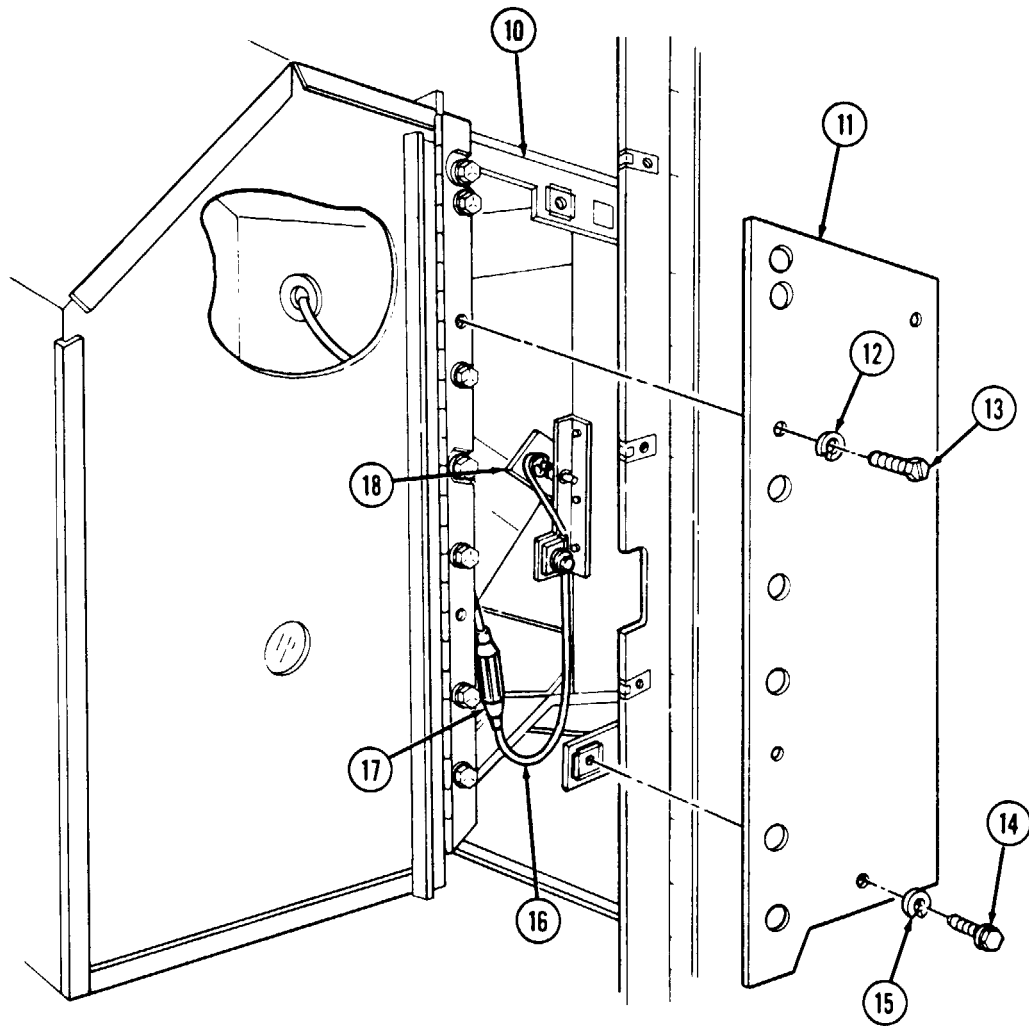
- (a) Place bottom lever (3) on control box (1) in UNIT OFF position.
- (b) Adjust turnbuckle (8) on cable (9) until duct door arm (4) is all the way up (duct door fully closed).

3. Heater/air-conditioning outlet cable adjustment.

- (a) Remove two screws (13) and lockwashers (12) from plate (11) and evaporator duct (10). Discard lockwashers (12).
- (b) Remove two capscrews (14), lockwashers (15), and plate (11) from evaporator duct (10). Discard lockwashers (15).
- (c) Place top lever (2) on control box (1) in HEAT position.
- (d) Adjust turnbuckle (17) on control cable (16) until duct door arm (18) is all the way down (duct door all the way up).
- (e) Place top lever (2) on control box (1) in A/C-VENT position.
- (f) Adjust turnbuckle (17) on control cable (16) until duct door arm (18) is all the way up (duct door all the way down).
- (g) Install plate (11) on evaporator duct (10) with two lockwashers (15) and capscrews (14).
- (h) Install plate (11) on evaporator duct (10) with two lockwashers (12) and screws (13).



11-199. DUCT DOOR CONTROL CABLES MAINTENANCE (Cont'd)



- FOLLOW-ON TASKS:
- Close blower housing (para. 11-198).
 - Connect battery ground cable (para. 4-73).

11-200. EVAPORATOR DRAIN TUBE REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M997, M997A1, M997A2

Materials/Parts

Tiedown strap (Appendix G, Item 309)

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-24P

Equipment Condition

Blower housing open (para. 11-198).

a. Removal

NOTE

Perform steps 1 through 3 for old configuration only.

1. Disconnect flex tube (2) from evaporator drain pan (1).
2. Disconnect flex tube (2) from nipple (3).
3. Remove clamp (4) and nipple (3) from drain tube (5).

NOTE

Perform steps 4 through 8 for new configuration only.

4. Remove clamp (10) from drain tube (5).
5. Remove elbow (9) from drain tube (5).
6. Remove clamps (6) and (7) from hose (8).
7. Remove elbow (9) from hose (8).
8. Disconnect hose (8) from evaporator drain pan (1).
9. Remove tiedown strap (12) from harness (13) and drain tube (5). Discard tiedown strap (12).
10. Remove screw (14), clamp (17), and drain tube (5) from body (15).
11. Pull drain tube (5) through cab ceiling grommet (11) and cab floor grommet (16).

b. Installation

1. Install drain tube (5) through cab floor grommet (16) and cab ceiling grommet (11). Allow approximately 2 in. (5 cm) of drain tube (5) to extend through cab floor grommet (16).
2. Install drain tube (5) on body (15) with clamp (17) and screw (14).
3. Install drain tube (5) on harness (13) with tiedown strap (12).

NOTE

Perform steps 4 through 6 for new configuration only.

4. Connect hose (8) to evaporator drain pan (1) with clamp (7).
5. Install elbow (9) on hose (8) with clamp (6).
6. Install elbow (9) on drain tube (5) with clamp (10).

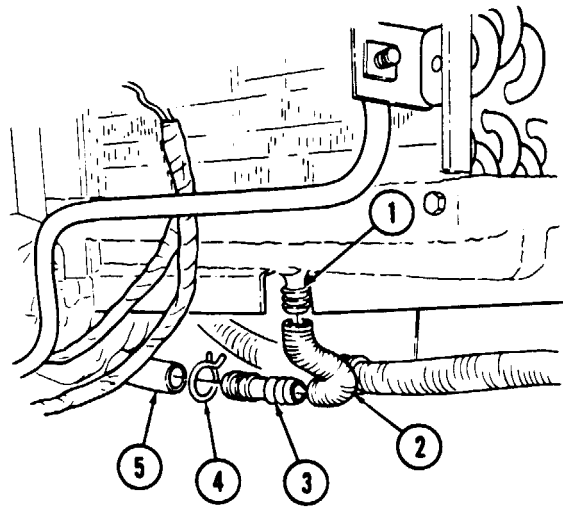
NOTE

Perform steps 7 through 9 for old configuration only.

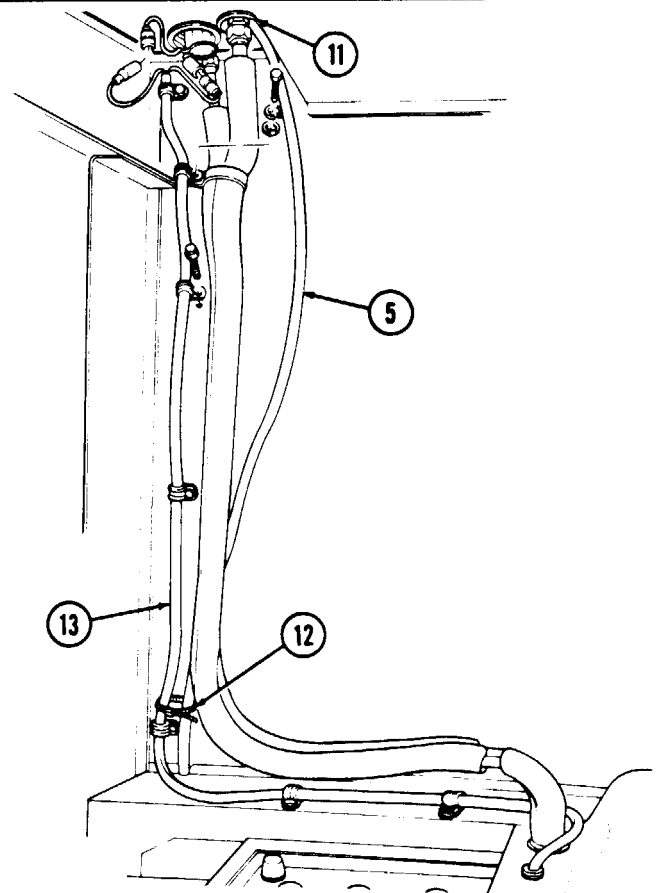
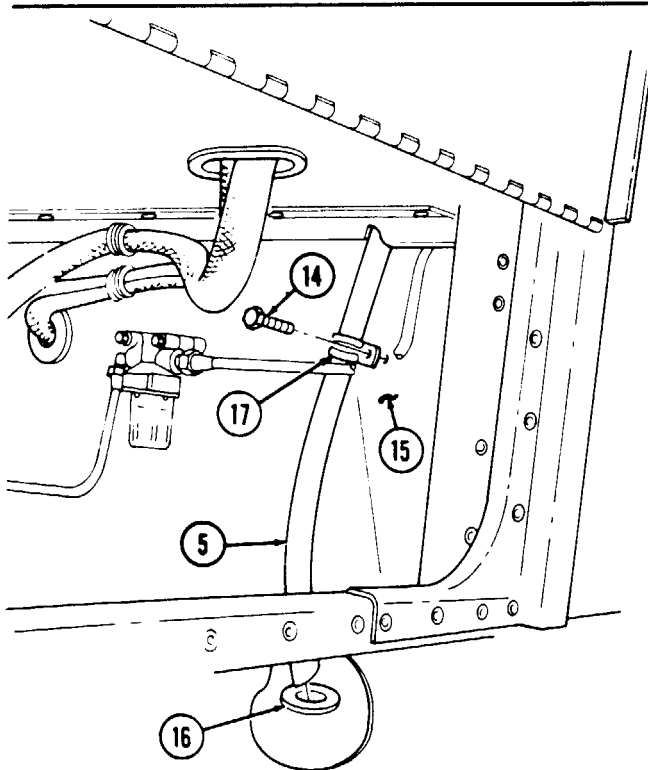
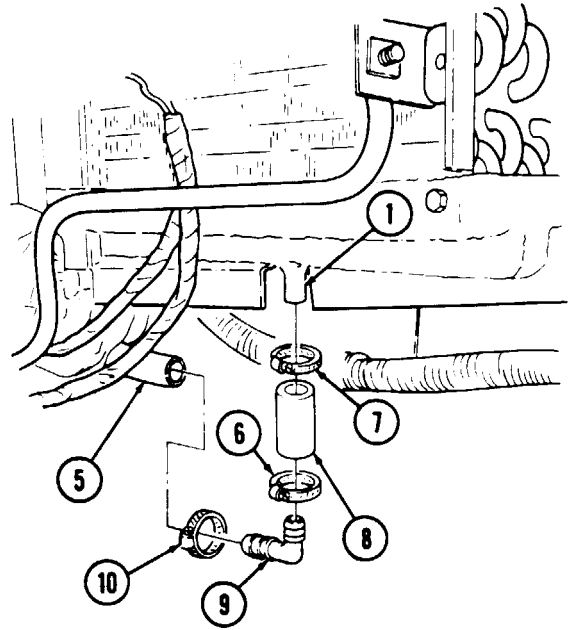
7. Install nipple (3) in drain tube (5) with clamp (4).
8. Connect flex tube (2) to nipple (3).
9. Connect flex tube (2) to evaporator drain pan (1).

11-200. EVAPORATOR DRAIN TUBE REPLACEMENT (Cont'd)

OLD CONFIGURATION



NEW CONFIGURATION



FOLLOW-ON TASK: Close blower housing (para. 11-198).

11-201. CONDENSER COOLING FAN REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M997, M997A1, M997A2

Manual References

TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

- Air intake compartment panels removed (para. 11-184).
- Battery ground cable disconnected (para. 4-73).

Materials/Parts

Lockwasher (Appendix G, Item 182)

a. Removal

NOTE

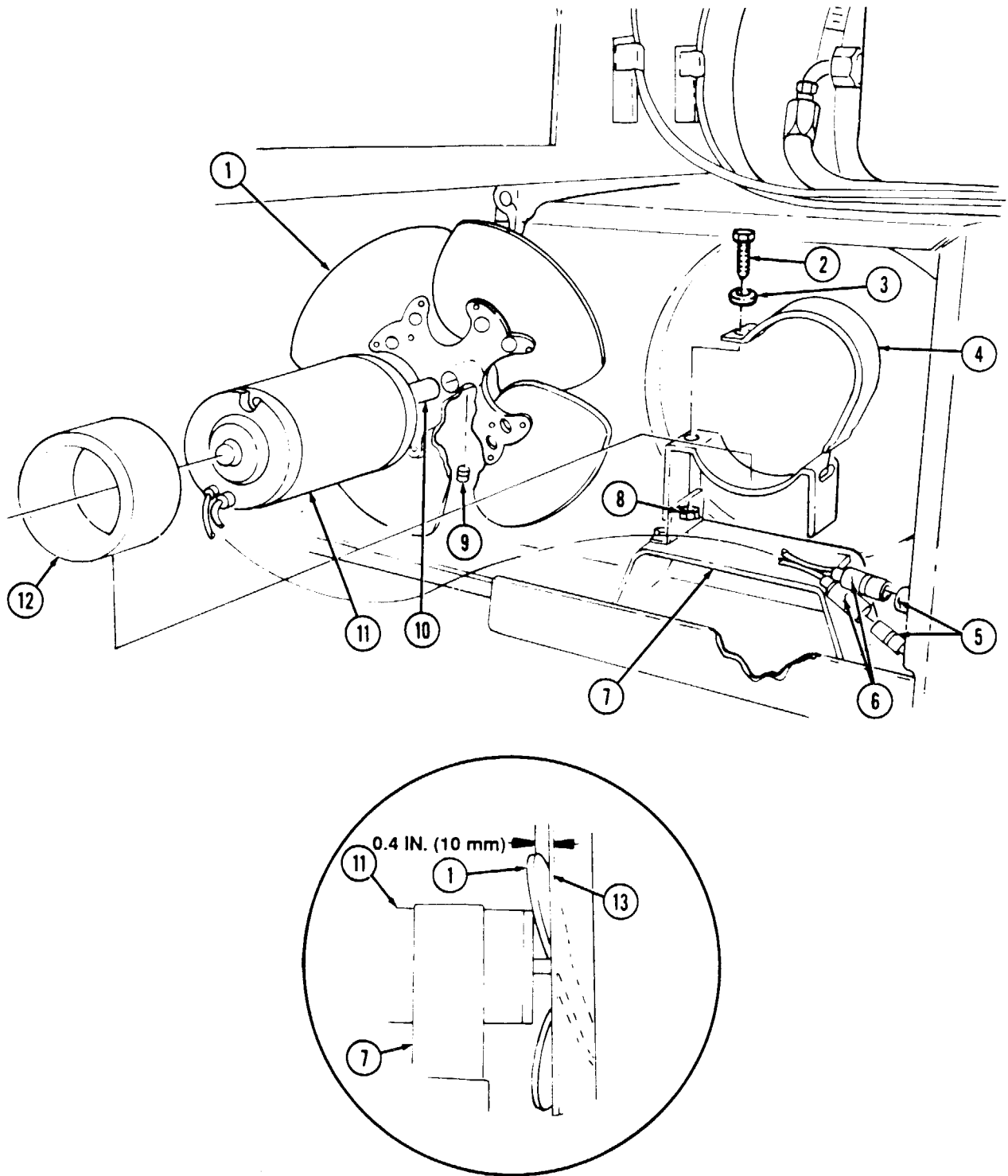
Prior to removal, tag leads for installation.

1. Disconnect two harness leads (5) from fan motor leads (6).
2. Remove nut (8), capscrew (2), lockwasher (3), motor clamp (4), and fan motor (11) from bracket (7). Discard lockwasher (3).
3. Remove rubber mount (12) from fan motor (11).
4. Remove set screw (9) and fan blade (1) from motor shaft (10).

b. Installation

1. Install fan blade (1) on motor shaft (10) with set screw (9).
2. Install rubber mount (12) on fan motor (11).
3. Install fan motor (11) on bracket (7) so that rubber mount (12) is centered on bracket (7), and further-most corner edges of fan blades (1) are approximately 0.4 in. (10 mm) from fan shroud facing (13).
4. Install motor clamp (4) to bracket (7) and fan motor (11) with lockwasher (3), capscrew (2), and nut (8).
5. Connect two harness leads (5) to fan motor leads (6).

11-201. CONDENSER COOLING FAN REPLACEMENT (Cont'd)



- FOLLOW-ON TASKS:
- Install air intake compartment panels (para. 11-184).
 - Connect battery ground cable (para. 4-73).

11-202. COMPRESSOR BELT MAINTENANCE

This task covers:

- a. Removal
- c. Adjustment
- b. Installation

INITIAL SETUP:

Applicable Models

M997, M997A1, M997A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Special Tools

Belt tension gauge (Appendix B, Item 67)
Crowfoot, 14 mm (Appendix B, Item 152)

Personnel Required

One mechanic
One assistant

Manual References

TM 9-2320-280-24P

Equipment Condition

- Engine right splash shield removed (para. 10-20).
- Engine access cover removed (para. 10-15).
- Serpentine drivebelt removed ("A2" series only) (para. 3-83).

a. Removal

1. Loosen two capscrews (10) from compressor (11) and support bracket (12).
2. Loosen two nuts (1) and capscrew (7) from adjusting bracket (5) and mounting ears (6).
3. Loosen nut (2) on adjusting bracket (5) and timing cover bolt (3), and push compressor (11) toward timing chain cover (4) to loosen belt (9).
4. Disconnect fan drive hose (15) from fan drive assembly (17).
5. Remove belt (9) from compressor pulley (8), water pump pulley (14), crankshaft pulley (16), and over fan blades (13).

b. Installation

Install belt (9) over fan blades (13) and place belt (9) on crankshaft pulley (16), water pump pulley (14), and compressor pulley (8).

c. Adjustment

NOTE

If belt was replaced, go to step 2.

1. Perform Removal, steps a.1 through a.4.

CAUTION

Do not pry against compressor housing with pry bar when adjusting belt tension. Compressor may be damaged.

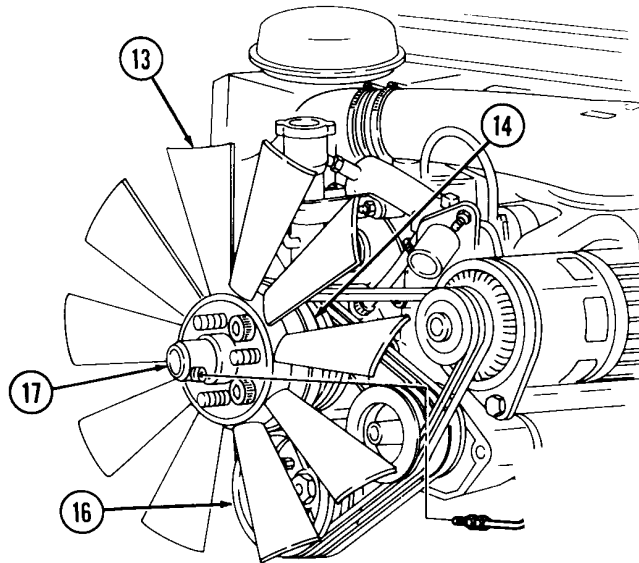
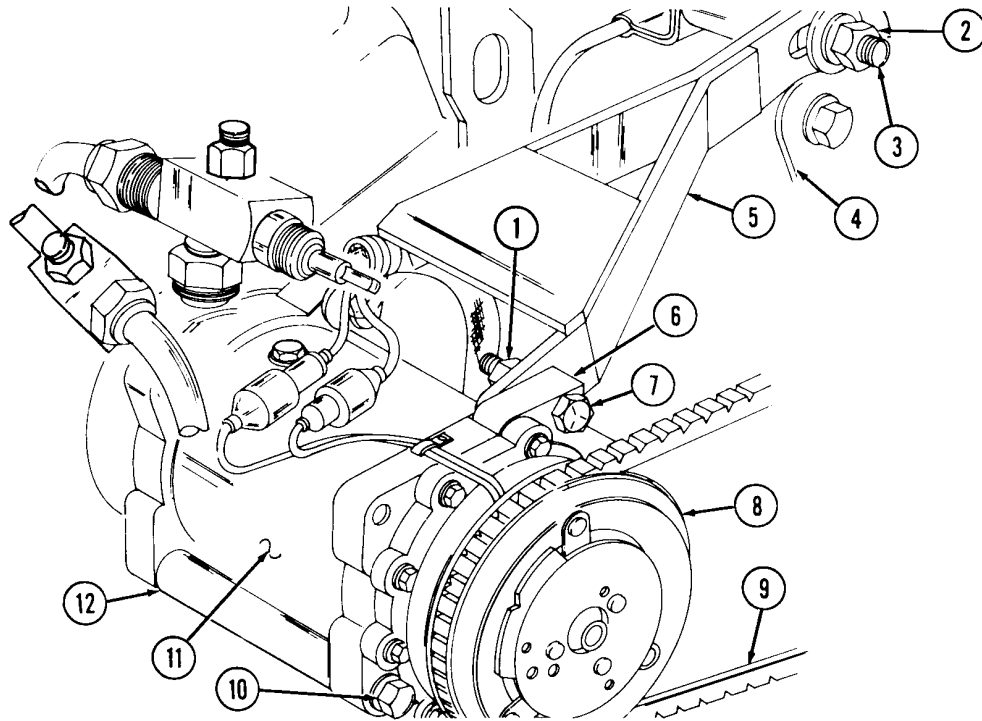
2. Pull compressor (11) away from timing chain cover (4) and position pry bar between rear mounting ear (6) and support bracket (12) to adjust belt tension.
3. Using belt tension gauge, check belt (9) for proper tension (refer to table 11-1).

Table 11-1. Compressor Belt Tension Requirements

NOTE		
A "used" belt is one that has run at least fifteen minutes or fifteen miles (24 kilometers).		
APPLICATION	NEW BELT	USED BELT
Compressor belt	105 ± 5 lbs (467 ± 22 N)	90 ± 5 lbs (400 ± 22 N)

11-202. COMPRESSOR BELT MAINTENANCE (Cont'd)

4. If belt (9) tension is correct, tighten nut (2), two capscrews (10), capscrew (7), and two nuts (1).
5. Repeat step (3). If belt (9) tension cannot be properly adjusted, replace belt (9).
6. Tighten nut (2) to 40 lb-ft (54 N·m). Using crowfoot on front capscrew (10), tighten two capscrews (10) to 26 lb-ft (35 N·m). Tighten two nuts (1) to 26 lb-ft (35 N·m).
7. Connect fan drive hose (15) to fan drive assembly (17).



- FOLLOW-ON TASKS:**
- Install engine right splash shield (para. 10-20).
 - Install engine access cover (para. 10-15).
 - Install serpentine drivebelt (A2 series only) (para. 3-83).

11-203. AIR-CONDITIONING DUCT LOUVER REPLACEMENT

This task covers:

a Removal

b. Installation

INITIAL SETUP:

Applicable Models

M997, M997A1, M997A2

Manual References

TM 9-2320-280-24P

Tools

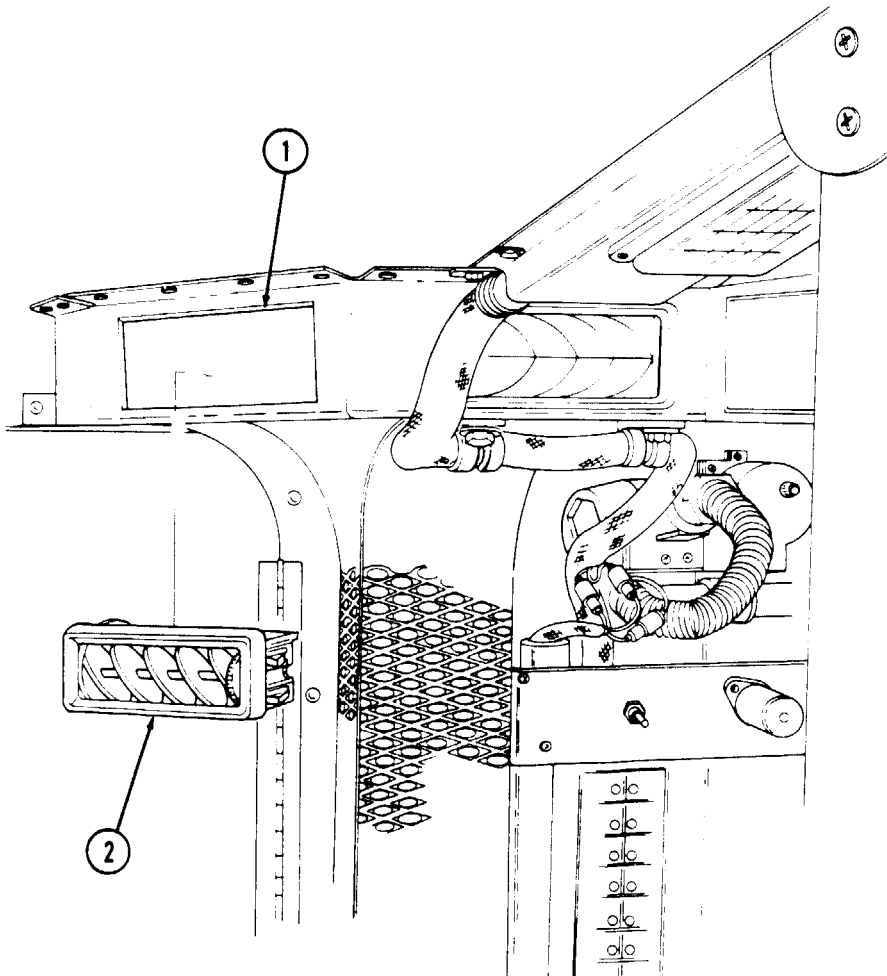
General mechanic's tool kit:
automotive (Appendix B, Item 1)

a. Removal

Pry duct louver (2) from air-conditioning duct (1) and remove duct louver (2).

b. Installation

Push duct louver (2) into opening in air-conditioning duct (1).



11-204. HEATER COMPARTMENT PANEL REPLACEMENT (M996, M996A1)

This task covers:

a. Removal

b. Installation

INITIAL SETUP:**Applicable Models**

M996, M996A1

Manual References

TM 9-2320-280-24P

Tools

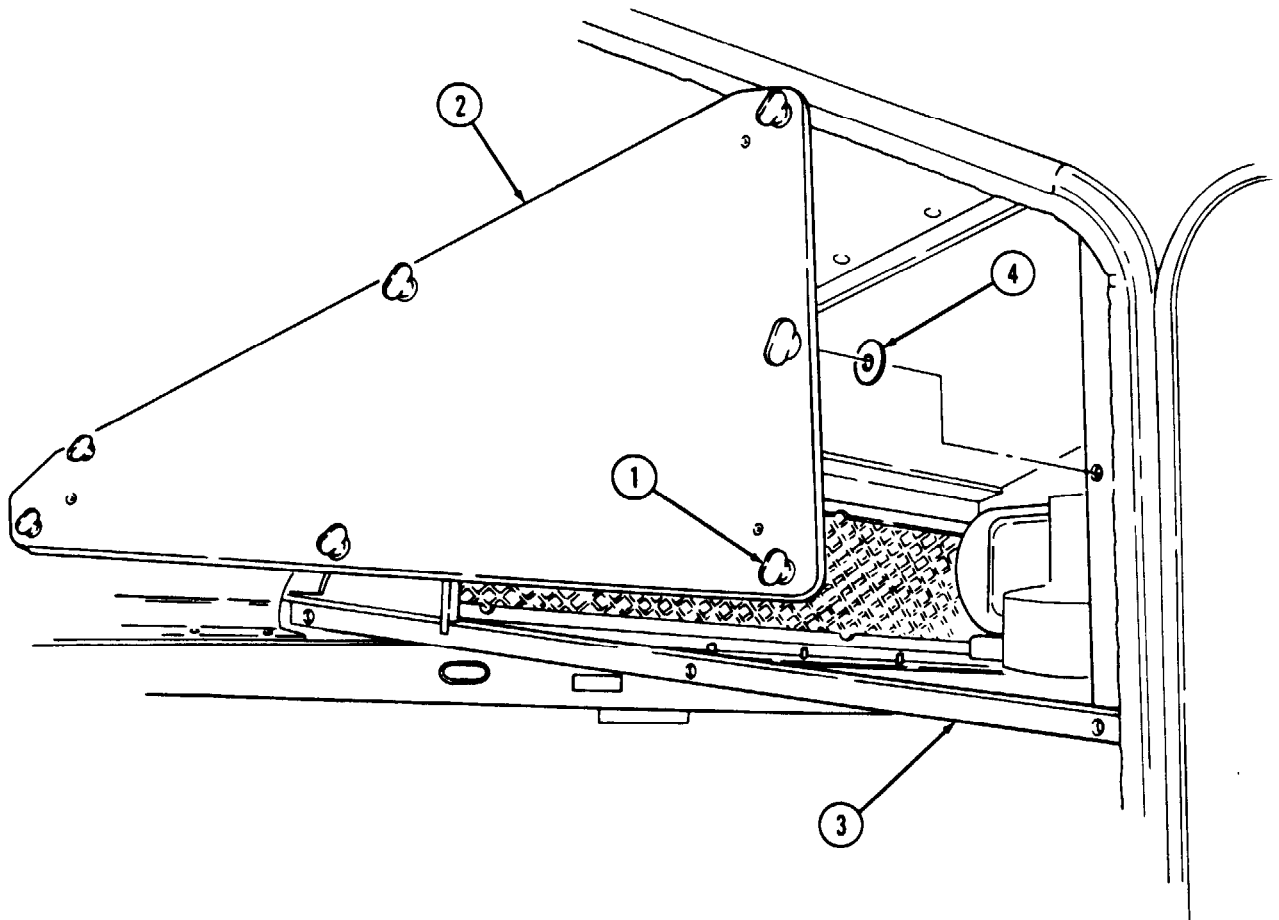
General mechanic's tool kit:
automotive (Appendix B, Item 1)

a. Removal

1. Loosen seven wing bolts (1) and remove panel (2) from body (3).
2. Inspect seven retaining washers (4) on wing bolts (1) for presence and damage. Replace retaining washers (4) if missing or damaged.

b. Installation

Install panel (2) to body (3) with seven wing bolts (1).



11-205. AIR INTAKE FILTER MAINTENANCE

This task covers

a. Inspection

b. Cleaning

INITIAL SETUP:

Applicable Models

M996, M996A1, M997, M997A1, M997A2

Materials/Parts

Detergent (Appendix C, Item (17))

Took

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

Air intake filters removed (TM 9-2320-280-10).

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P
FM 3-4
FM 3-5

General Safety Instructions

- NBC contaminated filters must be handled and disposed of only by trained personnel.
- Compressed air used for cleaning purposes will not exceed 30 psi (207 kPa).

WARNING

NBC contaminated filters must be handled and disposed of only by authorized and trained personnel. The unit commander or senior officer in charge of maintenance personnel must ensure that prescribed protective clothing (FM 3-4) is used, and prescribed safety measures and decontamination procedures (FM 3-5) are followed. The local unit SOP is responsible for final disposal of contaminated air filters,

a. Inspection

Inspect filters (1) for tears, rips, contaminants, or other damage. Inspect filter frames (2) and supports (3) for cracks, bends, or other damage. If filters (1), frames (2), or support (3) are damaged, replace.

b. Cleaning

1. Cleaning with detergent.

Remove oily dirt from filter (1) by gently hand washing in warm water and non-sudsing detergent. Gently rinse filter (1) with warm water. Allow filter to dry.

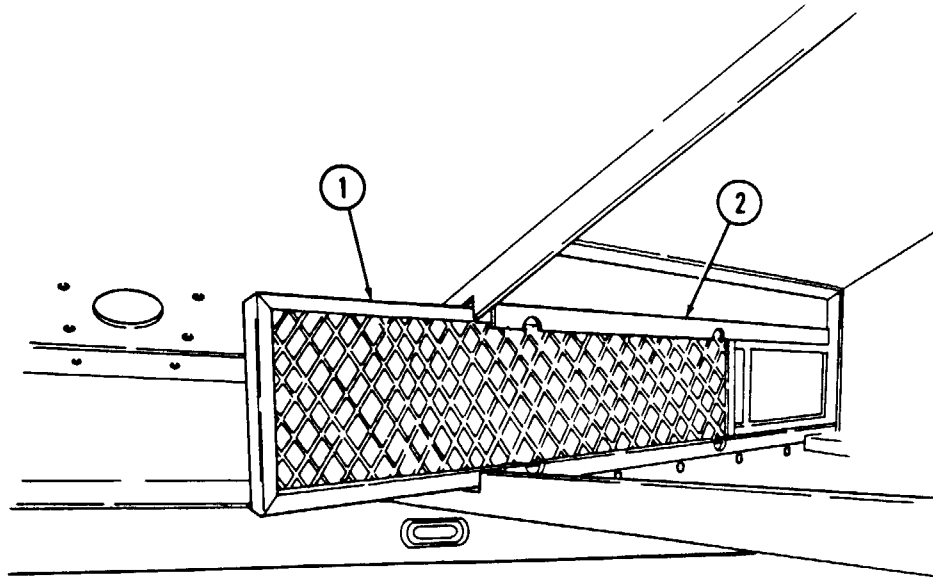
2. Cleaning with compressed air.

WARNING

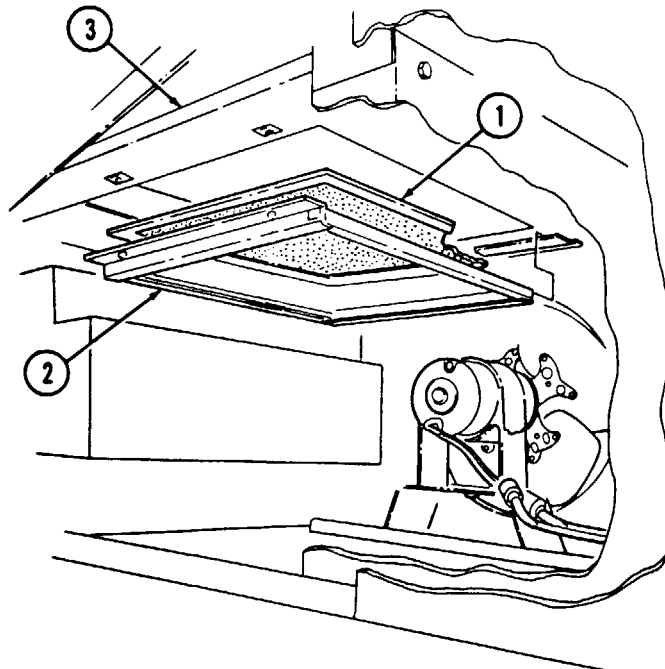
Compressed air used for cleaning purposes will not exceed 30 psi (207 kPa). Use only with effective chip guarding and personnel protective equipment (goggles/shield, gloves, etc.).

Remove oily dirt and dust from filter (1) by directing air stream at an angle and approximately 6 in. (152.4 mm) from filter (1). Blow away loosened dirt or dust from both sides of filter (1).

11-205. AIR INTAKE FILTER MAINTENANCE (Cont'd)



M996, M996A1 ONLY



M997, M997A1, M997A2 ONLY

FOLLOW-ON TASK: Install air intake filter (TM 9-2320-280-10).

11-206. HEATER OUTLET/BLOWER FAN HOSE REPLACEMENT (M996, M996A1)

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M996, M996A1

Manual References

TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment condition

Heater compartment panel removed (para. 11-204).

NOTE

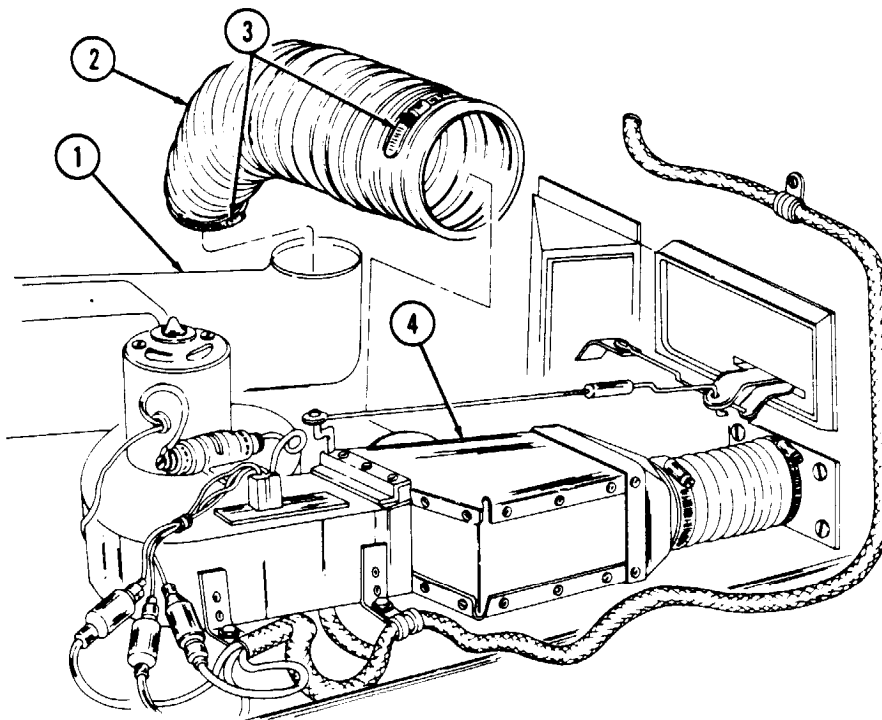
Heater outlet hose and blower fan hose replacement procedures are basically the same. This procedure covers the heater outlet hose.

a. Removal

Loosen two clamps (3) and remove hose (2) from heater (1) and blower duct (4).

b. Installation

Install hose (2) on blower duct (4) and heater (1) and tighten two clamps (3).



FOLLOW-ON TASK: Install heater compartment panel (para. 11-204).

11-207. HEATER EXHAUST PIPE REPLACEMENT (M996, M996A1)

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M996, M996A1

Manual References

TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item)

General Safety Instructions

Do not touch hot exhaust system components with bare hands.

Materials/Parts

Two lockwashers (Appendix G, Item 144)

WARNING

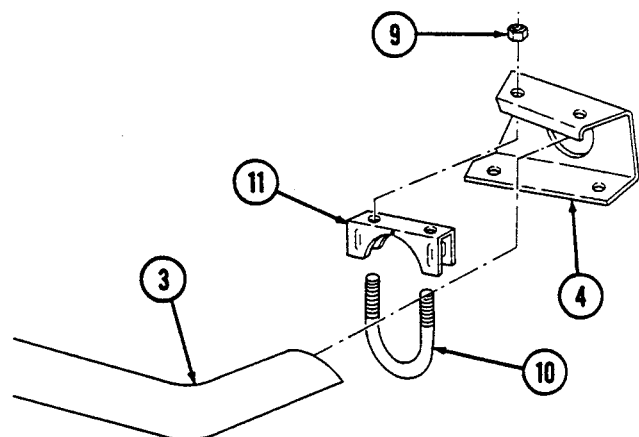
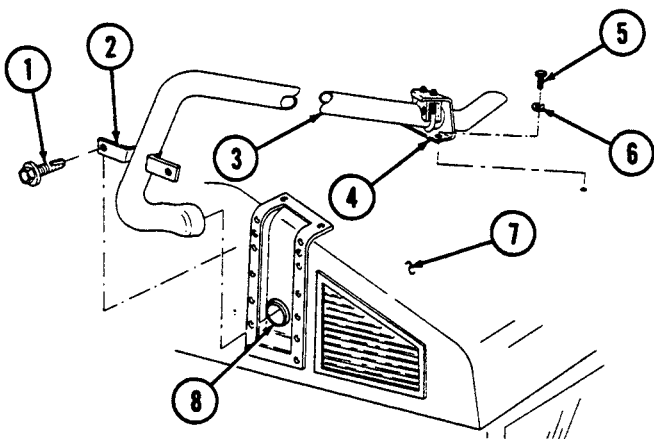
Do not touch hot exhaust system components with bare hands.
Severe injury will result.

a. Removal

1. Remove two screws (1) from exhaust pipe bracket (2) and body (7).
2. Remove two capscrews (5) and lockwashers (6) from support bracket (4) and body (7). Discard lockwashers (6).
3. Remove exhaust pipe (3) and support bracket (4) by sliding out of exhaust outlet (8).
4. Remove two nuts (9), U-bolt (10), clamp (11), and support bracket (4) from exhaust pipe (3).

b. Installation

1. Install support bracket (4) and clamp (11) on exhaust pipe (3) with U-bolt (10) and two nuts (9). Do not tighten nuts (9).
2. Install exhaust pipe (3) and support bracket (4) on body (7), ensuring end of exhaust pipe (3) is fully seated on exhaust outlet (8).
3. Install exhaust pipe bracket (2) on body (7) with two screws (1).
4. Install support bracket (4) on body (7) with two lockwashers (6) and capscrews (5). Tighten capscrews (5) to 15 lb-ft (20 N•m).
5. Tighten two nuts (9) to 15 lb-ft (20 N•m).



11-208. HEATER MOUNTING BRACKET ASSEMBLY REPLACEMENT (M996, M996A1)

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M996, M996A1

Manual References

TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

Heater removed (para. 11-209).

Materials/Parts

Eight blind rivets (Appendix G, Item 241)

NOTE

For instructions on replacement of rivets, refer to para. 10-66.

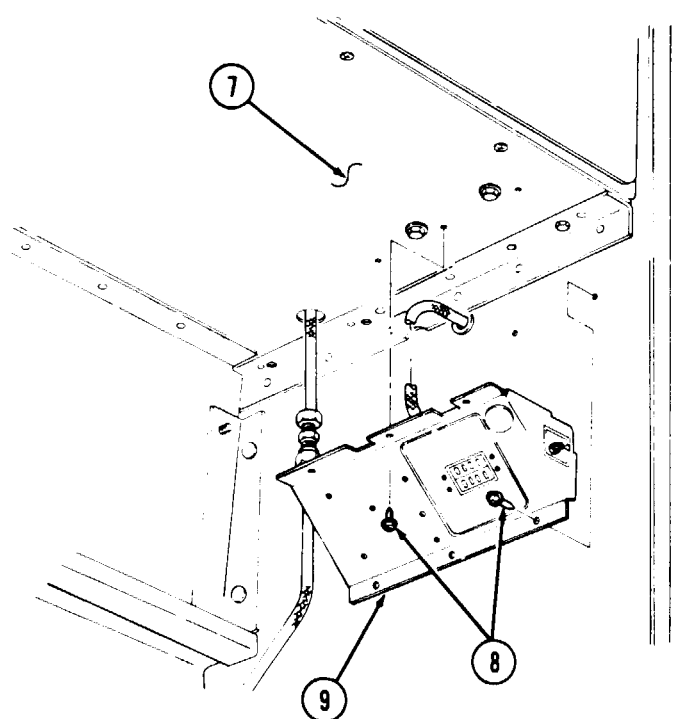
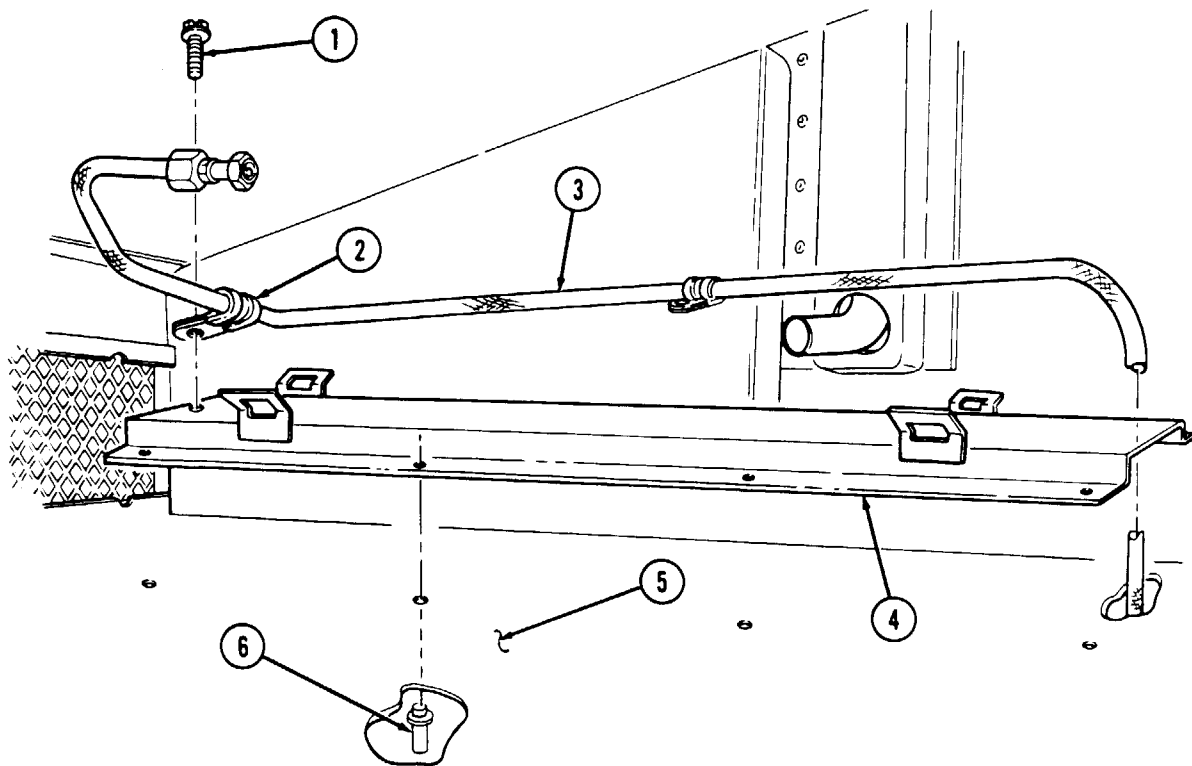
a. Removal

1. Remove two screws (1), clamps (2), and fuel line (3) from bracket (4).
2. Remove six screws (8) from NBC control box (9) and body (7), and pull control box (9) away for access.
3. Remove eight rivets (6) and bracket (4) from body (5).

b. Installation

1. Install bracket (4) on body (5) with eight rivets (6).
2. Install fuel line (3) and two clamps (2) on bracket (4) with two screws (1).
3. Install NBC control box (9) on body (7) with six screws (8).

11-208. HEATER MOUNTING BRACKET ASSEMBLY REPLACEMENT (M996, M996A1) (Cont'd)



FOLLOW-ON TASK: Install heater (para. 11-209).

11-209. HEATER REPLACEMENT (M996, M996A1)

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M996, M996A1

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Sealing compound (Appendix C, Item 44)
Two assembled washer screws
(Appendix G, Item 280)

Personnel Required

One mechanic
One assistant

Manual References

TM 9-2320-280-24P

Equipment Condition

- Blower assembly removed (para. 11-212).
- Heater outlet hose removed (para. 11-206).

General Safety Instructions

Do not perform this procedure near fire, flames, or sparks.

WARNING

Diesel fuel is highly flammable. Do not perform this procedure near fire, flames, or sparks. Severe injury or death will result.

NOTE

- Have drainage container ready to catch fuel.
- Cover or plug all open connections immediately after disconnection to prevent contamination. Remove all covers or plugs prior to connection.
- Apply sealing compound to threads of all fuel line joints before installation.

a. Removal

1. Disconnect fuel line (11) from heater (2) and allow fuel to drain.
2. Disconnect control box plug (7) from heater receptacle (1).
3. Remove two clamps (9) and heater (2) from mounting brackets (10).
4. Remove four screws (8) and outlet (5) from heater (2).
5. Remove two assembled washer screws (6), exhaust tube (4), and seal (3) from heater (2). Discard assembled washer screws (6).
6. Inspect seal (3) for damage, replace if damaged.

b. Installation

1. Install seal (3) and exhaust tube (4) on heater (2) with two assembled washer screws (6).
2. Install outlet (5) on heater (2) with four screws (8).
3. Install two clamps (9) on mounting brackets (10).

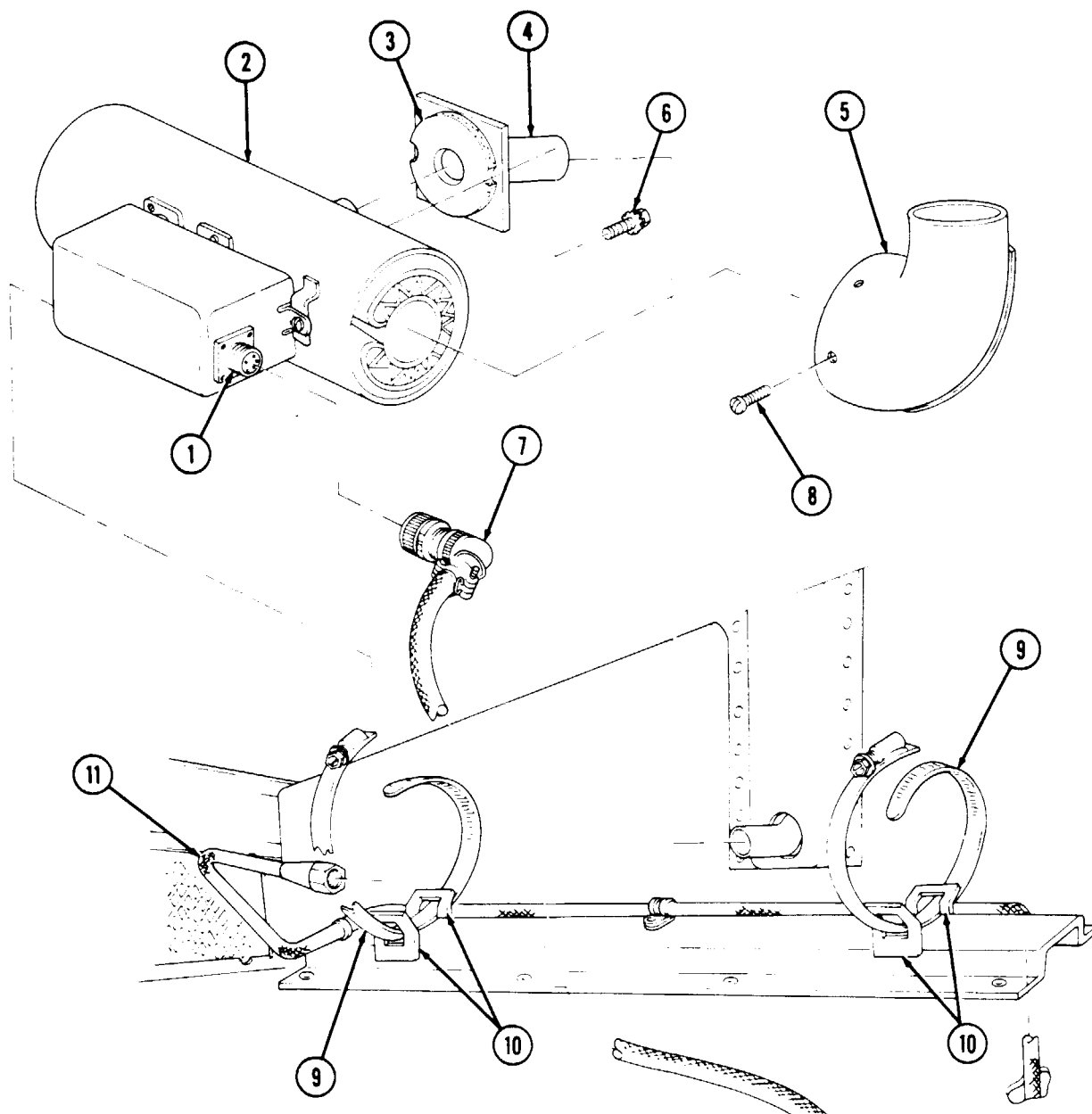
NOTE

Have assistant guide exhaust outlet into exhaust pipe from outside of vehicle. Install heater exhaust outlet in first for proper clearance.

4. Install heater (2) on mounting brackets (10) with clamps (9).

11-209. HEATER REPLACEMENT (M996, M996A1) (Cont'd)

5. Connect fuel line (11) to heater (2).
6. Connect control box plug (7) to heater receptacle (1).



FOLLOW-ON TASKS:

- Install heater outlet hose (para. 11-206).
- Install blower assembly (para. 11-212).

11-210. BLOWER OUTLET DEFLECTOR REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M996, M996A1

Materials/Parts

Nineteen blind rivets (Appendix G, Item 250)

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-24P

NOTE

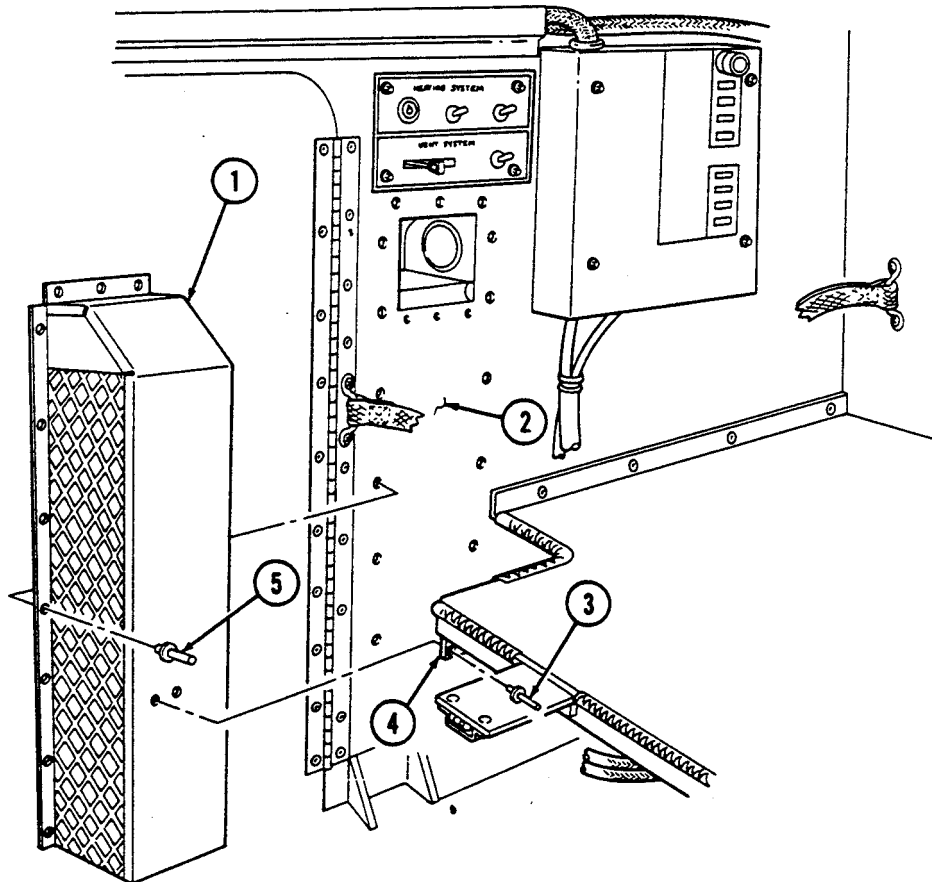
For instructions on replacement of rivets, refer to para. 10-66.

a. Removal

1. Remove two rivets (3) from deflector (1) and bracket (4).
2. Remove seventeen rivets (5) and deflector (1) from body (2).

b. Installation

1. Install deflector (1) on body (2) with seventeen rivets (5).
2. Install deflector (1) on bracket (4) with two rivets (3).



11-211. HEAT/AIR-CONDITIONING DUCT MAINTENANCE

This task covers:

- | | |
|----------------|-----------------|
| a. Removal | c. Assembly |
| b. Disassembly | d. Installation |

INITIAL SETUP:

Applicable Models

M997, M997A1, M997A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Fourteen blind rivets (Appendix G, Item 250)
Twenty blind rivets (Appendix G, Item 251)
Eight blind rivets (Appendix G, Item 237)
Six blind rivets (Appendix G, Item 262)

Manual References

TM 9-2320-280-24P

Equipment Condition

- Control box assembly removed (para. 4-96).
- Upper and lower stowage doors removed (para. 11-152).
- NBC heater bracket removed (para. 11-165).

NOTE

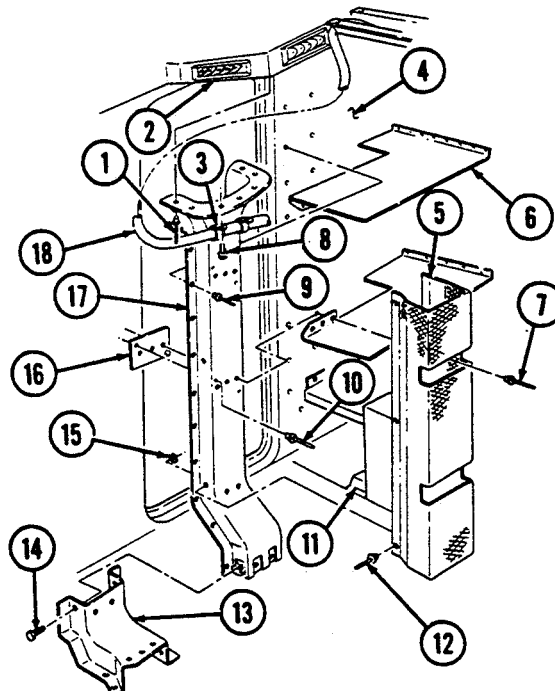
For instructions on replacement of rivets, refer to para. 10-66.

a. Removal

1. Remove two screws (8), clamps (3), and light harness (18), from duct (17).
2. Remove eight rivets (7) and three stowage shelves (6) from duct (17).
3. Remove twenty rivets (9) from duct (17) and body (4).
4. Remove eight screws (14) and floor duct (13) from duct (17) and floor tunnel (11).
5. Remove eight rivets (1) and duct (17) from air-conditioning outlet (2).

b. Disassembly

1. Remove six rivets (12), washers (15), and guard (5) from duct (17).
2. Remove six rivets (10) and three reinforcement plates (16) from duct (17).



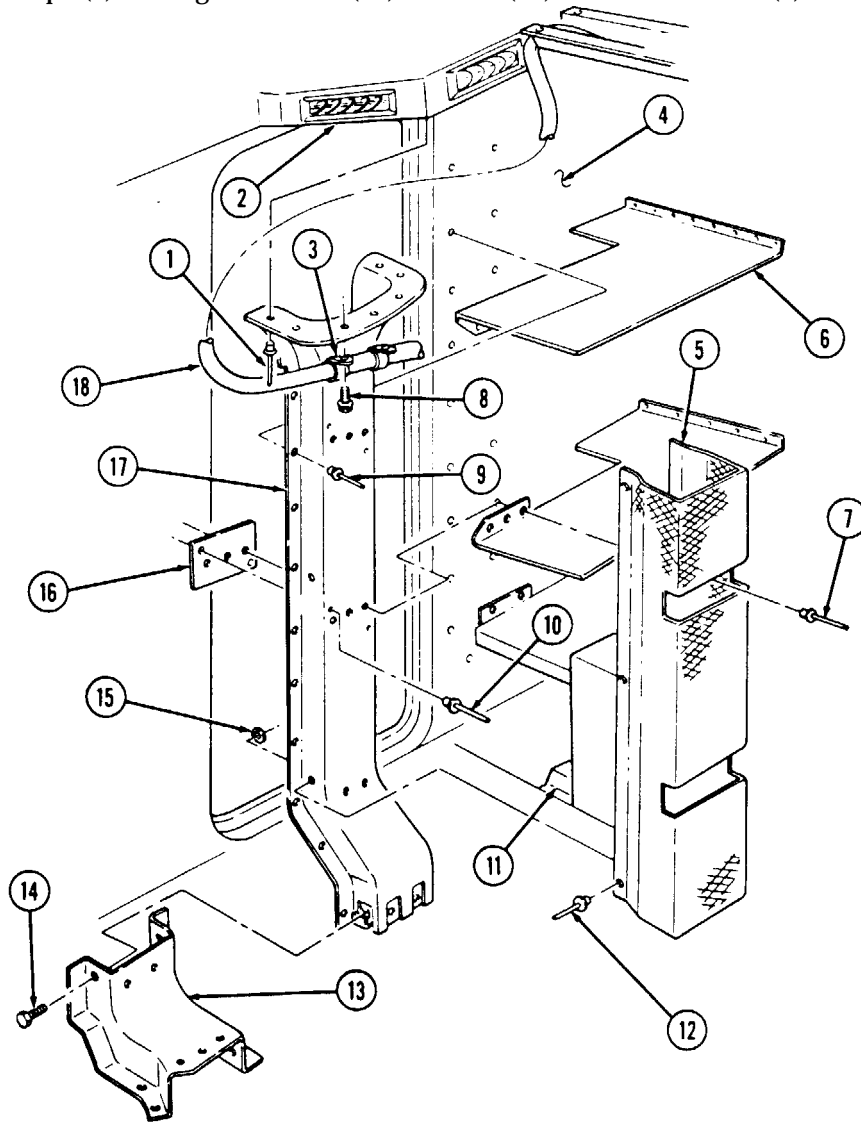
11-211. HEAT/AIR-CONDITIONING DUCT MAINTENANCE (Cont'd)

c. Assembly

1. Install three reinforcement plates (16) on duct (17) with six rivets (10).
2. Install guard (5) on duct (17) with six washers (15) and rivets (12).

d. Installation

1. Install duct (17) on air-conditioning outlet (2) with eight rivets (1).
2. Install floor duct (13) on duct (17) and floor tunnel (11) with eight screws (14).
3. Install duct (17) on body (4) with twenty rivets (9).
4. Install three stowage shelves (6) on duct (17) with eight rivets (7).
5. Install two clamps (3) and light harness (18) on duct (17) with two screws (8).



- FOLLOW-ON TASKS:
- Install NBC heater bracket (para. 11-165).
 - Install upper and lower stowage doors (para. 11-152).
 - Install control box assembly (para. 4-96).

11-212. BLOWER ASSEMBLY REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M996, M996A1

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Four blind rivnuts (Appendix G, Item 274)
Push on nut (Appendix G, Item 227)
Four blind rivets (Appendix G, Item 264)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

- Battery ground cable disconnected (para. 4-73).
- Heater compartment panel removed (para. 11-204).

NOTE

For instructions on replacement of rivets, refer to para. 10-66.

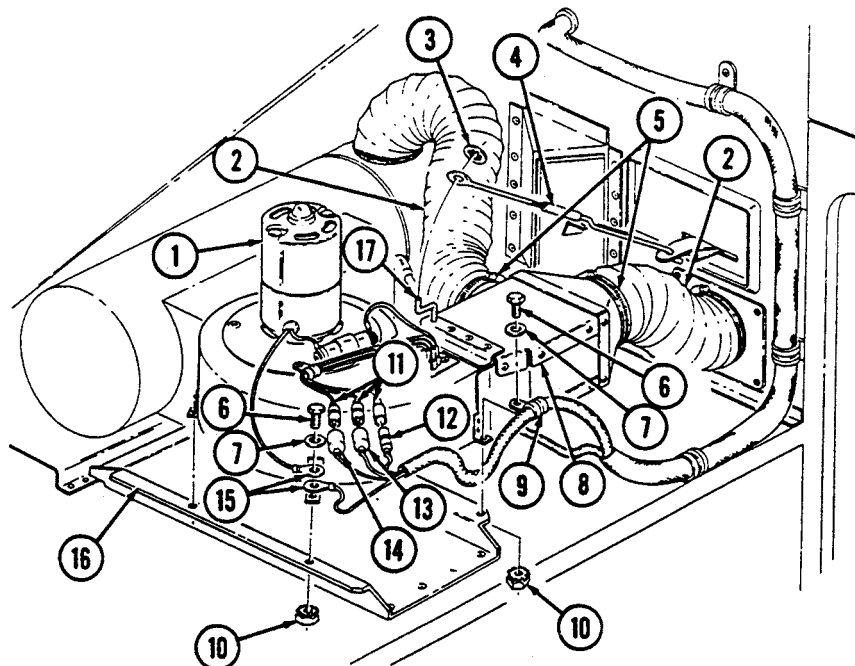
a. Removal

1. Loosen two clamps (5) and disconnect hose ducts (2) from diverter box (8).
2. Remove push on nut (3) and disconnect control linkage (4) from diverter box arm (17). Discard push on nut (3).

NOTE

Prior to removal tag leads for installation.

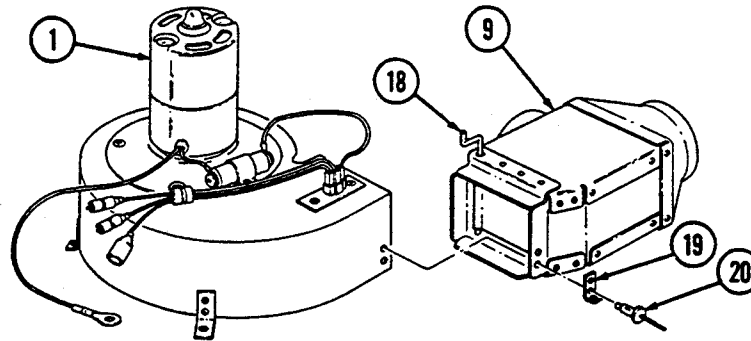
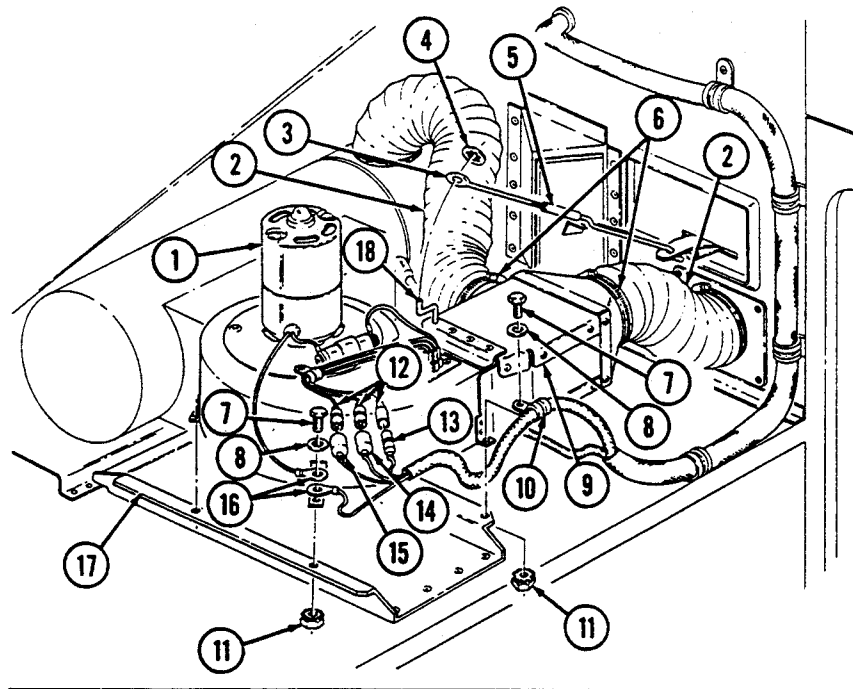
3. Disconnect harness leads 770 (12), 771 (13), and 772 (14) from blower motor leads (11).
4. Remove four rivnuts (10), capscrews (6), washers (7), harness clamp (9), two ground terminals (15), and blower assembly (1) from bracket (16). Discard rivnuts (10).
5. Remove four rivets (20), diverter box (9), and foot (19) from blower assembly (1).



11-212. BLOWER ASSEMBLY REPLACEMENT (Cont'd)

b. Installation

1. Install diverter box (9) and foot (19) on blower assembly (1) with four rivets (20).
2. Install blower assembly (1), harness clamp (10), and two ground terminals (16) on bracket (17) with four washers (8), capscrews (7), and rivnuts (11).
3. Connect leads 770 (13), 771 (14), and 772 (15) to blower motor leads (12).
4. Place lever on heat/vent control panel in UNIT OFF position (TM 9-2320-280-10). Turn adjustable end (3) of control linkage (5) so that diverter box arm (18) is installed all the way forward (toward blower motor) when adjustable end (3) is installed on diverter box arm (18).
5. Install control linkage (5) on diverter box arm (18) with push on nut (4).
6. Install two hose ducts (2) on diverter box (9) and tighten clamps (6).



- FOLLOW-ON TASKS:
- Install heater compartment panel (para. 11-204).
 - Connect battery ground cable (para. 4-73).
 - Check blower for proper operation (TM 9-2320-280-10).

11-213. AIR DIVERTER REPLACEMENT (M996, M996A1)

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M996, M996A1

Manual References

TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

Blower assembly removed (para. 11-212).

Materials/Parts

Nine blind rivets (Appendix G, Item 265)
Lockwasher (Appendix G, Item 160)

NOTE

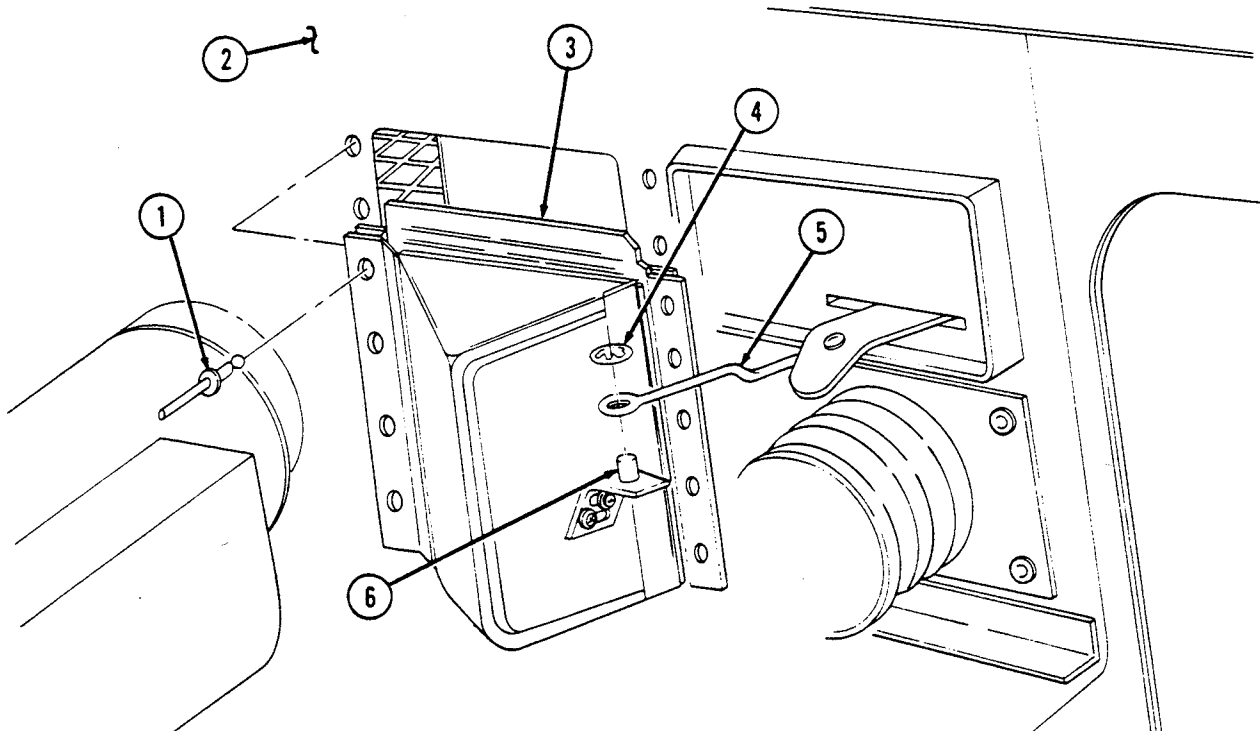
For instructions on replacement of rivets, refer to para. 10-66.

a. Removal

1. Remove lockwasher (4) and control linkage (5) from diverter door arm (6). Discard lockwasher (4).
2. Remove nine rivets (1) and diverter (3) from body (2).

b. Installation

1. Install diverter (3) on body (2) with nine rivets (1).
2. Connect control linkage (5) on diverter door arm (6) with lockwasher (4).



FOLLOW-ON TASK: Install blower assembly (para. 11-212).

11-214. PANEL INSULATION REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M997, M997A1 M997A2

Manual References

TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

Blower housing opened (para. 11-198).

NOTE

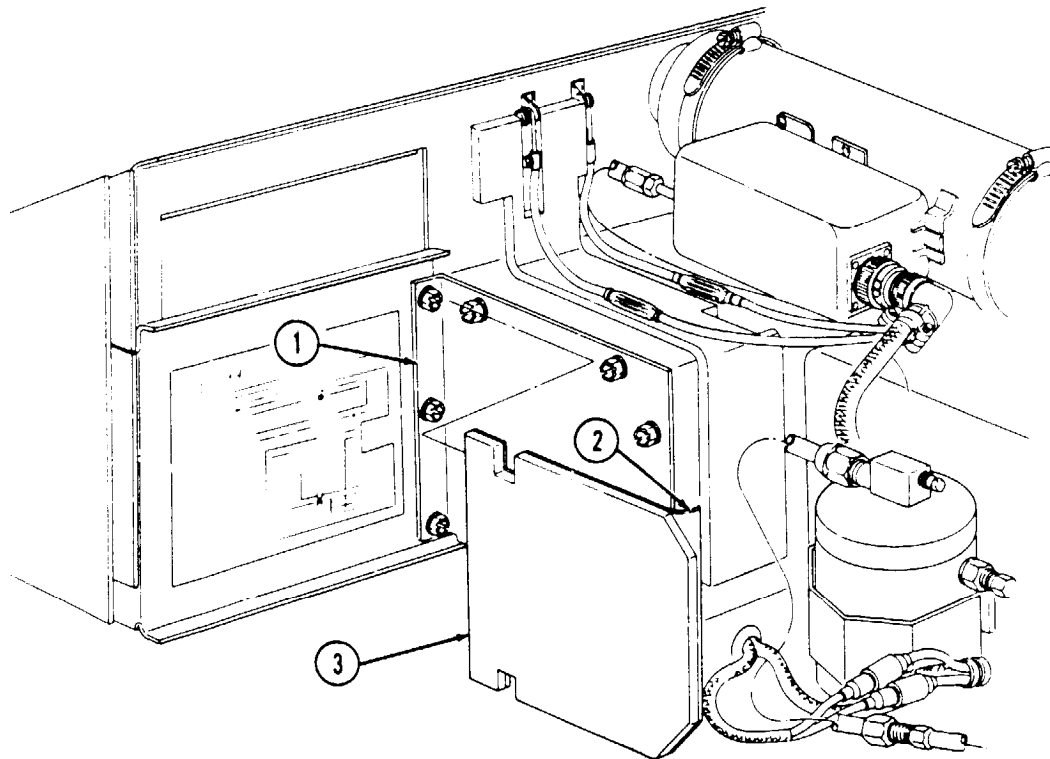
Replacement of all air-conditioning insulation panels is basically the same. This procedure covers the air intake compartment insulation panel.

a. Removal

Remove insulation (3) from air intake compartment panel (1). Clean panel (1) to remove remaining adhesive.

b. Installation

Peel paper backing (2) from insulation (3) and install insulation (3) on air intake compartment panel (1).



FOLLOW-ON TASK: Close blower housing (para. 11-198).

11-215. AMBULANCE SPREADER BAR MAINTENANCE

This task covers:

- | | |
|----------------|-----------------|
| a. Removal | c. Assembly |
| b. Disassembly | d. Installation |

INITIAL SETUP:

Applicable Models

M996, M996A1, M997, M997A1, M997A2

Manual References

TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

a. Removal

1. Remove three pins (3) and extension bar (1) from ambulance.
2. Remove two links (7) from extension bar (1).

b. Disassembly

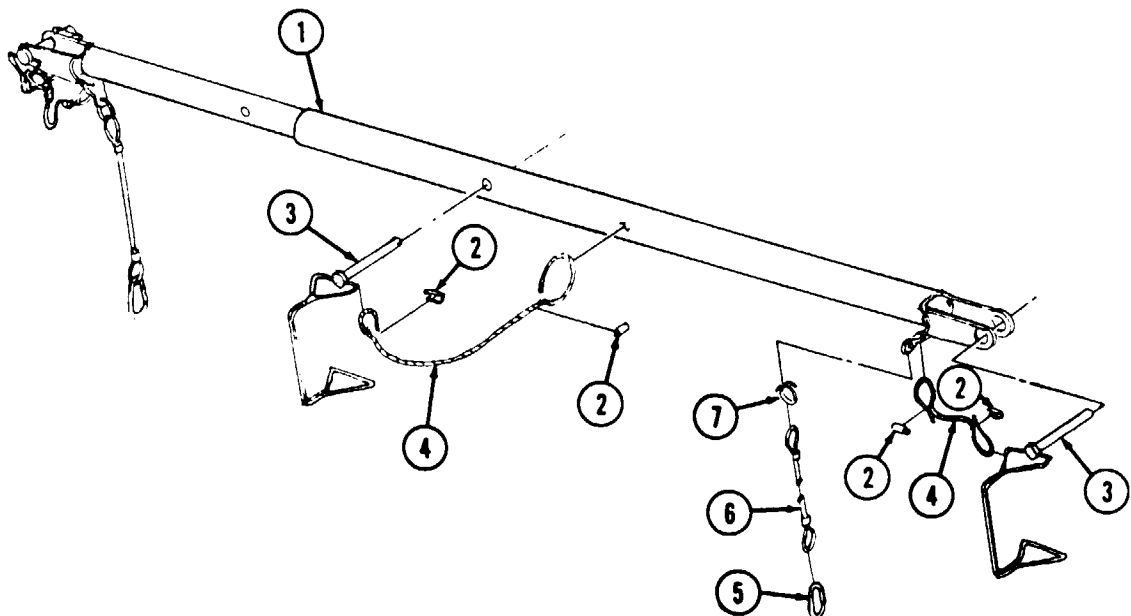
1. Remove six ferrules (2) and three cables (4) from extension bar (1) and three pins (3).
2. Disconnect two cable assemblies (6) from links (7).
3. Disconnect two snap hooks (5) from cable assemblies (6).

c. Assembly

1. Connect two snap hooks (5) to cable assemblies (6).
2. Connect two cable assemblies (6) to links (7).
3. Install six ferrules (2) and three cables (4) on extension bar (1) and three pins (3).

d. Installation

1. Install two links (7) on extension bar (1).
2. Install extension bar (1) on ambulance with three pins (3).



CHAPTER 12 SPECIAL PURPOSE KITS MAINTENANCE

Section I. DEEP WATER FORDING KIT MAINTENANCE

12-1. DEEP WATER FORDING KIT MAINTENANCE TASK SUMMARY

TASK PARA.	PROCEDURES	PAGE NO.
12-2.	Deep Water Fording Kit Exhaust Assembly Maintenance	12-2
12-3.	Deep Water Fording Kit Air Intake Assembly Replacement	12-4
12-4.	Air Cleaner Extension Elbow Maintenance	12-5
12-5.	Windshield Mounting Bracket Replacement	12-7
12-6.	Air Cleaner Dust Cap Maintenance	12-8
12-7.	Air Cleaner to Selector Valve Vent Line Replacement	12-9
12-8.	Fuel Tank Vent Stack Tube Replacement	12-10
12-9.	Selector Valve Replacement	12-11
12-10.	CDR Valve Vent Line Replacement	12-13
12-11.	Hydro-Boost Vent Line Replacement	12-14
12-12.	Deep Water Fording Sensor Cup Replacement	12-15
12-13.	Sensor Cup Vent Line Replacement	12-16
12-14.	Power Steering Vent Line Replacement	12-17
12-15.	Exhaust Reinforcement Bracket Replacement	12-18

12-2. DEEP WATER FORDING KIT EXHAUST ASSEMBLY MAINTENANCE

This task covers:

- | | |
|---|---|
| <ul style="list-style-type: none"> a. Removal b. Inspection | <ul style="list-style-type: none"> c. Installation |
|---|---|

INITIAL SETUP:

Applicable Models

All models except M966, M966A1, M1025, M1025A1, M1025A2, M1026, M1026A1

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

General Safety Instructions

Do not touch hot exhaust system components with bare hands.

Materials/Parts

Gasket (Appendix G, Item 42)
Five locknuts (Appendix G, Item 128)
Locknut (Appendix G, Item 79)

WARNING

Do not touch hot exhaust system components with bare hands.
Severe injury will result.

a. Removal

1. Remove three locknuts (1), washers (2), capscrews (10), washers (2), exhaust assembly (9), and gasket (11) from muffler (3). Discard locknuts (1) and gasket (11).
2. Remove two locknuts (4), washers (5), exhaust assembly (9), and two spacers (8) from wheel house (7). Discard locknuts (4).

NOTE

Perform steps 3 through 5 for M997, M997A1, and M997A2 models only.

3. Remove two bolts (18), washers (16), and exhaust extension (17) from upper body (25).
4. Remove locknut (19), washer (20), noise damper (21), exhaust reinforcement bracket (24), isolator (22), noise damper (23), and bolt (13) from exhaust extension (17). Discard locknut (19).
5. Remove two isolators (15) and spacers (14) from bracket (24).

b. Inspection

1. Inspect two insulators (6) for breaks, cracks, or deterioration. Replace if damaged.

NOTE

Perform step 2 for M997, M997A1, and M997A2 models only.

2. Inspect two rivnuts (12) for thread damage or deterioration. Replace if damaged.

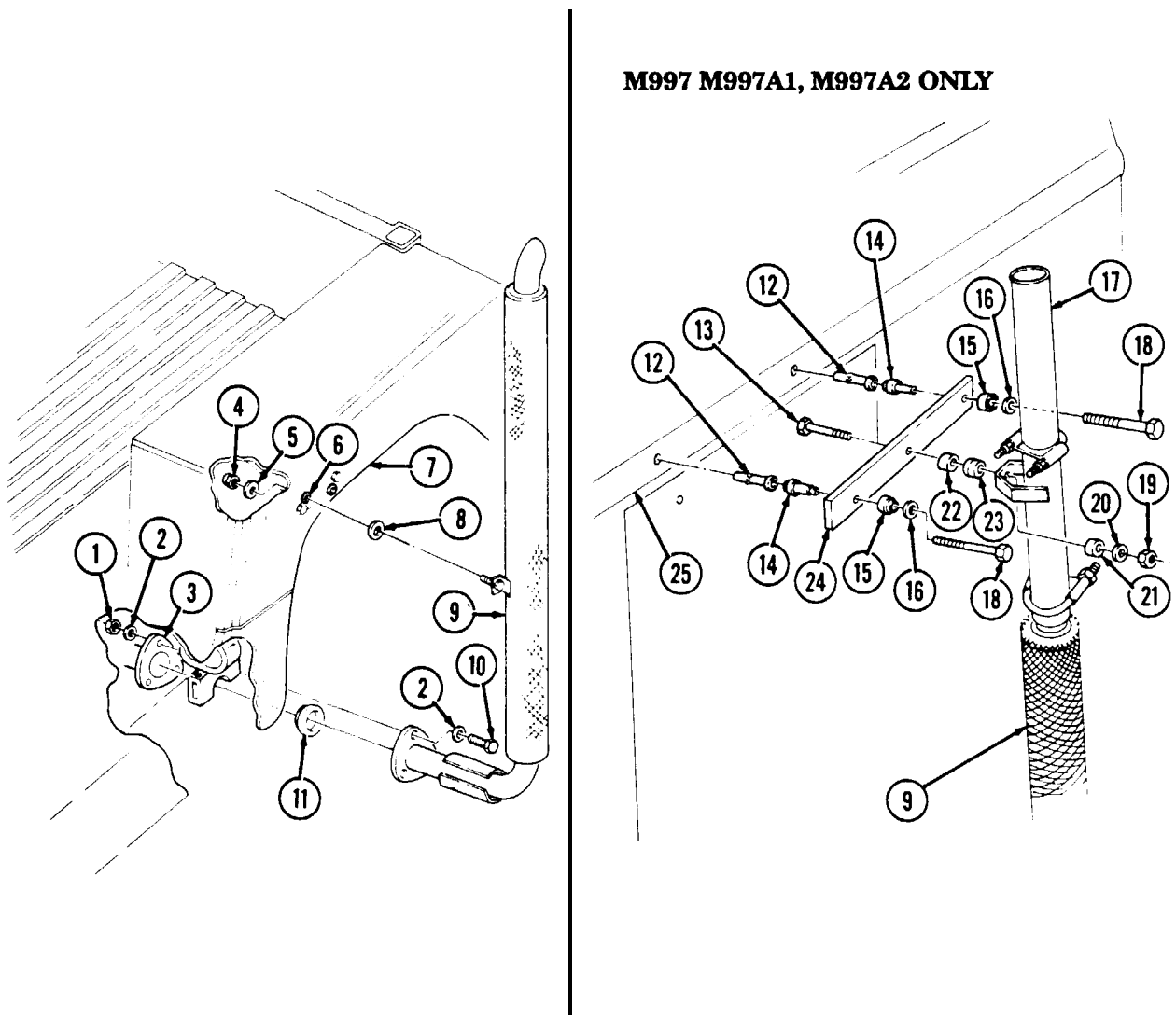
12-2. DEEP WATER FORDING KIT EXHAUST ASSEMBLY MAINTENANCE (Cont'd)

c. Installation

NOTE

Perform steps 1 through 3 for M997, M997A1, and M997A2 models only.

1. Install two spacers (14) and isolators (15) on bracket (24).
2. Install bolt (13), bracket (24), isolator (22), and noise damper (23) on exhaust extension (17) with noise damper (21), washer (20), and locknut (19). Tighten locknut (19) to 17 lb-ft (23 N•m).
3. Install exhaust extension (17) on upper body (25) with two washers (16) and bolts (18).
4. Install two spacers (8) and exhaust assembly (9) on wheelhouse (7) with two washers (5) and locknuts (4). Tighten locknuts (4) to 37 lb-ft (50 N•m).
5. Install exhaust assembly (9) and gasket (11) on muffler (3) with three washers (2), capscrews (10), washers (2), and locknuts (1). Tighten locknuts (1) to 26 lb-ft (35 N•m).



FOLLOW-ON TASK: Start engine (TM 9-2320-280-10) and check for exhaust leaks.

12-3. DEEP WATER FORDING KIT AIR INTAKE ASSEMBLY REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

All models except M966, M966A1, M1025, M1025A1, M1025A2, M1026, M1026A1

Manual References

TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

- Weathercap removed (para. 3-18).
- Fuel tank vent stack tube removed (para. 12-8).

Materials/Parts

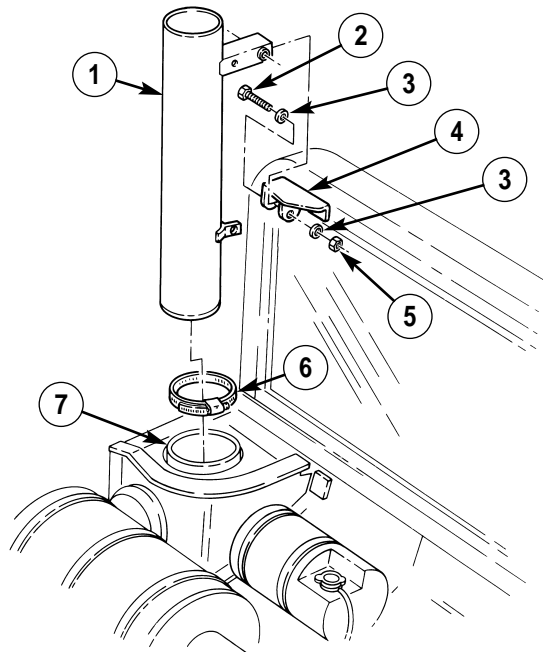
Locknut (Appendix G, Item 105)

a. Removal

1. Remove locknut (5), washer (3), capscrew (2), and washer (3) from air intake assembly (1) and windshield mounting bracket (4). Discard locknut (5).
2. Loosen clamp (6) and remove air intake assembly (1) from air cleaner extension elbow (7).

b. Installation

1. Install air intake assembly (1) into air cleaner extension elbow (7) with clamp (6). Tighten clamp (6) to 45-50 lb-in. (5-6 N•m).
2. Install air intake assembly (1) on windshield mounting bracket (4) with washer (3), capscrew (2), washer (3), and locknut (5). Tighten capscrew (2) to 43 lb-ft (58 N•m).



- FOLLOW-ON-TASKS:
- Install weather cap (para. 3-18).
 - Install fuel tank vent stack tube (para. 12-8).

12-4. AIR CLEANER EXTENSION ELBOW MAINTENANCE

This task covers:

- | | |
|---------------|-----------------|
| a. Removal | c. Installation |
| b. Inspection | |

INITIAL SETUP:

Applicable Models

All models except M966, M966A1, M1025, M1025A1, M1025A2, M1026, M1026A1

Manual References

TM 9-2320-280-24P

Tools

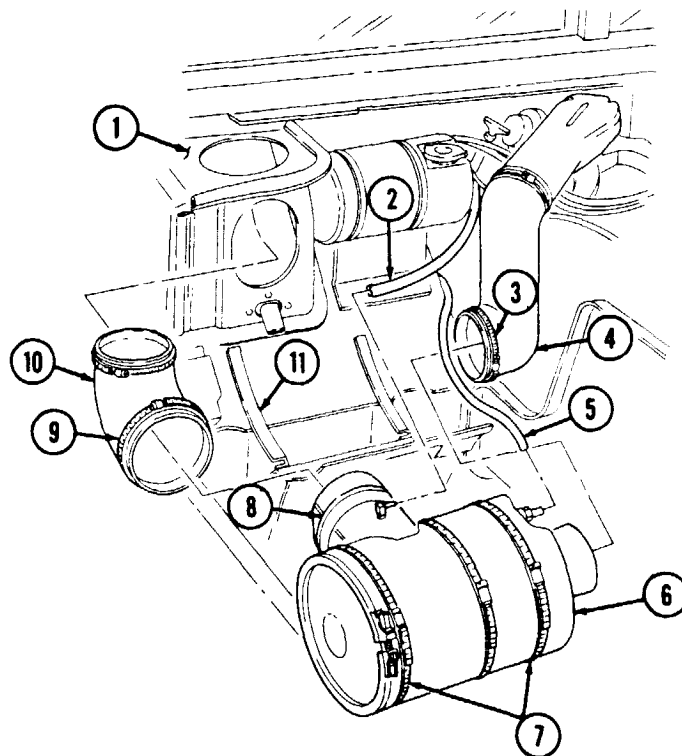
General mechanic's tool kit
automotive (Appendix B, Item 1)

Equipment Condition

Deep water fording kit removed (para. 12-3).

a. Removal

1. Loosen clamp (3) and disconnect air horn-to-air cleaner elbow (4) from air cleaner assembly (6).
2. Disconnect air cleaner-to-selector valve vent line (2) from air cleaner assembly (6).
3. Disconnect air restriction gauge hose (5) from air cleaner assembly (6).
4. Loosen two outer clamps (7) from air cleaner assembly (6) and support brackets (11).
5. Remove air cleaner assembly (6), gasket (8), and air cleaner extension elbow (10) from air induction box (1).
6. Loosen clamp (9) and remove air cleaner extension elbow (10) from air cleaner assembly (6).



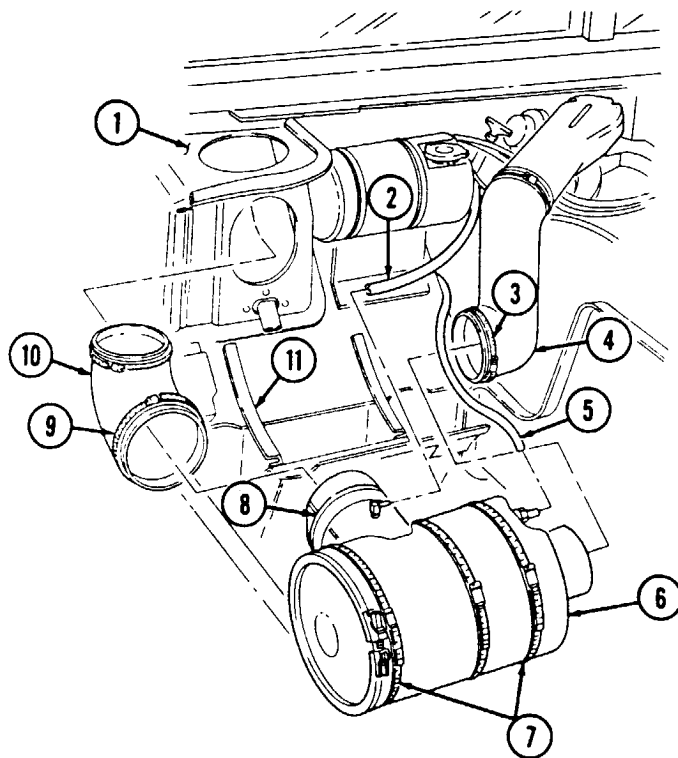
12-4. AIR CLEANER EXTENSION ELBOW MAINTENANCE (Cont'd)

b. Inspection

Inspect gasket (8) for breaks or cracks. Replace if broken or cracked.

c. Installation

1. Install air cleaner extension elbow (10) on air cleaner assembly (6). Tighten clamp (9) to 45-50 lb-in. (5-6 N•m).
2. Install air cleaner extension elbow (10) on air induction box (1),
3. Install air cleaner assembly (6) on support brackets (11) with two outer clamps (7). Tighten clamps (7) to 35-40 lb-in. (4-5 N•m).
4. Connect air restriction gauge hose (5) to air cleaner assembly (6).
5. Connect air cleaner-to-selector valve vent line (2) to air cleaner assembly (6).
6. Connect air horn-to-air cleaner elbow (4) to air cleaner assembly (6). Tighten clamp (3) to 45-50 lb-in. (5-6 N•m).



FOLLOW-ON TASK: Install air intake assembly (para. 12-3).

12-5. WINDSHIELD MOUNTING BRACKET REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

All models except M966, M966A1, M1025, M1025A1, M1025A2, M1026, M1026A1, M1121

Manual References

TM 9-2320-280-24P

Equipment Condition

Deep water fording kit removed (para. 12-3).

Tools

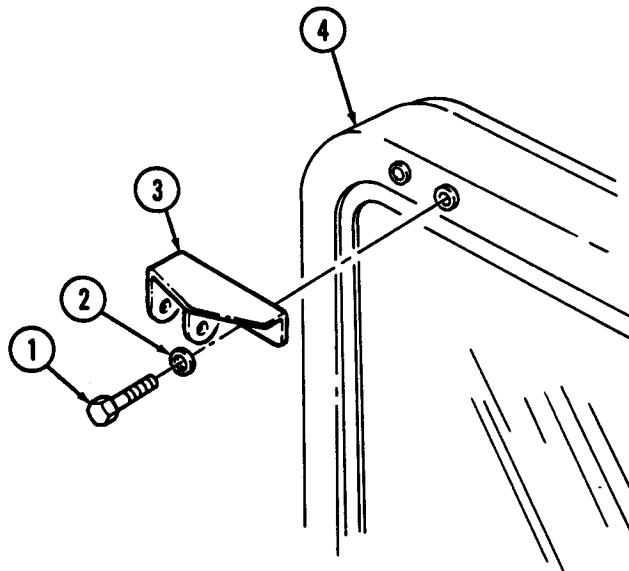
General mechanic's tool kit:
automotive (Appendix B, Item 1)

a. Removal

Remove two capscrews (1), washers (2), and windshield mounting bracket (3) from windshield (4).

b. Installation

Install windshield mounting bracket (3) on windshield (4) with two washers (2) and capscrews (1). Tighten capscrews (1) to 6 lb-ft (8 N·m).



FOLLOW-ON TASK: Install air intake assembly (para. 12-3).

12-6. AIR CLEANER DUST CAP MAINTENANCE

This task covers:

- a. Removal
- b. Inspection
- c. Installation

INITIAL SETUP:

Applicable Models

All models except M966, M966A1, M1025, M1025A1, M1025A2, M1026, M1026A1, M1121

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

Hood raised and secured (TM 9-2320-280-10).

a. Removal

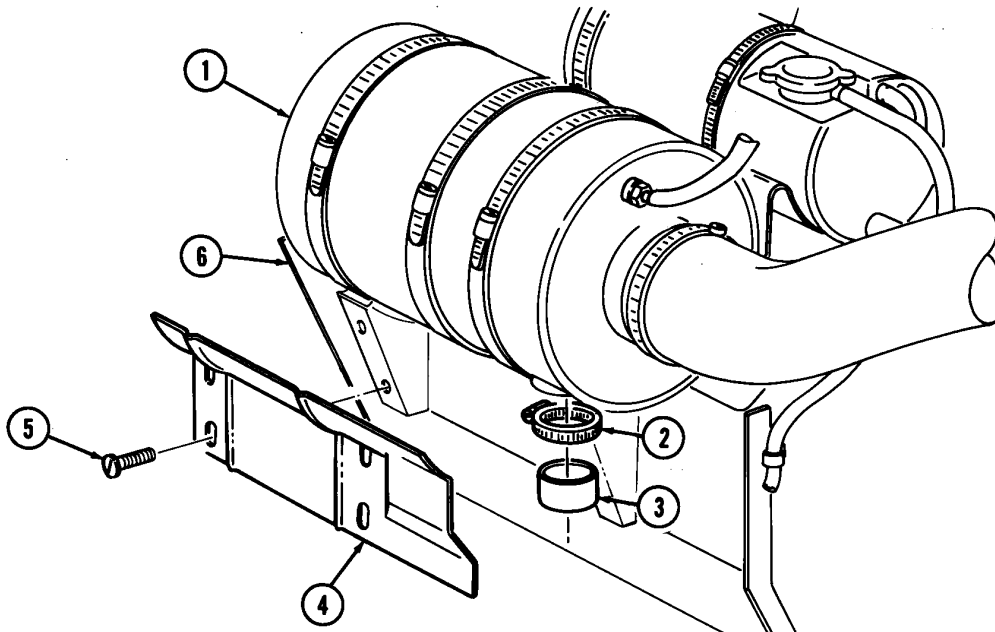
1. Remove four screws (5) and dust unloader cover plate (4) from air cleaner bracket (6).
2. Remove clamp (2) and air cleaner dust cap (3) from air cleaner assembly (1).

b. Inspection

Inspect air cleaner dust cap (3) for cuts, tears, obstructions, or enlarged gap. Replace if cut, torn, worn, missing, or if center opening exceeds 0.125 in. (3.18 mm).

c. Installation

1. Install dust cap (3) on air cleaner assembly (1) with clamp (2). Tighten clamp (2) to 45-50 lb-in. (5-6 N·m).
2. Install dust unloader cover plate (4) on air cleaner bracket (6) with four screws (5).



FOLLOW-ON TASK: Lower and secure hood (TM 9-2320-280-10).

12-7. AIR CLEANER TO SELECTOR VALVE VENT LINE REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

All models except M966, M966A1, M1025, M1025A1, M1025A2, M1026, M1026A1

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

Hood raised and secured (TM 9-2320-280-10).

Materials/Parts

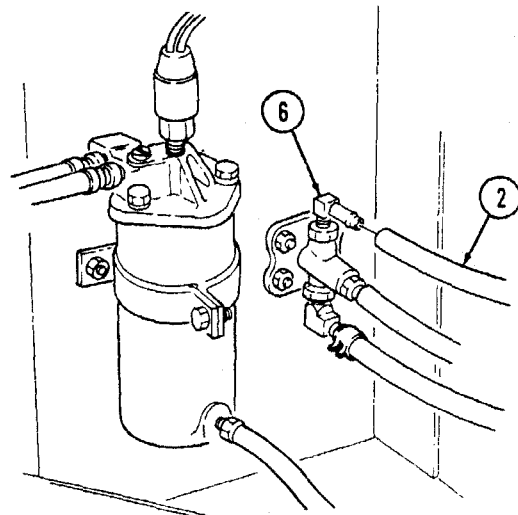
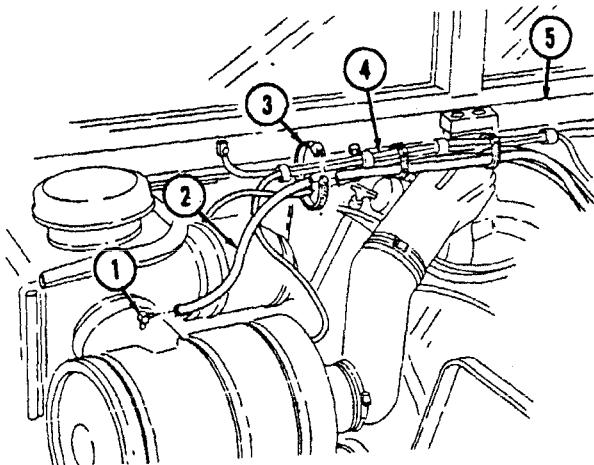
Three tiedown straps (Appendix G, Item 314)

a. Removal

1. Disconnect air cleaner-to-selector valve vent line (2) from air cleaner assembly fitting (1).
2. Remove three tiedown straps (3) and vent line (2) from existing hoses (4) on "A" beam (5). Discard tiedown straps (3).
3. Remove air cleaner-to-selector valve vent line (2) from selector valve (6).

b. Installation

1. Connect air cleaner-to-selector valve vent line (2) to selector valve (6).
2. Route vent line (2) along "A" beam (5) and secure to existing hoses (4) with three tiedown straps (3).
3. Connect air cleaner-to-selector vent line (2) to air cleaner assembly fitting (1).



FOLLOW-ON TASK: Lower and secure hood (TM 9-2320-280-10).

12-8. FUEL TANK VENT STACK TUBE REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

All models except M966, M966A1, M1025, M1025A1, M1025A2, M1026, M1026A1, M1097, M1097A1, M1097A2

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

Hood raised and secured (TM 9-2320-280-10).

Materials/Parts

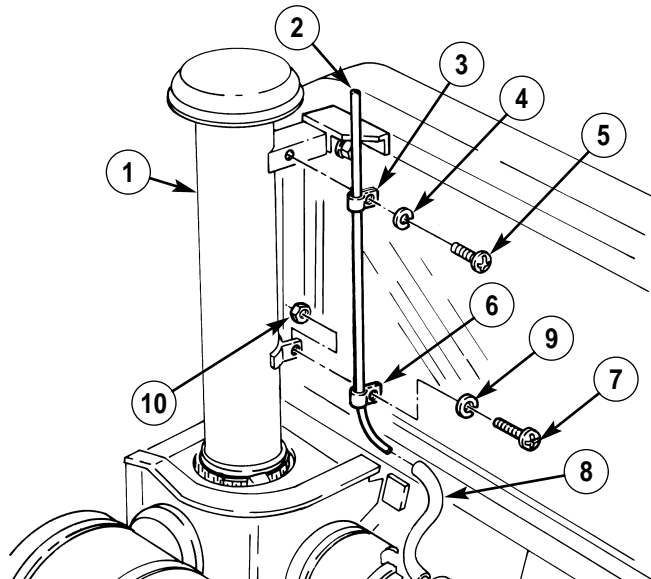
Two lockwashers (Appendix G, Item 183)

a. Removal

1. Disconnect fuel tank vent line (8) from fuel tank vent stack tube (2).
2. Remove nut (10), lockwasher (9), screw (7), and clamp (6) from fuel tank vent stack tube (2) and air intake assembly (1). Discard lockwasher (9).
3. Remove screw (5), lockwasher (4), fuel tank vent stack tube (2), and clamp (3) from air intake assembly (1). Discard lockwasher (4).

b. Installation

1. Install fuel tank vent stack tube (2) and clamp (3) on air intake assembly (1) with lockwasher (4) and screw (5).
2. Install fuel tank vent stack tube (2) and clamp (6) on air intake assembly (1) with lockwasher (9), screw (7), and nut (10).
3. Connect vent line (8) to vent stack tube (2).



FOLLOW-ON TASK: Lower and secure hood (TM 9-2320-280-10).

12-9. SELECTOR VALVE REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

All models except M966, M966A1, M1025, M1025A1, M1025A2, M1026, M1026A1, M1097, M1097A1, M1097A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Two locknuts (Appendix G, Item 70)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

- Hood raised and secured (TM 9-2320-280-10).
- Engine access cover removed (para. 10-15).

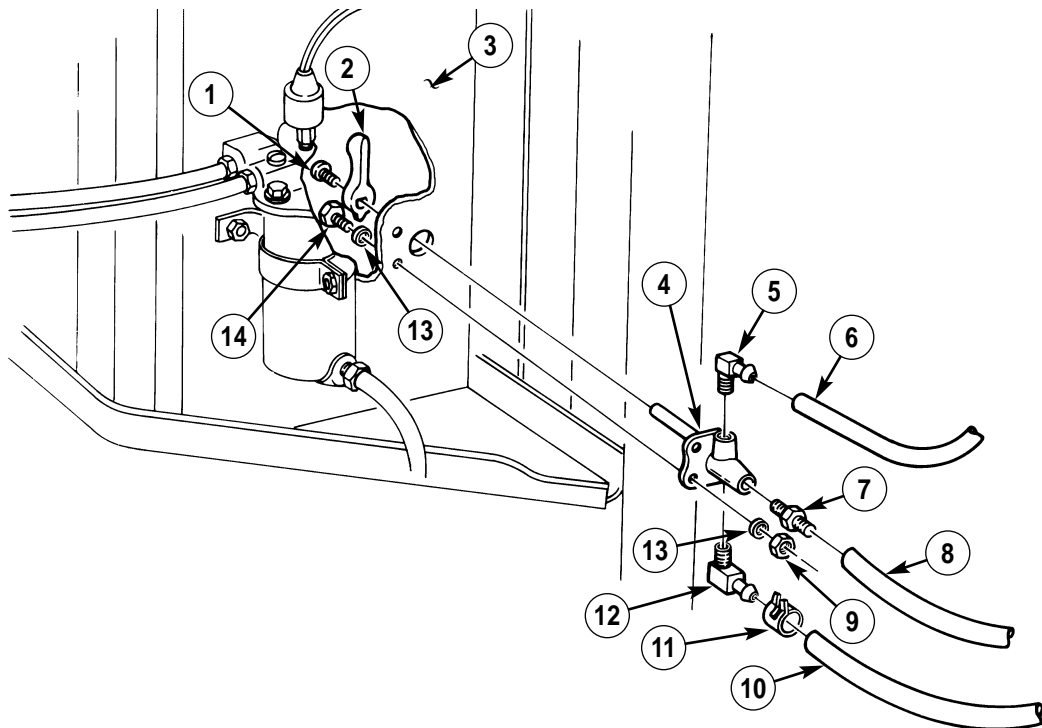
a. Removal

1. Remove screw (1) and selector control (2) from selector valve (4).
2. Remove two locknuts (9), washers (13), capscrews (14), and washers (13) from selector valve (4) and body (3). Discard locknuts (9).

NOTE

Prior to removal, tag vent lines for installation.

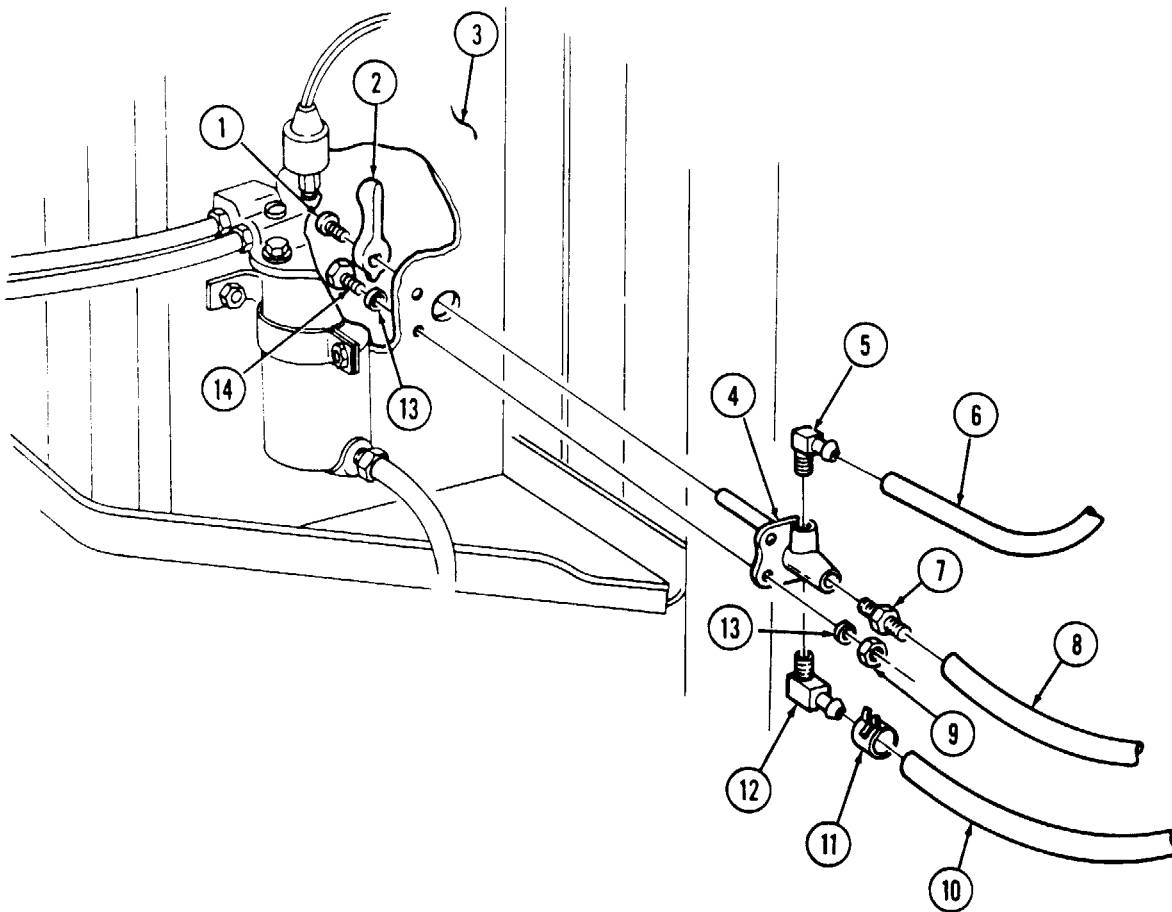
3. Disconnect air cleaner-to-selector valve vent line (6) from elbow (5).
4. Disconnect selector valve-to-union tee vent line (8) from connector (7).
5. Loosen clamp (11) and disconnect CDR valve vent line (10) from elbow (12).
6. Remove elbow (5), connector (7), and elbow (12) from selector valve (4).



12-9. SELECTOR VALVE REPLACEMENT (Cont'd)

b. Installation

1. Install elbow (12), connector (7), and elbow (5) on selector valve (4).
2. Connect CDR valve vent line (10) to selector elbow (12) with clamp (11).
3. Connect selector valve-to-union tee vent line (8) to connector (7).
4. Connect air cleaner-to-selector valve vent line (6) to elbow (5).
5. Install selector valve (4) on body (3) with two washers (13), capscrews (14), washers (13), and locknuts (9). Tighten locknuts (9) to 10 lb-ft (14 N•m).
6. Install selector control (2) on selector valve (4) with screw (1).



- FOLLOW-ON TASKS:**
- Install engine access cover (para. 10-15).
 - Lower and secure hood (TM 9-2320-280-10).

12-10. CDR VALVE VENT LINE REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

All models except M966, M966A1, M1025, M1025A1, M1025A2, M1026, M1026A1, M1097, M1097A1, M1097A2

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

Hood raised and secured (TM 9-2320-280-10).

Materials/Parts

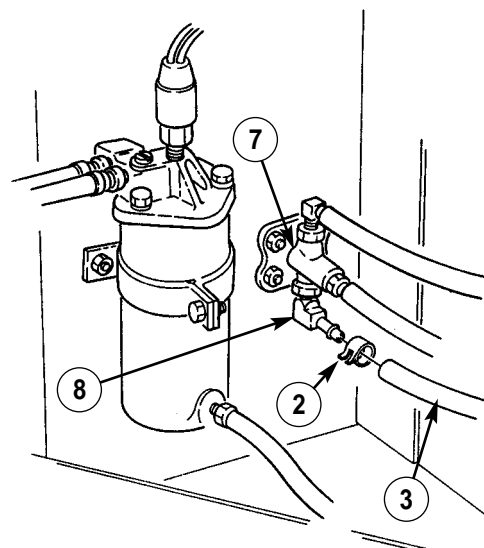
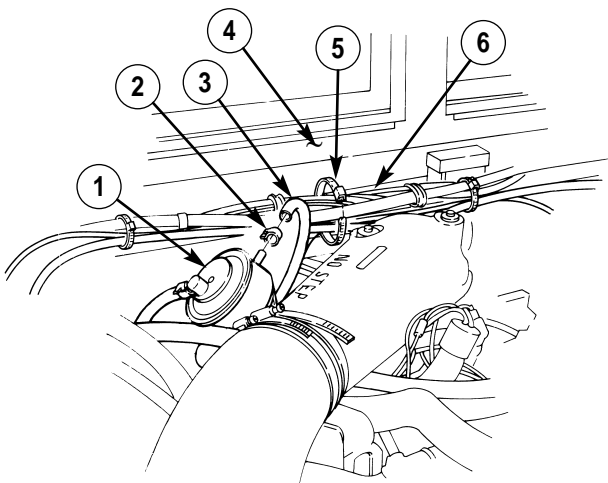
Two tiedown straps (Appendix G, Item 314)

a. Removal

1. Loosen clamp (2) and disconnect CDR valve vent line (3) from CDR valve (1).
2. Remove two tiedown straps (5) from vent line (3) and existing hoses (6) on "A" beam (4). Discard tiedown straps (5).
3. Loosen clamp (2) and remove vent line (3) from elbow (8) on selector valve (7).
4. Remove clamps (2) from vent line (3).

b. Installation

1. Install clamps (2) on vent line (3).
2. Connect vent line (3) to elbow (8) on selector valve (7) with clamp (2).
3. Install vent line (3) along "A" beam (4) on existing hoses (6) with two tiedown straps (5).
4. Connect vent line (3) to CDR valve (1) with clamp (2).



FOLLOW-ON TASK: Lower and secure hood (TM 9-2320-280-10).

12-11. HYDRO-BOOST VENT LINE REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

All models except M966, M966A1, M1025, M1025A1, M1025A2, M1026, M1026A1, M1097, M1097A1, M1097A2

Manual References

TM 9-2320-280-24P

Equipment Condition

Engine left splash shield removed (para. 10-17).

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

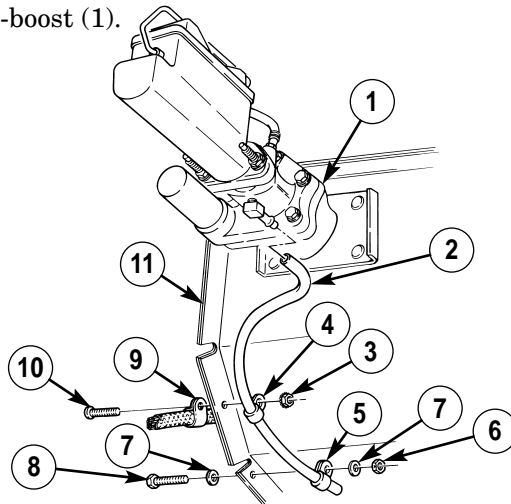
Locknut (Appendix G, Item 70)
Plain-assembled nut
(Appendix G, Item 201)

a. Removal

1. Disconnect hydro-boost vent line (2) from hydro-boost (1).
2. Remove plain-assembled nut (3), capscrew (10), clamp (4), harness clamp (9), and vent line (2) from body (11). Discard plain-assembled nut (3).
3. Remove locknut (6), washer (7), capscrew (8), washer (7), clamp (5), and vent line (2) from body (11). Discard locknut (6).
4. Remove two clamps (4) and (5) from vent line (2).

b. Installation

1. Install two clamps (4) and (5) on vent line (2).
2. Install vent line (2) and clamp (5) on body (11) with washer (7), capscrew (8), washer (7), and locknut (6). Tighten capscrew (8) to 6 lb-ft (8 N•m).
3. Install vent line (2), harness clamp (9), and clamp (4) on body (11) with capscrew (10) and plain-assembled nut (3).
4. Connect vent line (2) to hydro-boost (1).



FOLLOW-ON TASK: Install engine left splash shield (para. 10-17).

12-12. DEEP WATER FORDING SENSOR CUP REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

All models except M966, M966A1, M1025, M1025A1, M1025A2, M1026, M1026A1

Manual References

TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

Engine access cover removed (para. 10-15).

Materials/Parts

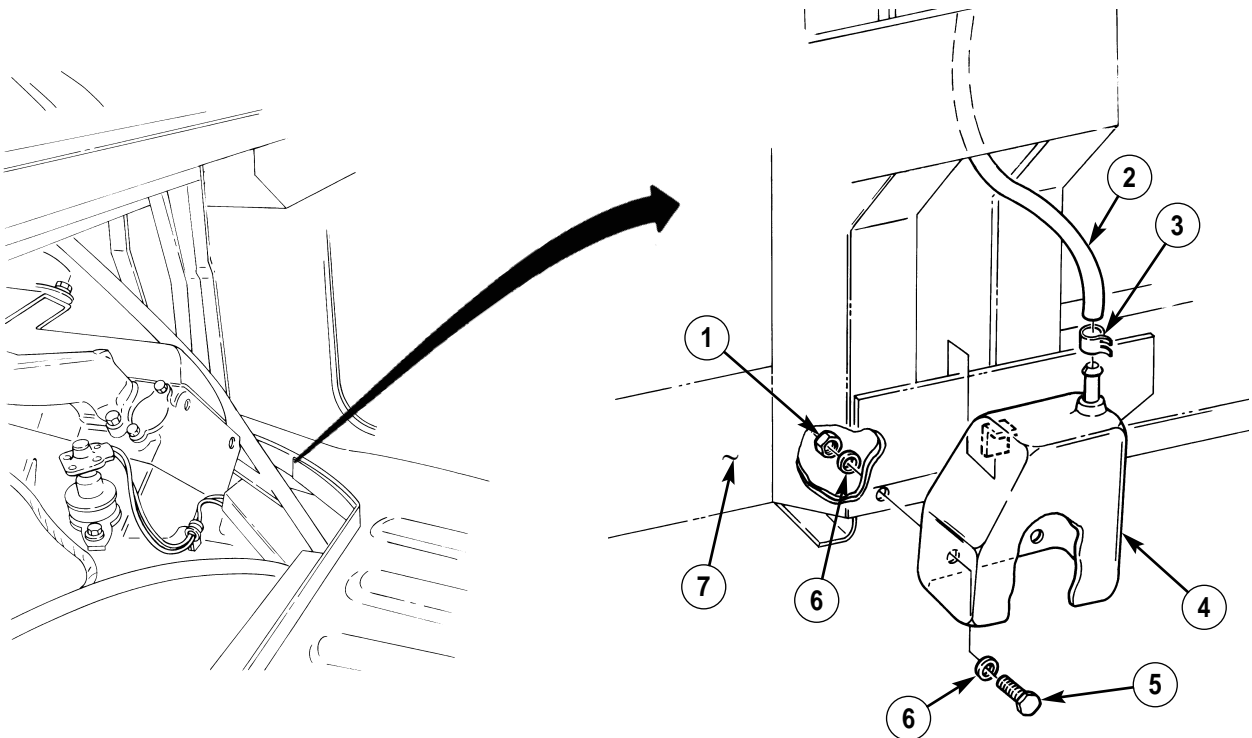
Two locknuts (Appendix G, Item 70)

a. Removal

1. Loosen clamp (3) and disconnect sensor cup vent line (2) from sensor cup (4).
2. Remove two locknuts (1), washers (6), capscrews (5), washers (6), and sensor cup (4) from body (7). Discard locknuts (1).

b. Installation

1. Install sensor cup (4) on body (7) with two washers (6), capscrews (5), washers (6), and locknuts (1). Tighten locknuts (1) to 6 lb-ft (8 N·m).
2. Connect sensor cup vent line (2) to sensor cup (4) with clamp (3).



FOLLOW-ON TASK: Install engine access cover (para. 10-15).

12-13. SENSOR CUP VENT LINE REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tol kit:
automotive (Appendix B, Item 1)

Equipment Condition

- Hood raised and secured (TM 9-2320-280-10).
- Engine access cover removed (paa. 10-15).

Manual References

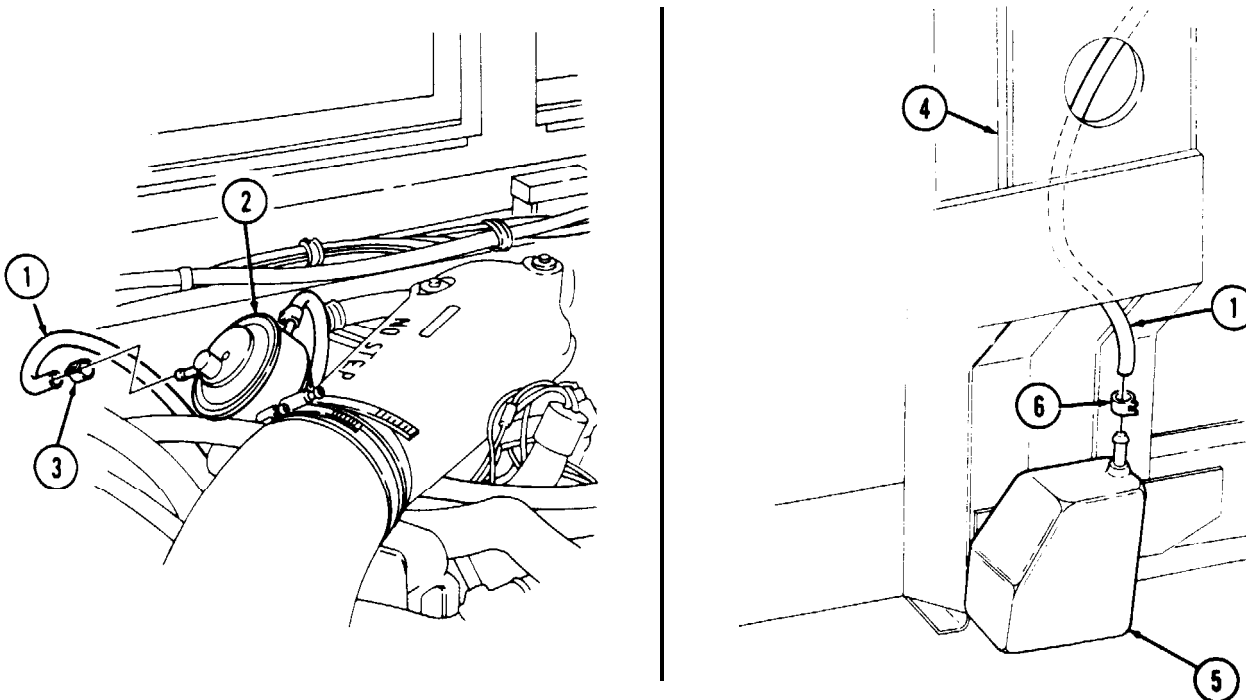
TM 9-2320-280-10
TM 9-2320-20-24P

a. Removal

1. Loosen clamp (3) and disconnect sensor cup vent line (1) from CDR valve (2).
2. Loosen clamp (6) and remove vent line (1) from sensor cup (5).
3. Remove two clamps (3) and (6) from vent line (1).

b. Installation

1. Install two clamps (3) and (6) on vent line (1).
2. Route vent line (1) through "A" beam (4).
3. Connect vent line (1) to sensor cup (5) with clamp (6).
4. Connect vent line (1) to CDR valve (2) with clamp (3).



- FOLLOW-ON TASKS: • Install engine access cover (para. 10-15).
• Lower and secure hood (TM 9-2320-280-10).

12-14. POWER STEERING VENT LINE REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

All models except M966, M966A1, M1025, M1025A1, M1025A2, M1026, M1026A1, M1097, M1097A1, M1097A2

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

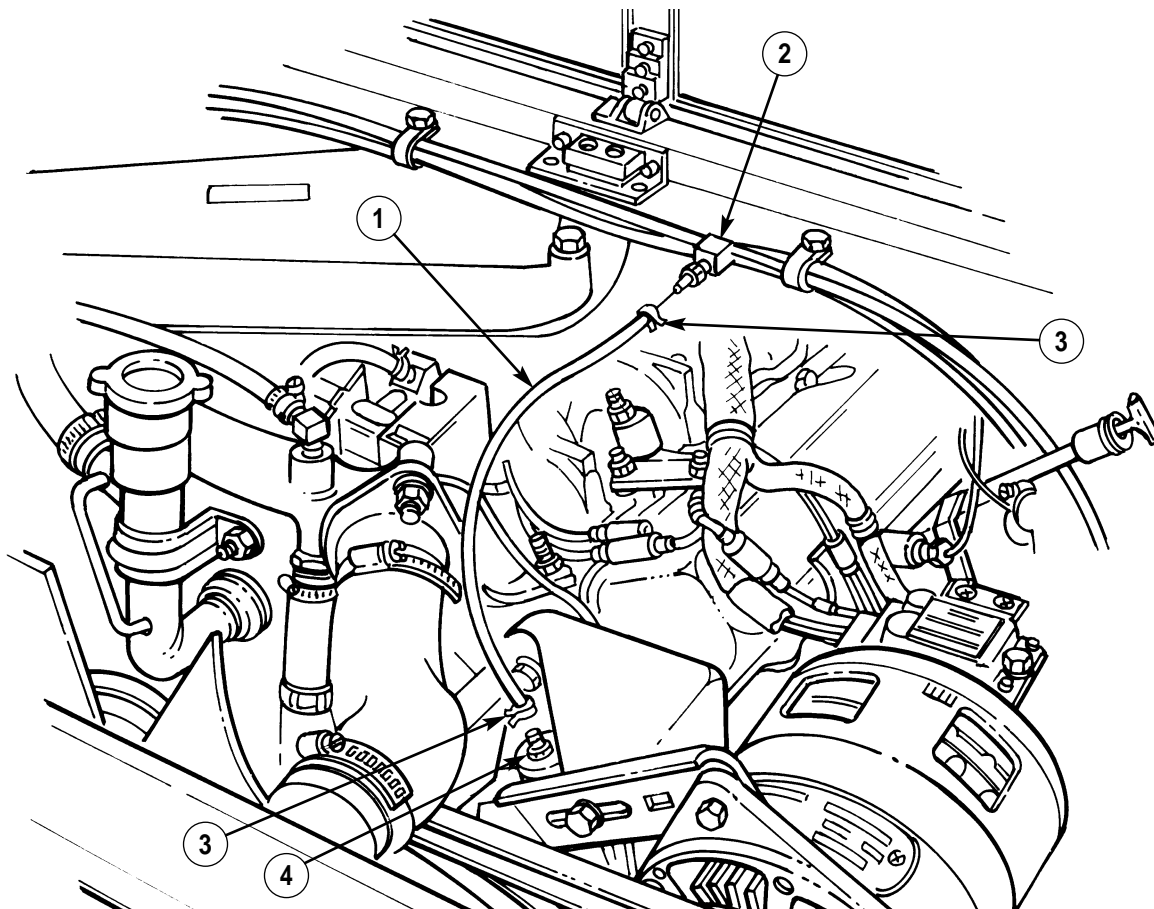
Hood raised and secured (TM 9-2320-280-10).

a. Removal

Loosen two clamps (3) and remove power steering vent line (1) from power steering pump cap (4) and tee fitting (2).

b. Installation

Connect vent line (1) to power steering cap (4) and tee fitting (2) with two clamps (3).



FOLLOW-ON TASK: Lower and secure hood (TM 9-2320-280-10).

12-15. EXHAUST REINFORCEMENT BRACKET REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-24P

Materials/Parts

Eight locknuts (Appendix G, Item 70)

Equipment Condition

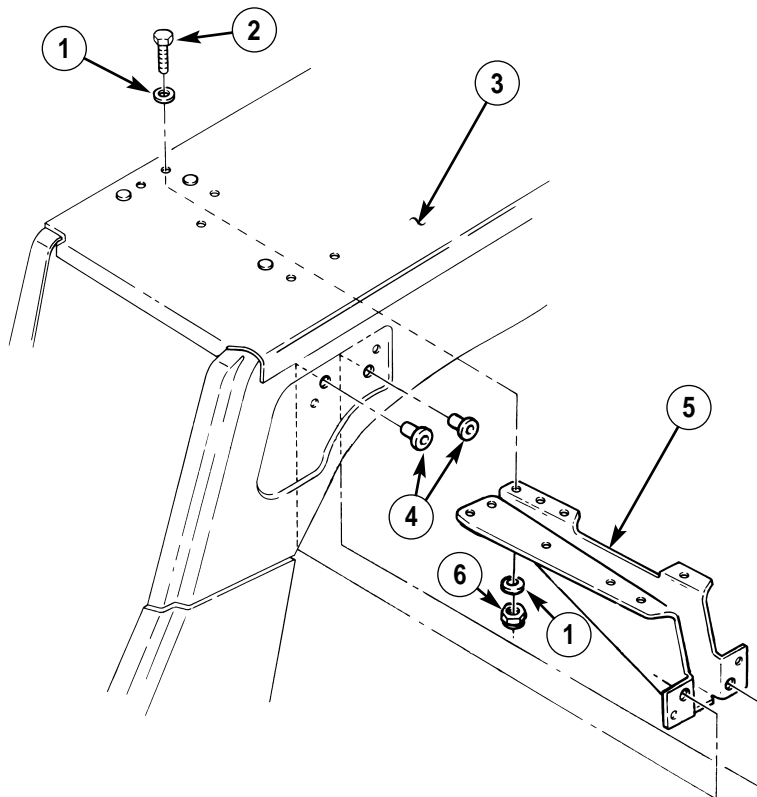
Deep water fording kit exhaust assembly removed
(para. 12-2).

a. Removal

1. Remove two isolators (4) from wheelhouse (3) and reinforcement bracket (5).
2. Remove eight locknuts (6), washers (1), capscrews (2), washers (1), and reinforcement bracket (5) from wheelhouse (3). Discard locknuts (6).

b. Installation

1. Install reinforcement bracket (5) on wheelhouse (3) with eight washers (1), capscrews (2), washers (1), and locknuts (6). Tighten capscrews (2) to 6 lb-ft (8 N•m).
2. Install two isolators (4) on wheelhouse (3) and reinforcement bracket (5).



FOLLOW-ON TASK: Install deep water fording kit exhaust assembly (para. 12-2).

Section II. TROOP SEAT KIT MAINTENANCE

12-16. TROOP SEAT KIT MAINTENANCE TASK SUMMARY

TASK PARA.	PROCEDURES	PAGE NO.
12-17.	Seat Support Replacement	12-19
12-18.	Troop Seat Kit Replacement	12-20
12-19.	Troop Seat Board Replacement	12-22

12-17. SEAT SUPPORT REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M998, M998A1, M1038, M1038A1, M1097, M1097A1, M1097A2

Materials/Parts

Three cotter pins (Appendix G, Item 19)

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

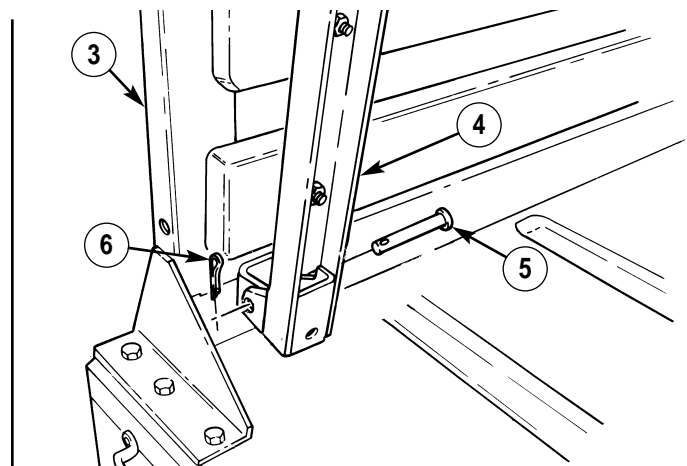
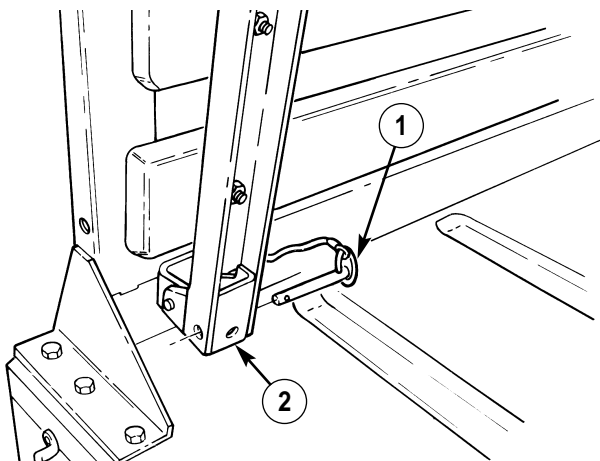
TM 9-2320-280-24P

a. Removal

1. Remove two lockpins (1) from troop seat (2).
2. Lower seat support (4).
3. Remove three cotter pins (6), clevis pins (5), and seat support (4) from back support (3). Discard cotter pins (6).

b. Installation

1. Install seat support (4) on back support (3) with three clevis pins (5) and cotter pins (6).
2. Raise seat support (4) and install two lockpins (1) on troop seat (2).



12-18. TROOP SEAT KIT REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M998, M998A1, M1038, M1038A1, M1097, M1097A1, M1097A2

Personnel Required

One mechanic
One assistant

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-24P

Materials/Parts

Nine locknuts (Appendix G, Item 70)
Two locknuts (Appendix G, Item 71)
Three locknuts (Appendix G, Item 86)

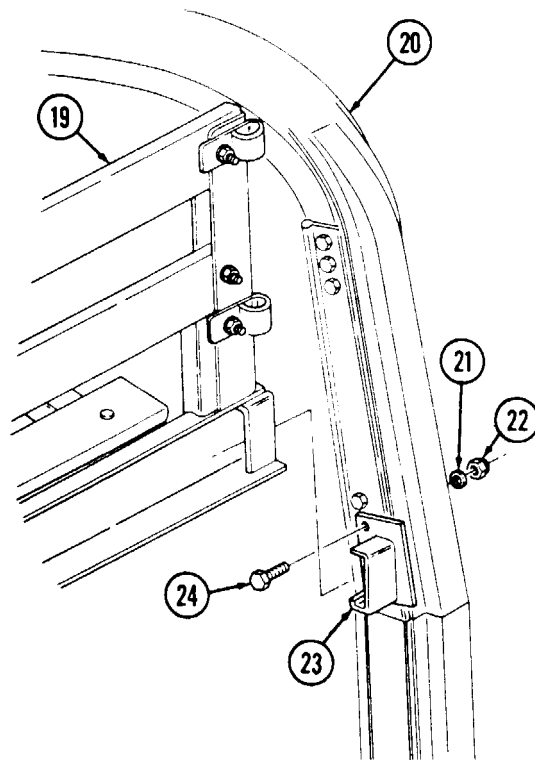
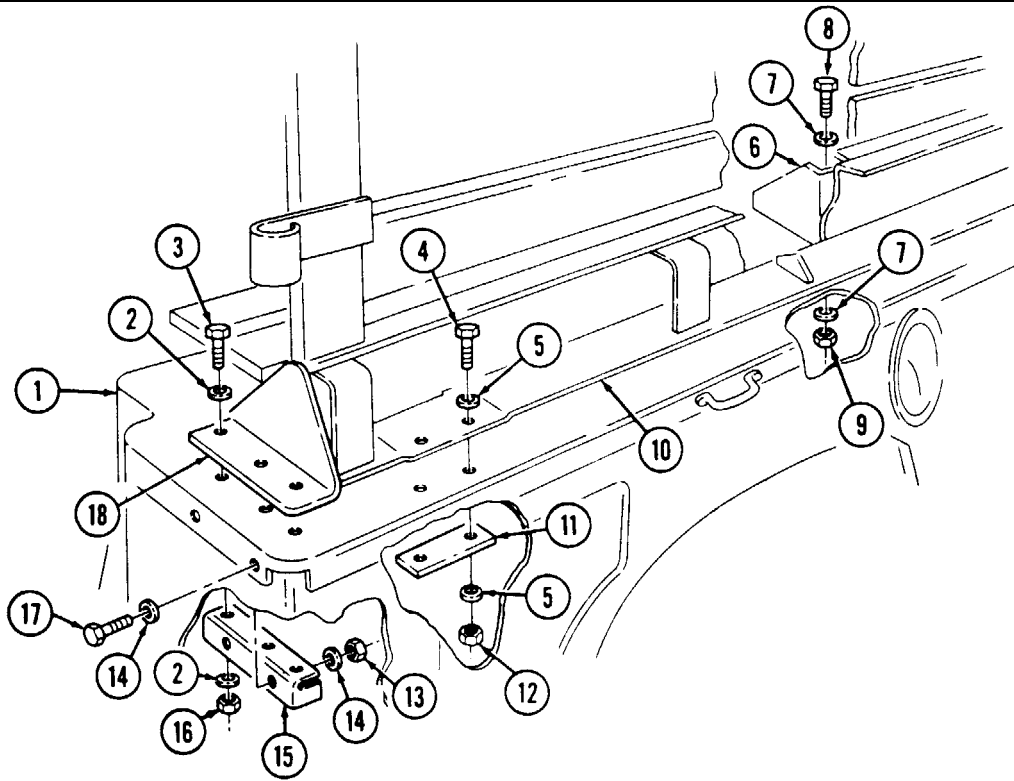
a. Removal

1. Remove three locknuts (16), washers (2), capscrews (3), washers (2), and rear angle bracket (18) from wheelhouse (1). Discard locknuts (16).
2. Remove two locknuts (13), washers (14), capscrews (17), washers (14), and rear bracket retainer plate (15) from wheelhouse (1). Discard locknuts (13).
3. Remove two nuts (9), washers (7), capscrews (8), washers (7), and support bracket (6) from wheelhouse (1).
4. Remove six locknuts (12), washers (5), capscrews (4), washers (5), three reinforcement plates (11), and main channel (10) from wheelhouse (1). Discard locknuts (12).
5. Remove troop seat (19).
6. Remove three locknuts (22), washers (21), capscrews (24), and channel support (23) from "B" pillar (20). Discard locknuts (22).

b. Installation

1. Install channel support (23) on "B" pillar (20) with three capscrews (24), washers (21), and locknuts (22). Tighten locknuts (22) to 15 lb-ft (20 N•m).
2. Install troop seat (19) on wheelhouse (1).
3. Install main channel (10) and three reinforcement plates (11) on wheelhouse (1) with six washers (5), capscrews (4), washers (5), and locknuts (12). Tighten capscrews (4) to 15 lb-ft (20 N•m).
4. Install support bracket (6) on wheelhouse (1) with two washers (7), capscrews (8), washers (7), and nuts (9). Tighten nuts (9) to 43 lb-ft (58 N•m).
5. Install rear bracket retainer plate (15) on wheelhouse (1) with two washers (14), capscrews (17), washers (14), and locknuts (13). Tighten locknuts (13) to 6 lb-ft (8 N•m).
6. Install rear angle bracket (18) on wheelhouse (1) with three washers (2), capscrews (3), washers (2), and locknuts (16). Tighten locknuts (16) to 6 lb-ft (8 N•m).

12-18. TROOP SEAT KIT REPLACEMENT (Cont'd)



12-19. TROOP SEAT BOARD REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M998, M998A1, M1038, M1038A1, M1097, M1097A1, M1097A2

Materials/Parts

Three plain-assembled nuts (Appendix G, Item 205)

Tools

General mechanic's tool kit: automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-24P

NOTE

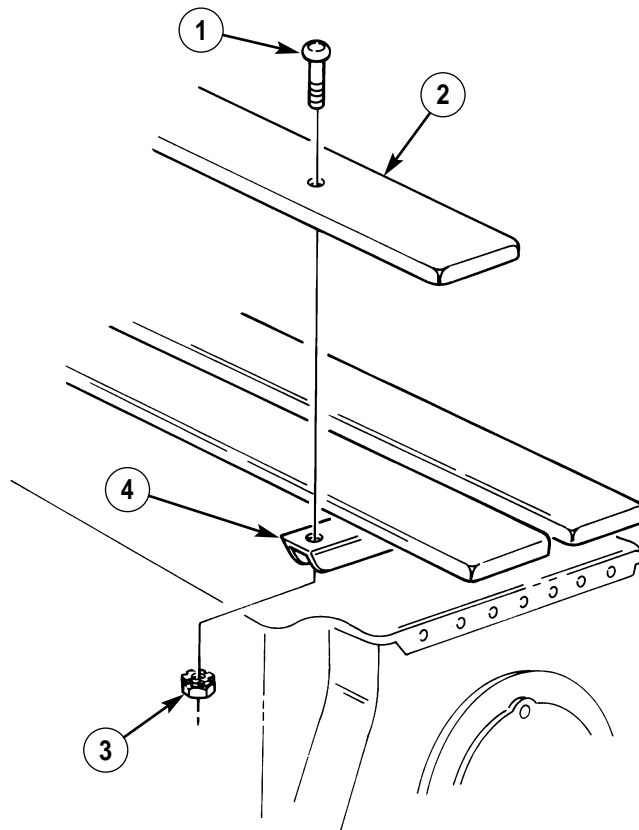
The procedure for replacing seat boards and back boards is basically the same. This procedure covers seat boards.

a. Removal

Remove three carriage bolts (1), plain-assembled nuts (3), and seat board (2) from channel assembly (4). Discard plain-assembled nuts (3).

b. Installation

Install seat board (2) on channel assembly (4) with three carriage bolts (1) and plain-assembled nuts (3).



Section III. 100 AMPERE ALTERNATOR KIT MAINTENANCE

12-20. 100 AMPERE ALTERNATOR MAINTENANCE TASK SUMMARY

TASK PARA.	PROCEDURES	PAGE NO.
12-21.	100 Ampere Regulator (R027096300) Replacement	12-24
12-22.	100 Ampere Regulator (12342944, N3106) Replacement	12-28
12-22.1.	100 Ampere Alternator Cable (12446821-2) Replacement	12-28.2
12-23.	100 Ampere Alternator (12340912) Replacement	12-30
12-24.	100 Ampere Alternator (12342944) Replacement	12-32
12-24.1.	100/200 Ampere Dual Voltage Alternator and Regulator Conversion	12-34.2

12-21. 100 AMPERE REGULATOR (R027096300) REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

All models except M996, M996A1, M1026, M1026A1, M1097, M1097A1, M1097A2, M1123

Tools

General mechanic's tool kit: automotive (Appendix B, Item 1)

Materials/Parts

Antiseize compound (Appendix C, Item 13)
 Adhesive sealant (Appendix C, Item 9)
 Silicone (Appendix C, Item 48)
 Six lockwashers (Appendix G, Item 184)
 Two lockwashers (Appendix G, Item 142)
 Lockwasher (Appendix G, Item 134)

Manual References

TM 9-2320-280-10
 TM 9-2320-280-24P

Equipment Condition

- Battery ground cable disconnected (para. 4-73).
- Hood raised and secured (TM 9-2320-280-10).

NOTE

- Prior to removal, tag leads for installation.
- Older model regulators have two screws securing regulator cover and terminals are sealed with sealant. Newer model regulators have four screws securing regulator cover and no sealant. Identify which type is on vehicle and follow particular model steps as noted.

a. Removal

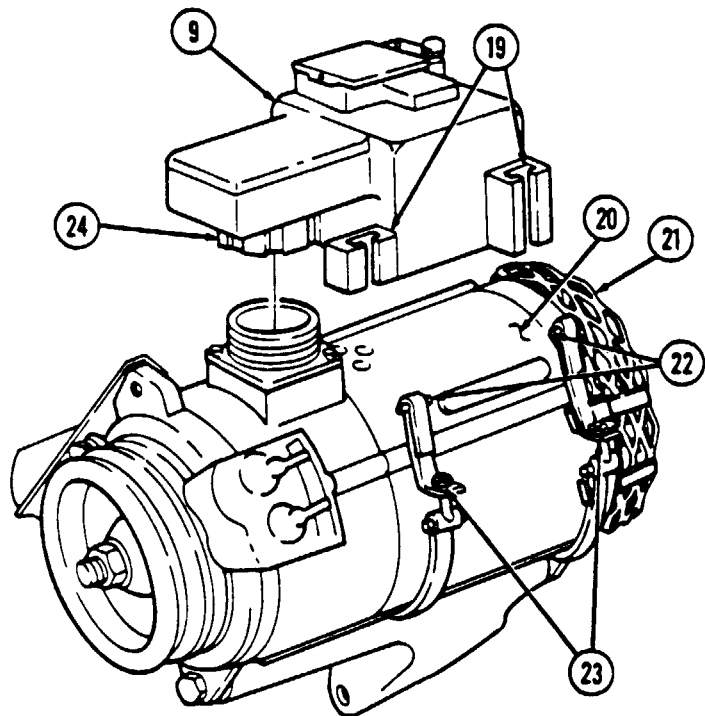
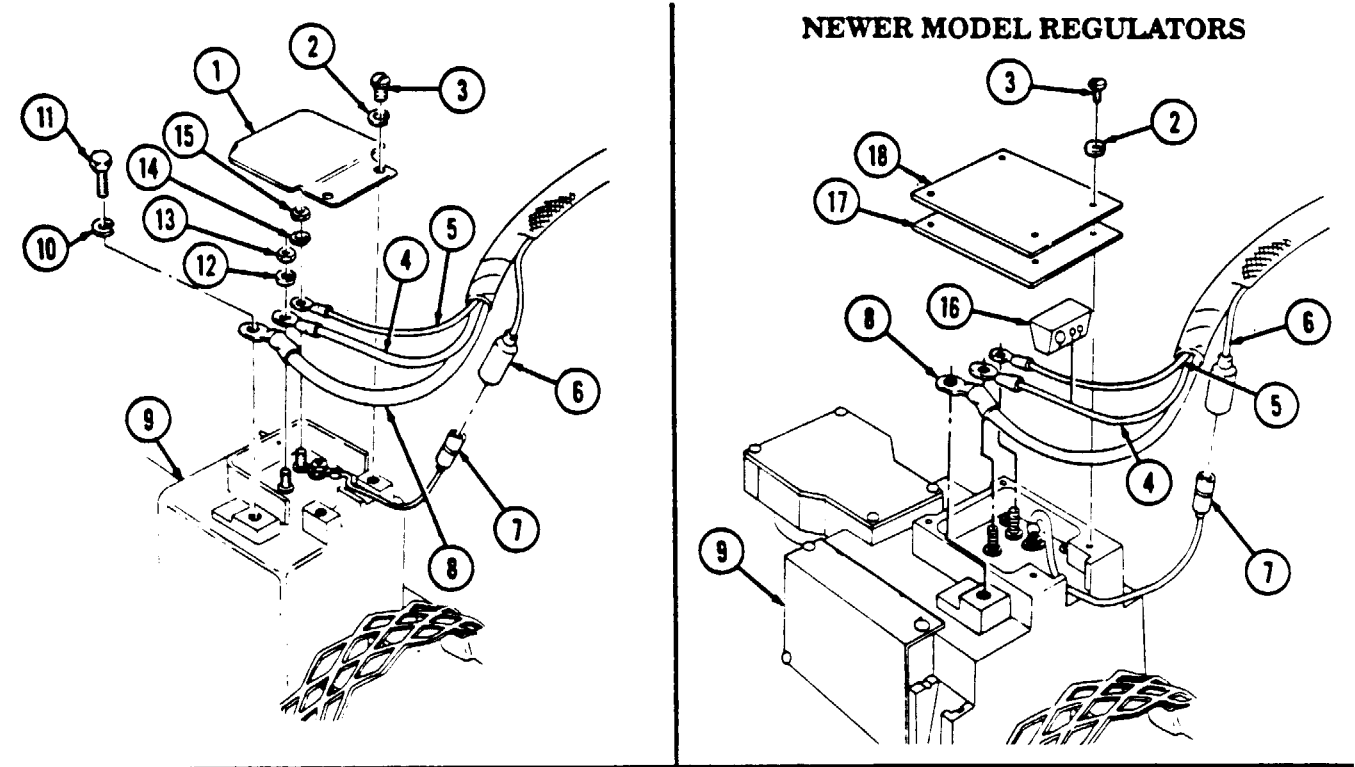
1. Remove capscrew (11), lockwasher (10), and lead 3B (8) from regulator (9). Discard lockwasher (10).

NOTE

Perform steps 2 and 3 for older model regulators and step 4 for newer models.

2. Remove two screws (3), lockwashers (2), and cover (1) from regulator (9). Discard lockwashers (2).
3. Remove sealant from cover (1), leads (4), (5), and (7), and regulator (9).
4. Remove four screws (3), lockwashers (2), cover (18), gasket (17) and sealing wedge (16) from regulator (9) and leads (4), (5), and (7). Discard lockwashers (2).
5. Remove nut (13), lockwasher (12), and lead 5A (4) from regulator (9). Discard lockwasher (12).
6. Remove nut (15), lockwasher (14), and lead 2A (5) from regulator (9). Discard lockwasher (14).
7. Disconnect regulator lead 568 (7) from engine harness lead 568A (6).
8. Loosen two clamp nuts (23) and remove clamp pins (22) and guard (21) from regulator slots (19).
9. Unscrew connector plug (24) and remove regulator (9) from alternator (20).

12-21. 100 AMPERE REGULATOR (R027096300) REPLACEMENT (Cont'd)



12-21. 100 AMPERE REGULATOR (R027096300) REPLACEMENT(Cont'd)

b. Installation

1. Fill alternator receptacle (8) with silicone. Install regulator (1) on alternator (3) and tighten connector plug (9) between alternator (3) and regulator (1).
2. Ensure guard (4) is positioned in rear clamp (5). Install clamp pins (7) into regulator slots (2). Tighten two clamp nuts (6) to 35-45 lb-in. (4-5 N•m).

NOTE

Ensure terminals are clean before connections are made.

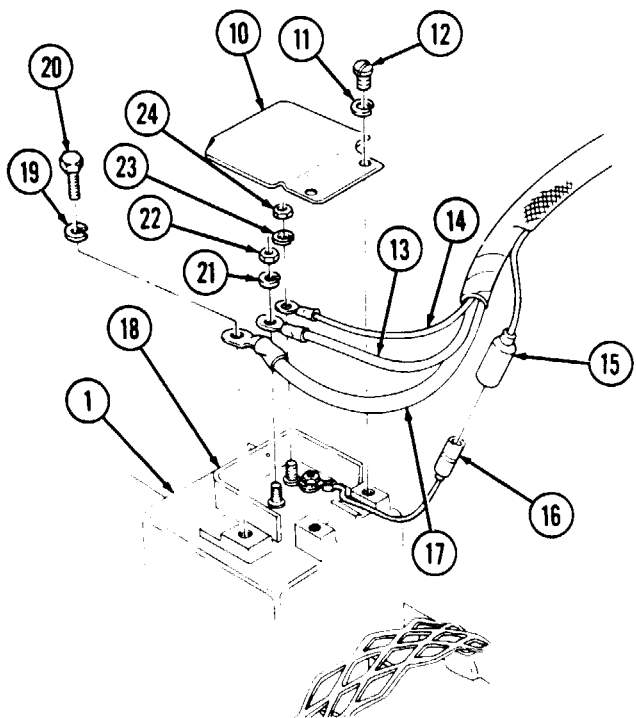
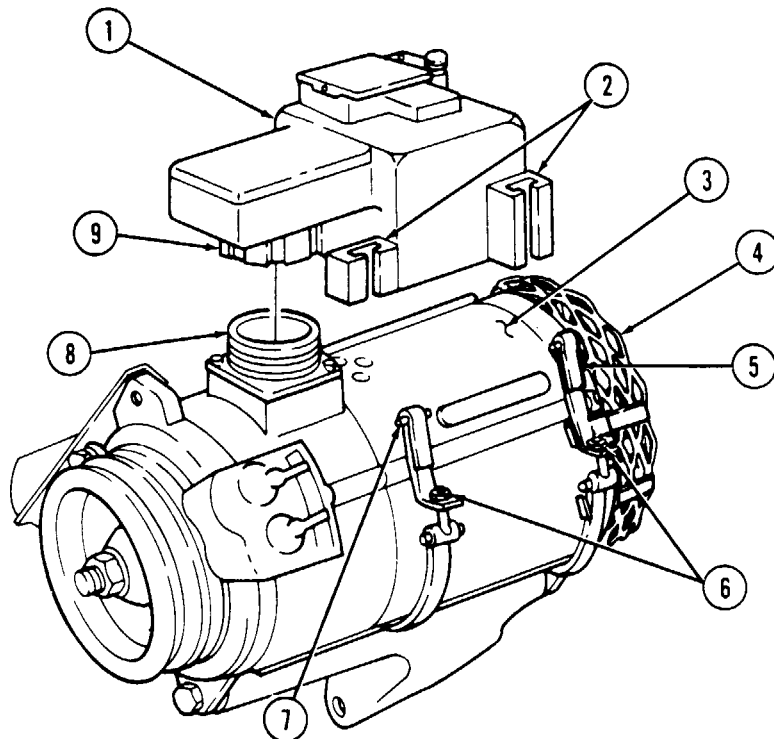
3. Connect engine harness lead 568A (15) to regulator lead 568 (16).
4. Connect lead 2A (14) to regulator (1) with lockwasher (23) and nut (24). Tighten nut (24) to 20 lb-in. (2.3 N•m).
5. Connect lead 5A (13) to regulator (1) with lockwasher (21) and nut (22). Tighten nut (22) to 50 lb-in. (5.6 N•m).

NOTE

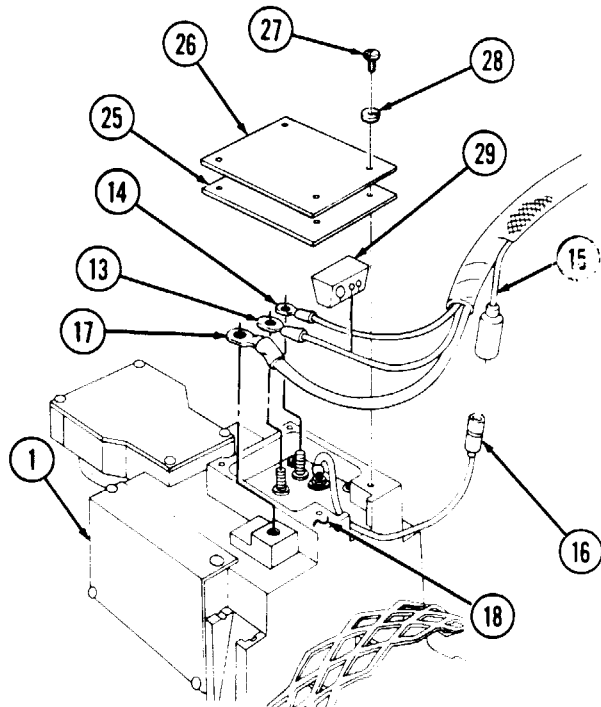
Perform steps 6 and 7 for older model regulators, and steps 8 and 9 for newer model regulators.

6. Completely fill regulator cavity (18) with sealant to form a water tight seal. Sealant should extrude from side of cover (10) when installed.
7. Install cover (10) to regulator (1) and secure with two lockwashers (11) and screws (12).
8. Insert leads (13), (14), and (17) into sealing wedge (29) and install sealing wedge (29) in regulator cavity (18).
9. Install gasket (25) and cover (26) on regulator (1) with four lockwashers (28) and screws (27).
10. Apply antiseize compound to contact surface of lead 3B (17). Install lead 3B (17) on regulator (1) with lockwasher (19) and capscrew (20). Tighten capscrew (20) to 90 lb-in. (10 N•m).

12-21. 100 AMPERE REGULATOR (R027096300) REPLACEMENT (Cont'd)



NEWER MODEL REGULATORS



- FOLLOW-ON TASKS: Ž Lower and secure hood (TM 9-2320-280-10).
 • Connect battery ground cable (para. 4-73).
 Ž Start engine (TM 9-2320-280-10) and observe voltmeter for proper reading.

12-22. 100 AMPERE REGULATOR (12342944, N3106) REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

All models except M996, M996A1, M1026, M1026A1, M1097, M1097A1, M1097A2, M1123

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Sealing compound (Appendix C, Item 45)
Three lockwashers (Appendix G, Item 138)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

- Battery ground cables disconnected (para. 4-73).
- Hood raised and secured (TM 9-2320-280-10).

a. Removal

NOTE

Prior to removal, tag leads for installation.

1. Disconnect regulator plug (1) from voltage regulator (4).
2. Slide back rubber boot (21) and remove nut (22), lead 5A (23), and washer (24) from red (energize) terminal (25).
3. Slide back rubber boot (18) and remove nut (17), lead 2A (16), and washer (15) from yellow (AC) terminal (14).

NOTE

Perform steps 4 and 5 for M1025A2, M1035A2, M1043A2, and M1045A2 vehicles only.

4. Slide back rubber boot (12) and remove nut (11), lead (10), and washer (9) from terminal (8).
5. Disconnect regulator connector (20) from alternator connector (19).
6. Remove two screws (5), lockwashers (6), and washers (7) securing voltage regulator (4) to alternator (13). Discard lockwashers (6).
7. Remove capscrew (3), lockwasher (2), and voltage regulator (4) from alternator (13). Discard lockwasher (2).

b. Installation

1. Apply sealing compound to threads of capscrew (3).
2. Install voltage regulator (4) on alternator (13) with lockwasher (2) and capscrew (3). Tighten capscrew (3) to 88-94 lb-in. (10-11 N•m).
3. Install two washers (7), lockwashers (6), and screws (5) on voltage regulator (4) and alternator (13). Tighten screws (5) to 30-34 lb-in. (3-4 N•m).

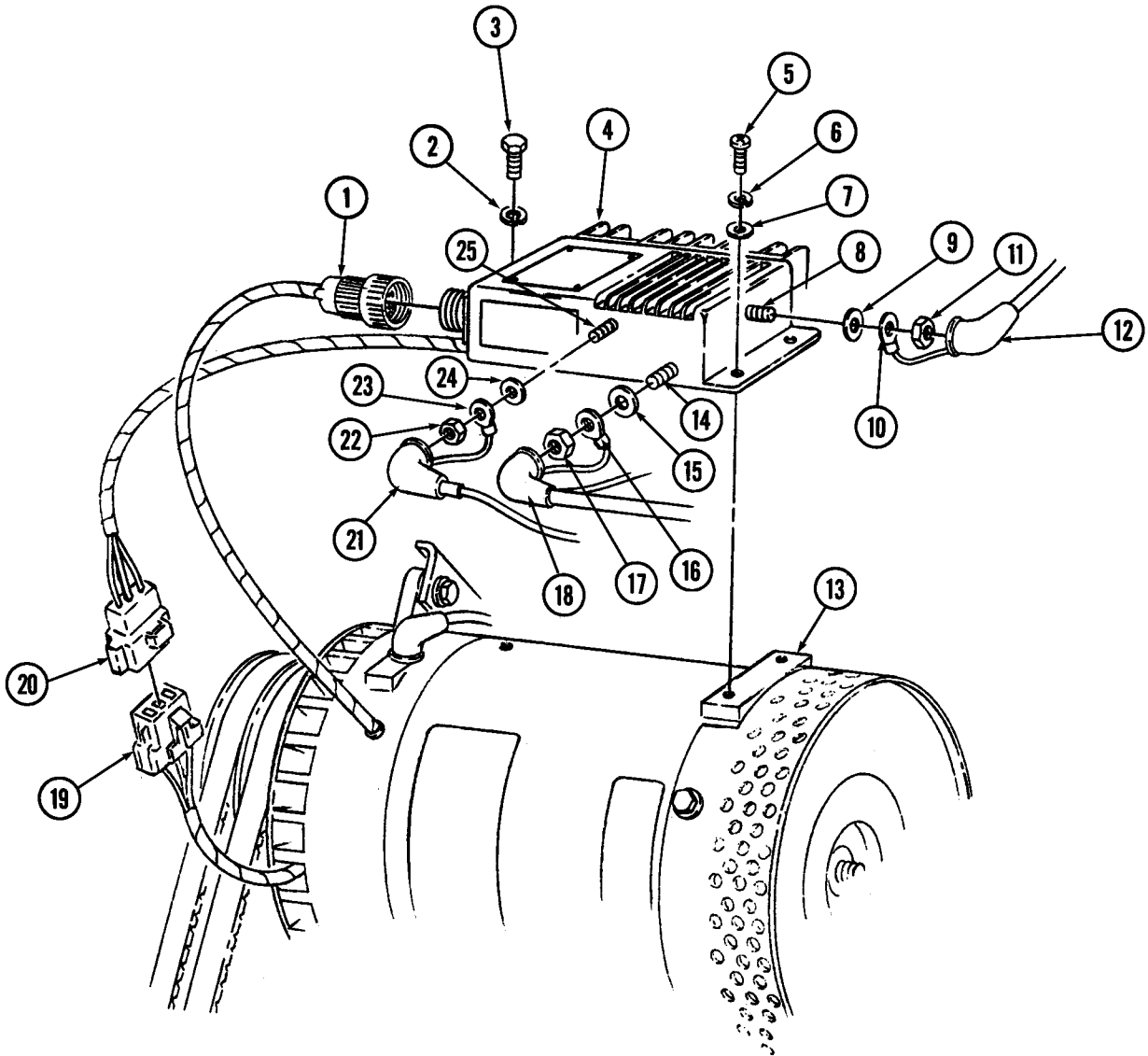
NOTE

Perform steps 4 and 5 for M1025A2, M1035A2, M1043A2, and M1045A2 vehicles only.

4. Install washer (9), lead (10), and nut (11) on terminal (8). Tighten nut (11) to 18-22 lb-in. (2.0-2.5 N•m). Slide rubber boot (12) over terminal (8).
5. Connect regulator connector (20) to alternator connector (19).
6. Install washer (24), lead 5A (23), and nut (22) on red (energize) terminal (25). Tighten nut (22) to 23-27 lb-in. (2.6-3.0 N•m). Slide rubber boot (21) over terminal (25).

12-22. 100 AMPERE REGULATOR (12342944, N3106) REPLACEMENT (6nt'd)

7. Install washer (15), lead 2A (16), and nut (17) on yellow (AC) terminal (14). Tighten nut (17) to 18-22 lb-in. (2.0-2.5 N·m). Slide rubber boot (18) over terminal (14).
8. Connect regulator plug (1) to voltage regulator (4).



- FOLLOW-ON TASKS:**
- Lower and secure hood (TM 9-2320-280-10).
 - Connect battery ground cables (para. 4-73).

12-22.1. 100 AMPERE ALTERNATOR CABLE (12446821-2) REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

All models except M996, M996A1, M1026, M1026A1, M1097, M1097A1, M1097A2, M1123

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Lockwasher (Appendix G, Item 150)
Adhesive sealant (Appendix C, Item 9)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

- Battery ground cables disconnected (para. 4-73).
- Hood raised and secured (TM 9-2320-280-10).
- Engine access cover removed (para. 10-15).

a. Removal

1. Slide back rubber boot (1) and remove nut (3), washer (5), fuse (2), insulator (6), cable (7), and bushing (8) from positive stud (9).
2. Remove capscrew (11), clamp (12), and cable (7) from bracket (10).
3. Remove nut (17), lockwasher (16), washer (15), and cable (7) from buss bar (14). Discard lockwasher (16).
4. Remove cable (7) through grommet (18) and from battery box (13).

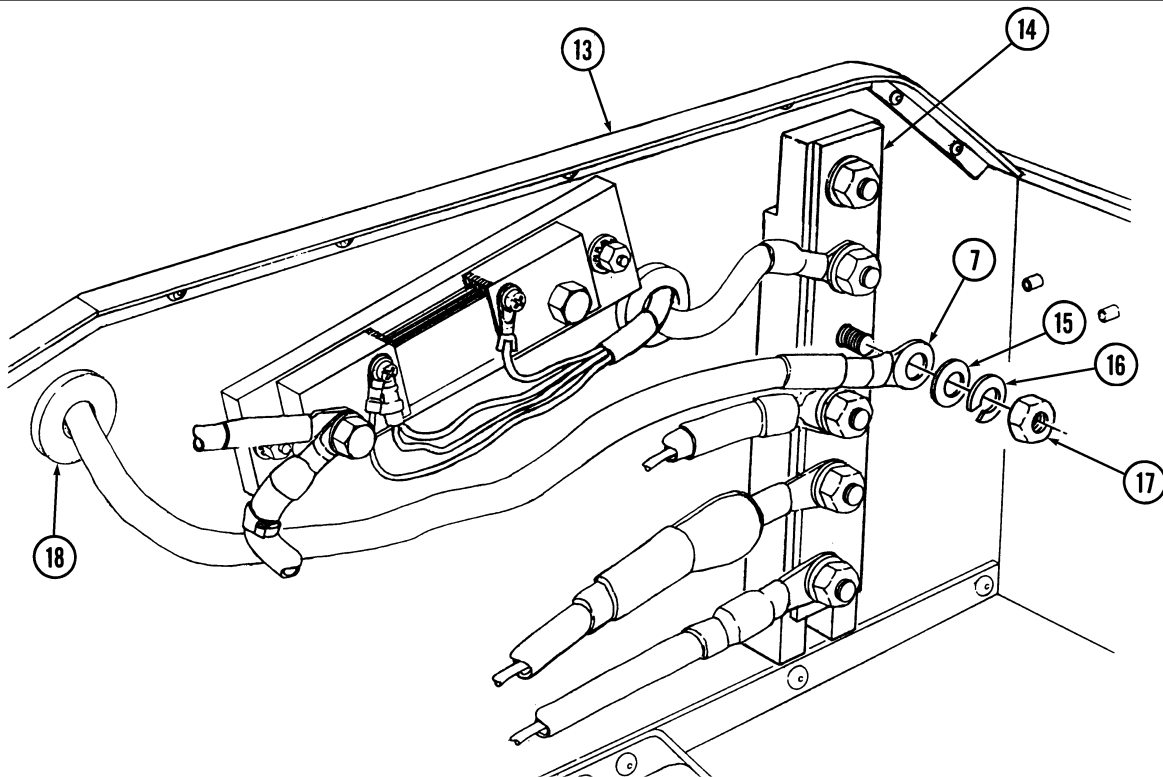
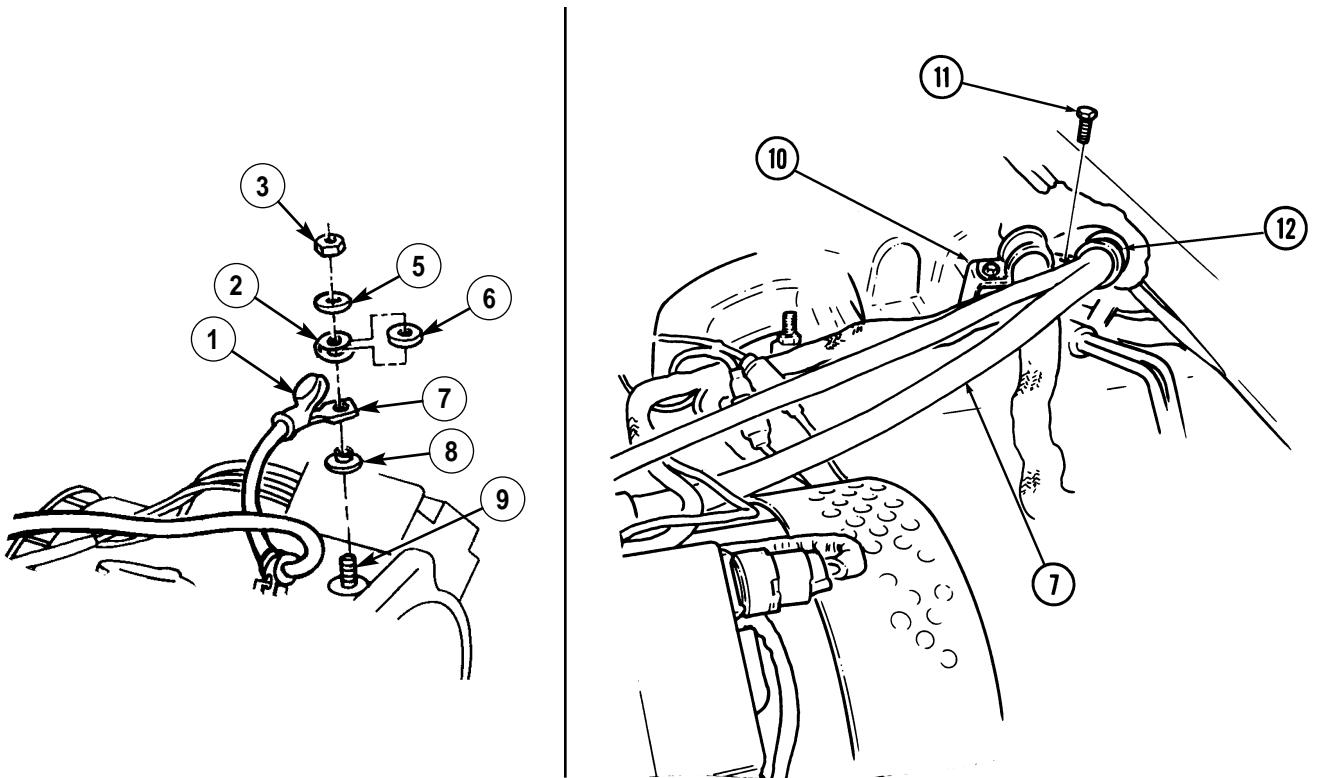
b. Installation

NOTE

Ensure terminals are clean before connections are made.

1. Route cable (7) through grommet (18) on battery box (13), and install cable (7) on buss bar (14) with washer (15), lockwasher (16), and nut (17).
2. Route cable (7) in approximate mounting location over heat shield, and secure cable (7) and clamp (12) on bracket (10) with capscrew (11).
3. Apply sealant to positive stud (9) and cable (7) so all exposed metallic surfaces are coated.
4. Install bushing (8), cable (7), fuse (2), and insulator (6) on positive stud (9) with washer (5) and nut (3). Tighten nut (3) to 10-15 lb-ft (14-20 N•m). Slide rubber boot (1) over nut (3).

12-22.1. 100 AMPERE ALTERNATOR CABLE (12446821-2) REPLACEMENT (Cont'd)



- FOLLOW-ON TASKS:
- Install engine access cover (para. 10-15).
 - Lower and secure hood (TM 9-2320-280-10).
 - Connect battery ground cables (para. 4-73).
 - Start engine and check operation of voltmeter gauge (TM 9-2320-280-10).

12-23. 100 AMPERE ALTERNATOR (12340912) REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Silicone (Appendix C, Item 48)
Two lockwashers (Appendix G, Item 188)
Lockwasher (Appendix G, Item 133)

Personnel Required

One mechanic
One assistant

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

- Battery ground cable disconnected (para. 4-73).
- Hood raised and secured (TM 9-2320-280-10).

General Safety Instructions

Alternator must be supported during removal and installation.

a. Removal

1. Loosen two clamp nuts (12) and remove clamp pins (7) from regulator slots (6).
2. Loosen connector plug (4) and remove regulator (5) from alternator (13) and position regulator (5) out of the way.
3. Loosen capscrew (20) on alternator adjusting bracket (19), and two capscrews (10) on alternator mounting bracket (18) and support bracket (17).
4. Remove two drivebelts (1) from alternator pulley (2).

WARNING

Alternator must be supported during removal and installation. Failure to do this may cause injury to personnel or damage to equipment.

5. Remove capscrew (14), lockwasher (15), and washer (16) from alternator (13) and adjusting bracket (19). Discard lockwasher (15).

NOTE

- Perform step 7 for vehicles with new alternator support bracket configuration.
- In some cases, a thru-bolt and nut may be present on mounting bracket instead of standard capscrews and washers.

6. Remove two capscrews (10), lockwashers (11), and alternator (13) from mounting bracket (18) and support bracket (17). Discard lockwashers (11).
7. Remove two capscrews (10), lockwashers (11), washer (22), spacer (24), and alternator (13) from power steering lines bracket (23), support bracket (17), and mounting bracket (18). Discard lockwashers (11).
8. Remove guard (9) and two clamp straps (8) from alternator (13).
9. Remove alternator pulley (2) (para. 4-3).

b. Installation

1. Install alternator pulley (2) (para. 4-3).
2. Install two clamp straps (8) and guard (9) on alternator (13).

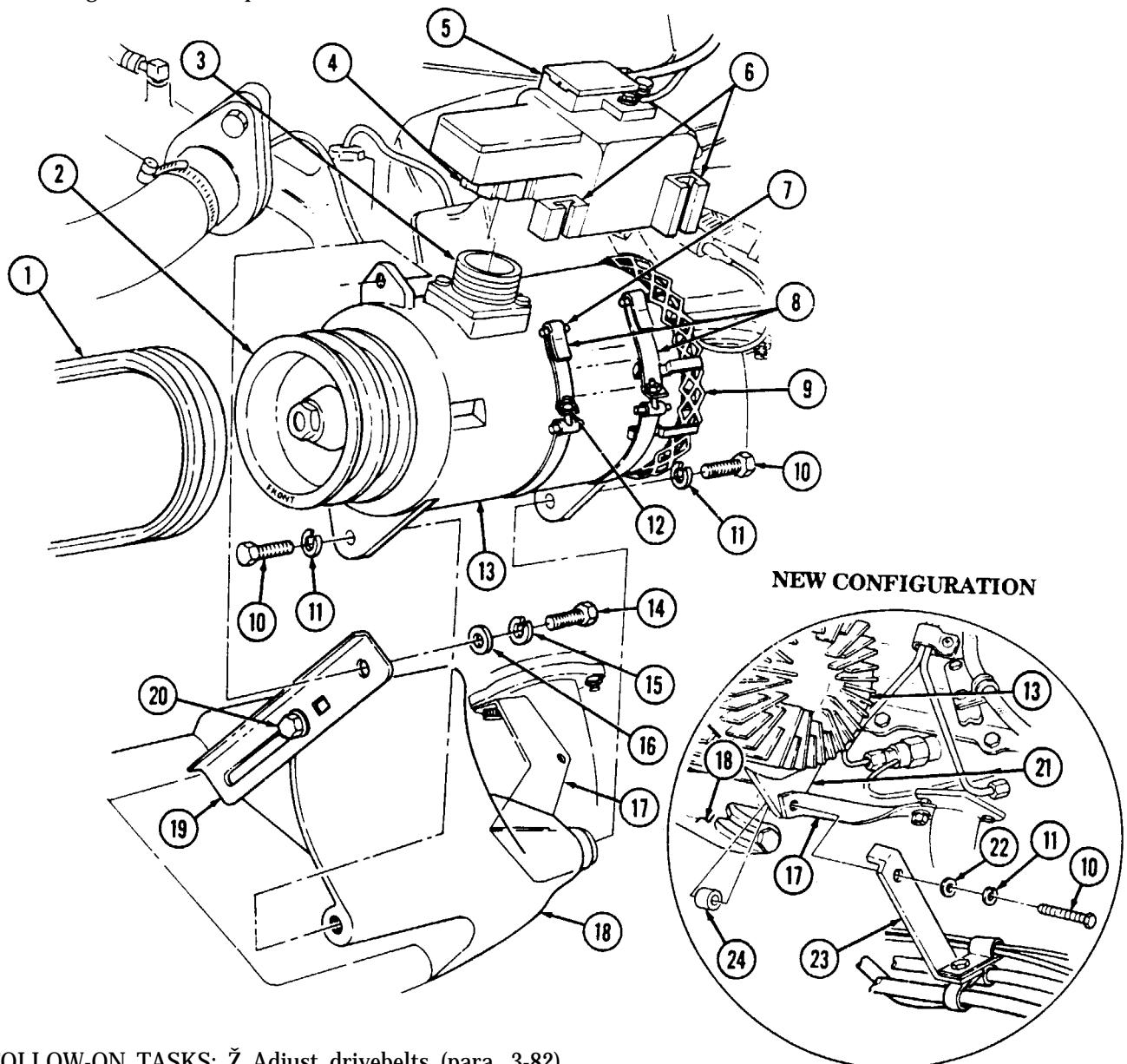
NOTE

- Perform step 4 for vehicles with new alternator support bracket configuration.
- In some cases, a thru-bolt and nut may be present on mounting bracket instead of standard capscrews and washers.

3. Install alternator (13) on mounting bracket (18) and support bracket (17) with two lockwashers (11) and capscrews (10). Tighten capscrews (10) finger tight.

12-23. 100 AMPERE ALTERNATOR (12340912) REPLACEMENT (Cont'd)

4. Position alternator (13) on mounting bracket (18) (with support bracket (17) and power steering lines bracket (23) on the outside of alternator mounting flange (21)) and install spacer (24), washer (22), two lockwashers (11), and capscrews (10).
5. Align alternator (13) with hole in adjusting bracket (19), and install washer (16), lockwasher (15), and capscrew (14). Tighten capscrew (14) finger tight.
6. Install two drivebelts (1) on alternator pulley (2).
7. Fill alternator receptacle (3) with silicone.
8. Install regulator (5) on alternator (13) and secure connector plug (4) between alternator (13) and regulator (5).
9. Ensure guard (9) is positioned in rear clamp (8). Install clamp pins (7) into regulator slots (6). Tighten two clamp nuts (12) to 40 lb-in. (4.5 NZm).



FOLLOW-ON TASKS: Ž Adjust drivebelts (para. 3-82).

Ž Connect battery ground cable (para. 4-73).

12-24. 100 AMPERE ALTERNATOR (12342944) REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

All models except M996, M996A1, M1026, M1026A1, M1097, M1097A1, M1097A2, M1123

Tools

General mechanic's tool kit:
 automotive (Appendix B, Item 1)
 Breaker bar, 3/8 in. (Appendix B, Item 2)

Materials/Parts

Lockwasher (Appendix G, Item 133)
 Lockwasher (Appendix G, Item 186)
 Lockwasher (Appendix G, Item 187)
 Two lockwashers (Appendix G, Item 188)

Personnel Required

One mechanic
 One assistant

Manual References

TM 9-2320-280-10
 TM 9-2320-280-24P

Equipment Condition

- Battery ground cable removed (para. 4-73).
- Hood raised and secured (TM 9-2320-280-10).
- Voltage regulator removed (para. 12-22).

General Safety Instructions

Alternator must be supported during removal and installation.

a. Removal

NOTE

Prior to removal, tag leads for installation.

1. Slide back rubber boot (4) and remove capscrew (1), lockwasher (2), washer (3), and ground cable (5) from alternator (6). Discard lockwasher (2).
2. Slide back rubber boot (18) and remove nut (21), lockwasher (20), washer (19), alternator positive cable (17), nut (16.2), and washer (16.1) from positive stud (16). Discard lockwasher (20).

NOTE

- Perform steps 3 and 4 for 6.2 L engine only.
- Perform step 5 for 6.5 L engine only.
- In some cases, a thru-bolt and nut may be present on mounting bracket instead of standard capscrews and washers.

3. Loosen capscrews (11) and (13) on alternator adjusting bracket (8) and two capscrews (23) from alternator (6), alternator mounting bracket (25), and support bracket (24).

NOTE

All "A2" models except the M997A2 are equipped with serpentine belts.

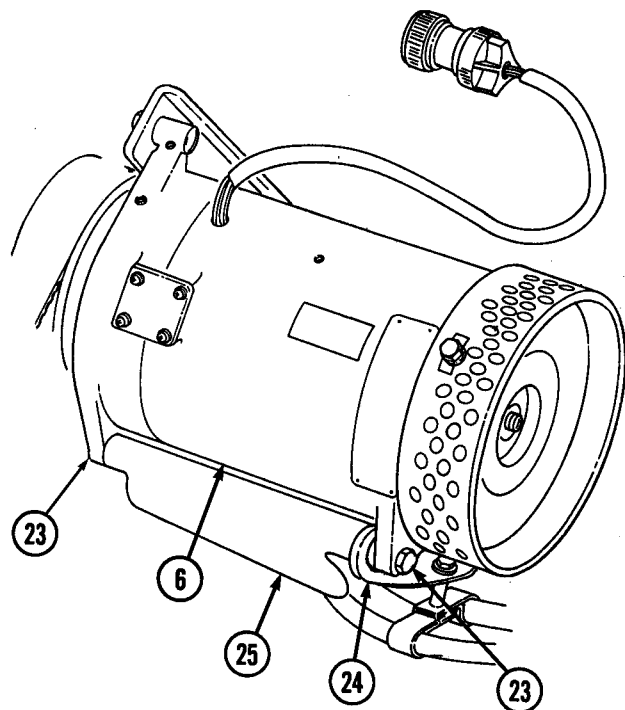
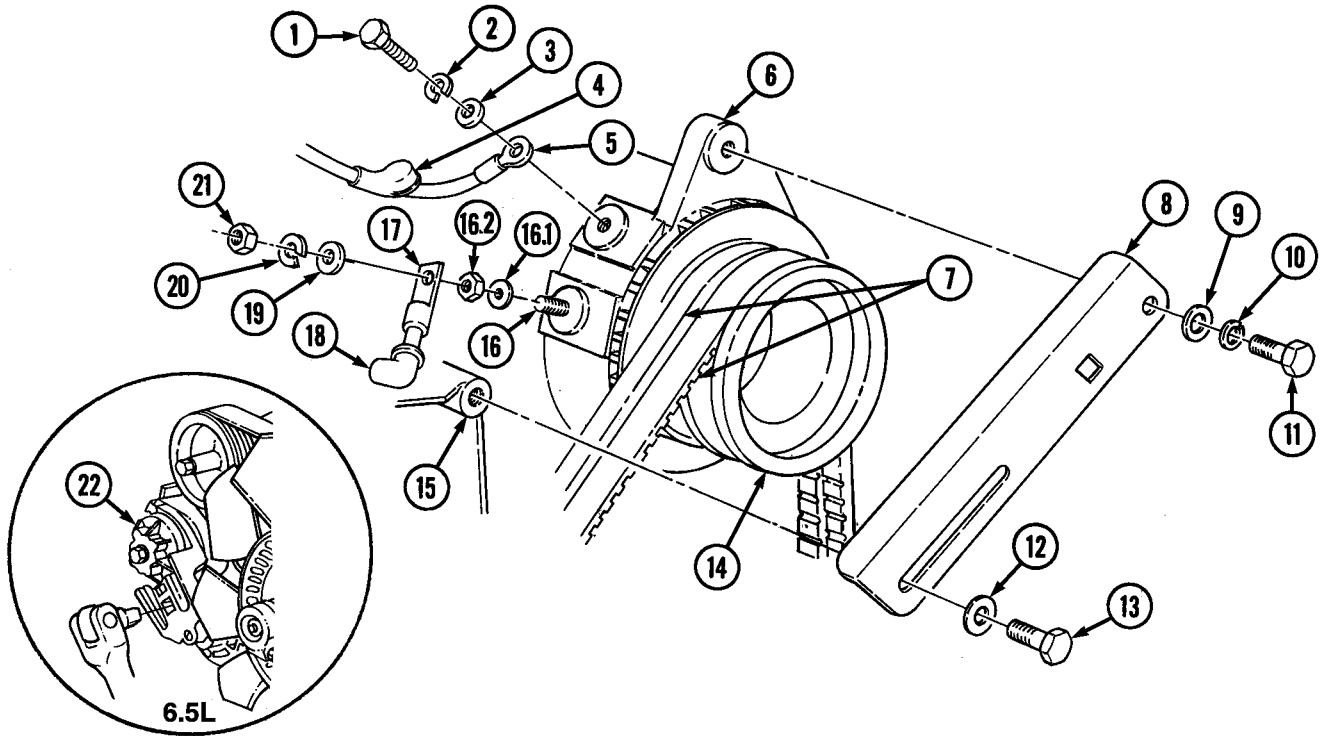
4. Remove two drivebelts (7) from alternator pulley (14).
5. Position 3/8-inch breaker bar on belt tensioner (22), move tensioner (22) clockwise, and remove drivebelt (7) from alternator pulley (14).

WARNING

Alternator must be supported during removal and installation. Failure to support alternator may cause injury to personnel or damage to equipment.

6. Remove capscrew (11), lockwasher (10), and washer (9) from alternator (6) and adjusting bracket (8). Discard lockwasher (10).

12-24. 100 AMPERE ALTERNATOR (12342944) REPLACEMENT (Cont'd)



12-24. 100 AMPERE ALTERNATOR (12342944) REPLACEMENT (Cont'd)

7. Remove capscrew (13), washer (12), and alternator adjusting bracket (8) from alternator mounting bracket (25).
8. Remove two capscrews (4), lockwashers (5), washers (6), and spacer (10) from alternator (12), power steering lines bracket (7), support bracket (8), and alternator mounting bracket (11). Discard lockwashers (5).
9. Remove alternator (12).
10. Remove three capscrews (1), washers (2), bushings (13), and fan guard assembly (3) from alternator (12).
11. Remove alternator pulley (25) (para. 4-3).

b. Installation

1. Install alternator pulley (25) (para. 4-3).
2. Install fan guard assembly (3) on alternator (12) with three bushings (13), washers (2), and capscrews (1).

NOTE

In some cases, a thru-bolt and nut may be present on mounting bracket instead of standard capscrews and washers.

3. Position alternator (12) on alternator mounting bracket (11) (with support bracket (8) and power steering lines bracket (7) on the outside of alternator mounting flange (9) and install spacer (10), two washers (6), lockwashers (5), and capscrews (4).
4. Install alternator adjusting bracket (19) on alternator mounting bracket (11) with washer (20), lockwasher (21), and capscrew (22).

NOTE

Perform step 4.1 for 6.2L only.

- 4.1. Tighten capscrew (22) to 40 lb-ft (54 N·m).

NOTE

Perform step 5 for 6.2L only.

5. Align alternator (12) with adjusting bracket (19) and install washer (23), and capscrew (24). Do not tighten capscrew (24) on 6.2 L only. On 6.5 L tighten capscrew (24) to 40 lb-ft (54 N·m).

NOTE

Ensure terminals are clean before connections are made.

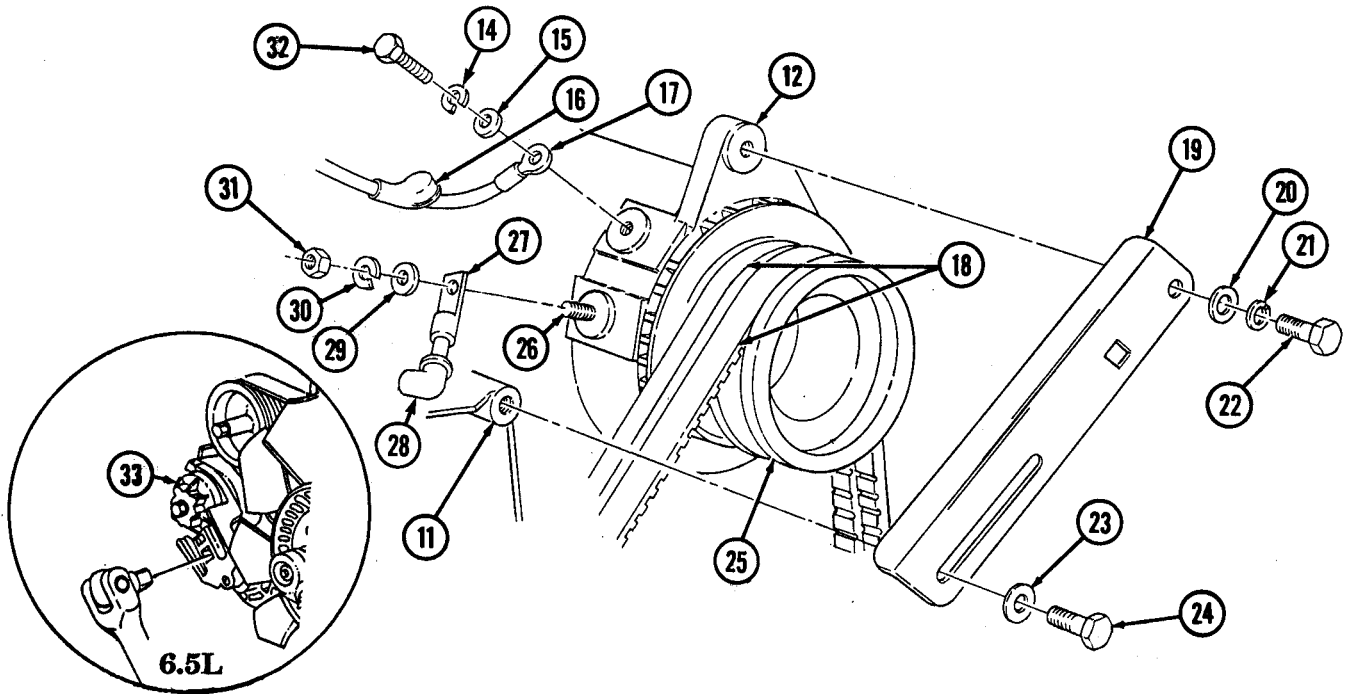
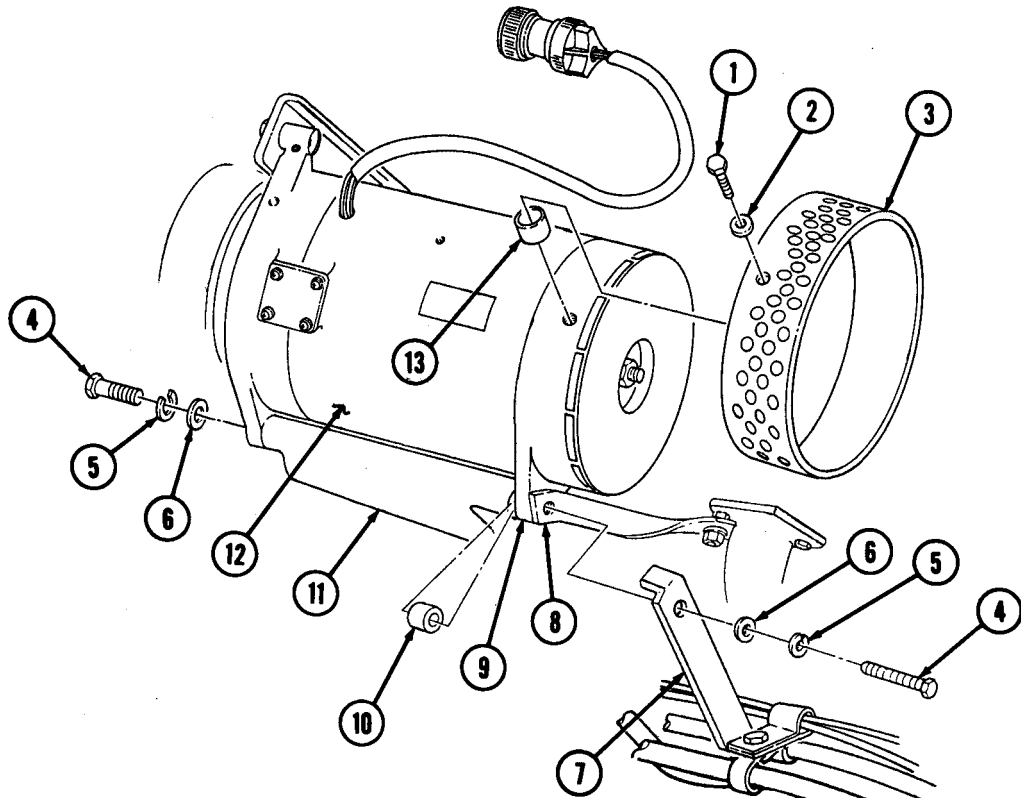
6. Install washer (26.1), nut (26.2), and positive cable (27) on positive stud (26) with washer (29), lockwasher (30), and nut (31). Tighten nut (31) to 10-15 lb-ft (14-20 N·m).
7. Install ground cable (17) on alternator (12) with washer (15), lockwasher (14), and capscrew (32). Tighten capscrew (32) to 8-12 lb-ft (11-16 N·m).

NOTE

- Perform step 8 for 6.2L only.
- Perform step 9 for 6.5L only.

8. Install two drivebelts (18) on alternator pulley (25).
9. Position 3/8-in. breaker bar on belt tensioner (33), move tensioner (33) clockwise and install belt (18) on alternator pulley (25).
10. Install rubber boots (16) and (28) over cables (17) and (27).

12-24. 100 AMPERE ALTERNATOR (12342944) REPLACEMENT (Cont'd)



- FOLLOW-ON TASKS:**
- Install voltage regulator (para. 12-22).
 - Adjust alternator belts (para. 3-81) (All except "A2" vehicles).
 - Battery ground cable installed (para. 4-73).
 - Lower and secure hood (TM 9-2320-280-10).

12-24.1. 100/200 AMPERE DUAL VOLTAGE ALTERNATOR AND REGULATOR CONVERSION

This task covers:

- a. Part Fabrication
- b. 100 Ampere Dual Voltage Alternator and Regulator Installation
- c. 200 Ampere Dual Voltage Alternator and Regulator Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Grease (Appendix C, Item 25)
Sealant (Appendix C, Item 38)
Alternator (NSN 2920-01-907-0532)
Lockwasher (Appendix G, Item 134)
Lockwasher (Appendix G, Item 185)
Lockwasher (Appendix G, Item 186)
Lockwasher (Appendix G, Item 187)
Tiedown strap (Appendix G, Item 313)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

- Battery ground cable disconnected (para. 4-73).
- Hood raised and secured (TM 9-2320-280-10).
- Regulator removed (para. 12-22).
- Alternator removed (para. 12-23).

NOTE

This task is for single voltage vehicle systems (basic and "A1" models) only.

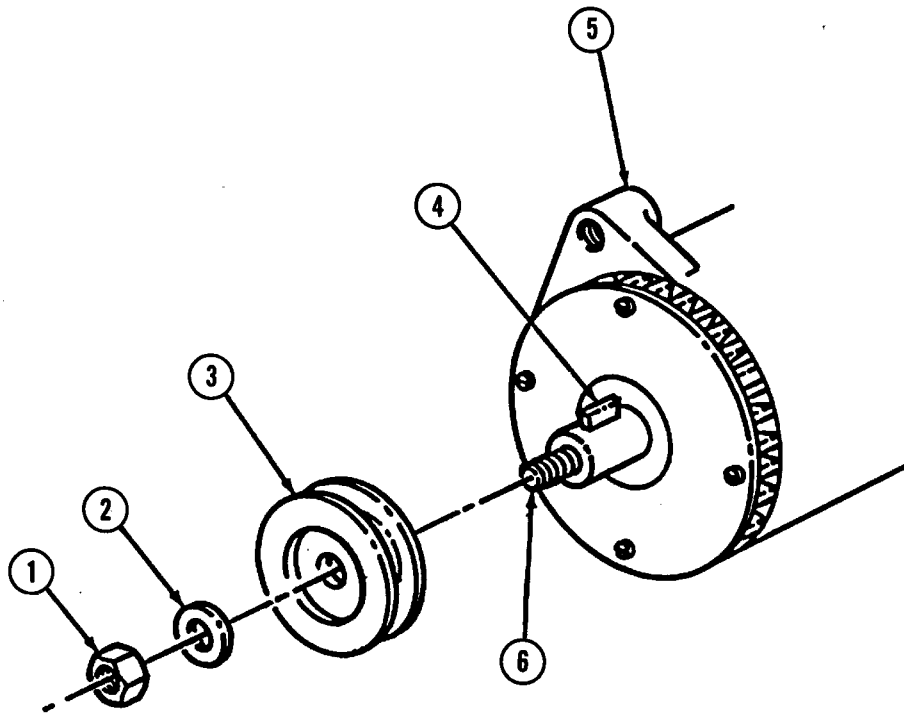
a. Part Fabrication

Refer to appendix D, figure D-121.

b. 100 Ampere Dual Voltage Alternator and Regulator Installation

1. Remove nut (1), washer (2), and pulley (3) from shaft (6) on alternator assembly (5).
2. Remove nut (1) and washer (2) from shaft (6) of replacement 100 ampere alternator assembly (5).
3. Install previously removed pulley (3) on woodruff key (4) and shaft (6) with washer (2) and nut (1).
4. Place alternator assembly (5) in a soft-jawed vise and tighten nut (1) to 120 lb-ft (163 N•m).
Remove alternator assembly (5) from vise.

12-24.1. 100/200 AMPERE DUAL VOLTAGE ALTERNATOR AND REGULATOR
CONVERSION (Cont'd)



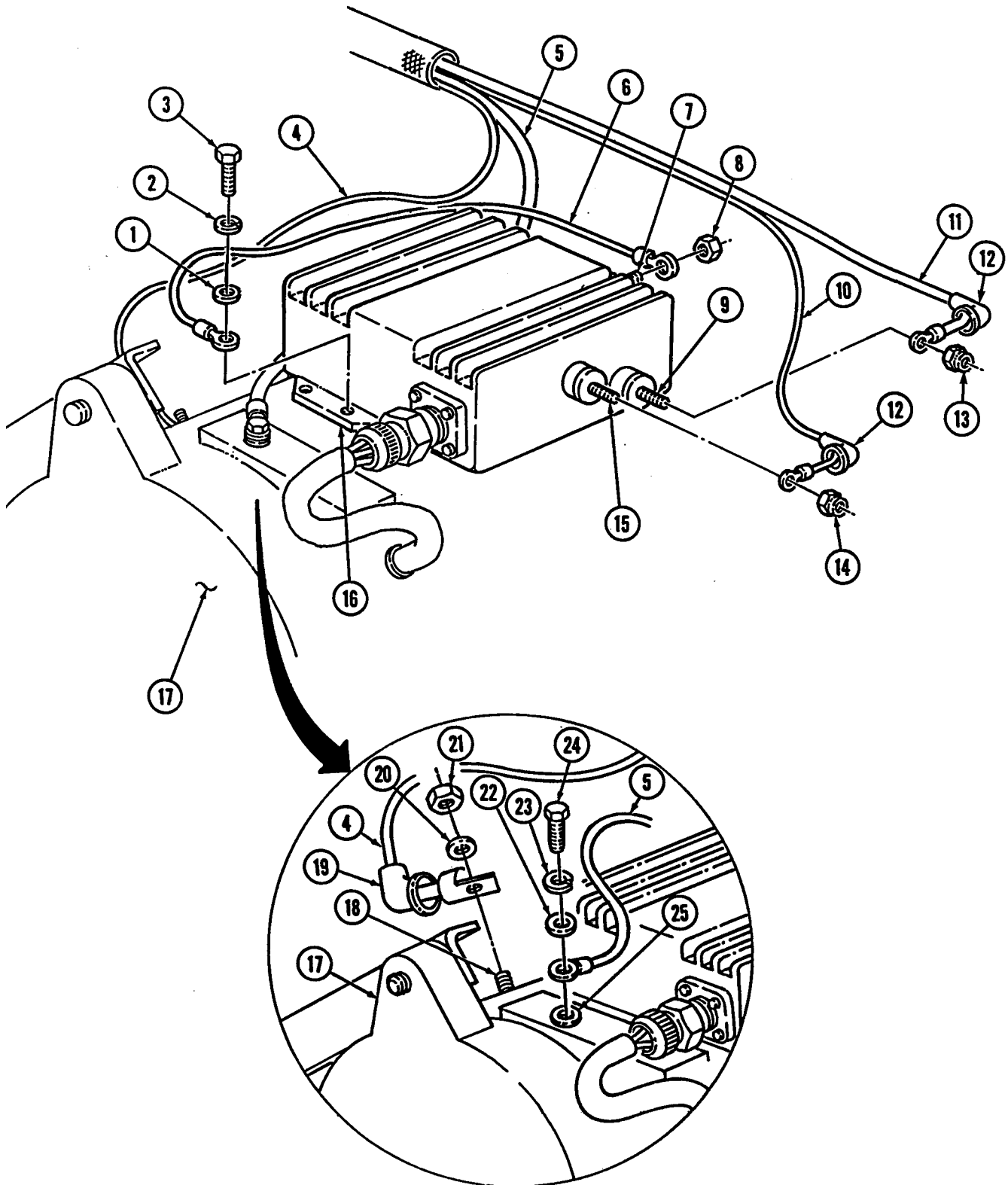
12-24.1 100/200 AMPERE DUAL VOLTAGE ALTERNATOR AND REGULATOR CONVERSION (Cont'd)

NOTE

Do not connect electrical connections when performing step 5.

5. Install alternator assembly (para. 12-23).
6. Remove screw (3), lockwasher (2), and washer (1) from regulator (16). Discard lockwasher (2).
7. Install ground wire (6), washer (1), lockwasher (2), and screw (3) on regulator (16). Tighten screw (3) to 88-94 lb-in. (10-11 N•m).
8. Route ground wire (6) around regulator (16) to 14-volt stud (7), remove nut (8) from stud (7), and install ground wire (6) on stud (7) with nut (8). Tighten nut (8) to 45-55 lb-ft (5-6 N•m).
9. Apply sealant to nut (8) and stud (7).
10. Remove screw (24), lockwasher (23), and washer (22) from ground point (25) on alternator assembly (17). Discard lockwasher (23).
11. Install lead 3B (5), washer (22), lockwasher (23), and screw (24) to ground point (25) on alternator assembly (17). Tighten screw (24) to 75-85 lb-in. (8-10 N•m).
12. Remove nut (21) and washer (20) from positive terminal (18) on alternator assembly (17).
13. Install red boot (19) on lead 5A (4).
14. Install lead 5A (4) on positive terminal (18) on alternator assembly (17) with washer (20) and nut (21). Tighten nut (21) to 65-70 lb-in. (7-8 N•m).
15. Apply grease to positive terminal (18) and lead 5A (4), and slide boot (19) over positive terminal (18).
16. Remove nut (13) from IGN terminal (9).
17. Install black boot (12) on lead 568A (11).
18. Install lead 568A (11) and nut (13) on IGN terminal (9). Tighten nut (13) to 23-27 lb-in. (2-3 N•m).
19. Apply grease to IGN terminal (9), lead 568A (11), and inside of boot (12), and slide boot (12) over IGN terminal (9).
20. Remove nut (14) from AC terminal (15).
21. Install black boot (12) on lead 2A (10).
22. Install lead 2A (10) and nut (14) on AC terminal (15). Tighten nut (14) to 18-22 lb-in. (2-3 N•m).
23. Apply grease to AC terminal (15), lead 2A (10), and inside of black boot (12), and slide boot (12) over AC terminal (15).
24. Connect battery ground cable (para. 4-73).

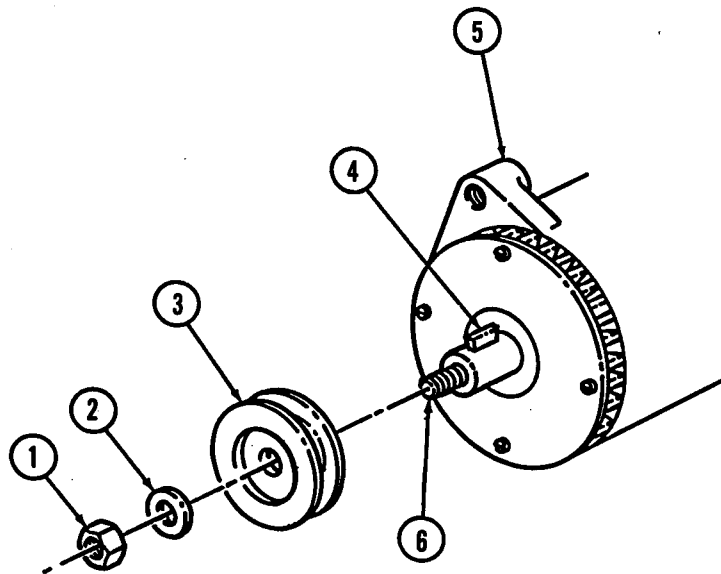
12-24.1. 100/200 AMPERE DUAL VOLTAGE ALTERNATOR AND REGULATOR
CONVERSION (Cont'd)



12-24.1. 100/200 AMPERE DUAL VOLTAGE ALTERNATOR AND REGULATOR CONVERSION (Cont'd)

c. 200 Ampere Dual Voltage Alternator and Regulator Installation

1. Remove nut (1) and washer (2) from shaft (6) of alternator assembly (5).
2. Install previously removed pulley (3) on woodruff key (4) and shaft (6) with washer (2) and nut (1).
3. Place alternator assembly (5) in a soft-jawed vise, and tighten nut (1) to 115-125 lb-ft (156-170 N•m).

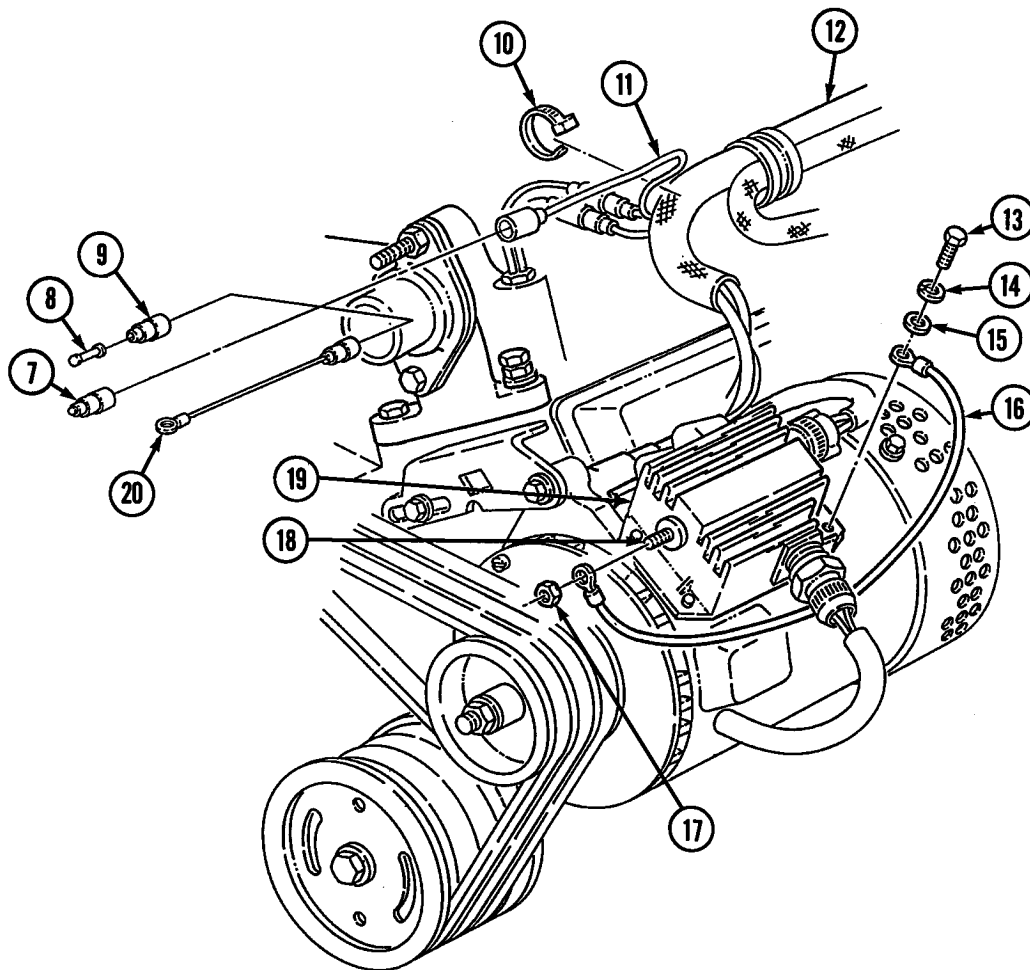


12-24.1. 100/200 AMPERE DUAL VOLTAGE ALTERNATOR AND REGULATOR CONVERSION (Cont'd)

NOTE

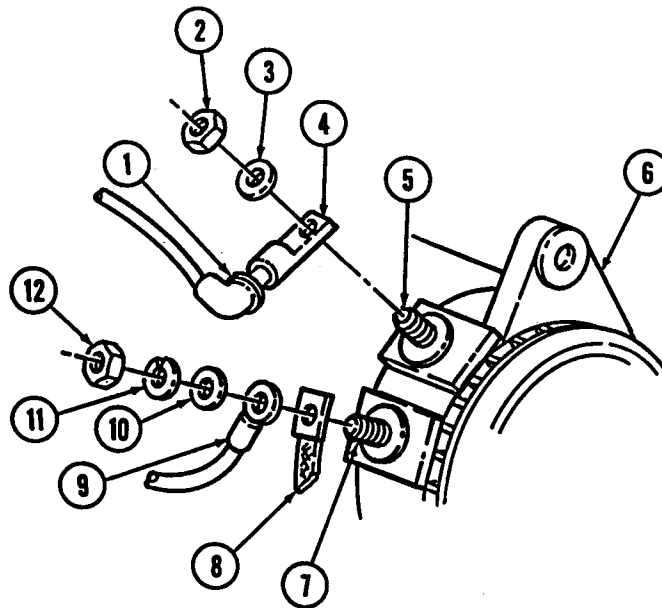
Do not connect electrical connections when performing step 4.

4. Install alternator assembly (para. 12-23).
5. Remove screw (13), lockwasher (14), and washer (15) from regulator (19). Discard lockwasher (14).
6. Install ground wire (16), washer (15), lockwasher (14), and screw (13) on regulator (19). Tighten screw (13) to 88-94 lb-in. (10-11 N·m).
7. Route ground wire (16) around regulator (19) to 14-volt stud (18), remove nut (17) from stud (18), and install ground wire (16) on stud (18) with nut (17). Tighten nut (17) to 45-55 lb-in. (5-6 N·m).
8. Apply sealant to nut (17) and stud (18).
9. Assemble dummy plug (7) by installing plug (8) in shell (9).
10. Remove lead 568 (20) from lead 568A (11). Discard lead 568 (20).
11. Install dummy plug assembly (7) in lead 568A (11).
12. Secure lead 568A (11) to electrical harness (12) with tiedown strap (10).



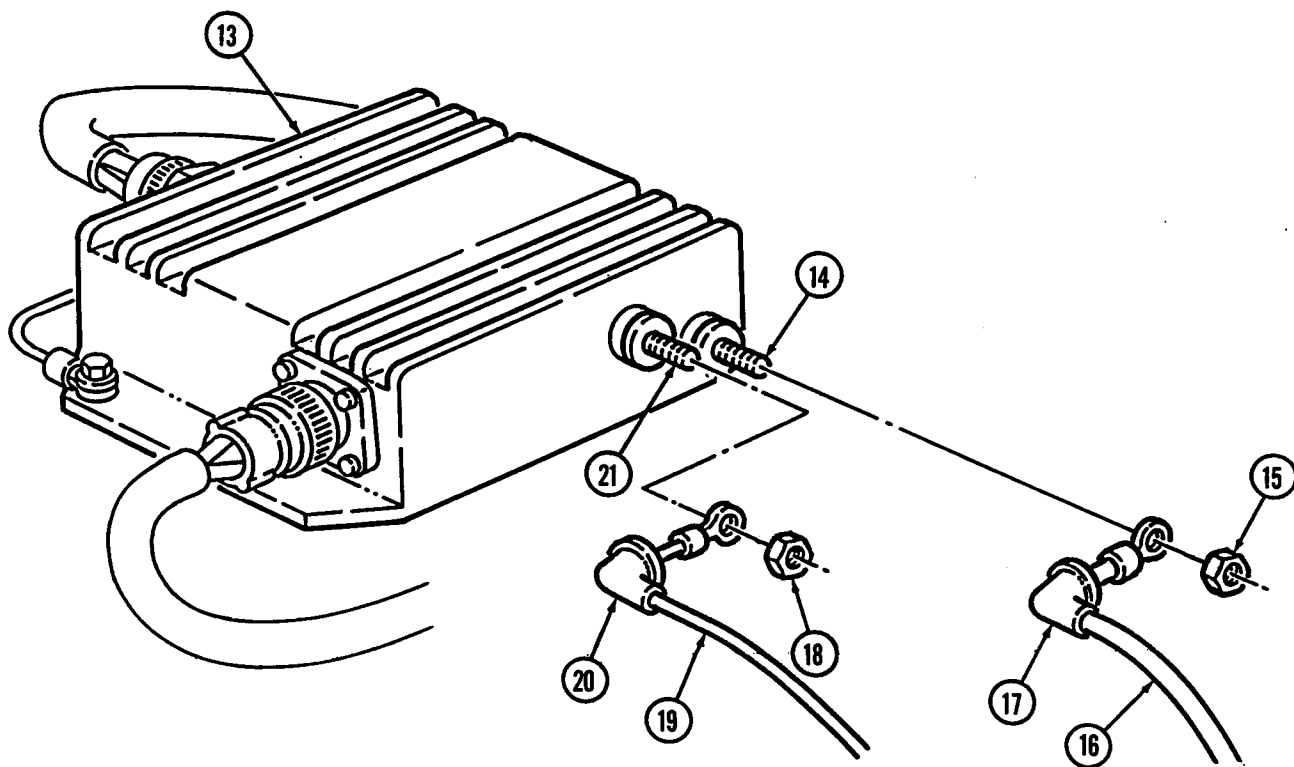
**12-24.1. 100/200 AMPERE DUAL VOLTAGE ALTERNATOR AND REGULATOR
CONVERSION (Cont'd)**

13. Remove nut (12), lockwasher (11), and washer (10) from ground stud (7) on alternator assembly (6). Discard lockwasher (11).
14. Install ground strap (8), lead 3B (9), washer (10), lockwasher (11), and nut (12) on alternator assembly (6).
15. Remove nut (2) and washer (3) from positive terminal (5).
16. Install lead 6 (4), washer (3), and nut (2) to positive terminal (5) on alternator assembly (6).
17. Apply grease to positive terminal (5), lead 6 (4), and inside of boot (1), and slide boot (1) over positive terminal (5).



12-24.1. 100/200 AMPERE DUAL VOLTAGE ALTERNATOR AND REGULATOR CONVERSION (Cont'd)

18. Remove nut (15) from IGN terminal (14) on regulator (13).
19. Install boot (17) on lead 5A (16).
20. Install lead 5A (16) to IGN terminal (14) on regulator (13) with nut (15). Tighten nut (15) to 23-27 lb-in. (2-3 N•m).
21. Apply grease to IGN terminal (14), lead 5A (16), and inside of boot (17), and slide boot (17) over IGN terminal (2).
22. Remove nut (18) from AC terminal (21) on regulator (13).
23. Install boot (20) on lead 2A (19).
24. Install lead 2A (19) to AC terminal (21) on regulator (13) with nut (18). Tighten nut (18) to 18-22 lb-in. (2-3 N•m).
25. Apply grease to AC terminal (21), lead 2A (19), and inside of boot (20), and slide boot (20) over AC terminal (21).



- FOLLOW-ON TASKS:
- Connect battery ground cable (para. 4-73).
 - Lower and secure hood (TM 9-2320-280-10).

Section IV. ARCTIC WINTERIZATION KITS MAINTENANCE

12-25. ARCTIC WINTERIZATION KITS MAINTENANCE TASK SUMMARY

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Section IV. ARCTIC WINTERIZATION KITS MAINTENANCE

12-25. ARCTIC WINTERIZATION KITS MAINTENANCE TASK SUMMARY (Cont'd)

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12-26. ARCTIC HEATER FUEL PUMP REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M966, M966A1, M996, M996A1, M997, M997A1, M997A2, M998, M998A1, M1025, M1025A1, M1025A2, M1037, M1038, M1038A1, M1121

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Sealing compound (Appendix C, Item 44)
Two locknuts (Appendix G, Item 70)
Lockwasher (Appendix G, Item 175)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

Battery ground cable disconnected (para. 4-73).

General Safety Instructions

Do not perform this procedure near fire, flames, or sparks.

WARNING

Diesel fuel is highly flammable. Do not perform this procedure near fire, flames, or sparks. Severe injury or death will result.

a. Removal

CAUTION

Cover or plug all open hoses and connections immediately after disconnection to prevent contamination. Remove all covers or plugs prior to connection.

NOTE

- Have drainage container ready to catch fuel.
- Prior to removal, tag leads for installation.
- Fuel pump is located under right rear passenger seat floor along frame.

1. Disconnect lead 402A (13) from wiring harness lead (14).
2. Disconnect pump-to-tank fuel supply line (11) from connector (12).
3. Remove connector (12) from fuel pump inlet (11.1).

NOTE

Proceed to step 5 for M996, M996A1, M997, M997A1, M997A2, M998, M998A1, M1038, and M1038A1 models only. Perform step 4 for all other models.

4. Remove cap (7) and connector (6) from fuel pump tee (5).
5. Remove fuel supply line (8) and connector (6) from fuel pump tee (5).
6. Disconnect tube assembly (10) from connector (9).
7. Remove connector (9) from fuel pump tee (5).
8. Remove two locknuts (17), washers (2), ground lead 416A (16), lockwasher (15), clamp (18), two capscrews (3), washers (2), and fuel pump (4) from mounting bracket (1). Discard locknuts (17) and lockwasher (15).
9. Remove fuel pump tee (5) from fuel pump outlet (4.1).
10. Inspect connectors (6), (9), and (12) for damaged threads or cracks. Replace if cracked or damaged.

12-26. ARCTIC HEATER FUEL PUMP REPLACEMENT(Cont'd)

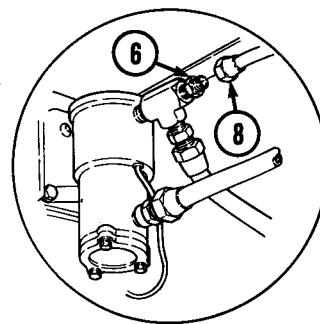
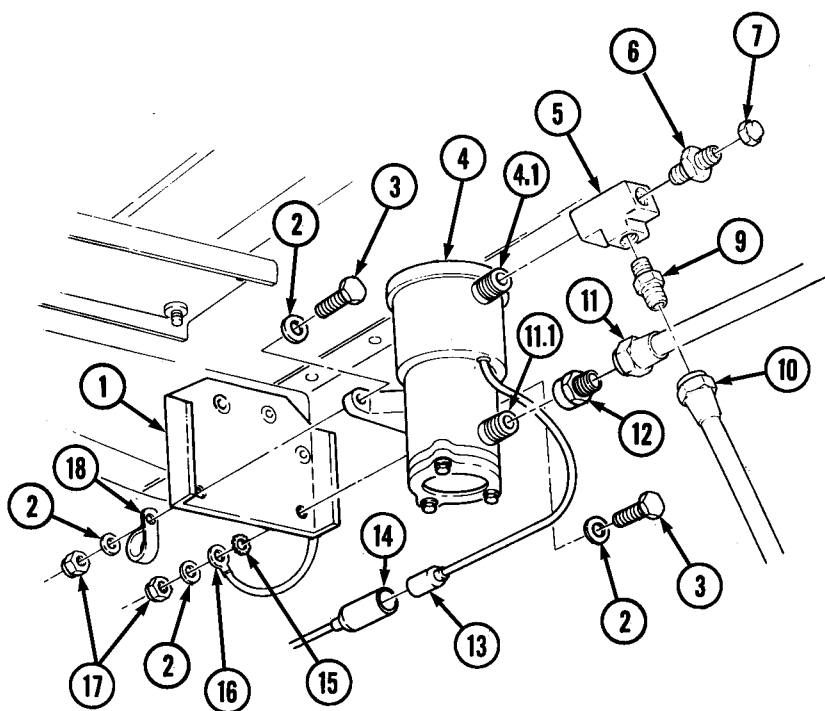
b. Installation

1. Install fuel pump (4) and ground lead 416A (16) on mounting bracket (1) with washer (2), capscrew (3), lockwasher (15), washer (2), and locknut (17). Tighten locknut (17) to 8 lb-ft (11 N•m).
2. Install fuel pump (4) on mounting bracket (1) with washer (2), capscrew (3), clamp (18), washer (2), and locknut (17). Tighten locknut (17) to 8 lb-ft (11 N•m).
3. Apply sealing compound to threads of fuel pump inlet (11.1) and install connector (12) on fuel pump inlet (11.1).
4. Apply sealing compound to threads of connector (12) and connect pump-to-tank fuel supply line (11) to connector (12).
5. Connect lead 402A (13) to wiring harness lead (14).
6. Apply sealing compound to threads of fuel pump outlet (4.1) and install fuel pump tee (5) on fuel pump outlet (4.1).
7. Apply sealing compound to threads of fuel pump tee (5) and install connector (9) on fuel pump tee (5).
8. Apply sealing compound to threads of connector (9) and install tube assembly (10) on connector (9).

NOTE

Proceed to step 11 for M996, M996A1, M997, M997A1, M997A2, M998, M998A1, M1038, and M1038A1 models. Perform steps 9 and 10 for all other models.

9. Apply sealing compound to threads of connector (6) and install connector (6) on fuel pump tee (5).
10. Install cap (7) on connector (6).
11. Apply sealing compound to threads of connector (6) and install connector (6) on fuel pump tee (5) and fuel supply line (8).



FOR M996, M996A1, M997, M997A1, M997A2, M998, M998A1, M1038, AND M1038A1 MODELS

- FOLLOW-ON TASKS:
- Connect battery ground cable (para. 4-73).
 - Operate arctic heater (TM 9-2320-280-10) and check for fuel leaks.

12-27. ARCTIC HEATER FUEL FILTER ASSEMBLY REPLACEMENT

This task covers

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Materials/Parts

Sealing compound (Appendix C, Item 44)

General Safety Instructions

Do not perform this procedure near fire, flames, or sparks.

WARNING

Diesel fuel is highly flammable. Do not perform this procedure near fire, flames, or sparks. Severe injury or death will result.

a. Removal

CAUTION

Cover or plug all open hoses and connections immediately after disconnection to prevent contamination. Remove all covers or plugs prior to connection.

NOTE

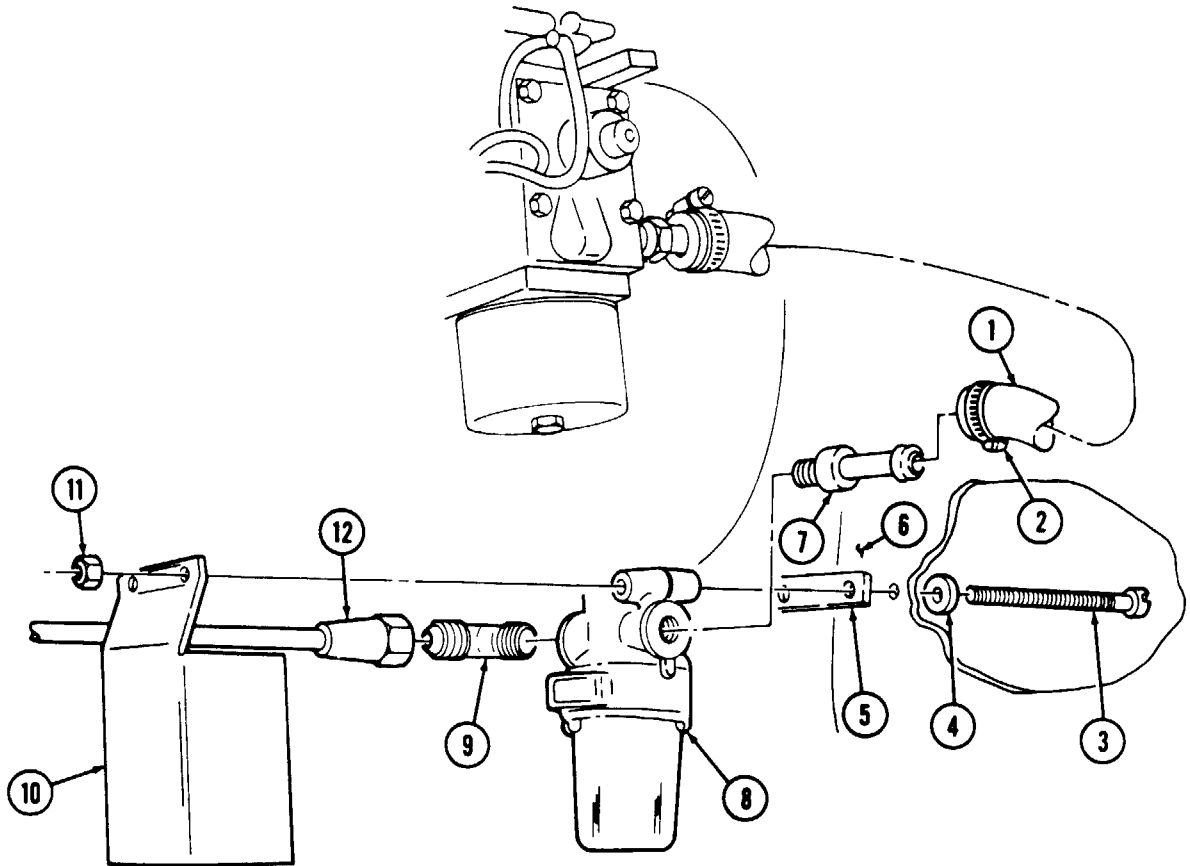
Have drainage container ready to catch fuel.

1. Disconnect fuel supply line (12) from elbow (9).
2. Loosen clamp (2) and disconnect filter-to-heater fuel supply hose (1) from connector (7).
3. Remove two nuts (11), capscrews (3), washers (4), shield (10), filter assembly (8), and spacer (5) from body (6).
4. Remove elbow (9) and connector (7) from filter assembly (8).
5. Inspect elbow (9) and connector (7) for damaged threads or cracks. Replace if cracked or damaged.

b. Installation

1. Apply sealing compound to threaded ends of elbow (9) and connector (7) and install elbow (9) and connector (7) on filter assembly (8).
2. Install spacer (5), filter assembly (8), and shield (10) on body (6) with two washers (4), capscrews (3), and nuts (11). Tighten nuts (11) to 16-30 lb-in. (2-3 NŹm).
3. Connect filter-to-heater fuel supply hose (1) to connector (7) with clamp (2).
4. Connect fuel supply line (12) to elbow (9).

12-27. ARCTIC HEATER FUEL FILTER ASSEMBLY REPLACEMENT (Cont'd)



FOLLOW-ON TASK: Operate arctic heater (TM 9-2320-280-10) and check for fuel leaks.

12-28. ARCTIC HEATER FUEL SUPPLY TUBE ASSEMBLY REPLACEMENT

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Materials/Parts

Sealing compound (Appendix C, Item 44)

Equipment Condition

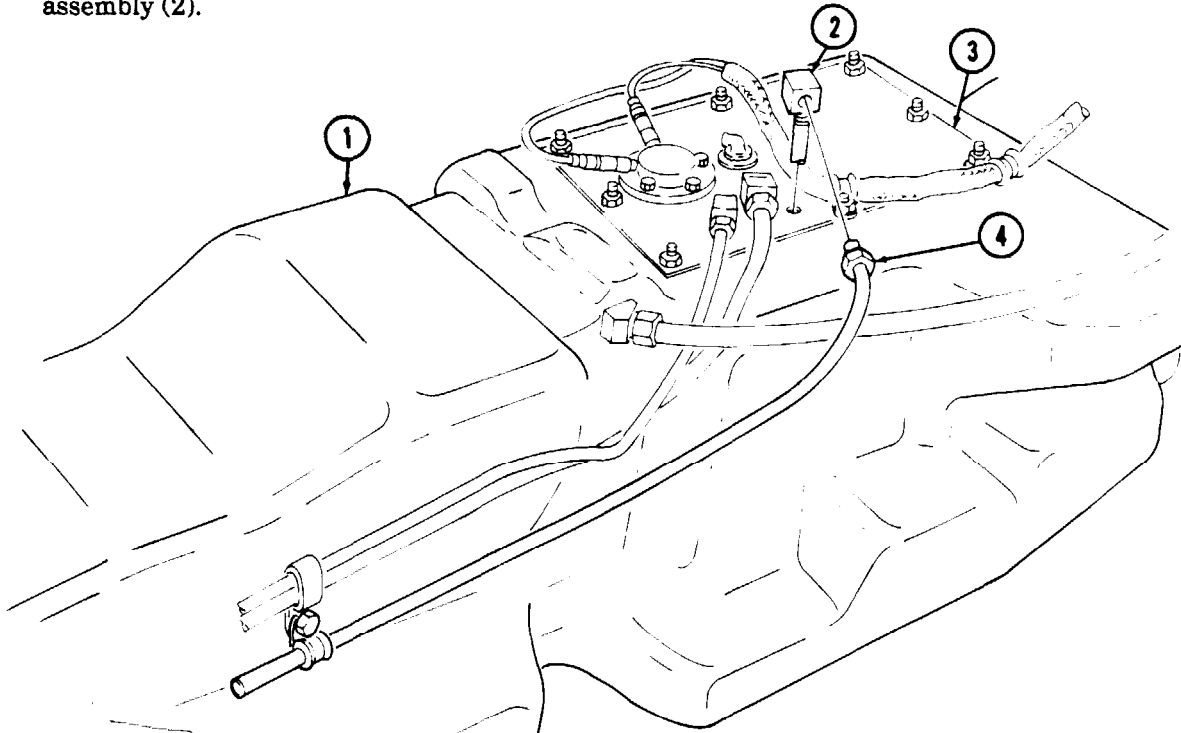
Fuel tank removed (para. 3-24).

a. Removal

1. Mark position of fuel supply tube assembly (2) on access cover (3).
2. Disconnect arctic fuel supply line (4) from fuel supply tube assembly (2).
3. Remove tube assembly (2) from fuel tank (1).

b. Installation

1. Apply sealing compound to threads of fuel supply tube assembly (2) and install fuel supply tube assembly (2) on fuel tank (1).
2. Apply sealing compound to fuel supply line (4) and connect fuel supply line (4) to fuel supply tube assembly (2).



FOLLOW-ON TASKS: Ž Install fuel tank (para. 3-24).
Ž Operate arctic heater (TM 9-2320-280-10) and check for fuel leaks.

12-29. ARCTIC HEATER TANK-TO-HOSE FUEL SUPPLY LINE REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Sealing compound (Appendix C, Item 44)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

Fuel tank removed (para. 3-24).

General Safety Instructions

Do not perform this procedure near fire, flames, or sparks.

WARNING

Diesel fuel is highly flammable. Do not perform this procedure near fire, flames, or sparks. Severe injury or death will result.

a. Removal

CAUTION

Cover or plug all open hoses and connections immediately after disconnection to prevent contamination. Remove all covers or plugs prior to connection.

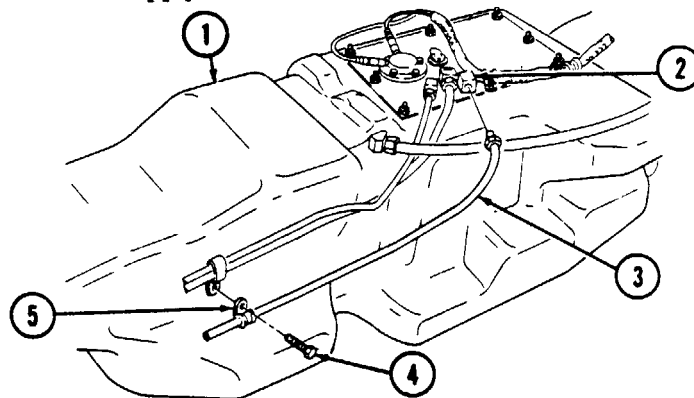
NOTE

Have drainage container ready to catch fuel.

1. Disconnect tank-to-hose fuel supply line (3) from fuel supply tube assembly (2).
2. Remove capscrew (4), clamp (5), and tank-to-hose fuel supply line (3) from fuel tank (1).

b. Installation

1. Apply sealing compound to threads of tank-to-hose fuel supply line (3) and connect fuel supply line (3) to fuel supply tube assembly (2).
2. Install tank-to-hose fuel supply line (3) on fuel tank (1) with clamp (5) and capscrew (4).



FOLLOW-ON TASKS: \bar{Z} Install fuel tank (para. 3-24).
 \bar{Z} Operate arctic heater (TM 9-2320-280-10) and check for fuel leaks.

12-30. ARCTIC HEATER FUEL SUPPLY HOSE REPLACEMENT

This task covers:

- a. Removal b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

General Safety Instructions

Do not perform this procedure near fire, flames, or sparks.

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

WARNING

Diesel fuel is highly flammable. Do not perform this procedure near fire, flames, or sparks. Severe injury or death will result.

a. Removal

CAUTION

Cover or plug all open hoses and connections immediately after disconnection to prevent contamination. Remove all covers or plugs prior to connection.

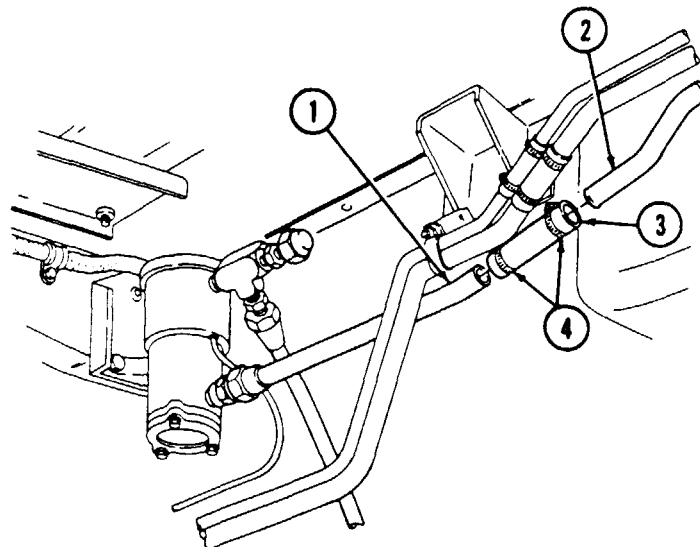
NOTE

Have drainage container ready to catch fuel.

Loosen two clamps (4) and remove fuel supply hose (3) from tank-to-hose fuel supply line (2) and pump-to-hose fuel supply line (1).

b. Installation

1. Connect hose (3) to tank-to-hose fuel supply line (2) with clamp (4).
2. Connect hose (3) to pump-to-hose fuel supply line (1) with clamp (4).



FOLLOW-ON TASKS: Operate arctic heater (TM 9-2320-280-10) and check for fuel leaks.

12-31. ARCTIC HEATER PUMP-TO-HOSE FUEL SUPPLY LINE REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Materials/Parts

Sealing compound (Appendix C, Item 44)

General Safety Instructions

Do not perform this procedure near fire, flames, or sparks.

WARNING

Diesel fuel is highly flammable. Do not perform this procedure near fire, flames, or sparks. Severe injury or death will result.

a. Removal

CAUTION

Cover or plug all open hoses and connections immediately after disconnection to prevent contamination. Remove all covers or plugs prior to connection.

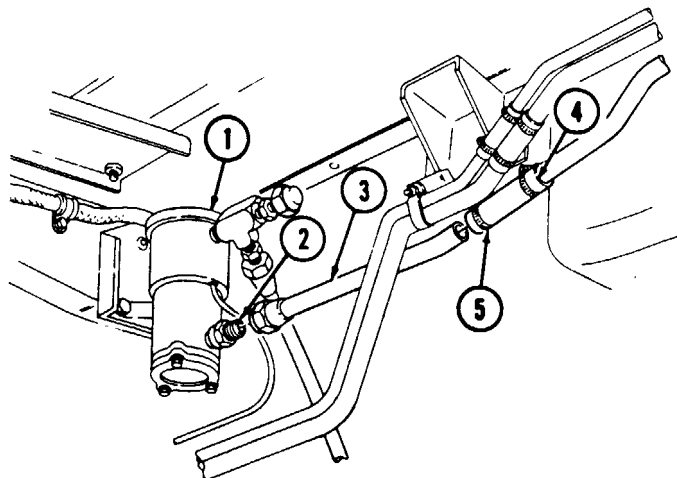
NOTE

Have drainage container ready to catch fuel.

1. Loosen clamp (5) and disconnect fuel supply hose (4) from pump-to-hose fuel supply line (3).
2. Remove pump-to-hose fuel supply line (3) from connector (2) on fuel pump (1).
3. Inspect connector (2) for damaged threads or cracks. Replace if cracked or damaged.

b. Installation

1. Apply sealing compound to threads of connector (2) and connect pump-to-hose fuel supply line (3) to connector (2) on fuel pump (1).
2. Connect fuel supply hose (4) to pump-to-hose fuel supply line (3) with clamp (5).



FOLLOW-ON TASK: Operate arctic heater (TM 9-2320-280-10) and check for fuel leaks.

12-32. ARCTIC HEATER PUMP-TO-BULKHEAD FUEL SUPPLY LINE REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Materials/Parts

Sealing compound (Appendix C, Item 44)

General Safety Instructions

Do not perform this procedure near fire, flames, or sparks.

WARNING

Diesel fuel is highly flammable. Do not perform this procedure near fire, flames, or sparks. Severe injury or death will result.

a. Removal

CAUTION

Cover or plug all open hoses and connections immediately after disconnection to prevent contamination. Remove all covers or plugs prior to connection.

NOTE

Have drainage container ready to catch fuel.

1. Disconnect pump-to-bulkhead fuel supply line (2) from connector (1).
2. Remove pump-to-bulkhead fuel supply line (2) from bulkhead coupling elbow (3).

NOTE

Perform steps 3 and 4 for M996, M996A1, M997, M997A1, M997A2, M998, M998A1, M1038, and M1038A1 models only.

3. Disconnect rear pump-to-bulkhead fuel supply line (5) from connector (4).
4. Remove rear pump-to-bulkhead fuel supply line (5) from rear bulkhead coupling elbow (6).
5. Inspect connectors (1) and (4) and bulkhead coupling elbows (3) and (6) for damaged threads or cracks. Replace if cracked or damaged.

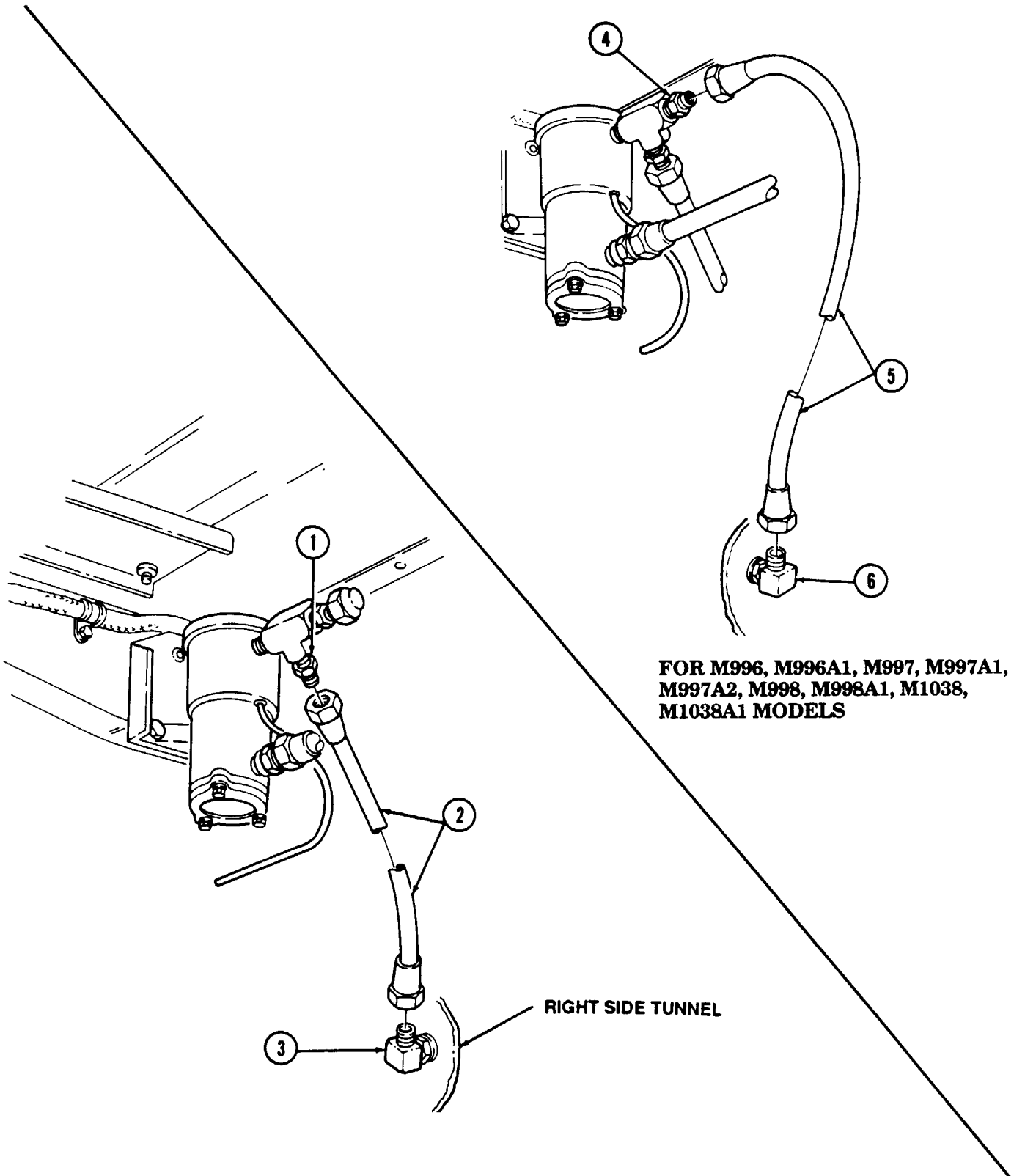
b. Installation

NOTE

Perform steps 1 and 2 for M996, M996A1, M997, M997A1, M997A2, M998, M998A1, M1038 and M1038A1 models only.

1. Apply sealing compound to threads of connector (4) and install rear pump-to-bulkhead fuel supply line (5) on connector (4).
2. Apply sealing compound to threads of rear bulkhead coupling elbow (6) and connect rear pump-to-bulkhead fuel supply line (5) to rear bulkhead coupling elbow (6).
3. Apply sealing compound to threads of connector (1) and install pump-to-bulkhead fuel supply line (2) on connector (1).
4. Apply sealing compound to threads of bulkhead Coupling elbow (3) and connect pump-to-bulkhead fuel supply line (2) to bulkhead coupling elbow (3).

12-32. ARCTIC HEATER PUMP-TO-BULKHEAD FUEL SUPPLY LINE REPLACEMENT (Cont'd)



FOR M996, M996A1, M997, M997A1, M997A2, M998, M998A1, M1038, M1038A1 MODELS

FOLLOW-ON TASK: Operate arctic heater (TM 9-2320-280-10) and check for fuel leaks.

12-33. ARCTIC HEATER FUEL SUPPLY LINE BULKHEAD COUPLING REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Materials/Parts

Sealing compound (Appendix C, Item 44)

General Safety Instructions

Do not perform this procedure near fire, flames, or sparks.

WARNING

Diesel fuel is highly flammable. Do not perform this procedure near fire, flames, or sparks. Severe injury or death will result.

a. Removal

CAUTION

Cover or plug all open hoses and connections immediately after disconnection to prevent contamination. Remove all covers or plugs prior to connection.

NOTE

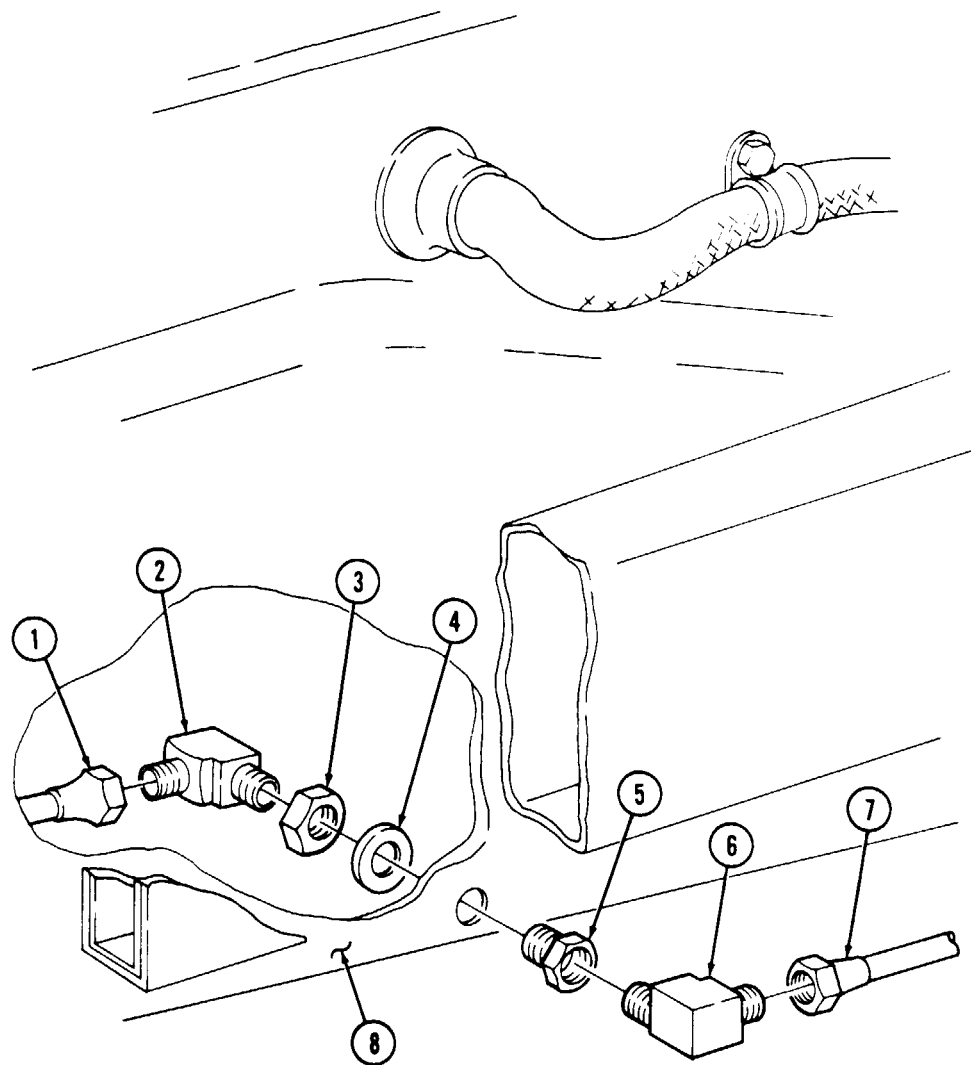
Have drainage container ready to catch fuel.

1. Disconnect pump-to-bulkhead fuel supply line (1) from elbow (2).
2. Disconnect elbow (2) from coupling half (5).
3. Remove coupling nut (3) and washer (4) from bulkhead (8) and coupling half (5).
4. Disconnect filter-to-bulkhead fuel supply line (7) from elbow (6).
5. Remove coupling half (5) from elbow (6).
6. Inspect elbows (2) and (6) and coupling half (5) for damaged threads or cracks. Replace if cracked or damaged.

b. Installation

1. Apply sealing compound to threads of elbows (2) and (6).
2. Connect elbow (6) to coupling half (5).
3. Connect filter-to-bulkhead fuel supply line (7) to elbow (6).
4. Install coupling half (5) on bulkhead (8) with washer (4) and coupling nut (3).
5. Connect elbow (2) to coupling half (5).
6. Connect pump-to-bulkhead fuel supply line (1) to elbow (2).

12-33. ARCTIC HEATER FUEL SUPPLY LINE BULKHEAD COUPLING REPLACEMENT (Cont'd)



FOLLOW-ON TASK: Operate arctic heater (TM 9-2320-280-10) and check for fuel leaks.

12-34. ARCTIC HEATER FILTER-TO-BULKHEAD FUEL SUPPLY LINE REPLACEMENT

This task covers

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Materials/Parts

Sealing compound (Appendix C, Item 44)

General Safety Instructions

Do not perform this procedure near fire, flames, or sparks.

WARNING

Diesel fuel is highly flammable. Do not perform this procedure near fire, flames, or sparks. Severe injury or death will result.

a. Removal

CAUTION

Cover or plug all open hoses and connections immediately after disconnection to prevent contamination. Remove all covers or plugs prior to connection.

NOTE

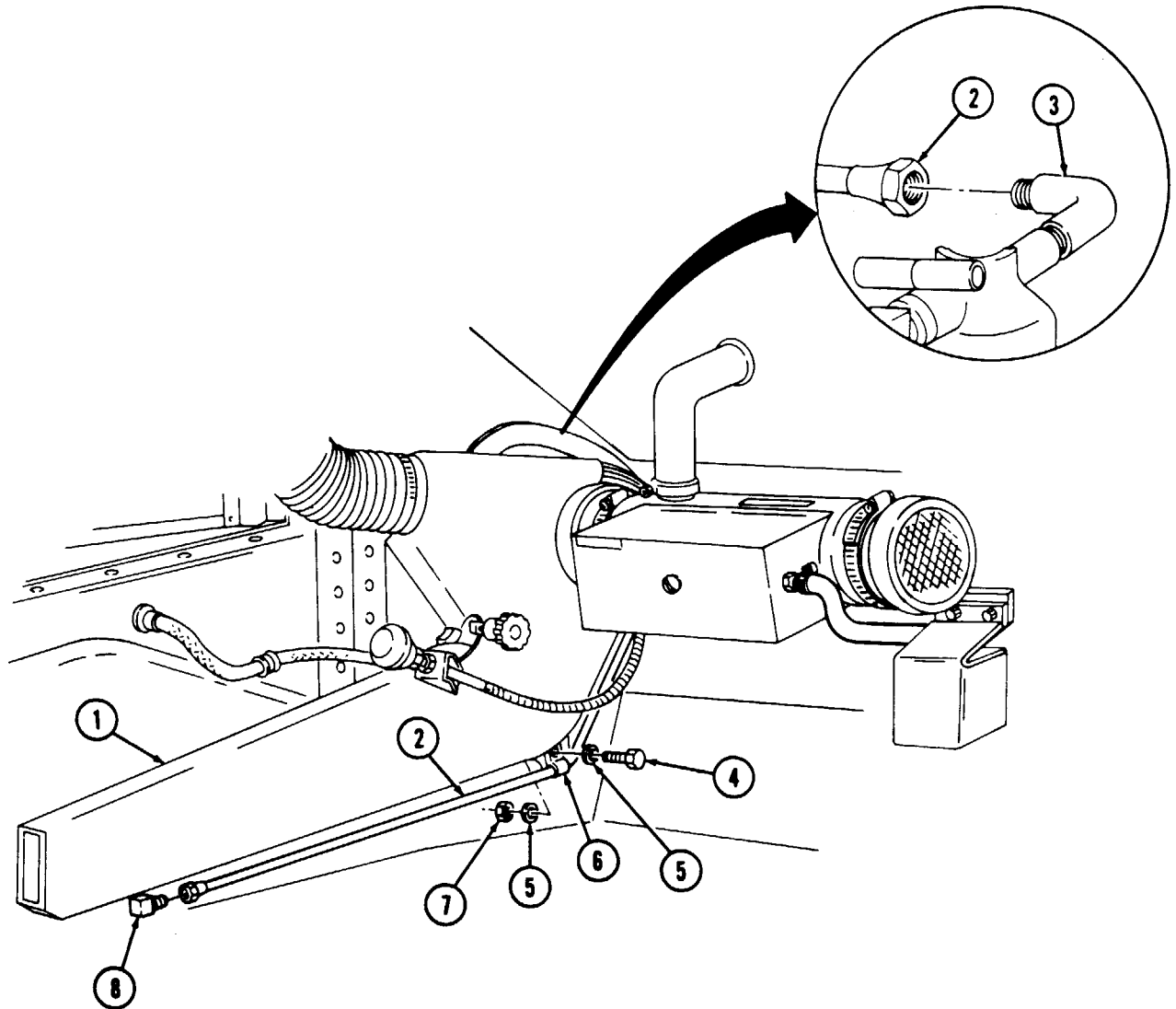
Have drainage container ready to catch fuel.

1. Disconnect filter-to-bulkhead fuel supply line (2) from bulkhead elbow (8).
2. Disconnect fuel supply line (2) from filter elbow (3).
3. Remove nut (7), washer (5), capscrew (4), washer (5), clamp (6), and fuel supply line (2) from plenum (1).
4. Inspect filter elbow (3) and bulkhead elbow (8) for damaged threads or cracks. Replace if cracked or damaged.

b. Installation

1. Apply sealing compound to threads of filter elbow (3) and install fuel supply line (2) on filter elbow (3).
2. Apply sealing compound to threads of bulkhead elbow (8) and connect fuel supply line (2) to bulkhead elbow (8).
3. Connect fuel supply line (2) to plenum (1) with clamp (6), washer (5), capscrew (4), washer (5), and nut (7). Tighten capscrew (4) to 8 lb-ft (11 N·m).

12-34. ARCTIC HEATER FILTER-TO-BULKHEAD FUEL SUPPLY LINE REPLACEMENT (Cont'd)



FOLLOW-ON TASK: Operate arctic heater (TM 9-2320-280-10) and check for fuel leaks.

12-35. ARCTIC HEATER FILTER-TO-HEATER FUEL SUPPLY HOSE REPLACEMENT

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

General Safety Instructions

Do not perform this procedure near fire, flames, or sparks.

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

WARNING

Diesel fuel is highly flammable. Do not perform this procedure near fire, flames, or sparks. Severe injury or death will result.

a. Removal

CAUTION

Cover or plug all open hoses and connections immediately after disconnection to prevent contamination. Remove all plugs prior to connection.

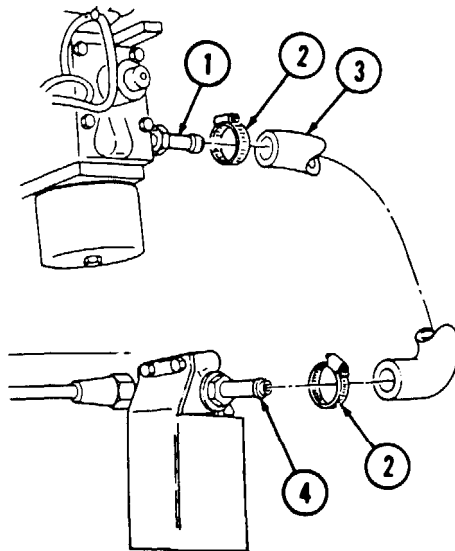
NOTE

Have drainage container ready to catch fuel.

1. Remove two clamps (2) and hose (3) from filter connector (4) and heater connector (1).
2. Inspect filter connector (4) and heater connector (1) for damage. Replace if damaged.

b. Installation

1. Install clamps (2) on hose (3).
2. Install hose (3) on heater connector (4) and heater connector (1) with clamps (2).



FOLLOW-ON TASK: Operate arctic heater (TM 9-2320-280-10) and check for fuel leaks.

12-36. ARCTIC HEATER CDR VALVE TUBE ASSEMBLY REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

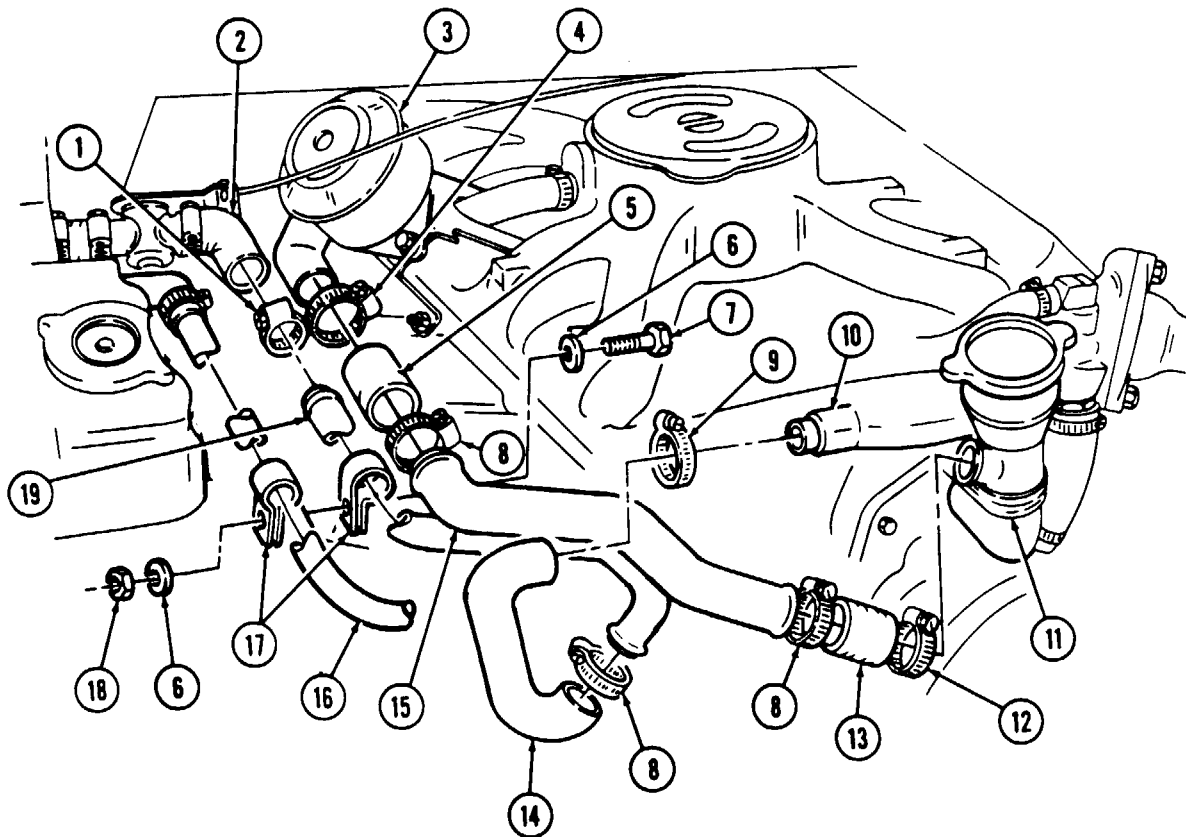
Ž Cooling system drained, as required (para. 3-60).
Ž Air horn removed (para. 3-14).

Manual References

TM 9-2320-280-24P

a. Removal

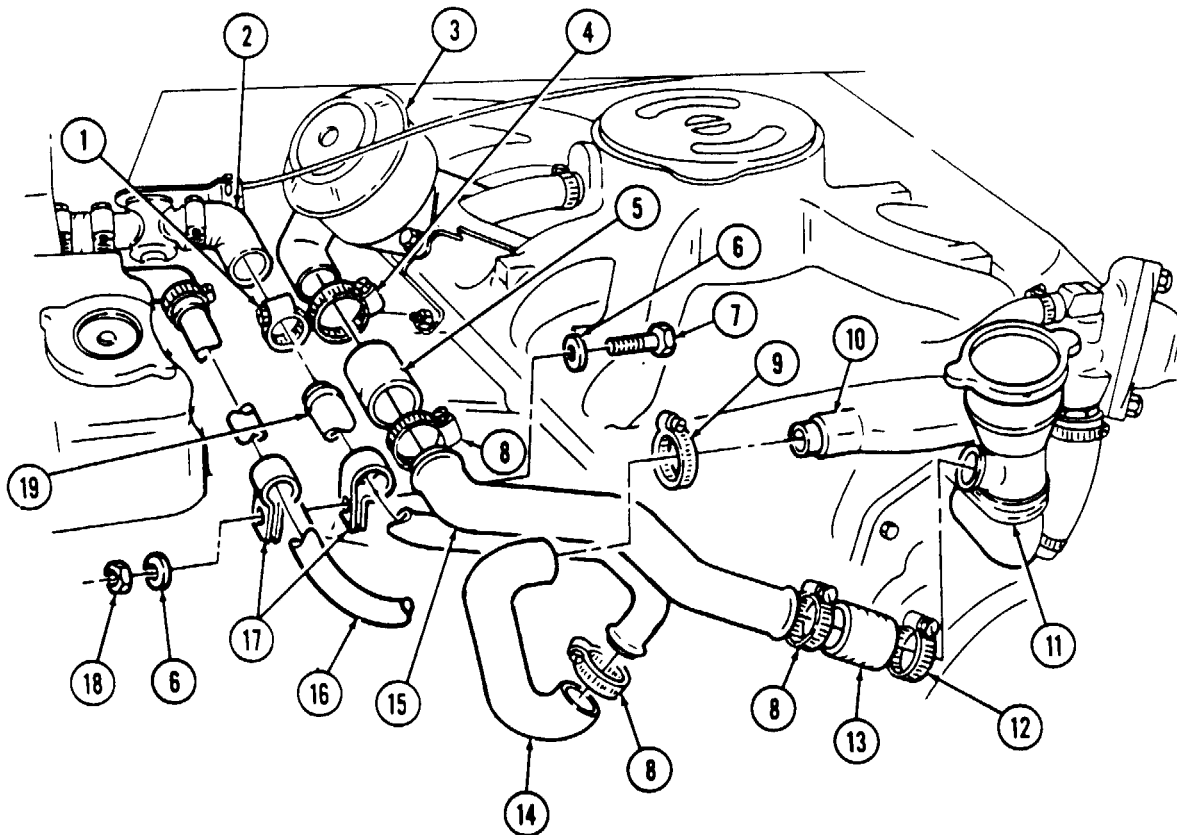
1. Remove clamp (1) and disconnect heater inlet elbow hose (2) from CDR valve tube assembly (19).
2. Remove clamp (4) and disconnect hose (5) from CDR valve (3).
3. Remove clamp (12) and disconnect hose (13) from oil filter tube (11).
4. Remove clamp (9) and disconnect hose (14) from water pump fitting (10). Remove tube assembly (15).
5. Remove nut (18), two washers (6), clamps (17), and capscrew (7) from heater inlet tube (16) and tube assembly (19).
6. Remove three clamps (8) and hoses (5), (14), and (13) from tube assembly (15).



12-36. ARCTIC HEATER CDR VALVE TUBE ASSEMBLY REPLACEMENT (Cont'd)

b. Installation

1. Install three clamps (8) on hoses (5), (14), and (13). Install three hoses (5), (14), and (13) on tube assembly (15) with three clamps (8).
2. Install two clamps (17) on heater inlet tube (16) and tube assembly (19) with two washers (6), capscrew (7), and nut (18).
3. Install clamp (9) on hose (14), and connect hose (14) to water pump fitting (10) with clamp (9).
4. Install clamp (12) on hose (13), and connect hose (13) to oil filler tube (11) with hose (13) and clamp (12).
5. Install clamp (4) on hose (5) and connect hose (5) to CDR valve (3) with clamp (4).
6. Install clamp (1) on heater inlet elbow hose (2) and connect heater inlet elbow hose (2) to tube assembly (19) with clamp (1).



FOLLOW-ON TASKS: Ž Install air horn (para. 3-14).
 Ž Fill cooling system (para. 3-60).

12-37. ARCTIC HEATER PLENUM ASSEMBLY REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

Arctic heater assembly removed (para. 12-41).

Manual References

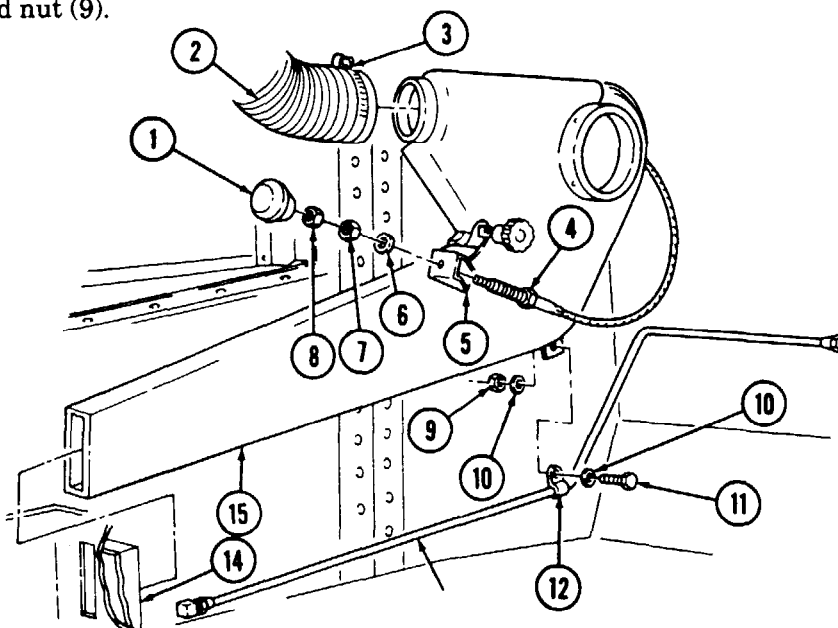
TM 9-2320-280-24P

a. Removal

1. Remove nut (9), washer (10), capscrew (11), washer (10), and clamp (12) from fuel supply line (13) and plenum (15).
2. Loosen nut (8) and remove knob (1) and nut (8) from cable assembly core (4).
3. Remove nut (7), washer (6), and cable assembly core (4) from plenum bracket (5).
4. Loosen clamp (3) and remove hose (2) from plenum (15).
5. Remove plenum (15) from receptacle assembly (14).

b. Installation

1. Slide plenum (15) into receptacle assembly (14).
2. Connect hose (2) to plenum (15) with clamp (3).
3. Connect cable assembly core (4) to plenum bracket (5) with washer (6) and nut (7).
4. Install nut (8) and knob (1) on cable assembly core (4).
5. Install clamp (12) and fuel supply line (13) on plenum (15) with washer (10), capscrew (11), washer (10), and nut (9).



FOLLOW-ON TASKS: \bar{Z} Install arctic heater assembly (para. 12-41).
 \bar{Z} Adjust exhaust diverter cable (para. 12-48).

12-38. ARCTIC HEATER PLENUM HOSE REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

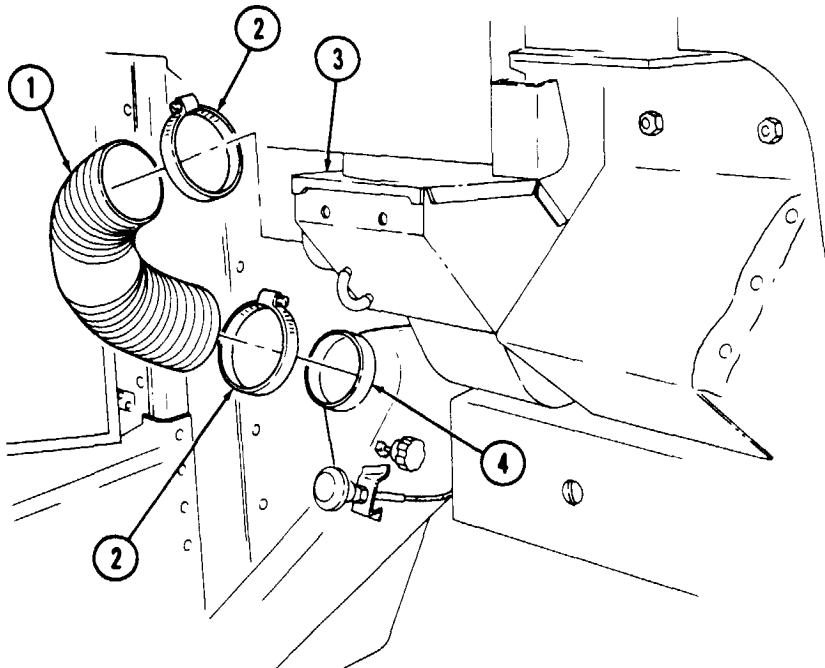
TM 9-2320-280-24P

a. Removal

Remove two clamps (2) and plenum hose (1) from adapter (3) and plenum (4).

b. Installation

Connect plenum hose (1) to plenum (4) and adapter (3) with two clamps (2).



12-39. ARCTIC HEATER PLENUM COVER REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-24P

Materials/Parts

Six blind rivets (Appendix G, Item 255)

a. Removal

1. Remove three rivets (1) and retainer (2) from plenum (6).
2. Remove three rivets (5) and retainer (4) from plenum (6).
3. Peel cover (3) back and remove from plenum (6).
4. Clean remaining adhesive from surface of plenum (6).

b. Installation

NOTE

Ensure surface is free of dirt and oil before applying adhesive backed cover.

1. Peel backing paper from adhesive-backed cover (3).

NOTE

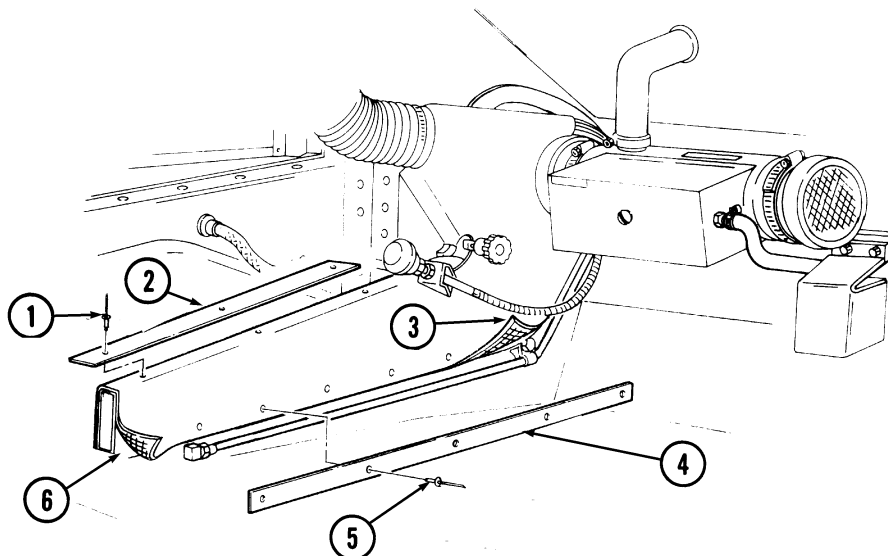
Ensure cover is attached to all bends and corners.

2. Install cover (3) on plenum (6) by pressing cover (3) firmly in place.

NOTE

Refer to para. 10-66 for rivet installation.

3. Install retainer (4) on plenum (6) with three rivets (5).
4. Install retainer (2) on plenum (6) with three rivets (1).



12-40. ARCTIC HEATER REGULATOR REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-24P

Materials/Parts

Seal (Appendix G, Item 287)
Four locknuts (Appendix G, Item 79)

Equipment Condition

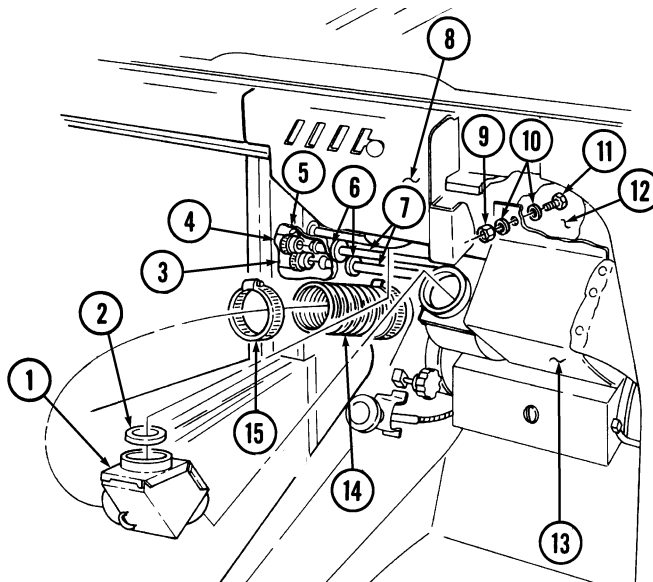
Arctic heater diverter box cover removed
(para. 12-47).

a. Removal

1. Loosen clamp (15) and disconnect plenum hose (14) from regulator (1).
2. Remove four locknuts (9), washers (10), capscrews (11), and washers (10) from heater assembly (13) and cowl panel (12) and pull heater assembly (13) away from cowl panel (12). Discard locknuts (9).
3. Loosen two clamps (5) and remove two heater pipes (7) from inlet hose (4), outlet hose (3), and two cowl grommets (6).
4. Disconnect regulator (1) from heat duct (8) and remove regulator (1) from heater assembly (13).
5. Remove seal (2) from regulator (1). Discard seal (2).

b. Installation

1. Install seal (2) on regulator (1).
2. Install regulator (1) on heat duct (8) and heater assembly (13).
3. Route two heater pipes (7) through two cowl grommets (6).
4. Install heater assembly (13) on cowl panel (12) with four capscrews (11), washers (10), locknuts (9), and washers (10). Tighten locknuts (9) to 17 lb-ft (23 N·m).
5. Install inlet hose (4) and outlet hose (3) on heater pipes (7) with two clamps (5).
6. Install plenum hose (14) on regulator (1) with clamp (15).



FOLLOW-ON TASK: Install arctic heater diverter box cover (para. 12-47).

12-41. ARCTIC HEATER ASSEMBLY REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Thermaseal (Appendix G, Item 304)
Four locknuts (Appendix G, Item 78)
Cotter pin (Appendix G, Item 13)

Manual References

TM 9-2320-280-24P

Equipment Condition

- Heater boot removed (para. 10-96).
- Arctic heater fuel filter removed (para. 12-27).
- Arctic heater filter-to-heater fuel supply hose removed (para. 12-35).

General Safety Instructions

Do not perform this procedure near fire, flames, or sparks.

WARNING

Diesel fuel is highly flammable. Do not perform this procedure near fire, flames, or sparks. Severe injury or death will result.

a. Removal

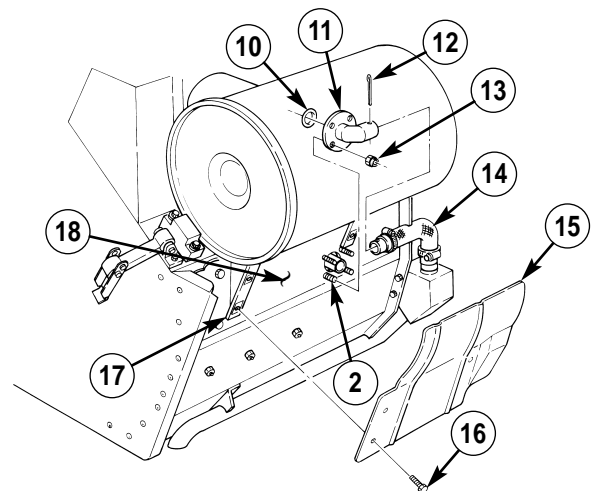
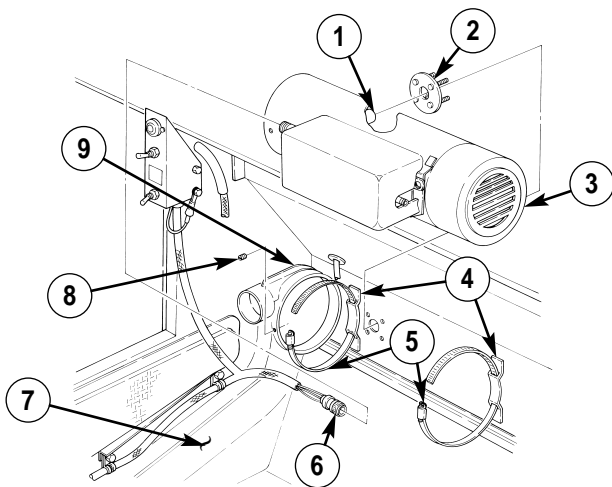
CAUTION

Cover or plug all open hoses and connections immediately after disconnection to prevent contamination. Remove all covers or plugs prior to connection.

NOTE

Have drainage container ready to catch fuel.

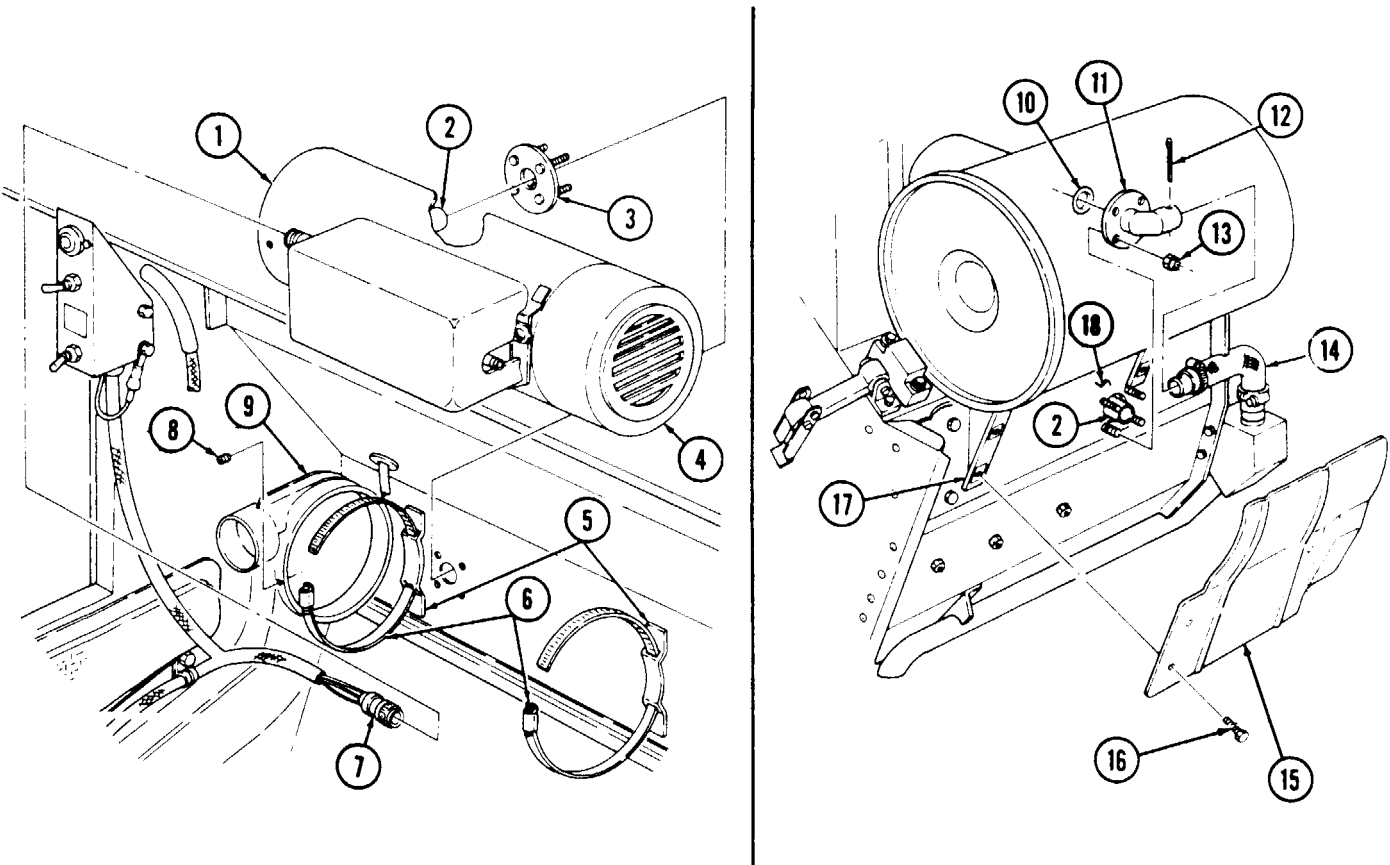
1. Disconnect electrical connector (6) from heater assembly (3).
2. Remove setscrew (8) from heater assembly (3) and plenum assembly input port (9).
3. Open two clamps (5) and slide heater assembly (3) from plenum assembly (7) and exhaust pipe (1) from cowl flange (2). Remove heater assembly (3) and exhaust pipe (1) from mounting bracket assemblies (4).
4. Remove three capscrews (16) and dust unloader cover plate (15) from air cleaner bracket (17).
5. Remove cotter pin (12) from elbow (11) and exhaust pipe elbow (14). Discard cotter pin (12).
6. Remove four locknuts (13), elbow (11), and thermaseal (10) from cowl (18). Discard thermaseal (10) and locknuts (13).



12-41. ARCTIC HEATER ASSEMBLY REPLACEMENT (Cont'd)

b. Installation

1. Install heater assembly (4) and exhaust pipe (2) on mounting bracket assemblies (5) with two clamps (6) finger tight.
2. Align heater assembly outlet port (1) with plenum assembly input port (9) and exhaust pipe (2) with cowl flange (3). Install heater assembly (4) on plenum assembly input port (9) with setscrew (8).
3. Connect electrical connector (7) to heater assembly (4).
4. Tighten two clamps (6).
5. Install elbow (11) on exhaust pipe elbow (14) with cotter pin (12).
6. Install thermaseal (10) on exhaust pipe (2).
7. Install elbow (11) on cowl (18) with four locknuts (13).
8. Install dust unloader cover plate (15) on air cleaner bracket (17) with three capscrews (16).



- FOLLOW-ON TASKS: \checkmark Install arctic heater fuel filter (para. 12-27).
 \checkmark Install arctic heater filter-to-heater fuel supply hose (para. 12-35).
 \checkmark Install heater boot (para. 10-96).

12-42. ARCTIC HEATER CONTROL BOX ASSEMBLY REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Locknut (Appendix G, Item 70)
Lockwasher (Appendix G, Items 175)
Two lockwashers (Appendix G, Item 178)

Personnel Required

One mechanic
One assistant

Manual References

TM 9-2320-280-24P

Equipment Condition

Battery ground cable disconnected (para. 4-73).

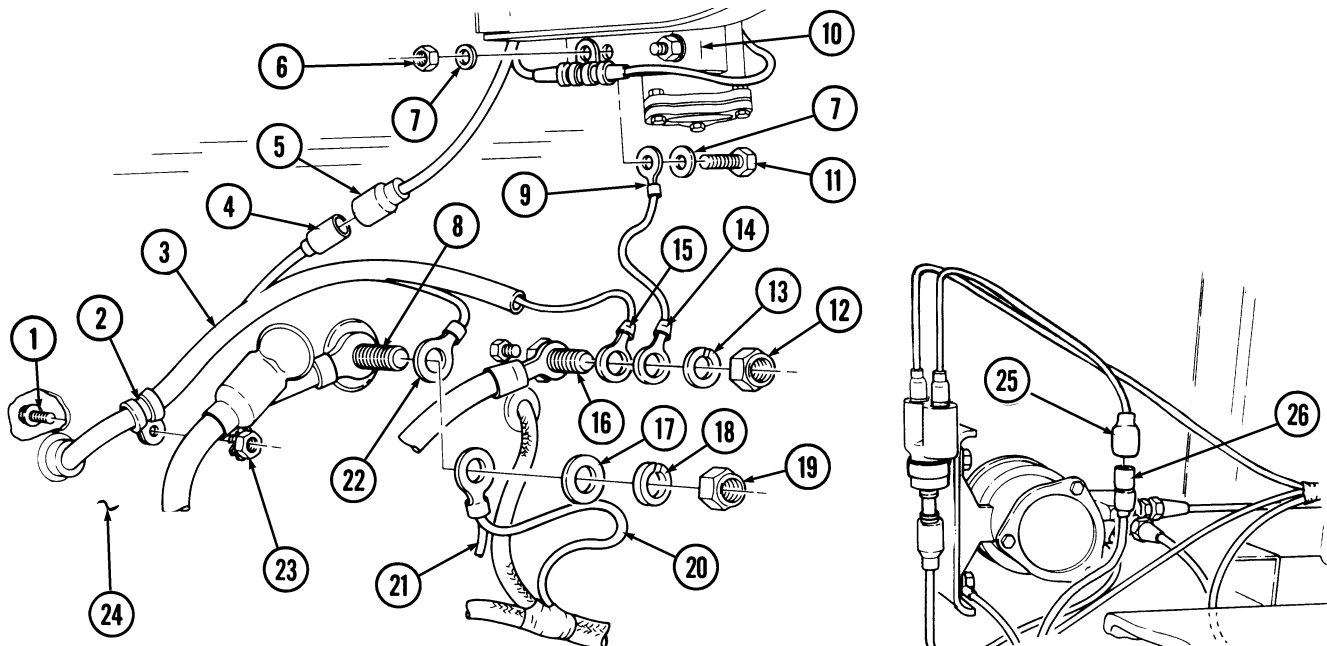
a. Removal

1. Remove nut (6), washer (7), capscrew (11), and washer (7) and disconnect ground lead 416A (9) from fuel pump bracket (10).

NOTE

Perform step 2 for vehicles not equipped with troop/cargo winterization kit. Perform step 3 for vehicles equipped with troop/cargo winterization kit.

2. Disconnect lead 402 (4) from fuel pump lead 402A (5).
3. Disconnect lead 402 (26) from fuel pump jumper lead (25).
4. Remove nut (19), lockwasher (18), and washer (17) and disconnect leads 6B (20), 6C (21), and 400 (22) from power stud (8). Discard lockwasher (18).
5. Remove nut (12) and lockwasher (13), and disconnect leads 416 (15) and 416A (14) from shunt (16). Discard lockwasher (13).
6. Remove locknut (23), capscrew (1), and clamp (2) from heater control box cable (3) and tunnel (24). Discard locknut (23).



12-42. ARCTIC HEATER CONTROL BOX ASSEMBLY REPLACEMENT (Cont'd)

7. Remove grommets (25) and (40) from tunnel (24) and battery box (39), and pull heater control box cable (3) through tunnel (24) and battery box (39).
8. Remove two screws (37) and clamps (38) from heater control box cable (3) and retainer (41).
9. Disconnect electrical connector (36) from heater (35).
10. Remove screw (34), retaining rod (33), and heater control box cable (3) from tunnel (24).
11. Remove two screws (30), lockwasher (31), heater control box (28), and ground lead 416B (29) from cowl (32). Discard lockwasher (31).

b. Installation

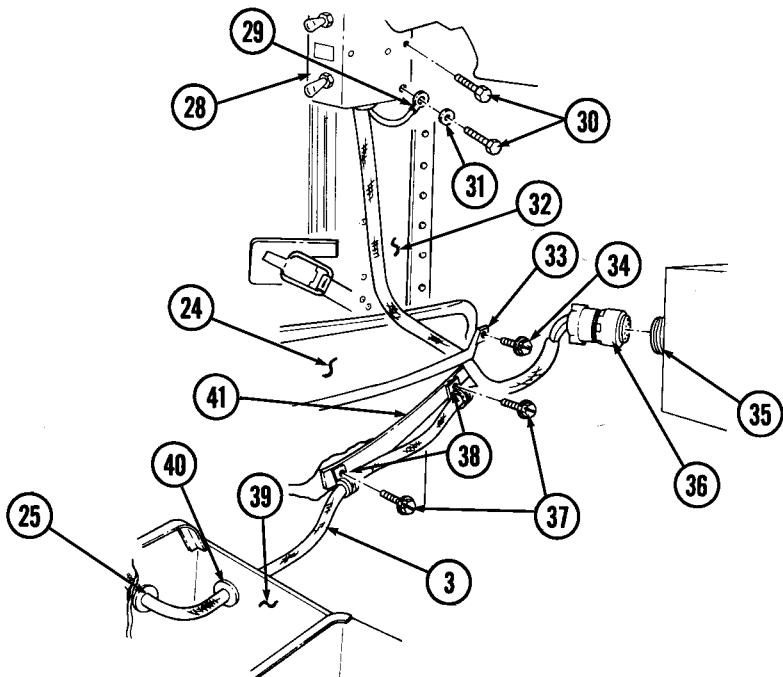
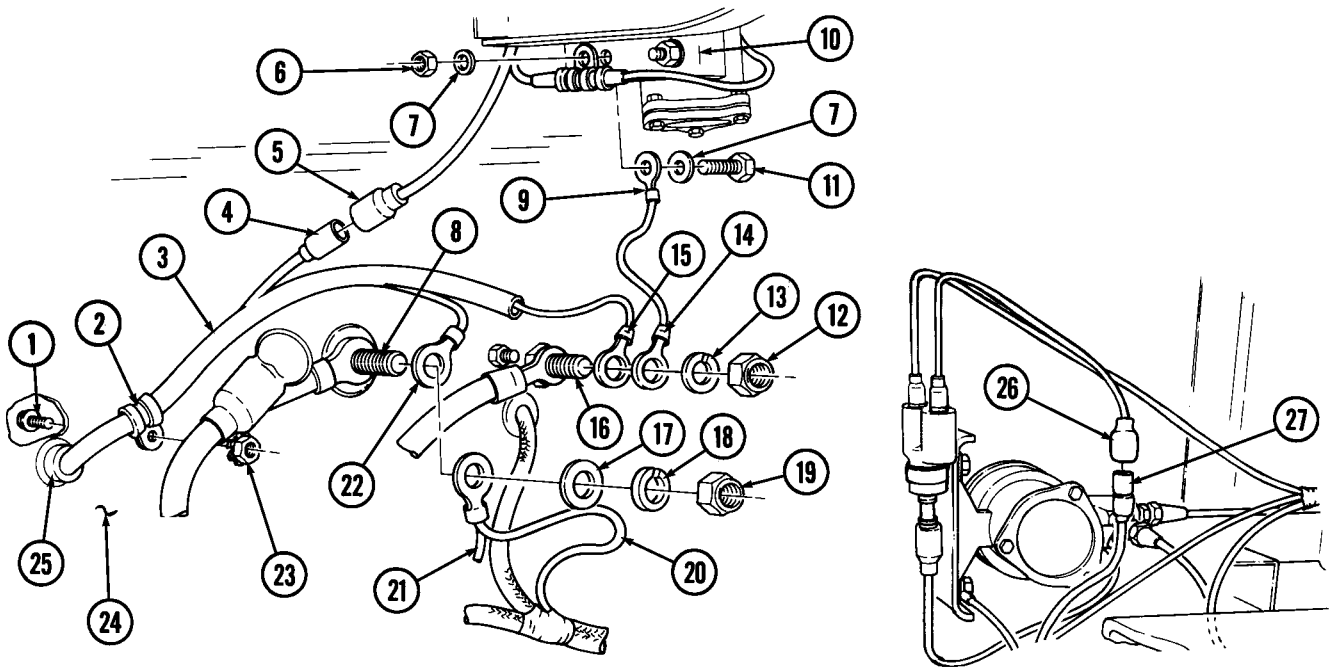
1. Install heater control box (28) and ground lead 416B (29) on cowl (32) with lockwasher (31) and two screws (30).
2. Connect electrical connector (36) to heater (35).
3. Install heater control box cable (3) on retainer (41) with two clamps (38) and screws (37).
4. Install heater control box cable (3) on tunnel (24) with retaining rod (33) and screw (34).
5. Push heater control box cable (3) through battery box (39) and tunnel (24), and install grommets (25) and (40).
6. Install heater control box cable (3) on tunnel (24) with clamp (2), capscrew (1), and locknut (23).
7. Connect leads 416 (15) and 416A (14) to shunt (16) with lockwasher (13) and nut (12).
8. Connect leads 6B (20), 6C (21), and 400 (22) to power stud (8) with washer (17), lockwasher (18), and nut (19).

NOTE

Perform step 9 for vehicles not equipped with troop/cargo winterization kit. Perform step 10 for vehicles equipped with troop/cargo winterization kit.

9. Connect lead 402 (4) to fuel pump lead 402A (5).
10. Connect lead 402 (27) to fuel pump jumper lead (26).
11. Connect ground lead 416A (9) to fuel pump bracket (10) with washer (7), capscrew (11), washer (7), and nut (6).

12-42. ARCTIC HEATER CONTROL BOX ASSEMBLY REPLACEMENT(Cont'd)



FOLLOW-ON TASK: Connect battery ground cable (para. 4-73).

12-42.1. ARCTIC HEATER CONTROL CABLE MAINTENANCE

This task covers:

- | | |
|--|----------------------|
| <p>a. Removal</p> <p>b. Installation</p> | <p>c. Adjustment</p> |
|--|----------------------|

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Cotter pin (Appendix G, Item 26)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

- Hood raised and secured (TM 9-2320-280-10).
- Engine right splash shield removed (para. 10-20).
- Arctic heater assembly removed (para. 12-41).

a. Removal

1. Loosen nut (2) and remove knob (1) and nut (2) from control cable core (6).
2. Remove nut (3), washer (4), and control cable (9) from plenum bracket (5).
3. Remove grommet (8) from cowl opening (7) and push control cable (9) through cowl opening (7).
4. Remove capscrew (15), washer (16), and control cable bracket (17) from diverter box (18).
5. Remove cotter pin (11) and washer (10) from control cable pin (13) and exhaust diverter lever (12). Discard cotter pin (11).
6. Disconnect cable pin (13) from exhaust diverter lever (12) and remove control cable (9).

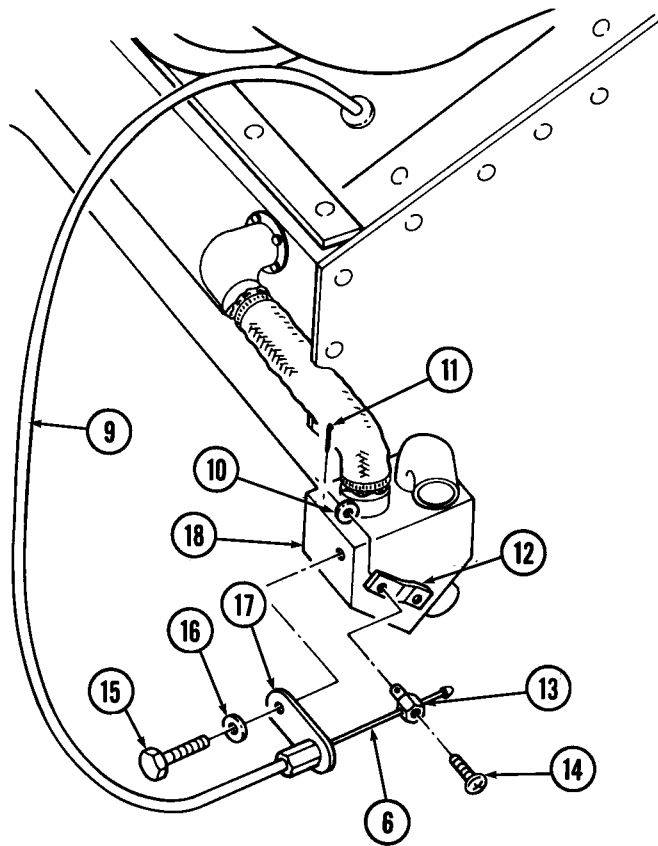
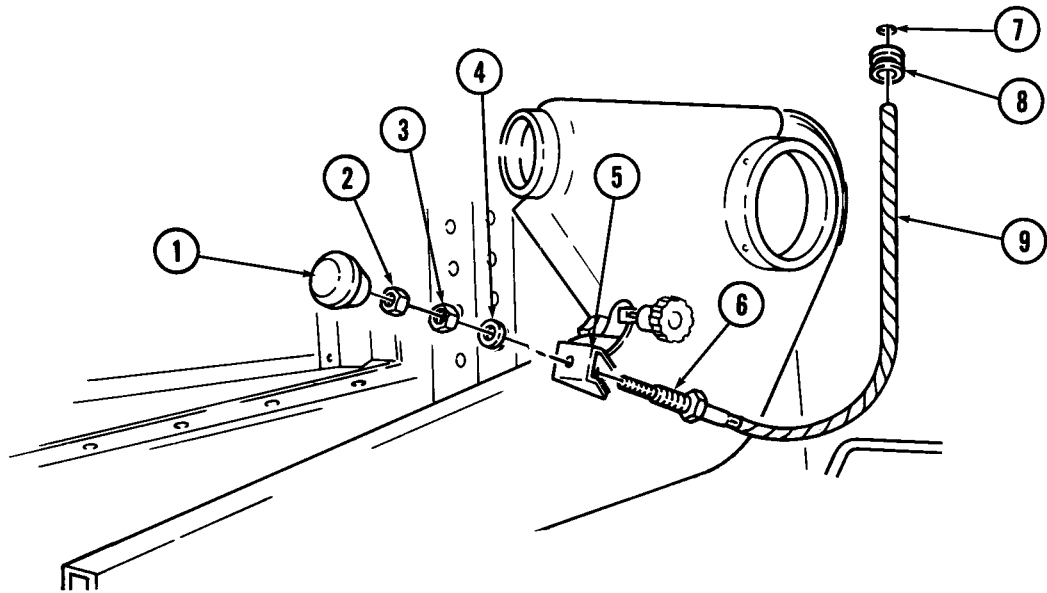
b. Installation

1. Install control cable pin (13) on exhaust diverter lever (12) with washer (10) and cotter pin (11).
2. Install control cable bracket (17) on diverter box (18) with washer (16) and capscrew (15).
3. Push control cable (9) through cowl opening (7) and install grommet (8) on cowl opening (7).
4. Connect control cable (9) to plenum bracket (5) with washer (4) and nut (3).
5. Install nut (2) and knob (1) on control cable core (6) and tighten nut (2).

c. Adjustment

1. Loosen screw (14) on control cable pin (13).
2. Ensure knob (1) is pushed all the way in (exhaust position).
3. Ensure exhaust diverter lever (12) on diverter box (18) is in the full vertical position (exhaust position).
4. Tighten screw (14) on control cable pin (13).

12-42.1 ARCTIC HEATER CONTROL CABLE MAINTENANCE (Cont'd)



- FOLLOW-ON TASKS:
- Install arctic heater assembly (para. 12-41).
 - Install engine right splash shield (para. 10-20).
 - Lower and secure hood (TM 9-2320-280-10).

12-43. ARCTIC HEATER CONTROL BOX ASSEMBLY MAINTENANCE

This task covers:

a. Disassembly

b. Assembly

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

Arctic heater control box assembly removed
(para. 12-42).

Manual References

TM 9-2320-280-24P

a. Disassembly

NOTE

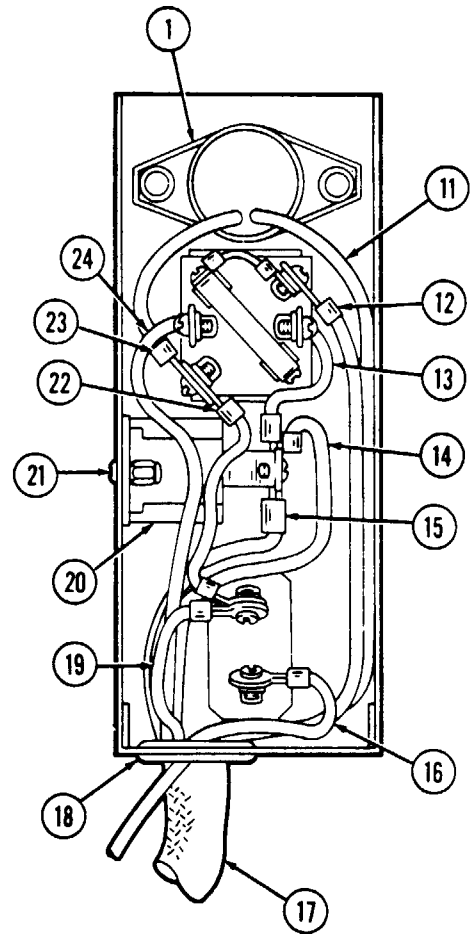
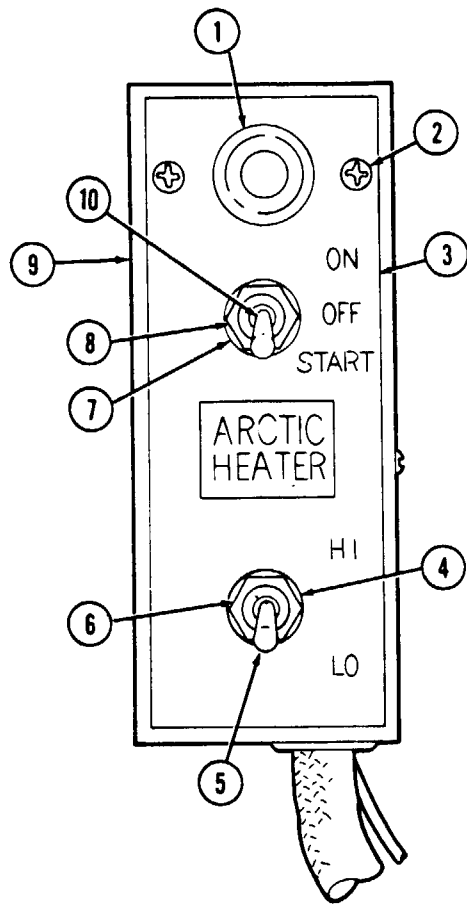
Prior to removal, tag all leads for installation.

1. Remove nut (6), washer (4), and toggle switch (5) from control box (9). Disconnect leads (16), (19), and (22) from toggle switch (5).
2. Remove two screws (21) and circuit breaker (20) from control box (9). Disconnect leads (15), (14), and (13) from circuit breaker (20).
3. Remove nut (8), washer (7), and toggle switch (10) from control box (9). Disconnect leads (22), (12) (13), (24), and (23) from toggle switch (10).
4. Remove grommet (18) and harness (17) from control box (9).
5. Remove two screws (2) and LED assembly (1) from control box (9).
6. Remove name plate (3) from control box (9).

b. Assembly

1. Install name plate (3) on control box (9).
2. Install LED assembly (1) on control box (9) with two screws (2).
3. Install grommet (18) and harness (17) on control box (9). Ensure lead (11) and LED assembly (1) are installed through grommet (18) and out of control box (9).
4. Connect leads (12), (24), (13), (22), and (23) to toggle switch (10). Install toggle switch (10) on control box (9) with washer (7) and nut (8).
5. Connect leads (15), (14), and (13) to circuit breaker (20). Install circuit breaker (20) on control box (9) with two screws (21).
6. Connect leads (16), (19), and (22) to toggle switch (5). Install toggle switch (5) on control box (9) with washer (4) and nut (6).

12-43. ARCTIC HEATER CONTROL BOX ASSEMBLY MAINTENANCE (Cont'd)



FOLLOW-ON TASK: Install arctic heater control box assembly (para. 12-42).

12-44. ARCTIC HEATER BRACKET ASSEMBLY REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Personnel Required

One mechanic
One assistant

Materials/Parts

Two lockwashers (Appendix G, Item 135)

Equipment Condition

- Hood raised and secured (TM 9-2320-280-10).
- Arctic heater assembly removed (para. 12-41).

Manual References

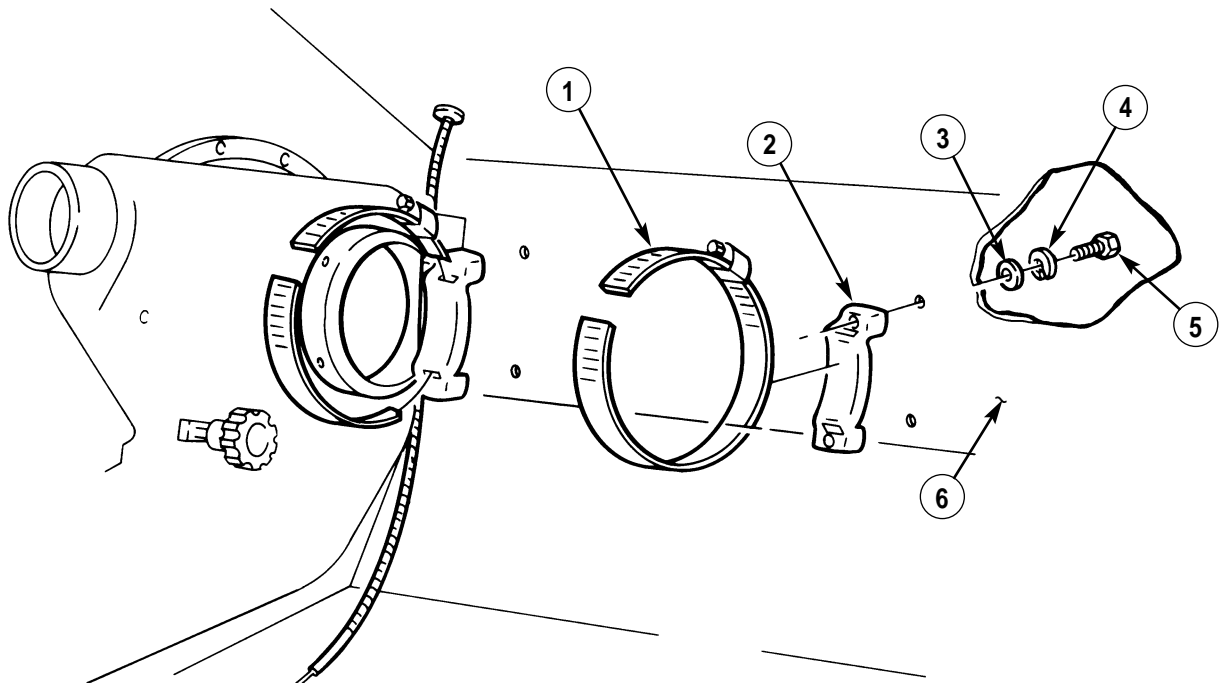
TM 9-2320-280-10
TM 9-2320-280-24P

a. Removal

1. Remove two capscrews (5), lockwashers (4), washers (3), and bracket assembly (2) from cowl (6). Discard lockwashers (4).
2. Remove clamp (1) from bracket assembly (2).

b. Installation

1. Install clamp (1) on bracket assembly (2).
2. Install bracket assembly (2) on cowl (6) with two washers (3), lockwashers (4), and capscrews (5). Tighten capscrews (5) to 8 lb-ft (11 N•m).



- FOLLOW-ON TASKS:**
- Install arctic heater (para. 12-41).
 - Lower and secure hood (TM 9-2320-280-10).

12-45. ARCTIC HEATER BATTERY BOX PLUGS REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit
automotive (Appendix B, Item 1)

Equipment Condition

Battery box cover removed (TM 9-2320-280-10).

Manual References

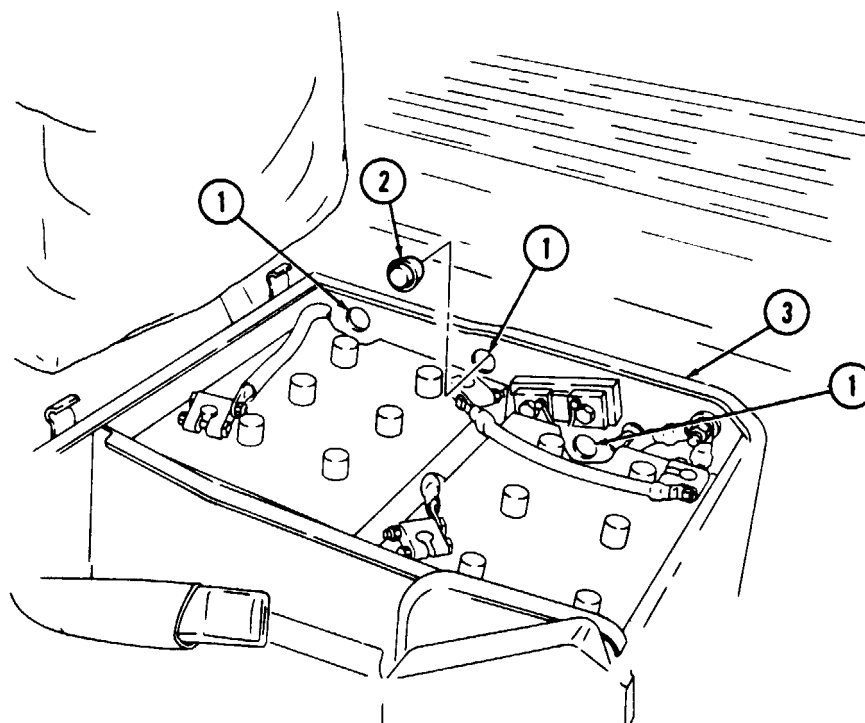
TM 9-2320-280-10
TM 9-2320-280-24P

a. Removal

Remove three plugs (2) from openings (1) in battery box (3).

b. Installation

Install three plugs (2) on openings (1) in battery box (3).



FOLLOW-ON TASK: Install battery box cover (TM 9-2320-280-10).

12-46. ARCTIC HEATER FRONT COWL INSULATION REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-24P

Materials/Parts

Eight locknuts (Appendix G, Item 70)

NOTE

Right and left front cowl insulation is removed and installed basically the same. This procedure covers the right front cowl insulation.

a. Removal

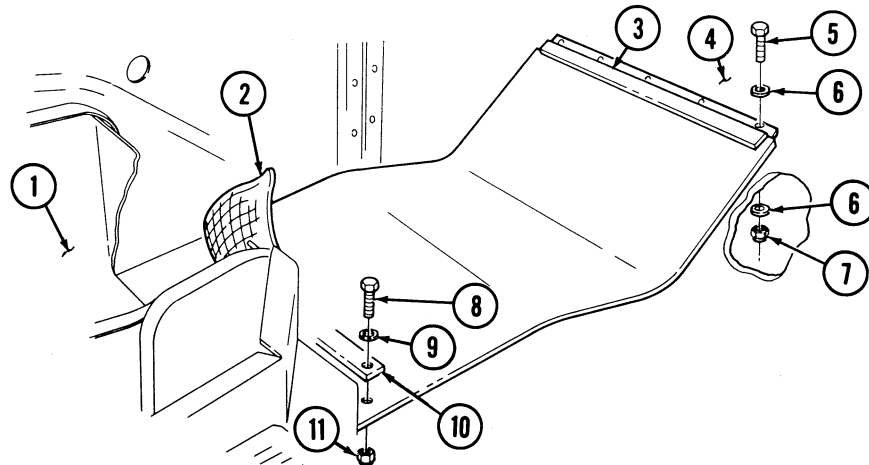
1. Remove four locknuts (11), washers (9), capscrews (8), and retainer (10) from cowl (4). Discard locknuts (11).
2. Remove four locknuts (7), washers (6), capscrews (5), washers (6), and retainer (3) from cowl (4). Discard locknuts (7).
3. Starting at base of battery box (1), peel back insulation (2) and work forward.
4. Remove insulation (2) from cowl (4).
5. Clean remaining adhesive from cowl (4).

b. Installation

NOTE

Ensure surface is free of dirt and oil before applying adhesive backing.

1. Peel backing paper from adhesive-backed insulation (2).
2. Install insulation (2) on cowl (4) and work toward battery box (1), pressing insulation (2) firmly in place.
3. Install retainer (10) on cowl (4) with four washers (9), capscrews (8), and locknuts (11).
4. Install retainer (3) on cowl (4) with four washers (6), capscrews (5), washers (6), and locknuts (7).



12-47. ARCTIC HEATER DIVERTER BOX COVER REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-24P

Materials/Parts

Adhesive (Appendix C, Item 3)
Five blind rivets (Appendix G, Item 254)

NOTE

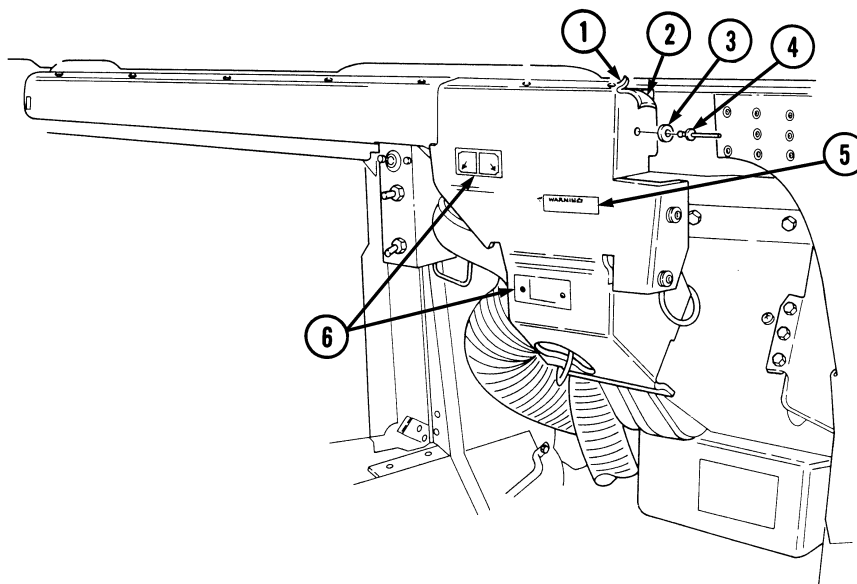
For rivet replacement instructions, refer to para. 10-66.

a. Removal

1. Remove five rivets (4) and washers (3) from cover (1) and diverter box (2).
2. Peel back cover (1) and remove from diverter box (2).
3. Clean remaining adhesive, dirt, and oil from diverter box (2).

b. Installation

1. Apply adhesive to surface of diverter box (2) and rough surface of cover (1).
2. Install cover (1) on diverter box (2), pressing firmly in place.
3. Secure cover (1) to diverter box (2) with five washers (3) and rivets (4).
4. Ensure cover (1) is attached at all bends and corners of diverter box (2).
5. Remove backing from two data plates (6) and install data plates (6) on cover (1).
6. Remove backing from warning plate (5) and install warning plate (5) on cover (1).



12-48. ARCTIC HEATER EXHAUST DIVERTER CABLE ASSEMBLY MAINTENANCE

This task covers:

- | | |
|--|----------------------|
| <p>a. Removal</p> <p>b. Installation</p> | <p>c. Adjustment</p> |
|--|----------------------|

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Cotter pin (Appendix G, Item 26)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

- Hood raised and secured (TM 9-2320-280-10).
- Engine right splash shield removed (para. 10-20).
- Arctic heater assembly removed (para. 12-41).

a. Removal

1. Loosen nut (2) and remove knob (1) and nut (2) from cable assembly core (6).
2. Remove nut (3), washer (4), and cable assembly (9) from plenum bracket (5).
3. Remove grommet (8) from cowl opening (7) and pull cable assembly (9) through cowl opening (7).
4. Remove capscrew (15), washer (16), and cable bracket (17) from diverter box (18).
5. Remove cotter pin (11) and washer (10) from cable pin (13) and exhaust diverter lever (12). Disconnect cable pin (13) from exhaust diverter lever (12) and remove cable assembly (9). Discard cotter pin (11).

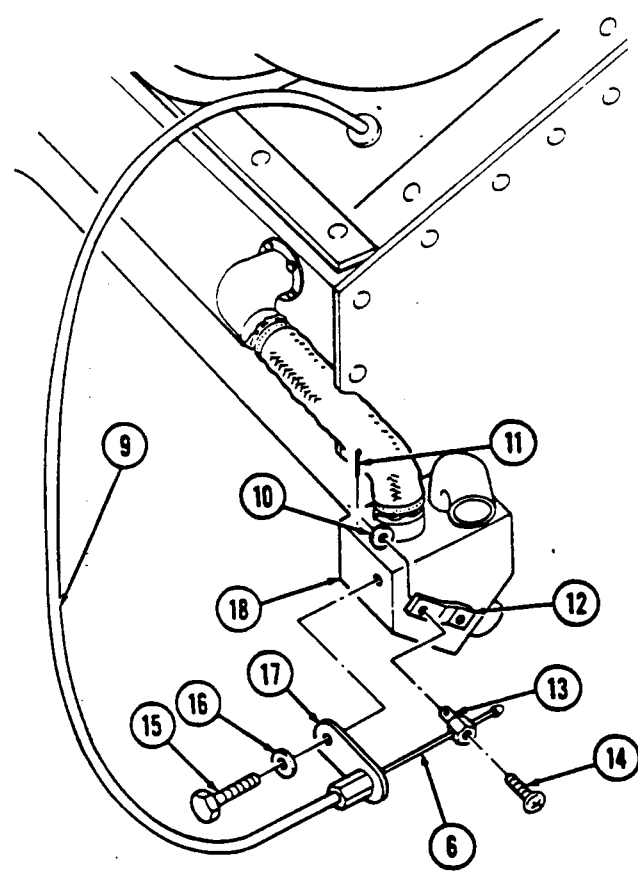
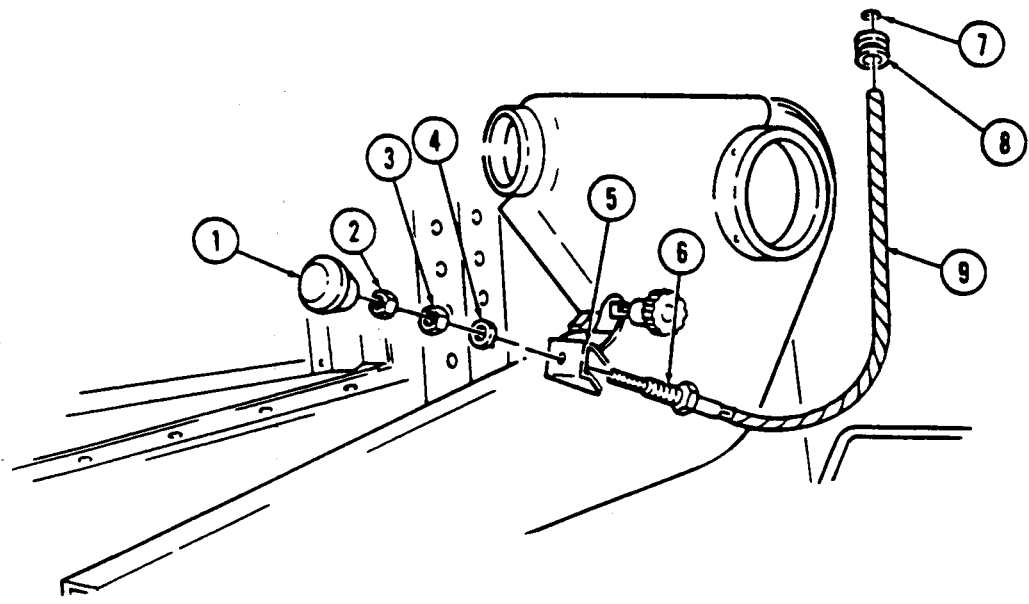
b. Installation

1. Install cable pin (13) on exhaust diverter lever (12) with washer (10) and cotter pin (11).
2. Install cable bracket (17) on diverter box (18) with washer (16) and capscrew (15).
3. Push cable assembly (9) through cowl opening (7) and install grommet (8) on cowl opening (7).
4. Connect cable assembly (9) to plenum bracket (5) with washer (4) and nut (3).
5. Install nut (2) and knob (1) on cable assembly core (6) and tighten nut (2) on knob (1).

c. Adjustment

1. Loosen screw (14) on cable assembly core (6) to cable pin (13).
2. Ensure knob (1) is pushed all the way in (exhaust position).
3. Ensure exhaust diverter lever (12) on diverter box (18) is in the full vertical position (exhaust position).
4. Tighten screw (14) on cable assembly core (6) on cable pin (13).

12-48. ARCTIC HEATER EXHAUST DIVERTER CABLE ASSEMBLY MAINTENANCE (Cont'd)



- FOLLOW-ON TASKS:
- Install arctic heater assembly (para. 12-41).
 - Install engine right splash shield (para. 10-20).
 - Lower and secure hood (TM 9-2320-280-10).

12-48.1 ARCTIC HEATER DUCTING REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M997A2, M1025A2, M1043A2,
M1045A2, M1097A2, M1123

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

- Engine access cover removed (para. 10-15).
- Front radio rack assembly removed, if equipped (para. 12-132).

Materials/Parts

Two locknuts (Appendix G, Item 70)
Two blind rivets (Appendix G, Item 264)

a. Removal

1. Remove two capscrews (4), washers (5), and two radio rack mounting brackets (6) from plenum panel (7).
2. Remove nine screws (9), retainer (8), and plenum panel (7) from "A" beam (2).
3. Disconnect connector (25) from light switch (12).
4. Remove two locknuts (27), washers (13), capscrews (14), and washers (13) securing instrument panel (11) to firewall (26). Discard locknuts (27).
5. Remove nut (21), washer (20), capscrew (19), washer (20) from hand throttle bracket (17), steering column bracket (22), and instrument panel (11).
6. Remove nut (15), screw (18), and hand throttle bracket (17) from instrument panel (11).
7. Remove screw (16) securing panel (11) to firewall (26) and pull panel (11) away from "A" beam (2) for access to air duct (1).

NOTE

Refer to para. 10-66 for rivet removal.

8. Remove two rivets (10) securing air duct (1) to diverter assembly (3).
9. Remove clamp (24) and air duct (1) from steering column mount (23).

b. Installation

1. Install air duct (1) on steering column mount (23) with clamp (24).

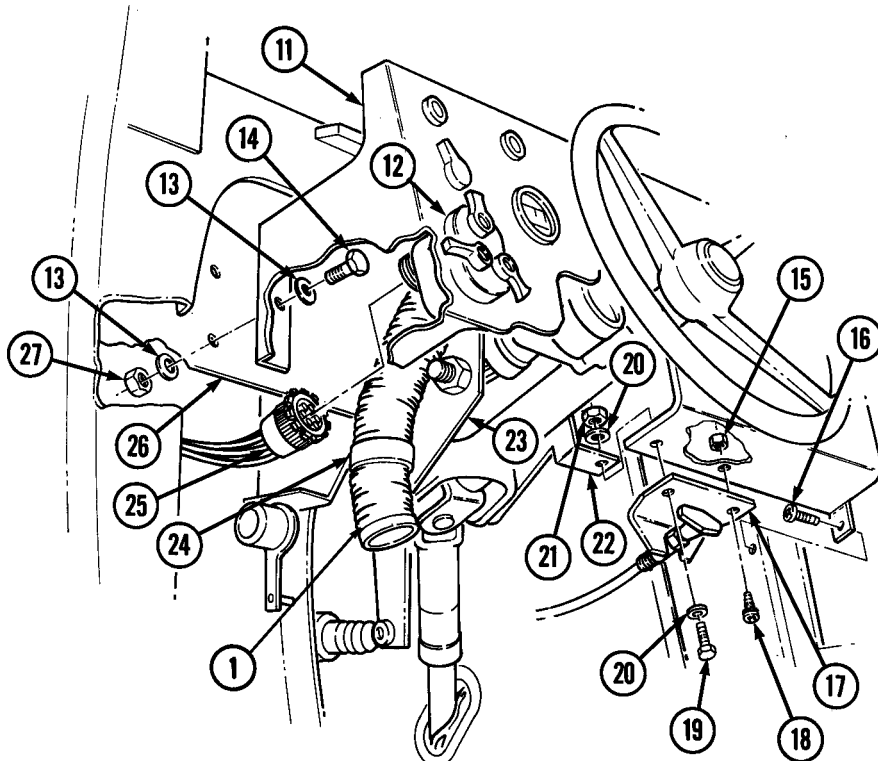
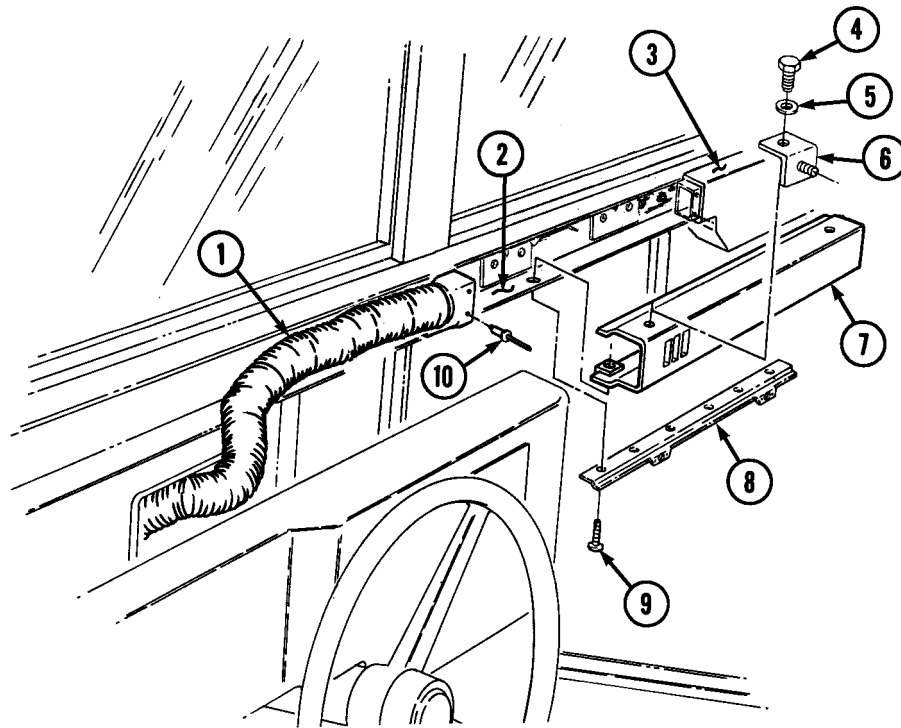
NOTE

Refer to para. 10-66 for rivet installation.

2. Install air duct (1) on diverter assembly (3) with two rivets (10).
3. Install panel (11) on firewall (26) with screw (16).
4. Secure panel (11) and hand throttle bracket (17) to steering column bracket (22) with washer (20), capscrew (19), washer (20), and nut (21).
5. Install hand throttle bracket (17) on instrument panel (11) with screw (18) and nut (15).
6. Secure panel (11) to firewall (26) with two washers (13), capscrews (14), washers (13), and locknuts (27).
7. Connect connector (25) to light switch (12).
8. Install plenum panel (7) and retainer on "A" beam (2) with nine screws (9).
9. Install two radio rack mounting brackets (6) on plenum panel (7) with two washers (5) and capscrews (4).

12-48.1. ARCTIC HEATER DUCTING REPLACEMENT(Cont'd)

NEW CONFIGURATION



- FOLLOW-ON TASKS:**
- Install engine access cover (para. 10-15).
 - Install front radio rack assembly, if equipped (para. 12-132).

12-48.2. ARCTIC HEATER OIL PAN SHROUD REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M966, M966A1, M997, M997A1, M997A2, M998, M998A1, M1025, M1025A1, M1025A2, M1037, M1038, M1038A1, M1121

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Cotter pin (Appendix G, Item 13)
Nine locknuts (Appendix G, Item 129)

Manual References

TM 9-2320-280-20
TM 9-2320-280-24P

General Safety Instructions

Do not touch hot exhaust system with bare hands.

WARNING

Do not touch hot exhaust system components with bare hands.
Severe injury may result.

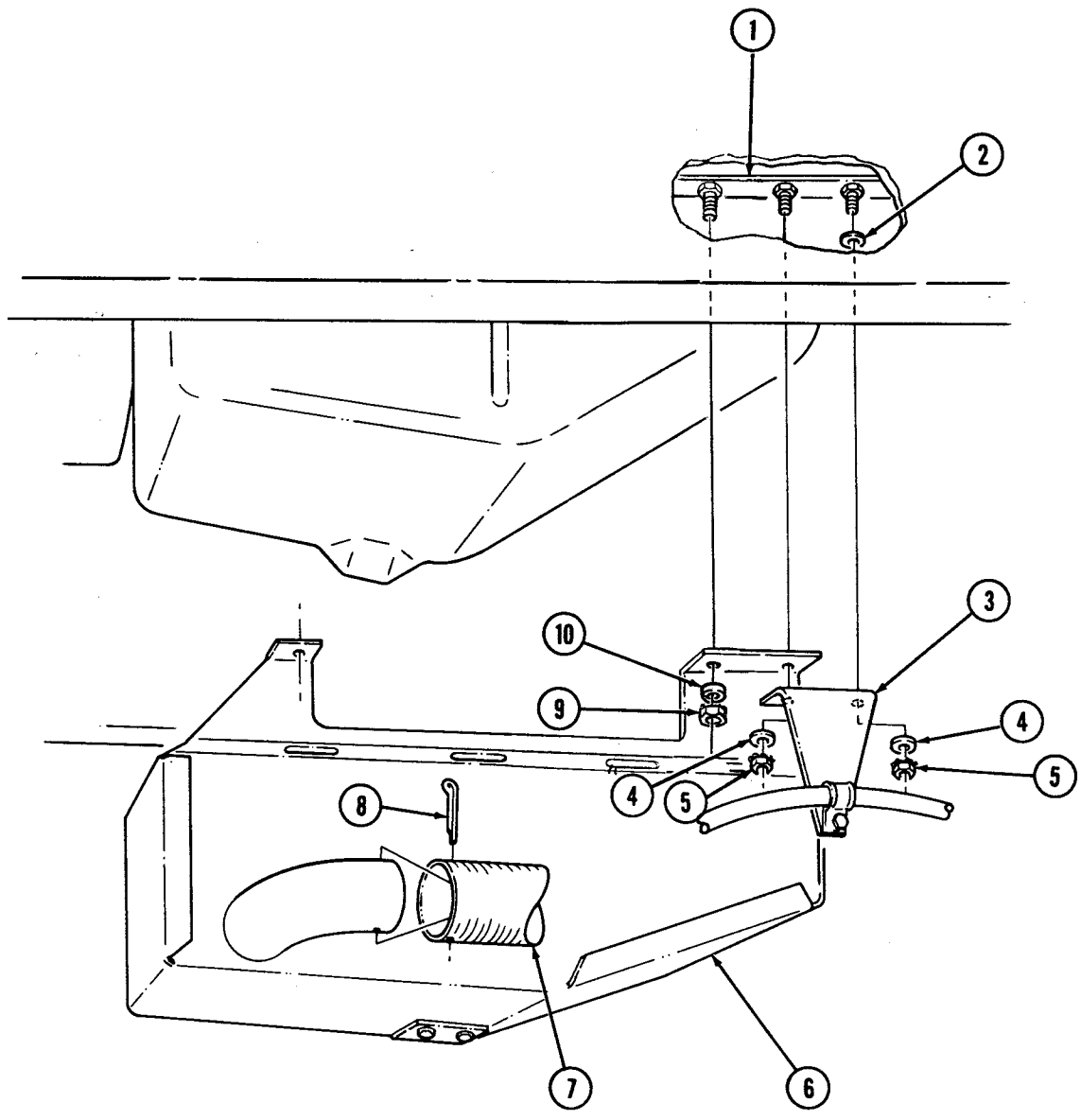
a. Removal

1. Remove cotter pin (8) and flex tube (7) from oil pan shroud (6). Discard cotter pin (8).
2. Remove two locknuts (5), washers (4), starter cable bracket (3), and washer (2) from oil pan (1). Discard locknuts (5).
3. Remove seven locknuts (9), washers (10), and oil pan shroud (6) from oil pan (1). Discard locknuts (9).

b. Installation

1. Install oil pan shroud (6) on oil pan (1) with seven washers (10) and locknuts (9).
2. Install washer (2) and starter cable bracket (3) on oil pan (1) with two washers (4) and locknuts (5).
3. Connect flex tube (7) to oil pan shroud (6) with cotter pin (8).

12-48.2. ARCTIC HEATER OIL PAN SHROUD REPLACEMENT(Cont'd)



12-49. ARCTIC DIVERTER BOX MAINTENANCE

This task covers:

- | | |
|--|--|
| <ul style="list-style-type: none"> a. Removal b. Disassembly | <ul style="list-style-type: none"> c. Assembly d. Installation |
|--|--|

INITIAL SETUP:

Applicable Models

M997A2, M1025A2, M1035A2, M1043A2,
M1045A2, M1097A2, M1123

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Plug button (Appendix G, Item 8)
Two blind rivets (Appendix G, Item 253)
Four blind rivets (Appendix G, Item 258)

Equipment Condition

Arctic diverter ducting removed (para. 12-56).

a. Removal

1. Remove two screws (14) from transition diverter (12) and transition (13).
2. Remove two screws (8) from diverter (9) and heater (7).
3. Remove screw (5) and clamp (4) from diverter (9)
4. Remove plug button (11) and disconnect defroster cable core (6) from baffle pin (10). Discard plug button (11).
5. Pull diverter (9) away from "A" beam (1), loosen two clamps (3), and remove diverter (9) from defroster flex ducts (2).

b. Disassembly

NOTE

Refer to para. 10-66 for rivet removal.

1. Remove four rivets (21) and transition diverter (12) from diverter (9).
2. Remove screw (15), spring (16), and louver (17) from transition diverter (12).
3. Remove two rivets (19), flap (20), and bracket (18) from diverter (9).

c. Assembly

NOTE

Refer to para. 10-66 for rivet installation.

1. Install flap (20) and bracket (18) on diverter (9) with two rivets (19).
2. Install louver (17) on transition diverter (12) with spring (16) and screw (15).
3. Install transition diverter (12) on diverter (9) with four rivets (21).

d. Installation

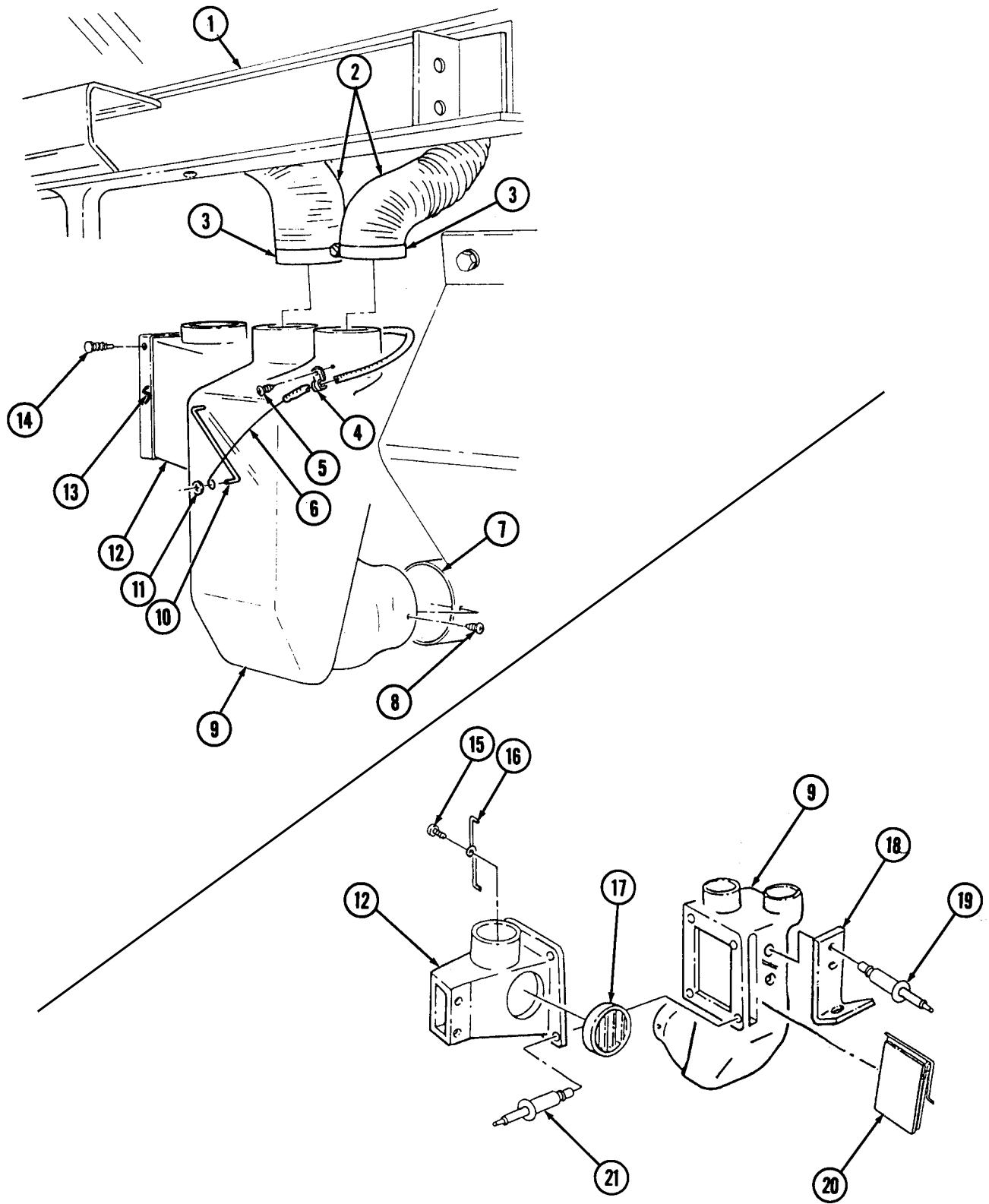
1. Position diverter (9) under "A" beam (1) and connect two defroster flex ducts (2) on diverter (9).
2. Secure flex ducts (2) to diverter (9) with two clamps (3).
3. Connect defroster cable core (6) on baffle pin (10) with plug button (11).
4. Install transition diverter (12) on transition (13) with two screws (14).

NOTE

Control cable must be pushed in, and baffle pin must be in the upward position before securing control cable to diverter box.

5. Install clamp (4) on diverter (9) with screw (5).
6. Install diverter (9) on heater (7) with two screws (8).

12-49. ARCTIC DIVERTER BOX MAINTENANCE (Cont'd)



FOLLOW-ON TASK: Install arctic diverter ducting (para. 12-56).

12-50. ARCTIC DEFROSTER DUCTING REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M997A2, M1025A2, M1035A2,
M1043A2, M1045A2, M1097A2

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Tools

General mechanic's tool kit
automotive (Appendix B, Item 1)

Equipment Condition

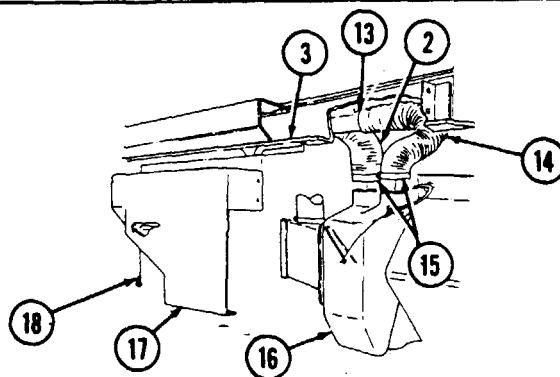
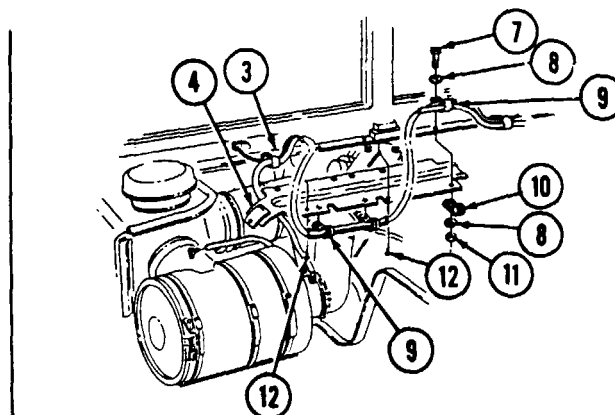
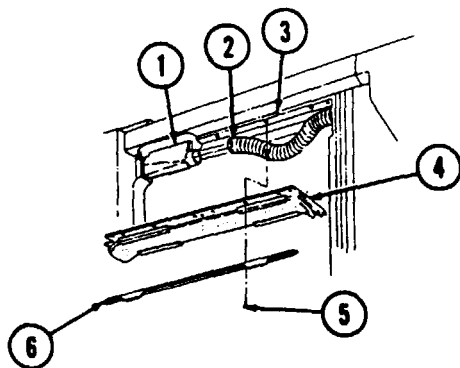
⌚ Hood raised and secured (TM 9-2320-280-10).
⌚ Engine access cover removed (para. 10-15).

Materials/Parts

Adhesive sealant (Appendix C, Item 10)

a. Removal

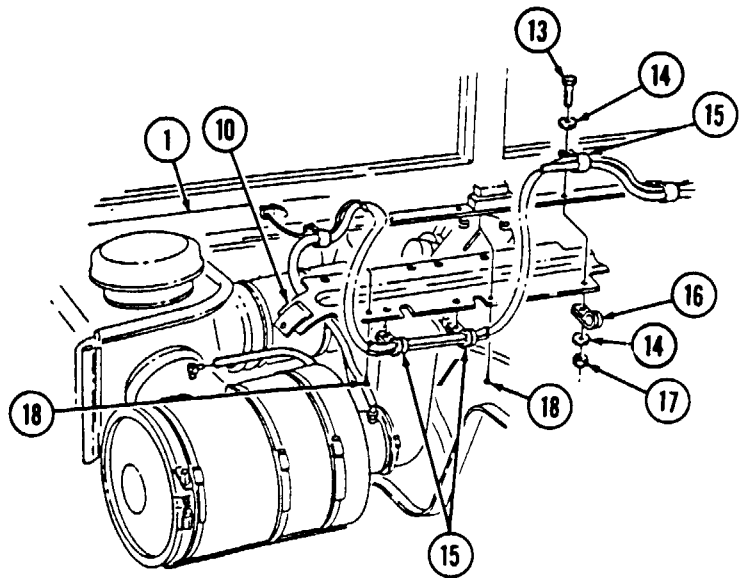
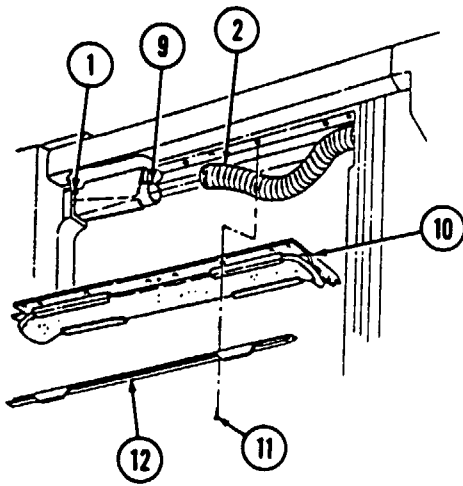
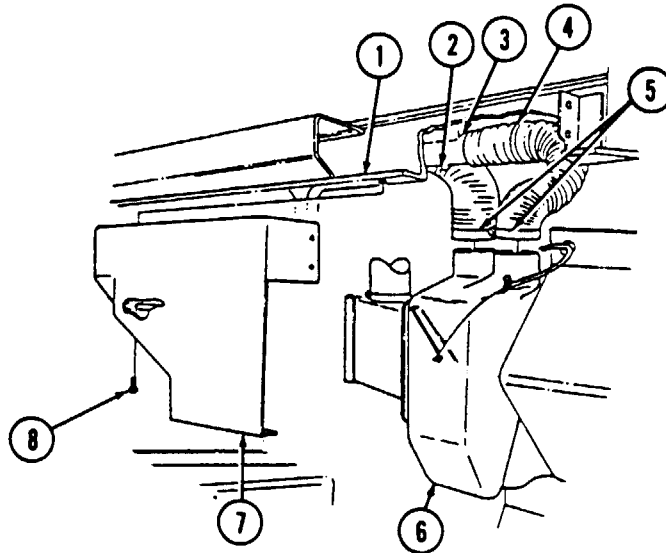
1. Remove six screws (5), retainer (6), and closeout panel (4) from "A" beam (3).
2. Remove three nuts (11), washers (8), capscrews (7), and washers (8) from three clamps (9), cable clamp (10), closeout panel (4), and "A" beam (3).
3. Remove three screws (12) from closeout panel (4) and "A" beam (3).
4. Disconnect left flex duct (2) from left defroster nozzle (1).
5. Remove four screws (18) from panel assembly (17) and "A" beam (3) and pull panel assembly (17) away from "A" beam (3) for access to right defroster nozzle (13).
6. Disconnect right flex duct (14) from right defroster nozzle (13).
7. Loosen two clamps (15) and disconnect left flex duct (2) and right flex duct (14) from diverter housing (16).



12-50. ARCTIC DEFROSTER DUCTING REPLACEMENT (Cont'd)

b. Installation

1. Connect left flex duct (2) and right flex duct (4) to diverter housing (6) with two clamps (5).
2. Apply adhesive sealant and connect right flex duct (4) to right defroster nozzle (3).
3. Install panel assembly (7) on "A" beam (1) with four screws (8).
4. Apply adhesive sealant and connect left flex duct (2) to left defroster nozzle (9).
5. Install retainer (12) and closeout panel (10) on "A" beam (1) with six screws (11).
6. Secure closeout panel (10) to "A" beam (1) with three screws (18).
7. Install three clamps (15), cable clamp (16), and closeout panel (10) on "A" beam (1) with three washers (14), capscrews (13), washers (14), and nuts (17).



FOLLOW-ON TASKS: \checkmark Install engine access cover (para. 10-15).
 \checkmark Lower and secure hood (TM 9-2320-280-10).

12-51. ARCTIC LEFT DEFROSTER NOZZLE REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M997A2, M1025A2, M1035A2,
M1043A2, M1045A2, M1097A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Adhesive sealant (Appendix C, Item 10)
Lockwasher (Appendix G, Item 133)
Locknut (Appendix G, Item 128)

Manual References

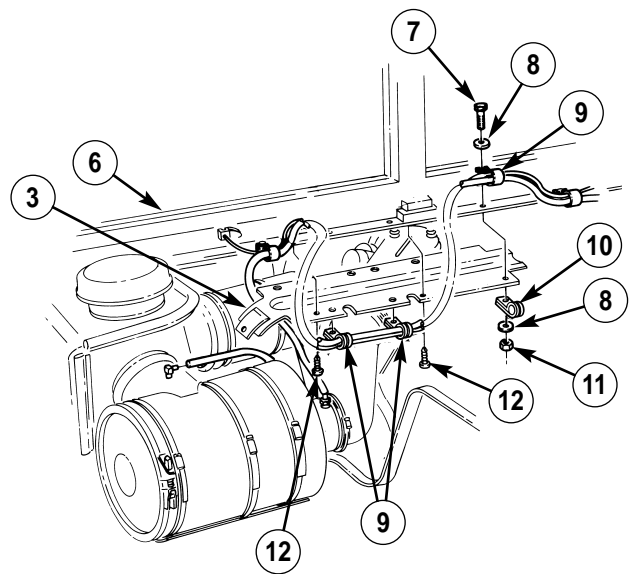
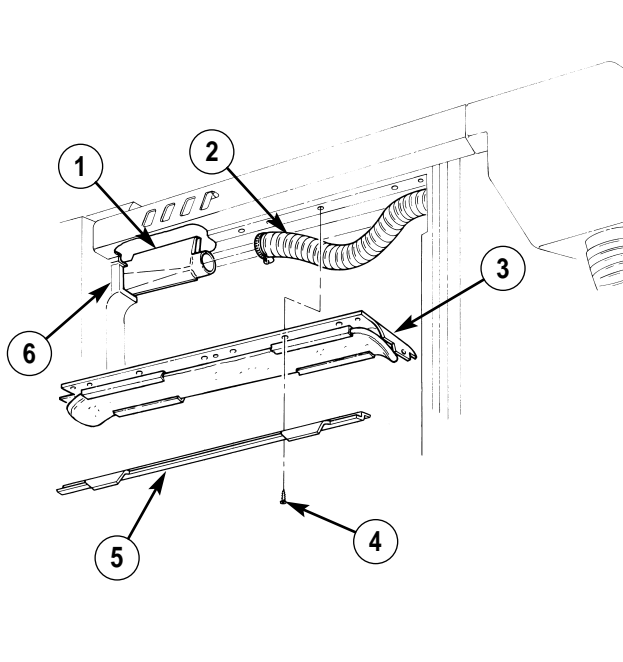
TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

- Hood raised and secured (TM 9-2320-280-10).
- Engine access cover removed (para. 10-15).

a. Removal

1. Remove six screws (4) and retainer (5) from closeout panel (3) and "A" beam (6).
2. Remove three nuts (11), washers (8), capscrews (7), and washers (8) from three clamps (9), cable clamp (10), closeout panel (3) and "A" beam (6).
3. Remove three screws (12) and closeout panel (3) from "A" beam (6).
4. Disconnect defroster duct (2) from defroster nozzle (1).



12-51. ARCTIC LEFT DEFROSTER NOZZLE REPLACEMENT (Cont'd)

5. Remove locknut (9), lockwasher (10), washer (11), and pin (14) from steering column (15) and bracket (13), and lower steering column (15). Discard locknut (9) and lockwasher (10).
6. Remove retaining pin (12) from defroster nozzle (2) and bracket (13).

NOTE

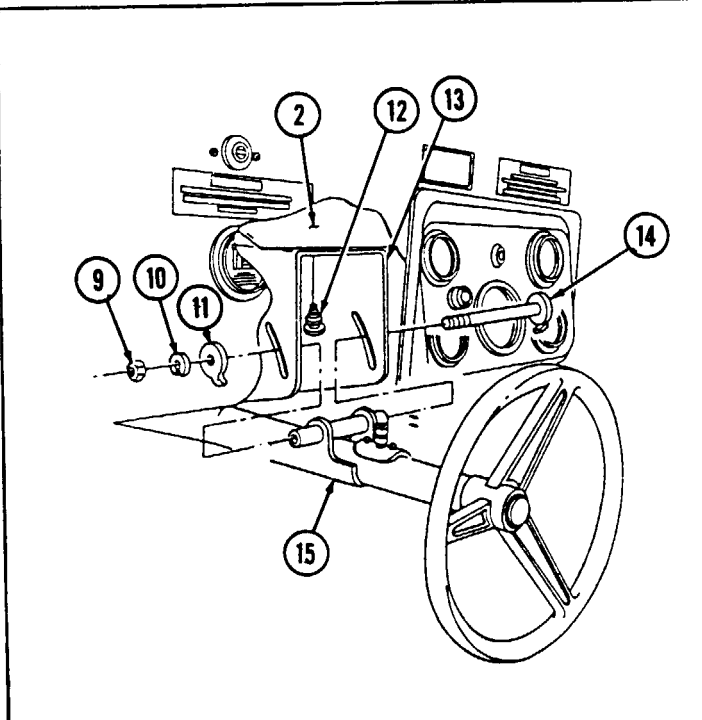
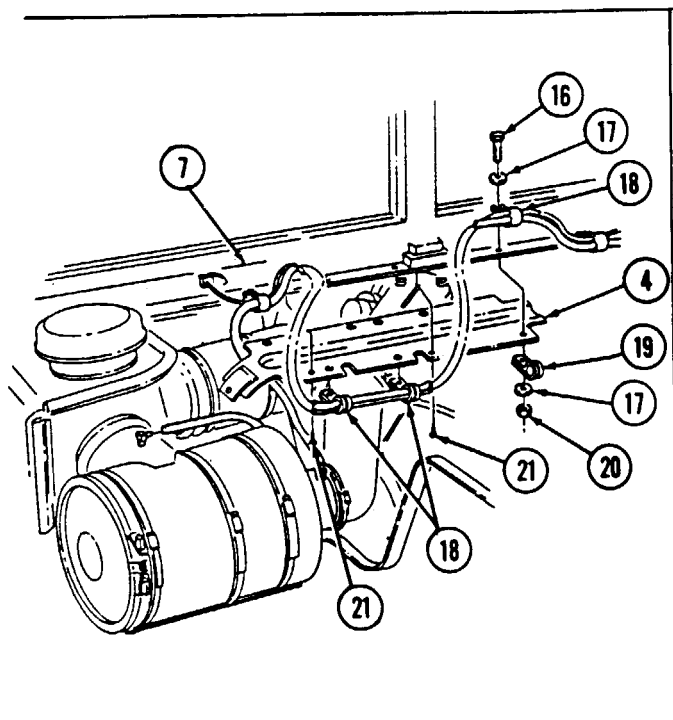
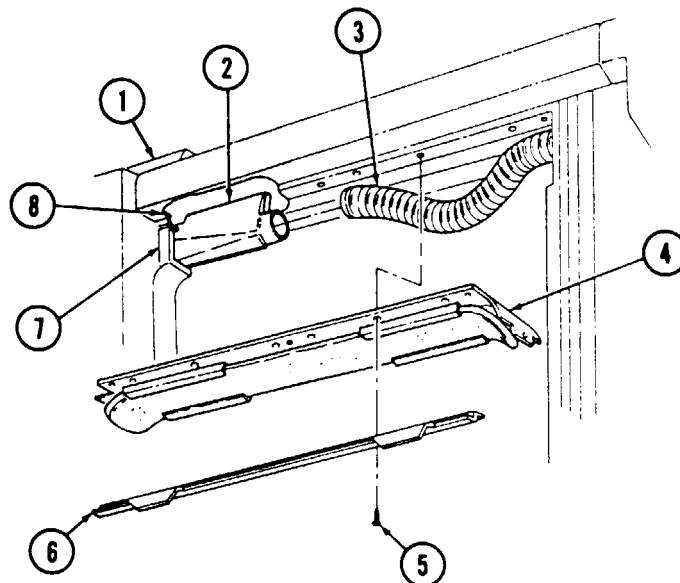
Note position of defroster nozzle for installation.

7. Turn defroster nozzle (2) counterclockwise and remove from "A" beam (7).

b. Installation

1. Install defroster nozzle (2) on "A" beam (7).
2. Turn defroster nozzle (2) clockwise until defroster nozzle outlets (8) align with windshield frame louvers (1).
3. Install defroster nozzle (2) on steering column bracket (13) with retaining pin (12).
4. Place steering column (15) in desired position, and install on bracket (13) with pin (14), washer (11), lockwasher (10), and locknut (9). Tighten locknut (9) to 31 lb-ft (42 N·m).
5. Apply adhesive sealant and connect defroster duct (3) to defroster nozzle (2).
6. Install retainer (6) and closeout panel (4) on "A" beam (7) with six screws (5).
7. Secure closeout panel (4) to "A" beam (7) with three screws (22).
8. Install closeout panel (4), three clamps (18), and cable clamp (19) on "A" beam (7) with three washers (17), capscrews (16), washers (17), and nuts (20).

12-51. ARCTIC LEFT DEFROSTER NOZZLE REPLACEMENT (Cont'd)



FOLLOW-ON TASKS: Ž Lower and secure hood (TM 9-2320-280-10).
 Ž Install engine access cover (para. 10-15).

12-52. ARCTIC RIGHT DEFROSTER NOZZLE REPLACEMENT

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP:

Applicable Models

M997A2, M1025A2, M1035A2,
M1043A2, M1045A2, M1097A2

Manual References

TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

Defroster ducting removed (para. 12-50).

a. Removal

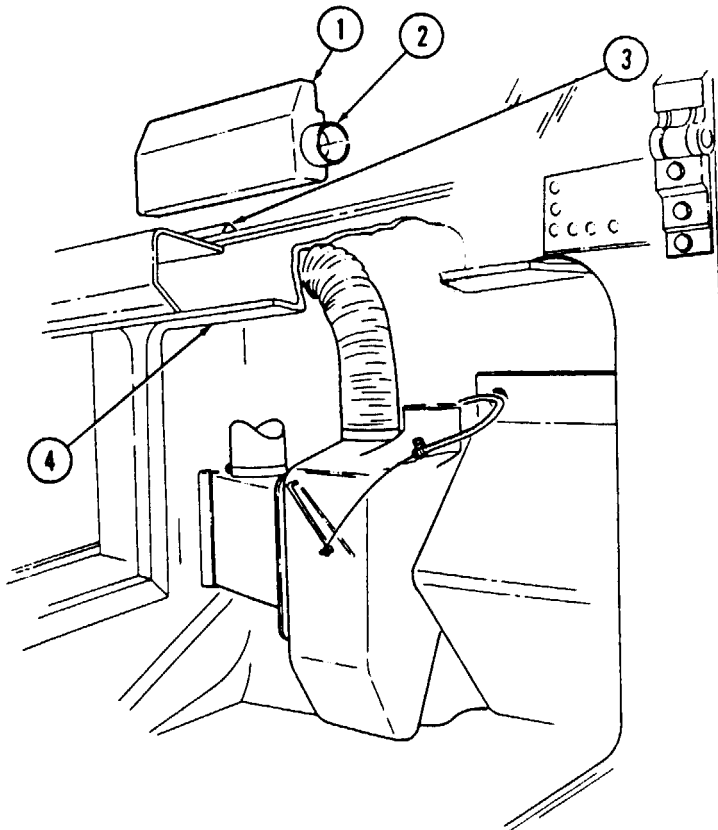
NOTE

Note position of defroster nozzle for installation.

Turn defroster nozzle (2) counterclockwise and remove from "A" beam (4).

b. Installation

Install defroster nozzle (2) on "A" beam (4) and turn defroster nozzle (2) clockwise until defroster nozzle outlets (1) align with windshield frame louvers (3).



FOLLOW-ON TASK: Install defroster ducting (para. 12-50).

12-53. ARCTIC HEATER NOZZLE REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:**Applicable Models**

M997A2, M1025A2, M1035A2,
M1043A2, M1045A2, M1097A2

Manual References

TM 9-2320-280-24P

Tools

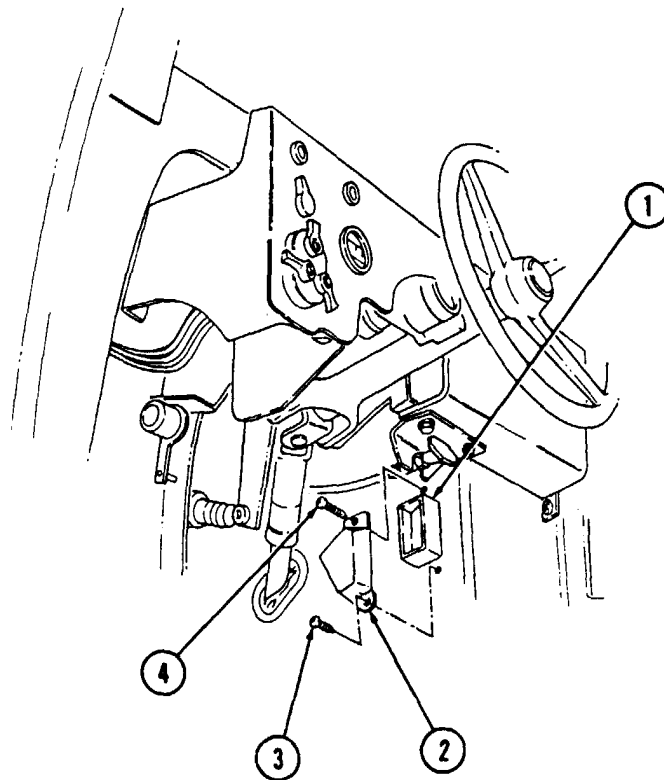
General mechanic's tool kit
automotive (Appendix B, Item 1)

a. Removal

Remove capscrews (3) and (4) and nozzle (2) from left transition (1).

b. Installation

Install nozzle (2) on left transition (1) with capscrews (3) and (4).



12-54. ARCTIC HEATER HOSE REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M997A2, M1025A2, M1035A2,
M1043A2, M1045A2, M1097A2

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

Ž Hood raised and secured (TM 9-2320-280-10).
Ž Engine access cover removed (pars. 10-15).

Materials/Parts

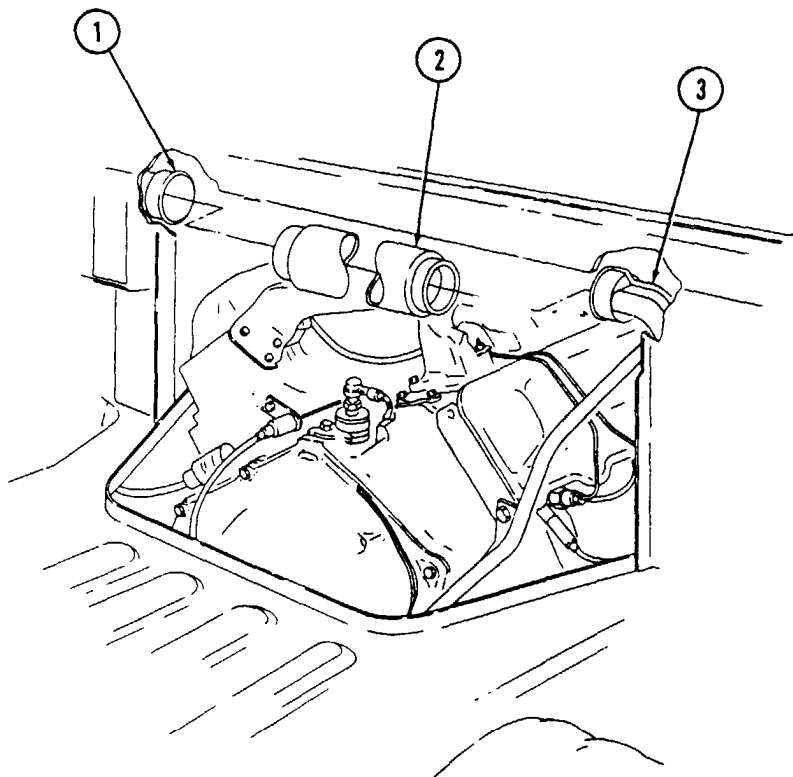
Adhesive sealant (Appendix C, Item 9)

a. Removal

Disconnect heater hose (2) from left transition (1) and right transition (3), and remove heater hose (2).

b. Installation

Apply adhesive sealant and connect heater hose (2) to left transition (1) and right transition (3).



FOLLOW-ON TASKS: Ž Install engine access cover (para. 10-15).
Ž Lower and secure hood (TM 9-2320-280-10).

12-55. ARCTIC DIVERTER BOX COVER REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M997A2, M1025A2, M1035A2,
M1043A2, M1045A2, M1097A2

Manual References

TM 9-2320-280-24P

Tools

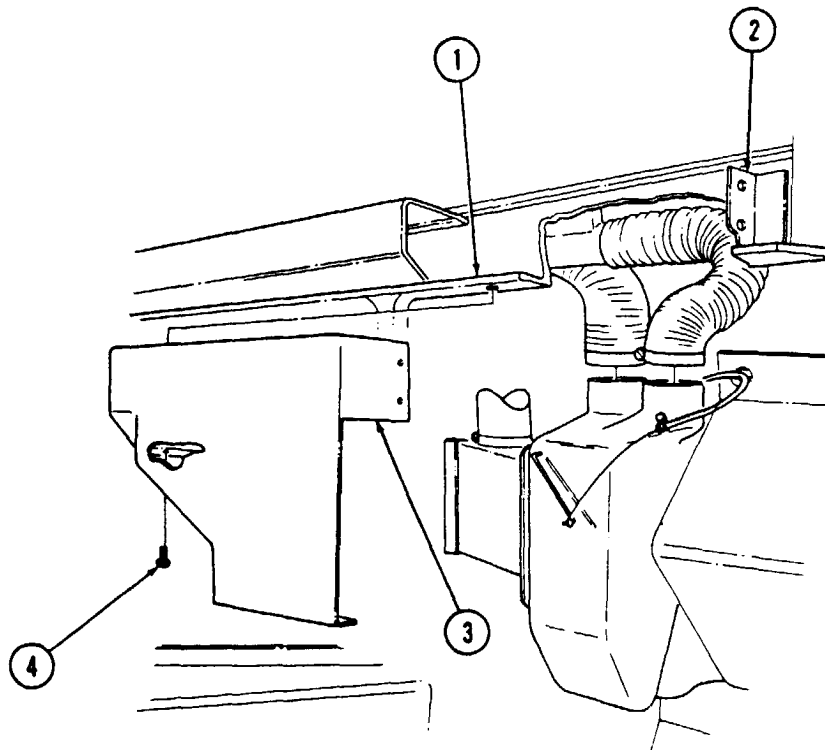
General mechanic's tool kit
automotive (Appendix B, Item 1)

a. Removal

Remove three capscrews (4) and diverter box cover (3) from right mounting bracket (2) and "A" beam (1).

b. Installation

Install diverter box cover (3) on right mounting bracket (2) and "A" beam (1) with three capscrews (4).



12-56. ARCTIC DIVERTER DUCTING REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M997A2, M1025A2, M1035A2,
M1043A2, M1045A2, M1097A2

Manual References

TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual Reference

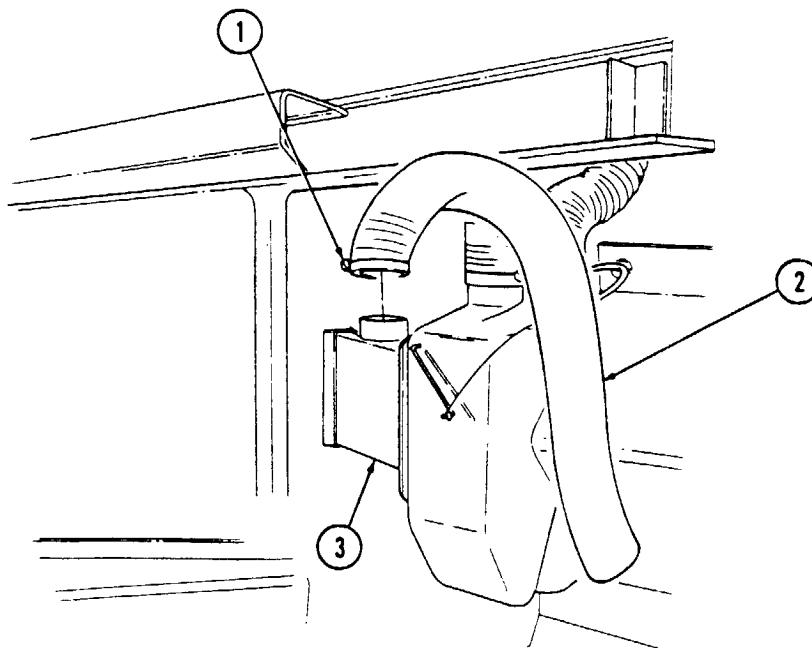
Diverter box cover removed (para. 12-55).

a. Removal

Loosen clamp (1) and remove diverter ducting (2) from diverter transition (3).

b. Installation

Install diverter ducting (2) to diverter transition (3) and tighten clamp (1).



FOLLOW-ON TASK: Install diverter box cover (para. 12-55).

12-57. SWINGFIRE HEATER WATER JACKET REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M966, M966A1, M996, M996A1, M997,
M997A1, M997A2, M998, M998A1, M1025,
M1025A1, M1025A2, M1037, M1038, M1038A1

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

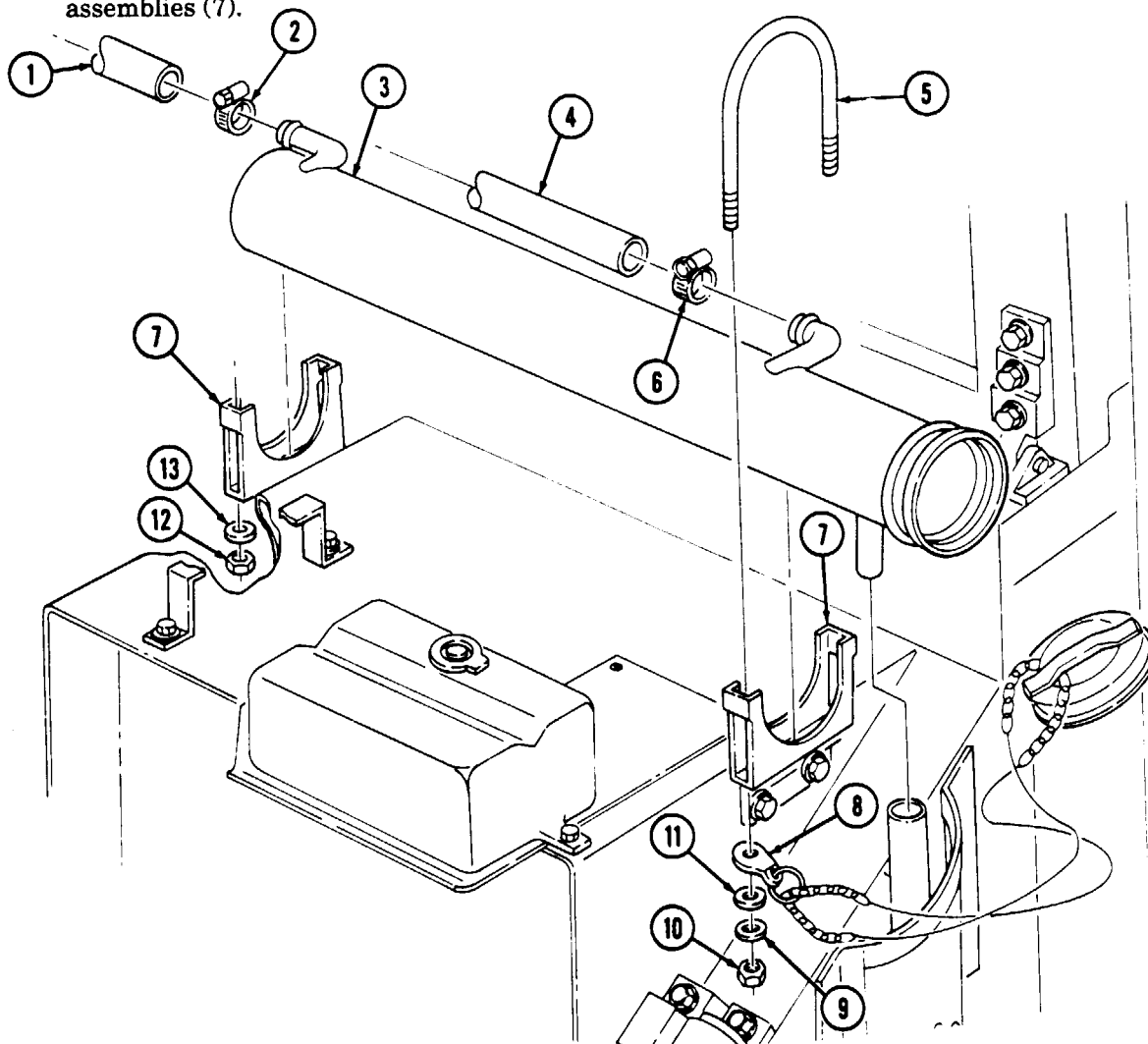
TM 9-2320-280-24P

Equipment Condition

⌞ Battery ground cable disconnected (para. 4-73).
⌞ Cooling system drained as required (para. 3-60).

a. Removal

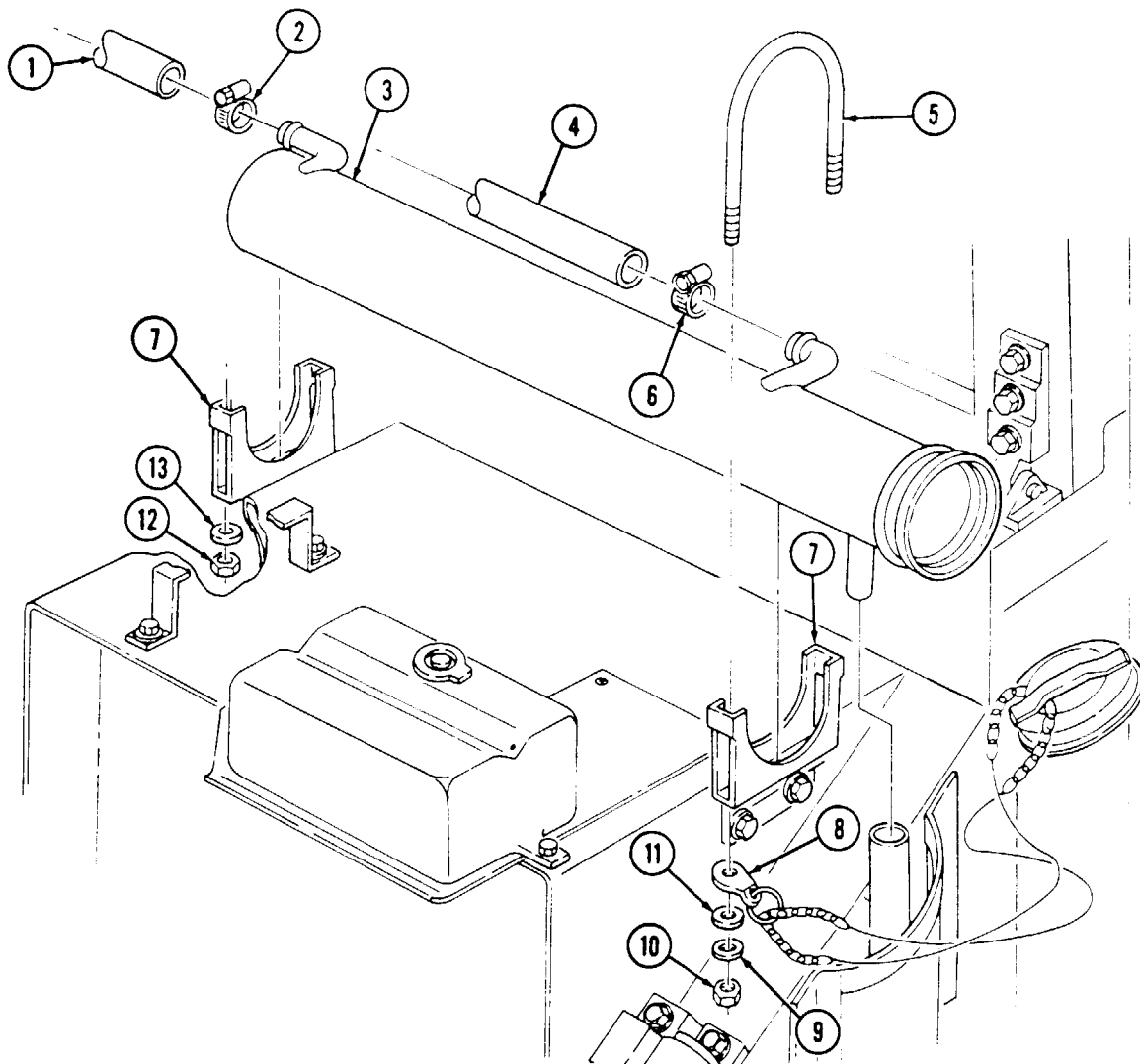
1. Remove clamp (2) and inlet hose (1) from water jacket (3).
2. Remove clamp (6) and outlet hose (4) from water jacket (3).
3. Remove nut (10), washer (9), washer (11) and chain retainer (8) from U-clamp assembly (7).
4. Remove three nuts (12), washers (13), two U-bolts (5), and water jacket (3) from two U-clamp assemblies (7).



12-57. SWINGFIRE HEATER WATER JACKET REPLACEMENT (Cont'd)

b. Installation

1. Install water jacket (3) on two U-clamp assemblies (7) with two U-bolts (5), three washers (13), and nuts (12).
2. Install chain retainer (8) on U-clamp assembly (7) with washer (11), washer (9), and nut (10).
3. Install outlet hose (4) on water jacket (3) with clamp (6).
4. Install inlet hose (1) on water jacket (3) with clamp (2).



FOLLOW-ON TASKS: Ž Fill cooling system (para. 3-60).
 Ž Connect battery ground cable (para. 4-73).

12-58. SWINGFIRE HEATER U-CLAMPS REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M966, M966A1, M996, M996A1, M997, M997A1, M997A2, M998, M998A1, M1025, M1025A1, M1025A2, M1037, M1038, M1038A1

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Four lockwashers (Appendix G, Item 133)

Personnel Required

One mechanic
One assistant

Manual References

TM 9-2320-280-24P

Equipment Condition

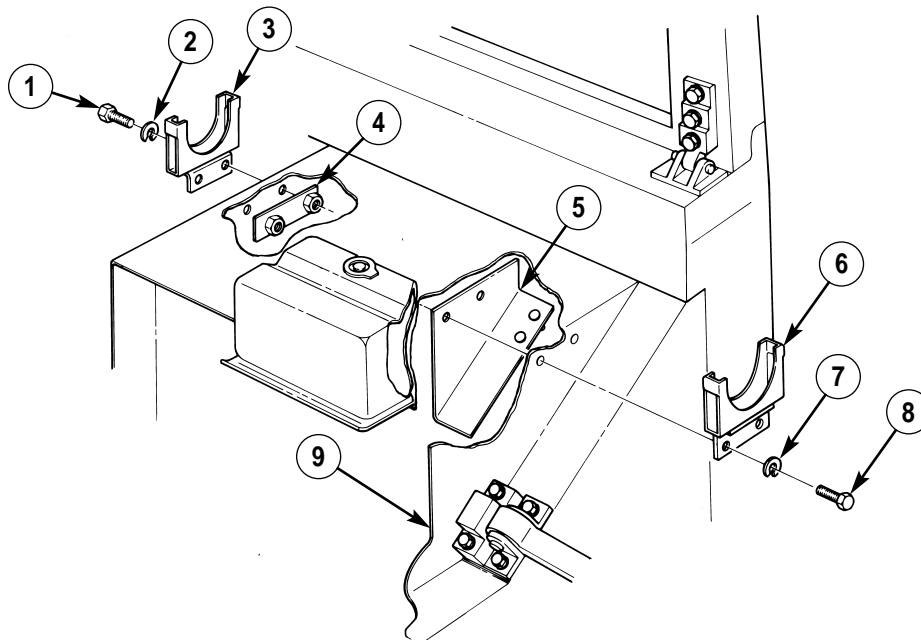
- Water jacket removed (para. 12-57).
- Wiring harness and relay disconnected (para. 12-67).

a. Removal

1. Remove two capscrews (8), lockwashers (7), bracket (5), and U-clamp assembly (6) from cowl (9). Discard lockwashers (7).
2. Remove two capscrews (1), lockwashers (2), plate (4), and U-clamp assembly (3) from cowl (9). Discard lockwashers (2).

b. Installation

1. Install U-clamp assembly (3) and plate (4) on cowl (9) with two lockwashers (2) and capscrews (1).
2. Install U-clamp assembly (6) and bracket (5) on cowl (9) with two lockwashers (7) and capscrews (8).



FOLLOW-ON TASKS: • Connect wiring harness and relay (para. 12-67).
• Install water jacket (para. 12-57).

12-59. SWINGFIRE HEATER BRUSHGUARD AND SHIELD ASSEMBLY REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M966, M966A1, M996, M996A1, M997,
M997A1, M997A2, M998, M998A1, M1025,
M1025A1, M1025A2, M1037, M1038, M1038A1

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-24P

Personnel Required

One mechanic
One assistant

General Safety Instructions

Do not touch hot exhaust system components
with bare hands.

WARNING

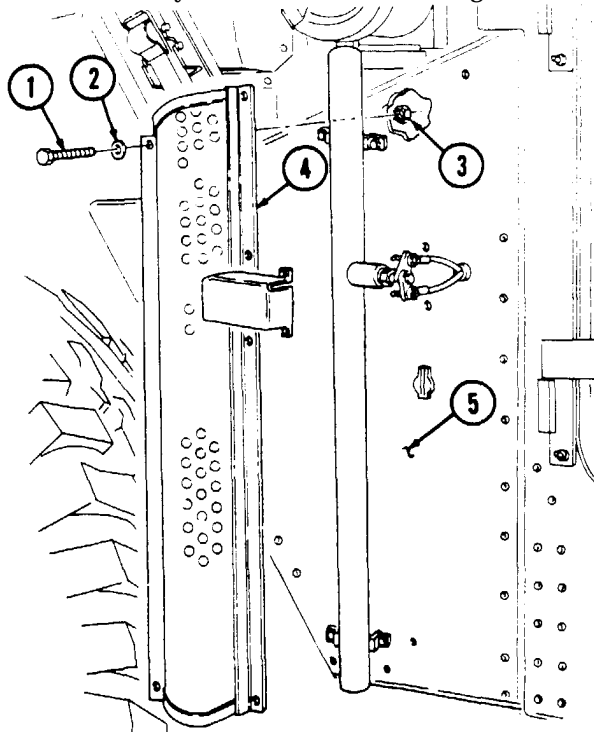
Do not touch hot exhaust system components with bare hands.
Severe injury will result.

a. Removal

Remove eight nuts (3), capscrews (1), washers (2), and brushguard and shield assembly (4) from cowl (5).

b. Installation

Install brushguard and shield assembly (4) on cowl (5) with eight washers (2), capscrews (1), and nuts (3).



12-60. SWINGFIRE HEATER EXHAUST PIPE ASSEMBLY REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M966, M966A1, M996, M996A1, M997,
M997A1, M997A2, M998, M998A1, M1025,
M1025A1, M1025A2, M1037, M1038, M1038A1

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-24P

Equipment Condition

- ⌘ Brushguard and shield assembly removed (para. 12-59).
- ⌘ Battery ground cable disconnected (para. 4-73).

General Safety Instructions

Do not touch hot exhaust system components with bare hands.

WARNING

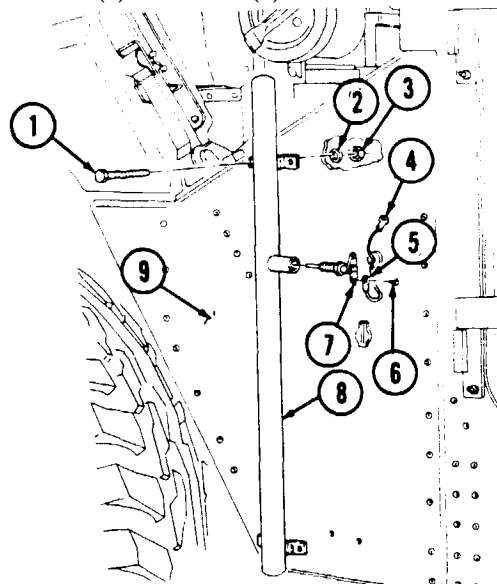
Do not touch hot exhaust system components with bare hands.
Severe injury will result.

a. Removal

1. Remove two screws (6) and harness leads 81B (5) and 81E (4) from thermal switch (7).
2. Remove four nuts (3), washers (2), capscrews (1), and exhaust pipe (8) from cowl (9).
3. Remove thermal switch (7) from exhaust pipe (8).

b. Installation

1. Install thermal switch (7) on exhaust pipe (8).
2. Install exhaust pipe (8) on cowl (9) with four capscrews (1), washers (2), and nuts (3).
3. Connect harness leads 81E (4) and 81B (5) to thermal switch (7) with two screws (6).



FOLLOW-ON TASKS: ⌘ Install brushguard and shield assembly (para. 12-59).
⌘ Connect battery ground cable (para. 4-73).

12-61. SWINGFIRE HEATER WINDSHIELD WASHER RESERVOIR PLATE REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M966, M966A1, M996, M996A1, M997, M997A1, M997A2, M998, M998A1, M1025, M1025A1, M1025A2, M1037, M1038, M1038A1

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Two blind rivets (Appendix G, Item 257)

Manual References

TM 9-2320-280-24P

Equipment Condition

- Protective control box removed (para. 4-5).
- Windshield washer reservoir removed (para. 10-75).

NOTE

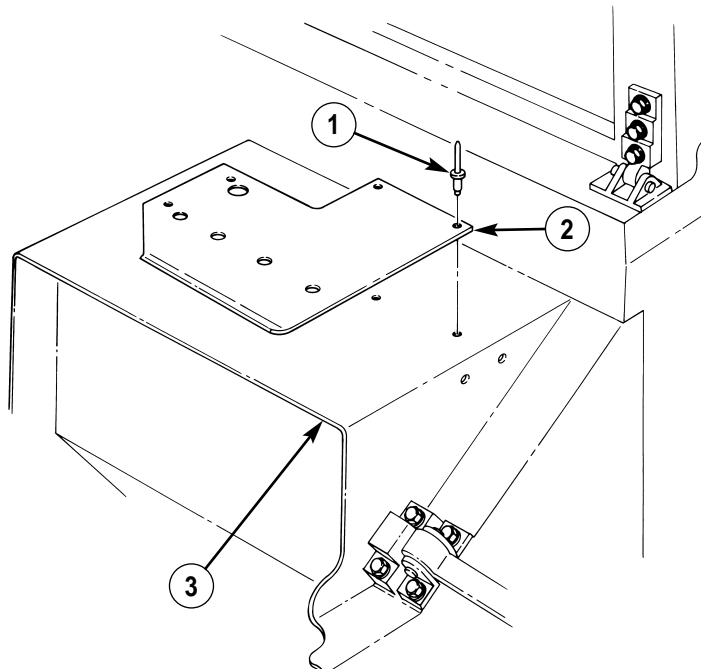
For instructions on replacement of rivets, refer to para. 10-66.

a. Removal

Remove two rivets (1) and plate (2) from cowl (3).

b. Installation

Install plate (2) on cowl (3) with two rivets (1).



- FOLLOW-ON TASKS:**
- Install windshield washer reservoir (para. 10-75).
 - Install protective control box (para. 4-5).

12-62. SWINGFIRE HEATER HOOD GUARD REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M966, M966A1, M996, M996A1, M997,
M997A1, M997A2, M998, M998A1, M1025,
M1025A1, M1025A2, M1037, M1038, M1038A1

Materials/Parts

Eleven blind rivets (Appendix G, Item 258)

Manual References

TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

NOTE

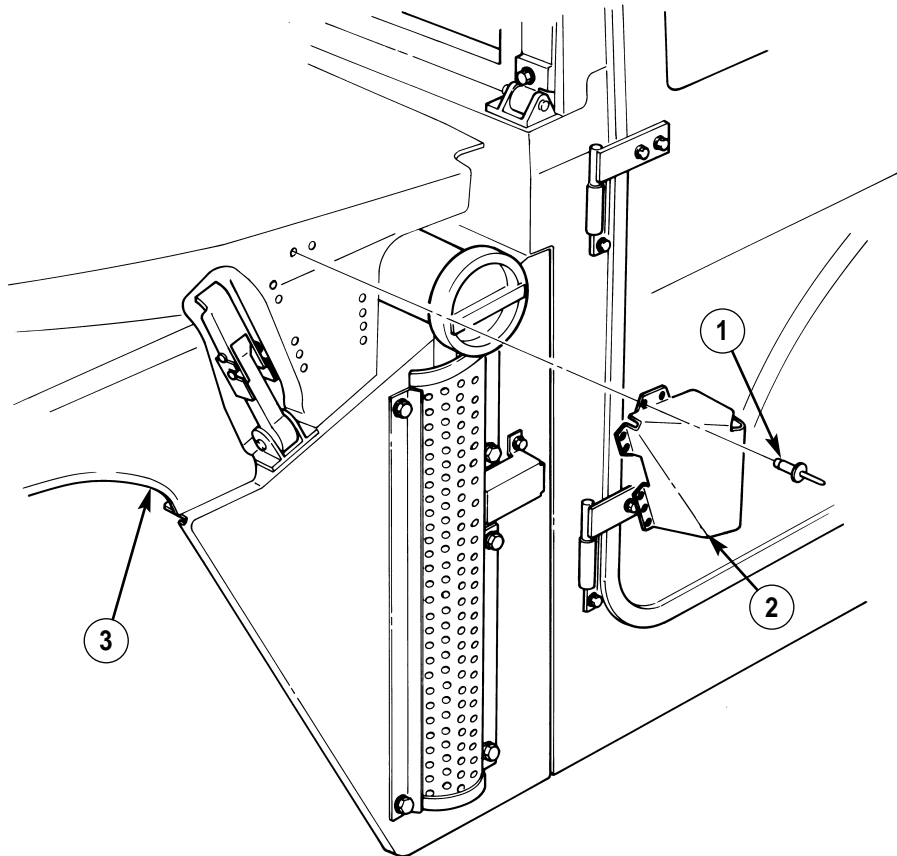
For instructions on replacement of rivets, refer to para. 10-66.

a. Removal

Remove eleven rivets (1) and guard (2) from hood (3).

b. Installation

Install guard (2) on hood (3) with eleven rivets (1).



12-63. SWINGFIRE HEATER RADIATOR LOWER TUBE ASSEMBLY REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M966, M966A1, M996, M996A1, M997, M997A1, M997A2, M998, M998A1, M1025, M1025A1, M1025A2, M1037, M1038, M1038A1

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Two locknuts (Appendix G, Item 70)

Manual References

TM 9-2320-280-24P

Equipment Condition

Cooling system drained (para. 3-60).

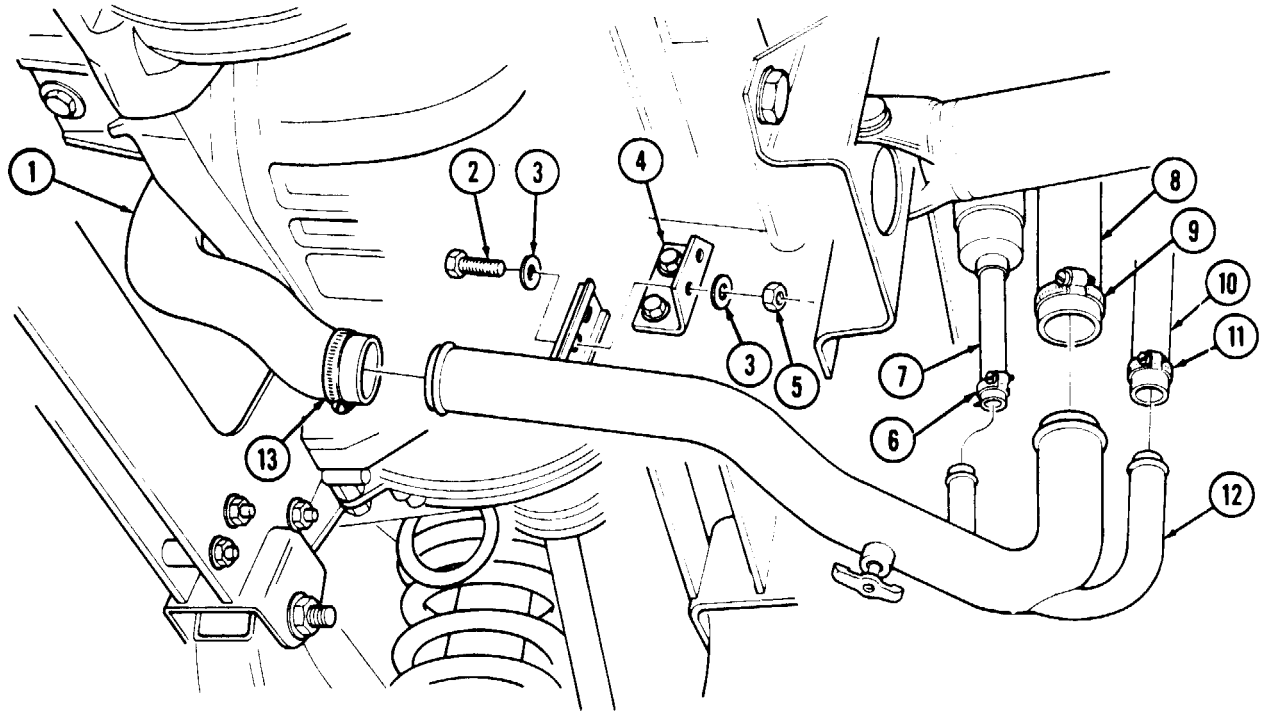
a. Removal

1. Remove two locknuts (5), washers (3), capscrews (2), and washers (3) from radiator lower tube assembly (12) and frame bracket (4). Discard locknuts (5).
2. Loosen clamp (9) and disconnect water pump inlet hose (8) from radiator lower tube assembly (12).
3. Loosen clamp (6) and disconnect swingfire heater pump hose (7) from radiator lower tube assembly (12).
4. Loosen clamp (11) and disconnect surge tank hose (10) from radiator lower tube assembly (12).
5. Loosen clamp (13) and disconnect lower radiator hose (1) from radiator lower tube assembly (12).
6. Remove radiator lower tube assembly (12).
7. Remove clamps (9), (6), (11), and (13) from water pump inlet hose (8), swingfire heater pump hose (7), surge tank hose (10), and lower radiator hose (1).

b. Installation

1. Install clamps (9), (6), (11), and (13) on water pump inlet hose (8), swingfire heater pump hose (7), surge tank hose (10), and lower radiator hose (1).
2. Connect lower radiator hose (1) to radiator lower tube assembly (12) with clamp (13).
3. Connect surge tank hose (10) to radiator lower tube assembly (12) with clamp (11).
4. Connect swingfire heater pump hose (7) to radiator lower tube assembly (12) with clamp (6).
5. Connect water pump inlet hose (8) to radiator lower tube assembly (12) with clamp (9).
6. Connect radiator lower tube assembly (12) to bracket (4) with two washers (3), capscrews (2), washers (3), and locknuts (5).

12-63. SWINGFIRE HEATER RADIATOR LOWER TUBE ASSEMBLY REPLACEMENT (Cont'd)



FOLLOW-ON TASKS: Fill cooling system (para. 3-60).

12-64. SWINGFIRE HEATER INLET HOSE AND TEE REPLACEMENT

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP:

Applicable Models

M966, M966A1, M996, M996A1, M997, M997A1, M997A2, M998, M998A1, M1025, M1025A1, M1025A2, M1037, M1038, M1038A1

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-24P

Equipment Condition

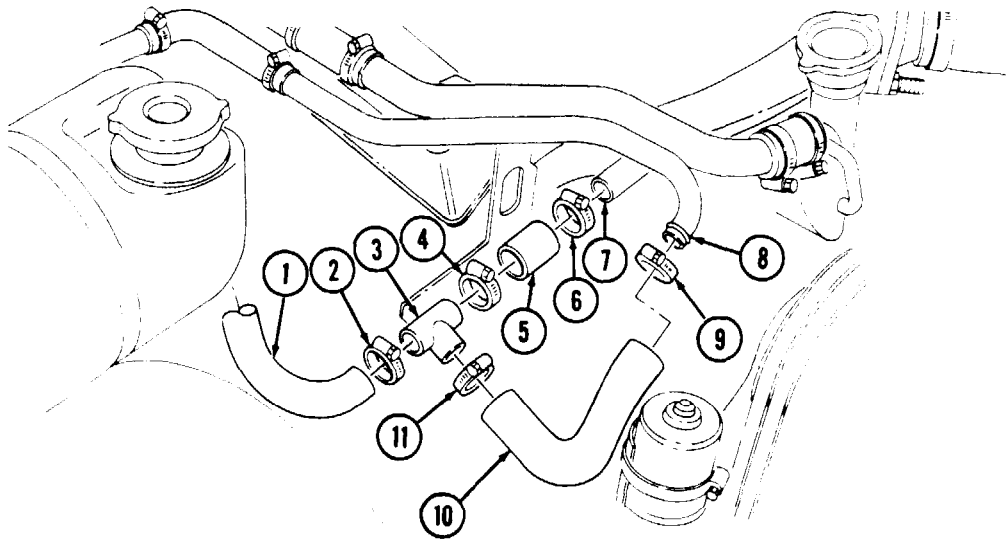
- ⌘ Battery ground cable disconnected (para. 4-73).
- ⌘ Air horn removed (para. 3-14).
- ⌘ Cooling system drained as required (para. 3-60).

a. Removal

1. Loosen clamp (2) and disconnect heater inlet hose (1) from tee (3).
2. Loosen clamps (11) and (4) and remove tee (3) from connector hose (10) and hose (5).
3. Loosen clamp (9) and disconnect connector hose (10) from CDR valve tube (8).
4. Loosen clamp (6) and disconnect hose (5) from water crossover nipple (7).
5. Remove clamps (9), (11), (4), (2), and (6) from connector hose (10), hose (5), and inlet hose (1).

b. Installation

1. Install clamps (9), (11), (4), (2), and (6) on connector hose (10), hose (5), and inlet hose (1).
2. Install connector hose (10) on CDR valve tube (8) with clamp (9).
3. Install hose (5) on water crossover nipple (7) with clamp (6).
4. Install tee (3) on connector hose (10) and hose (5) with clamps (4) and (11).
5. Install heater inlet hose (1) on tee (3) with clamp (2).



- FOLLOW-ON TASKS:**
- ⌘ Install air horn (para. 3-14).
 - ⌘ Fill cooling system (para. 3-60).
 - ⌘ Connect battery ground cable (para. 4-73).

12-65. SWINGFIRE HEATER PUMP ASSEMBLY, BRACKET, AND LOWER HOSE REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M966, M966A1, M996, M996A1, M997, M997A1, M997A2, M998, M998A1, M1025, M1025A1, M1025A2, M1037, M1038, M1038A1

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Two lockwashers (Appendix G, Item 191)

Manual References

TM 9-2320-280-24P

Equipment Condition

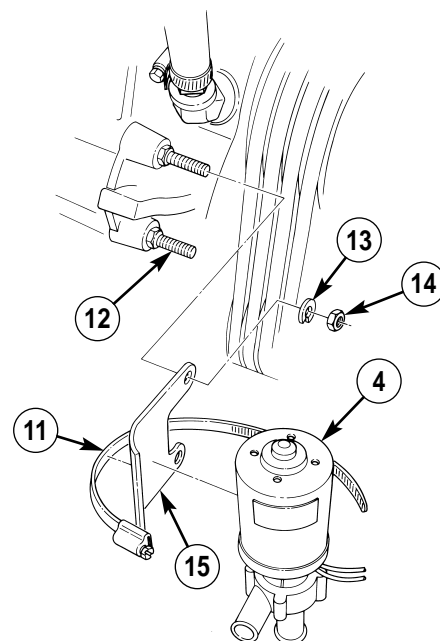
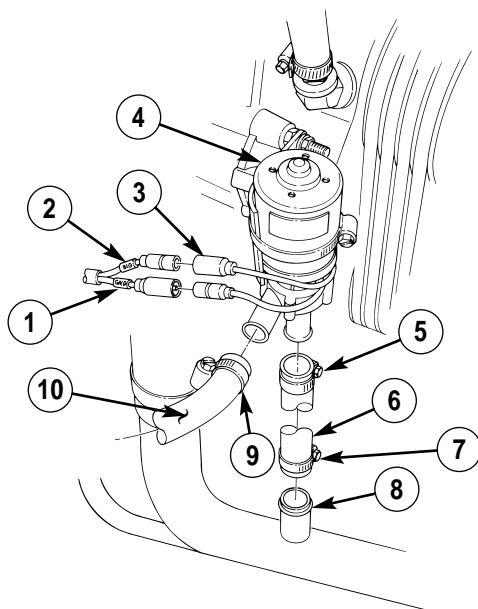
- Battery ground cable disconnected (para. 4-73).
- Cooling system drained as required (para. 3-60).

NOTE

Prior to removal, tag leads for installation.

a. Removal

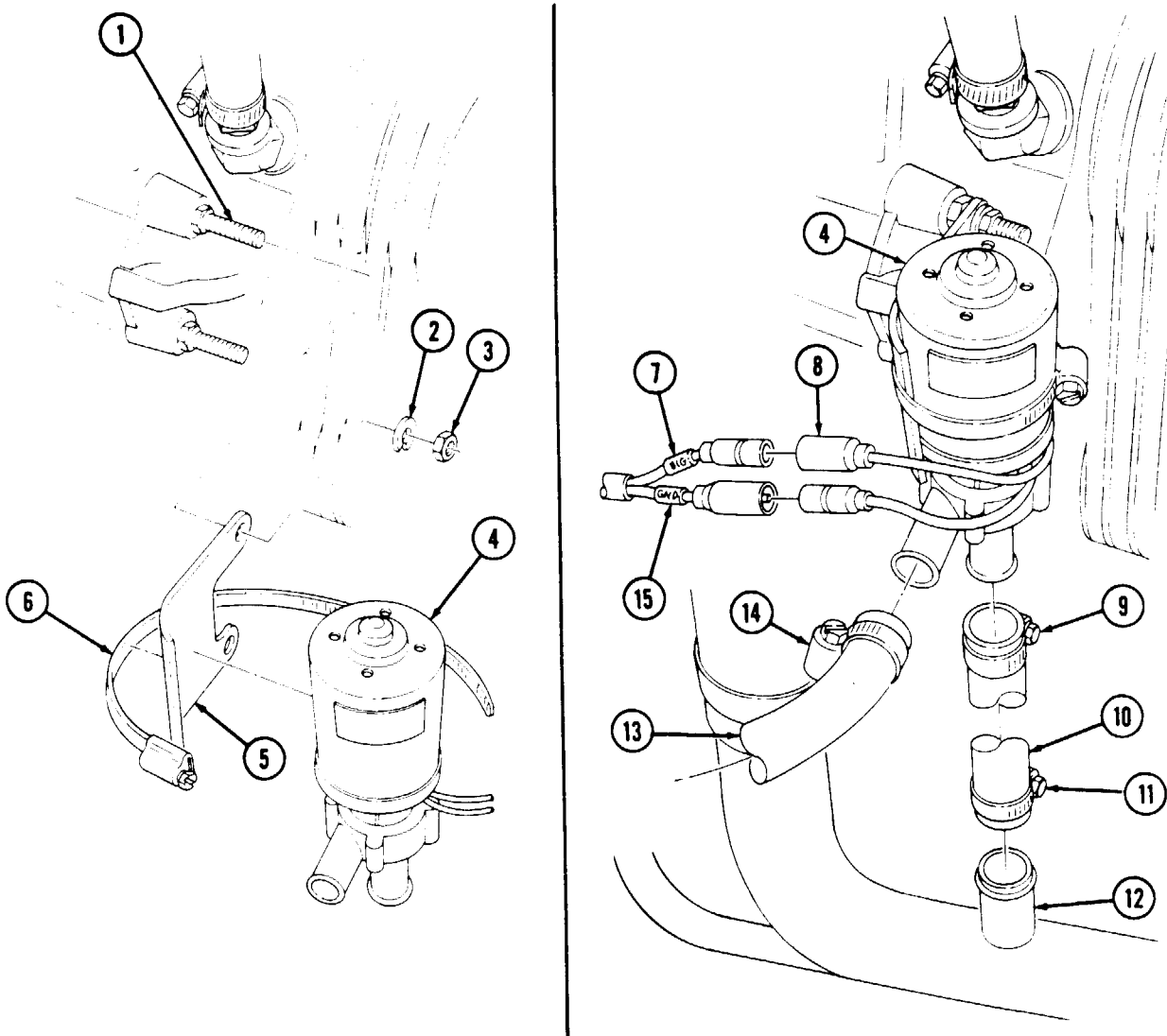
1. Disconnect lead 81G (2) and ground wire lead (1) from heater pump leads (3).
2. Loosen clamp (9) and disconnect outlet hose (10) from heater pump (4).
3. Loosen clamps (5) and (7) and disconnect inlet hose (6) from heater pump (4) and radiator lower tube assembly (8).
4. Remove clamps (5) and (7) from inlet hose (6).
5. Remove clamp (11) and heater pump (4) from bracket (15).
6. Remove two nuts (14), lockwashers (13), and bracket (15) from water pump studs (12). Discard lockwashers (13).



12-65. SWINGFIRE HEATER PUMP ASSEMBLY, BRACKET, AND LOWER HOSE REPLACEMENT (Cont'd)

b. Installation

1. Install bracket (5) on water pump studs (1) with two lockwashers (2) and nuts (3).
2. Install heater pump (4) on bracket (5) with clamp (6).
3. Install clamps (9) and (11) on inlet hose (10).
4. Install inlet hose (10) on radiator lower tube assembly (12) and heater pump (4) with clamps (9) and (11).
5. Install clamp (14) on outlet hose (13). Connect outlet hose (13) to heater pump (4) with clamp (14).
6. Connect ground wire lead (15) and lead 81G (7) to heater pump leads (8).



FOLLOW-ON TASKS: \checkmark Fill cooling system (para. 3-60).
 \checkmark Connect battery ground cable (para. 4-73).

12-66. SWINGFIRE HEATER WATER JACKET TO PUMP AND TEE HOSES REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M966, M966A1, M996, M996A1, M997, M997A1, M997A2, M998, M998A1, M1025, M1025A1, M1025A2, M1037, M1038, M1038A1

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Three tiedown straps (Appendix G, Item 312)

Manual References

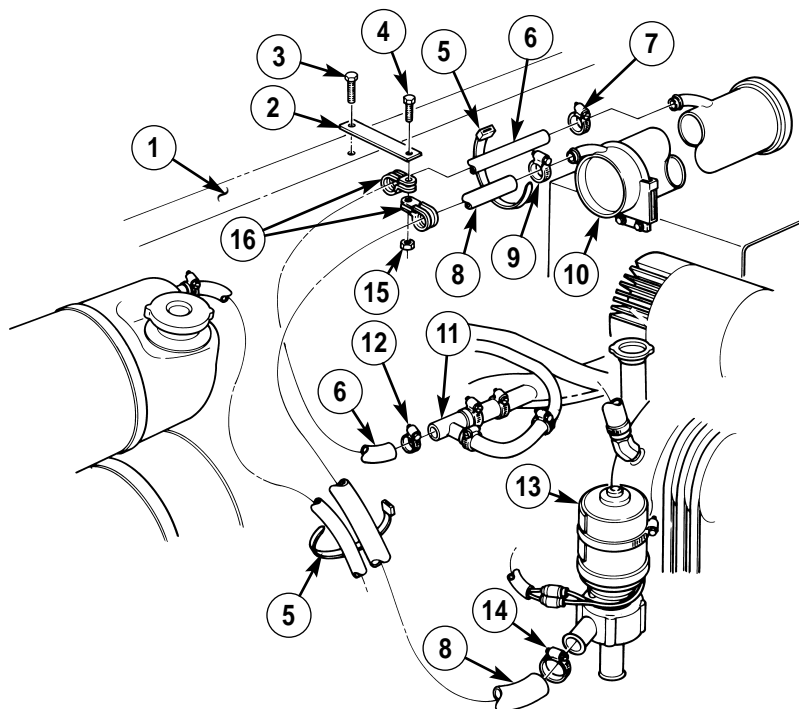
TM 9-2320-280-24P

Equipment Condition

- Cooling system drained as required (para. 3-60).
- Air horn removed (para. 3-14).

a. Removal

1. Remove three tiedown straps (5) from inlet hose (8) and outlet hose (6). Discard tiedown straps (5).
2. Remove nut (15) and screw (4) from two clamps (16), inlet hose (8), outlet hose (6) and support (2).
3. Remove screw (3) and support (2) from "A" beam (1).
4. Remove clamp (7) and outlet hose (6) from water jacket (10).
5. Remove clamp (9) and inlet hose (8) from water jacket (10).
6. Remove clamp (12) and outlet hose (6) from tee (11).
7. Remove clamp (14) and inlet hose (8) from heater pump (13).
8. Remove clamps (9), (12), (7), (14), and (16) from inlet and outlet hoses (6) and (8).



12-66. SWINGFIRE HEATER WATER JACKET TO PUMP AND TEE HOSES REPLACEMENT (Cont'd)

b. Installation

1. Install clamps (16), (14), (7), (12), and (9) on inlet and outlet hoses (6) and (8).
2. Install outlet hose (8) on heater pump (13) with clamp (14).
3. Install inlet hose (6) on tee (11) with clamp (12).
4. Connect inlet hose (6) to water jacket (10) with clamp (7).
5. Connect outlet hose (8) to water jacket (10) with clamp (9).
6. Install support (2) on "A" beam (1) with screw (3).
7. Connect inlet and outlet hoses (6) and (8) with clamps (16) on support (2) with screw (4) and nut (15).
8. Install three tiedown straps (5) on inlet and outlet hoses (6) and (8).



FOLLOW-ON TASKS: \checkmark Fill cooling system (para. 3-60).
 \checkmark Install air horn (para. 3-14).

12-67. SWINGFIRE RELAY AND HARNESS ASSEMBLY REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M966, M966A1, M996, M996A1, M997, M997A1, M997A2, M998, M998A1, M1025, M1025A1, M1025A2, M1037, M1038, M1038A1

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Lockwasher (Appendix G, Item 161)

Manual References

TM 9-2320-280-24P

Equipment Condition

- Battery ground cable disconnected (para. 4-73).
- Brushguard and shield assembly removed (para. 12-59).

a. Removal

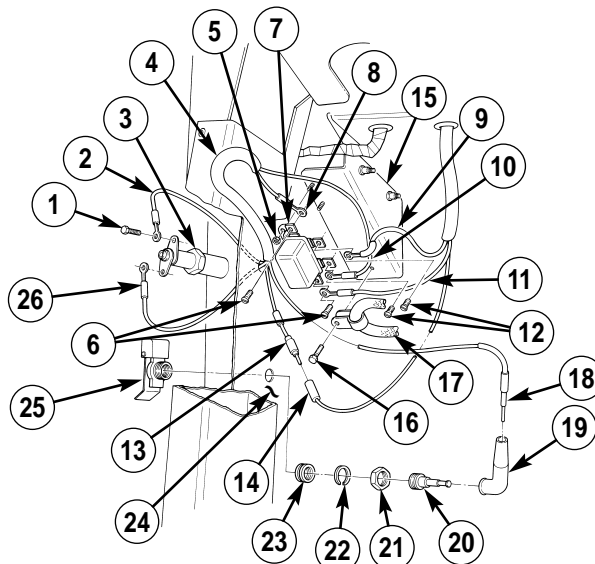
CAUTION

Use care when removing harness. Failure to do so will cause damage to harness.

NOTE

Prior to removal, tag leads for installation.

1. Remove screw (16) and body wiring harness (17) from bracket (15).
2. Remove two screws (6) and leads 81E (8) and 81B (10) from relay (7).
3. Remove two screws (12) and leads 81B (11) and GND (9) from relay (7).
4. Remove two nuts (5) and relay (7) from bracket (15).
5. Remove two screws (1) and leads 81E (26) and 81B (2) from thermal switch (3).
6. Disconnect lead 81B (18) from connector (20).
7. Disconnect lead 81B (13) from lead 81A (14) and remove harness assembly (4).
8. Remove nipple (19) from lead 81B (18).
9. Remove nut (21), lockwasher (22), and connector (20) from cover (25). Discard lockwasher (22).
10. Remove grommet (23) from cowl (24).



12-67. SWINGFIRE RELAY AND HARNESS ASSEMBLY REPLACEMENT (Cont'd)

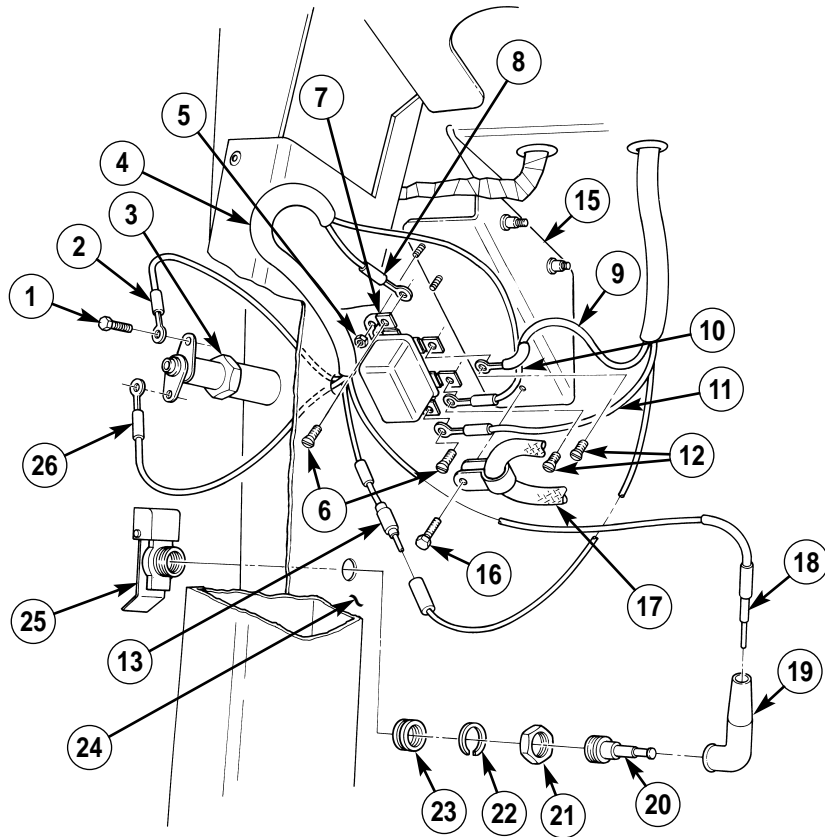
b. Installation

1. Install grommet (23) to cowl (24).
2. Install cover (25) and connector (20) with lockwasher (22) and nut (21).
3. Install nipple (19) on lead 81B (18).

CAUTION

Use care when routing harness. Failure to do so will cause damage to harness.

4. Install harness assembly (4) inside cowl (24) and connect lead 81B (13) to 81A (14).
5. Route leads 81E (26) and 81B (2) through cowl (24).
6. Connect lead 81B (18) to connector (20).
7. Connect leads 81B (2) and 81E (26) to thermal switch (3) with two screws (1).
8. Install relay (7) on bracket (15) with two nuts (5).
9. Connect leads 81G (11) and GND (9) to relay (7) with two screws (12).
10. Connect leads 81B (10) and 81E (8) to relay (7) with two screws (6).
11. Connect body wiring harness (17) to bracket (15) with screw (16).



- FOLLOW-ON TASKS:
- Install brushguard and shield assembly (para. 12-59).
 - Connect battery ground cable (para. 4-73).

12-68. SWINGFIRE HEATER HARNESS ASSEMBLY REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M966, M966A1, M996, M996A1, M997, M997A1, M997A2, M998, M998A1, M1025, M1025A1, M1025A2, M1037, M1038, M1038A1

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Four tiedown straps (Appendix G, Item 312)

Manual References

TM 9-2320-280-24P

Equipment Condition

- Battery ground cable disconnected (para. 4-73).
- Air horn removed (para. 3-14).

a. Removal

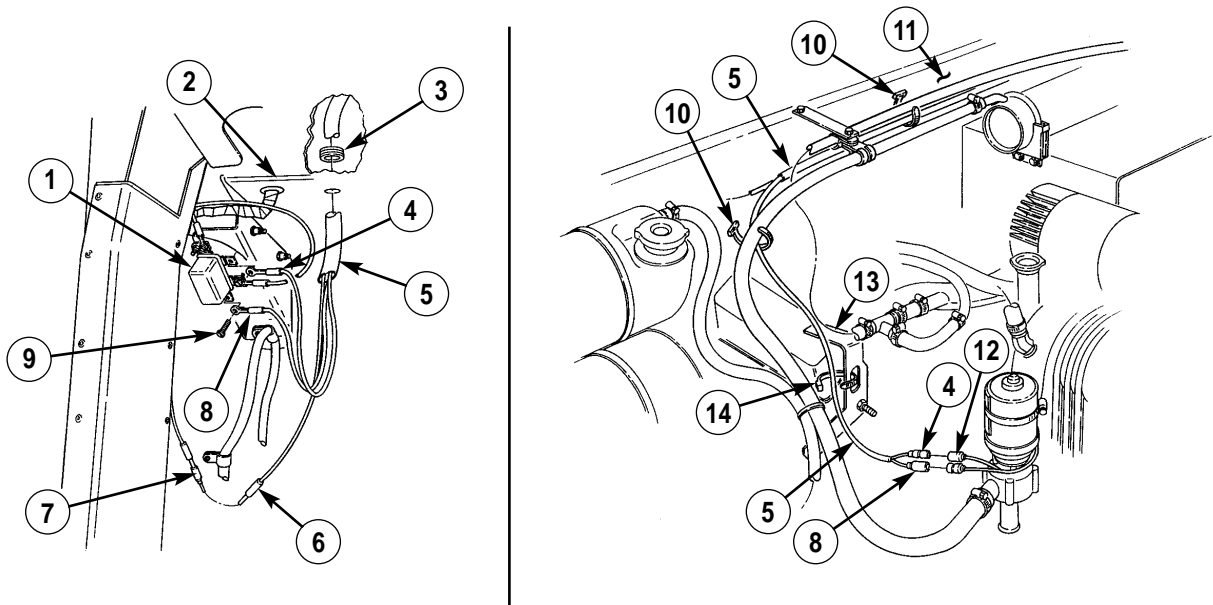
CAUTION

Use care when removing harness. Failure to do so will cause damage to harness.

NOTE

Prior to removal, tag leads for installation.

1. Remove two screws (9) and disconnect lead 81G (8) and GND (4) from relay (1).
2. Disconnect lead 81A (6) from lead 81B (7).
3. Pull harness assembly (5) out through cowl (2).
4. Remove grommet (3) from cowl (2).
5. Remove three tiedown straps (10) from harness assembly (5) and "A" beam (11). Discard tiedown straps (10).
6. Remove tiedown strap (14) from harness assembly (5) and air horn bracket (13). Discard tiedown strap (14).
7. Disconnect lead 81G (8) and GND (4) from heater pump leads (12).



12-68. SWINGFIRE HEATER HARNESS ASSEMBLY REPLACEMENT (Cont'd)

- 8. Deleted.
- 9. Remove nut (19) from lead GND (4) and negative battery terminal (18) inside battery box (17).
- 10. Disconnect GND (4) from negative battery terminal (18) and lead 81A (6) from circuit breaker (20).
- 11. Guide harness assembly (5) out through hole in battery box (17) and remove harness assembly (5) from vehicle.

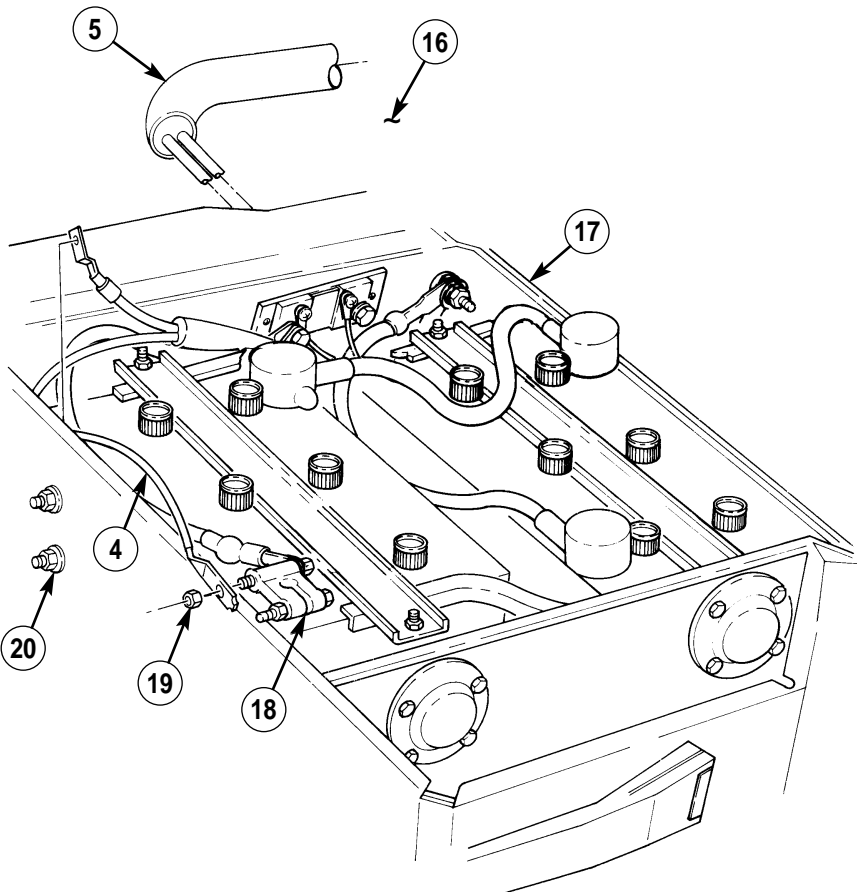
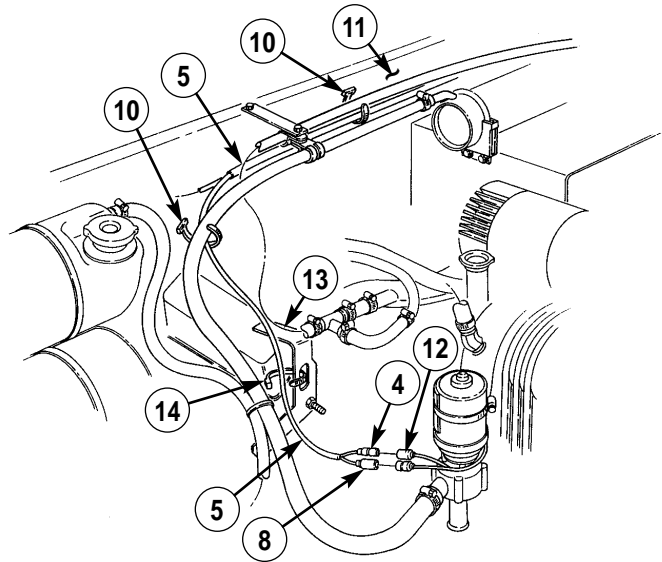
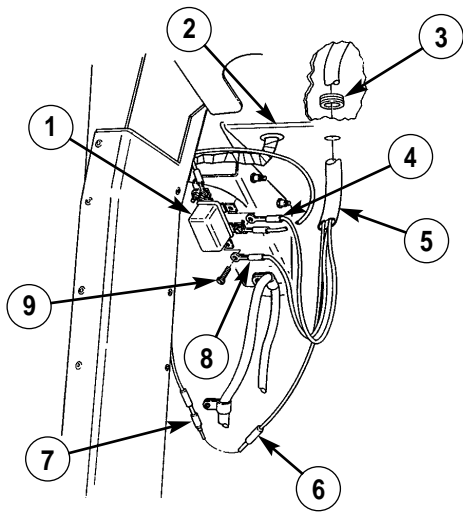
b. Installation

CAUTION

Use care when routing harness. Failure to do so will cause damage to harness.

- 1. Position harness assembly (5) on right hand cowl (16) along right hand frame rail and vent line.
- 2. Guide harness assembly (5) through hole in battery box (17) and connect lead 81A (6) to circuit breaker (20) inside battery box (17).
- 3. Connect GND (4) to negative battery terminal (18) with nut (19).
- 4. Connect GND (4) and lead 81G (8) to heater pump leads (12).
- 5. Install harness assembly (5) under air horn bracket (13) with tiedown strap (14).
- 6. Install harness assembly (5) across "A" beam (11) with three tiedown straps (10).
- 7. Install grommet (3) to cowl (2).
- 8. Guide harness assembly (5) through grommet (3).
- 9. Connect lead 81A (6) to lead 81B (7).
- 10. Connect GND (4) and lead 81G (8) to relay (1) with two screws (9).

12-68. SWINGFIRE HEATER HARNESS ASSEMBLY REPLACEMENT (Cont'd)



- FOLLOW-ON TASKS:**
- Install air horn (para. 3-14).
 - Lower and secure hood (TM 9-2320-280-10).
 - Connect battery ground cable (para. 4-73).

12-69. SWINGFIRE CIRCUIT BREAKER AND HARNESS LEAD REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M966, M966A1, M996, M996A1, M997, M997A1, M997A2, M998, M998A1, M1025, M1025A1, M1025A2, M1037, M1038, M1038A1

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Two lockwashers (Appendix G, Item 136)
Lockwasher (Appendix G, Item 141)

Manual References

TM 9-2320-280-24P

Equipment Condition

Battery ground cable disconnected (para. 4-73).

NOTE

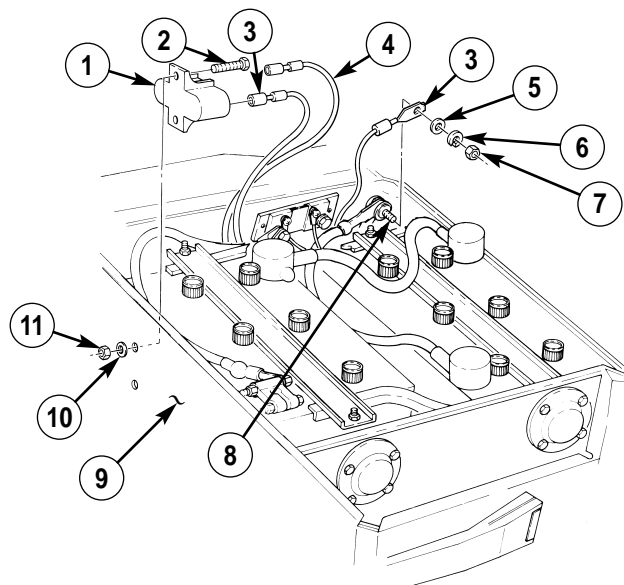
Prior to removal, tag leads for installation.

a. Removal

1. Disconnect harness leads 81A (3) and 81A (4) from circuit breaker (1) inside battery box (9).
2. Remove two nuts (11), lockwashers (10), screws (2), and circuit breaker (1) from battery box (9). Discard lockwashers (10).
3. Remove nut (7), lockwasher (6), washer (5) and harness lead 81A (3) from power feed through stud (8). Discard lockwashers (6).

b. Installation

1. Install harness lead 81A (3) on power feed through stud (8) with washer (5), lockwasher (6), and nut (7).
2. Install circuit breaker (1) on battery box (9) with two screws (2), lockwashers (10), and nuts (11).
3. Connect harness leads 81A (3) and 81A (4) to circuit breaker (1).



FOLLOW-ON TASK: Connect battery ground cable (para. 4-73).

12-70. SWINGFIRE WINDSHIELD WASHER PUMP HARNESS EXTENSION REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M966, M966A1, M996, M996A1, M997, M997A1, M997A2, M998, M998A1, M1025, M1025A1, M1025A2, M1037, M1038, M1038A1

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Tiedown strap (Appendix G, Item 312)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

- Battery ground cable disconnected (para. 4-73).
- Hood raised and secured (TM 9-2320-280-10).

a. Removal

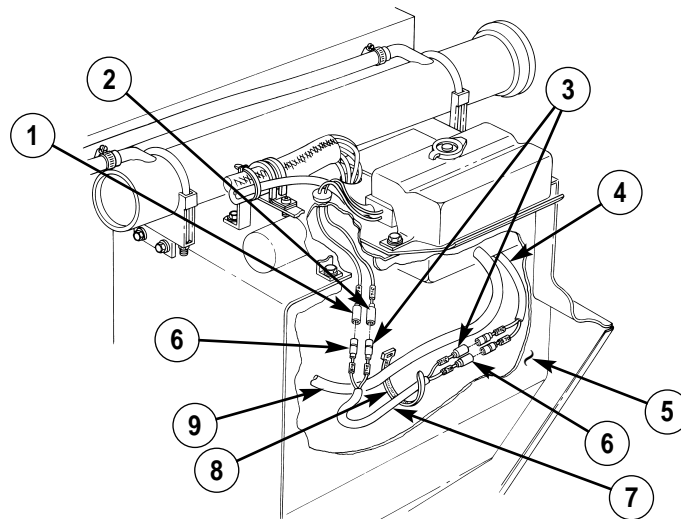
NOTE

Prior to removal, tag leads for installation.

1. Remove tiedown strap (8) from harness extension (7) and protective control box wiring harness (9). Discard tiedown strap (8).
2. Disconnect leads 71C (3) and 57D (6) from windshield washer pump leads 71C (2) and 57D (1).
3. Disconnect leads 71C (3) and 57D (6) from body wiring harness (4) under dash panel.
4. Pull harness extension (7) out through cowl (5) and remove harness extension (7) from vehicle.

b. Installation

1. Guide harness extension (7) through cowl (5).
2. Connect leads 71C (3) and 57D (6) to body wiring harness (4) under dash panel.
3. Connect leads 57D (6) and 71C (3) to windshield washer pump leads 71C (2) and 57D (1).
4. Install harness extension (7) on protective control box wiring harness (9) with tiedown strap (8).



- FOLLOW-ON TASKS:
- Lower and secure hood (TM 9-2320-280-10).
 - Connect battery ground cable (para. 4-73).

Section V. ARCTIC WINTERIZATION CREW TOP KITS MAINTENANCE

12-71. ARCTIC WINTERIZATION CREW TOP KITS MAINTENANCE TASK SUMMARY

TASK PARA.	PROCEDURES	PAGE NO.
12-72.	Arctic Top Cover Assembly Replacement	12-105
12-73.	Arctic Curtain Assembly Replacement	12-106
12-74.	Arctic Curtain Angle Assembly Replacement	12-107
12-75.	Arctic Window Replacement	12-108
12-76.	Arctic Curtain Channel Assembly Replacement (2-Man Crew)	12-109
12-77.	Arctic Curtain Channel Assembly Replacement (4-Man Crew)	12-110
12-78.	Arctic Curtain Fastener Tape Hook Replacement	12-112
12-79.	Arctic Foam Insulation Strip Replacement	12-113

12-72. ARCTIC TOP COVER ASSEMBLY REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M998, M998A1, M1037, M1038, M1038A1,
M1097, M1097A1, M1097A2

Manual References

TM 9-2320-280-24P

Tools

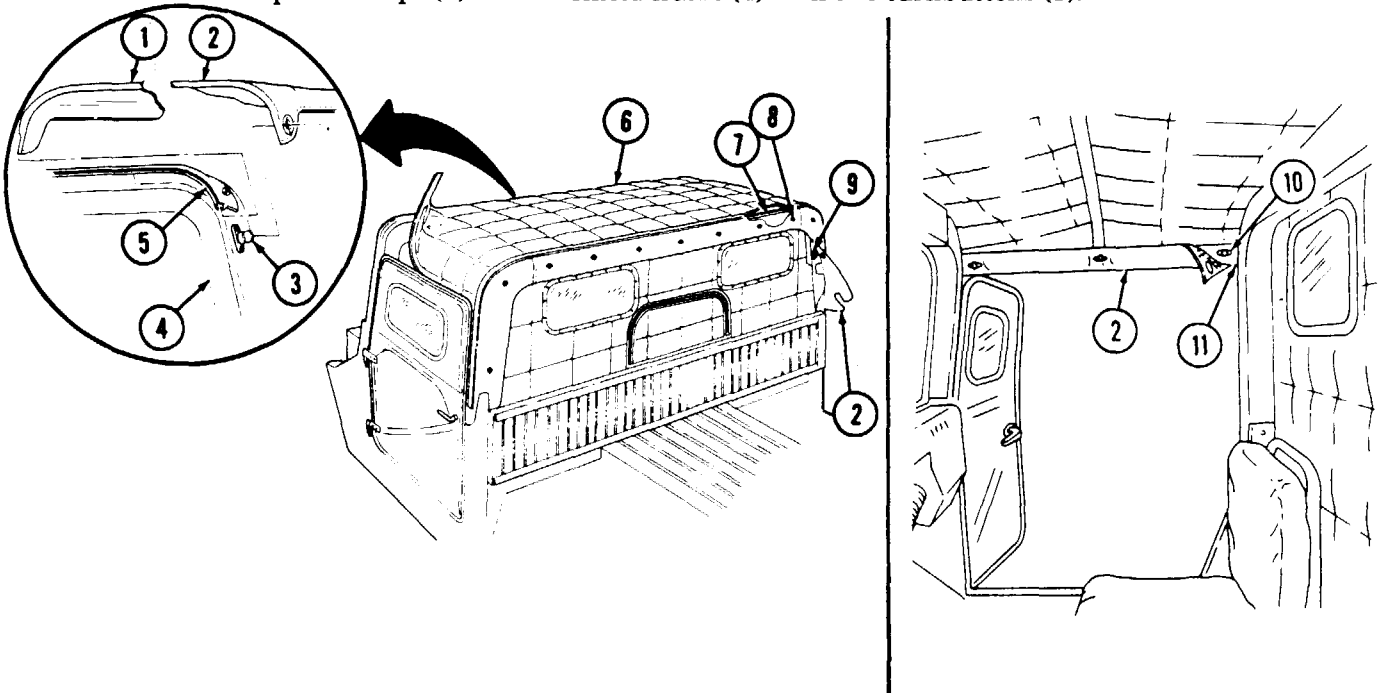
General mechanic's tool kit:
automotive (Appendix B, Item 1)

a. Removal

1. Unfasten eleven turnbuttons (8) from top cover (6) and "B" pillar (7).
2. Unfasten two turnbuttons (9) from top cover flaps (2) and "B" pillar (7).
3. Unfasten six turnbuttons (10) from top cover flaps (2) and horizontal rails (11).
4. Unfasten two turnbuttons (3) from top cover flaps (2) and windshield frame (4).
5. Fold top cover (6) toward front of vehicle and slide front bead (1) of top cover (6) from "A" pillar former assembly (5) and remove top cover (6).

b. Installation

1. Install top cover (6) by sliding front bead (1) of top cover (6) into "A" pillar former assembly (5).
2. Unfold top cover (6) toward rear of vehicle.
3. Install top cover flaps (2) on horizontal rails (11) with six turnbuttons (10).
4. Install top cover flaps (2) on "B" pillar (7) with two turnbuttons (9).
5. Install top cover (6) on "B" pillar (7) with eleven turnbuttons (8).
6. Install two top cover flaps (2) on windshield frame (4) with two turnbuttons (3).



12-73. ARCTIC CURTAIN ASSEMBLY REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M998, M998A1, M1037, M1038, M1038A1,
M1097, M1097A1, M1097A2

Manual References

TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

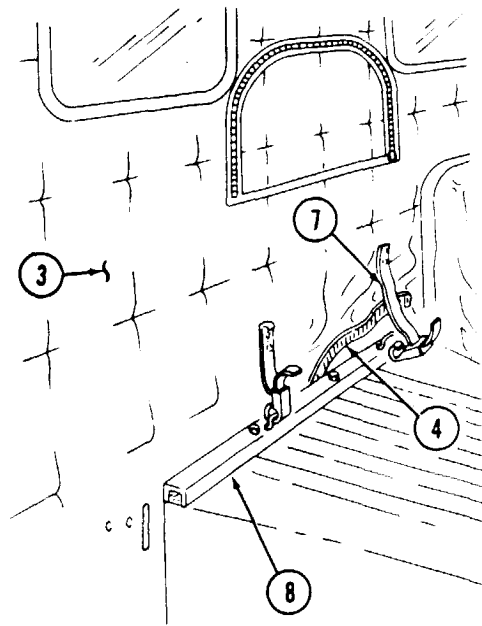
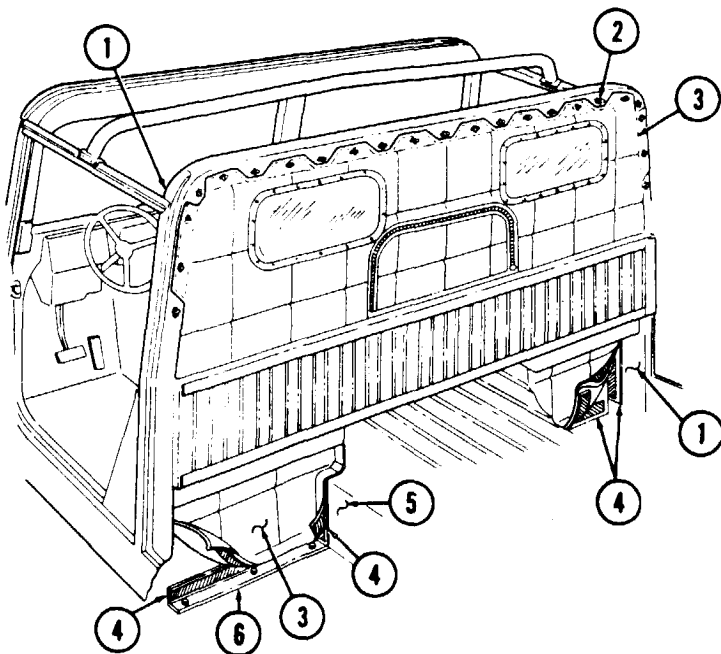
Ž Companion seat back removed (para. 10-34).
Ž Arctic top cover assembly removed (para. 12-72).

a. Removal

1. Peel curtain (3) back from fastener tape (4) on angle assembly (6).
2. Release two straps (7), remove curtain (3) from channel assembly (8), and peel curtain (3) back from fastener tape (4) on channel assembly (8).
3. Peel curtain (3) back from fastener tape (4) on tunnel (5) and "B" pillar (1).
4. Unfasten twelve turnbuttons (2) and remove curtain (3) from "B" pillar (1).

b. Installation

1. Install curtain (3) on "B" pillar (1) with twelve turnbuttons (2).
2. Attach curtain (3) to fastener tape (4) on "B" pillar (1) and tunnel (5).
3. Attach curtain (3) to fastener tape (4) on channel assembly (8) with two straps (7).
4. Attach curtain (3) to fastener tape (4) on angle assembly (6).



FOLLOW-ON TASKS: Ž Install arctic top cover assembly (para. 12-72).
Ž Install companion seat back (para. 10-34).

12-74. ARCTIC CURTAIN ANGLE ASSEMBLY REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M998, M998A1, M1037, M1038, M1038A1,
M1097, M1097A1, M1097A2

Personnel Required

One mechanic
One assistant

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-24P

Materials/Parts

Adhesive-sealant (Appendix C, Item 10)
Three locknuts (Appendix G, Item 94)

a. Removal

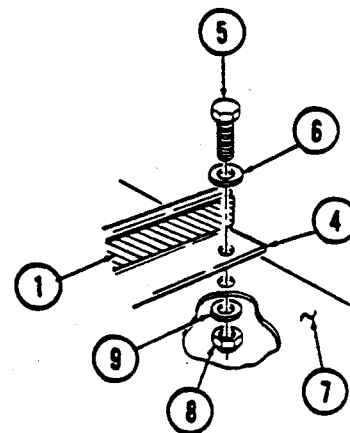
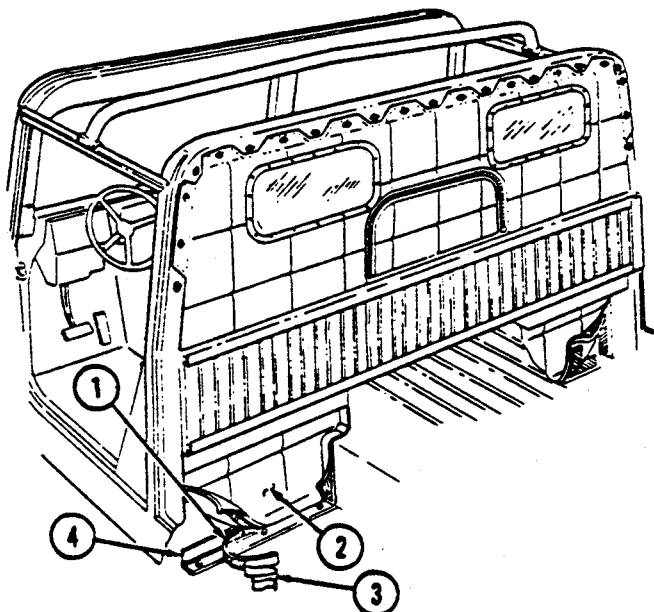
1. Peel curtain (2) back from fastener tape (1) on angle assembly (4).
2. Remove three locknuts (8), washers (9), capscrews (5), washers (6), and angle assembly (4) from cargo floor (7). Discard locknuts (8).
3. Peel fastener tape (1) from angle assembly (4).
4. Clean remaining adhesive from angle assembly (4) surface.

b. Installation

NOTE

Ensure surface is free of dirt and oil before applying adhesive backing.

1. Peel paper backing (3) from fastener tape (1) and install fastener tape (1) to angle assembly (4).
2. Install angle assembly (4) on cargo floor (7) with three washers (6), capscrews (5), washers (9), and locknuts (8). Tighten locknuts (8) to 17 lb-ft (23 N·m).
3. Attach curtain (2) to fastener tape (1) on angle assembly (4).



12-75. ARCTIC WINDOW REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M998, M998A1, M1037, M1038, M1038A1, M1042, M1097, M1097A1, M1097A2

Personnel Required

One mechanic
One assistant

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-24P

Materials/Parts

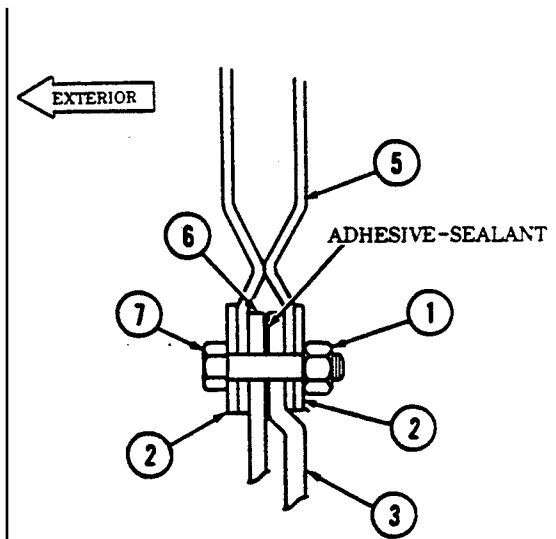
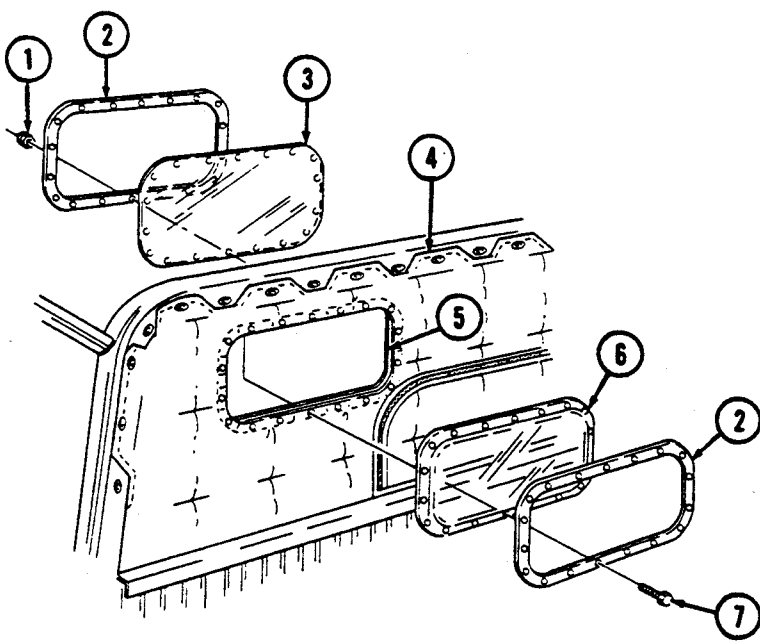
Adhesive-sealant (Appendix C, Item 10)
Eighteen locknuts (Appendix G, Item 95)

a. Removal

1. Remove eighteen locknuts (1), screws (7), two retainers (2), inner window (3), and outer window (6) from arctic curtain (4). Discard locknuts (1).
2. Remove adhesive-sealant from edge of outer window (6).

b. Installation

1. Apply adhesive-sealant around edge of outer window (6) between screw holes.
2. Insert outer window (6) into curtain flaps (5), ensuring surface without adhesive-sealant faces outside of vehicle.
3. Insert inner window (3) into curtain flaps (5) from inside of vehicle, and align inner window (3) and outer window (6) screw holes.
4. Secure inner window (3) and outer window (6) to arctic curtain flaps (5) with two retainers (2), eighteen screws (7), and locknuts (1).



12-76. ARCTIC CURTAIN CHANNEL ASSEMBLY REPLACEMENT (2-MAN CREW)

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M998, M998A1, M1037, M1038, M1038A1,
M1097, M1097A1, M1097A2

Manual References

TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

a. Removal

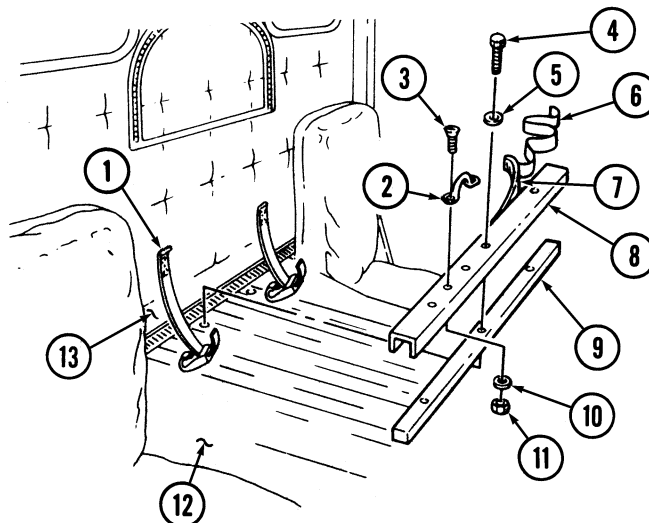
1. Peel curtain (13) back from fastener tape (7) on channel assembly (8).
2. Open two straps (1) from curtain (13) and channel assembly (8).
3. Remove four capscrews (4), washers (5), and channel assembly (8) from cargo floor (12).
4. Peel and remove fastener tape (7) from channel assembly (8).
5. Remove seal (9) from channel assembly (8).
6. Remove four nuts (11), washers (10), screws (3), and two footman loops (2) from channel assembly (8).

b. Installation

NOTE

Ensure surface is free of dirt and oil before applying adhesive backing.

1. Install two footman loops (2) on channel assembly (8) with four screws (3), washers (10), and nuts (11).
2. Install seal (9) into channel assembly (8).
3. Peel paper backing (6) from fastener tape (7) and install fastener tape (7) on channel assembly (8).
4. Install channel assembly (8) on cargo floor (12) with four washers (5) and capscrews (4).
5. Install curtain (13) on channel assembly (8) with two straps (1).
6. Secure curtain (13) to channel assembly (8) with fastener tape (7).



12-77. ARCTIC CURTAIN CHANNEL ASSEMBLY MAINTENANCE (4-MAN CREW)

This task covers:

- | | |
|---|---|
| <ul style="list-style-type: none"> a. Removal b. Inspection | <ul style="list-style-type: none"> c. Installation |
|---|---|

INITIAL SETUP:

Applicable Models

M998, M998A1, M1038, M1038A1, M1097, M1097A1, M1097A2, M1123

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Twelve locknuts (Appendix G, Item 118)
Ten locknuts (Appendix G, Item 71)

Manual References

TM 9-2320-280-24P

a. Removal

1. Release two straps (2) from curtain (3) and wheelhousing channel assemblies (1) and (22).
2. Release four straps (4) from curtain (3) and cargo floor channel assembly (11).
3. Pull curtain (3) back from fastener tape (10) on wheelhousing channel assemblies (1) and (22), and cargo floor channel assembly (11).
4. Remove six capscrews (8), washers (9), and cargo floor channel assembly (11) from cargo floor (14).
5. Remove seal (12) from cargo floor channel assembly (11).
6. Remove eight locknuts (13), washers (12.1), screws (7), and four footman loops (6) from cargo floor channel assembly (11). Discard locknuts (13).
7. Remove ten locknuts (21), twenty washers (16), ten capscrews (15), and wheelhousing channel assemblies (1) and (22) from wheel housings (20). Discard locknuts (21).
8. Remove four locknuts (19), screws (17), and two footman loops (18) from wheelhousing channel assemblies (1) and (22). Discard locknuts (19).

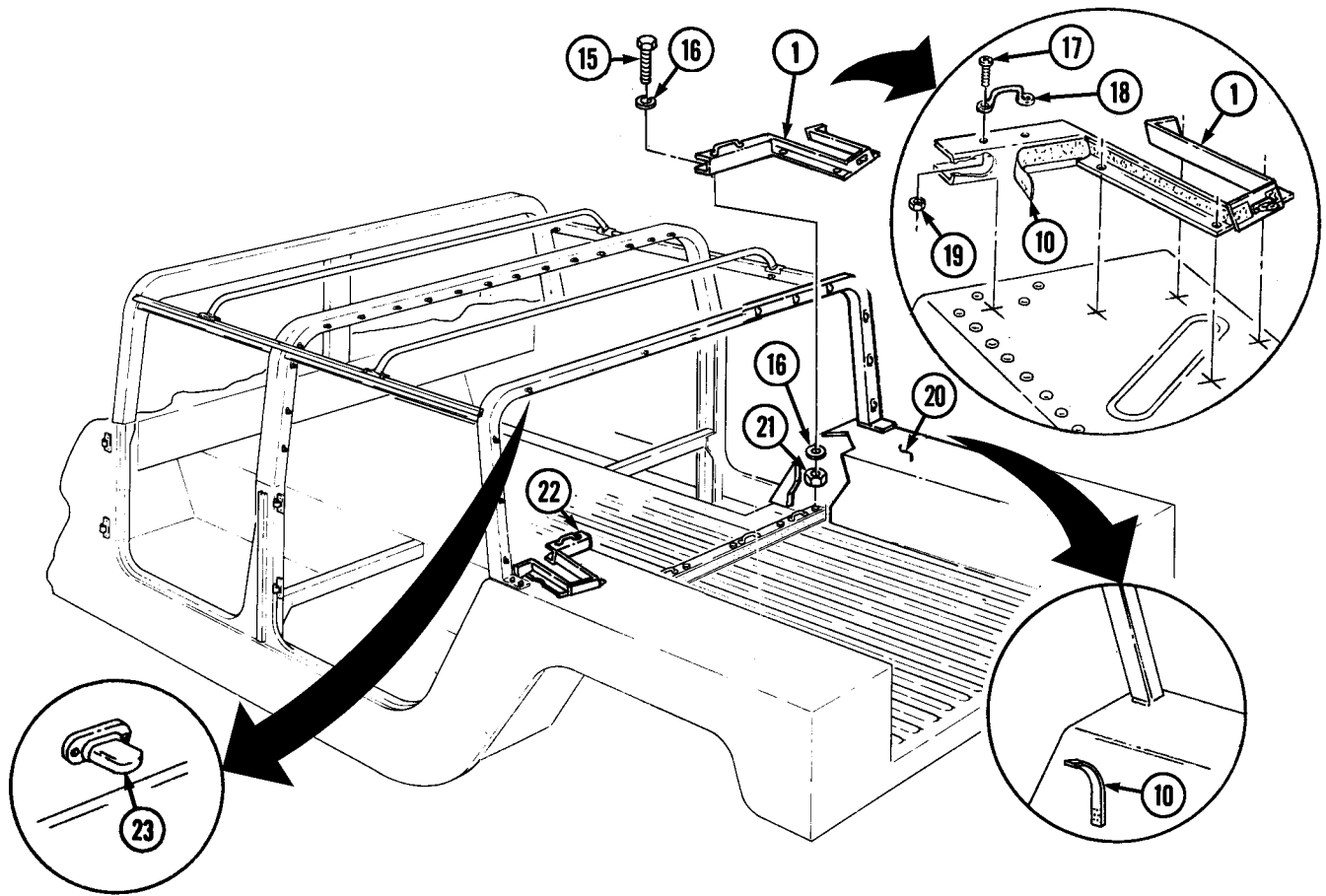
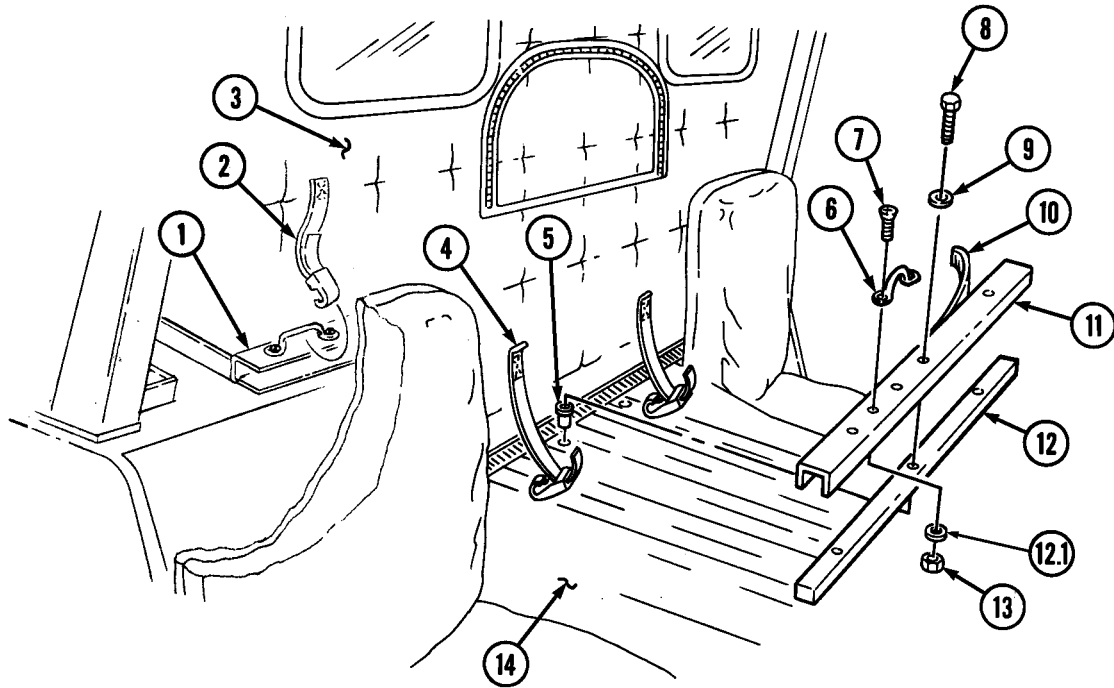
b. Inspection

1. Inspect thirty-one turnbuttons (23) on soft top for bends, corrosion, or damage. Replace if bent, corroded, or damaged (refer to para. 10-66).
2. Inspect six rivnuts (5) on cargo floor for looseness, cracks, wearing, or damage. Replace if loose, cracked, worn, or damaged (refer to para. 10-66).
3. Inspect fastener tape (10) on wheelhousing channel assemblies (1) and (22) and cargo floor channel assembly (11) for tearing or damage. Replace if torn or damaged (refer to para. 12-78).

c. Installation

1. Install two footman loops (18) on wheelhousing channel assemblies (1) and (22) with four screws (17) and locknuts (19).
2. Install wheelhousing channel assemblies (1) and (22) on wheel housings (20) with twenty washers (16), ten capscrews (15), and locknuts (21).
3. Install four footman loops (6) on cargo floor channel assembly (11) with eight screws (7), washers (12.1), and locknuts (13).
4. Install seal (12) in cargo floor channel assembly (11).
5. Install cargo floor channel assembly (11) on cargo floor (14) with six washers (9) and capscrews (8).
6. Install curtain (3) on wheelhousing channel assemblies (1) and (22) and cargo floor channel assembly (11) with fastener tape (10).
7. Secure curtain (3) to cargo floor channel assembly (11) with four straps (4).
8. Secure curtain (3) to wheelhousing channel assemblies (1) and (22) with two straps (2).

12-77. ARCTIC CURTAIN CHANNEL ASSEMBLY REPLACEMENT (4-MAN CREW)(Cont'd)



12-78. ARCTIC CURTAIN FASTENER TAPE HOOK REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M998, M998A1, M1037, M1038, M1038A1,
M1097, M1097A1, M1097A2

Manual References

TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

Arctic curtain assembly removed (para. 12-73).

NOTE

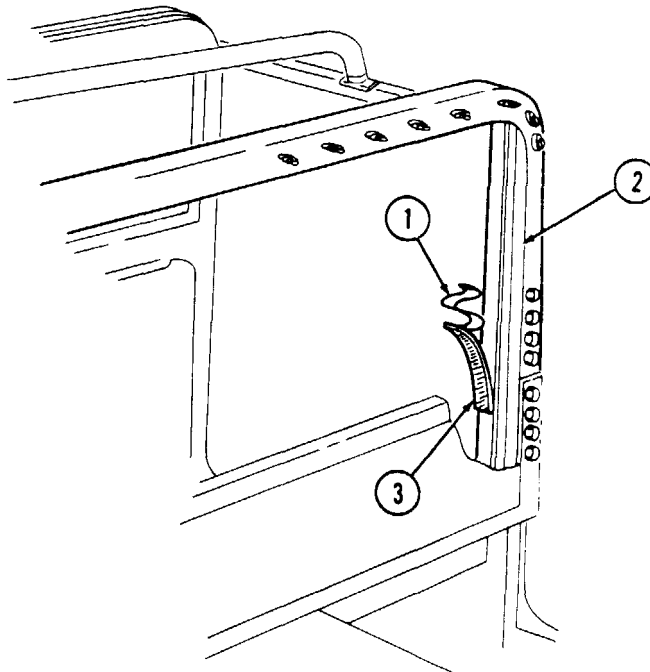
All fastener tape is removed and installed the same. This procedure covers the "B" pillar fastener tape.

a. Removal

1. Peel fastener tape (3) from "B" pillar (2).
2. Clean remaining adhesive from "B" pillar (2).

b. Installation

1. Ensure "B" pillar surface (2) is free of dirt and oil.
2. Peel paper backing (1) from fastener tape (3).
3. Apply fastener tape (3) to "B" pillar (2) and press firmly in place.



FOLLOW-ON TASK: Install arctic curtain assembly (para. 12-73).

12-79. ARCTIC FOAM INSULATION STRIP REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M998, M998A1, M1037, M1038, M1038A1,
M1097, M1097A1, M1097A2

Manual References

TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

a. Removal

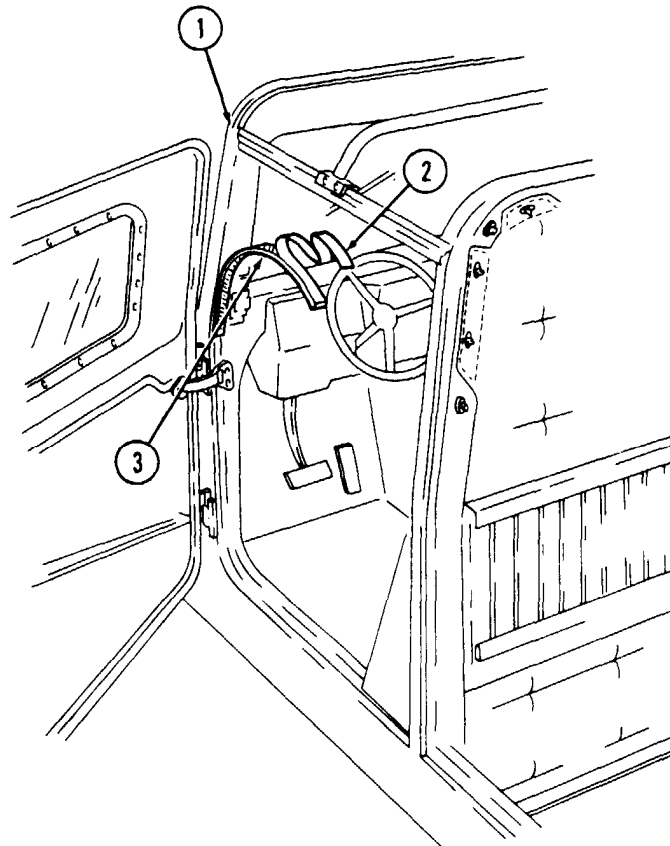
1. Peel foam insulation strip (3) from "A" pillar (1).
2. Clean remaining adhesive from "A" pillar surface (1).

b. Installation

NOTE

Ensure "A" pillar surface is free of dirt and oil before applying foam insulation strip.

1. Peel paper backing (2) from foam insulation strip (3).
2. Install foam insulation strip (3) on "A" pillar (1) and press firmly in place.



Section VI. TROOP/CARGO WINTERIZATION KIT MAINTENANCE

12-80. TROOP/CARGO WINTERIZATION KIT MAINTENANCE TASK SUMMARY

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12-85.	Troop/Cargo Winterization Heater Fuel Supply Hose Replacement	12-123
12-86.	Troop/Cargo Winterization Heater Pump-to-Hose Fuel Supply Line Replacement	12-124
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12-91.	Troop/Cargo Winterization Heater Filter-to-Bulkhead Coupling Fuel Supply Hose Replacement	12-131
12-92.	Troop/Cargo Winterization Heater Filter-to-Heater Fuel Supply Hose Replacement	12-133
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12-96.	Troop/Cargo Winterization Heater Diverter Assembly Replacement	12-140
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12-80. TROOP/CARGO WINTERIZATION KIT MAINTENANCE TASK SUMMARY (Cont'd)

TASK PARA.	PROCEDURES	PAGE NO.
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12-81. TROOP/CARGO WINTERIZATION HEATER FUEL PUMP REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M998, M998A1, M1038, M1038A1

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Sealing compound (Appendix C, Item 44)
Two locknuts (Appendix G, Item 70)
Lockwasher (Appendix G, Item 175)
Four blind rivets (Appendix G, Item 257)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

Battery ground cable disconnected (para. 4-73).

General Safety Instructions

Do not perform this procedure near fire, flames, or sparks.

WARNING

Diesel fuel is highly flammable. Do not perform this procedure near fire, flames, or sparks. Severe injury or death will result.

a. Removal

CAUTION

Cover or plug all open hoses and connections immediately after disconnection to prevent contamination. Remove all plugs prior to connection.

NOTE

- Have drainage container ready to catch fuel.
 - Prior to removal, tag leads for installation.
1. Disconnect fuel pump lead (2) from electrical connector (3).
 2. Disconnect pump-to-hose fuel supply line (6) from connector (7).
 3. Remove connector (7) from fuel pump (1).
 4. Disconnect pump-to-bulkhead fuel supply line (8) from connector (9).

NOTE

Perform step 5 if vehicle is equipped with front arctic heater.
Perform step 6 if vehicle is not equipped with front arctic heater.

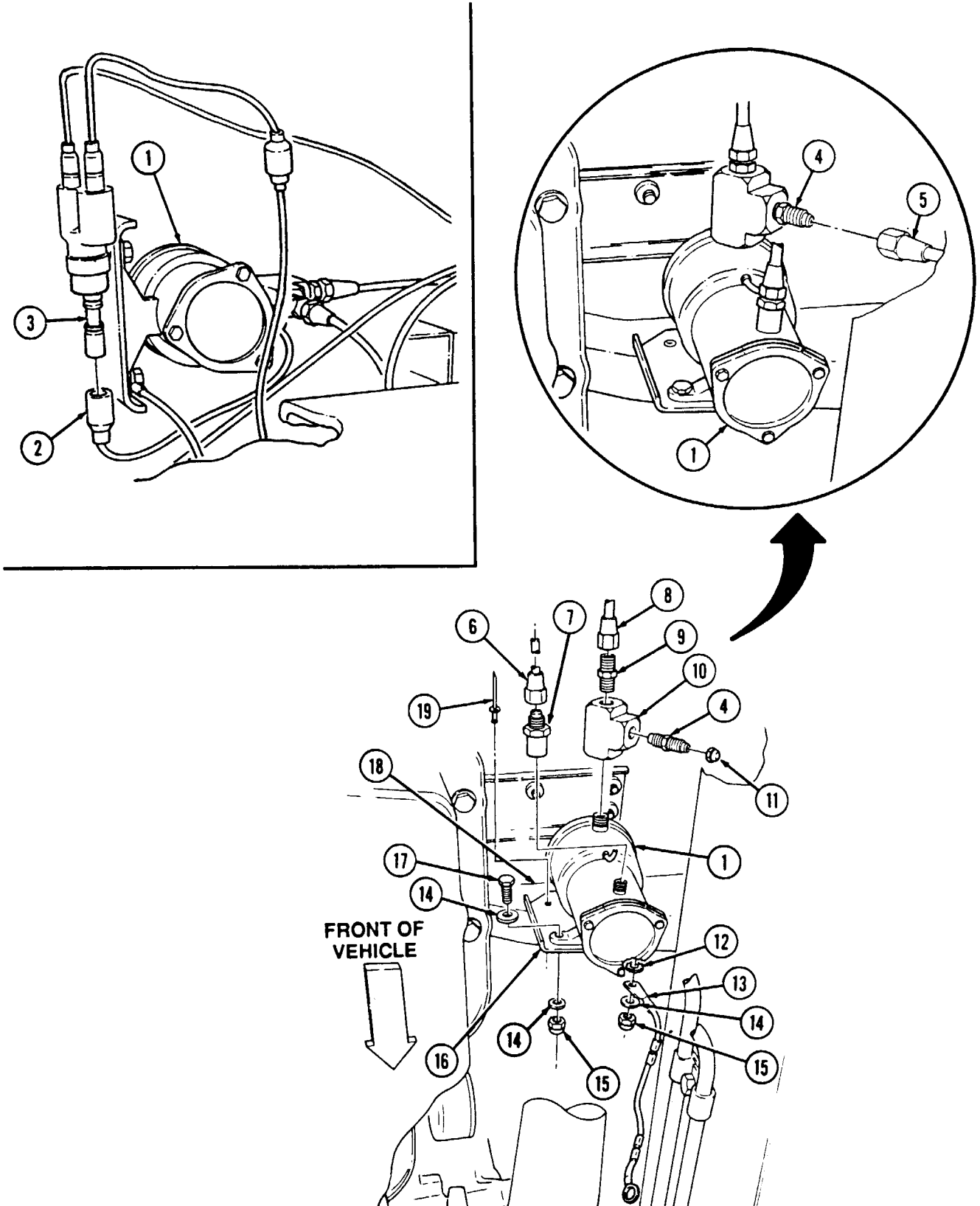
5. Disconnect arctic heater fuel supply line (5) from connector (4).
6. Remove cap (11) from connector (4).
7. Remove two locknuts (15), washers (14), lockwasher (12), two capscrews (17), washers (14), fuel pump (1), and ground lead 799B (13) from bracket (16). Discard locknuts (15) and lockwasher (12).

NOTE

For instructions on replacement of rivets, refer to para. 10-66.

8. Inspect four rivets (19) on bracket (16) and crossmember (18) and replace rivets (19), if damaged.
9. Remove connectors (9) and (4) and tee (10) from fuel pump (1).

12-81. TROOP/CARGO WINTERIZATION HEATER FUEL PUMP REPLACEMENT (Cont'd)



12-81. TROOP/CARGO WINTERIZATION HEATER FUEL PUMP REPLACEMENT (Cont'd)

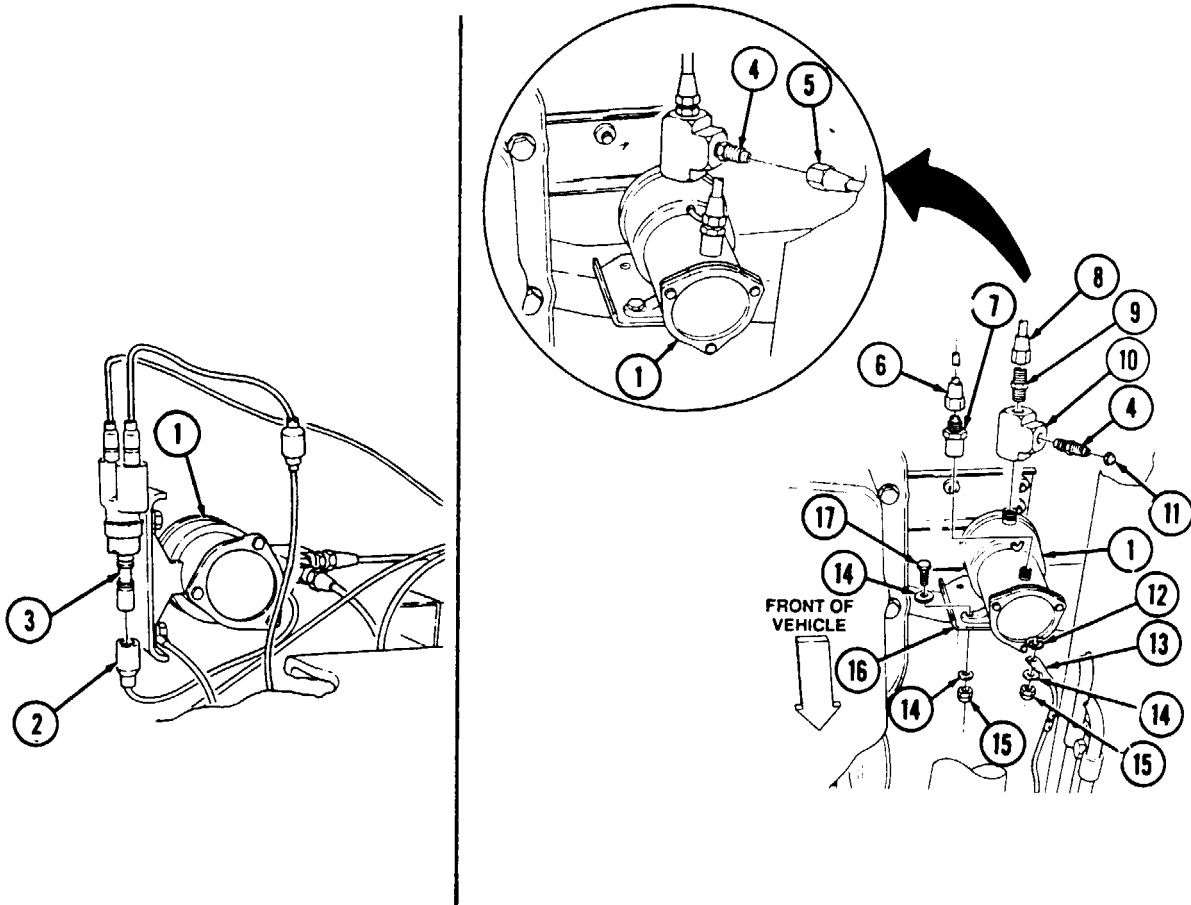
b. Installation

1. Apply sealing compound to threads of connectors (9) and (4) and install connectors (9) and (4) on tee (10).
2. Apply sealing compound to threads of fuel pump (1) and install connector (7) and tee (10) on fuel pump (1).
3. Install fuel pump (1) and ground lead 799B (13) on bracket (16) with two washers (14), capscrews (17), lockwasher (12), two washers (14), and locknuts (15).
4. Apply sealing compound to threads of connector (9) and connect pump-to-bulkhead fuel supply line (8) to connector (9).

NOTE

Perform step 5 if vehicle is equipped with front arctic heater.
 Perform step 6 if vehicle is not equipped with front arctic heater.

5. Apply sealing compound to threads of connector (4) and connect arctic heater fuel supply line (5) to connector (4).
6. Apply sealing compound to threads of connector (4) and install cap (11) on connector (4).
7. Apply sealing compound to threads of connector (7) and connect pump-to-hose fuel supply line (6) to connector (7).
8. Connect fuel pump lead (2) to electrical connector (3).



FOLLOW-ON TASKS: \bar{Z} Connect battery ground cable (para. 4-73).
 \bar{Z} Operate troop/cargo heater (TM 9-2320-280-10) and check for fuel leaks.

12-82. TROOP/CARGO WINTERIZATION HEATER FUEL FILTER ASSEMBLY REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M998, M998A1, M1038, M1038A1

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Sealing compound (Appendix C, Item 44)
Two locknuts (Appendix G, Item 117)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

Heater guard assembly removed
(para. 12-93).

General Safety Instructions

Do not perform this procedure near fire, flames, or sparks.

WARNING

Diesel fuel is highly flammable. Do not perform this procedure near fire, flames, or sparks. Severe injury or death will result.

a. Removal

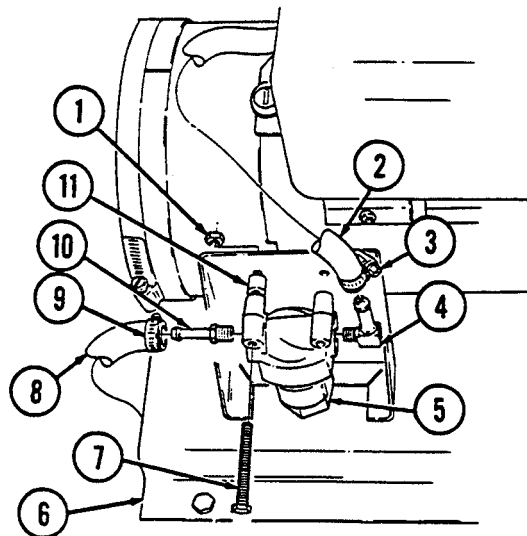
CAUTION

Cover or plug all open hoses and connections immediately after disconnection to prevent contamination. Remove all plugs prior to connection.

NOTE

Have drainage container ready to catch fuel.

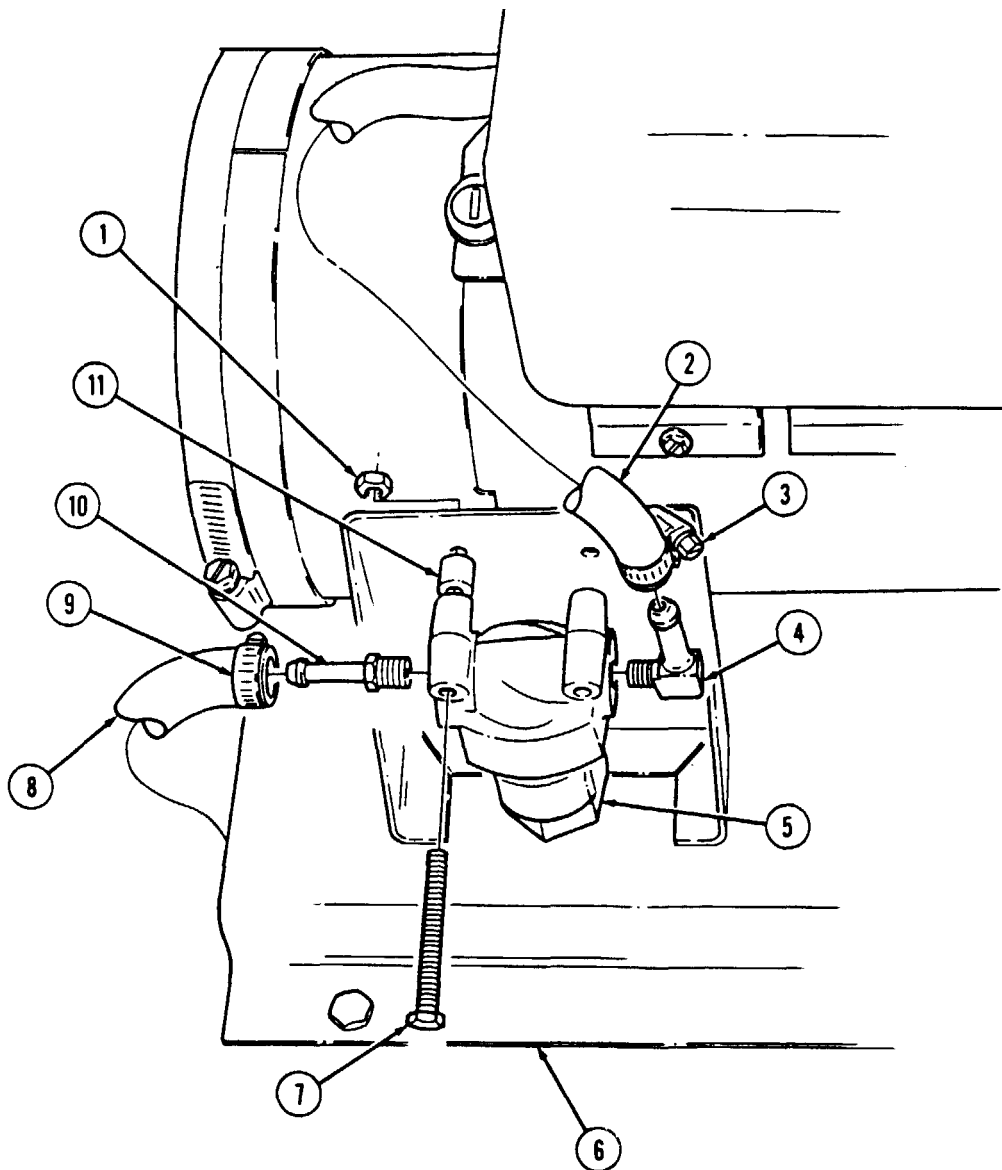
1. Loosen clamp (3) and disconnect filter-to-heater fuel supply hose (2) from filter elbow (4).
2. Loosen clamp (9) and disconnect filter-to-bulkhead coupling fuel supply hose (8) from filter connector (10).
3. Remove two locknuts (1) and capscrews (7) from filter assembly (5), spacers (11), and heater base assembly (6). Discard locknuts (1).
4. Remove filter elbow (4) and connector (10) from filter assembly (5).



12-82. TROOP/CARGO WINTERIZATION HEATER FUEL FILTER ASSEMBLY REPLACEMENT (Cont'd)

b. Installation

1. Apply sealing compound to threads of filter elbow (4) and connector (10) and install filter elbow (4) and connector (10) on filter assembly (5).
2. Install two spacers (11) and filter assembly (5) on heater base assembly (6) with two capscrews (7) and locknuts (1).
3. Connect filter-to-bulkhead coupling fuel supply hose (8) to filter connector (10) with clamp (9).
4. Connect filter-to-heater fuel supply hose (2) to filter elbow (4) with clamp (3).



FOLLOW-ON TASKS: \checkmark Install heater guard assembly (para. 12-93).
 \checkmark Operate troop/cargo heater (TM 9-2320-280-10) and check for fuel leaks.

12-83. TROOP/CARGO WINTERIZATION HEATER FUEL SUPPLY TUBE ASSEMBLY REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M998, M998A1, M1038, M1038A1

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Sealing compound (Appendix C, Item 44)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

Fuel tank removed (para. 3-24).

General Safety Instructions

Do not perform this procedure near fire, flames, or spar .

WARNING

Diesel fuel is highly flammable. Do not perform this procedure near fires, flames, or sparks. Severe injury or death will result.

a. Removal

1. Mark position of fuel supply tube assembly (2) on access cover (3).

CAUTION

Cover or plug all open hoses and connections immediately after disconnection to prevent contamination. Remove all plugs prior to connection.

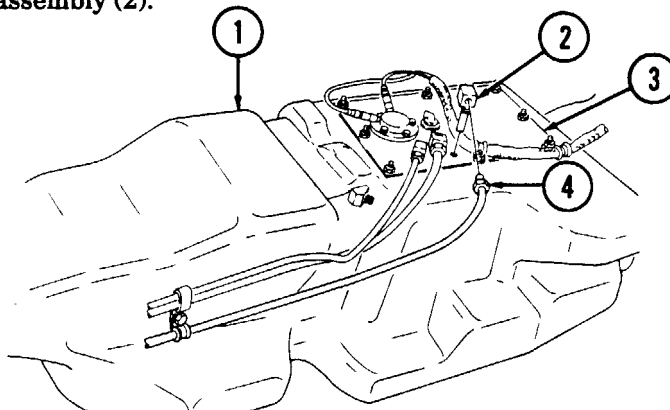
NOTE

Have drainage container ready to catch fuel.

2. Disconnect tank-to-hose fuel supply line (4) from fuel supply tube assembly (2).
3. Remove fuel supply tube assembly (2) from fuel tank (1).

b. Installation

1. Apply sealing compound to threads of fuel supply tube assembly (2) and install tube assembly (2) on fuel tank (1).
2. Apply sealing compound to tank-to-hose fuel supply line (4) and connect fuel supply line (4) to fuel supply tube assembly (2).



FOLLOW-ON TASKS: Ž Install fuel tank (para. 3-24).

Ž Operate troop/cargo heater (TM 9-2320-280-10) and check for fuel leaks.

12-84. TROOP/CARGO WINTERIZATION HEATER TANK-TO-HOSE FUEL SUPPLY LINE REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M998, M998A1, M1038, M1038A1

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

Fuel tank removed (para. 3-24).

Materials/Parts

Sealing compound (Appendix C, Item 44)

General Safety Instructions

Do not perform this procedure near fire, flames, or sparks.

WARNING

Diesel fuel is highly flammable. Do not perform this procedure near fire, flames, or sparks. Severe injury or death will result.

a. Removal

CAUTION

Cover or plug all open hoses and connections immediately after disconnection to prevent contamination. Remove all plugs prior to connection.

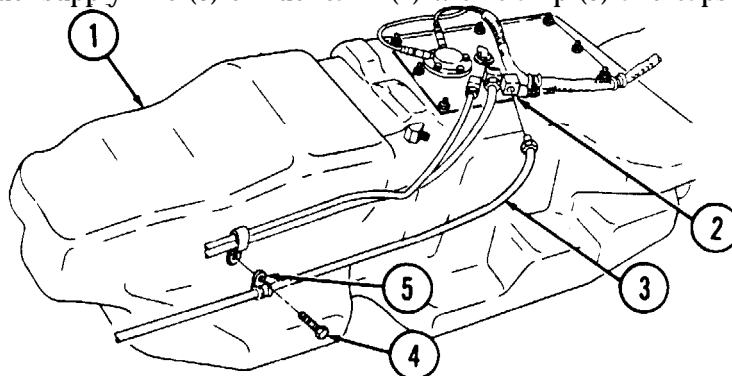
NOTE

Have drainage container ready to catch fuel.

1. Disconnect tank-to-hose fuel supply line (3) from tube assembly (2).
2. Remove capscrew (4), clamp (5), and tank-to-hose fuel supply line (3) from fuel tank (1).

b. Installation

1. Apply sealing compound to threads of tank-to-hose fuel supply line (3) and connect tank-to-hose fuel supply line (3) to tube assembly (2).
2. Install tank-to-hose fuel supply line (3) on fuel tank (1) with clamp (5) and capscrew (4).



- FOLLOW-ON TASKS:**
- ⌘ Install fuel tank (para. 3-24).
 - ⌘ Operate troop/cargo heater (TM 9-2320-280-10) and check for fuel leaks.

12-85. TROOP/CARGO WINTERIZATION HEATER FUEL SUPPLY HOSE REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M998, M998A1, M1038, M1038A1

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

General Safety Instructions

Do not perform this procedure near fire, flames, or sparks.

WARNING

Diesel fuel is highly flammable. Do not perform this procedure near fire, flames, or sparks. Severe injury or death will result.

a. Removal

CAUTION

Cover or plug all open hoses and connections immediately after disconnection to prevent contamination. Remove all plugs prior to connection.

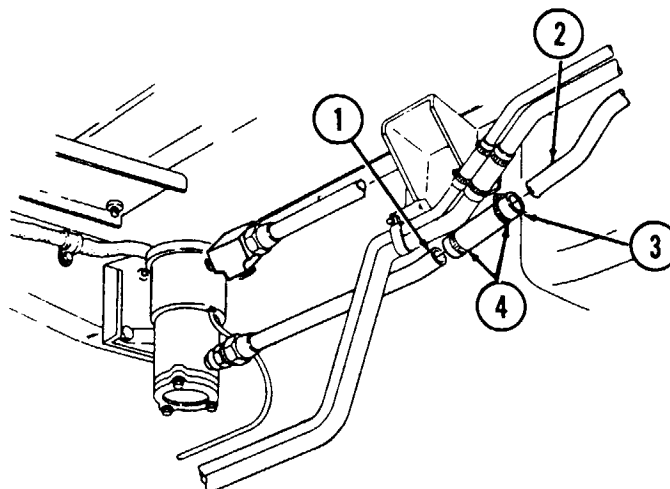
NOTE

Have drainage container ready to catch fuel.

Remove two clamps (4) and fuel supply hose (3) from tank-to-hose fuel supply line (2) and pump-to-hose fuel supply line (1).

b. Installation

1. Connect fuel supply hose (3) to tank-to-hose fuel supply line (2) with clamp (4).
2. Connect fuel supply hose (3) to pump-to-hose fuel supply line (1) with clamp (4).



FOLLOW-ON TASK: Operate troop/cargo heater (TM 9-2320-280-10) and check for fuel leaks.

12-86. TROOP/CARGO WINTERIZATION HEATER PUMP-TO-HOSE FUEL SUPPLY LINE REPLACEMENT

This task covers:

a Removal

b. Installation

INITIAL SETUP:

Applicable Models

M998, M998A1, M1038, M1038A1

Manual References

TM 9-2320-280-10

TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

General Safety Instructions

Do not perform this procedure near fire, flames, or sparks.

Materials/Parts

Sealing compound (Appendix C, Item 44)

WARNING

Diesel fuel is highly flammable. Do not perform this procedure near fire, flames, or sparks. Severe injury or death will result.

a. Removal

CAUTION

Cover or plug all open hoses and connections immediately after disconnection to prevent contamination. Remove all plugs prior to connection.

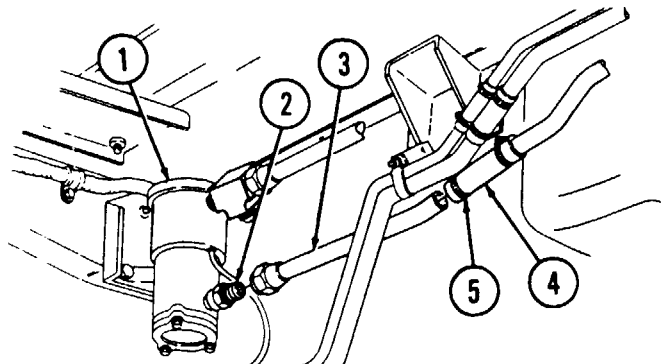
NOTE

Have drainage container ready to catch fuel.

1. Loosen clamp (5) and disconnect fuel supply hose (4) from pump-to-hose fuel supply line (3).
2. Disconnect pump-to-hose fuel supply line (3) from connector (2) on fuel pump (1).
3. Inspect connector (2) for damaged threads or cracks. Replace if cracked or damaged.

b. Installation

1. Apply sealing compound to threads of connector (2) and connect pump-to-hose fuel supply line (3) to connector (2) on fuel pump (1).
2. Connect fuel supply hose (4) to pump-to-hose fuel supply line (3) with clamp (5).



FOLLOW-ON TASK: Operate troop/cargo heater (TM 9-2320-280-10) and check for fuel leaks.

12-87. TROOP/CARGO WINTERIZATION HEATER PUMP-TO-BULKHEAD FUEL SUPPLY LINE REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M998, M998A1, M1038, M1038A1

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Sealing compound (Appendix C, Item 44)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

General Safety Instructions

Do not perform this procedure near fire, flames, or sparks.

WARNING

Diesel fuel is highly flammable. Do not perform this procedure near fire, flames, or sparks. Severe injury or death will result.

a. Removal

CAUTION

Cover or plug all open hoses and connections immediately after disconnection to prevent contamination. Remove all plugs prior to connection.

NOTE

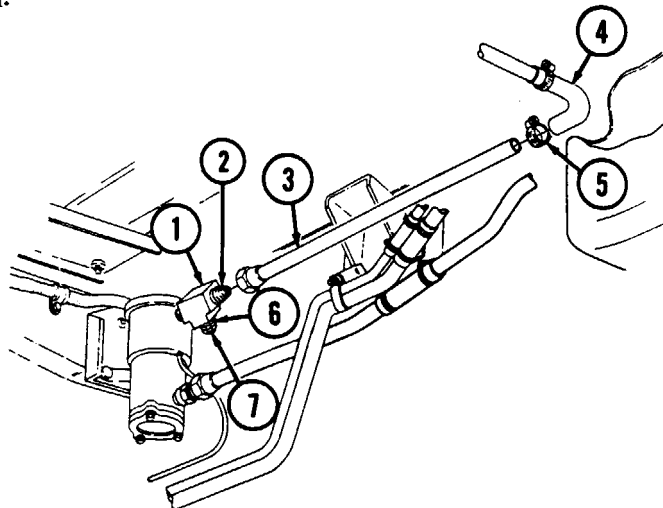
Have drainage container ready to catch fuel.

1. Disconnect pump-to-bulkhead fuel supply line (3) from connector (2).
2. Remove clamp (5) and bulkhead hose (4) from pump-to-bulkhead fuel supply line (3).

NOTE

If vehicle is equipped with front arctic heater unit, cap will not be installed on connector.

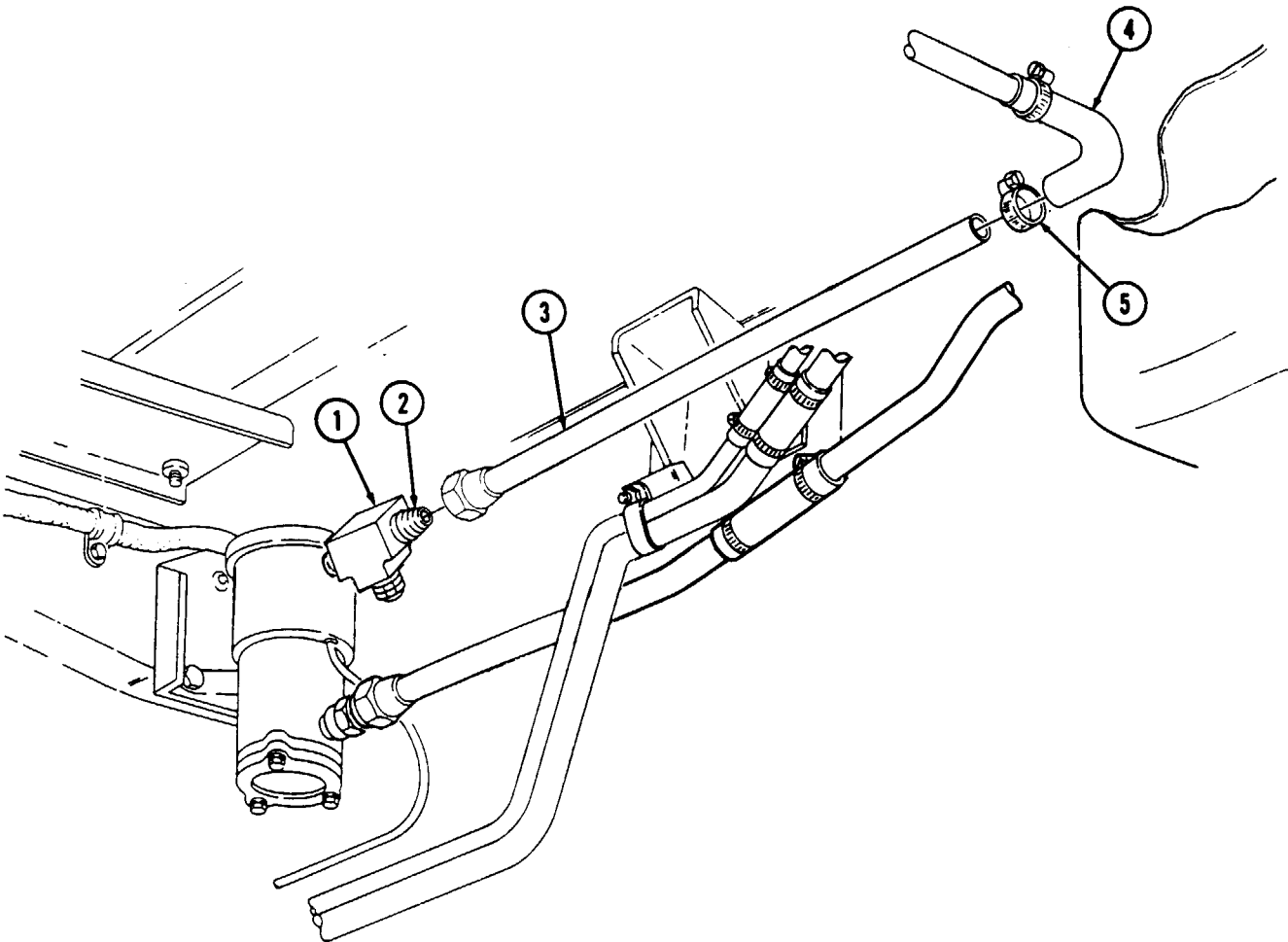
3. Inspect connector (2), tee (1), connector (6), and cap (7) for damaged threads or cracks. Replace if cracked or damaged.



12-87. TROOP/CARGO WINTERIZATION HEATER PUMP-TO-BULKHEAD FUEL SUPPLY LINE REPLACEMENT (Cont'd)

b. Installation

1. Connect bulkhead hose (4) to pump-to-bulkhead fuel supply line (3) with clamp (5).
2. Apply sealing compound to threads of connector (2) on tee (1) and connect pump-to-bulkhead fuel supply line (3) to connector (2).



FOLLOW-ON TASK: Operate troop/cargo heater (TM 9-2320-280-10) and check for fuel leaks.

12-88. TROOP/CARGO WINTERIZATION HEATER BULKHEAD FUEL SUPPLY HOSE REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M998, M998A1, M1038, M1038A1

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

General Safety Instructions

Do not perform this procedure near fire, flames, or sparks.

WARNING

Diesel fuel is highly flammable. Do not perform this procedure near fire, flames, or sparks. Severe injury or death will result.

a. Removal

CAUTION

Cover or plug all open hoses and connections immediately after disconnection to prevent contamination. Remove all plugs prior to connection.

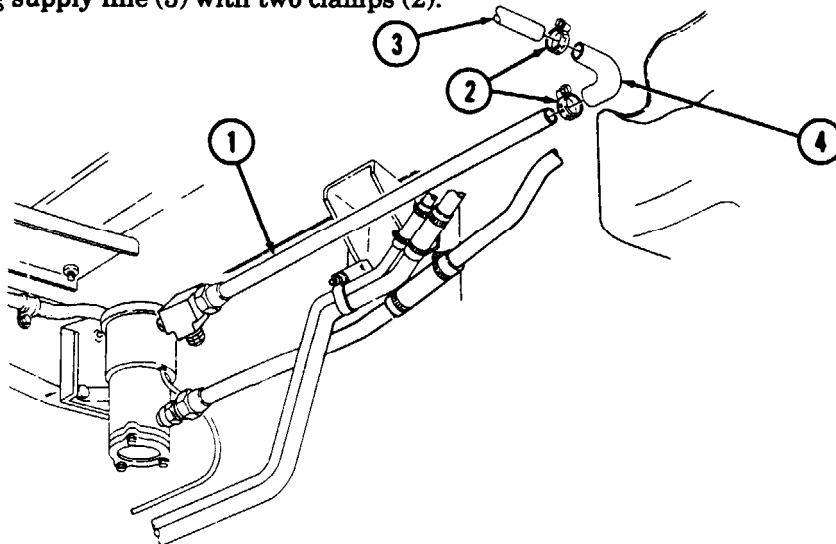
NOTE

Have drainage container ready to catch fuel.

Remove two clamps (2) and bulkhead fuel supply hose (4) from pump-to-bulkhead fuel supply line (1) and bulkhead hose-to-bulkhead coupling supply line (3).

b. Installation

Connect bulkhead fuel supply hose (4) to pump-to-bulkhead fuel supply line (1) and bulkhead hose-to-bulkhead coupling supply line (3) with two clamps (2).



FOLLOW-ON TASK: Operate troop/cargo heater (TM 9-2320-280-10) and check for fuel leaks.

12-89. TROOP/CARGO WINTERIZATION HEATER BULKHEAD HOSE-TO-BULKHEAD COUPLING FUEL SUPPLY LINE REPLACEMENT

This task covers:

- a. Removal b. Installation

INITIAL SETUP:

Applicable Models

M998, M998A1, M1038, M1038A1

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Sealing compound (Appendix C, Item 44)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

General Safety Instructions

Do not perform this procedure near fire, flames, or sparks.

WARNING

Diesel fuel is highly flammable. Do not perform this procedure near fire, flames, or sparks. Severe injury or death will result.

a. Removal

CAUTION

Cover or plug all open hoses and connections immediately after disconnection to prevent contamination. Remove all plugs prior to connection.

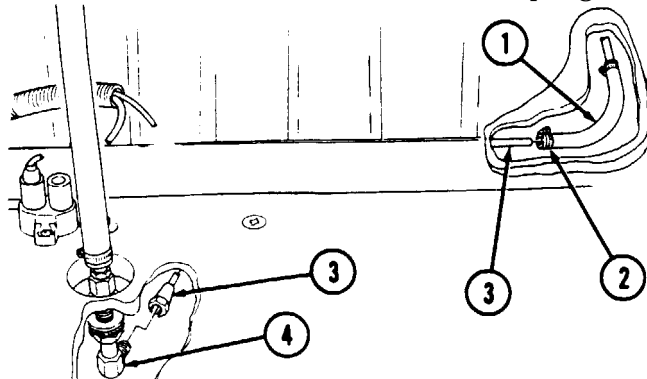
NOTE

Have drainage container ready to catch fuel.

1. Loosen clamp (2) and disconnect bulkhead hose (1) from bulkhead hose-to-bulkhead coupling fuel supply line (3).
2. Disconnect bulkhead hose-to-bulkhead coupling fuel supply line (3) from elbow (4) and remove bulkhead hose-to-bulkhead coupling fuel supply line (3).

b. Installation

1. Apply sealing compound to threads of elbow (4) and connect bulkhead hose-to-bulkhead coupling fuel supply line (3) to elbow (4).
2. Connect bulkhead hose (1) to bulkhead hose-to-bulkhead coupling fuel supply line (3) with clamp (2).



FOLLOW-ON TASK: Operate troop/cargo heater (TM 9-2320-280-10) and check for fuel leaks.

12-90. TROOP/CARGO WINTERIZATION HEATER FUEL SUPPLY LINE BULKHEAD COUPLING REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M998, M998A1, M1038, M1038A1

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Sealing compound (Appendix C, Item 44)

Manual References

TM 9-2320-280-10

TM 9-2320-280-24P

General Safety Instructions

Do not perform this procedure near fire, flames, or sparks.

WARNING

Diesel fuel is highly flammable. Do not perform this procedure near fire, flames, or sparks. Severe injury or death will result.

a. Removal

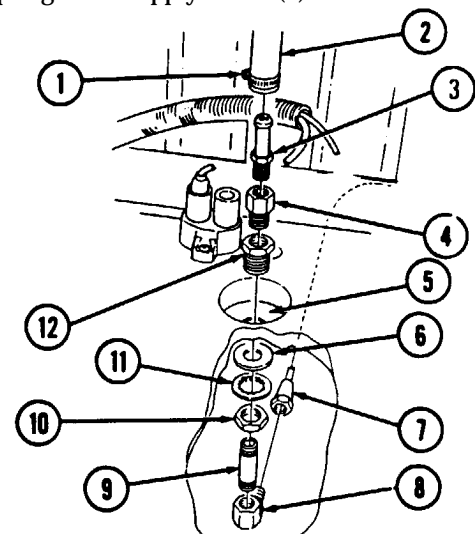
CAUTION

Cover or plug all open hoses and connections immediately after disconnection to prevent contamination. Remove all plugs prior to connection.

NOTE

Have drainage container ready to catch fuel.

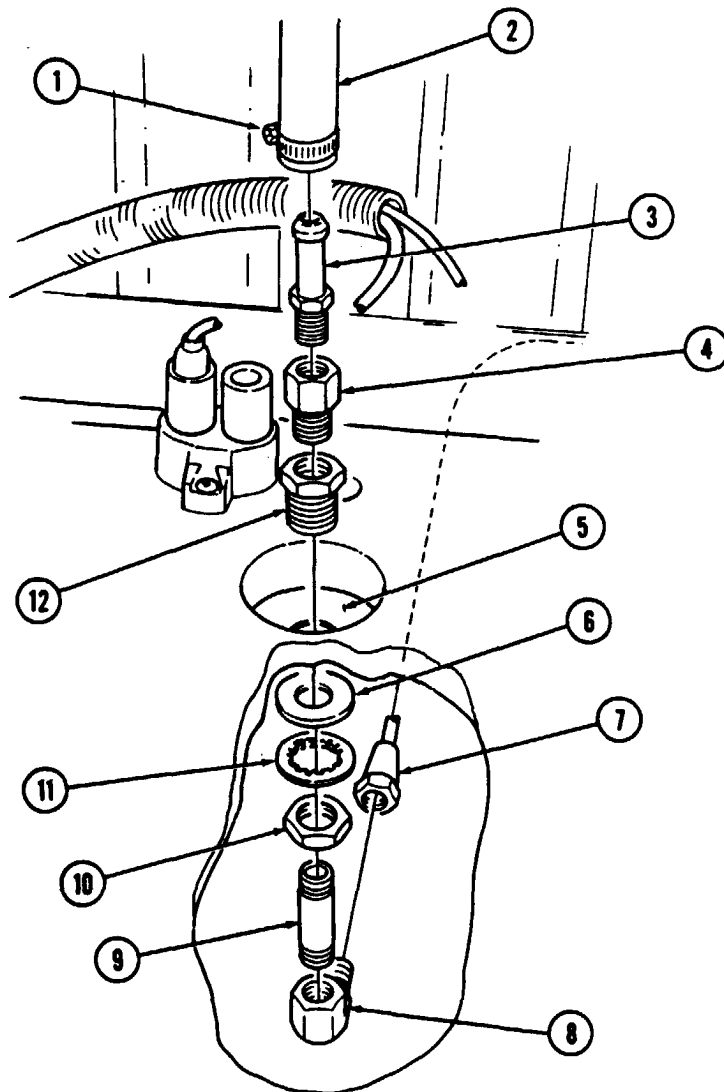
1. Disconnect bulkhead hose-to-bulkhead coupling fuel supply line (7) from elbow (8).
2. Remove elbow (8) from nipple (9).
3. Remove nut (10) and washers (11) and (6) from coupling half (12) and cargo floor (5).
4. Pull remaining fittings up through cargo floor (5).
5. Loosen clamp (1) and disconnect filter-to-bulkhead coupling fuel supply hose (2) from connector (3).
6. Remove connector (3) from adapter (4).
7. Remove adapter (4) from coupling half (12).
8. Remove nipple (9) from coupling half (12).



12-90. TROOP/CARGO WINTERIZATION HEATER FUEL SUPPLY LINE BULKHEAD COUPLING REPLACEMENT (Cont'd)

b. Installation

1. Apply sealing compound to threads of nipple (9) and install nipple (9) on coupling half (12).
2. Apply sealing compound to threads of adapter (4) and install adapter (4) on coupling half (12).
3. Apply sealing compound to threads of connector (3) and install connector (3) on adapter (4).
4. Connect filter-to-bulkhead coupling fuel supply hose (2) to connector (3) with clamp (1).
5. Insert nipple (9), coupling half (12), adapter (4), and connector (3) through cargo floor (5).
6. Secure coupling half (12) to cargo floor (5) with washers (6) and (11) and nut (10).
7. Apply sealing compound to threads of nipple (9) and install elbow (8) on nipple (9).
8. Apply sealing compound to threads of elbow (8) and connect bulkhead hose-to-bulkhead coupling fuel supply line (7) to elbow (8).



FOLLOW-ON TASK: Operate troop/cargo heater (TM 9-2320-280-10) and check for fuel leaks.

12-91. TROOP/CARGO WINTERIZATION HEATER FILTER-TO-BULKHEAD COUPLING FUEL SUPPLY HOSE REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M998, M998A1, M1038, M1038A1

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

Heater guard assembly removed
(para. 12-93).

Materials/Parts

Sealing compound (Appendix C, Item 44)

General Safety Instructions

Do not perform this procedure near tire, flames, or sparks.

WARNING

Diesel fuel is highly flammable. Do not perform this procedure near fire, flames, or sparks. Severe injury or death will result.

a. Removal

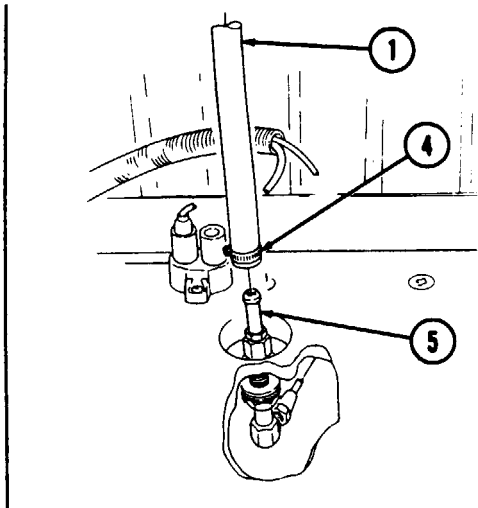
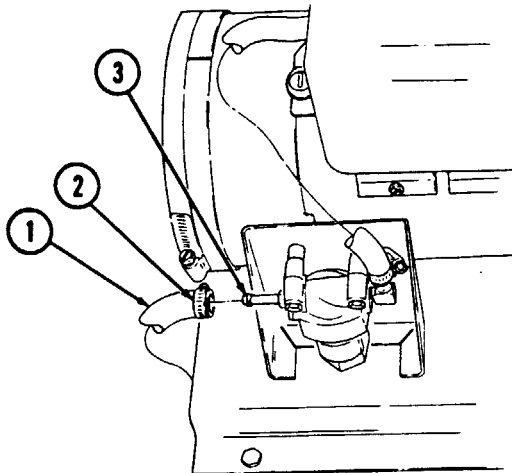
CAUTION

Cover or plug all open hoses and connections immediately after disconnection to prevent contamination. Remove all plugs prior to connection.

NOTE

Have drainage container ready to catch fuel.

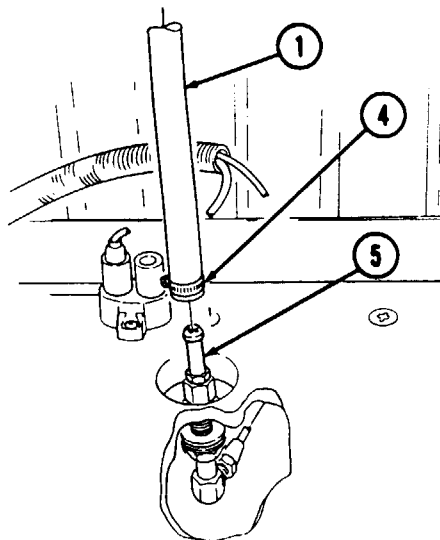
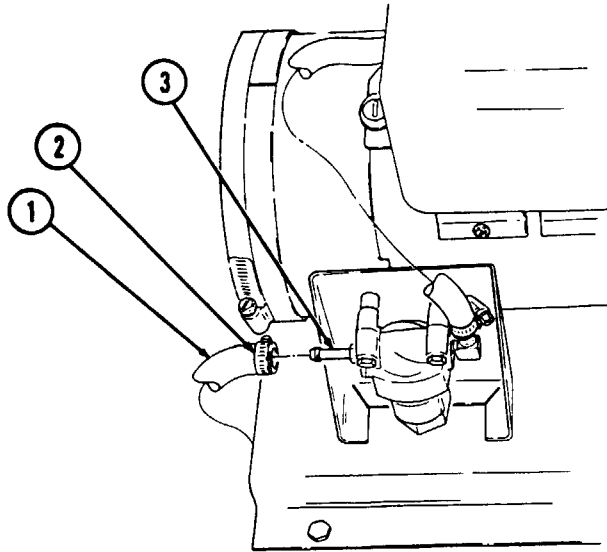
1. Loosen clamp (2) and disconnect filter-to-bulkhead coupling fuel supply hose (1) from filter connector (3).
2. Loosen clamp (4) and remove filter-to-bulkhead coupling fuel supply hose (1) from bulkhead coupling connector (5).
3. Inspect filter connector (3) and bulkhead coupling connector (5) for damage. Replace if cracked or damaged.



12-91. TROOP/CARGO WINTERIZATION HEATER FILTER-TO-BULKHEAD COUPLING FUEL SUPPLY HOSE REPLACEMENT (Cont'd)

b. Installation

1. Connect filter-to-bulkhead coupling fuel supply hose (1) to bulkhead coupling connector (5) with clamp (4).
2. Connect filter-to-bulkhead coupling fuel supply hose (1) to filter connector (3) with clamp (2).



FOLLOW-ON TASKS: Ž Install heater guard assembly (para. 12-93).
Ž Operate troop/cargo heater (TM 9-2320-280-10) and check for fuel leaks.

12-92. TROOP/CARGO WINTERIZATION HEATER FILTER-TO-HEATER FUEL SUPPLY HOSE REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M998, M998A1, M1038, M1038A1

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Sealing compound (Appendix C, Item 44)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

Heater guard assembly removed
(para. 12-93).

General Safety Instructions

Do not perform this procedure near fire, flames, or sparks.

WARNING

Diesel fuel is highly flammable. Do not perform this procedure near fire, flames, or sparks. Severe injury or death will result.

a. Removal

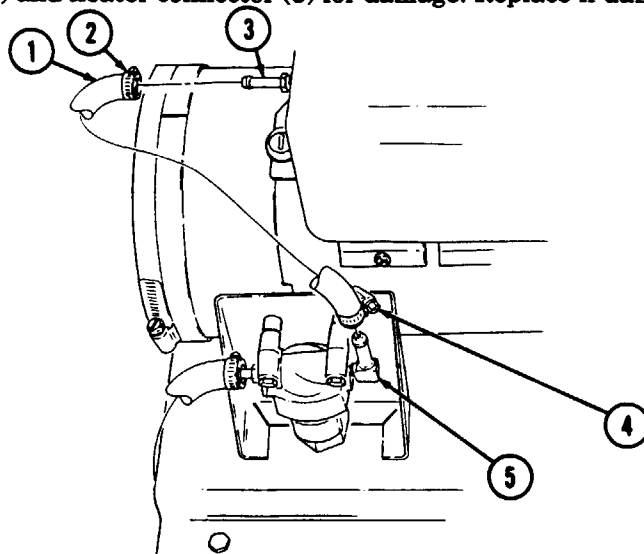
CAUTION

Cover or plug all open hoses and connections immediately after disconnection to prevent contamination. Remove all plugs prior to connection.

NOTE

Have drainage container ready to catch fuel.

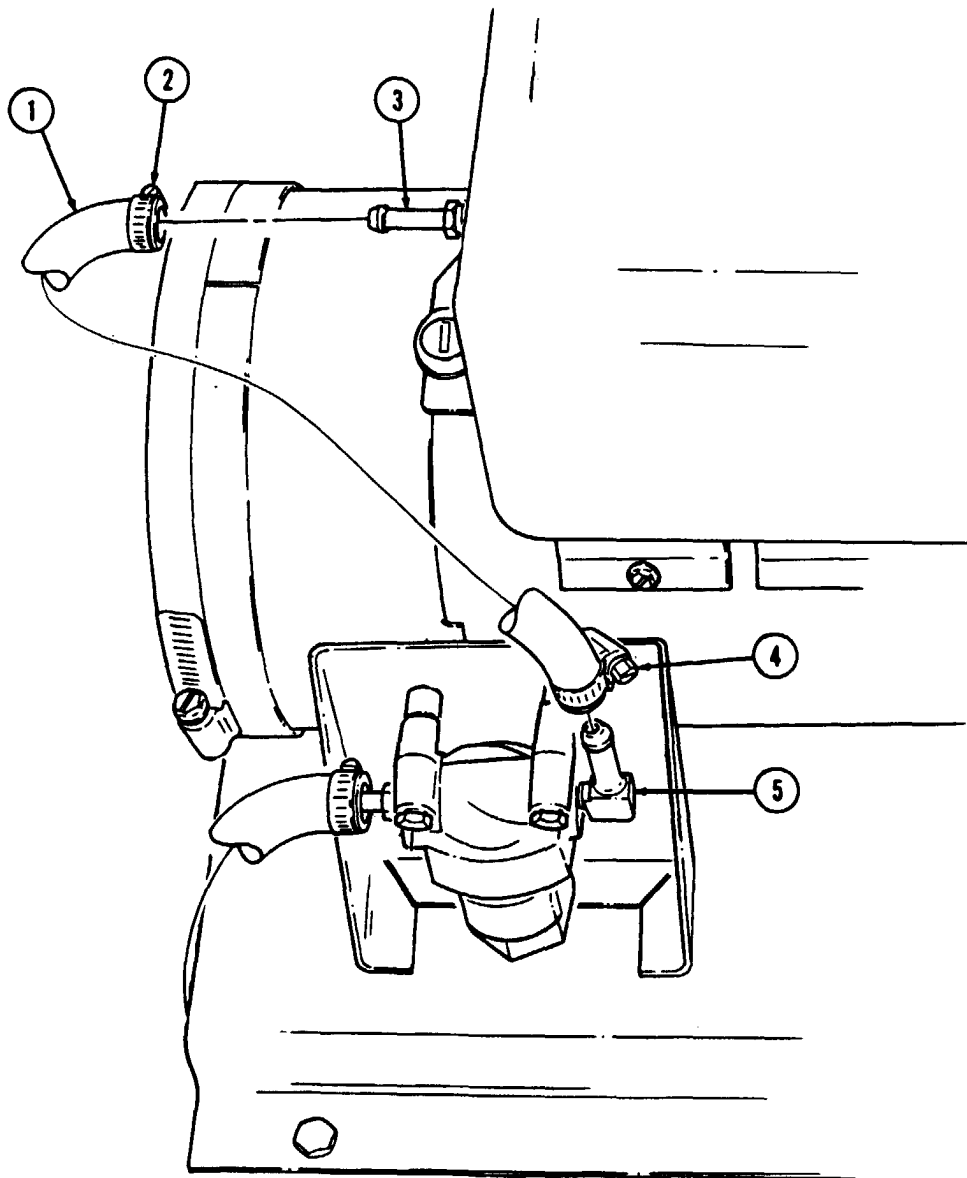
1. Loosen clamp (4) and disconnect filter-to-heater fuel supply hose (1) from filter elbow (5).
2. Loosen clamp (2) and disconnect filter-to-heater fuel supply hose (1) from heater connector (3).
3. **Inspect filter elbow (5) and heater connector (3) for damage. Replace if damaged.**



12-92. TROOP/CARGO WINTERIZATION HEATER FILTER-TO-HEATER FUEL SUPPLY HOSE REPLACEMENT (Cont'd)

b. Installation

1. Connect filter-to-heater fuel supply hose (1) to heater connector (3) with clamp (2).
2. Install filter-to-heater fuel supply hose (1) on filter elbow (5) with clamp (4).



- FOLLOW-ON TASKS:
- Ž Install heater guard assembly (para. 12-93).
 - Ž Operate troop/cargo heater (TM 9-2320-280-10) and check for fuel leaks.

12-93. TROOP/CARGO WINTERIZATION HEATER GUARD ASSEMBLY REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M998, M998A1, M1038, M1038A1

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Four lockwashers (Appendix G, Item 162)

Manual References

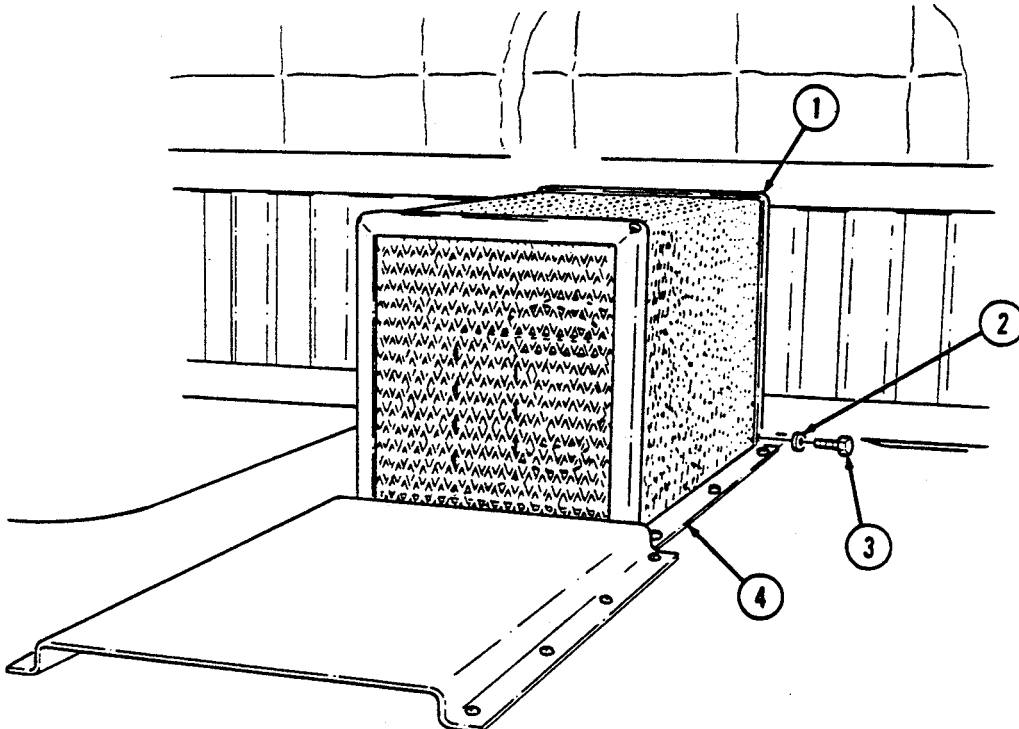
TM 9-2320-280-24P

a. Removal

Remove four capscrews (3), lockwashers (2), and guard assembly (1) from heater base assembly (4). Discard lockwashers (2).

b. Installation

Install guard assembly (1) on heater base assembly (4) with four lockwashers (2) and capscrews (3).



12-94. TROOP/CARGO WINTERIZATION HEAT DEFLECTOR REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M998, M998A1, M1038, M1038A1

Manual References

TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

Heater guard assembly removed (para. 12-93).

Materials/Parts

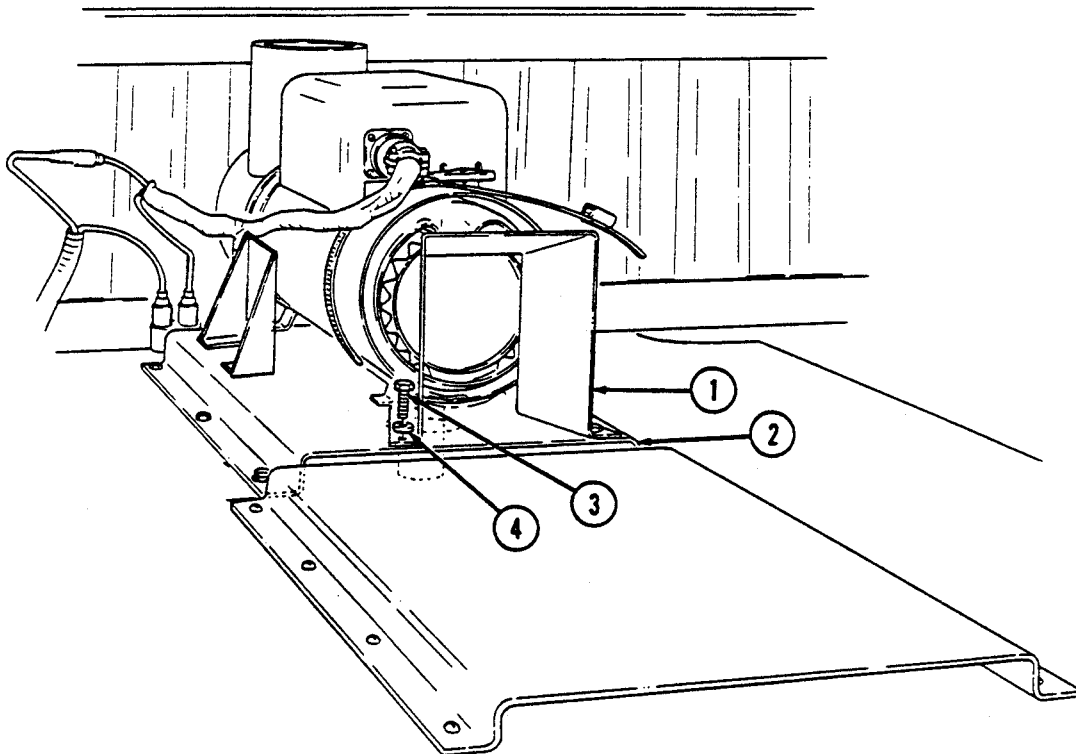
Four lockwashers (Appendix G, Item 163)

a. Removal

Remove four capscrews (3), lockwashers (4), and heat deflector (1) from heater base assembly (2). Discard lockwashers (4).

b. Installation

Install heat deflector (1) on heater base assembly (2) with four lockwashers (4) and capscrews (3).



FOLLOW-ON TASK: Install heater guard assembly (para. 12-93).

12-95. TROOP/CARGO WINTERIZATION HEATER ASSEMBLY REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M998, M998A1, M1038, M1038A1

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Adhesive sealant (Appendix C, Item 10)
Sealing compound (Appendix C, Item 42)
O-ring (Appendix G, Item 222)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

- Battery ground cable disconnected (para. 4-73).
- Heater guard assembly removed (para. 12-93).

General Safety Instructions

- Do not perform this procedure near fire, flames or sparks.
- Ensure handle on diverter assembly is facing toward left side of vehicle.

WARNING

Diesel fuel is highly flammable. Do not perform this procedure near fire, flames, or sparks. Severe injury or death will result.

a. Removal

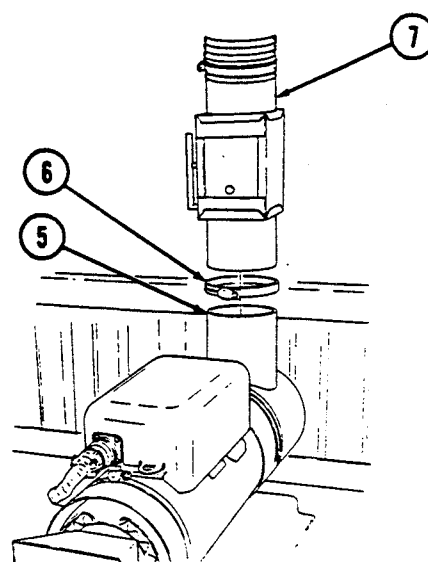
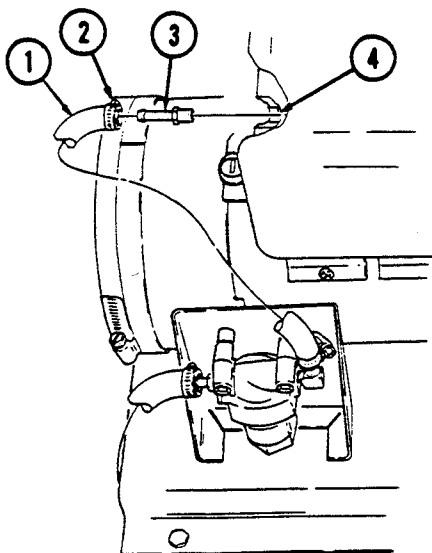
CAUTION

Cover or plug all open hoses and connections immediately after disconnection to prevent contamination. Remove all plugs prior to connection.

NOTE

Have drainage container ready to catch fuel.

1. Loosen clamp (2) and disconnect filter-to-heater fuel supply hose (1) from connector (3).
2. Remove connector (3) from heater inlet port (4).
3. Remove clamp (6) and diverter assembly (7) from air inlet adapter (5).



12-95. TROOP/CARGO WINTERIZATION HEATER ASSEMBLY REPLACEMENT (Cont'd)

4. Disconnect cannon plug (2) from heater (3).
5. Remove two clamps (1) and heater (3) from heater base assembly (4) .
6. Remove air inlet adapter (5) from heater (3).
7. Remove O-ring (6) and washer (7) from heater (3). Discard O-ring (6).
8. Remove exhaust extension (8) from heater base assembly (4).

b. Installation

NOTE

When installing exhaust extension into heater base assembly, ensure tab on exhaust extension and notch in heater base assembly are aligned.

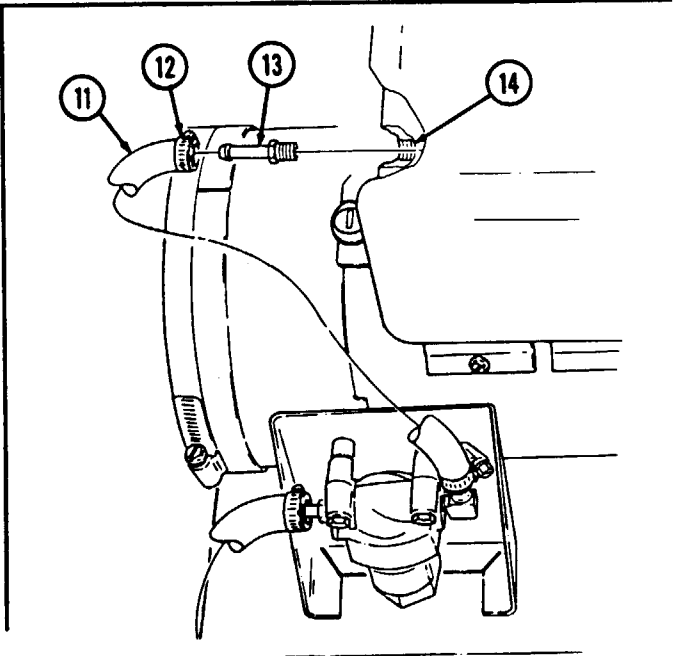
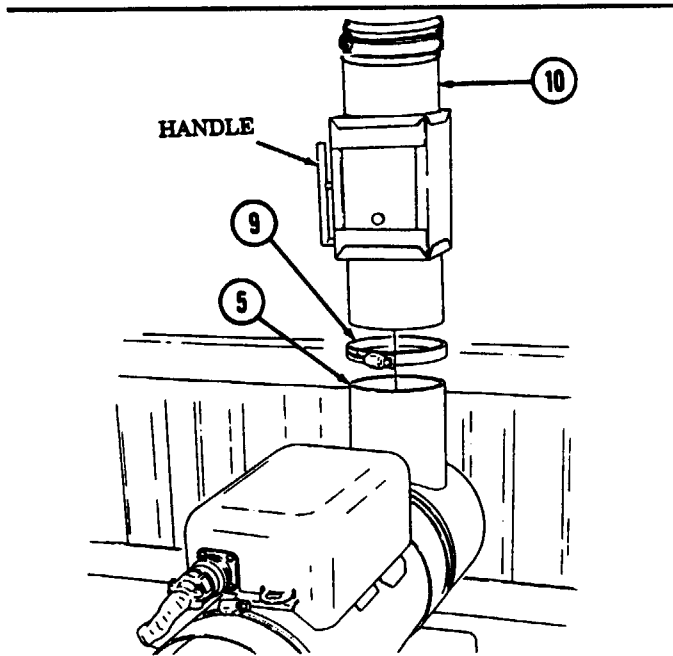
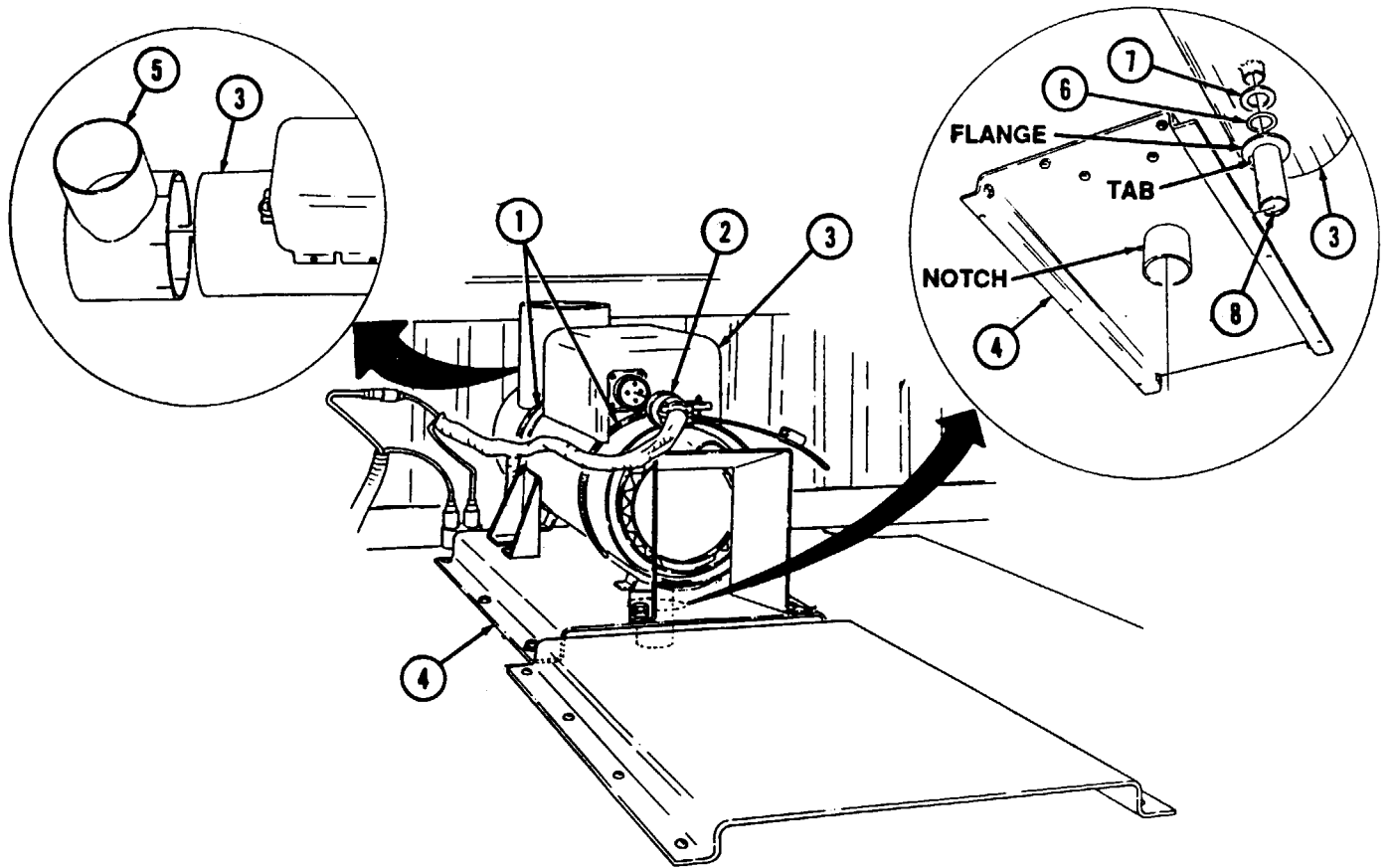
1. Apply sealant to underside surface of flange on exhaust extension (8), and install exhaust extension (8) on heater base assembly (4).
2. Install washer (7) and O-ring (6) on heater (3).
3. Install air inlet adapter (5) on heater (3).
4. Install heater (3) on heater base assembly (4) with two clamps (1).
5. Connect cannon plug (2) to heater (3).

WARNING

Ensure handle on diverter assembly is facing toward left side of vehicle. Improper installation of the diverter assembly may cause serious injury to personnel.

6. Install diverter assembly (10) on air inlet adapter (5) with clamp (9).
7. Apply sealing compound to threads of connector (13) and install connector (13) on heater inlet port (14).
8. Connect filter-to-heater fuel supply hose (11) to connector (13) with clamp (12).

12-95. TROOP/CARGO WINTERIZATION HEATER ASSEMBLY REPLACEMENT (Cont'd)



- FOLLOW-ON TASKS:
- ☒ Install heater guard assembly (para. 12-93).
 - ☒ Connect battery ground cable (para. 4-73).
 - ☒ Operate troop/cargo heater (TM 9-2320-280-10) and check for fuel leaks.

12-96. TROOP/CARGO WINTERIZATION HEATER DIVERTER ASSEMBLY REPLACEMENT

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP:

Applicable Models

M998, M998A1, M1038, M1038A1

Manual References

TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

General Safety Instructions

Ensure handle on diverter assembly is facing toward left side of vehicle.

a. Removal

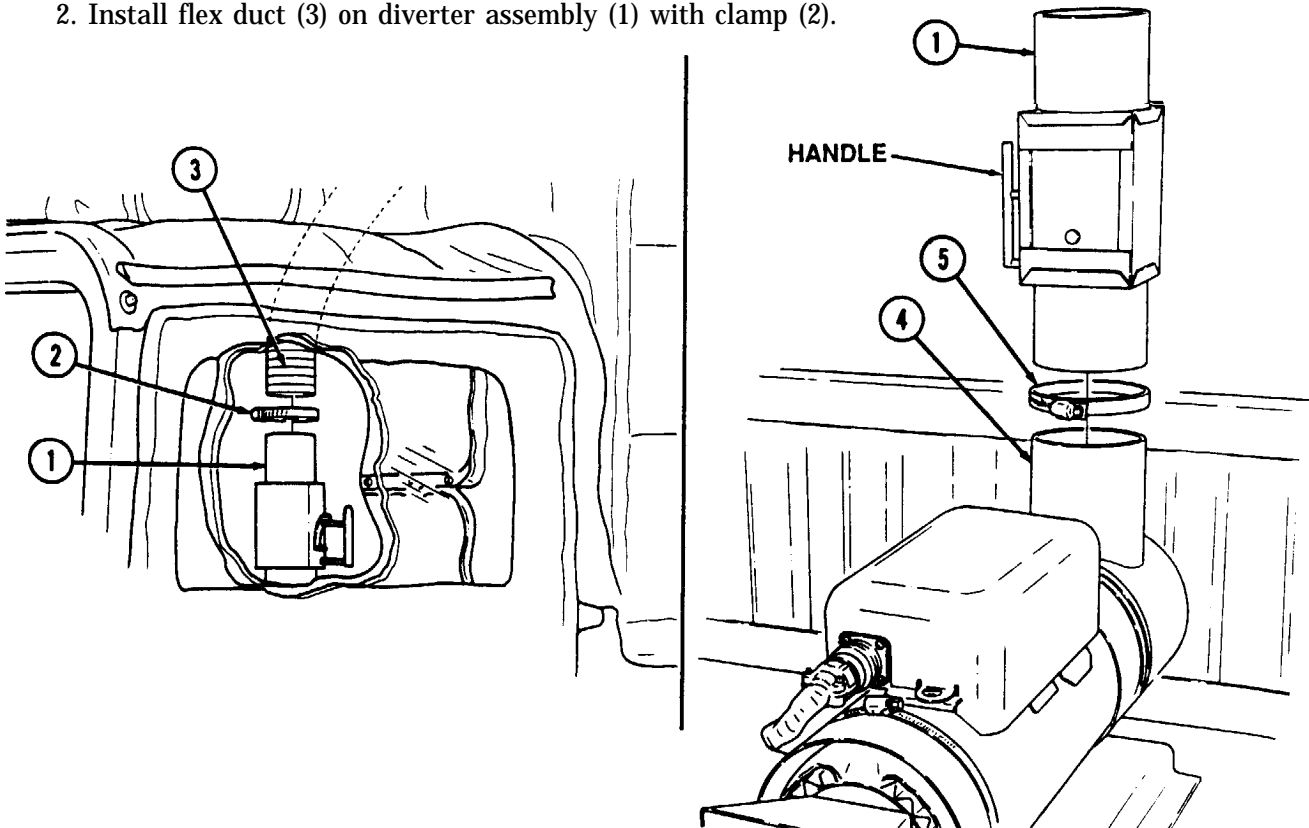
1. Remove clamp (2) and flex duct (3) from diverter assembly (1).
2. Remove clamp (5) and diverter assembly (1) from air inlet adapter (4).

b. Installation

WARNING

Ensure handle on diverter assembly is facing toward left side of vehicle. Improper installation of the diverter assembly may cause serious injury to personnel.

1. Install diverter assembly (1) on air inlet adapter (4) with clamp (5).
2. Install flex duct (3) on diverter assembly (1) with clamp (2).



12-97. TROOP/CARGO WINTERIZATION HEATER AIR INTAKE ASSEMBLY REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M998, M998A1, M1038, M1038A1

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Three locknuts (Appendix G, Item 78)
Four locknuts (Appendix G, Item 117)

Manual References

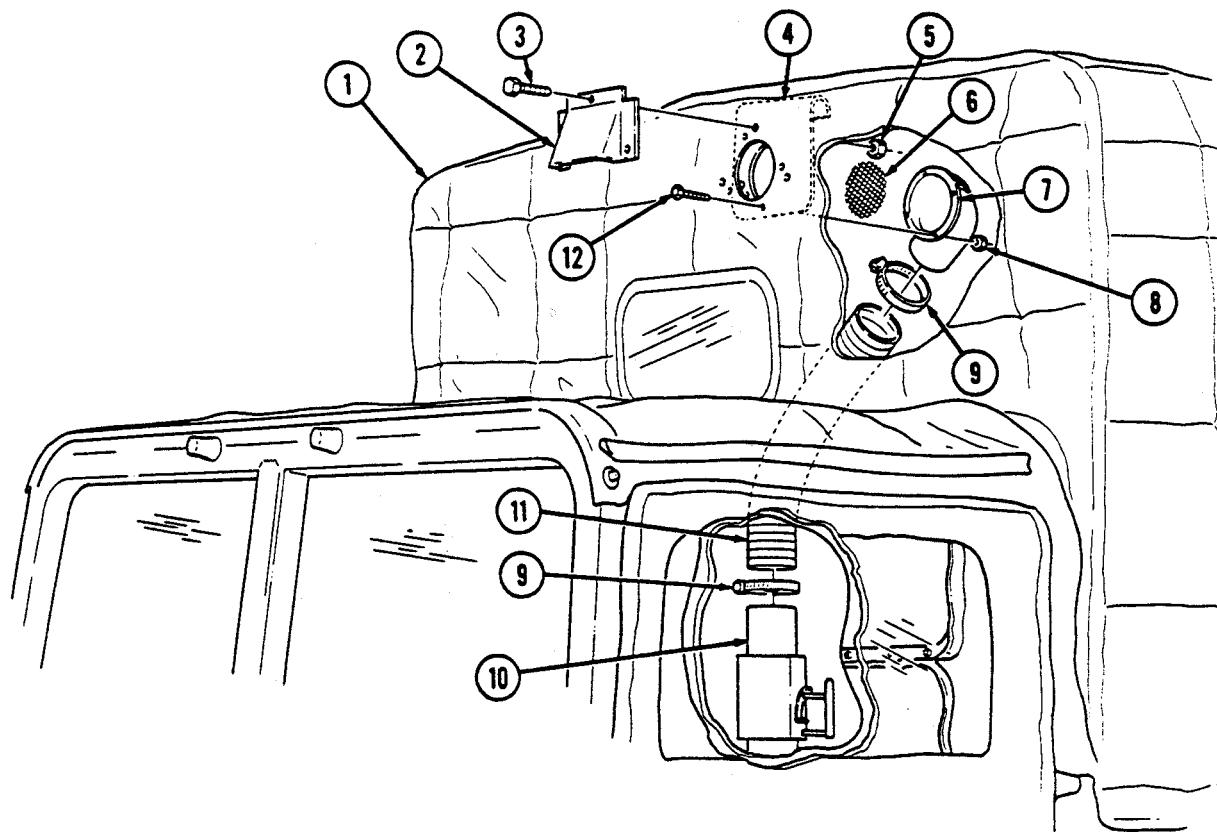
TM 9-2320-280-24P

a. Removal

1. Remove two clamps (9) and flex duct (11) from diverter assembly (10) and adapter (7).
2. Remove three locknuts (5), capscrews (3), and hood (2), from top cover assembly (1) and plate (4). Discard locknuts (5).
3. Remove four locknuts (8), screws (12), adapter (7), and screen (6) from plate (4). Discard locknuts (8).

b. Installation

1. Install screen (6) and adapter (7) on plate (4) with four screws (12) and locknuts (8).
2. Install hood (2) on top cover assembly (1) and plate (4) with three capscrews (3) and locknuts (5).
3. Install flex duct (11) on adapter (7) and diverter assembly (10) with two clamps (9).



12-98. TROOP/CARGO WINTERIZATION HEATER BASE ASSEMBLY REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M998, M998A1, M1038, M1038A1

Manual References

TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

- Heater assembly removed (para. 12-95).
- Heater fuel filter assembly removed (para. 12-82).
- Heat deflector removed (para. 12-94).

Materials/Parts

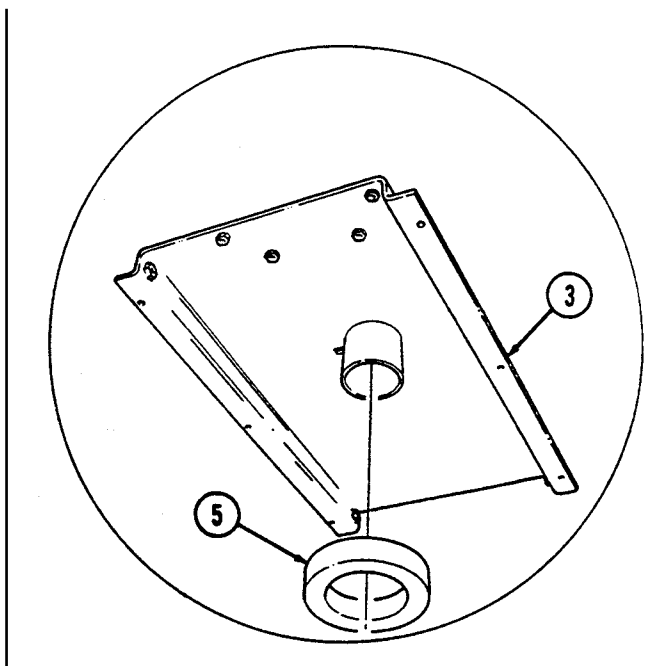
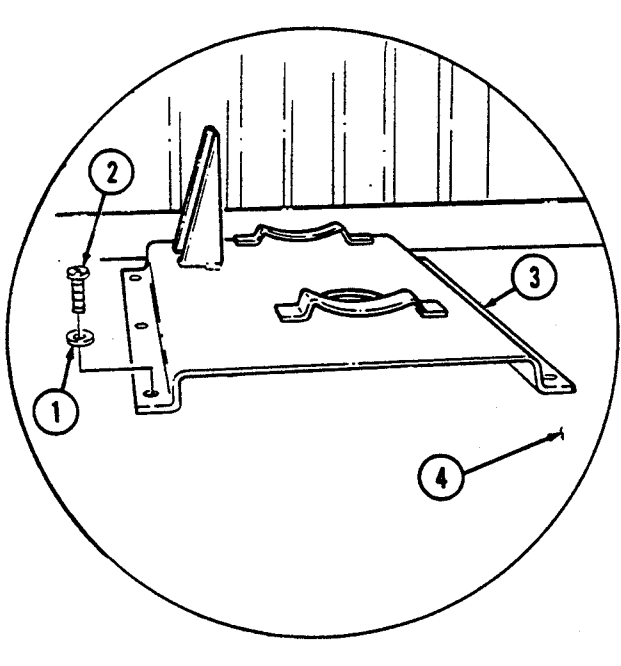
Gasket (Appendix G, Item 52)
Six lockwashers (Appendix G, Item 163)

a. Removal

1. Remove six capscrews (2), lockwashers (1), and heater base assembly (3) from cargo floor cover (4). Discard lockwashers (1).
2. Remove gasket (5) from heater base assembly (3). Discard gasket (5).

b. Installation

1. Install gasket (5) on heater base assembly (3).
2. Install heater base assembly (3) on cargo floor cover (4) with six lockwashers (1) and capscrews (2).



- FOLLOW-ON TASKS:**
- Install heat deflector (para. 12-94).
 - Install fuel filter assembly (para. 12-82).
 - Install heater assembly (para. 12-95).

12-99. TROOP/CARGO WINTERIZATION FLOOR BRACKET REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M998, M998A1, M1038, M1038A1

Manual References

TM 9-2320-280-24P

Tools

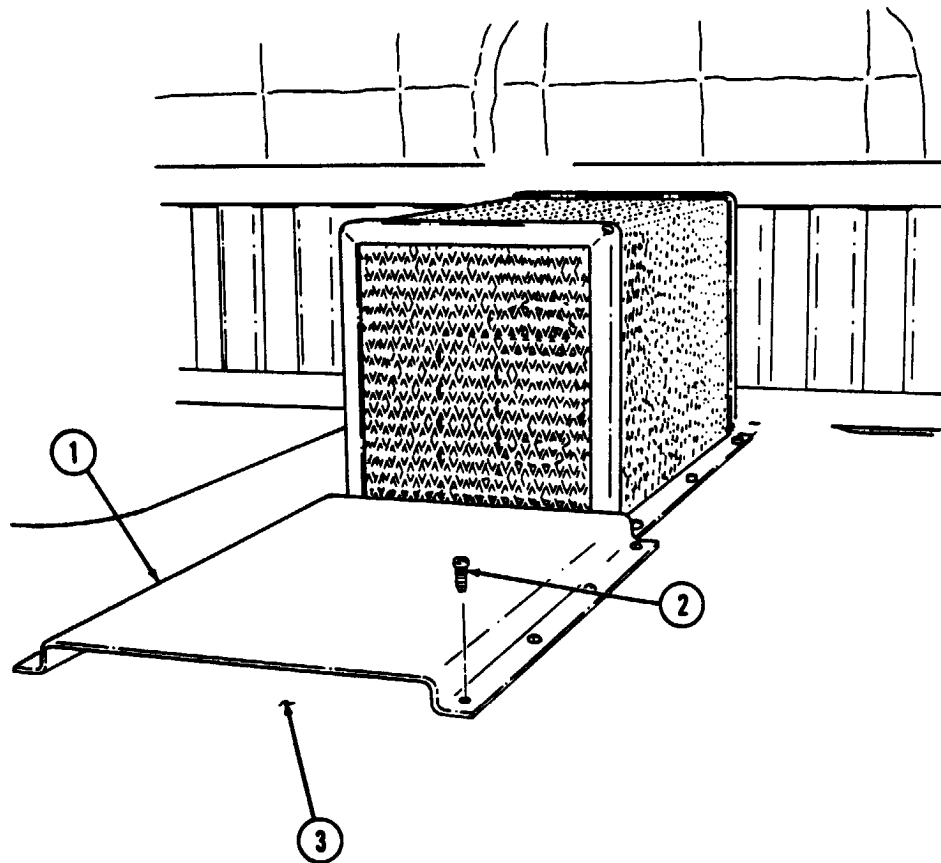
General mechanic's tool kit:
automotive (Appendix B, Item 1)

a. Removal

Remove eight screws (2) and floor bracket (1) from front cargo floor cover (3).

b. Installation

Install floor bracket (1) on front cargo floor cover (3) with eight screws (2).



12-100. TROOP/CARGO WINTERIZATION HEATER CONTROL BOX AND ANGLE BRACKET REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M998, M998A1, M1038, M1038A1

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Adhesive (Appendix C, Item 7)
Two locknuts (Appendix G, Item 78)
Two lockwashers (Appendix G, Item 189)
Tiedown strap (Appendix G, Item 313)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

Battery ground cable disconnected (para. 4-73).

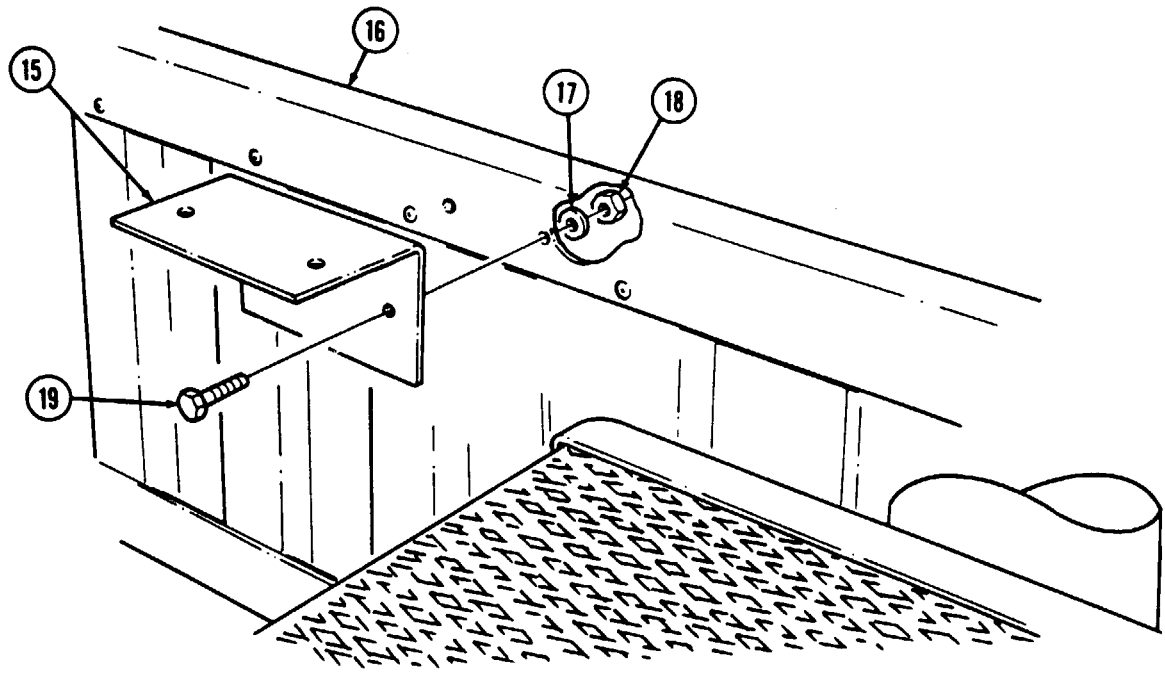
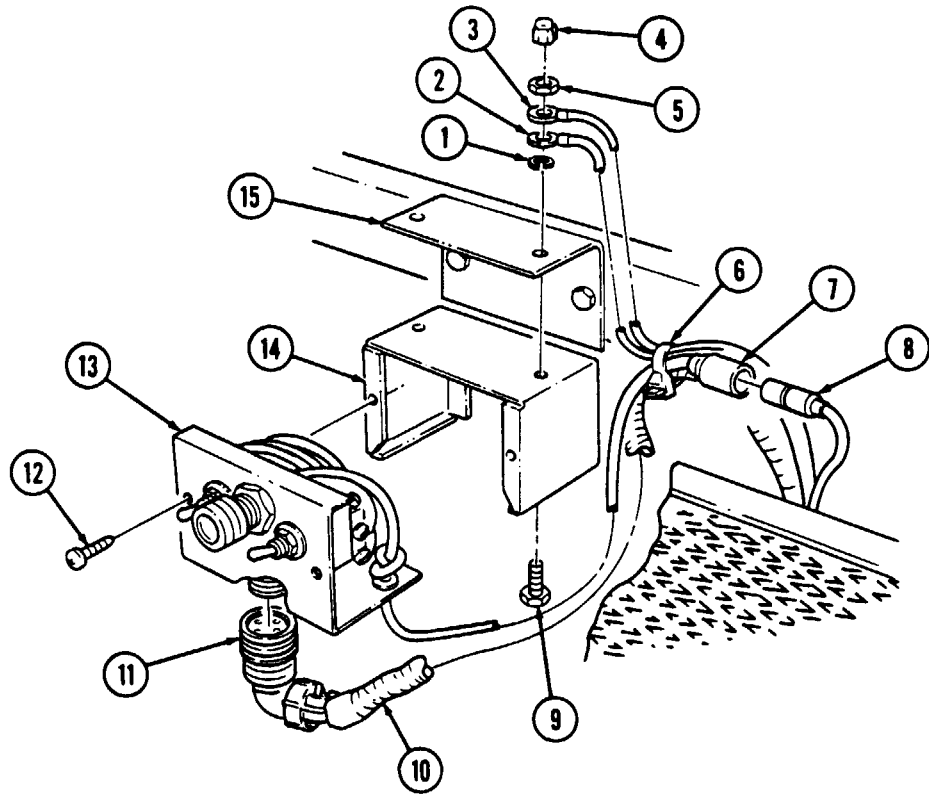
a. Removal

1. Disconnect control box lead 400 (7) from harness lead 1C (8).
2. Remove tiedown strap (6) from ground lead 2C (3), ground lead (2), control box lead 400 (7), and heater wiring harness (10). Discard tiedown strap (6).
3. Disconnect cannon plug (11) from inner shell (13).
4. Remove two screws (12) and control box inner shell (13) from outer shell (14),
5. Remove two crown nuts (4), nuts (5), lockwashers (1), capscrews (9), ground lead 2C (3), ground lead (2), and outer shell (14) from angle bracket (15). Discard lockwashers (1).
6. Remove two locknuts (18), washers (17), capscrews (19), and angle bracket (15) from cargo bulkhead (16). Discard locknuts (18).

b. Installation

1. Install angle bracket (15) on cargo bulkhead (16) with two capscrews (19), washers (17), and locknuts (18).
2. Install outer shell (14), ground lead (2), and ground lead 2C (3) to angle bracket (15) with two capscrews (9), lockwashers (1), and nuts (5).
3. Apply adhesive to exposed threads of two capscrews (9) and install two crown nuts (4) on capscrews (9).
4. Install inner shell (13) on outer shell (14) with two screws (12).
5. Connect cannon plug (11) to inner shell (13).
6. Connect control box lead 400 (7) to harness lead 1C (8).
7. Install tiedown strap (6) on ground lead 2C (3), ground lead (2), control box lead 400 (7), and heater wiring harness (10).

12-100. TROOP/CARGO WINTERIZATION HEATER CONTROL BOX AND ANGLE BRACKET REPLACEMENT (Cont'd)



FOLLOW-ON TASKS:
 Ž Connect battery ground cable (para. 4-73).
 Ž Check for proper operation of troop/cargo heater (TM 9-2320-280-10).

12-101. TROOP/CARGO WINTERIZATION HEATER WIRING HARNESS REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M998, M998A1, M1038, M1038A1

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Adhesive (Appendix C, Item 7)
Two lockwashers (Appendix G, Item 178)
Lockwasher (Appendix G, Item 189)
Tiedown strap (Appendix G, Item 309)
Tiedown strap (Appendix G, Item 313)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

Battery ground cable disconnected (para. 4-73).

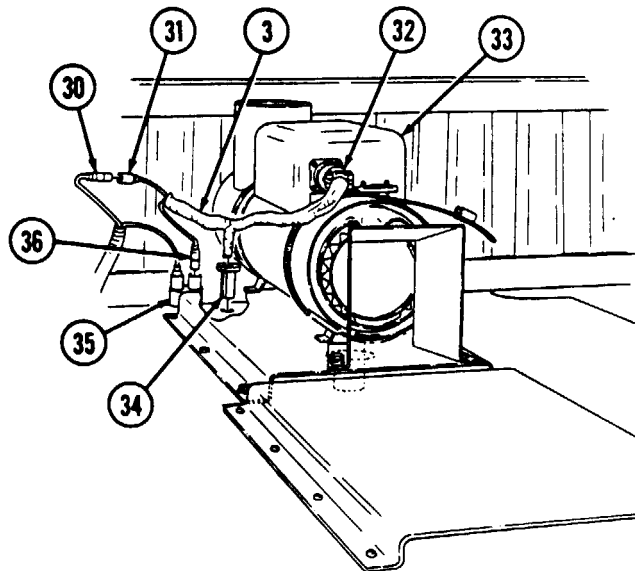
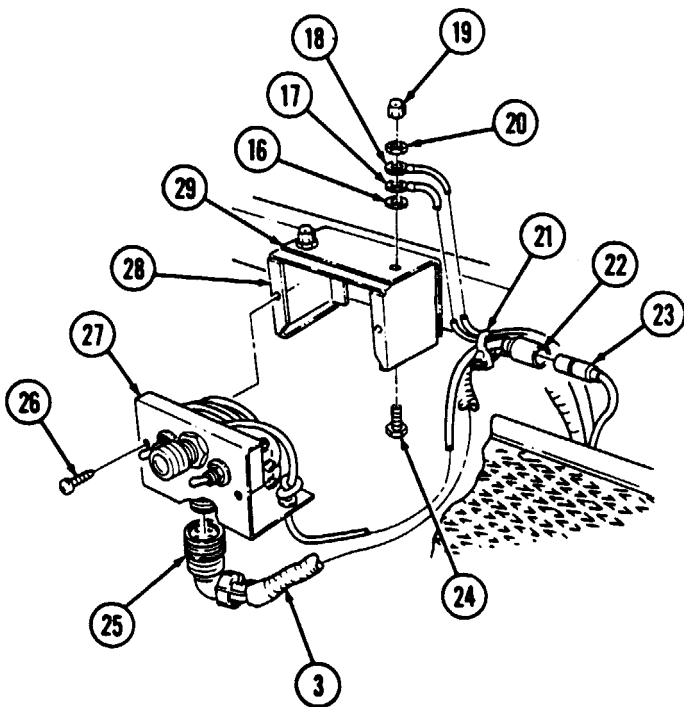
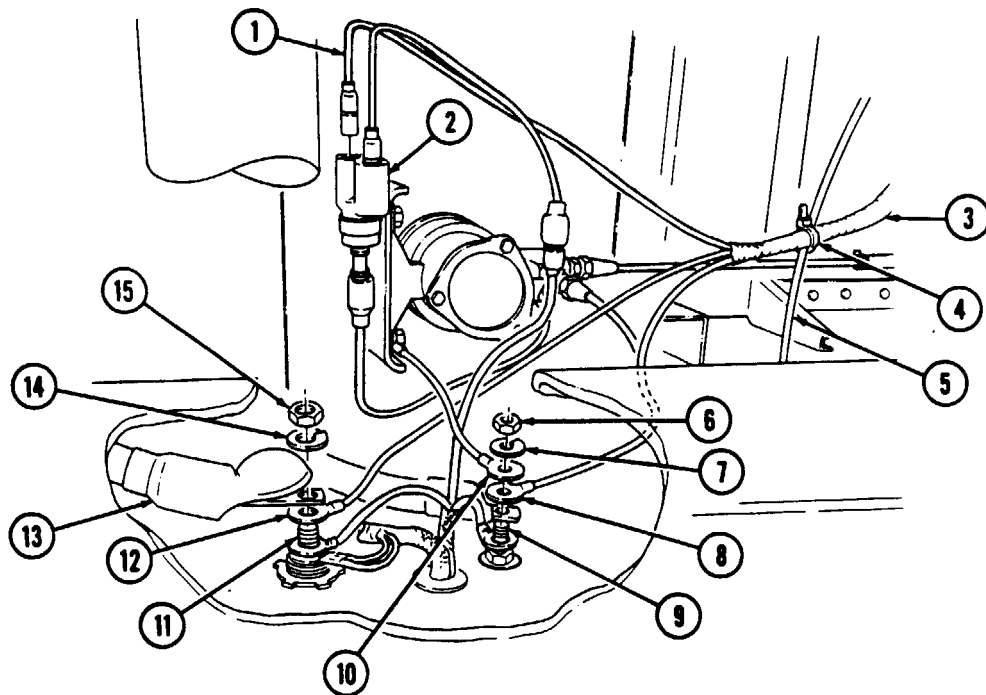
a. Removal

NOTE

- Depending on what kits are installed on the vehicle, there may be unidentified leads on the shunt stud and power stud. These leads must remain on the studs.
- Prior to removal, tag leads for installation.

1. Remove nut (6), lockwasher (7), fuel pump ground lead 799B (10) and lead 2A (8) from shunt stud (9). Discard lockwasher (7).
2. Remove nut (15), lockwasher (14), starter cable (13), and lead 1A (12) from power stud (11). Discard lockwasher (14).
3. Disconnect lead FP (1) from adapter (2).
4. Remove tiedown strap (4) and heater wiring harness (3) from transmission vacuum line (5). Discard tiedown strap (4).
5. Disconnect cannon plug (25) from control box inner shell (27).
6. Remove two screws (26) and control box inner shell (27) from outer shell (28).
7. Remove crown nut (19), nut (20), lockwasher (16), capscrew (24), ground lead 2C (18), and ground lead (17) from angle bracket (29). Discard lockwasher (16).
8. Disconnect lead 1C (23) from control box lead 400 (22).
9. Remove tiedown strap (21) from ground lead 2C (18), ground lead (17), control box lead 400 (22), and heater wiring harness (3). Discard tiedown strap (21).
10. Disconnect lead 2B (31) from lead 2A (30).
11. Disconnect lead 1B (36) from circuit breaker (35).
12. Disconnect cannon plug (32) from heater (33) and remove heater wiring harness (3).
13. Remove plastic sleeve (34) from heater wiring harness (3).

12-101. TROOP/CARGO WINTERIZATION HEATER WIRING HARNESS REPLACEMENT (Cont'd)

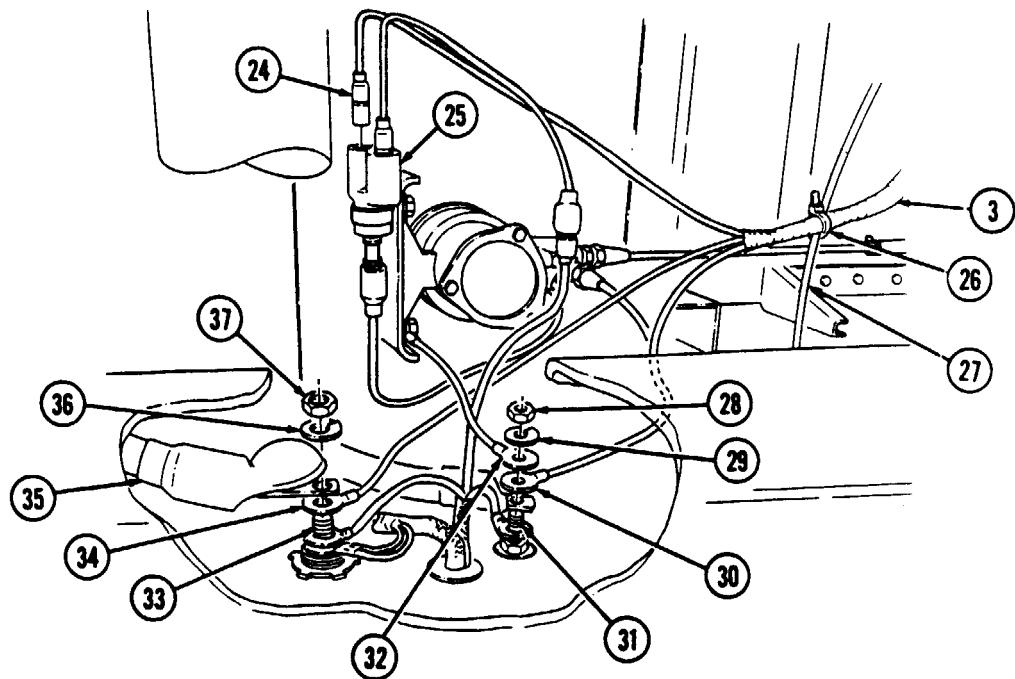
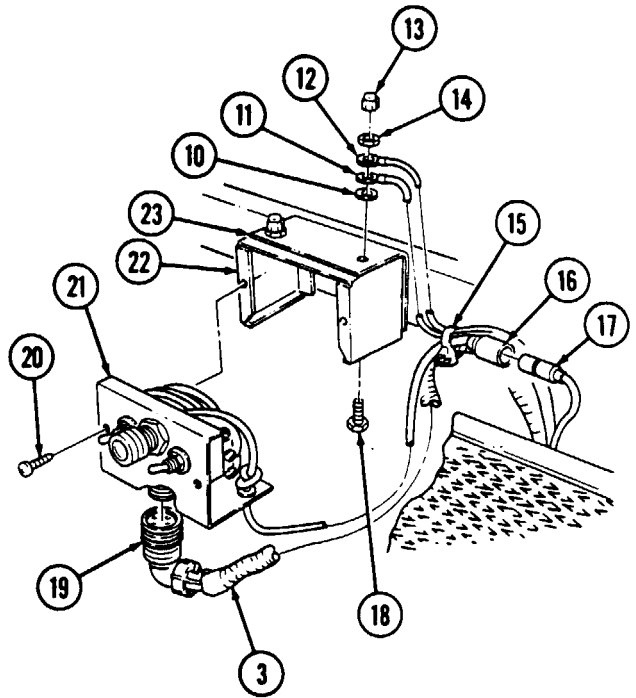
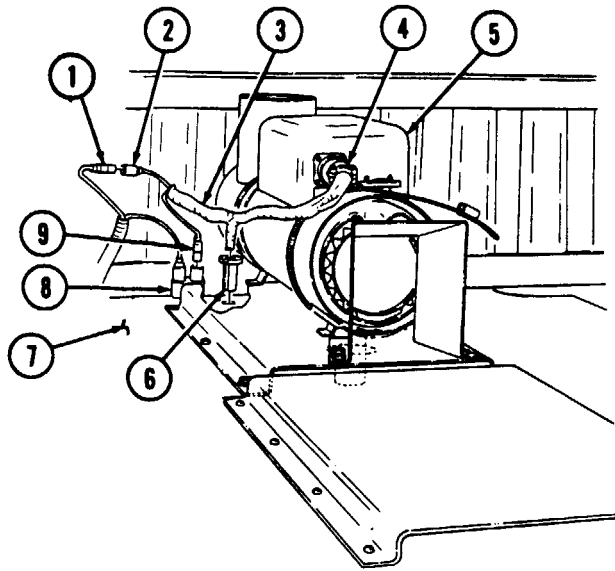


**12-101. TROOP/CARGO WINTERIZATION HEATER WIRING HARNESS REPLACEMENT
(Cont'd)**

b. Installation

1. Install heater wiring harness (3) through cargo floor (7), and position plastic sleeve (6) around harness (3). Insert plastic sleeve (6) into cargo floor (7).
2. Connect cannon plug (4) to heater (5).
3. Connect lead 1B (9) to circuit breaker (8).
4. Connect lead 2B (2) to lead 2A (1).
5. Connect lead 1C (17) to control box lead 400 (16).
6. Install ground lead (11) and ground lead 2C (12) on angle bracket (23) with capscrew (18), lockwasher (10), and nut (14).
7. Apply adhesive to exposed threads of capscrew (18) and install crown nut (13) on capscrew (18).
8. Install control box inner shell (21) on outer shell (22) with two screws (20).
9. Connect cannon plug (19) to control box inner shell (21).
10. Install tiedown strap (15) on ground lead 2C (12), ground lead (11), control box lead 400 (16), and heater wiring harness (3).
11. Connect lead FP (24) to adapter (25).
12. Install lead 1A (34) and starter cable (35) on power stud (33) with lockwasher (36) and nut (37).
13. Install lead 2A (30) and fuel pump ground lead 799B (32) on shunt stud (31) with lockwasher (29) and nut (28).
14. Install heater wiring harness (3) to transmission vacuum line (27) with tiedown strap (26).

12-101. TROOP/CARGO WINTERIZATION HEATER WIRING HARNESS REPLACEMENT (Cont'd)



FOLLOW-ON TASKS:
 Ž Connect battery ground cable (para. 4-73).
 Ž Check for proper operation of troop/cargo heater (TM 9-2320-280-10).

12-102. TROOP/CARGO WINTERIZATION HEATER WIRING HARNESS ADAPTER REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M998, M998A1, M1038, M1038A1

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Locknut (Appendix G, Item 70)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

Battery ground cable disconnected (para. 4-73).

a. Removal

1. Disconnect fuel pump lead (11) from connector (5).
2. Disconnect connector (5) from adapter (4).
3. Disconnect lead FP (1) from adapter (4).

NOTE

Perform step 4 if vehicle is equipped with front arctic heater.
Perform step 5 if vehicle is not equipped with front arctic heater.

4. Disconnect fuel pump jumper lead (6) from adapter (4).
5. Disconnect plug (2) and plug shell (3) from adapter (4).
6. Remove locknut (13), washer (14), capscrew (9), washer (8), fuel pump (10), clamp (12), and adapter (4) from bracket (7). Discard locknut (13).
7. Remove clamp (12) from adapter (4).

b. Installation

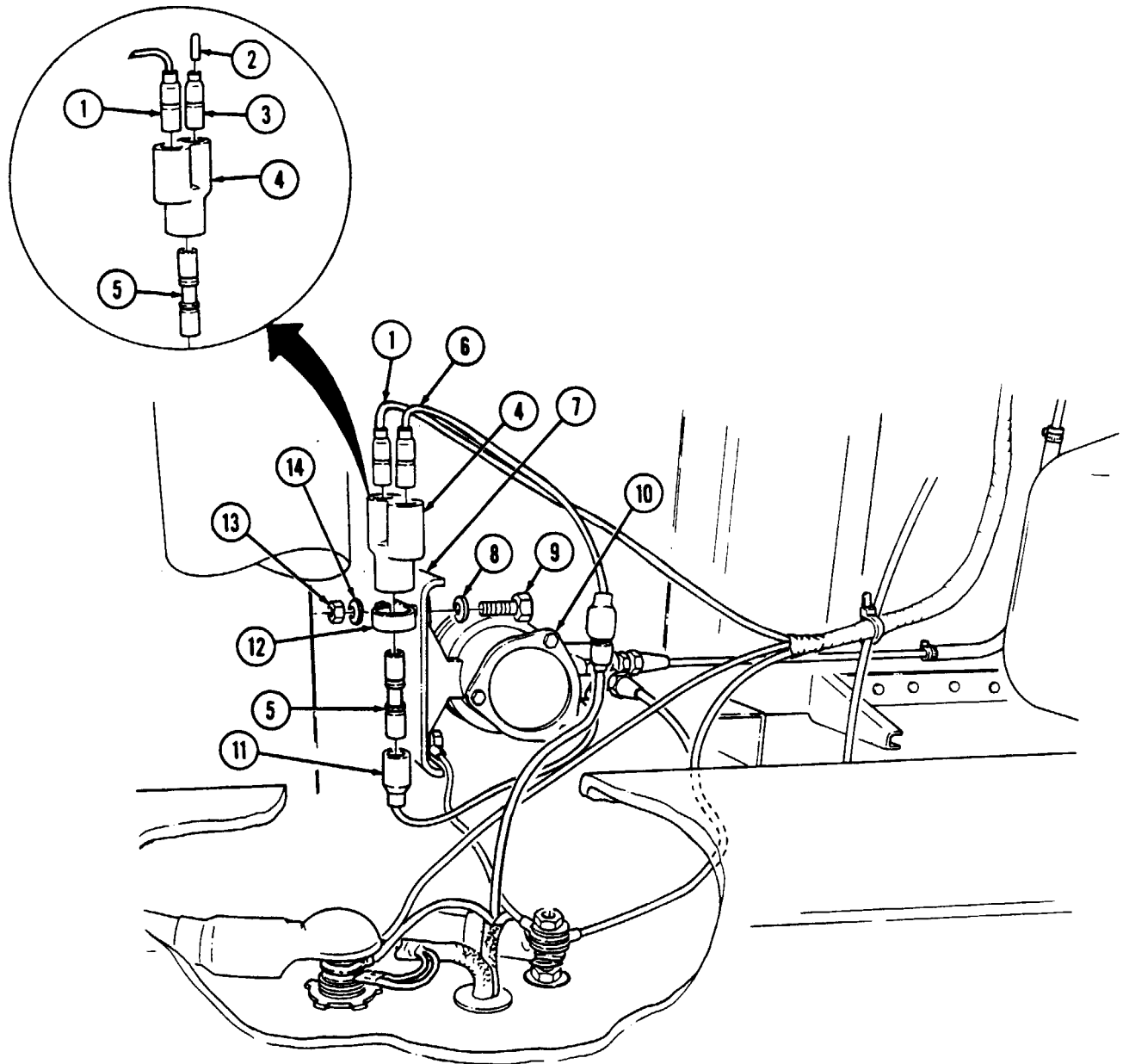
1. Install clamp (12) on adapter (4).
2. Install fuel pump (10), clamp (12), and adapter (4) on bracket (7) with washer (8), capscrew (9), washer (14), and locknut (13).

NOTE

Perform step 3 if vehicle is equipped with front arctic heater.
Perform step 4 if vehicle is not equipped with front arctic heater.

3. Connect fuel pump jumper lead (6) to adapter (4).
4. Connect plug shell (3) and plug (2) to adapter (4).
5. Connect lead FP (1) to adapter (4).
6. Connect connector (5) to adapter (4).
7. Connect fuel pump lead (11) to connector (5).

12-102. TROOP/CARGO WINTERIZATION HEATER WIRING HARNESS ADAPTER REPLACEMENT (Cont'd)



FOLLOW-ON TASKS:
 Ž Connect battery ground cable (para. 4-73).
 Ž Check for proper operation of troop/cargo heater (TM 9-2320-280-10).

12-103. TROOP/CARGO WINTERIZATION CIRCUIT BREAKER REPLACEMENT

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP:

Applicable Models

M998, M998A1, M1038, M1038A1

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

Battery ground cable disconnected (para. 4-73).

NOTE

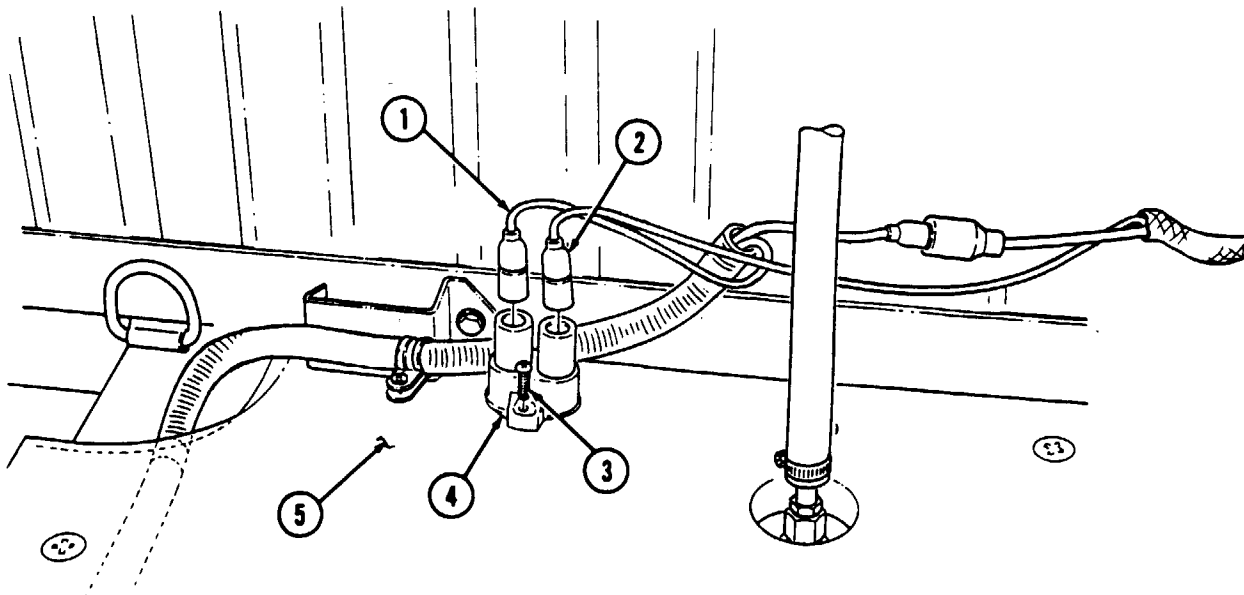
Prior to removal, tag leads for installation.

a. Removal

1. Disconnect heater harness lead 1B (2) from circuit breaker (4).
2. Disconnect blackout/dome light harness lead 1A (1) from circuit breaker (4).
3. Remove two screws (3) and circuit breaker (4) from front cargo floor cover (5).

b. Installation

1. Install circuit breaker (4) on front cargo floor cover (5) with two screws (3).
2. Connect blackout/dome light harness lead 1A (1) to circuit breaker (4).
3. Connect heater harness lead 1B (2) to circuit breaker (4).



- FOLLOW-ON TASKS:**
- ⌘ Connect battery ground cable (para. 4-73).
 - ⌘ Check for proper operation of troop/cargo heater (TM 9-2320-280-10).

12-104. TROOP/CARGO WINTERIZATION BLACKOUT CURTAIN REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M998, M998A1, M1038, M1038A1

Materials/Parts

Eighteen locknuts (Appendix G, Item 95)

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

NOTE

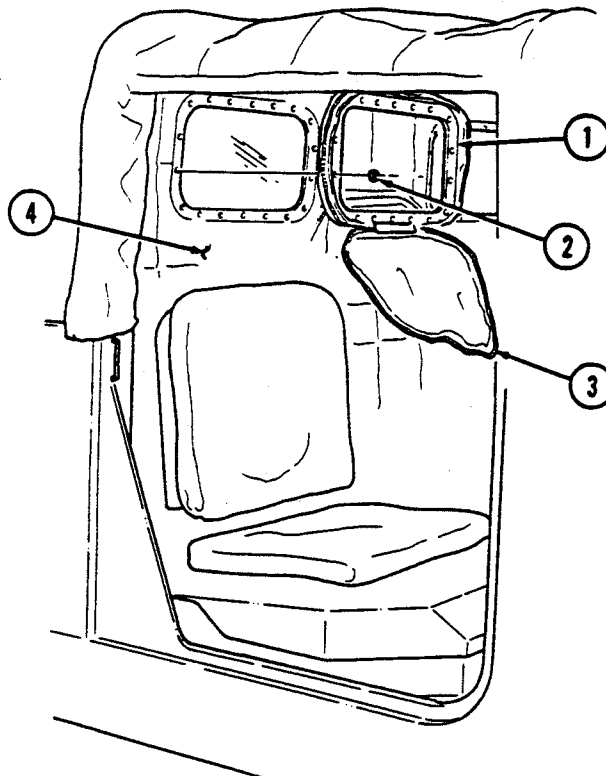
There are two blackout curtains located in the driver's compartment. There is also a blackout curtain located above the driver's compartment on the troop/cargo enclosure assembly. This blackout curtain opens from inside the enclosure assembly. The replacement procedures for all blackout curtains are basically the same. The following replacement instructions cover the right blackout curtain in the driver's compartment.

a. Removal

Remove eighteen locknuts (2), blackout curtain (3), and retainer (1) from arctic curtain (4). Discard locknuts (2).

b. Installation

Install blackout curtain (3) and retainer (1) on arctic curtain (4) with eighteen locknuts (2).



12-105. TROOP/CARGO WINTERIZATION BLACKOUT/DOME LIGHT WIRING HARNESS REPLACEMENT

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP:

Applicable Models

M998, M998A1, M1038, M1038A1

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

- Ž Battery ground cable disconnected (para. 4-73).
- Ž Cargo floor cover removed (para. 12-110).
- Ž Blackout/dome light switch removed (para. 12-106).
- Ž Blackout/dome light door switch removed (para. 12-107).

NOTE

Prior to removal, tag leads for installation.

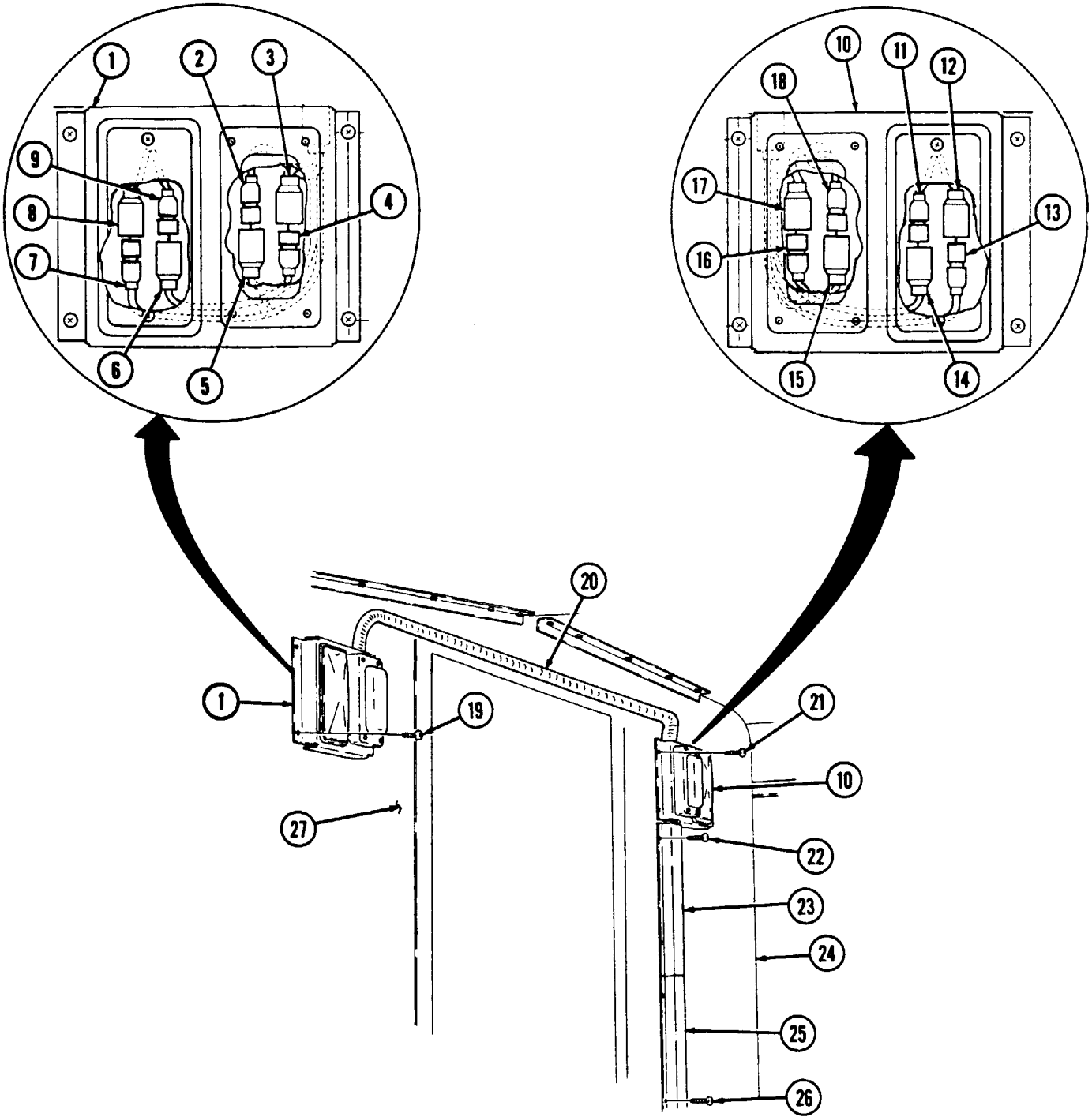
a. Removal

1. Remove four screws (22) and upper side channel (23) from left end closure (24).
2. Remove ten screws (26) and lower side channel (25) from left end closure (24).
3. Remove four screws (19) and right blackout/dome light assembly (1) from right end closure (27).
4. Disconnect harness leads 712C (7) and 719C (6) from dome light leads 711/712 (8) and 719 (9).
5. Disconnect harness leads 711C (2) and 2C (3) from blackout light leads 711/712 (5) and 717 (4).
6. Remove four screws (21) and left blackout/dome light assembly (10) from left end closure (24).
7. Disconnect harness leads 712B (13) and 719B (14) from dome light leads 711/712 (12) and 719 (11).
8. Disconnect harness leads 711B (16) and 2B (15) from blackout light leads 711/712 (17) and 717 (18) and remove wiring harness (20).

b. Installation

1. Connect harness leads 711B (16) and 2B (15) to blackout light leads 711/712 (17) and 717 (18).
2. Connect harness leads 712B (13) and 719B (14) to dome light leads 711/712 (12) and 719 (11).
3. Install left blackout/dome light assembly (10) on left end closure (24) with four screws (21).
4. Connect harness leads 711C (2) and 2C (3) to blackout light leads 711/712 (5) and 717 (4).
5. Connect harness leads 712C (7) and 719C (6) to dome light leads 711/712 (8) and 719 (9).
6. Install right blackout/dome light assembly (1) on right end closure (27) with four screws (19).
7. Install wiring harness (20) under lower side channel (25) and install lower side channel (25) to left end closure (24) with ten screws (26).
8. Install wiring harness (20) under upper side channel (23) and install upper side channel (23) to left end closure (24) with four screws (22).

12-105. TROOP/CARGO WINTERIZATION BLACKOUT/DOME LIGHT WIRING HARNESS REPLACEMENT (Cont'd)



- FOLLOW-ON TASKS:
- Ž Install blackout/dome light door switch (para. 12-107).
 - Ž Install blackout/dome light switch (para. 12-106).
 - Ž Install cargo floor cover (para. 12-110).
 - Ž Connect battery ground cable (para. 4-73).
 - Ž Check blackout light and dome light for proper operation (TM 9-2320-280-10).

12-106. TROOP/CARGO WINTERIZATION BLACKOUT/DOME LIGHT SWITCH REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M998, M998A1, M1038, M1038A1

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

Battery ground cable disconnected (para. 4-73).

a. Removal

1. Remove nut (7) from box (3).
2. Remove two screws (2), box (3), and switch (9) from upper side channel (1) and lower side channel (4).
3. Inspect decal (8) and remove from box (3) if decal (8) is damaged or illegible.

NOTE

Prior to removal, tag leads for installation.

4. Remove three screws (5), washers (11), and leads 711A (6), 1B (12), and 712A (10) from switch (9).

b. Installation

NOTE

Ensure lead 711A is positioned on top switch contact, and keyway is on bottom of switch.

1. Install leads 711A (6), 1B (12), and 712A (10) on switch (9) with three washers (11) and screws (5). Do not tighten screws (5).
2. Install decal (8) on box (3), if removed.

NOTE

Ensure keyway in switch is toward the "BLACKOUT" position on box when installed.

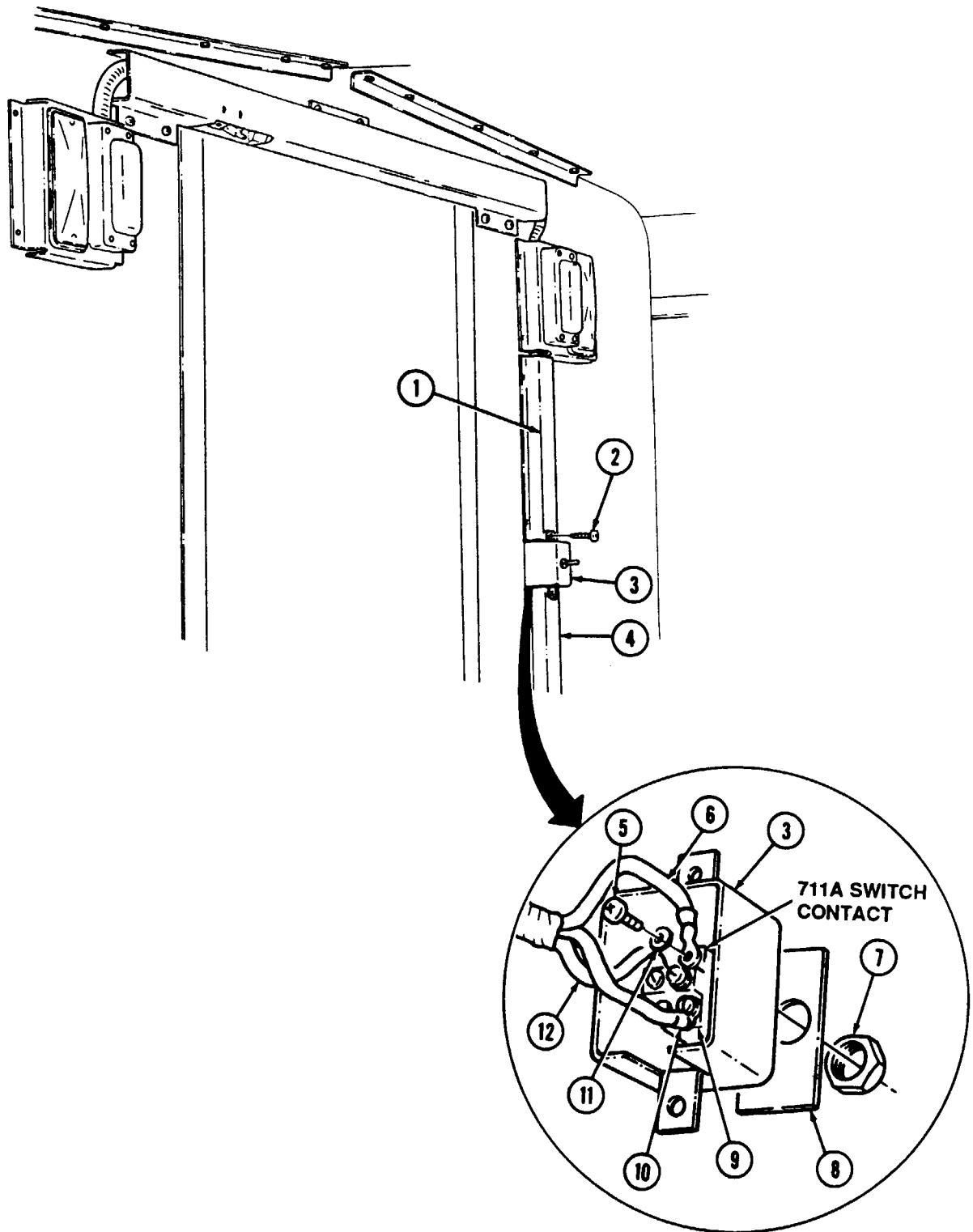
3. Install switch (9) on box (3) with nut (7).
4. Tighten three screws (5) installed in step 1.

NOTE

Ensure electrical harness lead are not binding during box installation.

5. Install box (3) on upper side channel (1) and lower side channel (4) with two screws (2).

12-106. TROOP/CARGO WINTERIZATION BLACKOUT/DOME LIGHT SWITCH REPLACEMENT (Cont'd)



- FOLLOW-ON TASKS:
- Ž Connect battery ground cable (para. 4-73).
 - Ž Check blackout light and dome light for proper operation (TM 9-2320-280-10).

12-107. TROOP/CARGO WINTERIZATION BLACKOUT/DOME LIGHT DOOR SWITCH REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M998, M998A1, M1038, M1038A1

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Four locknuts (Appendix G, Item 117)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

Battery ground cable disconnected (para. 4-73).

a. Removal

1. Remove six screws (2) and top channel (1) from left end closure (3) and right end closure (4).
2. Remove four screws (7), locknuts (5), four clamps (6), and wiring harness (11) from top channel (1). Discard locknuts (5).
3. Remove two screws (12), nuts (8), washers (9), and switch (10) from top channel (1).

NOTE

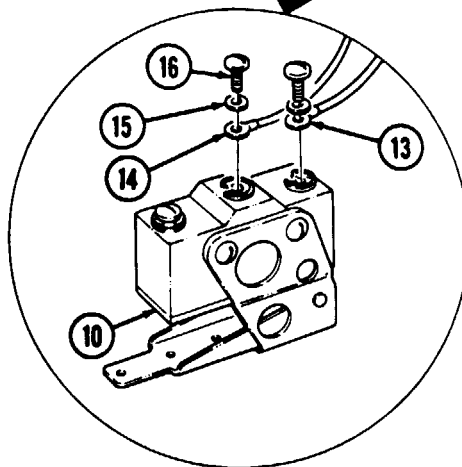
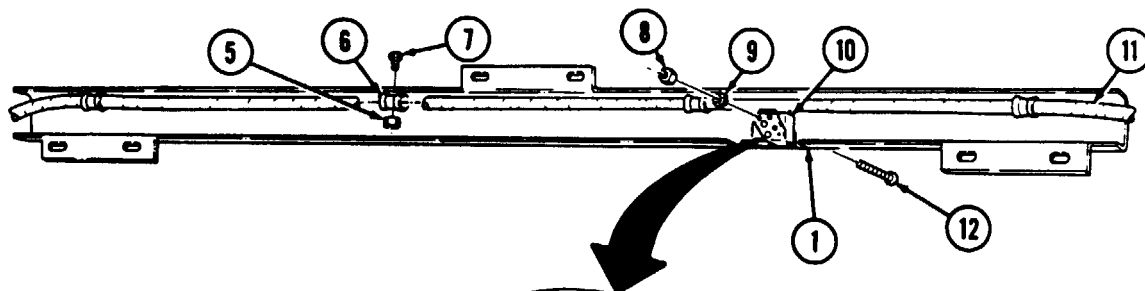
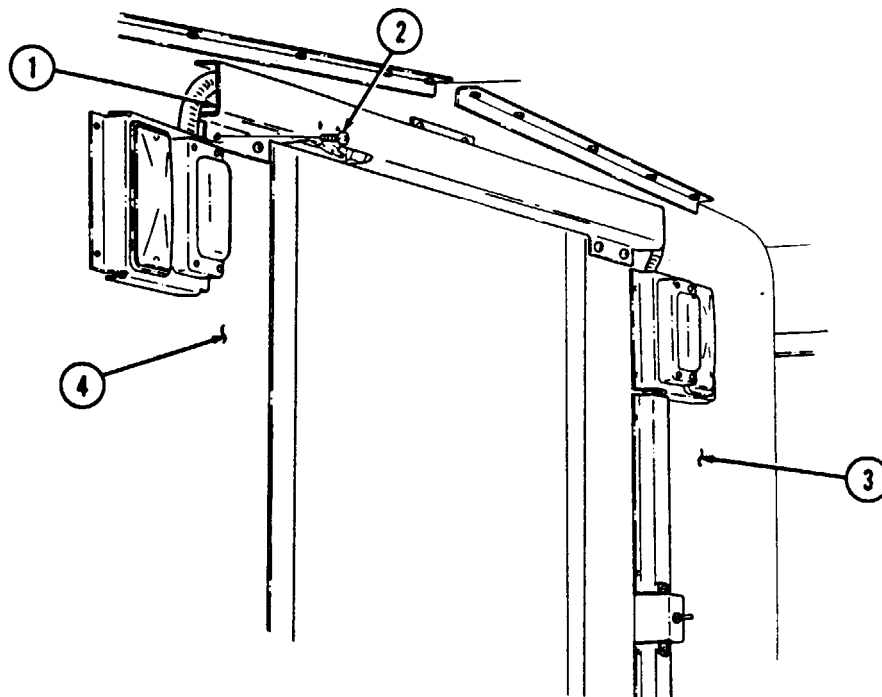
Prior to removal, tag leads for installation.

4. Remove two screws (16), washers (15), and leads 719A (14) and 2D (13) from switch (10).

b. Installation

1. Install leads 719A (14) and 2D (13) on switch (10) with two washers (15) and screws (16).
2. Install switch (10) on top channel (1) with two screws (12), washers (9), and nuts (8).
3. Install four clamps (6) and wiring harness (11) on top channel (1) with four screws (7) and locknuts (5).
4. Install top channel (1) on left end closure (3) and right end closure (4) with six screws (2).

12-107. TROOP/CARGO WINTERIZATION BLACKOUT/DOME LIGHT DOOR SWITCH REPLACEMENT (Cont'd)



FOLLOW-ON TASKS: \checkmark Connect battery ground cable (para. 4-73).
 \checkmark Check blackout light and dome light for proper operation (TM 9-2320-280-10).

12-108. TROOP/CARGO WINTERIZATION BLACKOUT/DOME LIGHT ASSEMBLY REPLACEMENT

This task covers:

- a Removal
- b. Installation

INITIAL SETUP:

Applicable Models

M998, M998A1, M1038, M1038A1

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

Battery ground cable disconnected (para. 4-73).

NOTE

Ž Replacement instructions for left and right blackout/dome light assemblies are the same. This procedure covers right blackout/dome light assembly.

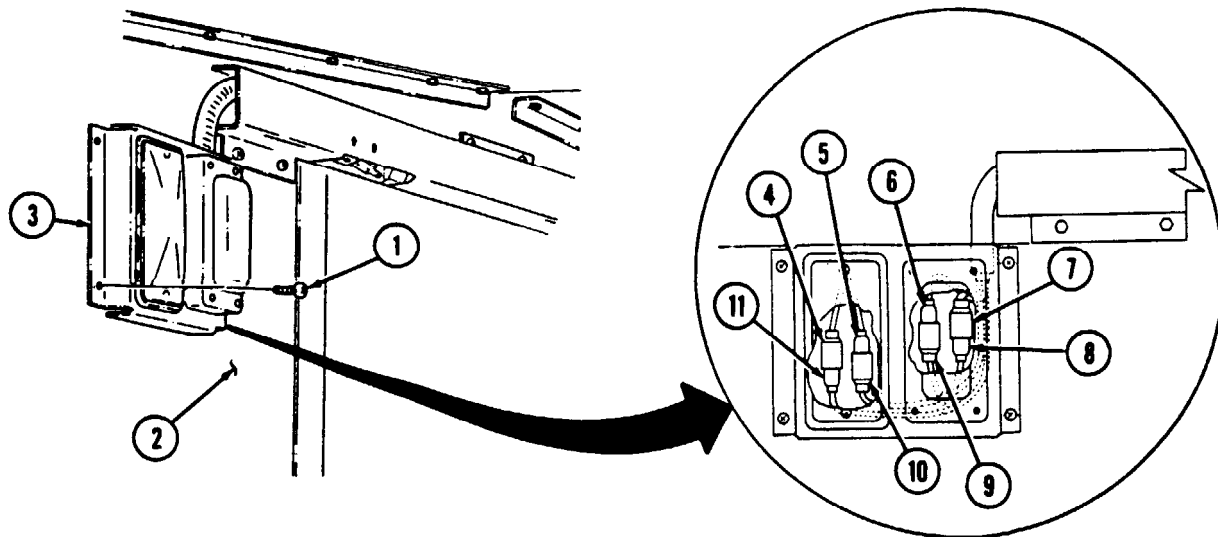
Ž Prior to removal, tag leads for installation.

a. Removal

1. Remove four screws (1) from blackout/dome light assembly (3) and right end closure (2).
2. Disconnect blackout light leads 717 (8) and 711/712 (9) from leads 2C (7) and 711C (6).
3. Disconnect dome light leads 719 (5) and 711/712 (4) from leads 719C (10) and 712C (11) and remove blackout/dome light assembly (3).

b. Installation

1. Connect dome light leads 719 (5) and 711/712 (4) to leads 719C (10) and 712C (11).
2. Connect blackout light leads 717 (8) and 711/712 (9) to leads 2C (7) and 711C (6).
3. Install blackout/dome light assembly (3) on right end closure (2) with four screws (1).



- FOLLOW-ON TASKS:**
- Ž Connect battery ground cable (para. 4-73).
 - Ž Check blackout light and dome light for proper operation (TM 9-2320-280-10).

12-109. TROOP/CARGO WINTERIZATION BLACKOUT/DOME LIGHT LAMP REPLACEMENT

This task covers:

a Removal

b. Installation

INITIAL SETUP:

Applicable Models

M998, M998A1, M1038, M1038A1

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

Battery ground cable disconnected (para. 4-73).

a. Removal

NOTE

Perform steps 1 and 2 for blackout light lamp removal. Perform steps 3 and 4 for dome light lamp removal.

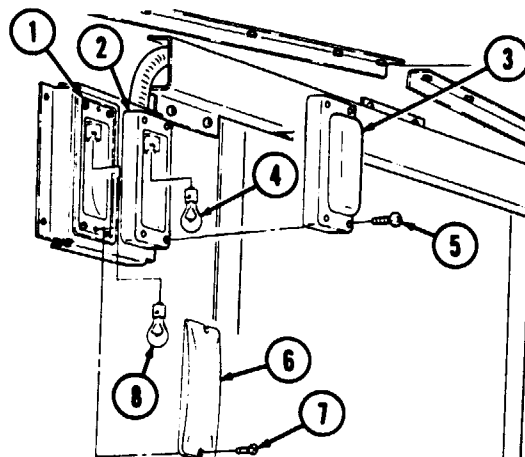
1. Remove four screws (5) and blackout light cover and lens assembly (3) from light body (2).
2. Remove lamp (4) from light body (2).
3. Remove two screws (7) and dome light cover and lens assembly (6) from light body (1).
4. Remove lamp (8) from light body(1).

b. Installation

NOTE

Perform steps 1 and 2 for blackout light lamp installation. Perform steps 3 and 4 for dome light lamp installation.

1. Install lamp (4) in light body (2).
2. Install blackout light cover and lens assembly (3) on light body (2) with four screws (5).
3. Install lamp (8) in light body (1).
4. Install dome light cover and lens assembly (6) on light body (1) with two screws (7).



FOLLOW-ON TASKS: \bar{Z} Connect battery ground cable (para. 4-73).
 \bar{Z} Check blackout light and dome light for proper operation (TM 9-2320-280-10).

12-110. TROOP/CARGO WINTERIZATION FRONT AND REAR CARGO FLOOR COVER REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M998, M998A1, M1038, M1038A1

Manual References

TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

- Heater base assembly removed (para. 12-98).
- Heater wiring harness removed (para. 12-101).
- Circuit breaker removed (para. 12-103).
- Skid strips removed (para. 12-111).
- Side wheelhousing covers removed (para. 12-115).

Materials/Parts

Four locknuts (Appendix G, Item 120)
Six platenuts (Appendix G, Item 225)
Nine rivnuts (Appendix G, Item 275)

a. Removal

1. Remove screw (1) and clamp (2) from blackout/dome light wiring harness (3) and front cargo floor cover (4).
2. Remove two locknuts (11), washers (10), and screws (8) from door and frame assembly (9), rear cargo floor cover (7), cargo floor (15), and "D" beam (14). Discard locknuts (11).
3. Remove two locknuts (12), washers (13), and capscrews (16) from door and frame assembly (9), rear cargo floor cover (7), cargo floor (15), and "D" beam (14). Discard locknuts (12).
4. Remove two screws (5) and step latch strip (6) from rear cargo floor cover (7).
5. Remove nine screws (17), front cargo floor cover (4), and rear cargo floor cover (7) from cargo floor (15).
6. Inspect nine rivnuts (18) for damage. Replace if damaged.
7. Inspect six platenuts (19) for damage. Replace if damaged.

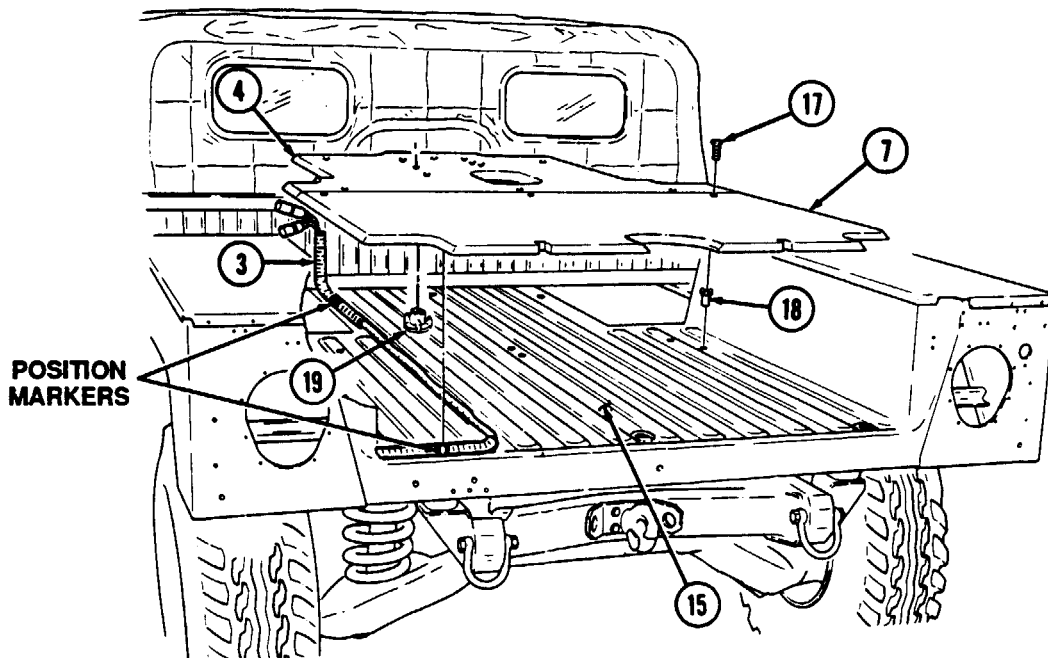
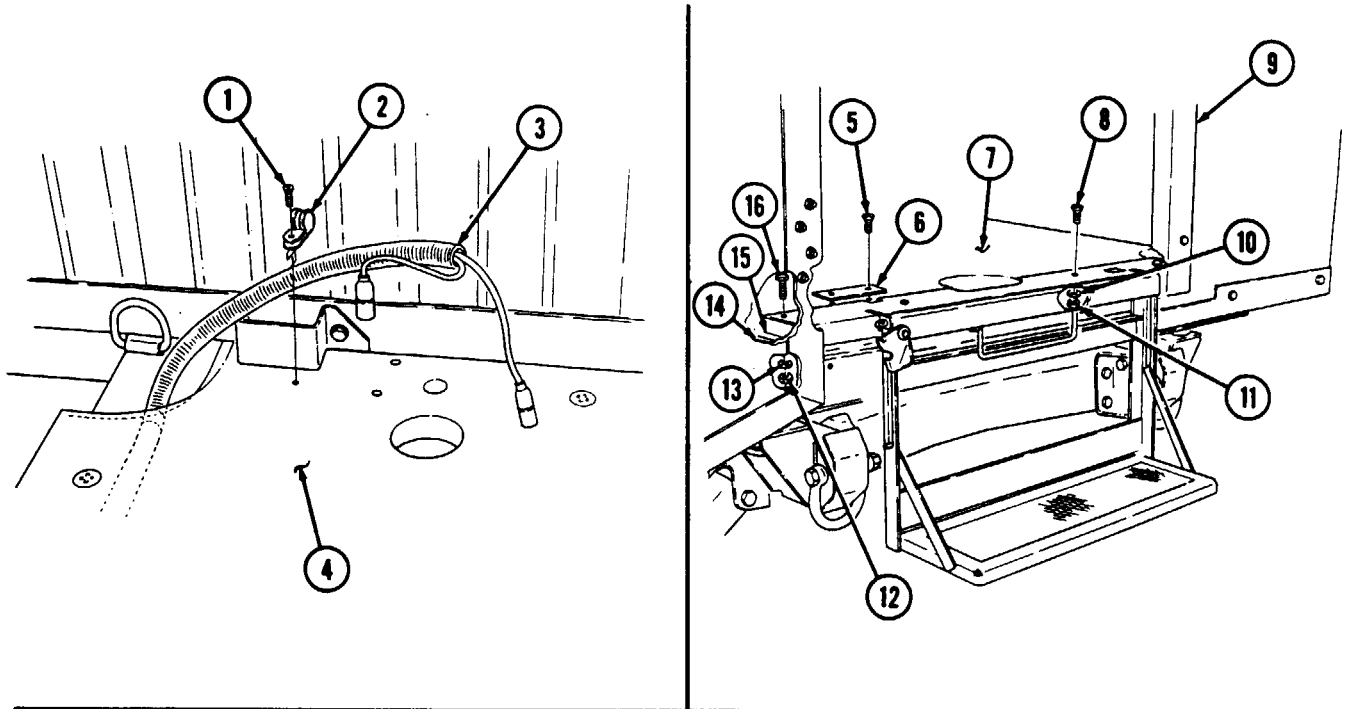
b. Installation

NOTE

Ensure position markers on blackout/dome light wiring harness extend beyond the front and rear cargo floor covers.

1. Install front cargo floor cover (4) and rear cargo floor cover (7) on cargo floor (15) with nine screws (17).
2. Install step latch strip (6) on rear cargo floor cover (7) with two screws (5).
3. Install door and frame assembly (9) and rear cargo floor cover (7) on cargo floor (15) and "D" beam (14) with two capscrews (16), washers (13), and locknuts (12).
4. Secure door and frame assembly (9) and rear cargo floor cover (7) to cargo floor (15) and "D" beam (14) with two screws (8), washers (10), and locknuts (11).
5. Install blackout/dome light wiring harness (3) on front cargo floor (4) with clamp (2) and screw (1).

12-110. TROOP/CARGO WINTERIZATION FRONT AND REAR CARGO FLOOR COVER REPLACEMENT (Cont'd)



- FOLLOW-ON TASKS:
- Ž Install side wheelhousing covers (para. 12-115).
 - Ž Install skid strips (para. 12-111).
 - Ž Install circuit breaker (para. 12-103).
 - Ž Install heater wiring harness (para. 12-101).
 - Ž Install heater base assembly (para. 12-98).

12-111. TROOP/CARGO WINTERIZATION CARGO FLOOR SKID STRIPS REPLACEMENT

This task covers:

- | | |
|------------|-----------------|
| a. Removal | b. Installation |
|------------|-----------------|

INITIAL SETUP:

Applicable Models

M998, M998A1, M1038, M1038A1

Manual References

TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

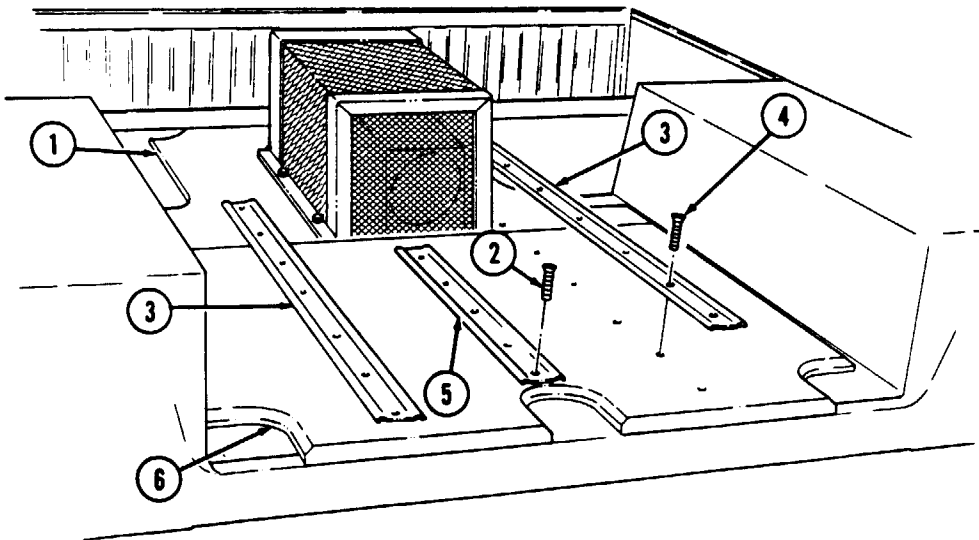
Floor bracket removed (para. 12-99).

a. Removal

1. Remove fourteen screws (4) and two skid strips (3) from front cargo floor cover (1) and rear cargo floor cover (6).
2. Remove five screws (2) and skid strip (5) from rear cargo floor cover (6).

b. Installation

1. Install skid strip (5) on rear cargo floor cover (6) with five screws (2).
2. Install two skid strips (3) to front cargo floor cover (1) and rear cargo floor cover (6) with fourteen screws (4).



FOLLOW-ON TASK: Install floor bracket (para. 12-99).

12-112. TROOP/CARGO WINTERIZATION SEAT BACK COVER REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M998, M998A1, M1038, M1038A1

Materials/Parts

Four locknuts (Appendix G, Item 120)

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-24P

NOTE

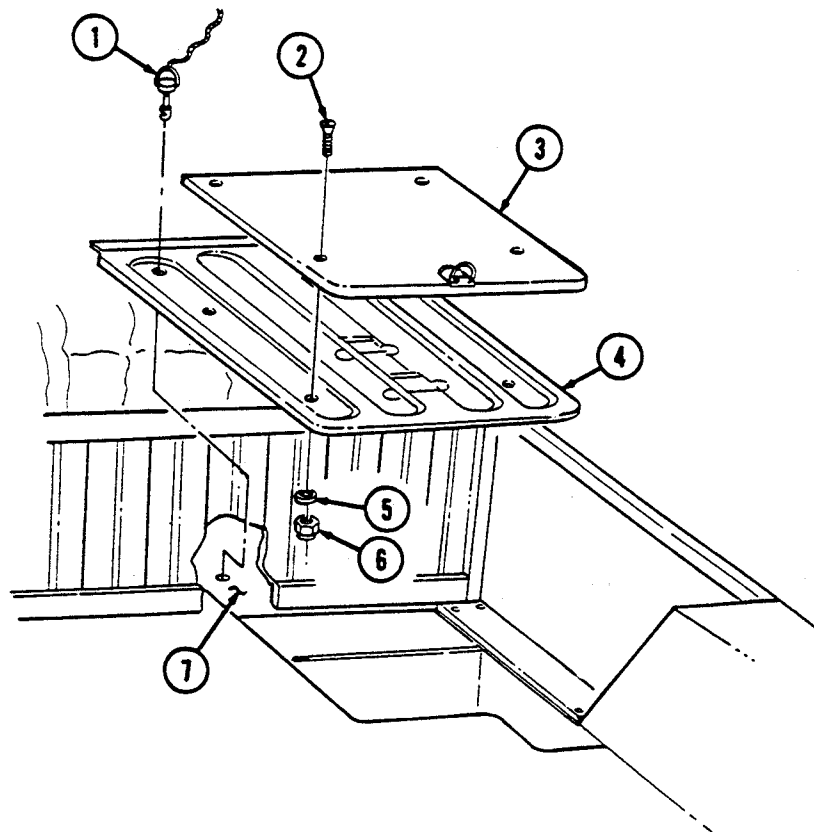
Replacement instructions for left and right seat back covers are the same. This procedure covers right seat back cover.

a. Removal

1. Remove two turn screws (1) and seat back (4) from body (7).
2. Remove four locknuts (6), washers (5), screws (2), and seat back cover (3) from seat back (4). Discard locknuts (6).

b. Installation

1. Install seat back cover (3) on seat back (4) with four screws (2), washers (5), and locknuts (6).
2. Install seat back (4) on body (7) with two turn screws (1).



12-113. TROOP/CARGO WINTERIZATION FIXED DOOR COVER REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M998, M989A1, M1038, M1038A1

Materials/Parts

Two locknuts (Appendix G, Item 119)

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-24P

NOTE

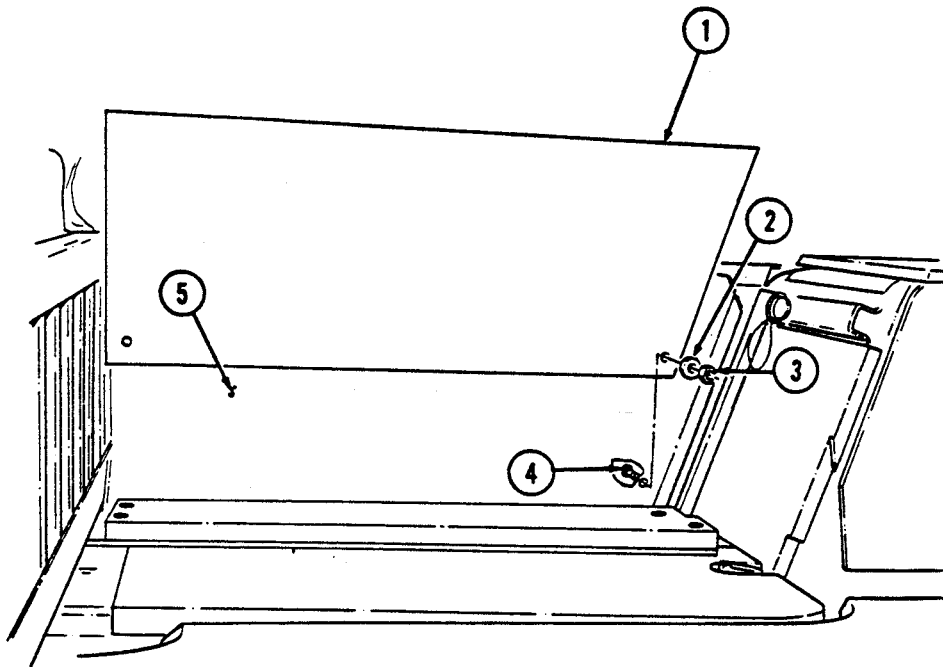
Replacement instructions for left and right fixed door covers are the same. This procedure covers right fixed door cover.

a. Removal

Remove two locknuts (3), washers (2), screws (4), and fixed door cover (1) from fixed door (5). Discard locknuts (3).

b. Installation

Install fixed door cover (1) on fixed door (5) with two screws (4), washers (2), and locknuts (3).



12-114. TROOP/CARGO WINTERIZATION SIDE FLOOR COVER REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M998, M998A1, M1038, M1038A1

Materials/Parts

Four locknuts (Appendix G, Item 120)

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-24P

NOTE

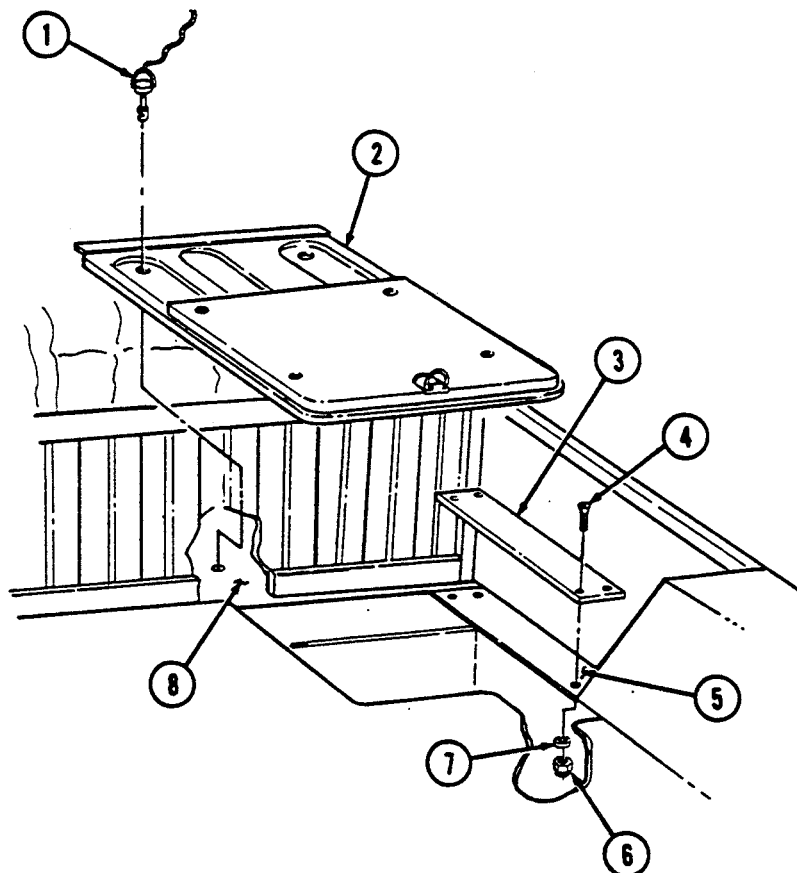
Replacement instructions for left and right side floor covers are the same. This procedure covers right side floor cover.

a. Removal

1. Remove two turnscrews (1) and seat back (2) from body (8).
2. Remove four locknuts (6), washers (7), screws (4), and side floor cover (3) from cargo floor (5). Discard locknuts (6).

b. Installation

1. Install side floor cover (3) on cargo floor (5) with four screws (4), washers (7), and locknuts (6).
2. Install seat back (2) on body (8) with two turnscrews (1).



12-115. TROOP/CARGO WINTERIZATION WHEELHOUSING COVERS REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M998, M998A1, M1038, M1038A1

Manual References

TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

Troop seat removed (para. 12-121).

Materials/Parts

Twenty-two locknuts (Appendix G, Item 119)

NOTE

Replacement instructions for left and right wheelhousing covers are the same. This procedure covers right wheelhousing covers.

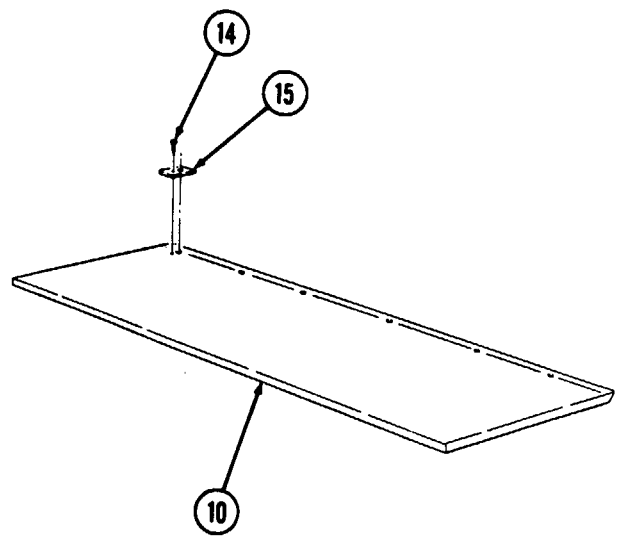
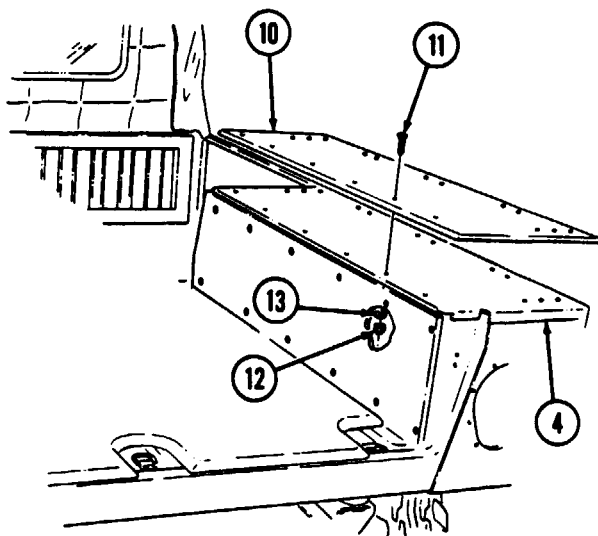
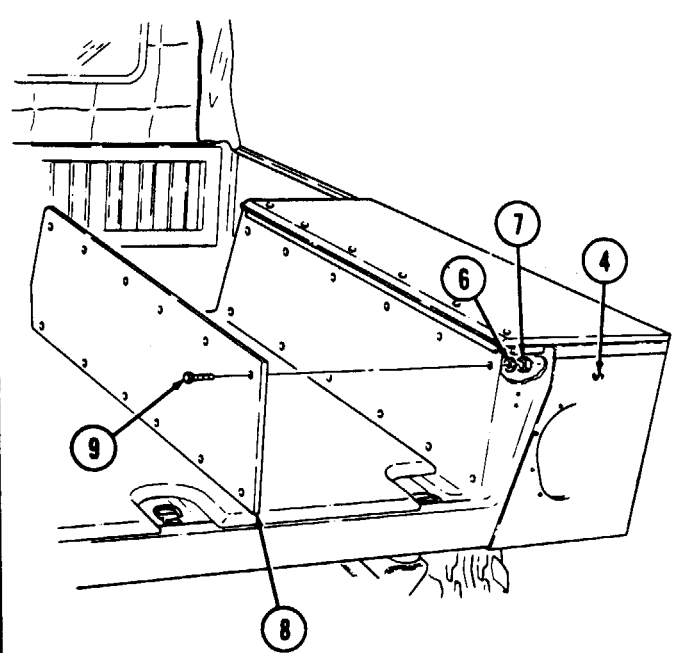
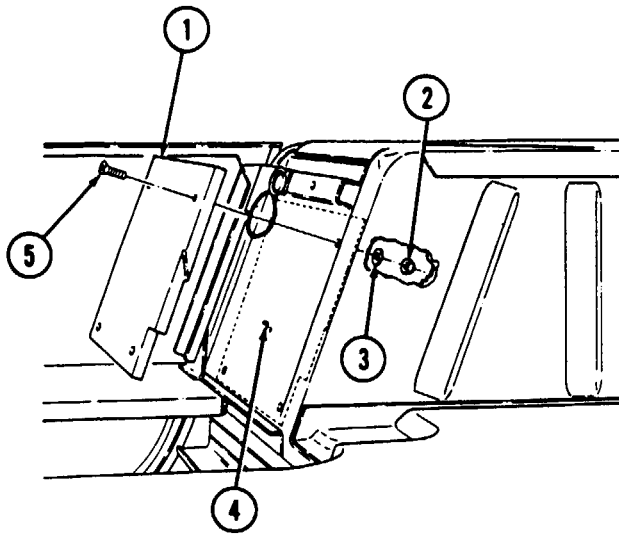
a. Removal

1. Remove four locknuts (2), washers (3), screws (5), and front cover (1) from wheelhousing (4). Discard locknuts (2).
2. Remove twelve locknuts (7), washers (6), screws (9), and side cover (8) from wheelhousing (4). Discard locknuts (7).
3. Remove six locknuts (12), washers (13), screws (11), and top cover (10) from wheelhousing (4). Discard locknuts (12).
4. Remove six screws (14) and six spacers (15) from top cover (10).

b. Installation

1. Install six spacers (15) on top cover (10) with six screws (14).
2. Install top cover (10) on wheelhousing (4) with six screws (11), washers (13), and locknuts (12).
3. Install side cover (8) on wheelhousing (4) with twelve screws (9), washers (6), and locknuts (7).
4. Install front cover (1) on wheelhousing (4) with four screws (5), washers (3), and locknuts (2).

12-115. TROOP/CARGO WINTERIZATION WHEELHOUSING COVERS REPLACEMENT (Cont'd)



FOLLOW-ON TASK: Install troop seat (para. 12-121).

12-116. TROOP/CARGO WINTERIZATION DOOR ADJUSTMENT

This task covers:

Adjustment

INITIAL SETUP:

Applicable Models

M998, M998A1, M1038, M1038A1

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Eight locknuts (Appendix G, Item 121)

Personnel Required

One mechanic
One assistant

Manual References

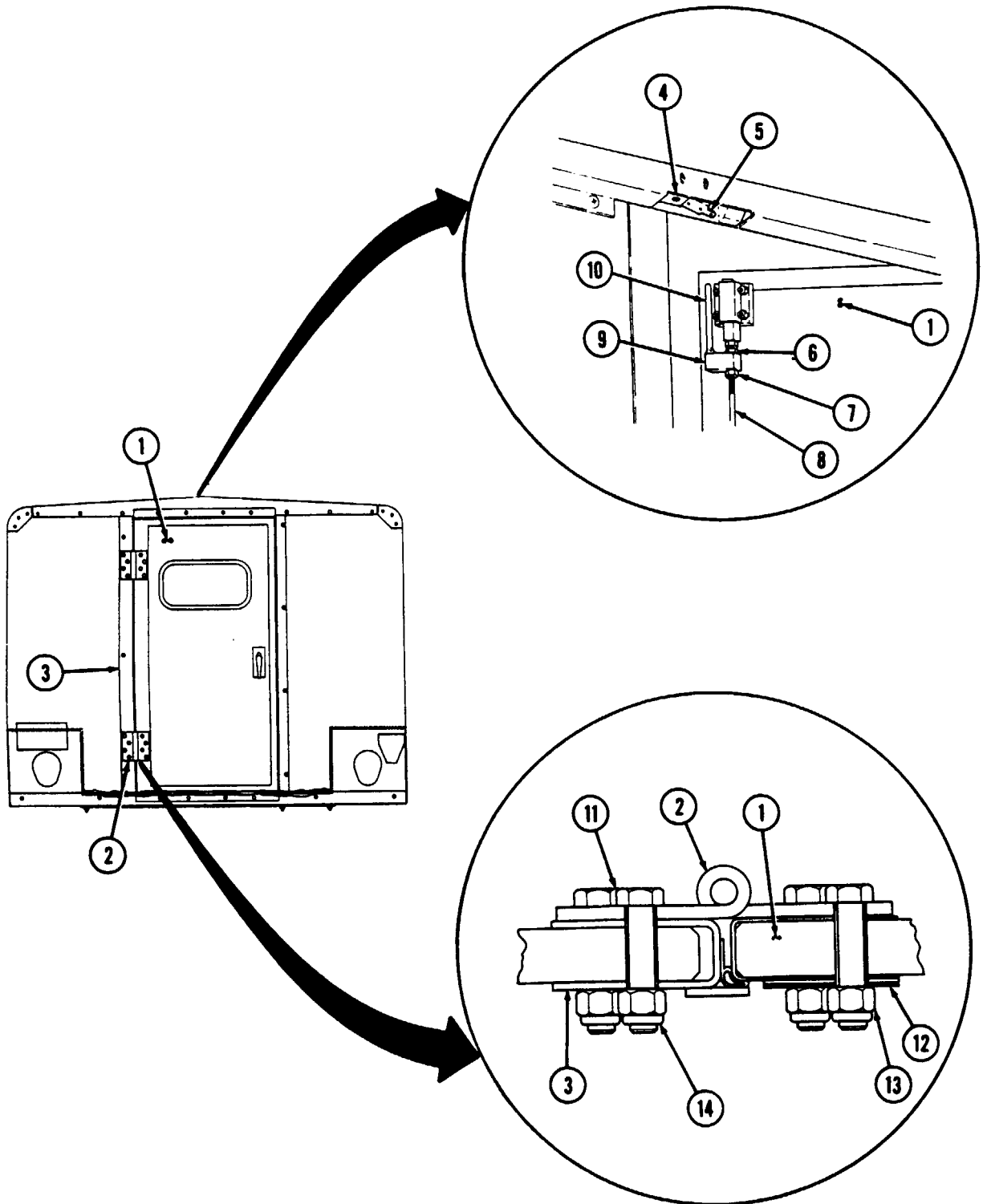
TM 9-2320-280-10
TM 9-2320-280-24P

Adjustment

NOTE

- Adjustment of door and frame assembly may be required if door is not centered or binds during opening or closing.
 - Ensure door has an equal distance around frame assembly in both vertical and horizontal directions.
 - For vertical or horizontal door adjustment, perform step 1.
 - For lateral door adjustment, perform steps 2 and 3.
 - For dome light on/off adjustment, perform steps 4 through 10.
1. Loosen eight nuts (14) and capscrews (11) from two hinges (2) and frame assembly (3) and lift or lower door (1) as required. Tighten nuts (14) to 85-90 lb-ft (115-122 N•m).
 2. Remove eight locknuts (13) from door (1) and two hinges (2). Discard locknuts (13).
 3. Add or remove shims (12) from door (1), as required. Install and tighten locknuts (13) to 50-55 lb-ft (68-75 N•m).
 4. Place dome light switch in "DOME LIGHT" position (TM 9-2320-280-10).
 5. With door (1) in open position, loosen upper jamnut (6) and lower jamnut (7) to maximum outward position on control rod (8).
 6. Close and fasten door (1).
 7. Align rod (10) of actuator light control (9) with center of control arm (5) on door switch assembly (4).
 8. Engage control arm (5) by adjusting lower jamnut (7) upward on control arm (5) and actuator light control (9) until dome lights are on.
 9. Adjust lower jamnut (7) 0.25 in. (6.4 mm) beyond initial adjustment made in step 8.
 10. Adjust upper jamnut (6) on control rod (8) down on actuator light control (9) and tighten jamnut (6).

12-116. TROOP/CARGO WINTERIZATION DOOR ADJUSTMENT (Cont'd)



12-117. TROOP/CARGO WINTERIZATION DOOR AND FRAME ASSEMBLY REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M998, M998A1, M1038, M1038A1

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Twelve locknuts (Appendix G, Item 119)
Four locknuts (Appendix G, Item 120)
Twelve locknuts (Appendix G, Item 121)

Personnel Required

One mechanic
One assistant

Manual References

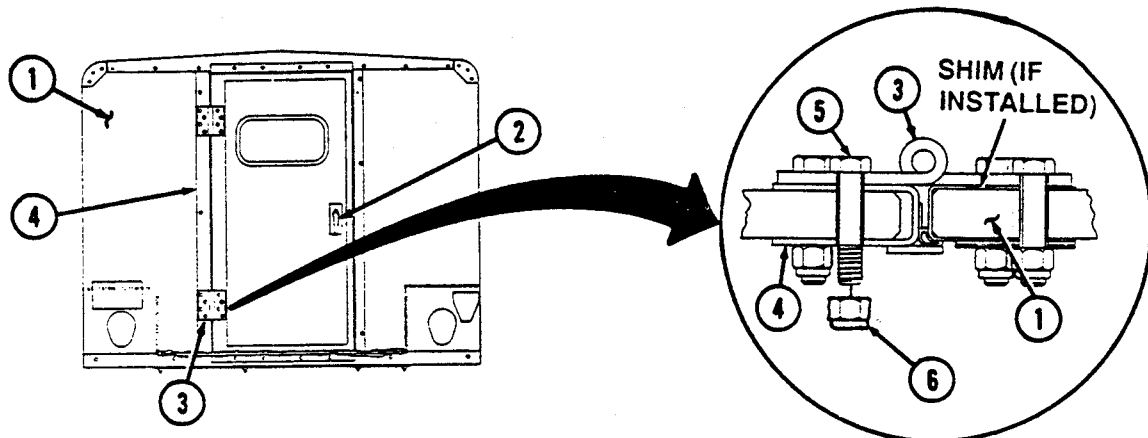
TM 9-2320-280-24P

Equipment Condition

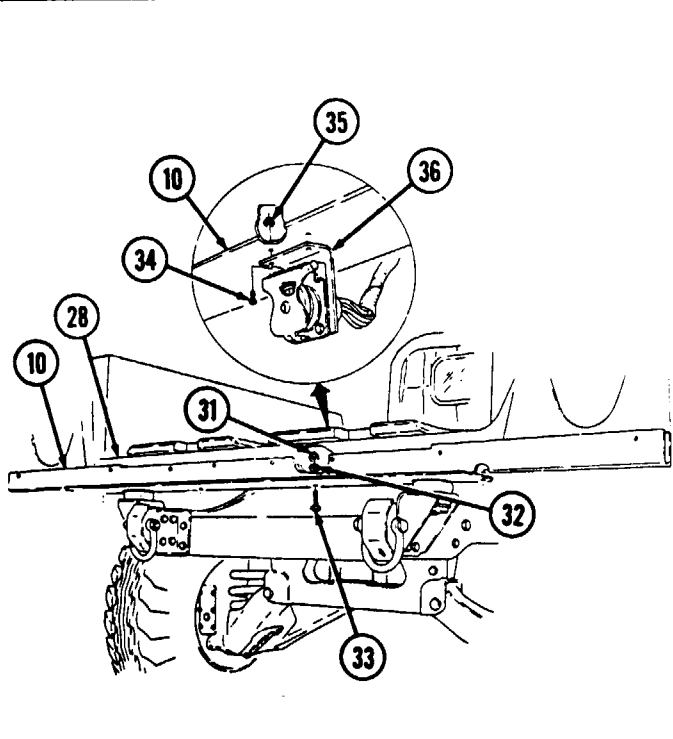
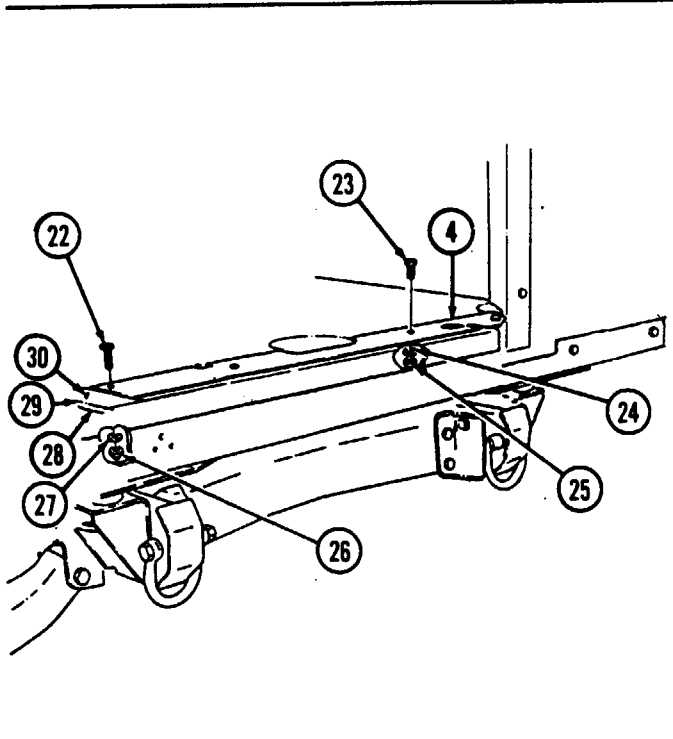
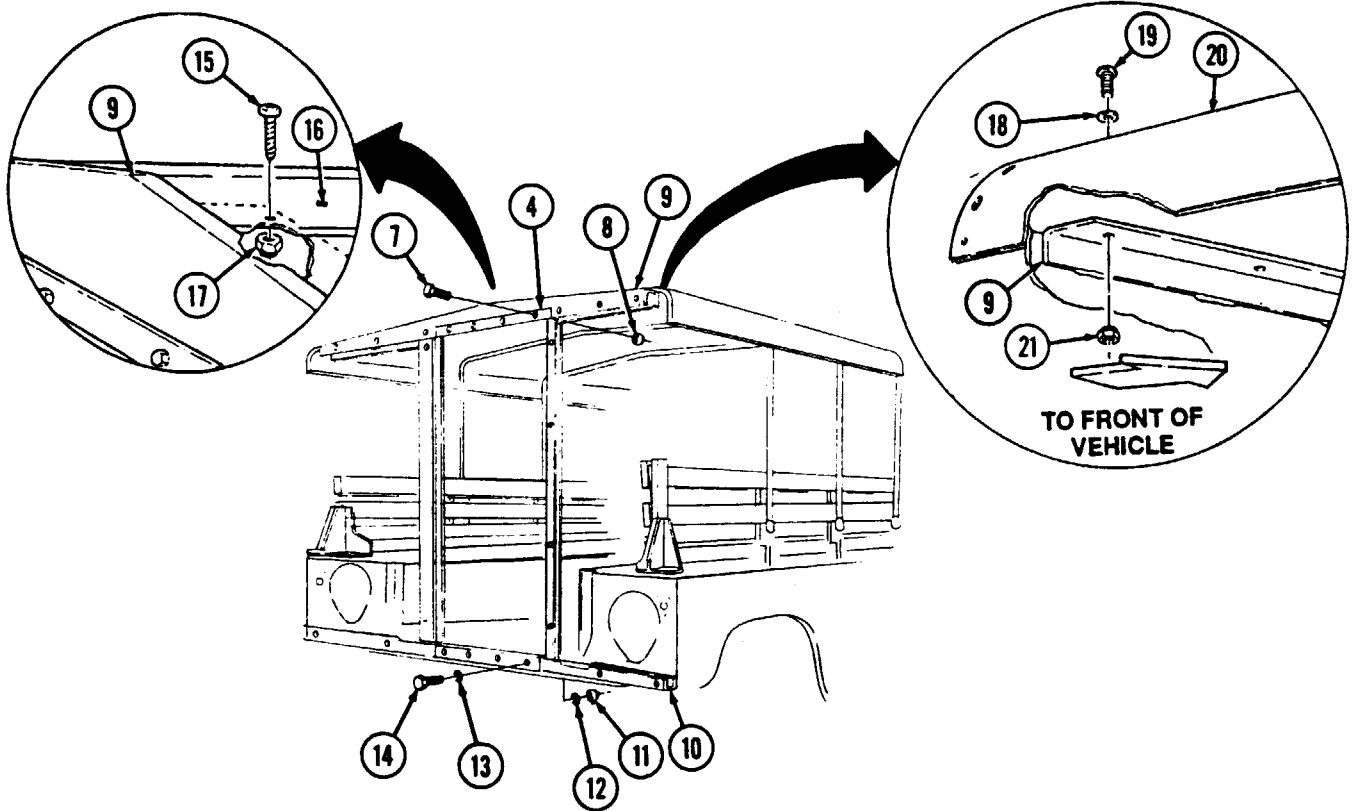
- End closures removed (para. 12-118).
- Rear step assembly removed (para. 12-122).

a. Removal

1. Shut door (1) and close latch (2).
2. Remove eight nuts (6) capscrews (5), and shims (if installed) from two hinges (3) and frame assembly (4).
3. Open latch (2) and remove door (1) and two hinges (3) from frame assembly (4).
4. Remove two locknuts (17) and screws (15) from channel (9) and top enclosure plate support (16). Discard locknuts (17).
5. Remove eight locknuts (21), screws (19), and washers (18) from channel (9) and top enclosure assembly (20). Discard locknuts (21).
6. Remove two locknuts (26), washers (27), and capscrews (22) from frame assembly (4), rear floor cover (30), cargo floor (29), and "D" beam (28). Discard locknuts (26).
7. Remove two locknuts (25), washers (24), and screws (23) from frame assembly (4), rear floor cover (30), cargo floor (29), and "D" beam (28). Discard locknuts (25).
8. Remove four locknuts (11), washers (12), capscrews (14), washers (13), and frame assembly (4) from support (10). Discard locknuts (11).
9. Remove two locknuts (35) and capscrews (34) from trailer mount bracket (36) and support (10). Discard locknuts (35).
10. Remove four locknuts (31), washers (32), capscrews (33), and support (10) from "D" beam (28). Discard locknuts (31).
11. Remove four locknuts (8), capscrews (7), and frame assembly (4) from channel (9). Discard locknuts (8).



12-117. TROOP/CARGO WINTERIZATION DOOR AND FRAME ASSEMBLY REPLACEMENT (Cont'd)



**12-117. TROOP/CARGO WINTERIZATION DOOR AND FRAME ASSEMBLY
REPLACEMENT (Cont'd)**

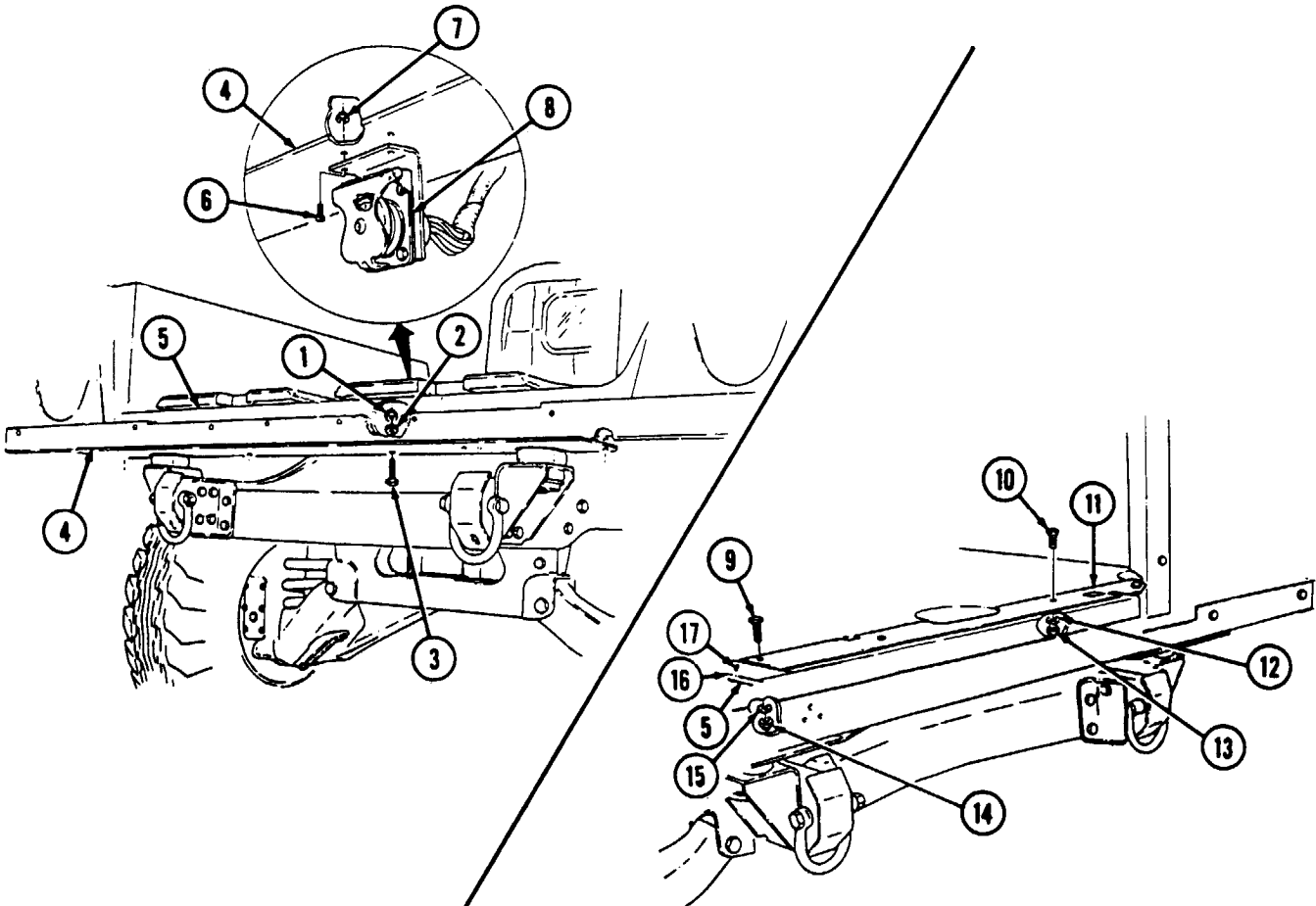
b. Installation

1. Install support (4) on "D" beam (5) with four capscrews (3), washers (2), and locknuts (1).
2. Install trailer mount bracket (8) on support (4) with two capscrews (6) and locknuts (7).
3. Install frame assembly (11) on channel (20) with four capscrews (18) and locknuts (19).
4. Install frame assembly (11) and channel (20) on support (4) with four washers (23), capscrews (24), washers (22), and locknuts (21).
5. Install frame assembly (11) on rear floor cover (17), cargo floor (16), and "D" beam (5) with two screws (10), washers (12), and locknuts (13).
6. Secure frame assembly (11) to rear floor cover (17), cargo floor (16), and "D" beam (5) with two capscrews (9), washers (15), and locknuts (14).
7. Install channel (20) on top enclosure assembly (30) with eight washers (28), screws (29), and locknuts (31).
8. Install channel (20) on top enclosure plate support (26) with two screws (25) and locknuts (27).

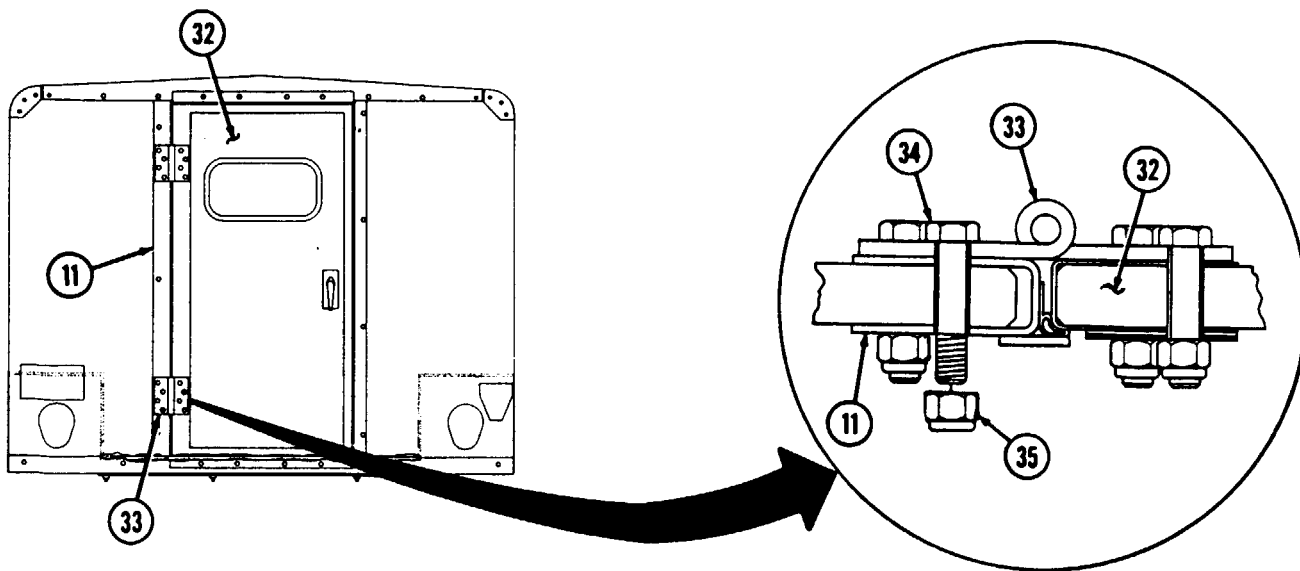
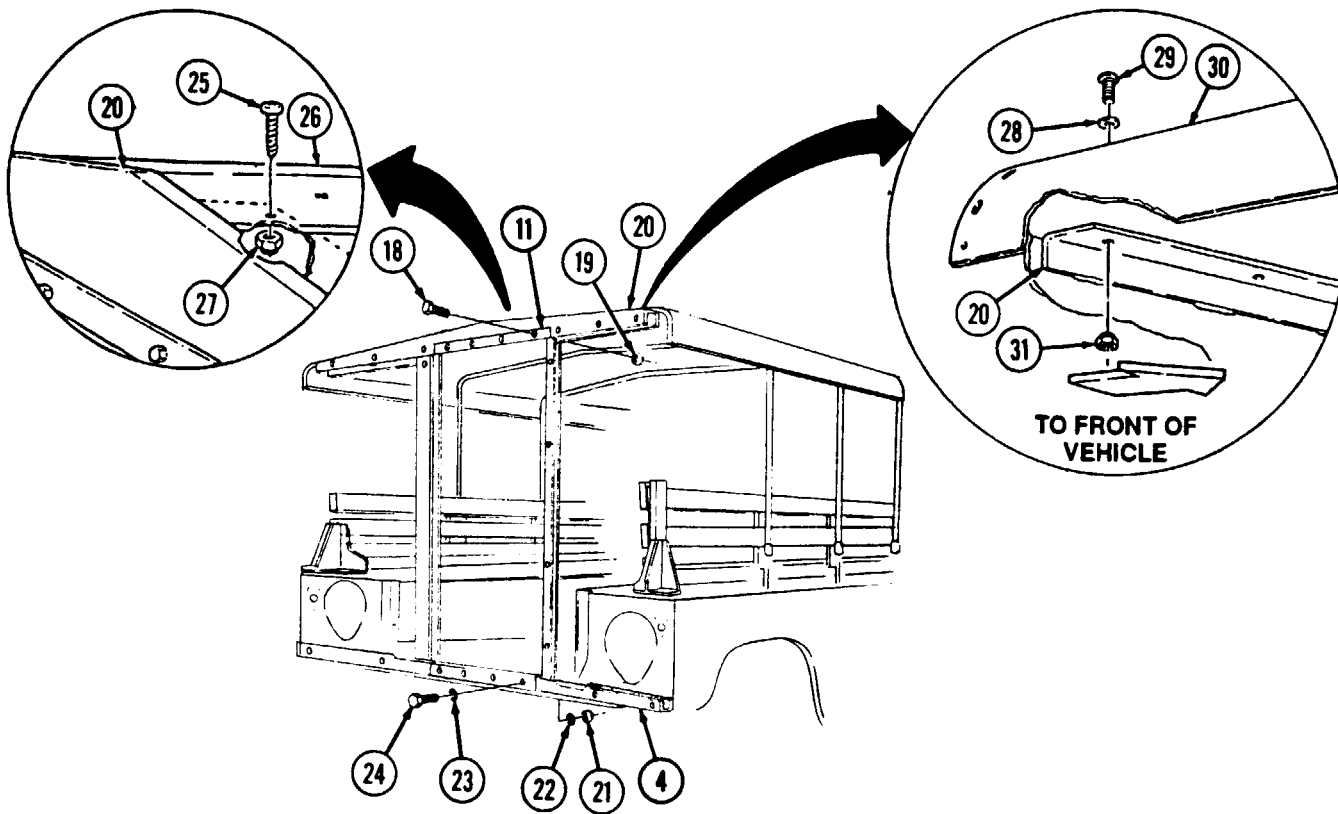
NOTE

Ensure shims are added as required.

9. Install door (32) and two hinges (33) on frame assembly (11) with eight capscrews (34) and nuts (35). Tighten nuts (35) to 85-90 lb-ft (115-122 NZm).



12-117. TROOP/CARGO WINTERIZATION DOOR AND FRAME ASSEMBLY REPLACEMENT (Cont'd)



FOLLOW-ON TASKS: Ž Install rear step assembly (para. 12-122).
 Ž Install end closures (para. 12-118).
 Ž Adjust door (para. 12-116).

12-118. TROOP/CARGO WINTERIZATION END CLOSURE REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M998, M998A1, M1038, M1038A1

Manual References

TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

- Rear reflector removed (para. 12-126).
- Rear composite light housing removed para. 12-127).
- Handle assembly removed (right end closure only) (para. 12-123).
- Antenna mounting bracket removed (right end closure only) (para. 12-125).
- Fuel can mounting bracket removed (left end closure only) (para. 12-124).
- Blackout/dome light wiring harness removed (para. 12-105).

Materials/Parts

Twelve locknuts (Appendix G, Item 121)

Personnel Required

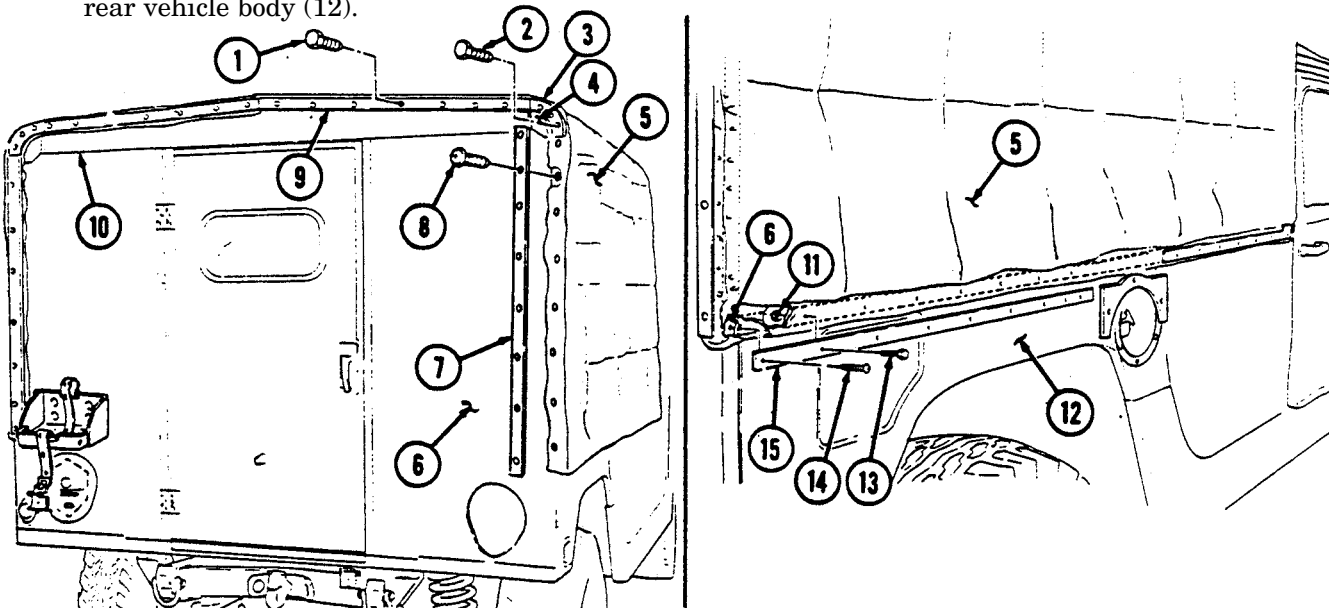
One mechanic
One assistant

a. Removal

NOTE

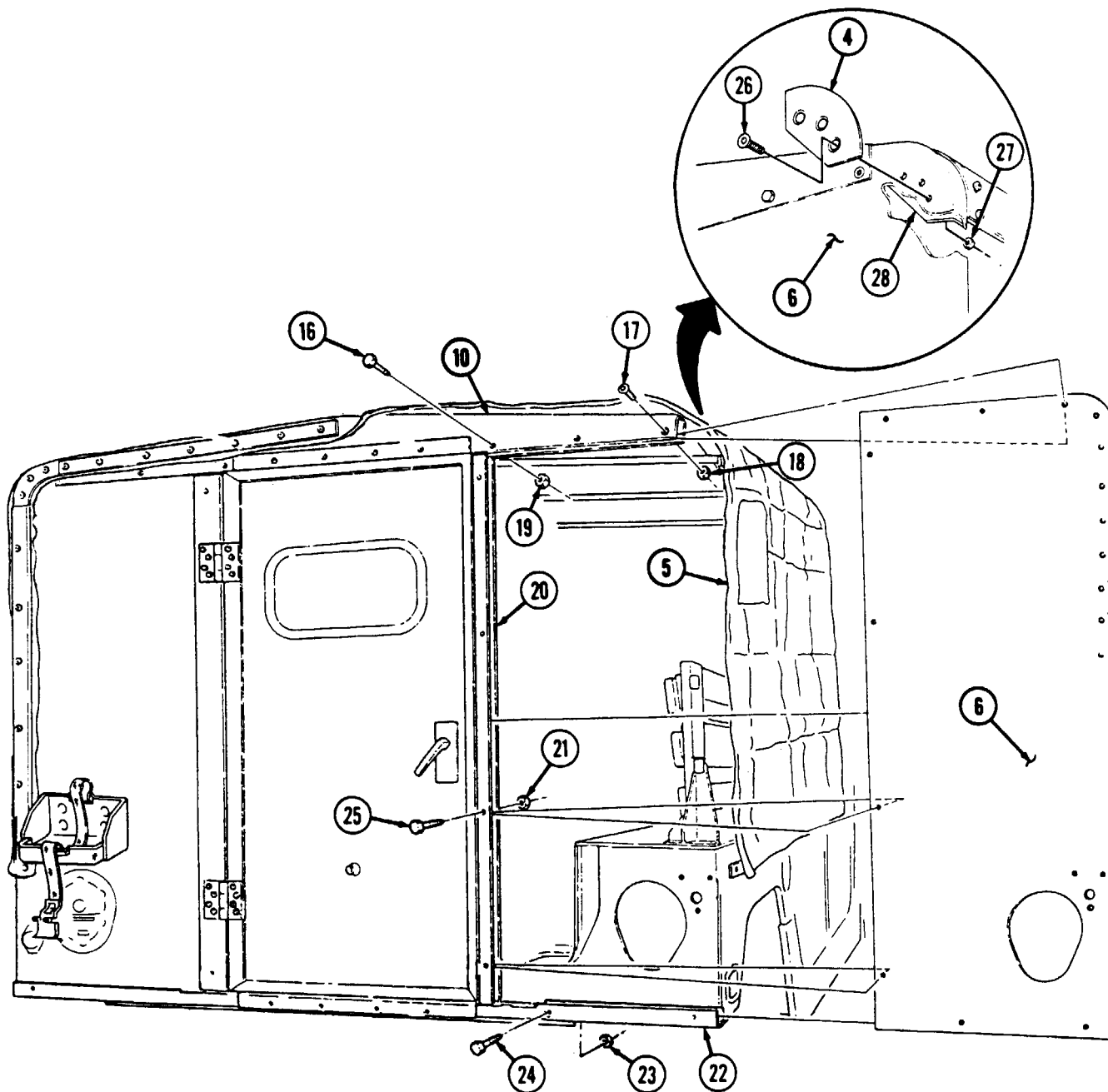
Replacement instructions for left and right end closures are basically the same. This procedure covers right end closure.

1. Remove seven screws (1) and clamping strip (9) from top cover assembly (5), channel (10), and right end closure (6).
2. Remove three screws (2) and clamping strip (3) from top cover assembly (5), outside corner plate (4), and right end closure (6).
3. Remove eight screws (8) and clamping strip (7) from top cover assembly (5), and right end closure (6).
4. Remove screw (14) from clamping strip (15), top cover assembly (5) and right end closure (6).
5. Remove eight nuts (11), capscrews (13), clamping strip (15), and top cover assembly (5) from right rear vehicle body (12).



12-118. TROOP/CARGO WINTERIZATION END CLOSURE REPLACEMENT (Cont'd)

6. Remove three locknuts (27), screws (26), and outside corner plate (4) from inside corner bracket (28), and right end closure (6). Discard locknuts (27).
7. Remove locknut (18) and screw (17) from right end closure (6) and channel (10). Discard locknut (18).
8. Remove two locknuts (19) and capscrews (16) from right end closure (6) and channel (10). Discard locknuts (19).
9. Remove four locknuts (21) and capscrews (25) from right end closure (6) and door and frame assembly (20). Discard locknuts (21).
10. Remove two locknuts (23), capscrews (24), and right end closure (6) from support assembly (22). Discard locknuts (23).



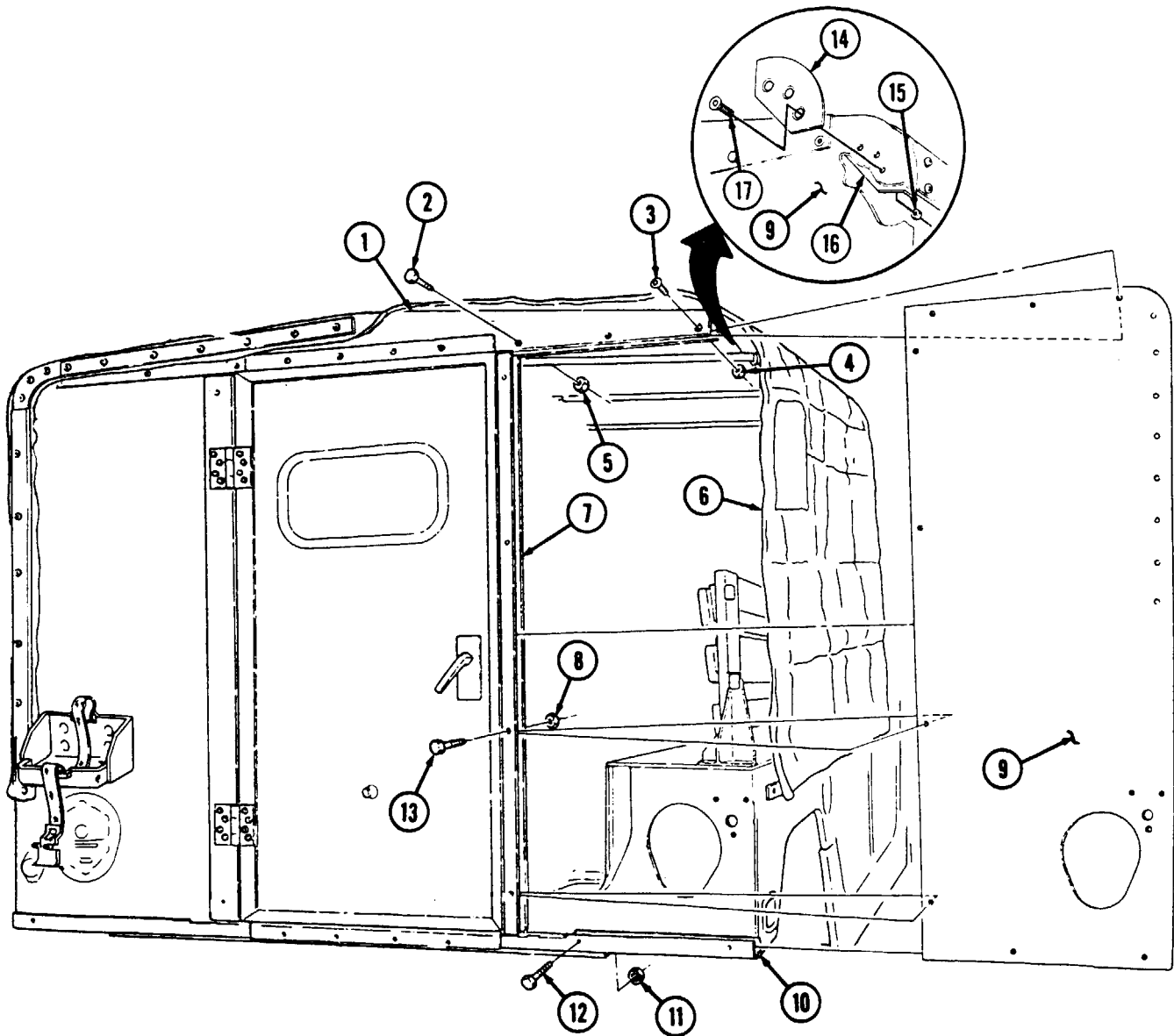
12-118. TROOP/CARGO WINTERIZATION END CLOSURE REPLACEMENT (Cont'd)

b. Installation

NOTE

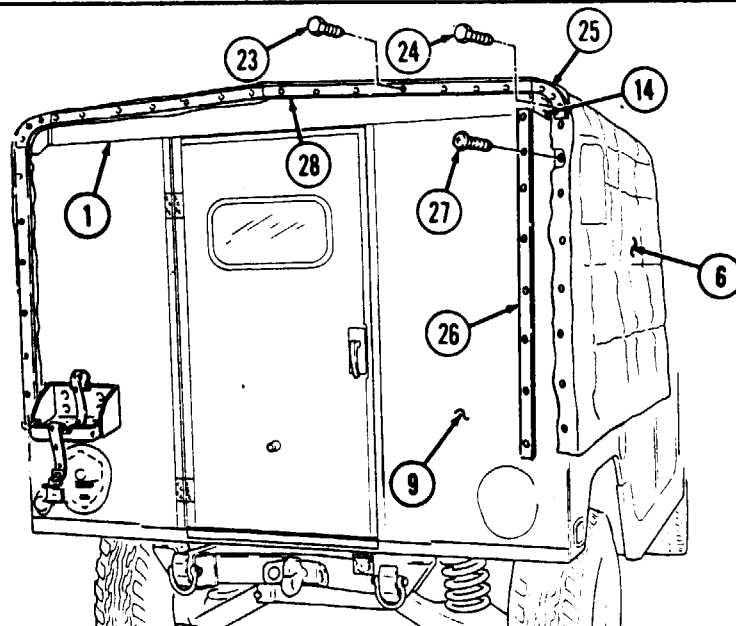
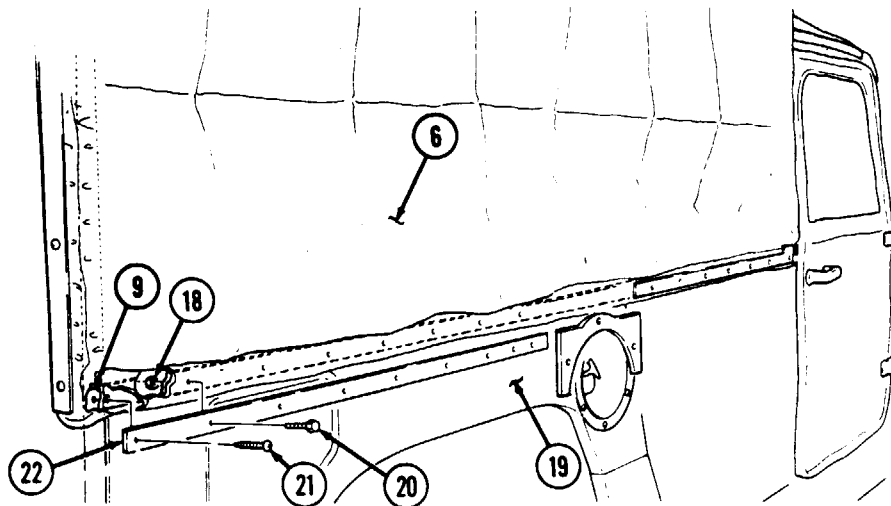
Ensure lower right corner of end closure is flush with support assembly.

1. Position right end closure (9) on support assembly (10), door and frame assembly (7), and channel (1).
2. Secure right end closure (9) to support assembly (10) with two capscrews (12) and locknuts (11).
3. Install right end closure (9) on door and frame assembly (7) with four capscrews (13) and locknuts (8).
4. Install right end closure (9) on channel (1) with two capscrews (2) and locknuts (5).
5. Secure right end closure (9) to channel (1) with screw (3) and locknut (4).
6. Install outside corner plate (14) on right end closure (9) and inside corner bracket (16) with three screws (17) and locknuts (15).



12-118. TROOP/CARGO WINTERIZATION END CLOSURE REPLACEMENT (Cont'd)

7. Install top cover assembly (6) on right rear vehicle body (19) with strip (22), eight capscrews (20), and nuts (18).
8. Install top cover assembly (6) on right end closure (9) with strip (22) and screw (21).
9. Secure top cover assembly (6) to right end closure (9) with strip (26) and eight screws (27).
10. Install top cover assembly (6) on outside corner plate (14) and right end closure (9) with strip (25) and three screws (24).
11. Install top cover assembly (6) on channel (1) and right end closure (9) with strip (28) and seven screws (23).



- FOLLOW-ON TASKS:
- Install blackout/dome light wiring harness (para. 12-105).
 - Install fuel can mounting bracket (left end closure only) (para. 12-124).
 - Install antenna mounting bracket (right end closure only) (para. 12-125).
 - Install handle assembly (right end closure only) (para. 12-123).
 - Install rear composite light housing (para. 12-127).
 - Install rear reflector (para. 12-126).

12-119. TROOP/CARGO WINTERIZATION TOP COVER ASSEMBLY REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M998, M998A1, M1038, M1038A1

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Adhesive spray (Appendix C, Item 8)
Adhesive sealant (Appendix C, Item 10)
Two rubber strips (Appendix G, Item 300)
Two rubber strips (Appendix G, Item 301)
Two rubber strips (Appendix G, Item 302)
Two seals (Appendix G, Item 289)

Personnel Required

One mechanic
One assistant

Manual References

TM 9-2320-280-24P

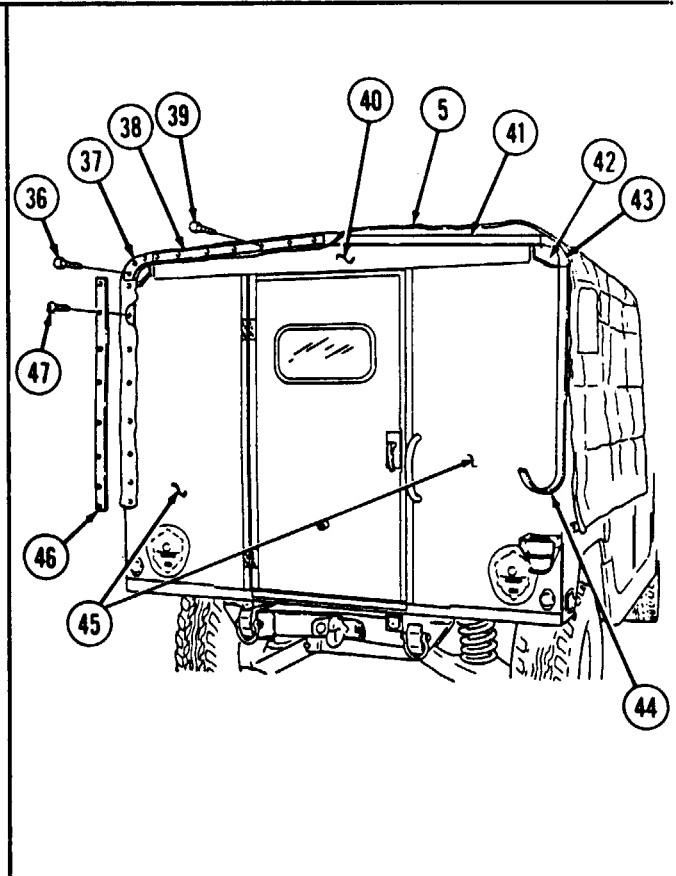
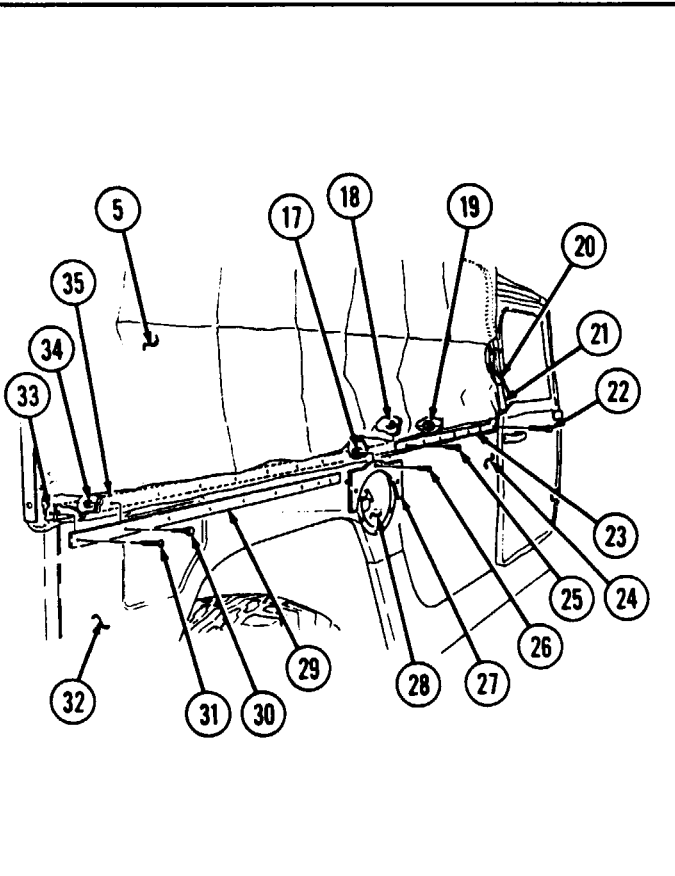
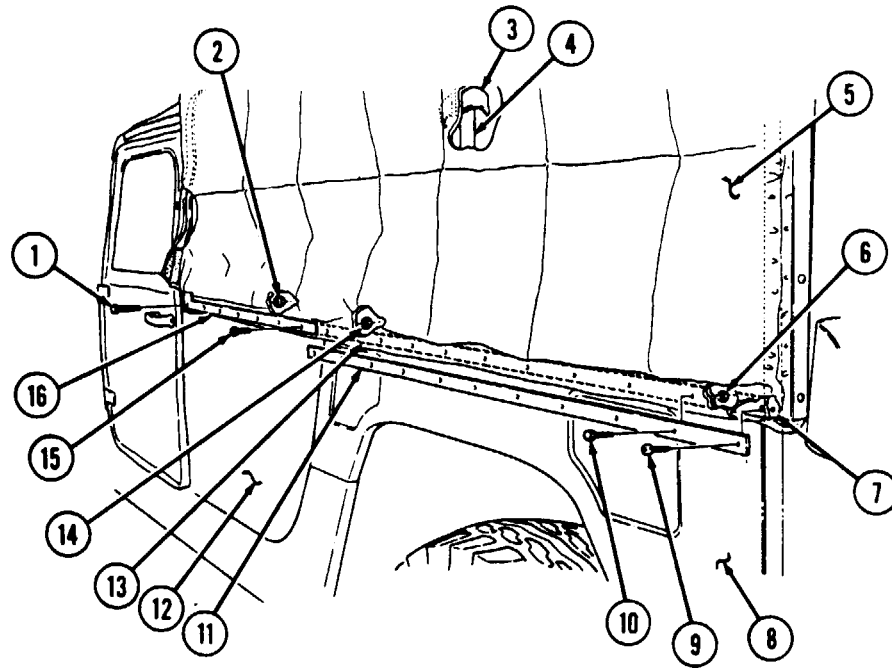
Equipment Condition

Air intake assembly removed (para. 12-97).

a. Removal

1. Remove nut (2) and capscrew (1) from clamping strip (16), top cover assembly (5), rubber strip (13), and left rear fixed door (12).
2. Remove six nuts (14), capscrews (15), and clamping strip (16) from top cover assembly (5), rubber strip (13), and left rear fixed door (12).
3. Remove screw (9) from clamping strip (11), top cover assembly (5), rubber strip (13), and left end closure (7).
4. Remove ten nuts (6), capscrews (10), and clamping strip (11) from top cover assembly (5), rubber strip (13), and left rear vehicle body (8).
5. Remove and discard rubber strip (13).
6. Remove nut (19) and capscrew (22) from clamping strip (23), top cover assembly (5), rubber strip (35), and right rear fixed door (24).
7. Remove six nuts (18), capscrews (25), and clamping strip (23) from top cover assembly (5), rubber strip (35), and right rear fixed door (24).
8. Remove three screws (26), spring nuts (17), (if damaged) and plate assembly (27) from top cover assembly (5), rubber strip (35), fuel tank filler (28), and right rear vehicle body (32).
9. Remove screw (31) from clamping strip (29), top cover assembly (5), rubber strip (35), and right end closure (33).
10. Remove eight nuts (34), capscrews (30), clamping strip (29), top cover assembly (5), and rubber strip (35) from right rear vehicle body (32). Discard rubber strip (35).
11. Remove sixteen screws (47), two clamping strips (46), and two rubber strips (44) from rear end closure assembly (45) and top cover (5). Discard rubber strips (44).
12. Remove six screws (36), two clamping strips (37), seals (43), and outside corner plates (42) from rear end closure assembly (45) and top cover (5). Discard seals (43).
13. Remove fourteen screws (39), two clamping strips (38), and rubber strips (41) from channel (40), top cover (5), and two rear end closure assemblies (45). Discard rubber strips (41).
14. Detach eight fastener straps (3) from bow assemblies (4).
15. Detach top cover assembly fastener strip (21) from cab top cover strip (20).
16. Remove top cover assembly (5).

12-119. TROOP/CARGO WINTERIZATION TOP COVER ASSEMBLY REPLACEMENT
(Cont'd)



**12-119. TROOP/CARGO WINTERIZATION TOP COVER ASSEMBLY REPLACEMENT
(Cont'd)**

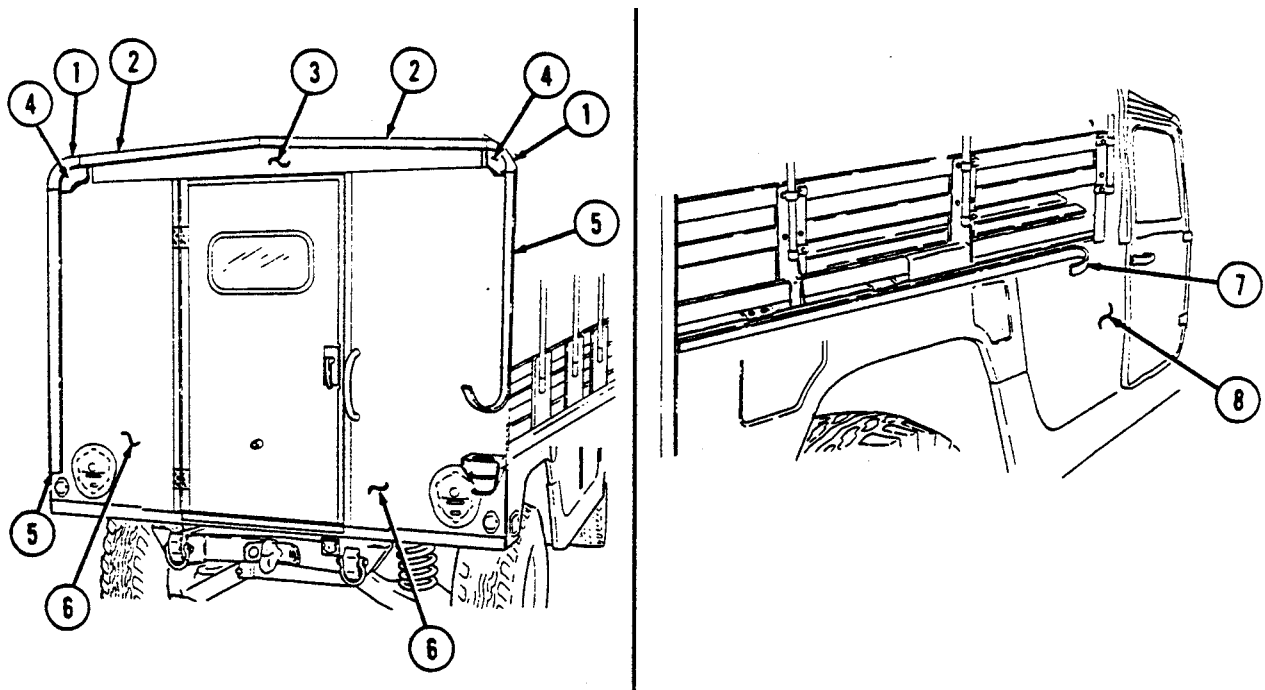
b. Installation

1. Apply adhesive spray to channel (3) and mating surfaces of two rubber strips (2) and install rubber strips (2) on channel (3).
2. Apply adhesive spray to outside corner plates (4) and mating surfaces of two seals (1) and install seals (1) on outside corner plates (4).
3. Apply adhesive spray to two rear end closure assemblies (6) and mating surfaces of rubber strips (5) and install rubber strips (5) on rear end closure assembly (6).
4. Apply adhesive spray to right side of vehicle (8) and mating surface of rubber strip (7) and install rubber strip (7) on right side of vehicle (8).
5. Apply adhesive spray to left side of vehicle (10) and mating surface of rubber strip (9) and install rubber strip (9) on left side of vehicle (10).
6. Apply an even coat of sealant to two top enclosure assemblies (13), rear end closure assemblies (17), corner edges (19), and other shaded areas.
7. Apply sealant to top enclosure assembly clamps (11), plates (14), and screws (12).

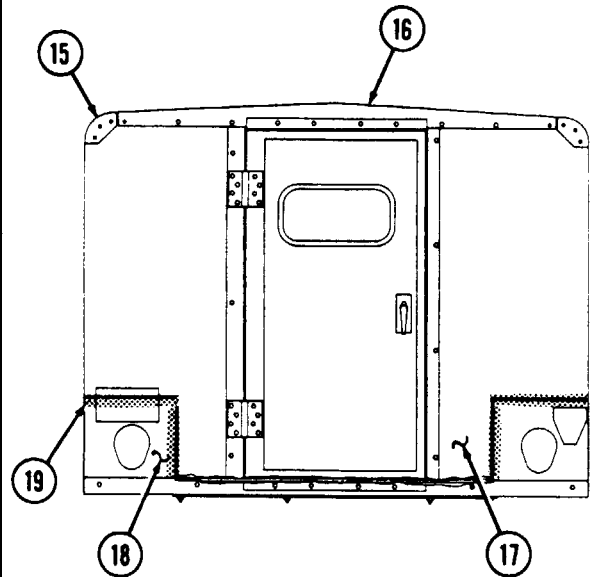
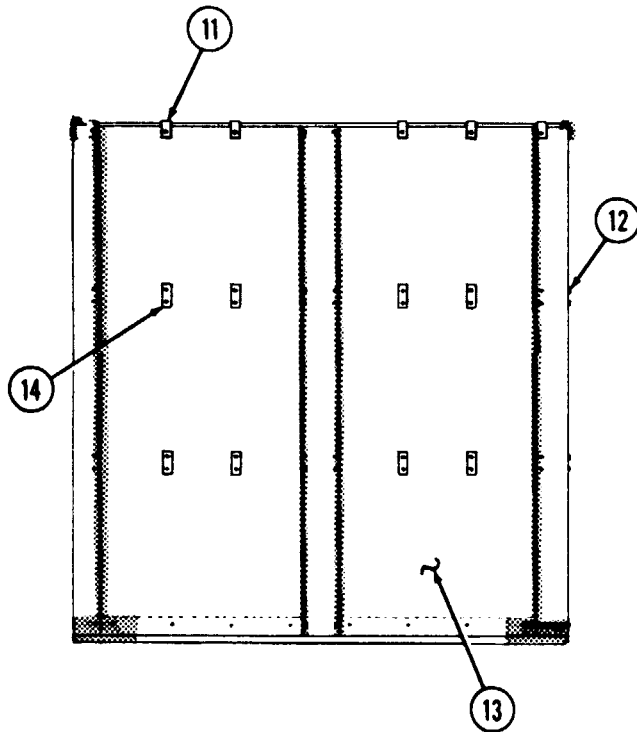
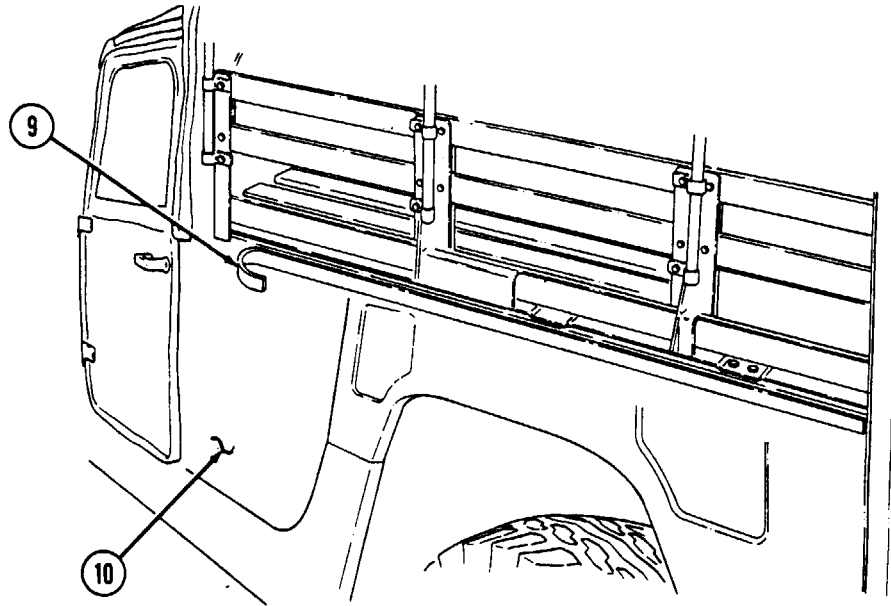
NOTE

If raised edges or gaps exist around areas of outside corner plates and rear end closure assembly, fill with sealant.

8. Apply sealant to outside corner plates (15) and channel assembly (16).
9. Apply sealant to any open gaps on rear end closure assembly (17) and vehicle body (18).



12-119. TROOP/CARGO WINTERIZATION TOP COVER ASSEMBLY REPLACEMENT
(Cont'd)



**12-119. TROOP/CARGO WINTERIZATION TOP COVER ASSEMBLY REPLACEMENT
(Cont'd)**

NOTE

When installing top cover assembly, ensure fastener straps are installed on inside of enclosure.

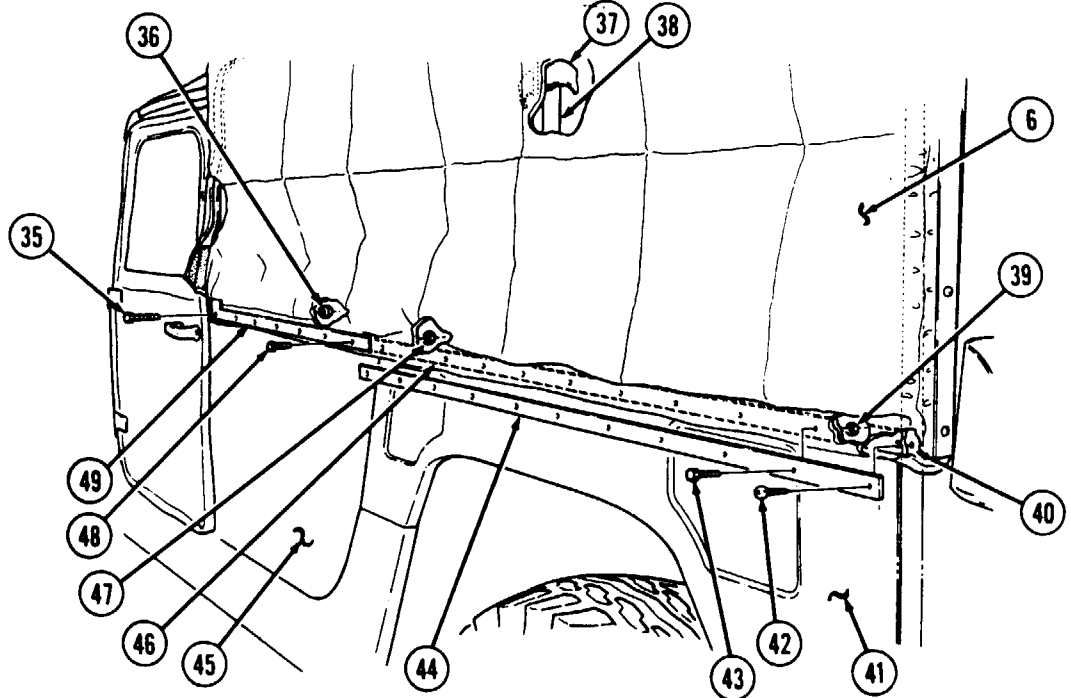
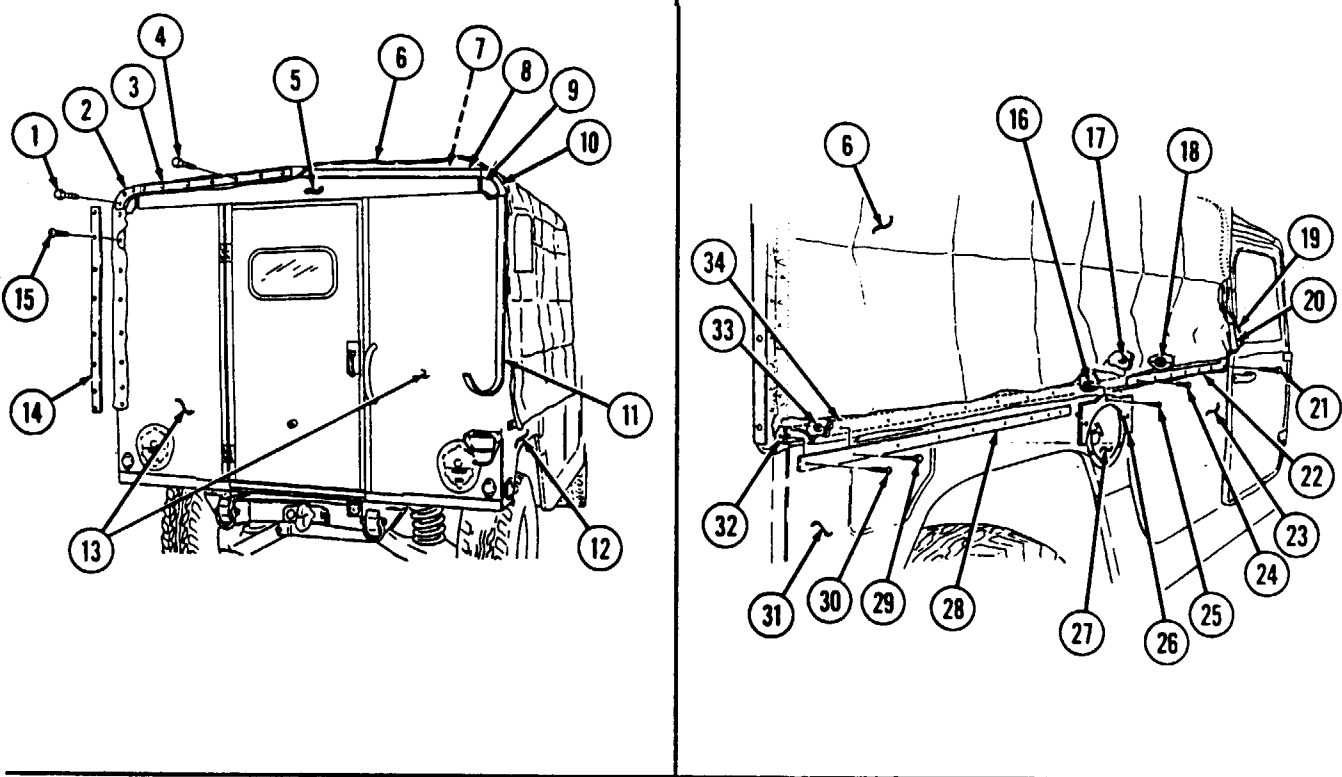
10. Center and install top cover assembly (6) over top enclosure assembly (7), rear end closure assemblies (13), and vehicle body (12).
11. Attach top cover assembly fastener strip (20) to cab top cover strip (19).
12. Install eight fastener straps (37) on bow assemblies (38).

NOTE

Top cover assembly is oversized to allow for shrinkage for proper fit.

- 13. Install top cover assembly (6) and two clamping strips (3) on two rubber strips (8), channel (5), and rear end closure assemblies (13) with fourteen screws (4).
14. Install top cover assembly (6) and two clamping strips (2) on two seals (10), outside corner plates (9), and rear end closure assemblies (13) with six screws (1).
- 15. Install top cover assembly (6) and two clamping strips (14) on two rubber strips (11) and rear end closure assemblies (13) with sixteen screws (15).
- 16. Install top cover assembly (6) and clamping strip (28) on rubber strip (34) and right rear vehicle body (31) with eight capscrews (29) and nuts (33).
- 17. Secure top cover assembly (6) and clamping strip (28) to rubber strip (34) and right end closure (32) with screw (30).
- 18. Install top cover assembly (6) and plate assembly (26) on rubber strip (34), fuel tank filler (27), and right rear vehicle body (31) with three screws (25) and spring nuts (16) (if removed).
- 19. Install top cover assembly (6) and clamping strip (22) on rubber strip (34) and right rear fixed door (23) with six capscrews (24) and nuts (17).
- 20. Secure top cover assembly (6) and clamping strip (22) to rubber strip (34) and right rear fixed door (23) with capscrew (21) and nut (18).
- 21. Install top cover assembly (6) and clamping strip (44) on rubber strip (46) and left rear vehicle body (41) with ten capscrews (43) and nuts (39).
- 22. Install top cover assembly (6) and clamping strip (44) on rubber strip (46) and left end closure (40) with screw (42).
- 23. Install top cover assembly (6) and clamping strip (49) on rubber strip (46) and left rear fixed door (45) with six capscrews (48) and nuts (47).
- 24. Secure top cover assembly (6) and clamping strip (49) to rubber strip (46) and left rear fixed door (45) with capscrew (35) and nut (36).

12-119. TROOP/CARGO WINTERIZATION TOP COVER ASSEMBLY REPLACEMENT (Cont'd)



FOLLOW-ON TASK: Install air intake assembly (para. 12-97).

12-120. TROOP/CARGO WINTERIZATION TOP ENCLOSURE ASSEMBLY REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M998, M998A1, M1038, M1038A1

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Adhesive (Appendix C, Item 7)
Eighteen locknuts (Appendix G, Item 119)
Six locknuts (Appendix G, Item 121)

Personnel Required

One mechanic
One assistant

Manual References

TM 9-2320-280-24P

Equipment Condition

Top cover assembly removed (para. 12-119).

a. Removal

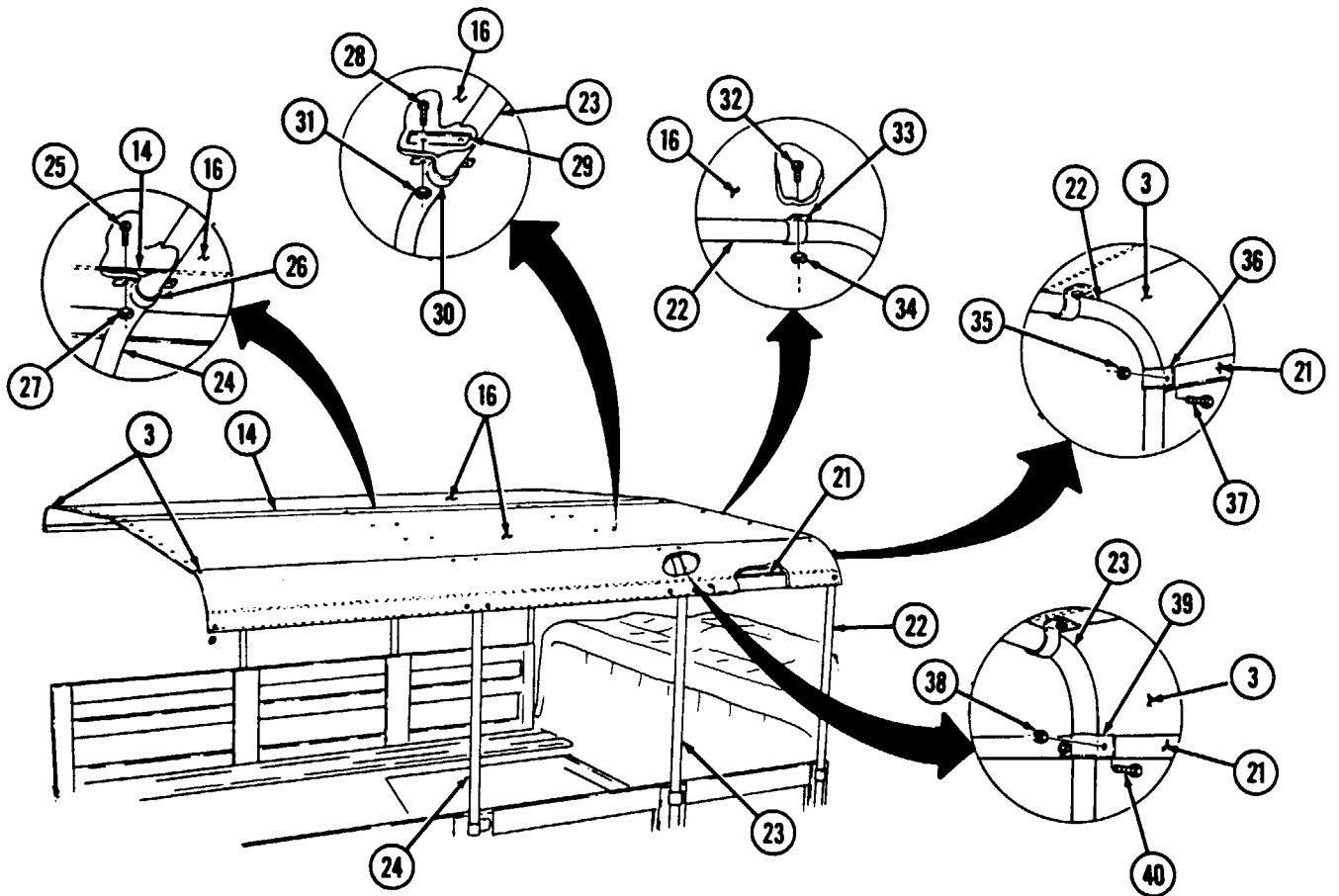
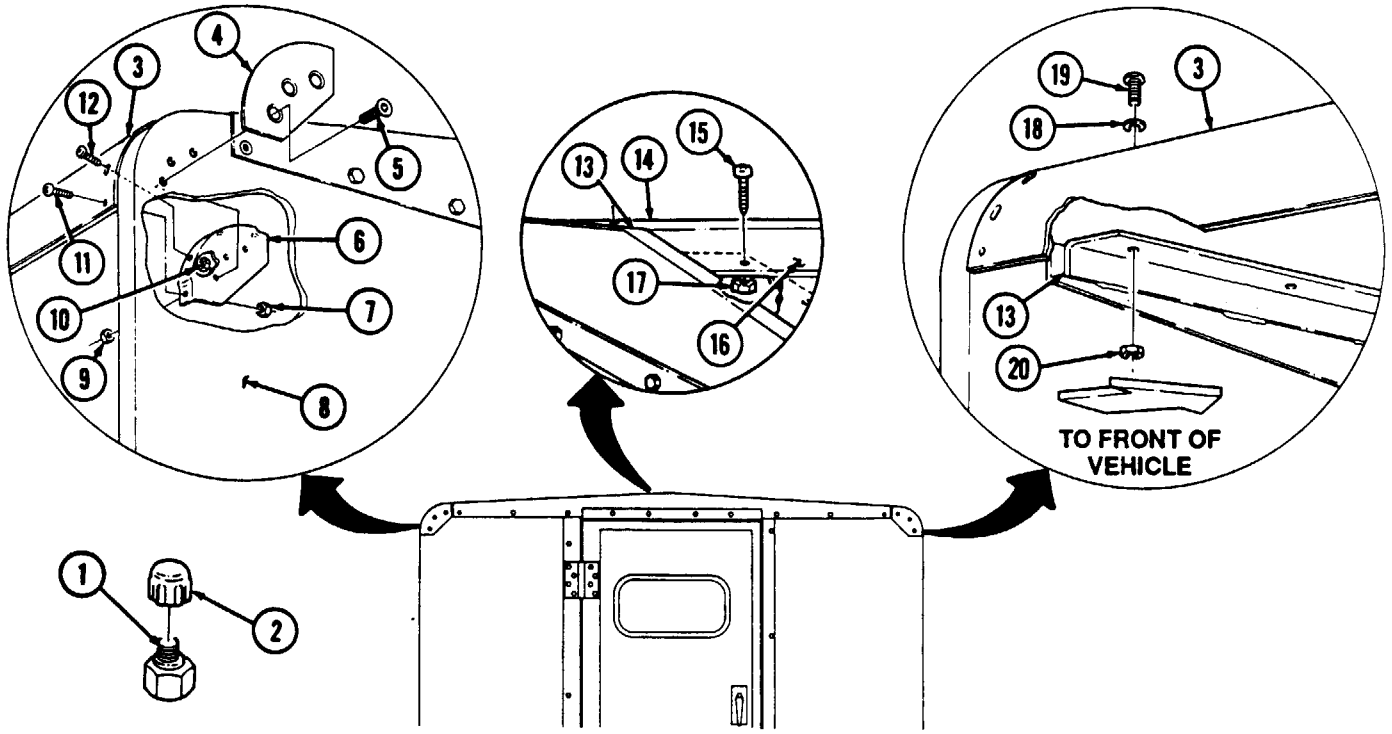
1. Remove safety caps (2) as required from top enclosure assembly mounting screws (1).
2. Remove six locknuts (9) and screws (5), and two outside plates (4) from inside corner brackets (6), and end enclosures (8). Discard locknuts (9).

NOTE

For installation, note size and location of inside corner bracket mounting screws.

3. Remove four locknuts (7) and screws (11) from two inside corner brackets (6) and supports (3). Discard locknuts (7).
4. Remove four locknuts (10) and screws (12) from two inside corner brackets (6) and supports (3). Discard locknuts (10).
5. Remove two locknuts (17) and screws (15) from plate (14), channel (13), and two supports (16). Discard locknuts (17).
6. Remove eight locknuts (20), screws (19), and washers (18) from two supports (3) and channel (13). Discard locknuts (20).
7. Remove sixteen nuts (38), screws (40), and eight clamps (39) from two supports (21), supports (3), rear bow (24), and middle bow (23).
8. Remove four nuts (35), screws (37), clamps (36), two supports (21), and supports (3) from front bow (22).
9. Remove sixteen nuts (31), screws (28), eight support plates (29), and clamps (30) from two supports (16), rear bow (24), and middle bow (23).
10. Remove six nuts (34), screws (32), and clamps (33) from two supports (16), plate (14), and front bow (22).
11. Remove eight nuts (27), screws (25), four clamps (26), two supports (16), and plate (14) from rear bow (24) and middle bow (23).

12-120. TROOP/CARGO WINTERIZATION TOP ENCLOSURE ASSEMBLY REPLACEMENT (Cont'd)

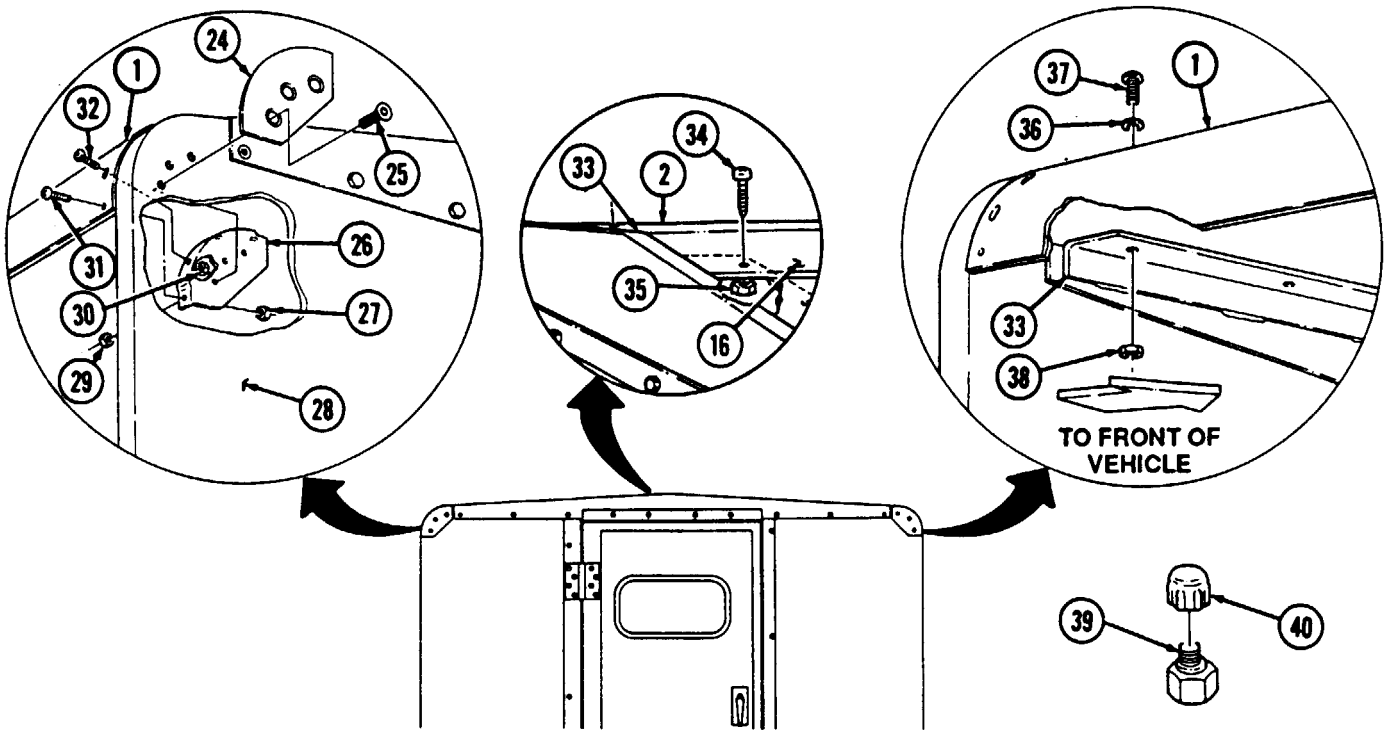
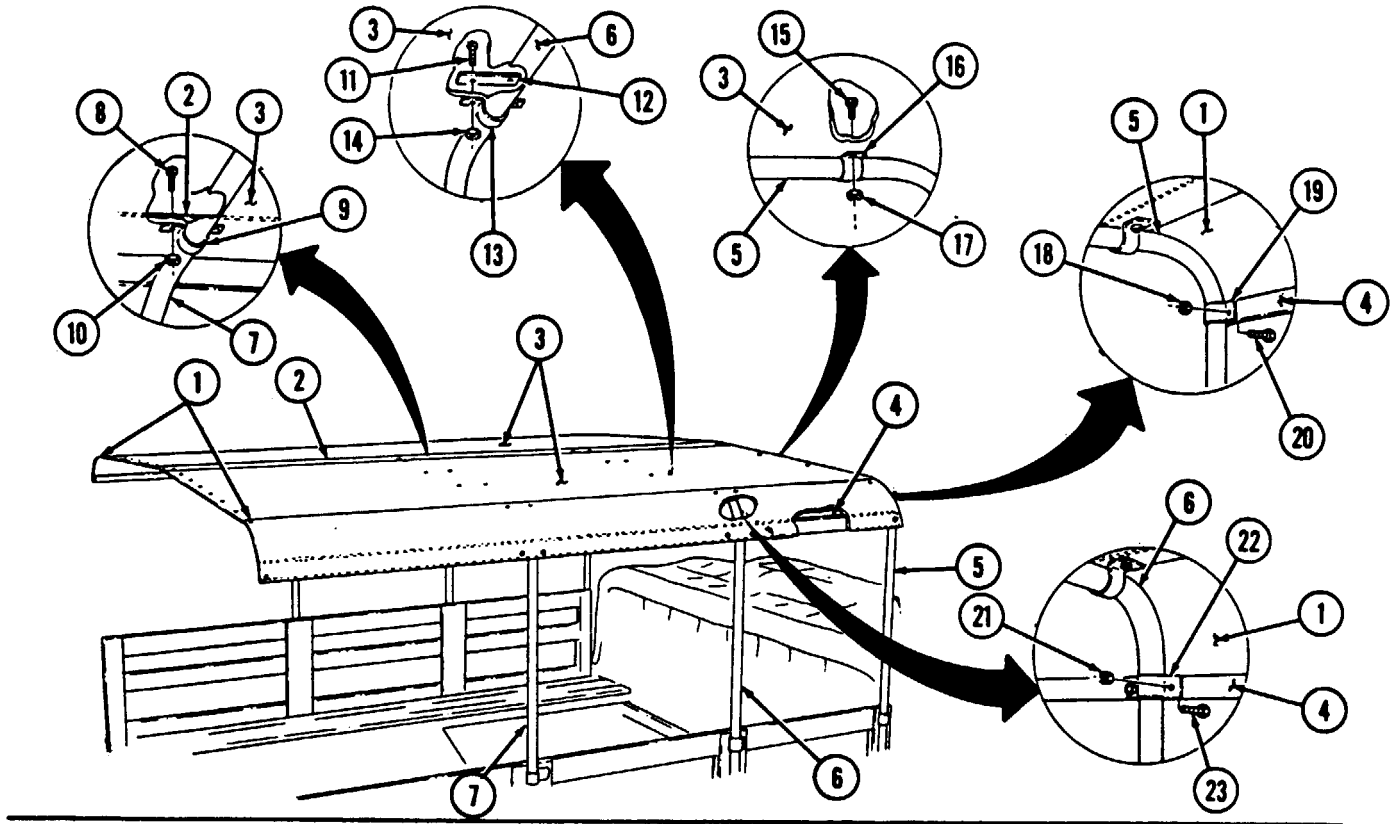


**12-120. TROOP/CARGO WINTERIZATION TOP ENCLOSURE ASSEMBLY REPLACEMENT
(Cont'd)**

b. Installation

1. Install plate (2) and two supports (3) on front bow (5), middle bow (6), and rear bow (7) with four clamps (9), eight screws (8) and nuts (10).
2. Secure plate (2) and two supports (3) to front bow (5) with six clamps (16), screws (15), and nuts (17).
3. Install two supports (3) on rear bow (7) and middle bow (6) with eight clamps (13), support plates (12), sixteen screws (11), and nuts (14).
4. Install two supports (4) and supports (1) on front bow (5), middle bow (6), and rear bow (7) with four clamps (19), screws (20), and nuts (18).
5. Install two supports (4) and supports (1) on rear bow (7) and middle bow (6) with eight clamps (22), sixteen screws (23), and nuts (21).
6. Install two supports (1) on channel (33) with eight washers (36), screws (37), and locknuts (38).
7. Install plate (2) on channel (33) and two supports (16) with two screws (34) and locknuts (35).
8. Install two outside plates (24) and inside corner brackets (26) on two end closures (28) with six screws (25) and locknuts (29).
9. Install two inside corner brackets (26) on two supports (1) with four screws (32) and locknuts (30).
10. Secure two inside corner brackets (26) to two supports (1) with four screws (31) and locknuts (27).
11. Apply adhesive to exposed threads of top enclosure assembly mounting screws (39) and install safety caps (40) on screws (39) as required.

**12-120. TROOP/CARGO WINTERIZATION TOP ENCLOSURE ASSEMBLY REPLACEMENT
(Cont'd)**



FOLLOW-ON TASK: Install top cover assembly (para. 12-119).

12-121. TROOP/CARGO WINTERIZATION TROOP SEAT ASSEMBLY AND BOW REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M998, M998A1, M1038, M1038A1

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Nine locknuts (Appendix G, Item 122)
Two locknuts (Appendix G, Item 123)
Two locknuts (Appendix G, Item 119)
Three locknuts (Appendix G, Item 86)

Personnel Required

One mechanic
One assistant

Manual References

TM 9-2320-280-24P

Equipment Condition

Top enclosure assembly removed (para. 12-120).

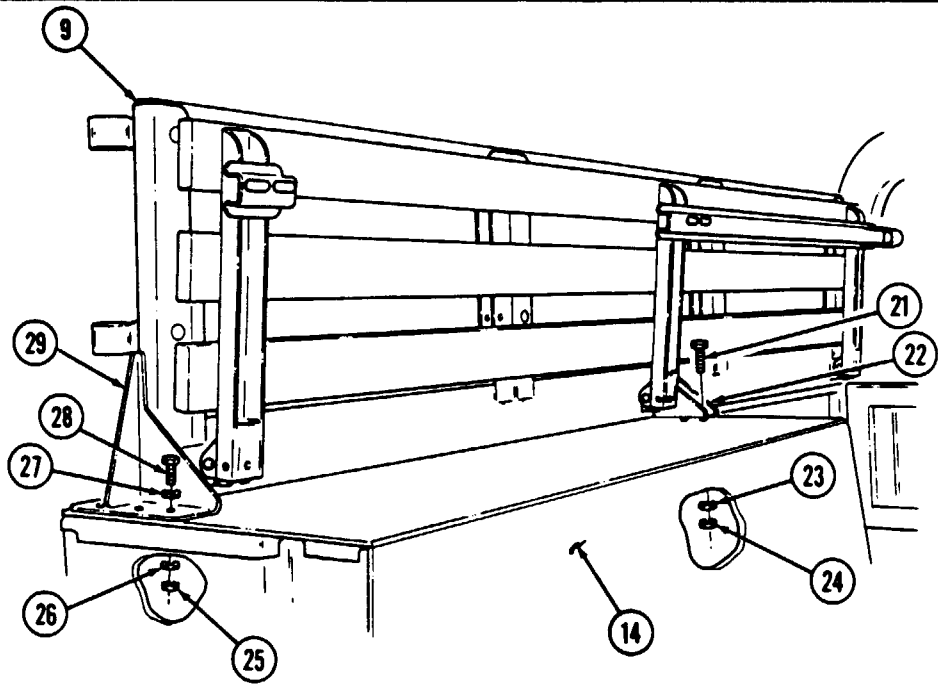
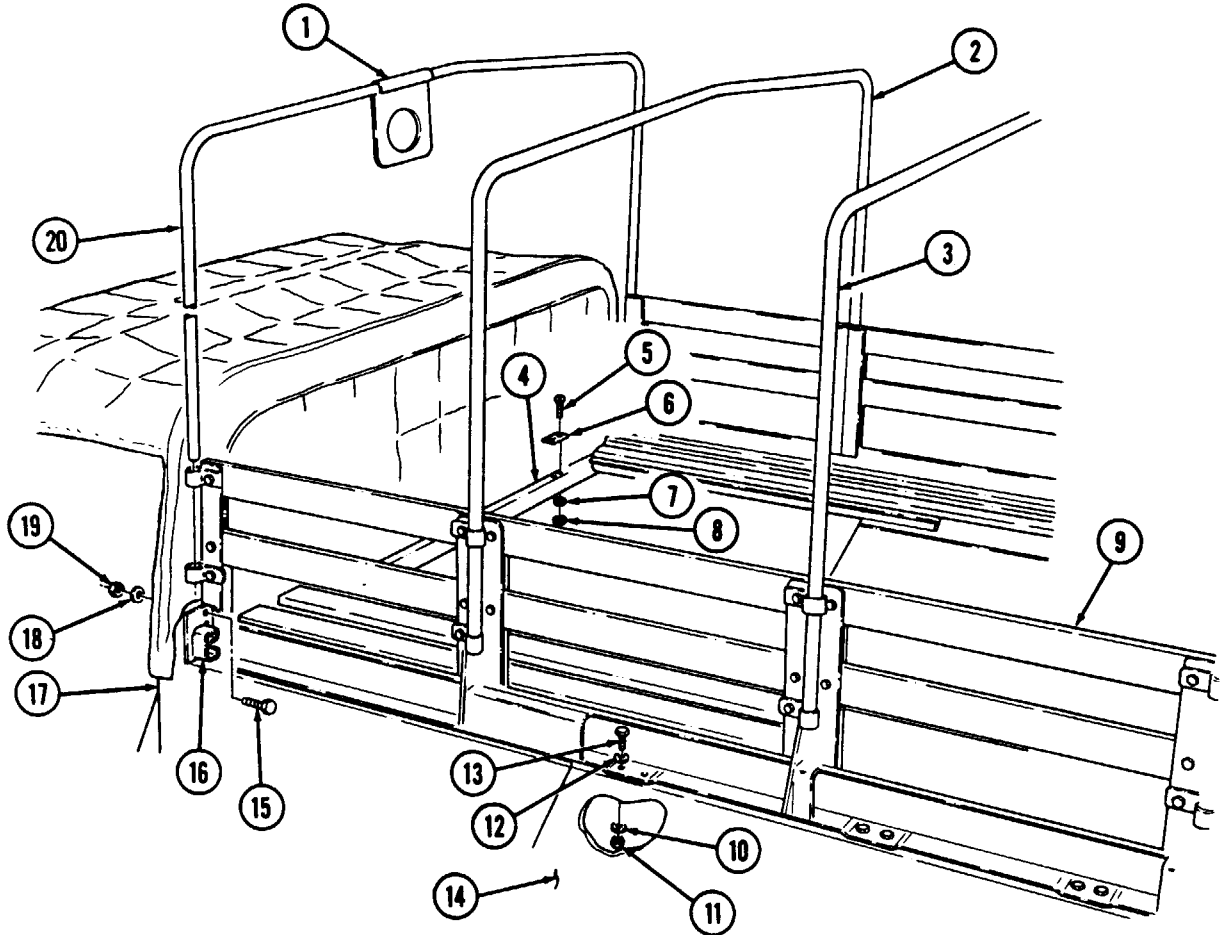
NOTE

Replacement instructions for left and right troop seat assemblies are the same. This procedure covers left troop seat assembly.

a. Removal

1. Remove plate (1) from front bow (20).
2. Remove front bow (20), middle bow (2), and rear bow (3) from troop seat assembly (9).
3. Remove six locknuts (11), washers (10), capscrews (13), and washers (12) from troop seat assembly (9) and wheelhousing (14). Discard locknuts (11).
4. Remove three locknuts (25), washers (26), capscrews (28), and washers (27) from rear corner troop seat bracket (29) and wheelhousing (14). Discard locknuts (25).
5. Remove two locknuts (24), washers (23), and capscrews (21) from front wheelhousing bracket (22) and wheelhousing (14). Discard locknuts (24).
6. Remove troop seat assembly (9) from wheelhousing (14) and support assembly (16).
7. Remove three locknuts (19), washers (18), and capscrews (15) from support assembly (16) and "B" pillar (17). Discard locknuts (19).
8. Remove two locknuts (8), washers (7), screws (5), and block (6) from cargo bulkhead (4).

12-121. TROOP/CARGO WINTERIZATION TROOP SEAT ASSEMBLY AND BOW REPLACEMENT (Cont'd)



12-121. TROOP/CARGO WINTERIZATION TROOP SEAT ASSEMBLY AND BOW REPLACEMENT (Cont'd)

b. Installation

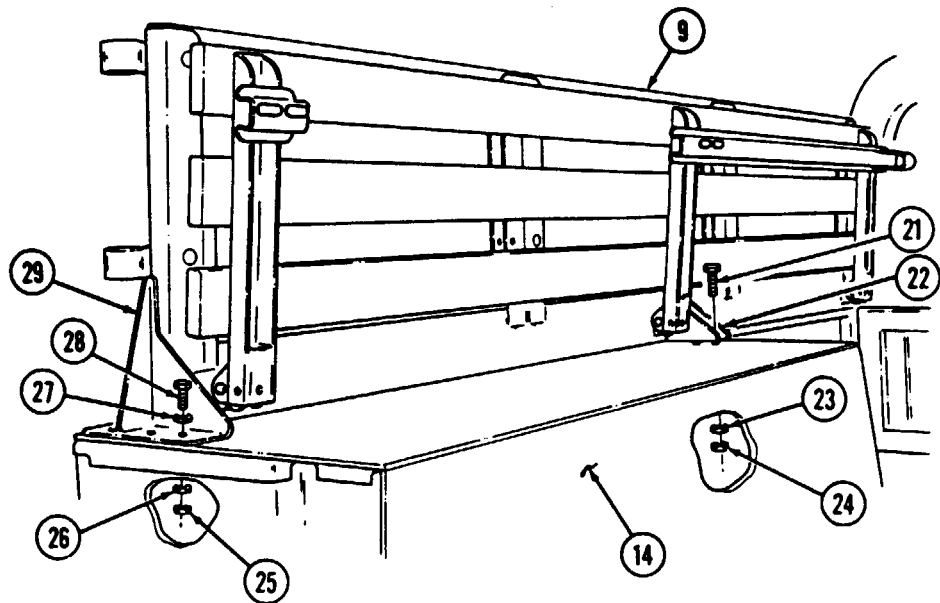
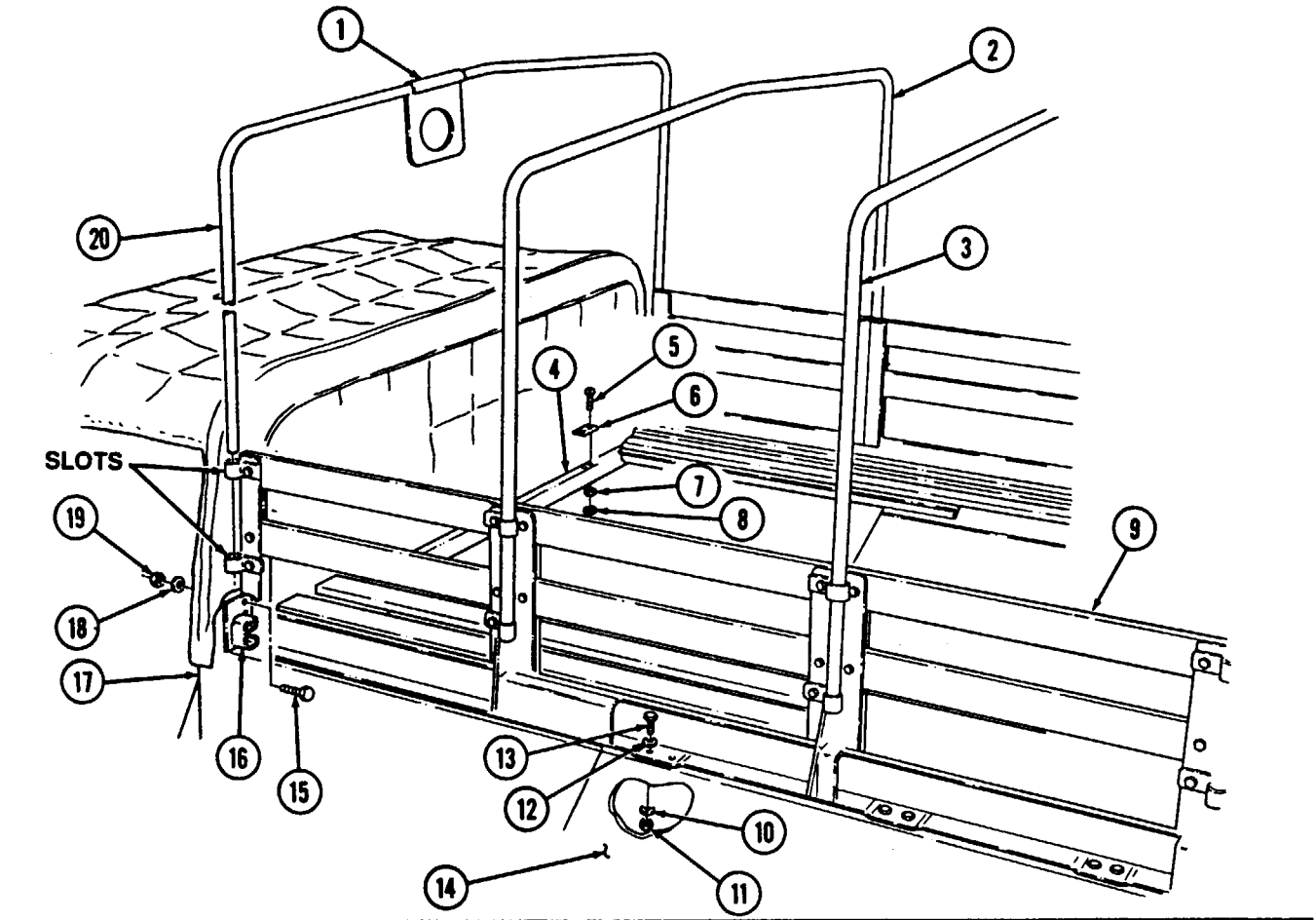
1. Install block (6) on cargo bulkhead (4) with two screws (5), washers (7), and locknuts (8).

NOTE

Support assembly must be installed with narrow offset to outside of vehicle and rounded side up.

2. Install support assembly (16) on "B" pillar (17) with three capscrews (15), washers (18), and locknuts (19).
3. Install troop seat assembly (9), folded in stowed position, into support assembly (16) and on wheelhousing (14).
4. Install front wheelhousing bracket (22) on wheelhousing (14) with two capscrews (21), washers (23), and locknuts (24). Tighten locknuts (24) to 49 lb-ft (66 N \bar{Z} m).
5. Install rear corner troop seat bracket (29) on wheelhousing (14) with three washers (27), capscrews (28), washers (26), and locknuts (25). Tighten locknuts (25) to 96 lb-in. (11 N \bar{Z} m).
6. Install troop seat assembly (9) on wheelhousing (14) with six washers (12), capscrews (13), washers (10), and locknuts (11). Tighten locknuts (11) to 96 lb-in. (11 N \bar{Z} m).
7. Install front bow (20), middle bow (2), and rear bow (3) on slots on outside of troop seat assembly (9).
8. Install plate (1) on front bow (20).

12-121. TROOP/CARGO WINTERIZATION TROOP SEAT ASSEMBLY AND BOW REPLACEMENT (Cont'd)



FOLLOW-ON TASK: Install top enclosure assembly (para. 12-120).

12-122. TROOP/CARGO WINTERIZATION REAR STEP ASSEMBLY REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M998, M998A1, M1038, M1038A1

Materials/Parts

Two cotter pins (Appendix G, Item 12)

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

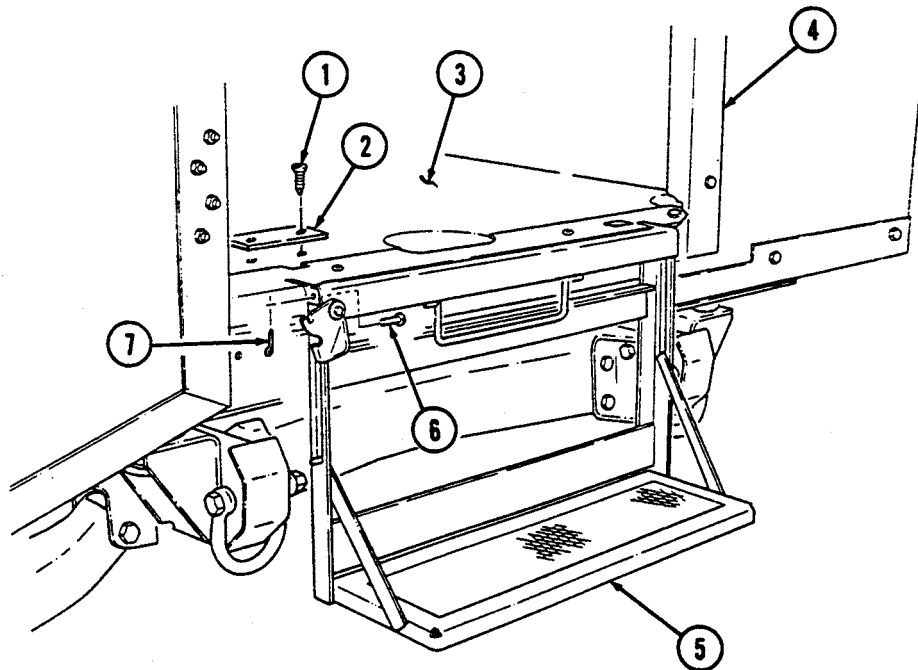
TM 9-2320-280-24P

a. Removal

1. Remove two cotter pins (7), clevis pins (6), and step assembly (5) from door and frame assembly (4). Discard cotter pins (7).
2. Remove two screws (1) and step latch strip (2) from cargo floor cover (3).

b. Installation

1. Install step latch strip (2) on cargo floor cover (3) with two screws (1).
2. Install step assembly (5) on door and frame assembly (4) with two clevis pins (6) and cotter pins (7).



12-123. TROOP/CARGO WINTERIZATION HANDLE ASSEMBLY REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M998, M998A1, M1038, M1038A1

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Adhesive (Appendix C, Item 7)
Two locknuts (Appendix G, Item 124)

Manual References

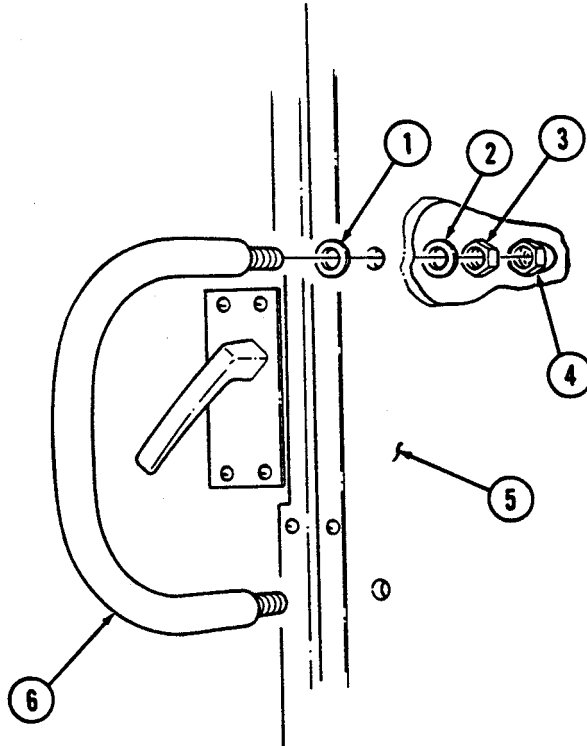
TM 9-2320-280-24P

a. Removal

Remove two safety caps (4), locknuts (3), washers (2), handle assembly (6) and two washers (1) from right end closure (5). Discard locknuts (3).

b. Installation

1. Install two washers (1) and handle assembly (6) on right end closure (5) with two washers (2) and locknuts (3).
2. Apply adhesive to exposed threads of handle assembly (6) and install two safety caps (4) on handle assembly (6).



12-124. TROOP/CARGO WINTERIZATION FUEL CAN MOUNTING BRACKET REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M998, M998A1, M1038, M1038A1

Materials/Parts

Four locknuts (Appendix G, Item 120)

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

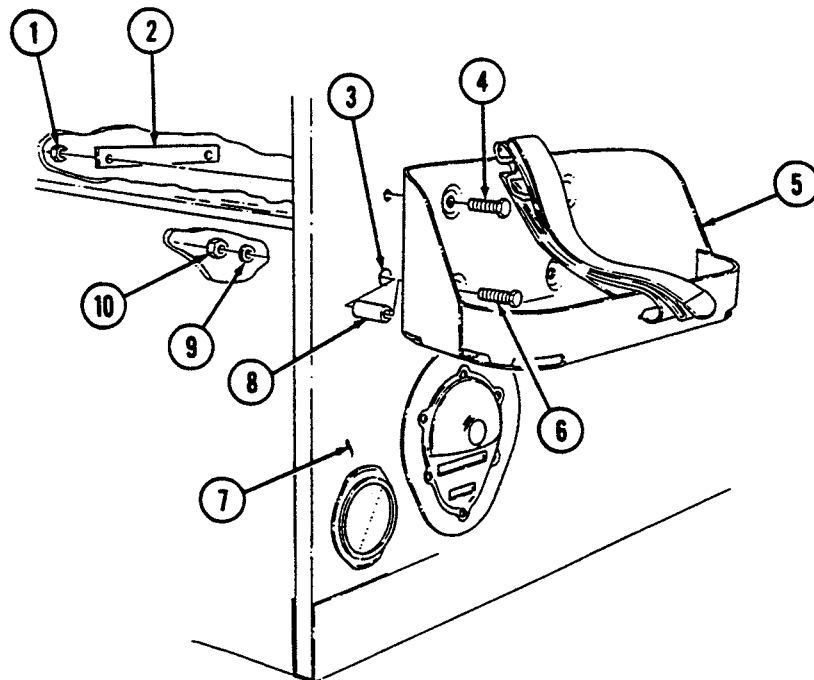
TM 9-2320-280-24P

a. Removal

1. Remove two locknuts (1), plate (2), and two capscrews (4) from fuel can mounting bracket (5) and left end closure (7). Discard locknuts (1).
2. Remove two locknuts (10), washers (9), capscrews (6), and fuel can mounting bracket (5) from left end closure (7). Discard locknuts (10).
3. Remove two spacers (8) from lower mounting holes (3) in left end closure (7).

b. Installation

1. Install two spacers (8) in lower mounting holes (3) in left end closure (7).
2. Install fuel can mounting bracket (5) on left end closure (7) with two capscrews (6), washers (9), and locknuts (10).
3. Secure fuel can mounting bracket (5) and plate (2) to left end closure (7) with two capscrews (4) and locknuts (1).
4. Tighten two locknuts (1) and locknuts (10) to 34 lb-ft (46 N•m).



12-125. TROOP/CARGO WINTERIZATION ANTENNA MOUNTING BRACKET REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M998, M998A1, M1038, M1038A1

Manual References

TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

- AS 1729/VRC antenna removed (para. 12-137), if installed.
- AB-652/GR antenna removed (para. 12-139), if installed.

Materials/Parts

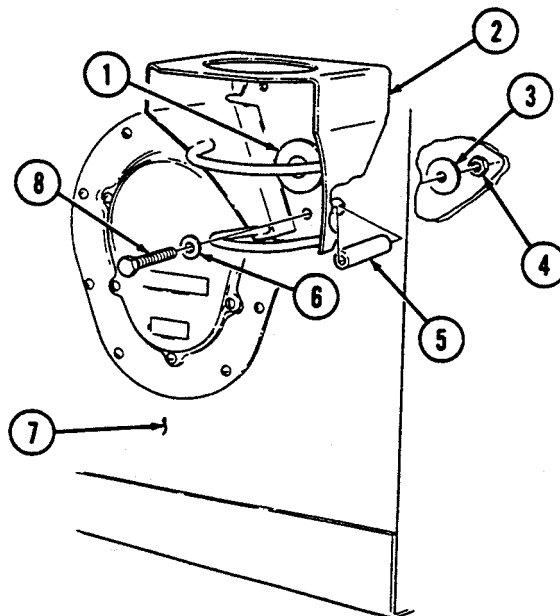
Three locknuts (Appendix G, Item 125)

a. Removal

1. Remove three locknuts (4), washers (3), capscrews (8), washers (6), and antenna mounting bracket (2) from right end closure (7). Discard locknuts (4).
2. Remove three spacers (5) from right end closure (7).
3. Remove grommet (1) from antenna mounting bracket (2).

b. Installation

1. Install grommet (1) on antenna mounting bracket (2).
2. Install three spacers (5) on right end closure (7).
3. Install antenna mounting bracket (2) on right end closure (7) with three washers (6), capscrews (8), washers (3), and locknuts (4). Tighten locknuts (4) to 15 lb-ft (20 N·m).



- FOLLOW-ON TASKS:
- Install AS 1729/VRC antenna (para. 12-137), if removed.
 - Install AB-652/GR antenna (para. 12-139), if removed.

12-126. TROOP/CARGO WINTERIZATION REAR REFLECTOR REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M998, M998A1, M1038, M1038A1

Manual References

TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

NOTE

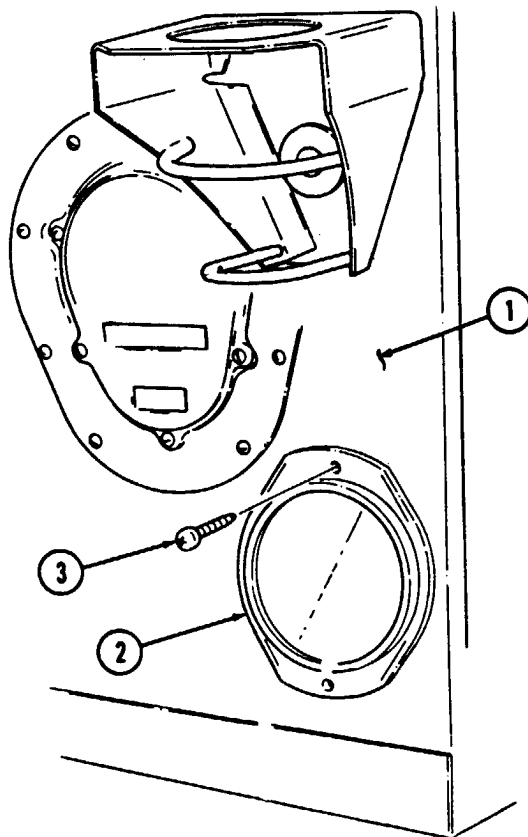
Replacement instructions for left and right rear reflectors are the same. This procedure covers right rear reflector.

a. Removal

Remove two screws (3) and reflector (2) from right end closure (1).

b. Installation

Install reflector (2) on right end closure (1) with two screws (3).



12-127. TROOP/CARGO WINTERIZATION REAR COMPOSITE LIGHT HOUSING REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M998, M998A1, M1038, M1038A1

Manual References

TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

Rear composite light assembly removed
(para. 4-56).

NOTE

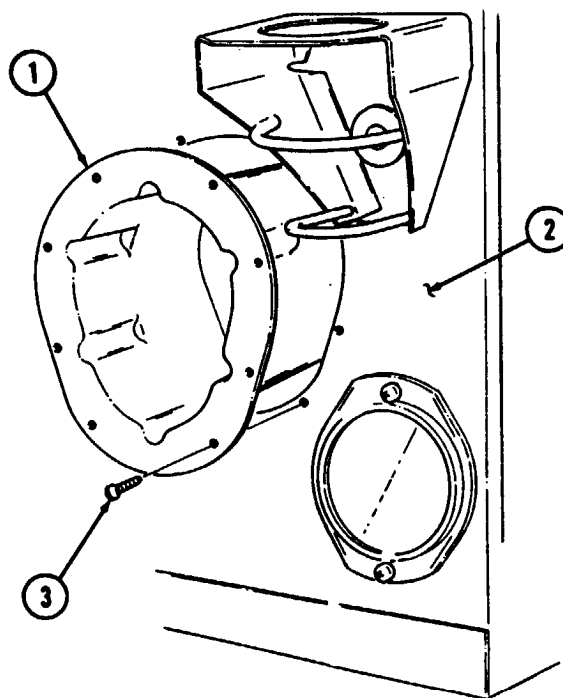
Replacement instructions for left and right rear composite light housings are the same. This procedure covers right rear composite light housing.

a. Removal

Remove eight screws (3) and rear composite light housing (1) from right end closure (2).

b. Installation

Install rear composite light housing (1) on right end closure (2) with eight screws (3).



FOLLOW-ON TASK: Install rear composite light housing (para. 4-56).

12-128. TROOP/CARGO WINTERIZATION DATA PLATE REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M998, M998A1, M1038, M1038A1

Manual References

TM 9-2320-280-24P

Tools

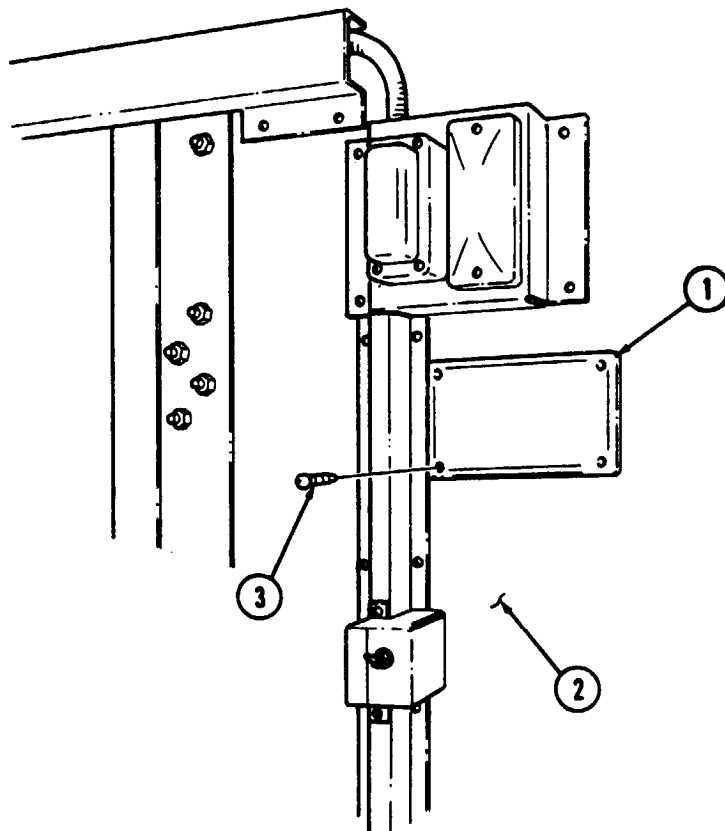
General mechanic's tool kit:
automotive (Appendix B, Item 1)

a. Removal

Remove four screws (3) and data plate (1) from left end closure (2).

b. Installation

Install data plate (1) on left end closure (2) with four screws (3).



Section VII. COMMUNICATIONS KITS MAINTENANCE

12-129. COMMUNICATIONS KITS MAINTENANCE TASK SUMMARY

TASK PARA.	PROCEDURES	PAGE NO.
12-130.	Front Radio Rack Mounting Bracket Replacement	12-202
12-131.	Auxiliary Shelf Replacement	12-202.1
12-131.1.	Front Radio Rack Upper Mounting Brackets Replacement	12-202.2
12-132.	Front Radio Rack Replacement	12-204
12-132.1.	Installation of New Configuration Front Radio Rack Bracket	12-204.2
12-133.	Front Lower Radio Rack Replacement	12-206
12-134.	Dual TSEC/KY-57 Mounting Bracket and Control Switch Bracket Replacement	12-207
12-135.	Speaker Stop Replacement	12-208
12-136.	Antenna Ground Strap Replacement	12-209
12-137.	AS 1729/VRC Antenna Replacement	12-211
12-138.	Rear Antenna Mounting Bracket Replacement	12-212
12-139.	AB-652/GR Antenna Replacement	12-213
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12-141.	Front Radio Rack Power Cable Replacement	12-221
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12-147.	Rear Radio Rack Power Cable Replacement	12-232

12-130. FRONT RADIO RACK MOUNTING BRACKET REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

All models except M996, M996A1, M997, M997A1, M997A2, M1037, M1042, M1097, M1097A1, M1097A2, M1123

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Personnel Required

One mechanic
One assistant

Manual References

TM 9-2320-280-24P

Equipment Condition

Radio rack assembly removed (para. 12-132).

a. Removal

NOTE

Brace is attached under the floor and secured by four capscrews holding the two radio rack mounting brackets to the cargo floor.

1. Remove two capscrews (2), washers (1), and radio rack mounting bracket (3) from cargo floor (4).

NOTE

Perform step 2 for vehicles with new configuration.

2. Remove two capscrews (7), washers (6), and radio rack mounting bracket (5) from cargo floor (4).

b. Installation

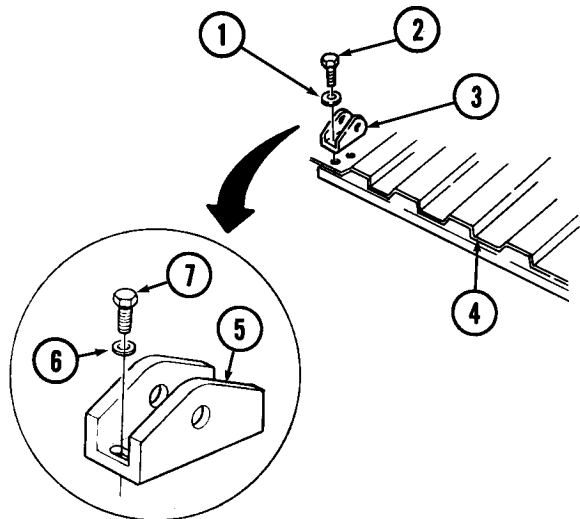
1. Install radio rack mounting bracket (3) on cargo floor (4) with two washers (1) and capscrews (2). Tighten capscrews (2) to 96 lb-in. (11 N•m).

NOTE

Perform step 2 for vehicles with new configuration.

2. Install radio rack mounting bracket (5) on cargo floor (4) with two washers (6) and capscrews (7). Tighten capscrews (7) to 96 lb-in. (11 N•m).

NEW CONFIGURATION



FOLLOW-ON TASK: Install radio rack assembly (para. 12-132).

12-131. AUXILIARY SHELF REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M998, M998A1, M1038, M1038A1

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Four locknuts (Appendix G, Item 70)

Manual References

TM 9-2320-280-24P

Equipment Condition

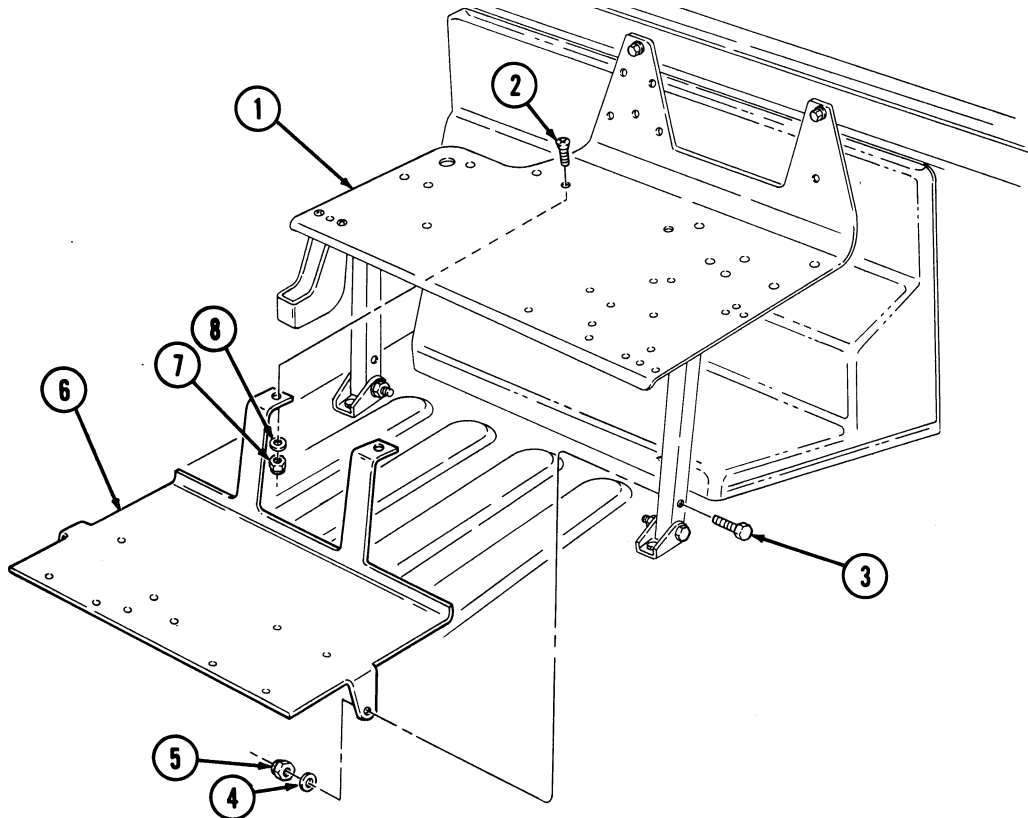
Speaker stop removed (para. 12-135).

a. Removal

1. Remove two locknuts (7), washers (8), screws (2), from auxiliary shelf (6) and radio rack (1). Discard locknuts (7).
2. Remove two locknuts (5), washers (4), capscrews (3), and auxiliary shelf (6) from radio rack (1). Discard locknuts (5).

b. Installation

1. Install auxiliary shelf (6) on radio rack (1) with two capscrews (3), washers (4), and locknuts (5).
2. Install radio rack (1) on auxiliary shelf (6) with two screws (2), washers (8), and locknuts (7).



FOLLOW-ON TASK: Install speaker stop (para. 12-135).

12-131.1. FRONT RADIO RACK UPPER MOUNTING BRACKETS REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M966, M998, M1025, M1026, M1036, M1038,
M1043, M1044, M1045, M1046, M1121

Manual References

TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

Radio rack assembly removed (para. 12-132).

Personnel Required

One mechanic
One assistant

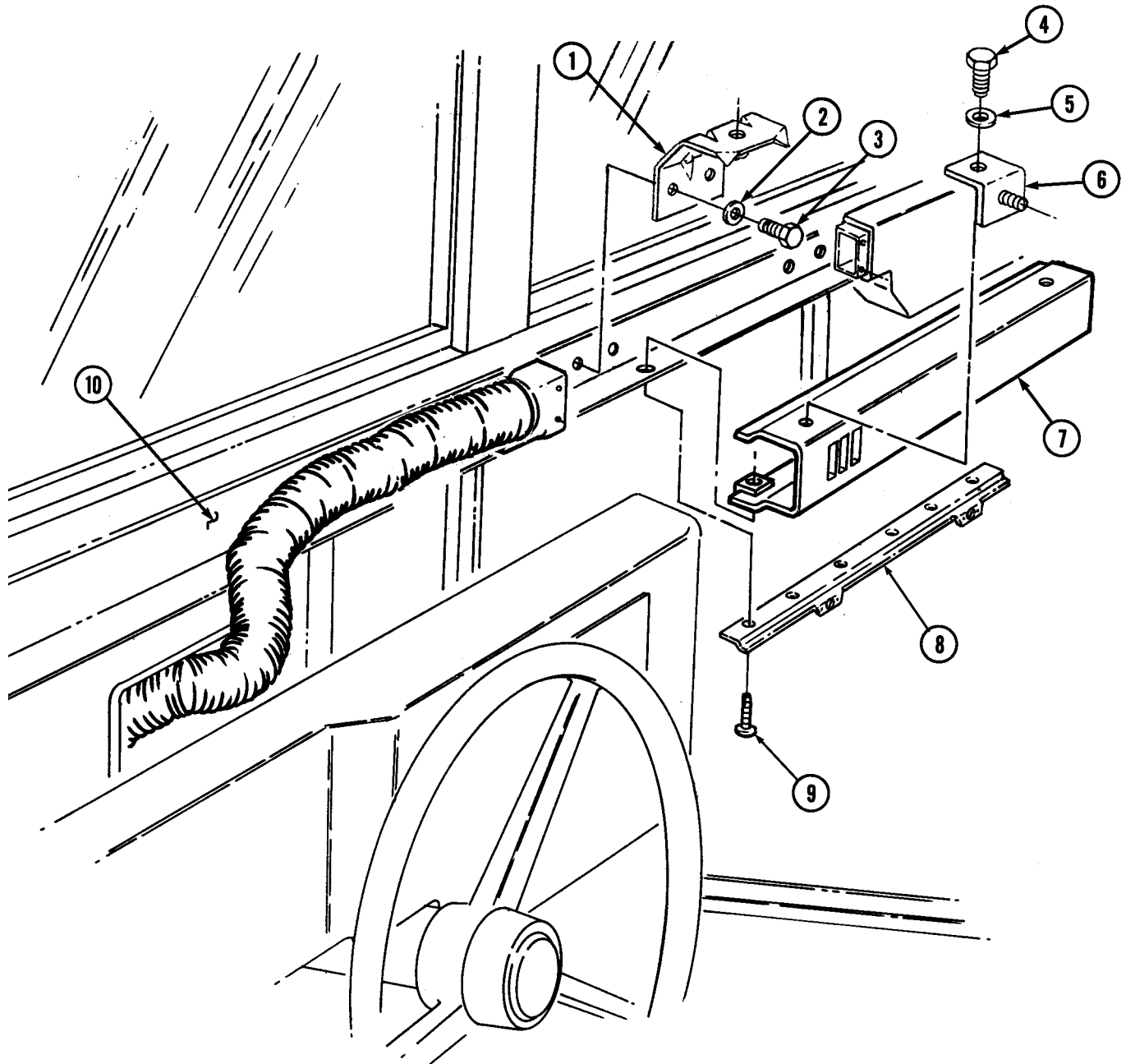
a. Removal

1. Remove two capscrews (4), washers (5), and radio rack mounting brackets (6) from plenum (7).
2. Remove nine screws (9), retainer (8), and plenum (7) from "A" beam (10).
3. Remove four capscrews (3), washers (2), and two radio rack upper mounting brackets (1) from "A" beam (10).

b. Installation

1. Install two radio rack upper mounting brackets (1) on "A" beam (10) with four washers (2) and capscrews (3).
2. Install retainer (8) and plenum (7) on "A" beam (10) with nine screws (9).
3. Install two radio rack mounting brackets (6) on plenum (7) with two washers (5) and capscrews (4).

12-131.1. FRONT RADIO RACK UPPER MOUNTING BRACKETS REPLACEMENT (6nt'd)



FOLLOW-ON TASK: Install radio rack assembly (para. 12-132).

12-132. FRONT RADIO RACK REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

All models except M996, M996A1, M997, M997A1, M997A2, M1037, M1042, M1097, M1097A1, M1097A2, M1123

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Antiseize compound (Appendix C, Item 13)
Four locknuts (Appendix G, Item 78)
Two plain-assembled nuts
(Appendix G, Item 201)
Two locknuts (Appendix G, Item 128)

Manual References

TM 9-2320-280-24P

Equipment Condition

- Headphone mounting bracket removed (para. 12-142).
- Dual TSEC/KY-57 mounting bracket and control switch bracket removed (para. 12-134) if installed.
- Auxiliary shelf removed (para. 12-131) if installed.

M966, M966A1, M1036, M1045, M1045A1, M1045A2, M1046, M1046A1, M1121 only:

- Vehicle power conditioner (VPC) mounting bracket removed (para. 11-66).
- Field glasses bracket removed (para. 11-69).

a. Removal

1. Remove two plain-assembled nuts (8), screws (5), two clamps (6), and cables (7) from radio rack (4). Discard plain-assembled nuts (8).
2. Remove two capscrews (1) and washers (2) from radio rack (4) and "A" beam (3).

NOTE

Perform steps 2.1 and 2.2 for vehicles with new configuration.

- 2.1. Remove two locknuts (15) and washers (14) from radio rack (4) and two radio rack upper brackets (13). Discard locknuts (15).
- 2.2. Remove two locknuts (18), washers (17), capscrews (16), and radio rack (4) from two radio rack mounting brackets (19) and remove radio rack (4). Discard locknuts (18).
3. Remove two locknuts (12), washers (11), capscrews (9), and radio rack (4) from radio rack mounting brackets (10). Discard locknuts (12).

b. Installation

1. Install radio rack (4) on radio rack mounting brackets (10) with two capscrews (9), washers (11), and locknuts (12). Tighten locknuts (12) to 8-10 lb-ft (11-14 N•m).

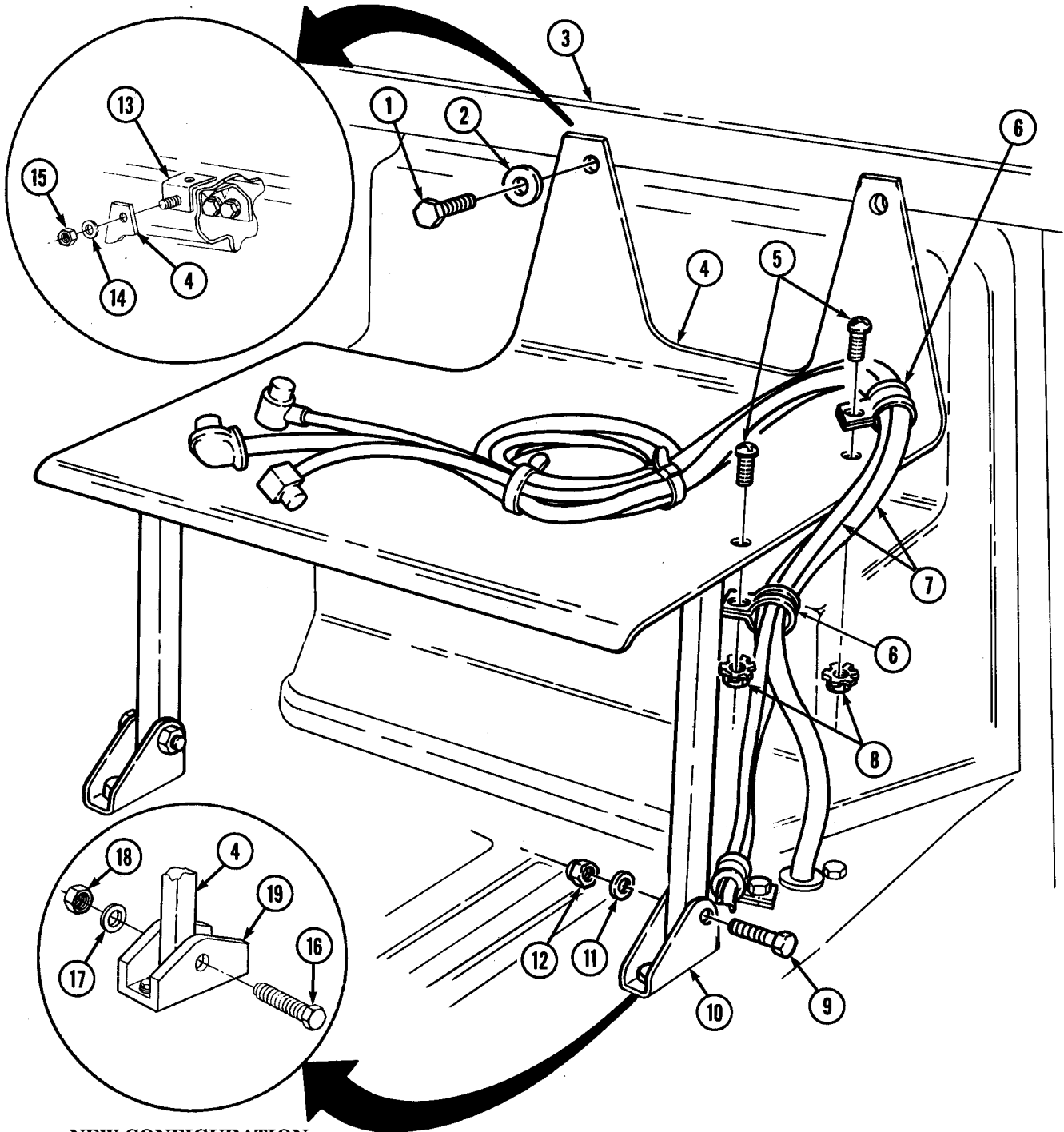
NOTE

Perform steps 1.1 and 1.2 for vehicles with new configuration.

- 1.1. Install radio rack (4) on two radio rack mounting brackets (19) with capscrews (16), washers (17), and locknuts (18). Tighten locknuts (18) to 8-10 lb-ft (11-14 N•m).
- 1.2. Install radio rack (4) on two radio rack upper brackets (13) with washers (14) and locknuts (15). Tighten locknuts (15) to 8-10 lb-ft (11-14 N•m).
2. Install radio rack (4) on "A" beam (3) with two washers (2) and capscrews (1). Tighten capscrews (1) to 6 lb-ft (8 N•m).
3. Install cables (7) and two clamps (6) on radio rack (4) with two screws (5) and plain-assembled nuts (8).

12-132. FRONT RADIO RACK REPLACEMENT(Cont'd)

NEW CONFIGURATION



NEW CONFIGURATION

- FOLLOW-ON TASKS:**
- Install headphone mounting bracket (para. 12-142).
 - Install dual TSEC/KY-57 mounting bracket and control switch bracket, (para. 12-134) if removed.
 - Install auxiliary shelf (para. 12-131) if removed.
M966, M966A1, M1036, M1045, M1045A1, M1045A2, M1046, M1046A1, and M1121 only.
 - Install vehicle power conditioner (VPC) mounting bracket (para. 11-66).
 - Install field glasses bracket (para. 11-69).

12-132.1. INSTALLATION OF NEW CONFIGURATION FRONT RADIO RACK BRACKET

This task covers:

a. Vehicle Preparation

b. Installation

INITIAL SETUP:

Applicable Models

All models except M996, M996A1, M997, M997A1, M997A2, M1037, M1042, M1097, M1097A1, M1097A2, M1123

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Four locknuts (Appendix G, Item 71)
Four locknuts (Appendix G, Item 128)
Two blind rivets (Appendix G, Item 237)
Sealant (Appendix C, Item 38)

Manual References

TM 9-2320-280-24P

Equipment Condition

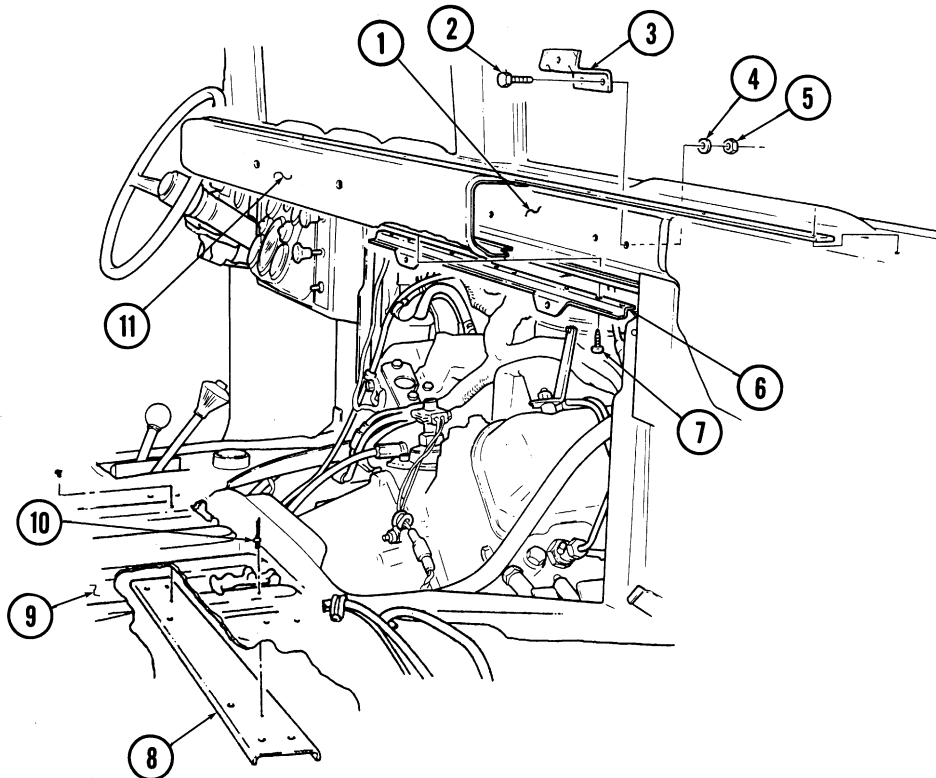
- Front radio rack removed (para. 12-132).
- Front floorboard removed (para. 11-154).
- Front radio rack mounting bracket removed (para. 12-130).
- Engine access cover removed (para. 10-15).

a. Vehicle Preparation

NOTE

Refer to para. 10-66 for rivet removal.

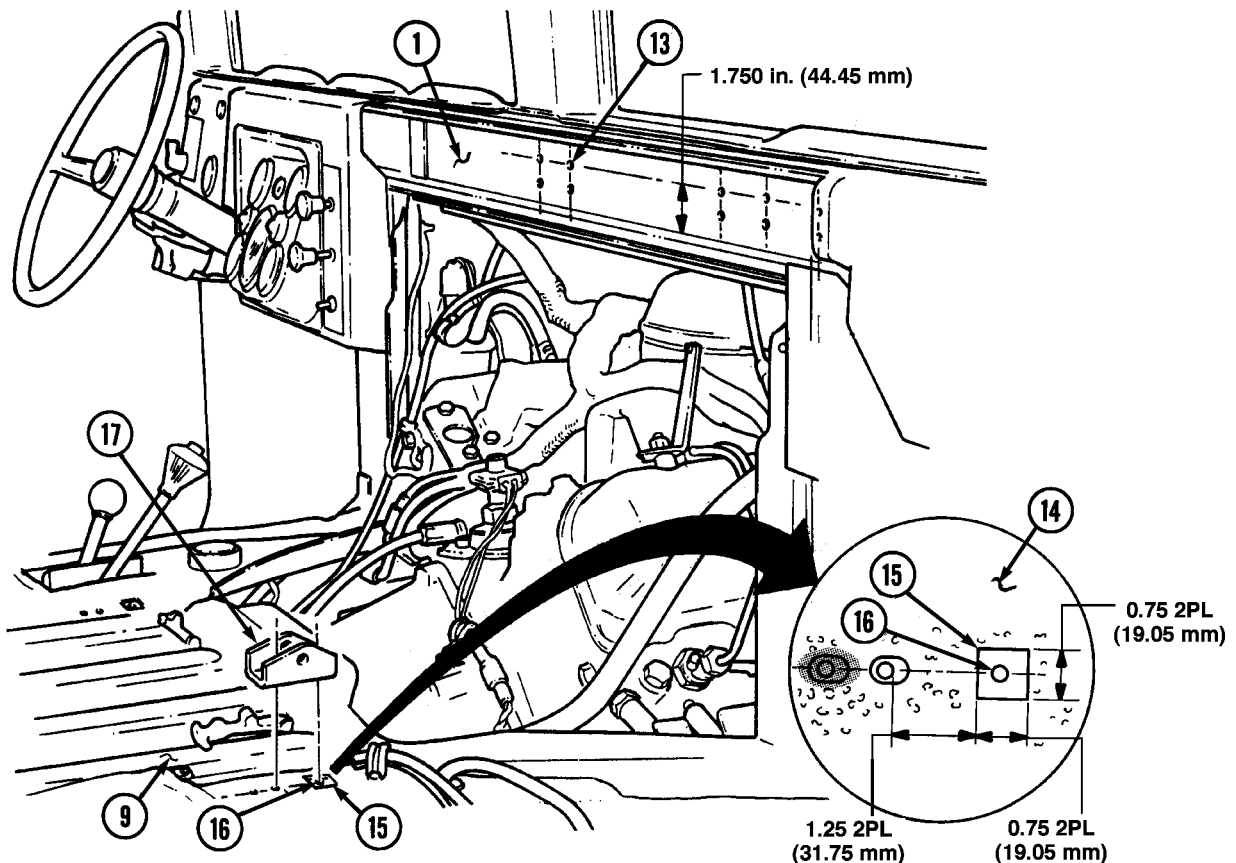
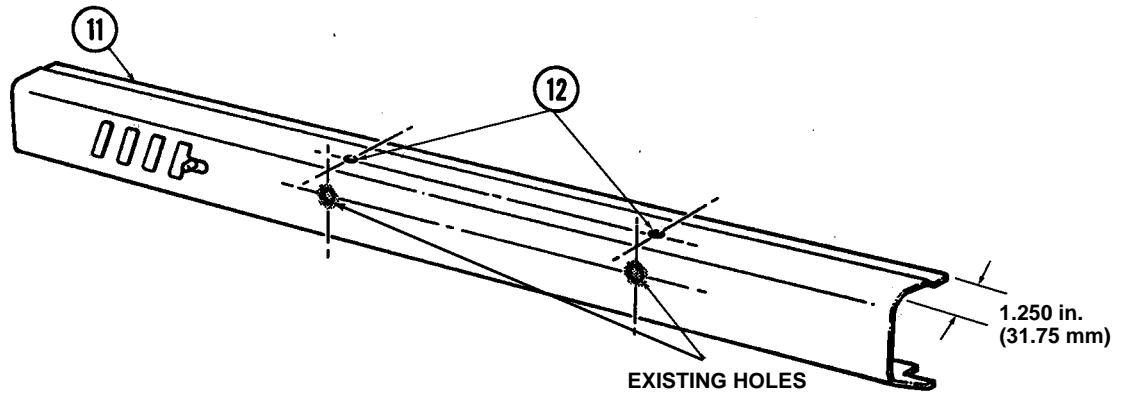
1. Remove nine screws (7), plenum panel (11), and engine shroud mount (6) from "A" beam (1).
2. Remove four nuts (5), washers (4), screws (2), and two mounting brackets (3) from "A" beam (1).
3. Remove two rivets (10) and radio rack brace (8) from tunnel floor (9).



12-132.1. INSTALLATION OF NEW CONFIGURATION FRONT RADIO RACK BRACKET (Cont'd)

b. Installation

1. Locate, mark, and drill two 0.440-in. (11.18 mm) diameter holes (12) in plenum panel (11).
2. Locate, mark, and drill four 0.281-in. (7.1 mm) diameter holes (13) in "A" beam (1).
3. Cut two 0.75-in. (2 mm) square holes (15) in floor mat (14) on top of tunnel floor (9).
4. Using two radio rack mounting brackets (17) as a template, locate, mark, and drill two 0.313-in. (8 mm) diameter holes (16) in top of tunnel floor (9).
5. Apply sealant to two holes (12) and two existing holes on plenum panel (11) and four holes (13) on "A" beam (1).



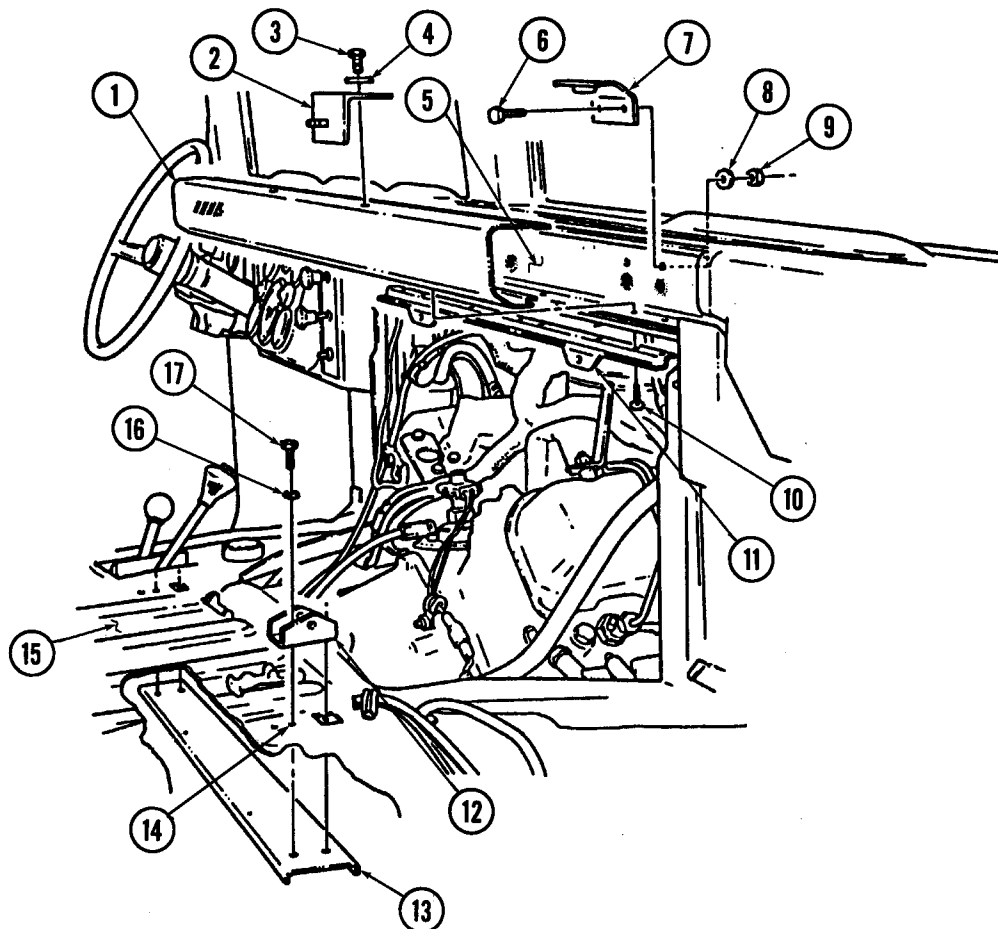
12-132.1. INSTALLATION OF NEW CONFIGURATION FRONT RADIO RACK BRACKET (Cont'd)

6. Position radio rack brace (13) under tunnel floor (15) and two radio rack mounting brackets (12) on tunnel floor (15).
7. Install radio rack brace (13) and two radio rack mounting brackets (12) on tunnel floor (15) with four screws (17) and washers (16).
8. Install plenum panel (1) and engine shroud mount (11) on "A" beam (5) with nine screws (10).
9. Using two holes (14) in tunnel floor (15) as a template, drill two 0.172-inch (4.3 mm) diameter holes through radio rack brace (13).

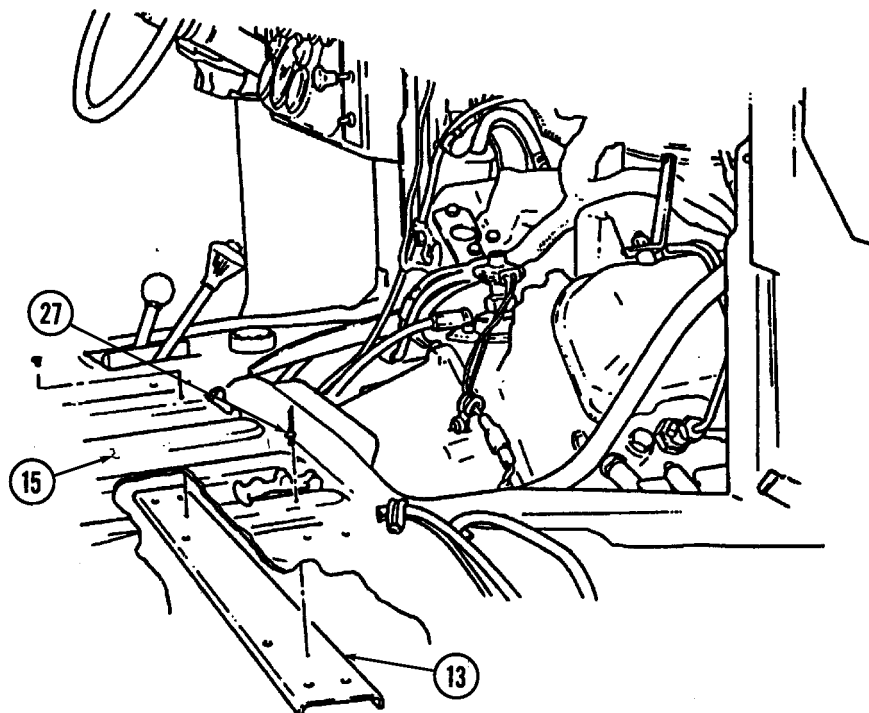
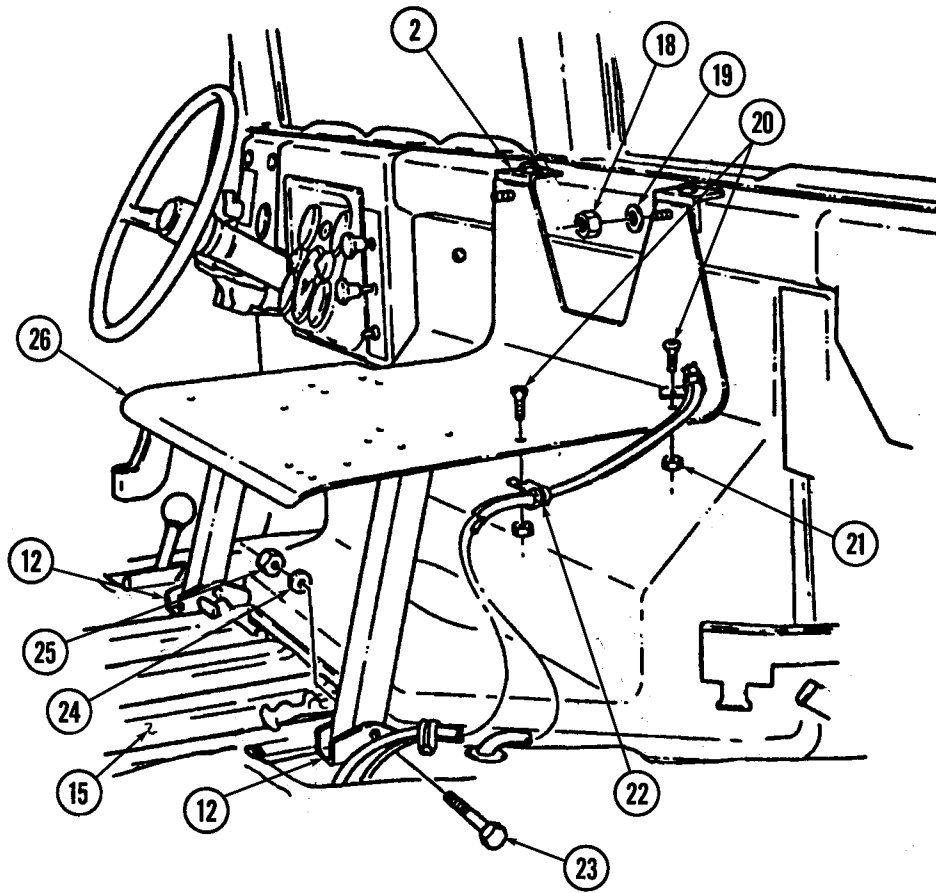
NOTE

Refer to para. 10-66 for rivet installation.

10. Install two rivets (27) in tunnel floor (15) and radio rack brace (13).
11. Install front floorboard (para. 11-154).
12. Install engine access cover (para. 10-15).
13. Install two radio mounting brackets (7) on "A" beam (5) with four screws (6), washers (8), and locknuts (9).
14. Install two upper radio rack brackets (2) on plenum panel (1) with two screws (3) and washers (4).
15. Install front radio rack (26) on two radio rack mounting brackets (12) with two screws (23), washers (24), and locknuts (25).
16. Install front radio rack (26) on plenum panel (1) and upper radio rack brackets (2) with two washers (19) and locknuts (18).
17. Install two screws (20) and nuts (21) through "P" clamps (22) and front radio rack (26).



12-132.1. INSTALLATION OF NEW CONFIGURATION FRONT RADIO RACK BRACKET (Cont'd)



12-133. FRONT LOWER RADIO RACK REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M998, M998A1, M1038, M1038A1

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Six locknuts (Appendix G, Item 70)
Four locknuts (Appendix G, Item 128)

Manual References

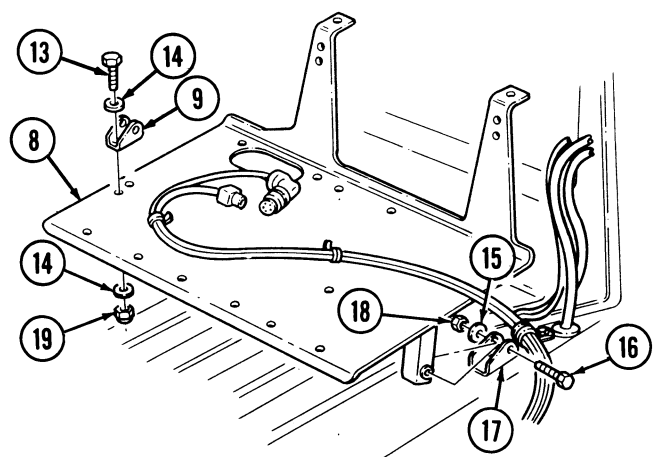
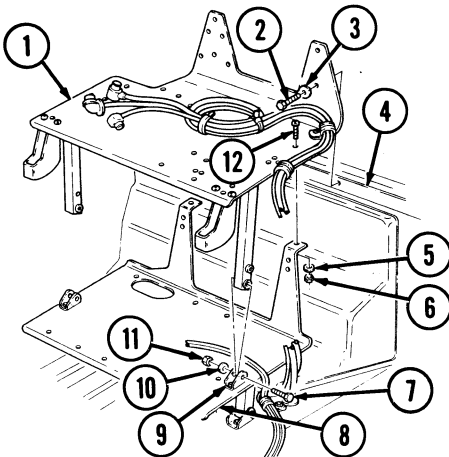
TM 9-2320-280-24P

a. Removal

1. Remove two capscrews (2) and washers (3) from upper radio rack (1) and plenum (4).
2. Remove two locknuts (6), washers (5), and screws (12) from lower radio rack (8) and upper radio rack (1). Discard locknuts (6).
3. Remove two locknuts (11), washers (10), capscrews (7), and upper radio rack (1) from mounting brackets (9). Discard locknuts (11).
4. Remove four locknuts (19), washers (14), capscrews (13), washers (14), and mounting brackets (9) from lower radio rack (8). Discard locknuts (19).
5. Remove two locknuts (18), washers (15), capscrews (16), and lower radio rack (8) from mounting brackets (17). Discard locknuts (18).

b. Installation

1. Install lower radio rack (8) on mounting brackets (17) with two capscrews (16), washers (15), and locknuts (18). Tighten locknuts (18) to 8-10 lb-ft (11-14 N·m).
2. Install two mounting brackets (9) on lower radio rack (8) with four washers (14), capscrews (13), washers (14), and locknuts (19). Finger tighten locknuts (19).
3. Install upper radio rack (1) on mounting brackets (9) with two capscrews (7), washers (10), and locknuts (11). Tighten locknuts (11) to 8-10 lb-ft (11-14 N·m).
4. Install upper radio rack (1) on lower radio rack (8) with two screws (12), washers (5), and locknuts (6).
5. Install upper radio rack (1) on plenum (4) with two washers (3) and capscrews (2). Tighten capscrews (2) to 6 lb-ft (8 N·m).
6. Tighten four locknuts (19) on mounting brackets (9) and lower radio rack (8).



12-134. DUAL TSEC/KY-57 MOUNTING BRACKET AND CONTROL SWITCH BRACKET REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M998, M998A1, M1038, M1038A1, M1097, M1097A1, M1097A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Four locknuts (Appendix G, Item 86)

Manual References

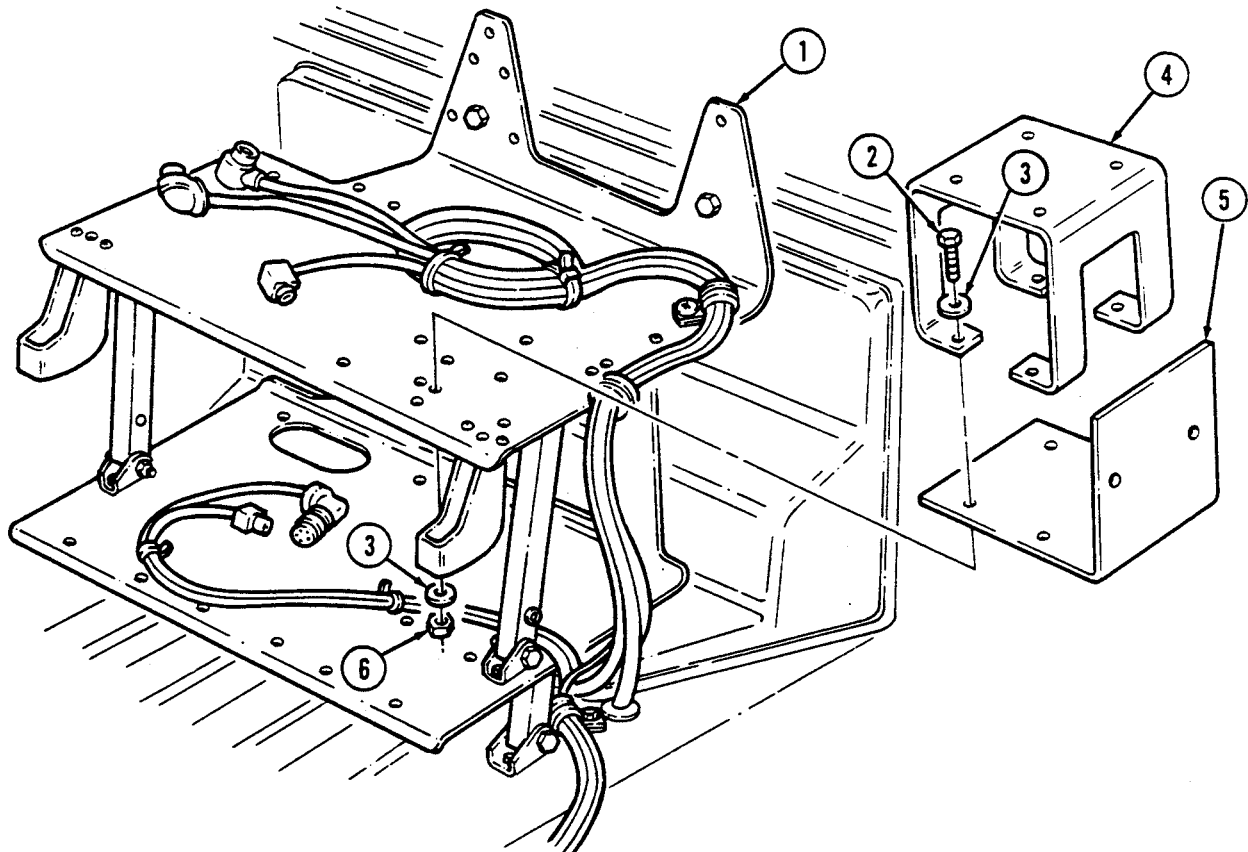
TM 9-2320-280-24P

a. Removal

Remove four locknuts (6), washers (3), capscrews (2), washers (3), dual TSEC/KY-57 mounting bracket (4) and control switch bracket (5) from radio rack (1). Discard locknuts (6).

b. Installation

Install switch bracket (5) and mounting bracket (4) on radio rack (1) with four washers (3), capscrews (2), washers (3), and locknuts (6).



12-135. SPEAKER STOP REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M998, M998A1, M1038, M1038A1

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Two locknuts (Appendix G, Item 70)

Manual References

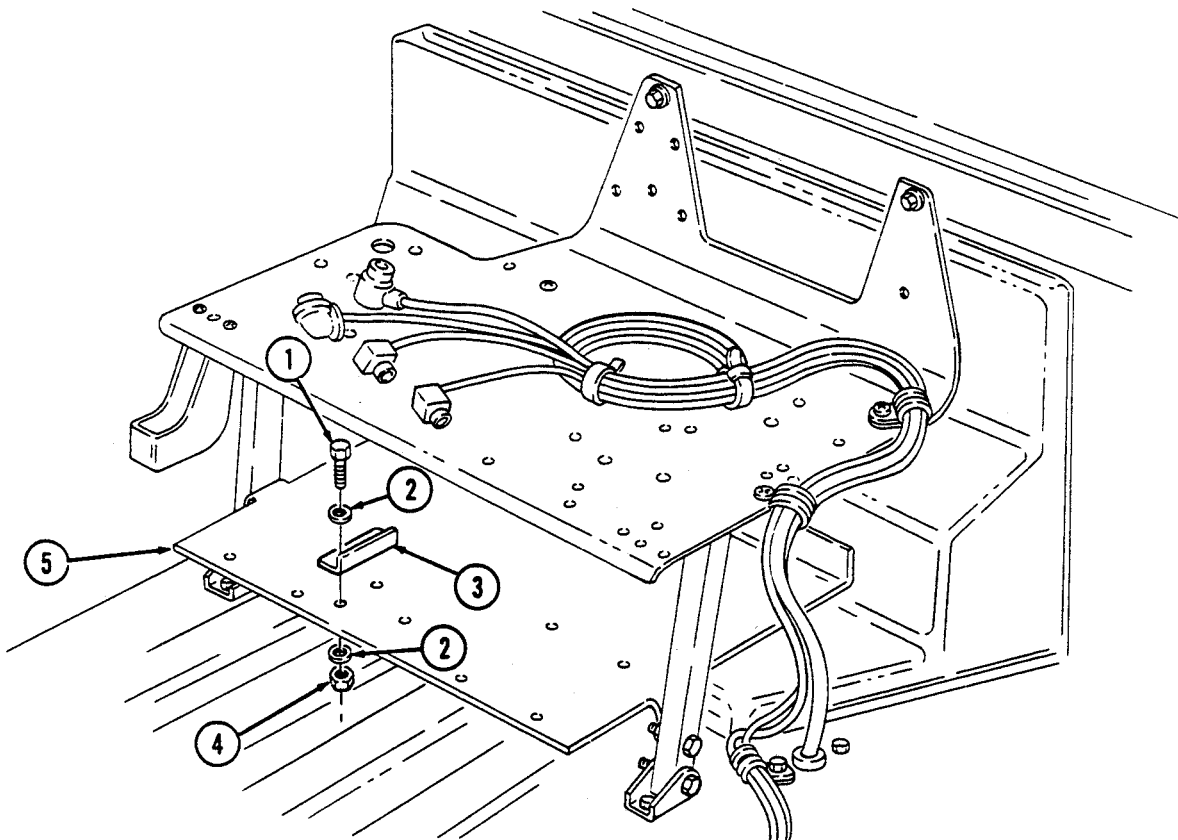
TM 9-2320-280-24P

a. Removal

Remove two locknuts (4), washers (2), capscrews (1), washers (2), and speaker stop (3) from auxiliary shelf (5). Discard locknuts (4).

b. Installation

Install speaker stop (3) on auxiliary shelf (5) with two washers (2), capscrews (1), washers (2), and locknuts (4).



12-136. ANTENNA GROUND STRAP REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

All models except M996, M996A1, M997, M997A1, M997A2, M1036, M1037, M1042, M1097, M1097A1, M1097A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Antiseize compound (Appendix C, Item 13)
Two lockwashers (Appendix G, Item 138)
Locknut (Appendix G, Item 128)
Plain-assembled nut (Appendix G, Item 201)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

- Battery ground cable disconnected (para. 4-73). M966, M966A1, M1025, M1025A1, M1025A2, M1026, M1026A1, M1043, M1043A1, M1043A2, M1044, M1044A1, M1045, M1045A1, M1045A2, M1046, and M1046A1 only:
- Cargo shell door raised (TM 9-2320-280-10).

a. Removal

1. Remove screw (6), lockwasher (7), and ground strap (3) from antenna base (2). Discard lockwasher (7).

NOTE

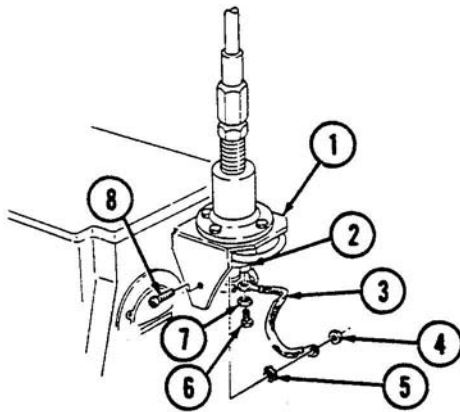
Perform step 2 for M998, M998A1, M1035, M1035A1, M1035A2, M1038, and M1038A1 models only.

2. Remove plain-assembled nut (4), lockwasher (5), screw (8), and ground strap (3) from antenna mounting bracket assembly (1). Discard plain-assembled nut (4) and lockwasher (5).

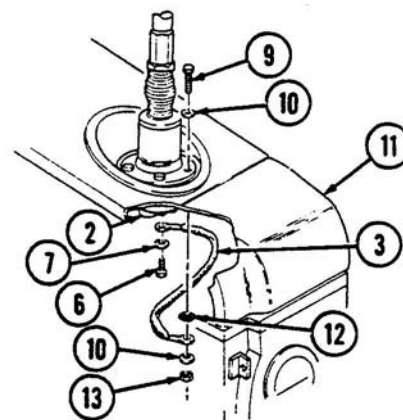
NOTE

Perform step 3 for M966, M966A1, M1025, M1025A1, M1025A2, M1026, M1026A1, M1043, M1043A1, M1043A2, M1044, M1044A1, M1045, M1045A1, M1045A2, M1046, and M1046A1 models only.

3. Remove locknut (13), washer (10), capscrew (9), washer (10), ground strap (3), and lockwasher (12) from cargo shell (11). Discard locknut (13) and lockwasher (12).



**M998, M998A1, M1035,
M1035A1, M1035A2, M1038,
M1038A1**



**M966, M966A1, M1025, M1025A1,
M1025A2, M1026, M1026A1, M1043,
M1043A1, M1043A2, M1044, M1044A1,
M1045, M1045A1, M1045A2, M1046,
M1046A1**

12-136. ANTENNA GROUND STRAP REPLACEMENT (Cont'd)

b. Installation

NOTE

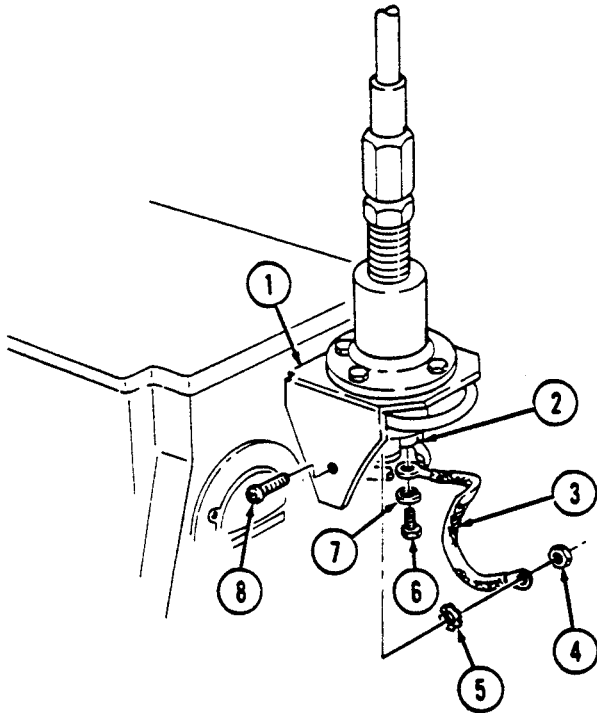
Perform step 1 for M966, M966A1, M1025, M1025A1, M1025A2, M1026, M1026A1, M1045A2, M1043, M1043A1, M1043A2, M1044, M1044A1, M1045, M1045A1, M1046, and M1046A1 models only.

1. Install lockwasher (12) and ground strap (3) on cargo shell (11) with washer (10), capscrew (9), washer (10), and locknut (13). Tighten locknut (13) to 31 lb-ft (42 N·m).

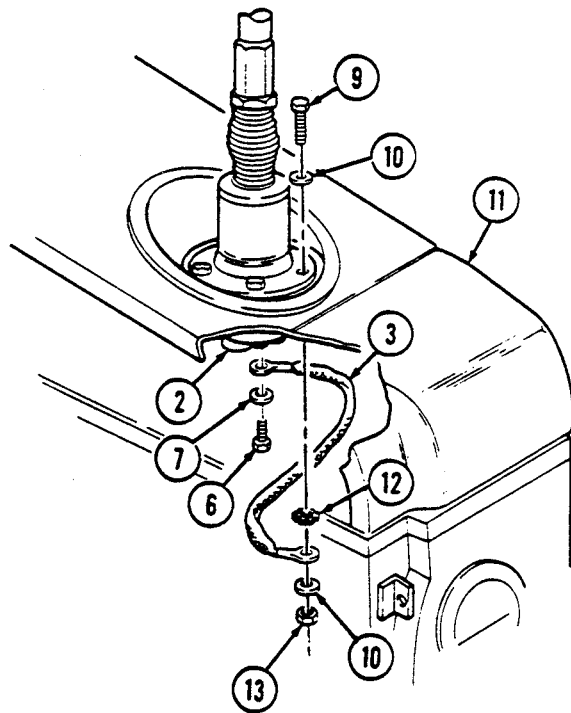
NOTE

Perform steps 2 and 3 for M998, M998A1, M1035, M1035A1, M1035A2, M1038, and M1038A1 models only.

2. Apply antiseize compound to screw (8) threads.
3. Install lockwasher (5) and ground strap (3) on antenna mounting bracket assembly (1) with screw (8) and plain-assembled nut (4).
4. Install ground strap (3) on antenna base (2) with lockwasher (7) and screw (6).



**M998, M998A1, M1035,
M1035A1, M1035A2, M1038,
M1038A1**



**M966, M966A1, M1025, M1025A1,
M1025A2, M1026, M1026A1, M1043,
M1043A1, M1043A2, M1044, M1044A1,
M1045, M1045A1, M1045A2, M1046,
M1046A1**

FOLLOW-ON TASKS: • Connect battery ground cable (para. 4-73).

M966, M966A1, M1025, M1025A1, M1025A2, M1026, M1026A1, M1043, M1043A1, M1043A2, M1044, M1044A1, M1045, M1045A1, M1045A2, M1046, and M1046A1 only:

- Lower cargo shell door (TM 9-2320-280-10).

12-137. AS 1729/VRC ANTENNA REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

All models except M996, M996A1, M1036, M1037, M1042, M1097, M1097A1, M1097A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Three locknuts (Appendix G, Item 128)

Manual References

TM 9-2320-280-24P

Equipment Condition

Antenna ground strap removed (para. 12-136)
(except M997, M997A1, M997A2)

NOTE

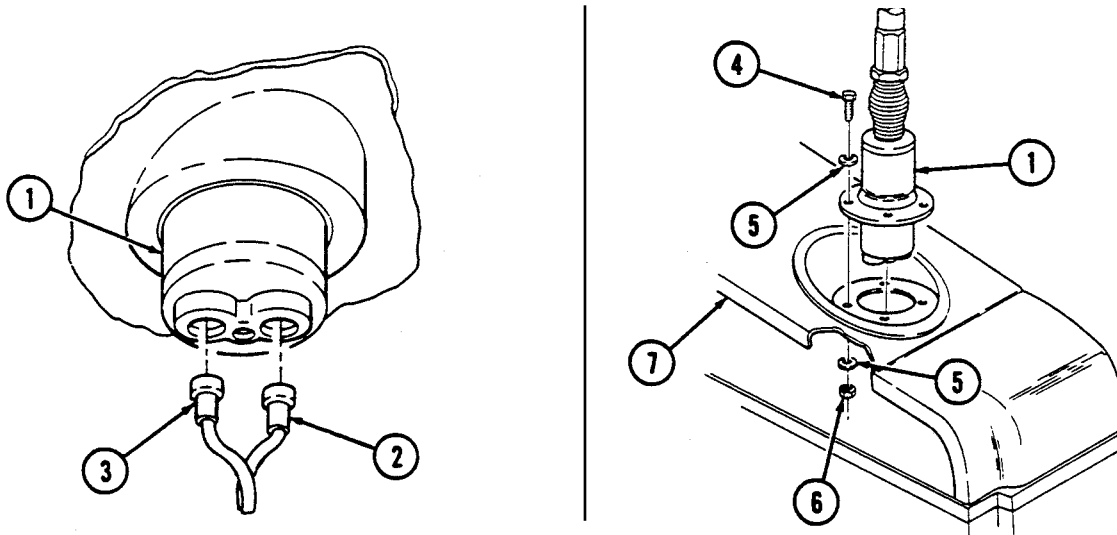
Antenna replacement is basically the same for all models except the M998, M998A1, M1038, and M1038A1 which use an external antenna mounting bracket. This procedure covers the M966, M966A1, M997, M997A1, M997A2, M1025, M1025A1, M1025A2, M1026, M1026A1, M1035, M1035A1, M1035A2, M1043, M1043A1, M1043A2, M1044, M1044A1, M1045, M1045A1, M1045A2, M1046, and M1046A1 models.

a. Removal

1. Disconnect radio antenna cable (3) and antenna control cable (2) from antenna (1).
2. Remove three locknuts (6), washers (5), capscrews (4), washers (5), and antenna (1) from cargo shell (7). Discard locknuts (6).

b. Installation

1. Install antenna (1) on cargo shell (7) with three washers (5), capscrews (4), and locknuts (6). Tighten locknuts (6) to 26 lb-ft (35 N•m).
2. Connect antenna control cable (2) and radio antenna cable (3) on antenna (1).



FOLLOW-ON TASK: Install antenna ground strap (para. 12-136).

12-138. REAR ANTENNA MOUNTING BRACKET REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M998, M998A1, M1038, M1038A1

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Special Tools

Crowfoot, 3/8 in. (Appendix B, Item 151)
Socket adapter, 3/8 in. (Appendix B, Item 146)

Materials/Parts

Three locknuts (Appendix G, Item 113)

Manual References

TM 9-2320-280-24P

Equipment Condition

- AS 1729/VRC antenna removed (para. 12-137) if installed.
- AB-652/GR antenna removed (para. 12-139) if installed.

a. Removal

1. Remove grommet (3).

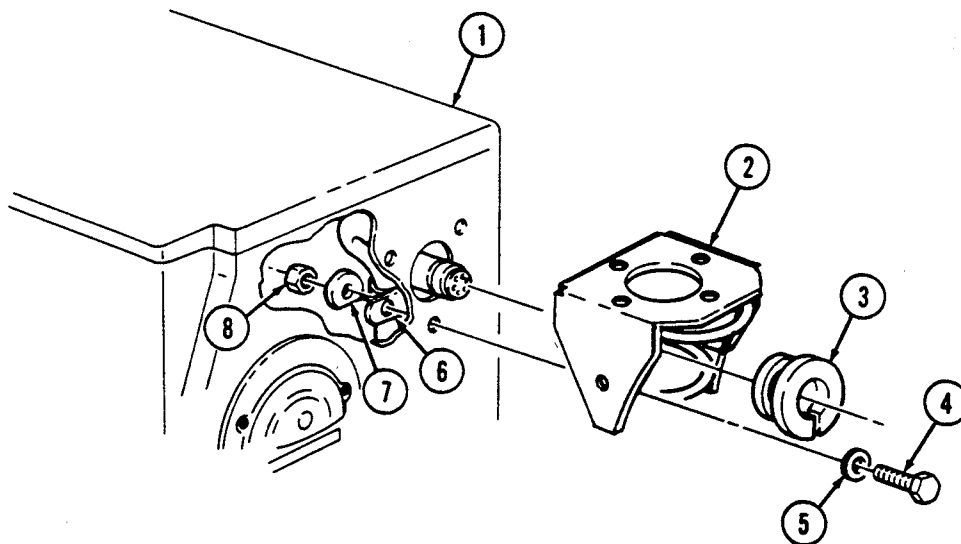
NOTE

Note position of washers and clamp for installation.

2. Remove three locknuts (8), washers (7), capscrews (4), washers (5), antenna mounting bracket (2), and clamp (6) from body (1). Discard locknuts (8).

b. Installation

1. Install antenna mounting bracket (2) and clamp (6) on body (1) with three washers (5), capscrews (4), washers (7), and locknuts (8). Using crowfoot, tighten locknuts (8) to 15 lb-ft (20 N·m).
2. Install grommet (3).



- FOLLOW-ON TASKS:**
- Install AS 1729/VRC antenna (para. 12-137) if removed.
 - Install AB-652/GR antenna (para. 12-139) if removed.

12-139. AB-652/GR ANTENNA REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M998, M998A1, M1038, M1038A1

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Four locknuts (Appendix G, Item 128)

Manual References

TM 9-2320-280-24P

Equipment Condition

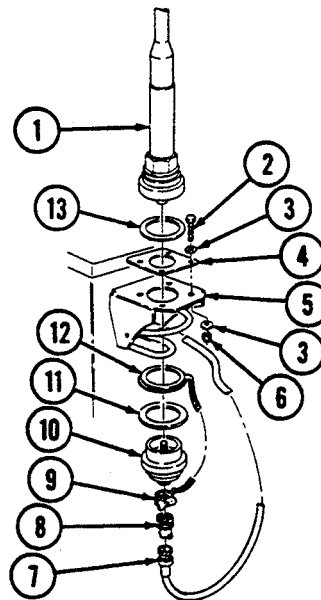
Battery ground cable disconnected
(para. 4-73).

a. Removal

1. Disconnect antenna cable (7) from adapter (8).
2. Loosen ground clamp (9) and remove from adapter (8).
3. Remove adapter (8) from lower insulator (10).
4. Remove antenna (1), rubber washer (13), ground ring (12), rubber washer (11), and lower insulator (10) from antenna mounting bracket (5).
5. Remove four locknuts (6), washers (3), capscrews (2), washers (3), and adapter (4) from antenna mounting bracket (5). Discard locknuts (6).

b. Installation

1. Install adapter (4) on antenna mounting bracket (5) with four washers (3), capscrews (2), washers (3), and locknuts (6).
2. Install lower insulator (10), rubber washer (11), ground ring (12), rubber washer (13), and antenna (1) on mounting bracket (5).
3. Install adapter (8) on lower insulator (10).
4. Install ground clamp (9) on adapter (8) and tighten.
5. Connect antenna cable (7) to adapter (8).



FOLLOW-ON TASK: Connect battery ground cable (para. 4-73).

12-140. REAR ANTENNA CABLES REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

All models except M996, M996A1, M997, M997A1, M997A2, M1037, M1042, M1097, M1097A1, M1097A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Two tiedown straps (Appendix G, Item 307)
Nine plain-assembled nuts
(Appendix G, Item 201)
Four assembled locknuts (Appendix G, Item 130)
Two lockwashers (Appendix G, Item 146)
Locknut (Appendix G, Item 70)

Personnel Required

One mechanic
One assistant

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

- Battery ground cable disconnected (para. 4-73).
 - Right rear passenger seat back removed (para. 10-45).
 - Dual TSEC/KY-57 mounting bracket and control switch bracket removed (para. 12-134) if installed.
 - Front floorboard removed (para. 11-154).
- M966, M966A1, M1025, M1025A1, M1025A2, M1026, M1026A1, M1043, M1043A1, M1043A2, M1044, M1044A1, M1045, M1045A1, M1045A2, M1046, and M1046A1 models only:
- Cargo shell door raised (TM 9-2320-280-10).

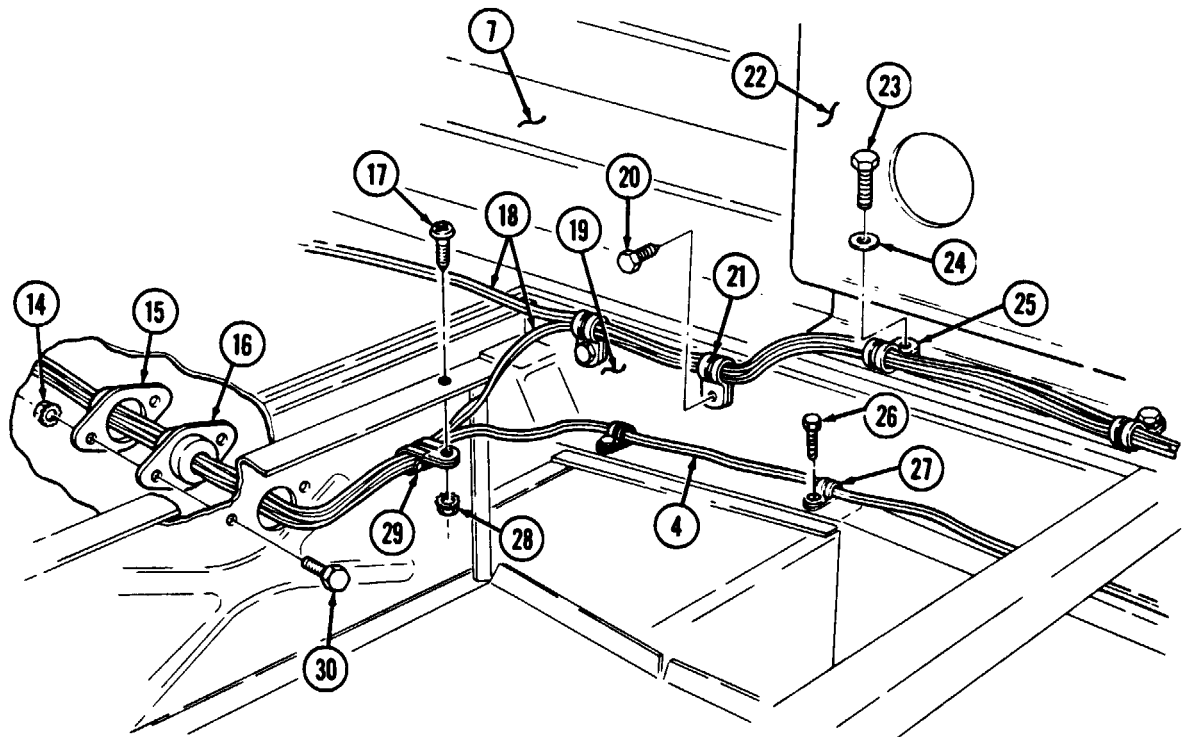
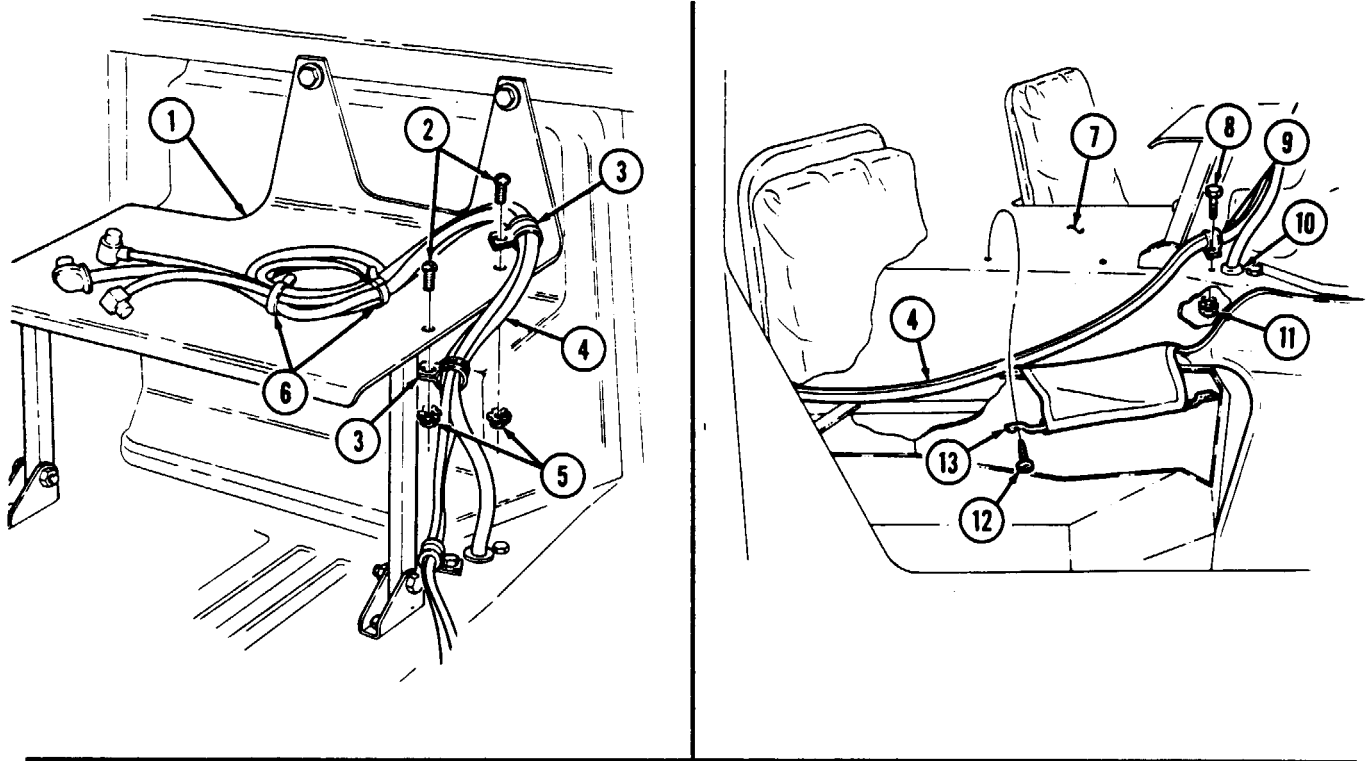
NOTE

- Left and right rear antenna cables are replaced basically the same, except the left antenna cables have an additional six clamps securing cables across rear of vehicle. This procedure covers the right rear antenna cables.
- Perform steps 1 through 5 for front radio rack, and steps 6 and 7 for rear radio rack.

a. Removal

1. Remove two tiedown straps (6) from antenna cables (4). Discard tiedown straps (6).
2. Remove two plain-assembled nuts (5), screws (2), two clamps (3), and antenna cables (4) from front radio rack (1). Discard plain-assembled nuts (5).
3. Remove plain-assembled nut (11), capscrew (8), clamp (9) from two antenna cables (4), and grommet (10). Discard plain-assembled nut (11).
4. Remove two screws (12) and insulation retainer (13) from cargo floor (7) and pull away from cargo floor (7).
5. Remove three screws (26), clamps (27), and two antenna cables (4) from body (19).
6. Remove two capscrews (23), washers (24), clamps (25), and antenna cables (18) from rear radio rack (22) and cargo floor (7).
7. Remove two screws (20), clamps (21), and antenna cables (18) from body (19) and remove clamps (21) from antenna cables (18).
8. Remove plain-assembled nut (28), screw (17), and clamp (29) from two antenna cables (4) and body (19). Discard plain-assembled nut (28).
9. Remove two assembled locknuts (14), capscrews (30), antenna cables (4), grommet (16), and retainer (15) from body (19). Discard assembled locknuts (14).

12-140. REAR ANTENNA CABLES REPLACEMENT (Cont'd)



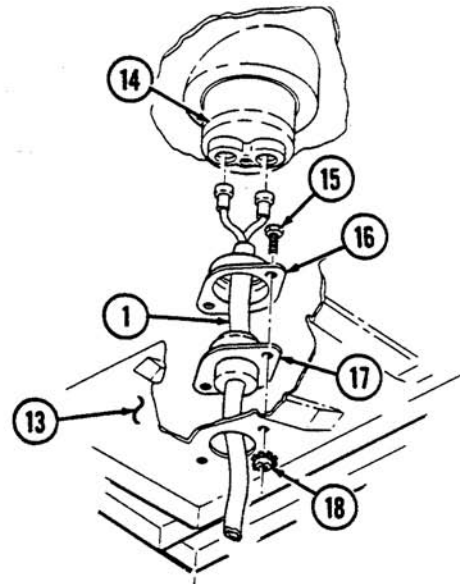
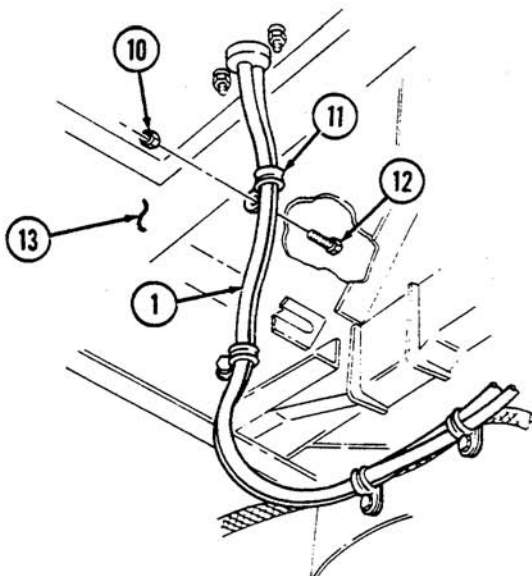
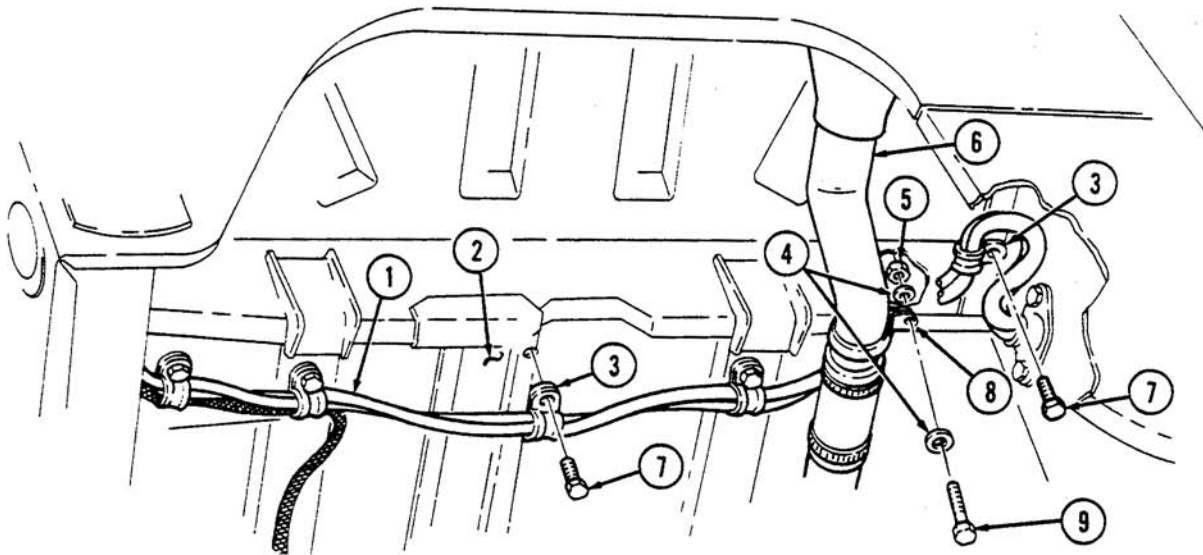
12-140. REAR ANTENNA CABLES REPLACEMENT (Cont'd)

10. Remove five screws (7), clamps (3), and two antenna cables (1) from underbody (2).
11. Remove locknut (5), washer (4), capscrew (9), washer (4), and filler pipe clamp (8) from underbody (2) and filler pipe (6). Discard locknut (5).

NOTE

Perform steps 12 through 15 for M966, M966A1, M1025, M1025A1, M1025A2, M1026, M1026A1, M1043, M1043A1, M1043A2, M1044, M1044A1, M1045, M1045A1, M1045A2, M1046, and M1046A1 models only.

12. Remove two plain-assembled nuts (10), screws (12), clamps (11), and antenna cables (1) from wheelhouse (13). Discard plain-assembled nuts (10).
13. Remove two assembled locknuts (18), capscrews (15), two antenna cables (1), grommet (17), and retainer (16) from wheelhouse (13). Discard assembled locknuts (18).
14. Disconnect two antenna cables (1) from antenna base (14) and remove antenna cables (1).
15. Remove ten clamps (3) and two clamps (11) from antenna cables (1).



12-140. REAR ANTENNA CABLES REPLACEMENT (Cont'd)

NOTE

Perform steps 16 through 22 for M998, M998A1, M1038, and M1038A1 models only.

16. Remove plain-assembled nut (23), capscrew (25), clamp (26), two antenna cables (1), and body harness (24) from body (22). Discard plain-assembled nut (23).
17. Remove two capscrews (28) and lockwashers (27) from cable shield (21) and body (22). Pull cable shield (21) away from body (22) to allow access to clamps (30). Discard lockwashers (27).
18. Remove two plain-assembled nuts (29), capscrews (20), clamps (30), antenna cables (1), and body harness (24) from cable shield (21). Discard plain-assembled nuts (29).

NOTE

Note position of clamp for installation.

19. Remove nut (18), clamp (31), and two antenna cables (1) from antenna mounting bracket cap-screw (19).
20. Disconnect two antenna cables (1) from antenna base (14), and push grommet (33) and antenna cables (1) through grommet opening (32) in body (22). Remove grommet (33) from antenna cables (1).
21. Remove antenna cables (1).
22. Remove clamps from two antenna cables (1) and body harness (24) as required.

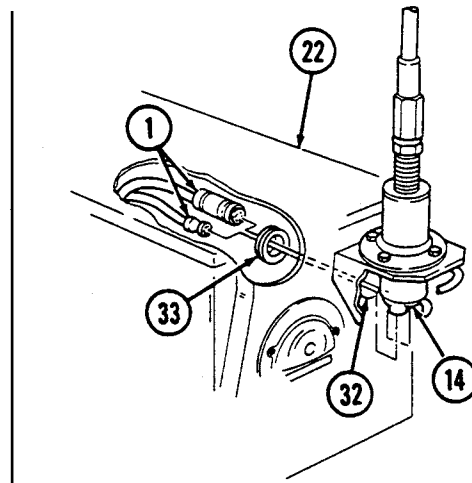
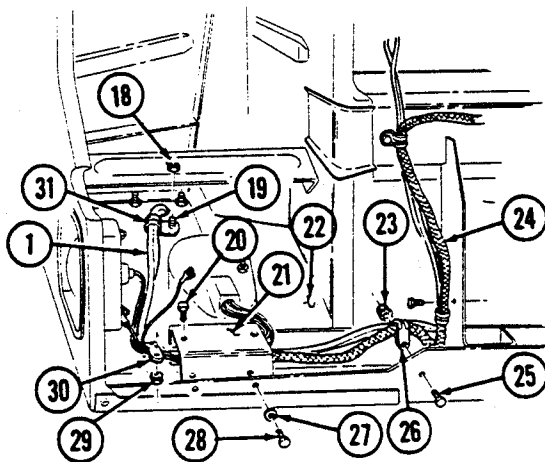
b. Installation

1. Install two antenna cables (1) in approximate mounting location.
2. Install clamps and grommet (33) on two antenna cables (1) and body harness (24) as required.

NOTE

Perform steps 3 through 8 for M998, M998A1, M1038, and M1038A1 models only.

3. Insert antenna cables (1) through grommet opening (32) and install grommet (33) in body (22).
4. Connect antenna cables (1) to antenna base (14).
5. Install two antenna cables (1) on antenna mounting bracket cap-screw (19) with clamp (31) and nut (18).
6. Install two antenna cables (1) and body harness (24) on shield (21) with two clamps (30), capscrews (20), and plain-assembled nuts (29).
7. Install shield (21) on body (22) with two lockwashers (27) and capscrews (28).
8. Secure two antenna cables (1) and body harness (24) to body (22) with clamp (26), capscrew (25), and plain-assembled nut (23).

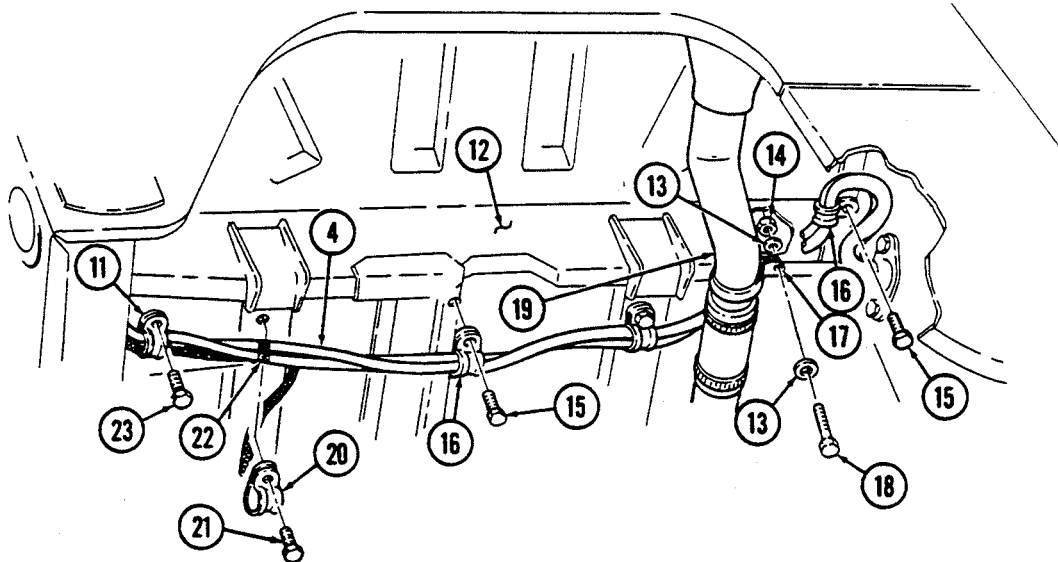
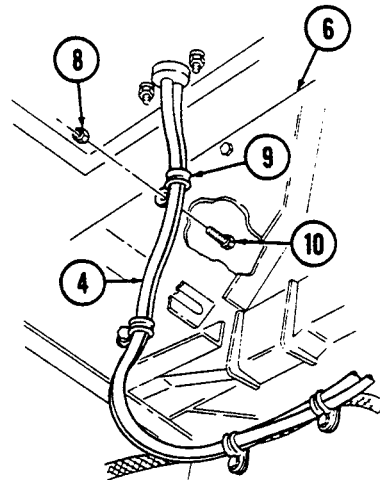
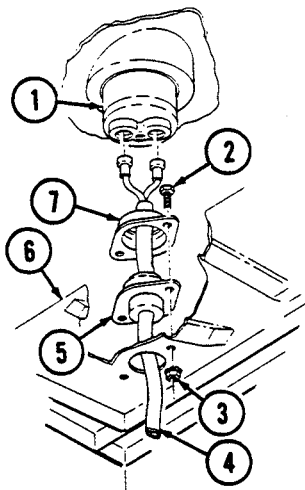


12-140. REAR ANTENNA CABLES REPLACEMENT (Cont'd)

NOTE

Perform steps 9 through 12 for M966, M966A1, M1025, M1025A1, M1025A2, M1026, M1026A1, M1043, M1043A1, M1043A2, M1044, M1044A1, M1045, M1045A1, M1045A2, M1046, and M1046A1 models only.

9. Connect two antenna cables (4) to antenna base (1).
10. Install grommet (5) and retainer (7) on antenna cables (4).
11. Install two antenna cables (4), grommet (5), and retainer (7) on wheelhouse (6) with two capscrews (2) and assembled locknuts (3).
12. Install two antenna cables (4) on wheelhouse (6) with two clamps (9), screws (10), and plain-assembled nuts (8).
13. Install two antenna cables (4) on underbody (12) with clamp (11) and screw (23).
14. Position clamp (20) over yellow locator tape (22) on two antenna cables (4) and install on underbody (12) with screw (21).
15. Secure two antenna cables (4) to underbody (12) with three clamps (16) and screws (15).
16. Install clamp (17) on filler spout (19) and underbody (12) with washer (13), capscrew (18), washer (13), and locknut (14).



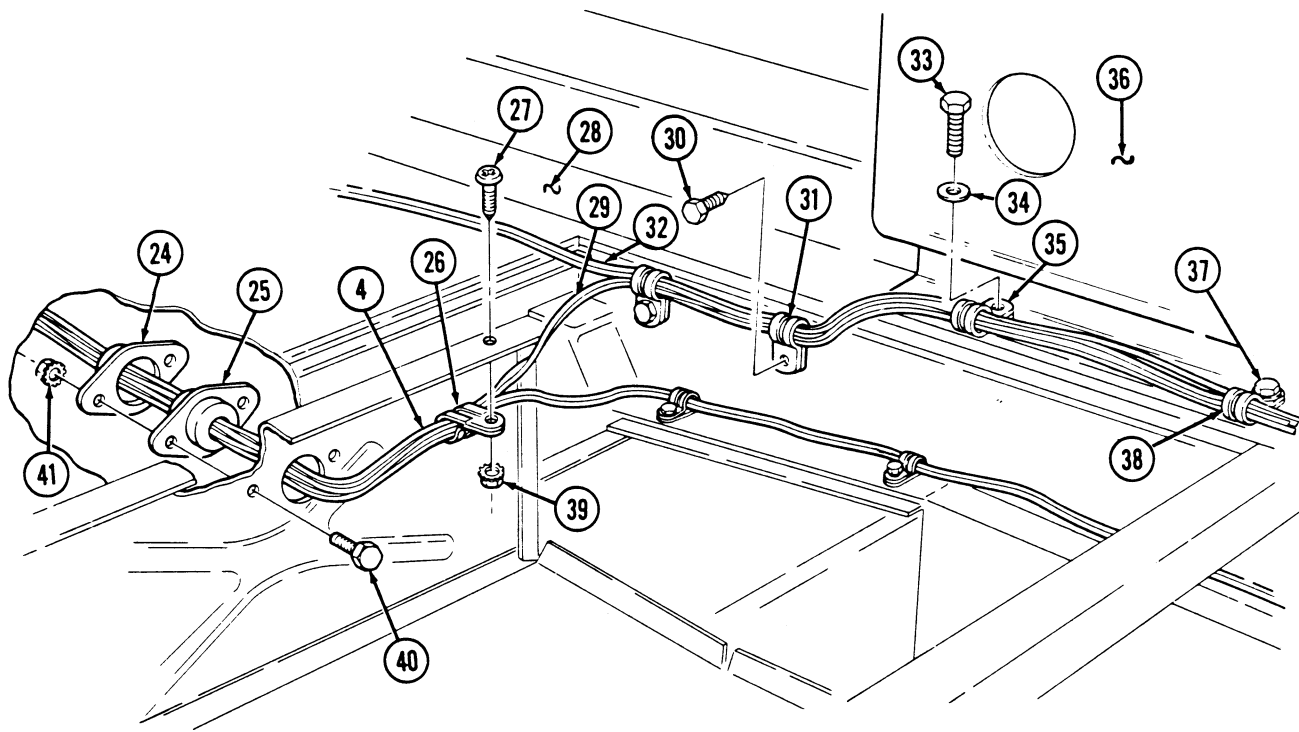
12-140. REAR ANTENNA CABLES REPLACEMENT (Cont'd)

17. Install grommet (25) and retainer (24) on two antenna cables (4).
18. Install two antenna cables (4), grommet (25), and retainer (24) on body (28) with two capscrews (40) and assembled locknuts (41).
19. Install two antenna cables (4) on body (28) with clamp (26), screw (27), and plain-assembled nut (39).

NOTE

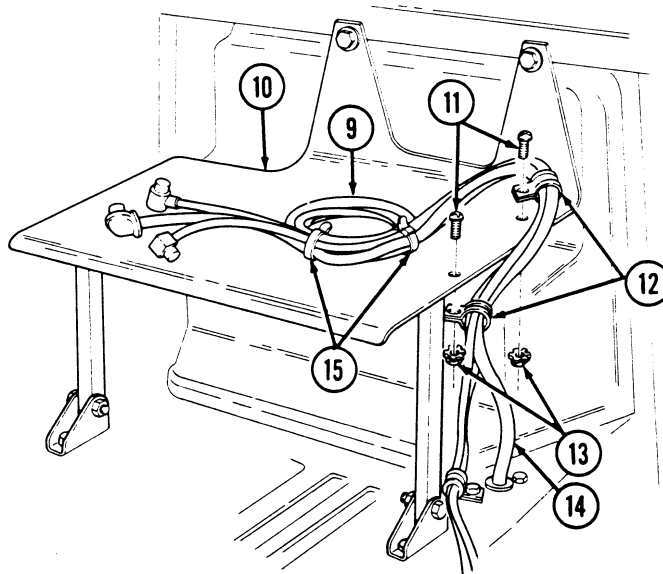
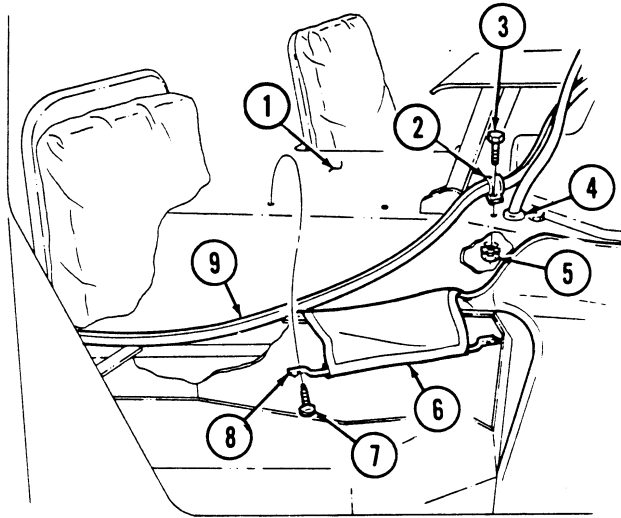
Perform steps 20 and 21 for rear radio rack, and steps 22 through 27 for front radio rack.

20. Install antenna cables (29) and (32) on body (28) with two clamps (31) and screws (30).
21. Install antenna cables (29) and (32) on rear radio rack (36) with two clamps (35), washers (34), and capscrews (33). Tighten capscrews (33) to 15 lb-ft (20 N•m).
22. Secure two antenna cables (4) to body (28) with three clamps (38) and screws (37).



12-140. REAR ANTENNA CABLES REPLACEMENT (Cont'd)

23. Route two antenna cables (9) under insulation (6) along cargo floor (1).
24. Install insulation retainer (8) on cargo floor (1) with two screws (7).
25. Install two antenna cables (9) and grommet (4) on cargo floor (1) with clamp (2), capscrew (3), and plain-assembled nut (5).
26. Install two antenna cables (9) and power cable (14) on front radio rack (10) with two clamps (12), screws (11), and plain-assembled nuts (13).
27. Secure two antenna cables (9) to radio power cable (14) with two tiedown straps (15).



- FOLLOW-ON TASKS:**
- Install right rear passenger seat back (para. 10-45).
 - Connect battery ground cable (para. 4-73).
 - Install dual TSEC/KY-57 mounting bracket and control switch bracket (para. 12-134), if removed.
 - Install front floorboard (para. 11-154).
M966, M966A1, M1025, M1025A1, M1025A2, M1026, M1026A1, M1043, M1043A1, M1043A2, M1044, M1044A1, M1045, M1045A1, M1045A2, M1046, and M1046A1 models only:
 - Lower cargo shell door (TM 9-2320-280-10).

12-141. FRONT RADIO RACK POWER CABLE REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

All models except M996, M996A1, M997, M997A1, M997A2, M1037, M1042, M1097, M1097A1, M1097A2, M1123

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Two plain-assembled nuts (Appendix G, Item 201)
Lockwasher (Appendix G, Item 165)
Two tiedown straps (Appendix G, Item 307)
Two locknuts (Appendix G, Item 78)
Lockwasher (Appendix G, Item 178)
Two assembled locknuts (Appendix G, Item 130)

Manual References

TM 9-2320-280-24P

Equipment Condition

Battery ground cable disconnected (para. 4-73).

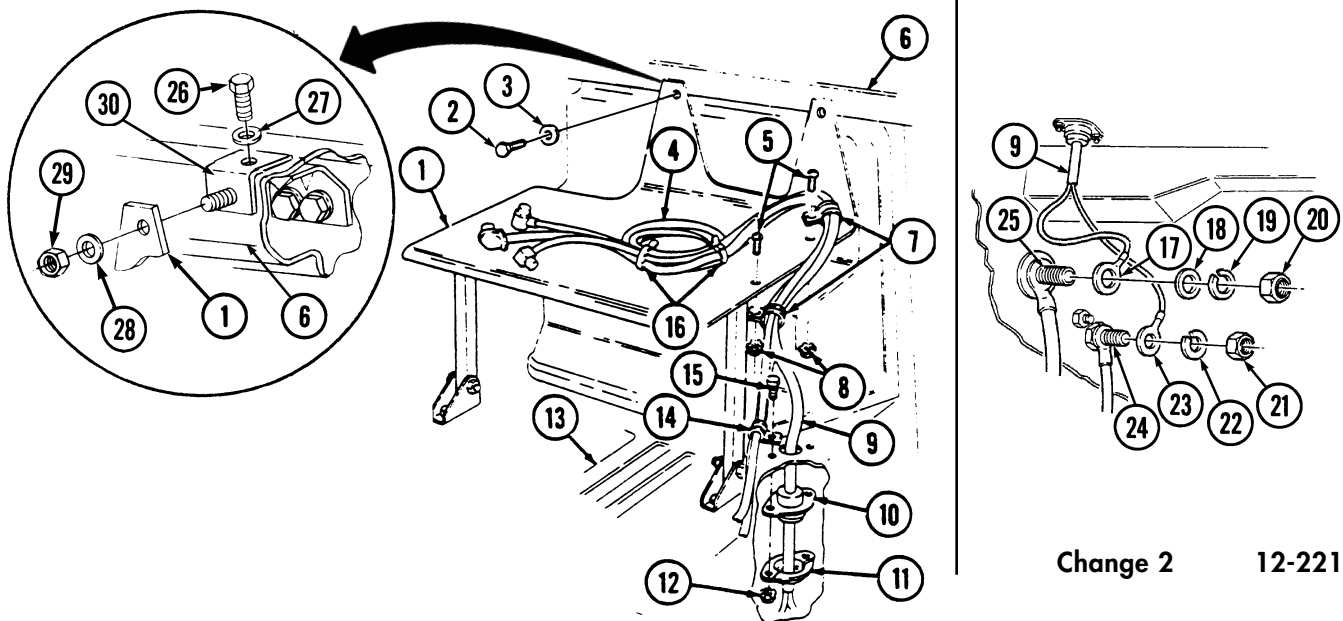
a. Removal

1. Remove two tiedown straps (16) from power cable (9) and antenna cables (4). Discard tiedown straps (16).
2. Remove two plain-assembled nuts (8), screws (5) clamps (7), and power cable (9) from radio rack (1). Discard plain-assembled nuts (8).
3. Remove two capscrews (2) and washers (3) from radio rack (1) and "A" beam (6). Pull radio rack (1) away from "A" beam (6).

NOTE

Perform step 3.1 for vehicles with new configuration.

- 3.1. Remove two locknuts (29), washers (28), radio rack (1), capscrews (26), washers (27), and radio rack upper brackets (30) from "A" beam (6). Discard locknuts (29).
4. Remove engine access cover (para. 10-15).
5. Remove two assembled locknuts (12) and capscrews (15) from clamp (14), retainer (11), grommet (10), power cable (9), and body (13). Discard assembled locknuts (12).
6. Remove nut (20), lockwasher (19), washer (18), and positive lead (17) from stud (25). Discard lockwasher (19).
7. Remove nut (21), lockwasher (22), and negative lead (23) from shunt (24). Discard lockwasher (22).
8. Remove power cable (9).



12-141. FRONT RADIO RACK POWER CABLE REPLACEMENT (Cont'd)

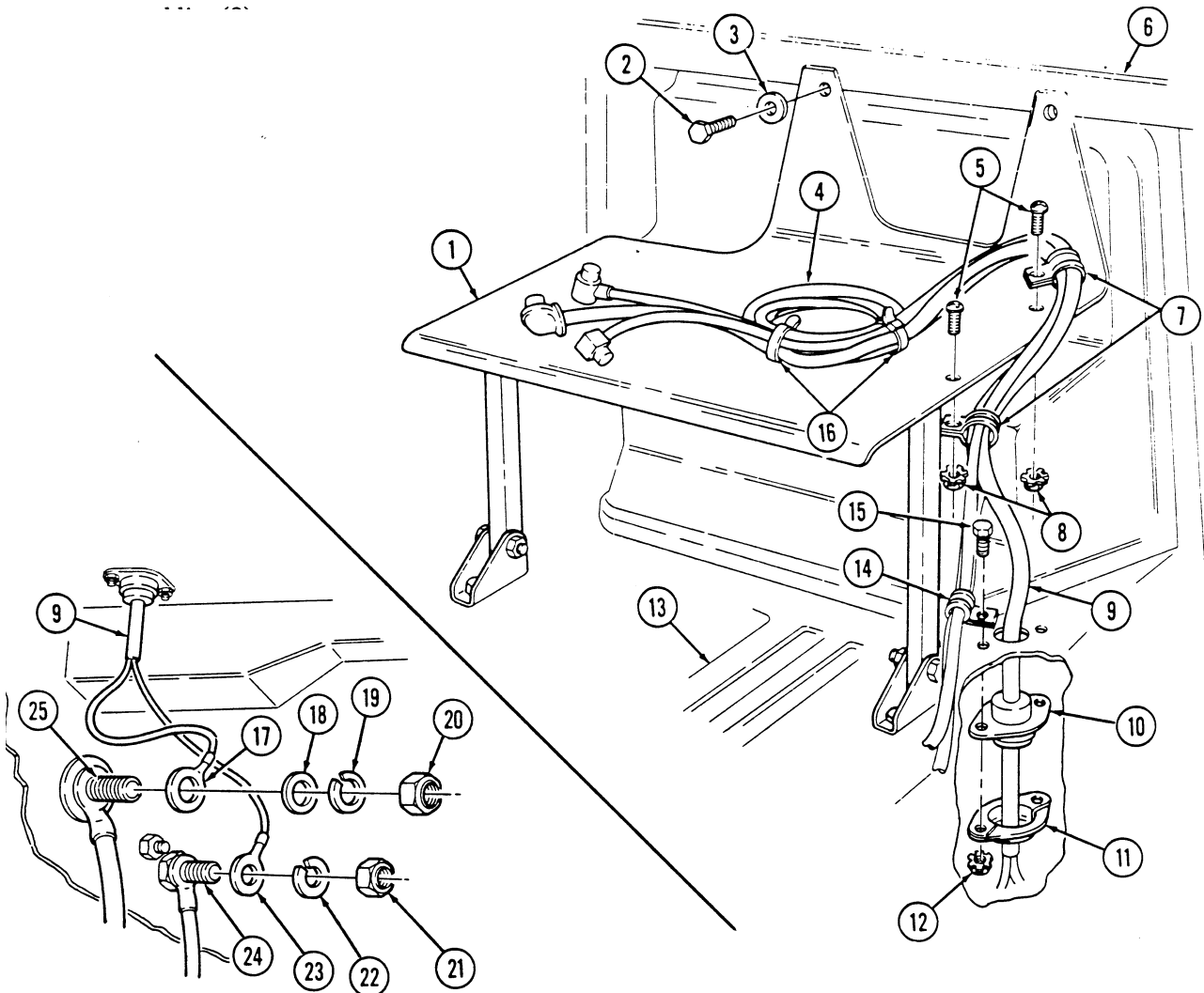
b. Installation

1. Position power cable (9) in approximate location.
2. Install negative lead (23) to shunt (24) with lockwasher (22) and nut (21). Tighten nut (21) to 75 lb-ft (102 N·m).
3. Install positive lead (17) on power stud (25) with washer (18), lockwasher (19), and nut (20). Tighten nut (20) to 26 lb-ft (35 N·m).
4. Install grommet (10), retainer (11), clamp (14), and power cable (9) on body (13) with two capscrews (15) and assembled locknuts (12). Tighten capscrews (15) to 5 lb-ft (7 N·m).
5. Install engine access cover (para. 10-15).

NOTE

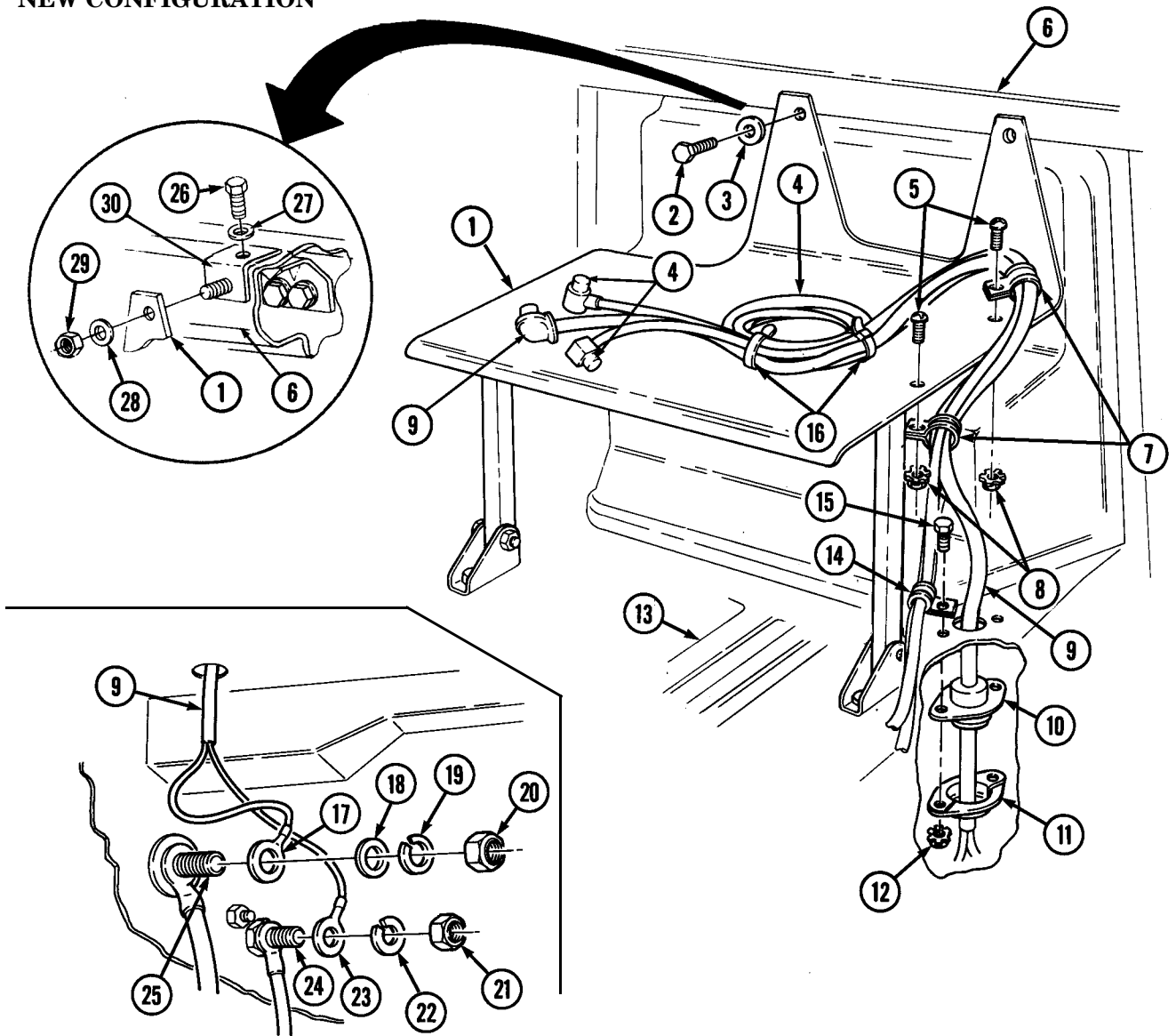
Perform step 5.1 for vehicles with new configuration.

- 5.1. Install radio rack (1) and two radio rack upper brackets (30) on "A" beam (6) with two washers (28), locknuts (29), washers (27), and capscrew (26).
6. Install radio rack (1) on "A" beam (6) with two washers (3) and capscrews (2). Tighten capscrews (2) to 6 lb-ft (8 N·m).
7. Install power cable (9) on antenna cables (4) with two tiedown straps (16).
8. Install power cable (9) on radio rack (1) with two clamps (7), screws (5), and plain-assembled nuts (8).



12-141. FRONT RADIO RACK POWER CABLE REPLACEMENT (6n1'd)

NEW CONFIGURATION



FOLLOW-ON TASK: Connect battery ground cable (para. 4-73).

12-142. HEADPHONE MOUNTING BRACKET REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-24P

Materials/Parts

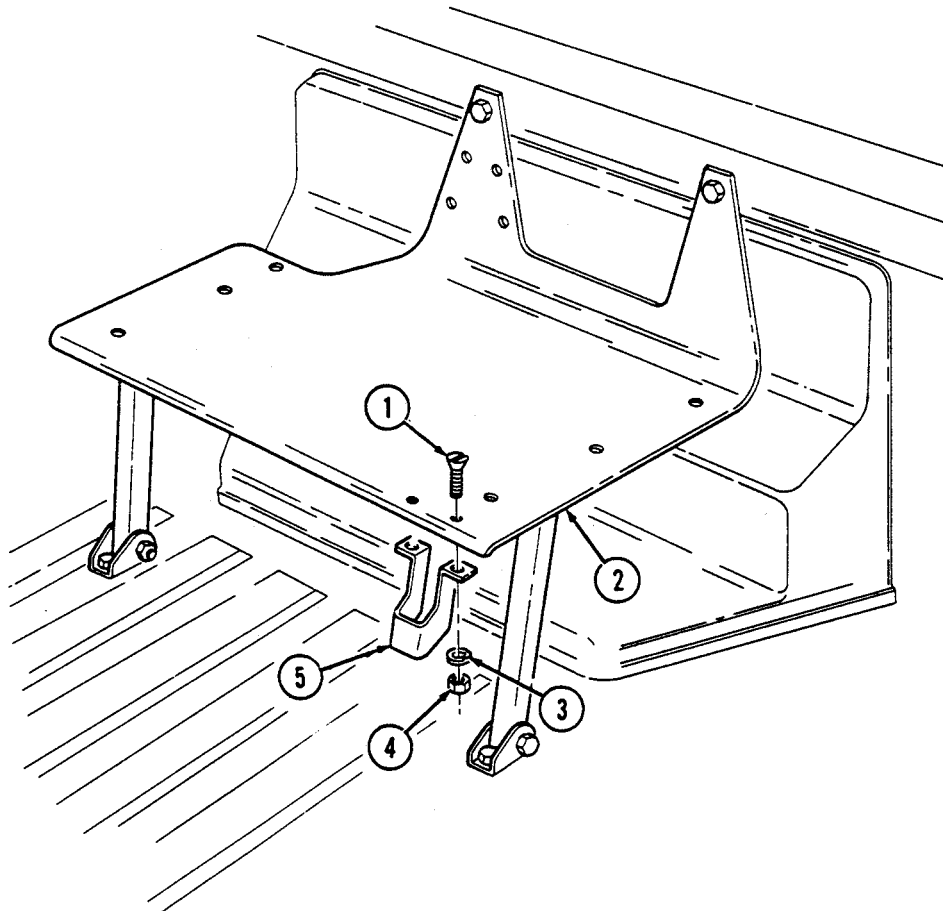
Two locknuts (Appendix G, Item 70)

a. Removal

Remove two locknuts (4), washers (3), screws (1), and headphone mounting bracket (5) from radio rack (2). Discard locknuts (4).

b. Installation

Install headphone mounting bracket (5) on radio rack (2) with two screws (1), washers (3), and locknuts (4). Tighten locknuts (4) to 6 lb-ft (8 N•m).



12-143. HANDSET BRACKET REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M998, M998A1, M1038, M1038A1

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Two locknuts (Appendix G, Item 70)

Manual References

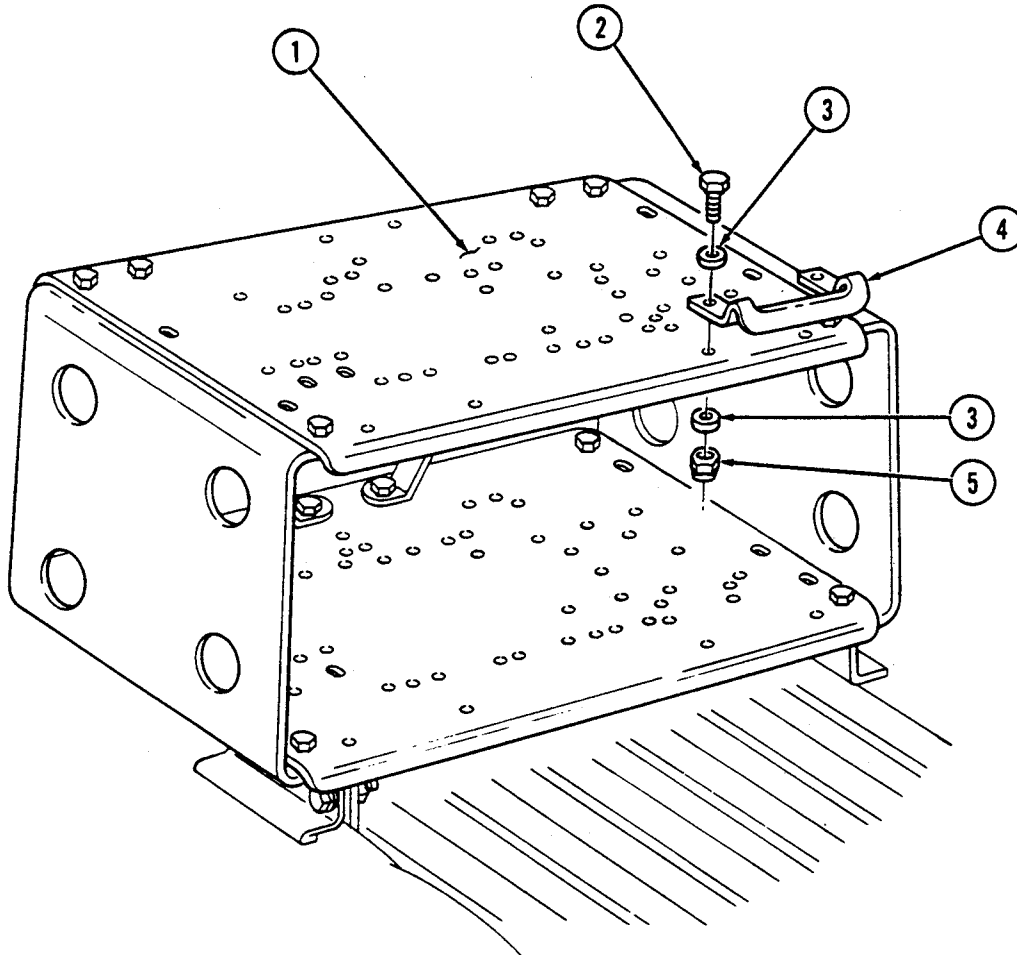
TM 9-2320-280-24P

a. Removal

Remove two locknuts (5), washers (3), capscrews (2), washers (3), and handset bracket (4) from upper shelf (1). Discard locknuts (5).

b. Installation

Install handset bracket (4) on upper shelf (1) with two washers (3), capscrews (2), washers (3), and locknuts (5). Tighten locknuts (5) to 8 lb-ft (11 N·m).



12-144. REAR RADIO RACK MAINTENANCE

This task covers:

- | | |
|----------------|-----------------|
| a. Removal | c. Assembly |
| b. Disassembly | d. Installation |

INITIAL SETUP:

Applicable Models

M998, M998A1, M1038, M1038A1

Manual References

TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

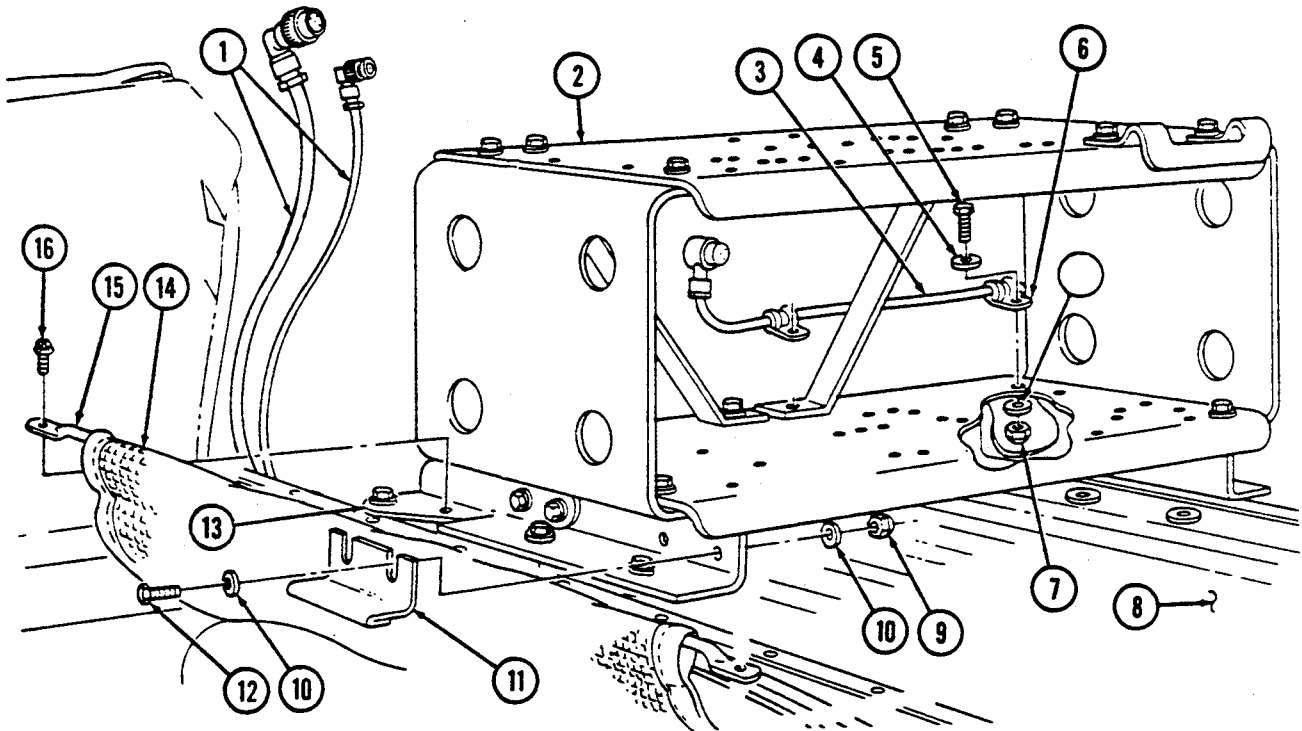
- Speaker stop removed (para. 12-135) if installed.
- Handset brackets removed (para. 12-143).

Materials/Parts

Fifteen locknuts (Appendix G, Item 79)
Three locknuts (Appendix G, Item 70)

a. Removal

1. Remove two locknuts (9), washers (10), capscrews (12), washers (10), and insulation retainer (11) from radio rack (2). Discard locknuts (9).
2. Remove two screws (16), retainer (15), and insulation (14) from cargo floor (8) and left brace (13), and pull insulation (14) and two left antenna cables (1), if present, away from radio rack (2).
3. Remove two locknuts (7), washers (4), capscrews (5), washers (4), power cable (3), and two clamps (6) from radio rack (2). Discard locknuts (7).



12-144. REAR RADIO RACK MAINTENANCE (Cont'd)

4. Remove two capscrews (36), washers (37), antenna cables (14), clamps (38), and radio rack (17) from cargo floor (23).
5. Remove two capscrews (35), washers (34), cargo tiedowns (33), and radio rack braces (29) from cargo floor (23).
6. Remove two capscrews (16), washers (15), and radio rack (17) from cargo floor (23).

b. Disassembly

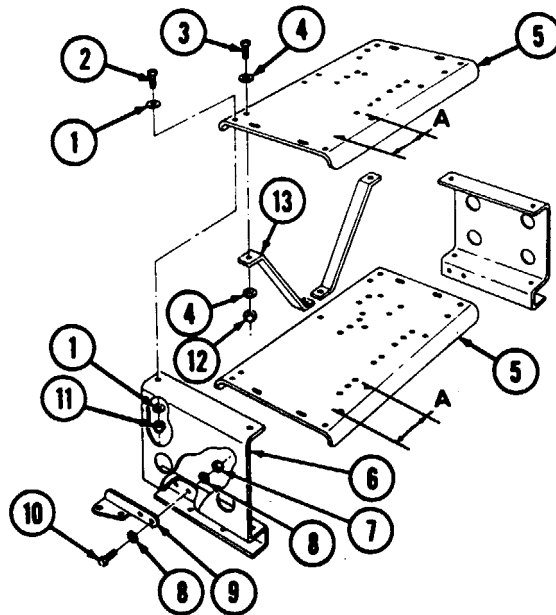
1. Remove four locknuts (7), washers (8), capscrews (10), washers (8), and two braces (9) from supports (6). Discard locknuts (7).
2. Remove three locknuts (12), washers (4), capscrews (3), washers (4), and two braces (13) from shelves (5). Discard locknuts (12).
3. Remove seven locknuts (11), washers (1), capscrews (2), washers (1), and two shelves (5) from supports (6). Discard locknuts (11).

c. Assembly

NOTE

Assemble shelves to supports with holes designated "A" facing in the same direction.

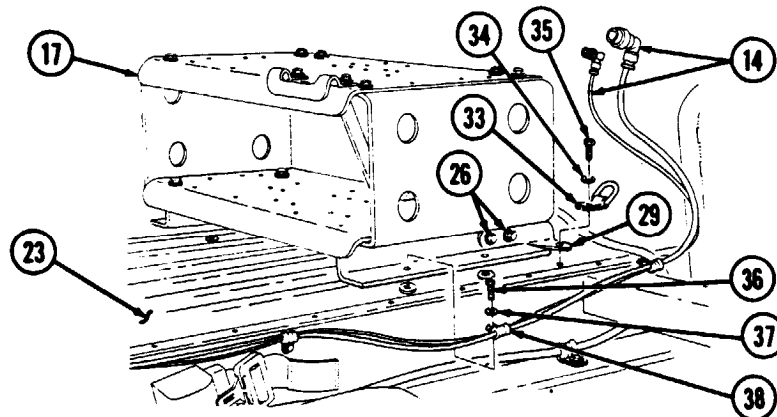
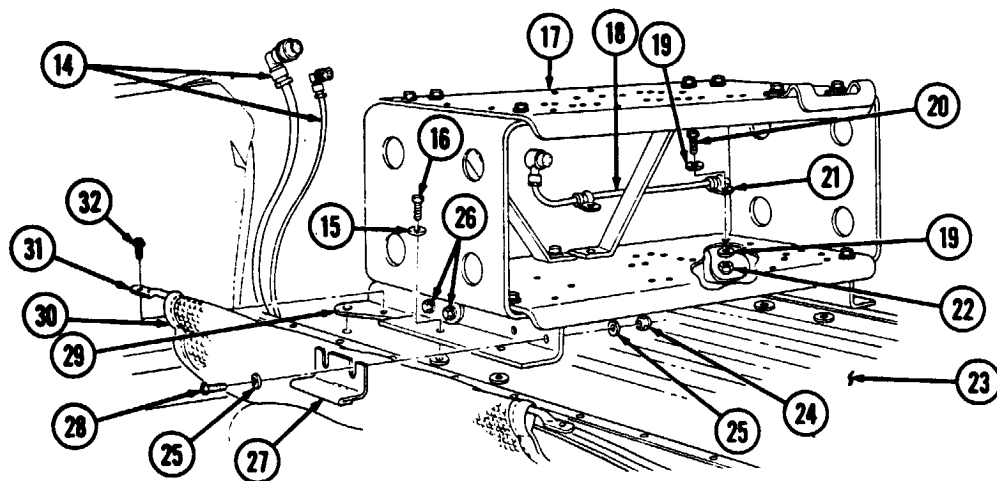
1. Install two shelves (5) on supports (6) with seven washers (1), capscrews (2), washers (1), and locknuts (11). Tighten locknuts (11) to 15 lb-ft (20 N·m).
2. Install two braces (13) on shelves (5) with three washers (4), capscrews (3), washers (4), and locknuts (12). Tighten locknuts (12) to 8 lb-ft (11 N·m).
3. Install two braces (9) on supports (6) with four washers (8), capscrews (10), washers (8), and locknuts (7). Do not tighten locknuts (7).



12-144. REAR RADIO RACK MAINTENANCE (Cont'd)

d. Installation

1. Install radio rack (17) on cargo floor (23) with two washers (15) and capscrews (16). Do not tighten capscrews (16).
2. Secure two radio rack braces (29) to cargo floor (23) with two cargo tiedowns (33), washers (34), and capscrews (35). Do not tighten capscrews (35).
3. Install two clamps (38) and antenna cables (14) on radio rack (17) with two washers (37) and capscrews (36).
4. Tighten capscrews (36) and (16) securely. Tighten capscrews (26) to 15 lb-ft (20 NŹm). Tighten capscrews (35) to 65 lb-ft (88 NŹm).
5. Install two clamps (21) and power cable (18) on radio rack (17) with two washers (19), capscrews (20), washers (19), and locknuts (22). Tighten capscrews (20) to 15 lb-ft (20 NŹm).
6. Ensure left antenna cable(s) (14), if present, are routed under insulation (30). Install retainer (31) and insulation (30) on cargo floor (23) and left brace (29) with two screws (32).
7. Install insulation retainer (27) on radio rack (17) with two washers (25), capscrews (28), washers (25), and locknuts (24). Tighten capscrews (28) to 15 lb-ft (20 NŹm).



FOLLOW-ON TASK: \checkmark Install handset brackets (para. 12-143).
 \checkmark Install speaker stop (para. 12-135) if removed.

12-145. REAR RADIO RACK ANTENNA TOWER MAINTENANCE

This task covers:

- | | |
|---|---|
| <p>a. Removal</p> <p>b. Disassembly</p> | <p>c. Assembly</p> <p>d. Installation</p> |
|---|---|

INITIAL SETUP:

Applicable Models

M998, M998A1, M1038, M1038A1

Manual References

TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

Antenna removed (para. 12-137 or 12-139).

Materials/Parts

Ten lockwashers (Appendix G, Item 135)

a. Removal

1. Remove three nuts (12), lockwashers (13), three clamps (14), and two antenna cables (17) from capscrews (2). Discard lockwashers (13).

NOTE

If cargo soft top is installed, it will be necessary to unfasten and roll up side for access to antenna tower mounting hardware.

2. Remove three nuts (11), washers (10), capscrews (18), washers (10), from tower (4) and wheelhouse (7).
3. Remove two nuts (9), washers (6), half moon washers (8), capscrews (5), washers (6), and tower (4) from wheelhouse (7).

b. Disassembly

Remove seven nuts (15), lockwashers (16), washers (3), capscrews (2), washers (3), and reinforcement (1) from tower (4). Discard lockwashers (16).

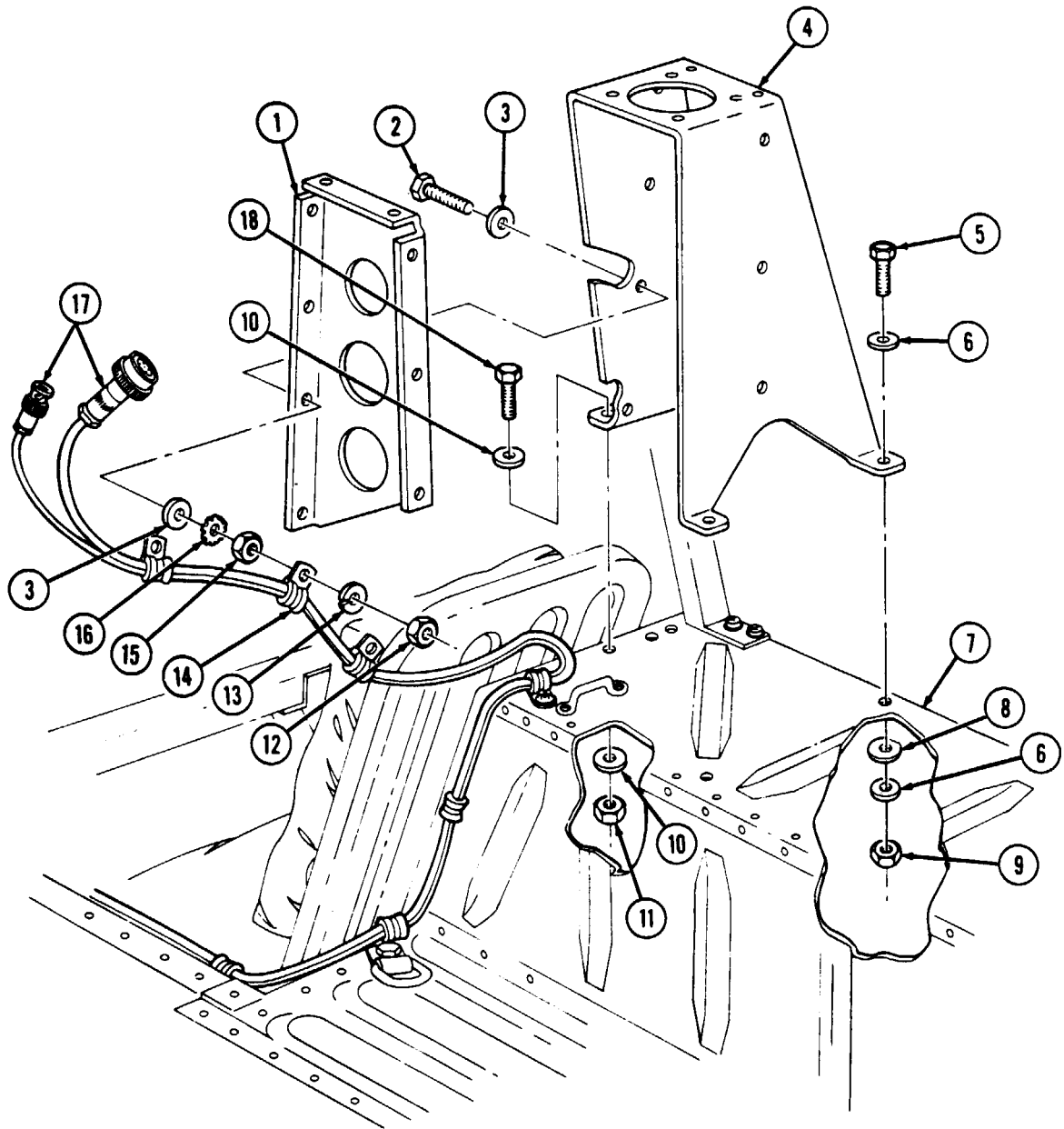
c. Assembly

Install reinforcement (1) on tower (4) with seven washers (3), capscrews (2), washers (3), lockwashers (16), and nuts (15). Tighten nuts (15) to 5 lb-ft (7 N•m).

d. Installation

1. Install antenna tower (4) on wheelhouse (7) with two washers (6), capscrews (5), half moon washers (8), washers (6), and nuts (9). Tighten nuts (9) to 5 lb-ft (7 N•m).
2. Secure antenna tower (4) to wheelhouse (7) with three washers (10), capscrews (18), washers (10), and nuts (11). Tighten nuts (11) to 45 lb-ft (61 N•m).
3. Install two antenna cables (17) on wheelhouse (7) and capscrews (2) with three clamps (14), lockwashers (13), and nuts (12).

12-145. REAR RADIO RACK ANTENNA TOWER MAINTENANCE (Cont'd)



FOLLOW-ON TASK: Install antenna (para. 12-137 or 12-139).

12-146. REAR RADIO RACK TO TOWER ANTENNA CABLES REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M998, M998A1, M1038, M1038A1

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Two locknuts (Appendix G, Item 79)
Three lockwashers (Appendix G, Item 135)

Manual References

TM 9-2320-280-24P

a. Removal

NOTE

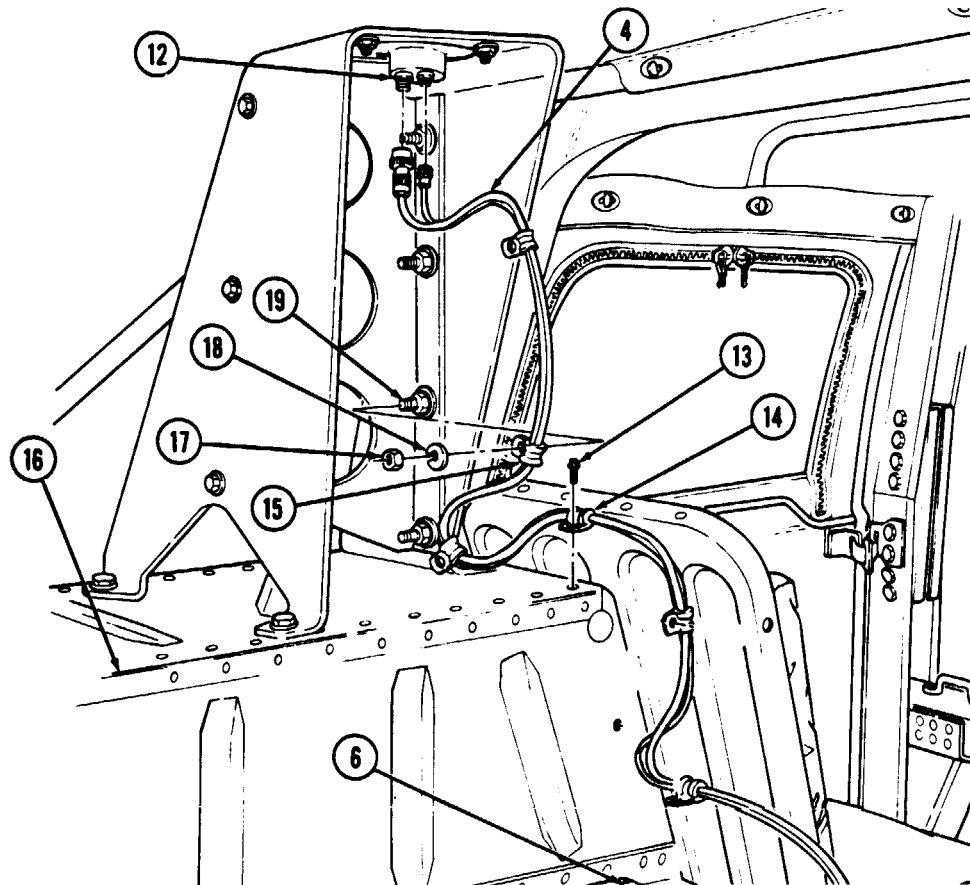
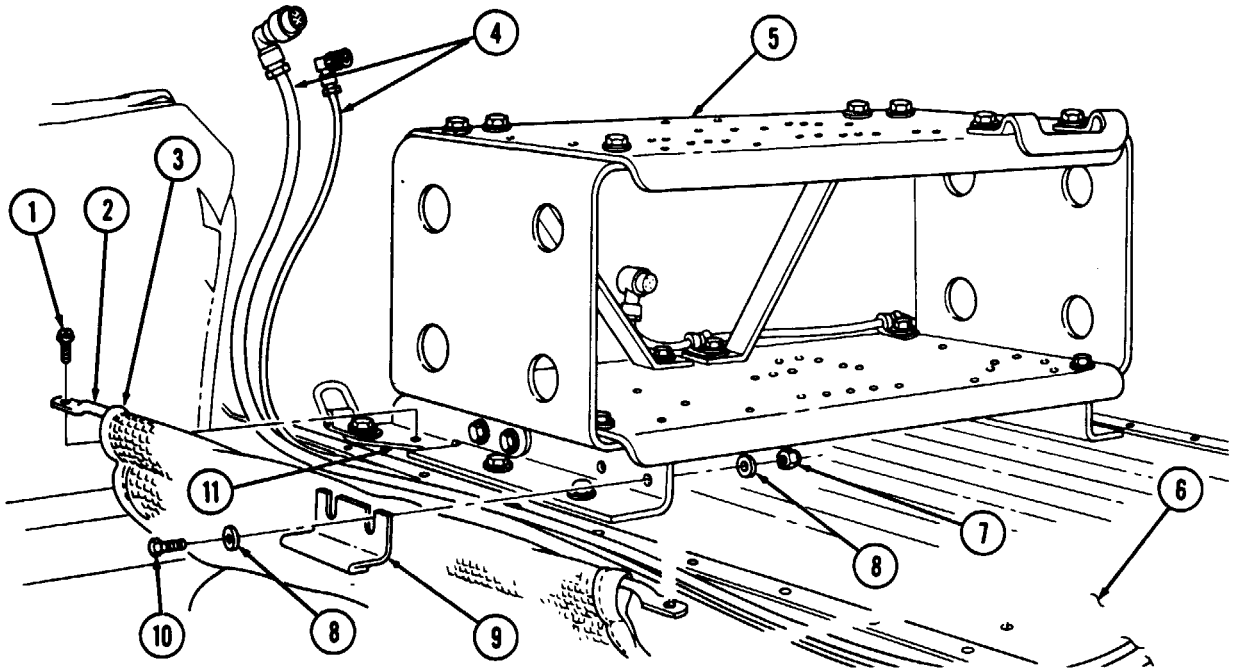
Antenna cables from rear radio rack to left or right antenna towers are replaced basically the same. This procedure covers the left antenna cables.

1. Remove two locknuts (7), washers (8), capscrews (10), washers (8), and insulation retainer (9) from radio rack (5). Discard locknuts (7).
2. Remove two screws (1) and retainer (2) from cargo floor (6) and left brace (11) and pull insulation (3) away from radio rack (5).
3. Remove three screws (13), clamps (14), and two antenna cables (4) from wheelhouse (16) and cargo floor (6).
4. Remove three nuts (17), lockwashers (18), clamps (15), and two antenna cables (4) from tower capscrews (19). Discard lockwashers (18).
5. Disconnect two antenna cables (4) from antenna (12).

b. Installation

1. Connect two antenna cables (4) to antenna (12) and route in approximate mounting location.
2. Install three clamps (15) and antenna cables (4) on tower capscrews (19) with three lockwashers (18) and nuts (17).
3. Install three clamps (14) on two antenna cables (4) and install three clamps (14) on wheelhouse (16) with screws (13).
4. Route antenna cables (4) under insulation (3) and install insulation (3) and retainer (2) on cargo floor (6) and left brace (11) with two screws (1).
5. Install insulation retainer (9) on radio rack (5) with two washers (8), capscrews (10) washers (8), and locknuts (7). Tighten capscrews (10) to 15 lb-ft (20 N•m).

12-146. REAR RADIO RACK TO TOWER ANTENNA CABLES REPLACEMENT (Cont'd)



12-147. REAR RADIO RACK POWER CABLE REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M998, M998A1, M1038, M1038A1

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Two lockwashers (Appendix G, Item 178)
Two locknuts (Appendix G, Item 79)
Lockwasher (Appendix G, Item 141)

Personnel Required

One mechanic
One assistant

Manual References

TM 9-2320-280-24P

Equipment Condition

Battery ground cable disconnected (para. 4-73).

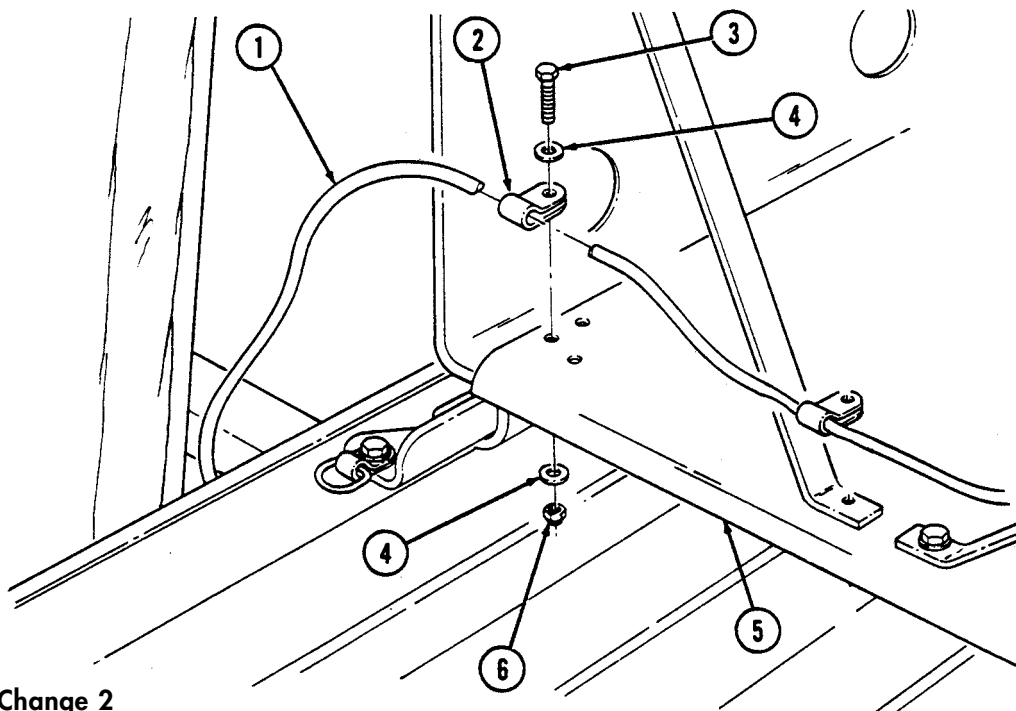
a. Removal

1. Remove two locknuts (6), washers (4), capscrews (3), washers (4), power cable (1), and clamps (2) from radio rack (5). Discard locknuts (6).
2. Remove two screws (8), clamps (7), power cable (1), and two antenna cables (12), if present, from tunnel (11).
3. Remove grommet (9) from body (10) and power cable (1).

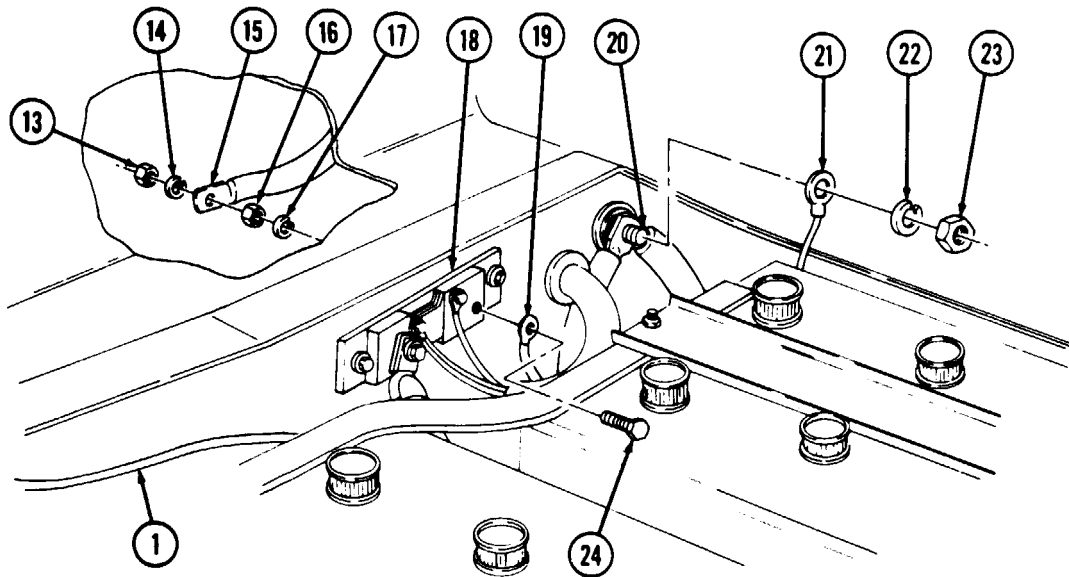
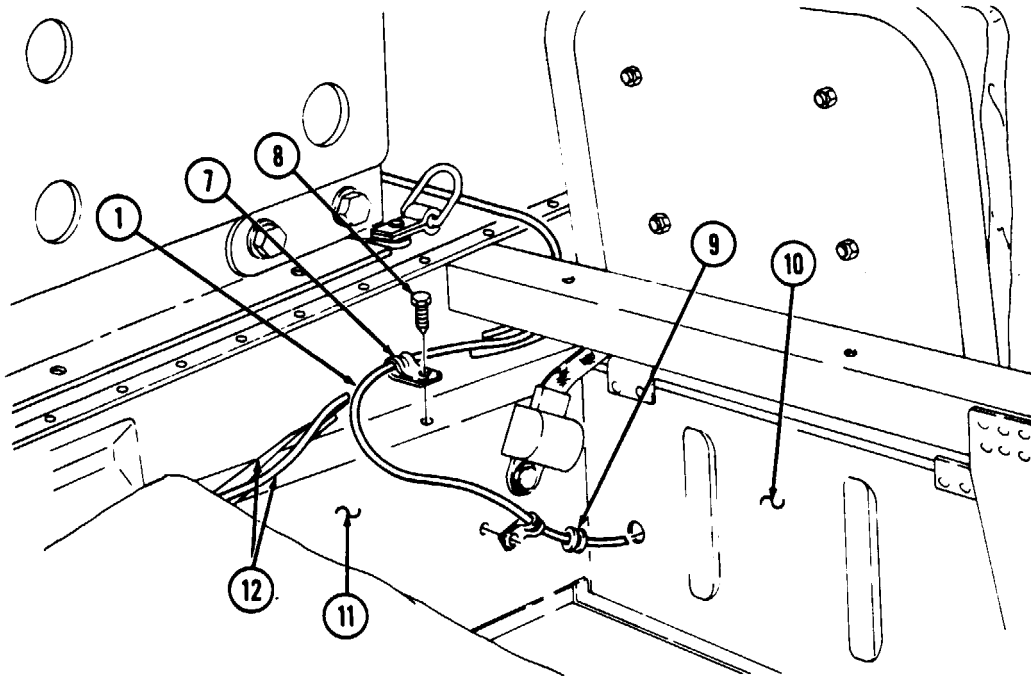
NOTE

It may be necessary to loosen front shunt mounting bolt to remove capscrew from shunt.

4. Remove nut (13), lockwasher (14), negative starter cable (15), nut (16), lockwasher (17), capscrew (24), and power cable negative terminal (19) from shunt (18). Discard lockwashers (14) and (17).
5. Remove nut (23), lockwasher (22), and power cable positive terminal (21) from power stud (20). Discard lockwasher (22).



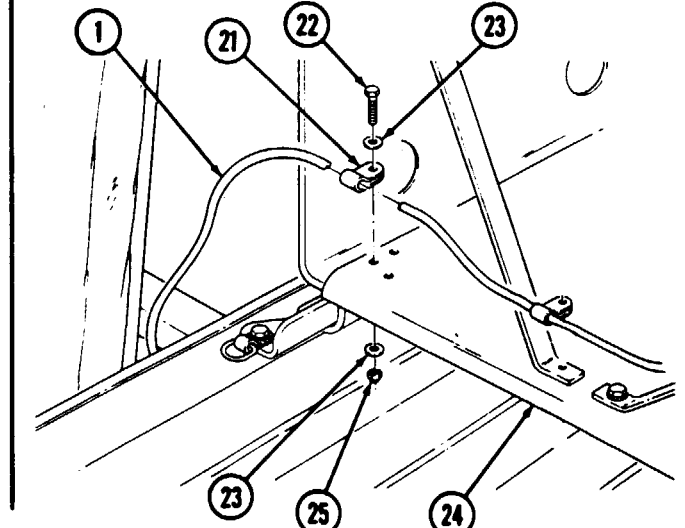
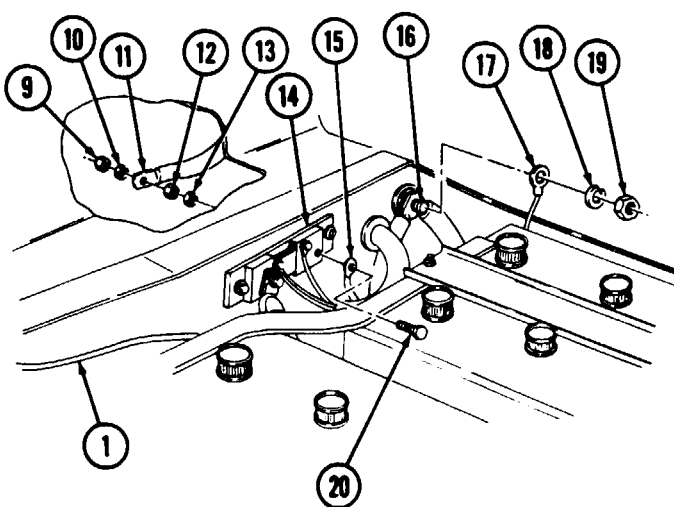
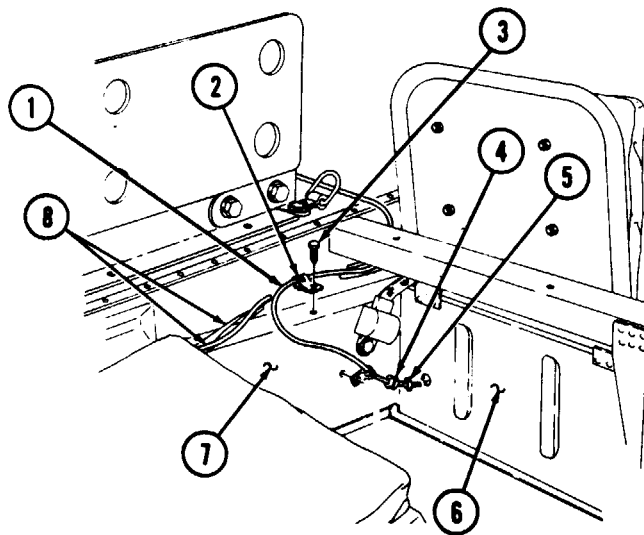
12-147. REAR RADIO RACK POWER CABLE REPLACEMENT (Cont'd)



12-147. REAR RADIO RACK POWER CABLE REPLACEMENT (Cont'd)

b. Installation

1. Install power cable (1) on approximate mounting location. Install locator tape (5) on power cable (1) in grommet (4), and install grommet (4) on body (6).
2. Install positive terminal (17) on power stud (16) with lockwasher (18) and nut (19). Tighten nut (19) to 26 lb-ft (35 NŹm).
3. Install negative terminal (15) on shunt (14) with capscrew (20), lockwasher (13), and nut (12). Tighten nut (12) to 75 lb-ft (102 NŹm).
4. Install negative starter cable (11) to capscrew (20) with lockwasher (10) and nut (9). Tighten nut (9) to 75 lb-ft (102 NŹm).
5. Install two clamps (2) on power cable (1) and two antenna cables (8), if present, and install on tunnel (7) with two screws (3).
6. Install two clamps (21) on power cable (1) and install on radio rack (24) with two washers (23), capscrews (22), washers (23), and locknuts (25). Tighten capscrews (22) to 15 lb-ft (20 NŹm).



FOLLOW-ON TASK: Connect battery ground cable (para. 4-73).

Section VIII. 81 MM MORTAR KIT MAINTENANCE

12-148. 81 MM MORTAR KIT MAINTENANCE TASK SUMMARY

TASK PARA.	PROCEDURES	PAGE NO.
12-149.	Mortar Ammo Container Maintenance	12-236
12-150.	Base Plate Strap Replacement	12-240
12-151.	Cleaning Staff Stowage Clip Replacement	12-241
12-152.	Bipod Stowage Tray Maintenance	12-242
12-153.	Ready Rack Replacement	12-244
12-154.	Ready Rack Strap Replacement	12-245
12-155.	Ready Rack Hand Guard Replacement	12-246
12-156.	Equipment Rack Replacement	12-247
12-157.	Tool Chest Strap Replacement	12-248
12-158.	Troop Seat Support Pad Replacement	12-249
12-159.	Mortar Barrel Stowage Bracket Replacement	12-250

12-149. MORTAR AMMO CONTAINER MAINTENANCE

This task covers:

- | | |
|----------------|-----------------|
| a. Removal | c. Assembly |
| b. Disassembly | d. Installation |

INITIAL SETUP:

Applicable Models

M998, M998A1, M1038, M1038A1

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Tape (Appendix C, Item 50)
Sixteen locknuts (Appendix G, Item 79)
Twenty-six locknuts (Appendix G, Item 81)
Thirty locknuts (Appendix G, Item 70)

Personnel Required

One mechanic
One assistant

Manual References

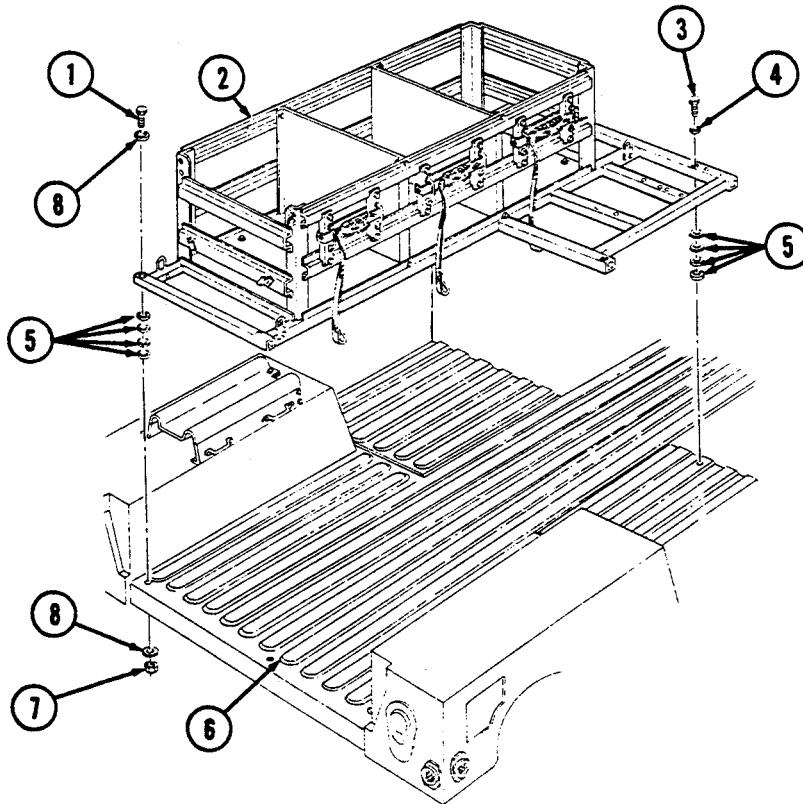
TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

- Ready rack straps removed (para. 12-154).
- Base plate strap removed (para. 12-150).
- Tailgate lowered (TM 9-2320-280-10).
- Cargo bulkhead removed (para. 10-53).

a. Removal

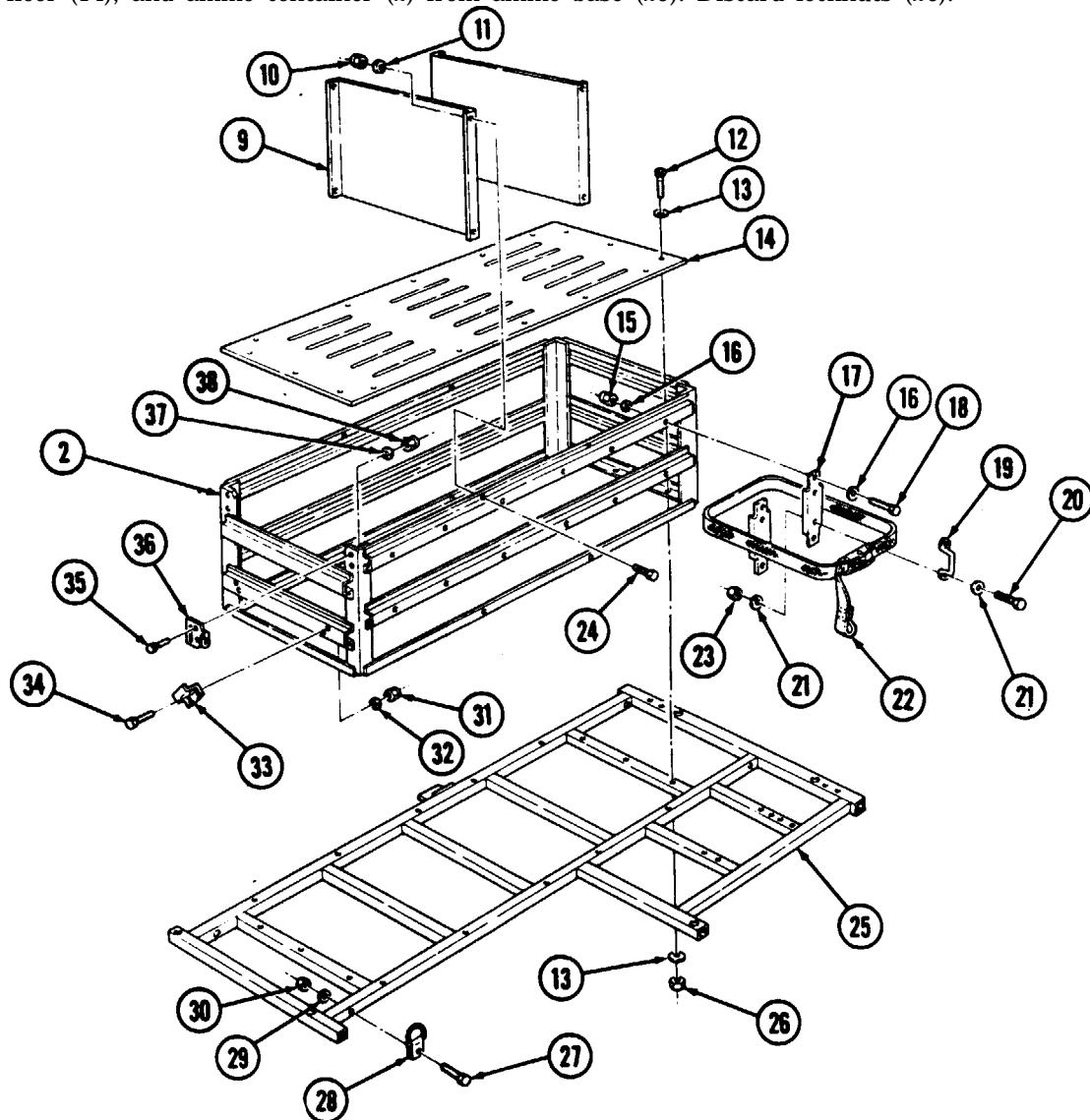
1. Remove four capscrews (3) and washers (4) from ammo container (2) and cargo floor (6).
2. Remove two locknuts (7), washers (8), capscrews (1), and washers (8) from ammo container (2) and cargo floor (6). Discard locknuts (7).
3. Remove ammo container (2) and twenty-four washers (5) from cargo floor (6).
4. Remove tape from ammo container (2).



12-149. MORTAR AMMO CONTAINER MAINTENANCE (Cont'd)

b. Disassembly

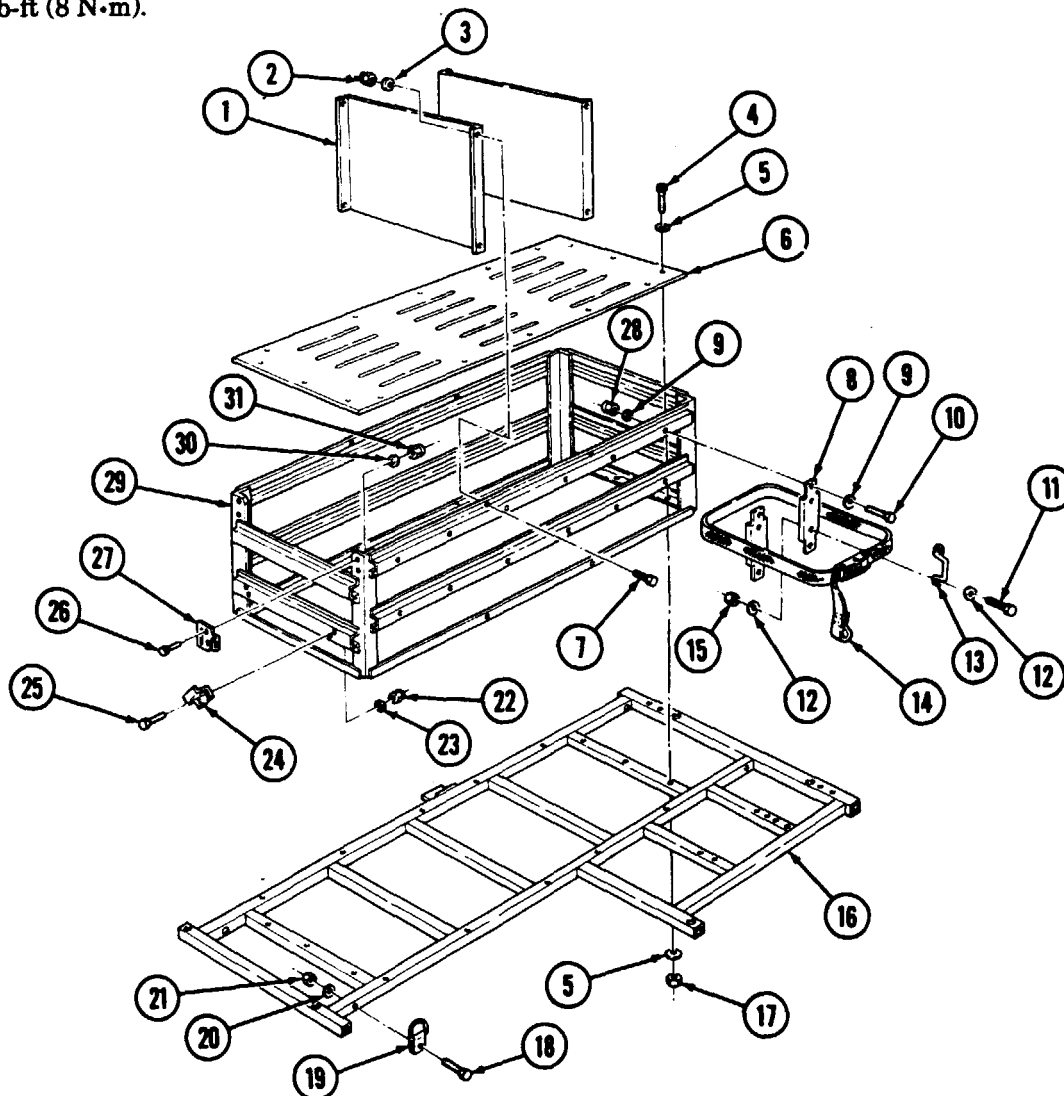
1. Remove twelve locknuts (23), washers (21), capscrews (20), washers (21), and six footman loops (19) from ammo container supports (17). Discard locknuts (23).
2. Remove twelve locknuts (15), washers (16), capscrews (18), washers (16), six ammo container supports (17), and three straps (19) from ammo container (2). Discard locknuts (15).
3. Remove two locknuts (38), washers (37), capscrews (35), and strap bracket (36) from ammo container (2). Discard locknuts (38).
4. Remove four locknuts (31), washers (32), capscrews (34), and two base plate brackets (33) from ammo container (2). Discard locknuts (31).
5. Remove four locknuts (30), washers (29), capscrews (27), and four tiedown brackets (28) from ammo container base (25). Discard locknuts (30).
6. Remove twenty locknuts (10), washers (11), capscrews (24), and two ammo container reinforcements (9) from ammo container (2). Discard locknuts (10).
7. Remove sixteen locknuts (26), washers (13), capscrews (12), washers (13), ammo container floor (14), and ammo container (2) from ammo base (25). Discard locknuts (26).



12-149. MORTAR AMMO CONTAINER MAINTENANCE (Cont'd)

c. Assembly

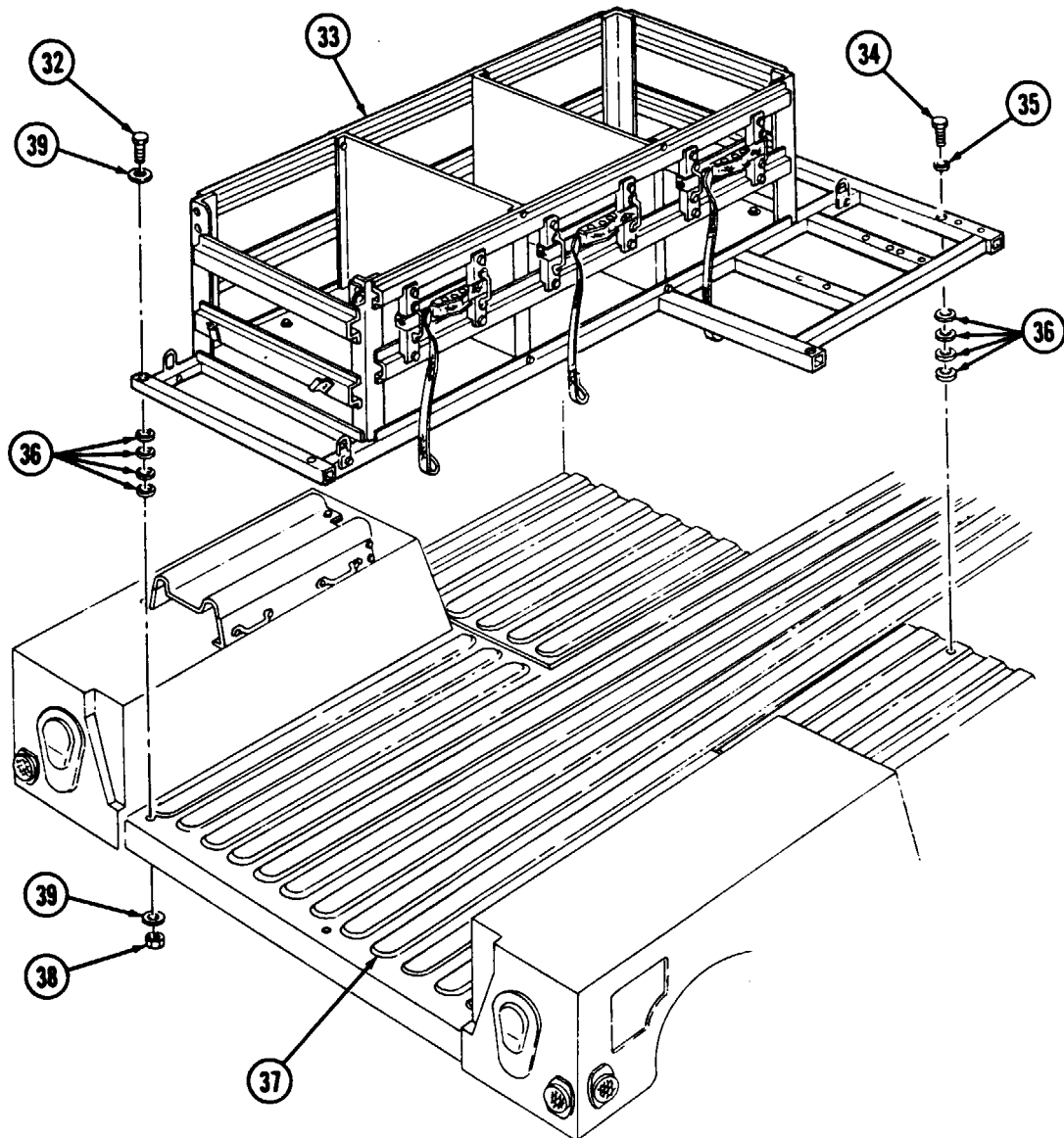
1. Install ammo container (29) and ammo container floor (6) on ammo container base (16) with sixteen washers (5), capscrews (4), washers (5), and locknuts (17). Tighten locknuts (17) to 15 lb-ft (20 N·m).
2. Install two ammo container reinforcements (1) on ammo container (29) with twenty capscrews (7), washers (3), and locknuts (2). Tighten locknuts (2) to 6 lb-ft (8 N·m).
3. Install four tiedown brackets (19) on ammo container base (16) with four washers (20), capscrews (18), and locknuts (21).
4. Install two base plate brackets (24) on ammo container (29) with two capscrews (25), washers (23), and locknuts (22). Tighten locknuts (22) to 6 lb-ft (8 N·m).
5. Install strap bracket (27) on ammo container (29) with two capscrews (26), washers (30), and locknuts (31). Tighten locknuts (31) to 6 lb-ft (8 N·m).
6. Install three straps (14) and ammo container supports (8) on ammo container (29) with twelve washers (9), capscrews (10), washers (9), and locknuts (28). Tighten locknuts (28) to 6 lb-ft (8 N·m).
7. Install six footman loops (13) and three straps (14) on ammo container supports (8) with twelve washers (12), capscrews (11), washers (12), and locknuts (15). Tighten locknuts (15) to 6 lb-ft (8 N·m).



12-149. MORTAR AMMO CONTAINER MAINTENANCE (Cont'd)

d. Installation

1. Install twenty-four washers (36) and ammo container (33) on vehicle.
2. Install two washers (39), capscrews (32), washers (39), locknuts (38), and ammo container (33) on cargo floor (37). Tighten capscrews (32) to 65 lb-ft (88 NŹm).
3. Install four washers (35), capscrews (34), and ammo container (33) on cargo floor (37). Tighten capscrews (34) to 65 lb-ft (88 NŹm).



- FOLLOW-ON TASKS:
- Ź Install cargo bulkhead (para. 10-53).
 - Ź Install base plate strap (para. 12-150).
 - Ź Install ready rack straps (para. 12-154).
 - Ź Raise tailgate (TM 9-2320-280-10).

12-150. BASE PLATE STRAP REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M998, M998A1, M1038, M1038A1

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Two locknuts (Appendix G, Item 70)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

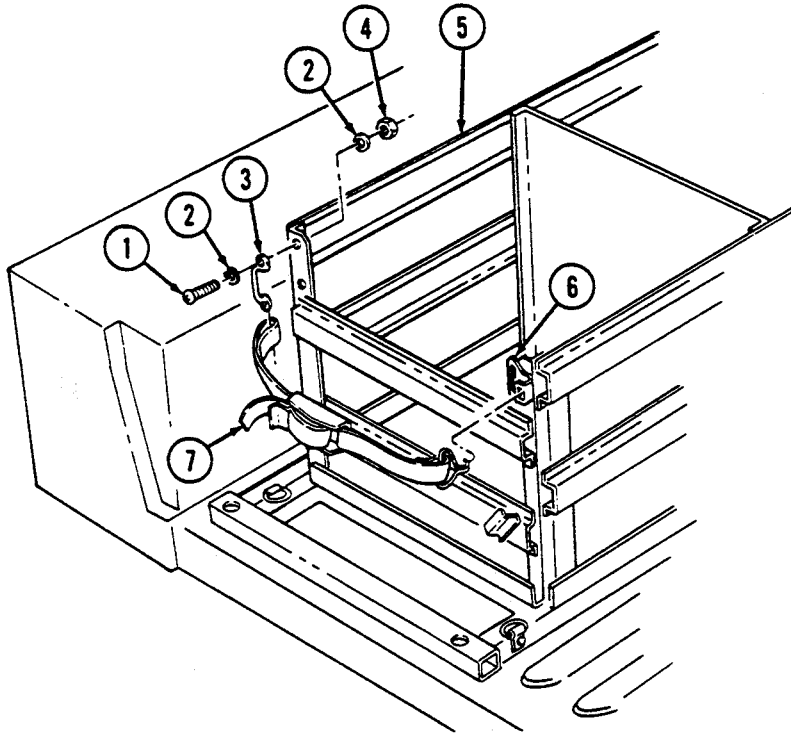
Tailgate lowered (TM 9-2320-280-10).

a. Removal

1. Unlatch strap (7) from bracket (6).
2. Remove two locknuts (4), washers (2), capscrews (1), washers (2), footman loop (3), and strap (7) from ammo rack container (5). Discard locknuts (4).

b. Installation

1. Install footman loop (3) and strap (7) on ammo rack container (5) with two washers (2), capscrews (1), washers (2), and locknuts (4). Tighten locknuts (4) to 6 lb-ft (8 N·m).
2. Latch strap (7) to bracket (6).



FOLLOW-ON TASK: Raise tailgate (TM 9-2320-280-10).

12-151. CLEANING STAFF STOWAGE CLIP REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M998, M998A1, M1038, M1038A1

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Tape (Appendix C, Item 50)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

Tailgate lowered (TM 9-2320-280-10).

NOTE

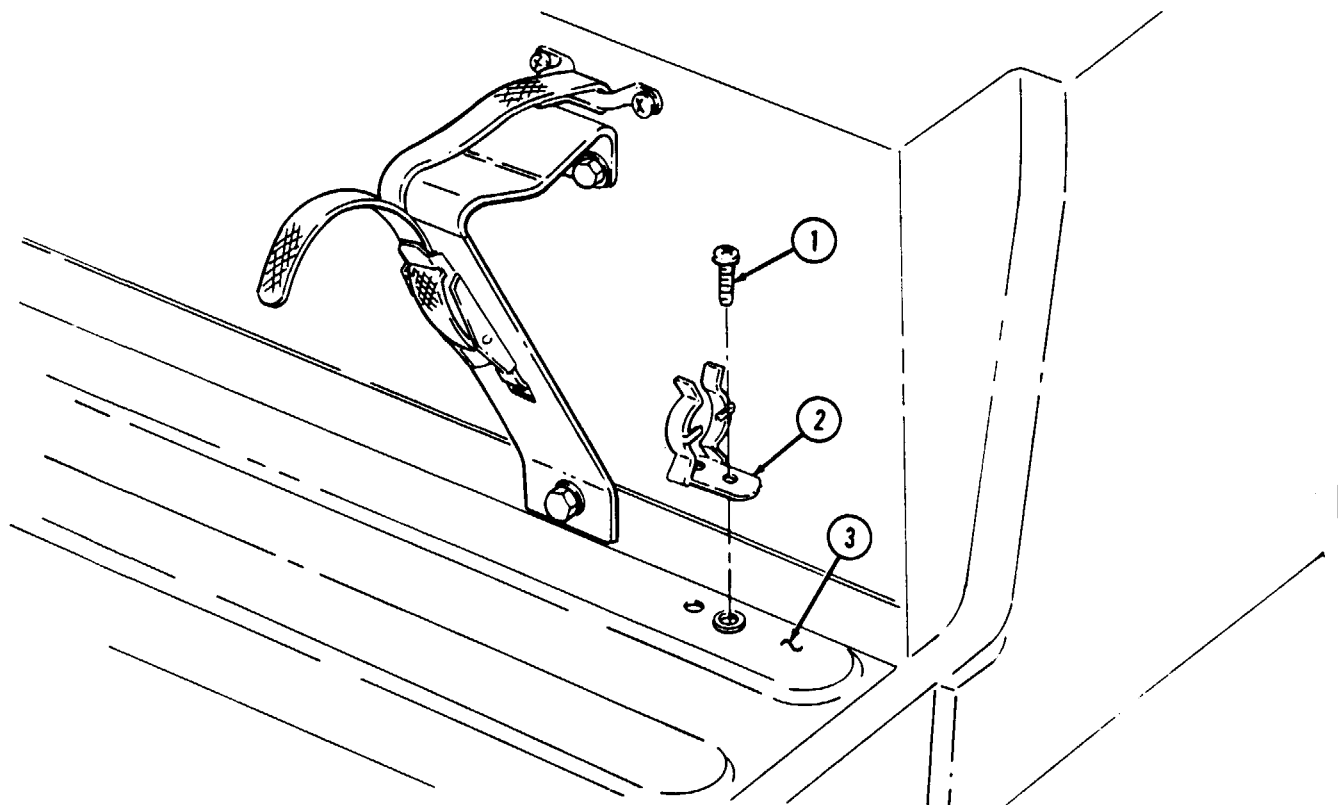
A shim is installed under front stowage clip.

a. Removal

1. Remove two screws (1) and clip (2) from cargo floor (3).
2. Remove tape from bottom of clip (2) (or bottom of shim for front clip).

b. Installation

1. Apply tape on bottom of clip (2) (or bottom of shim for front clip).
2. Install clip (2) on cargo floor (3) with two screws (1).



FOLLOW-ON TASK: Raise tailgate (TM 9-2320-280-10).

12-152. BIPOD STOWAGE TRAY MAINTENANCE

This task covers:

- | | |
|--|--|
| <ul style="list-style-type: none"> a. Removal b. Disassembly | <ul style="list-style-type: none"> c. Assembly d. Installation |
|--|--|

INITIAL SETUP:

Applicable Models

M998, M998A1, M1038, M1038A1

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Tape (Appendix C, Item 50)
Thirteen locknuts (Appendix G, Item 88)
Six locknuts (Appendix G, Item 70)
Three lockwashers (Appendix G, Item 135)

Personnel Required

One mechanic
One assistant

Manual References

TM 9-2320-280-24P

a. Removal

1. Remove five locknuts (7), washers (8), capscrews (1), and washers (8) from bipod stowage tray (2) and wheelhouse (3). Discard locknuts (7).
2. Remove three capscrews (6), lockwashers (5), washers (4), and bipod stowage tray (2) from wheelhouse (3). Discard lockwashers (5).
3. Remove tape from bipod stowage tray (2).

b. Disassembly

1. Remove six locknuts (15), washers (13), capscrews (12), washers (13), and support bracket (14) from tray (16). Discard locknuts (15).
2. Unlatch straps (9) from footman loops (21).
3. Remove four locknuts (18), washers (17), screws (11), two footman loops (10), and straps (9) from tray (16). Discard locknuts (18).
4. Remove four locknuts (19), washers (20), screws (22), and two footman loops (21) from tray (16). Discard locknuts (19).

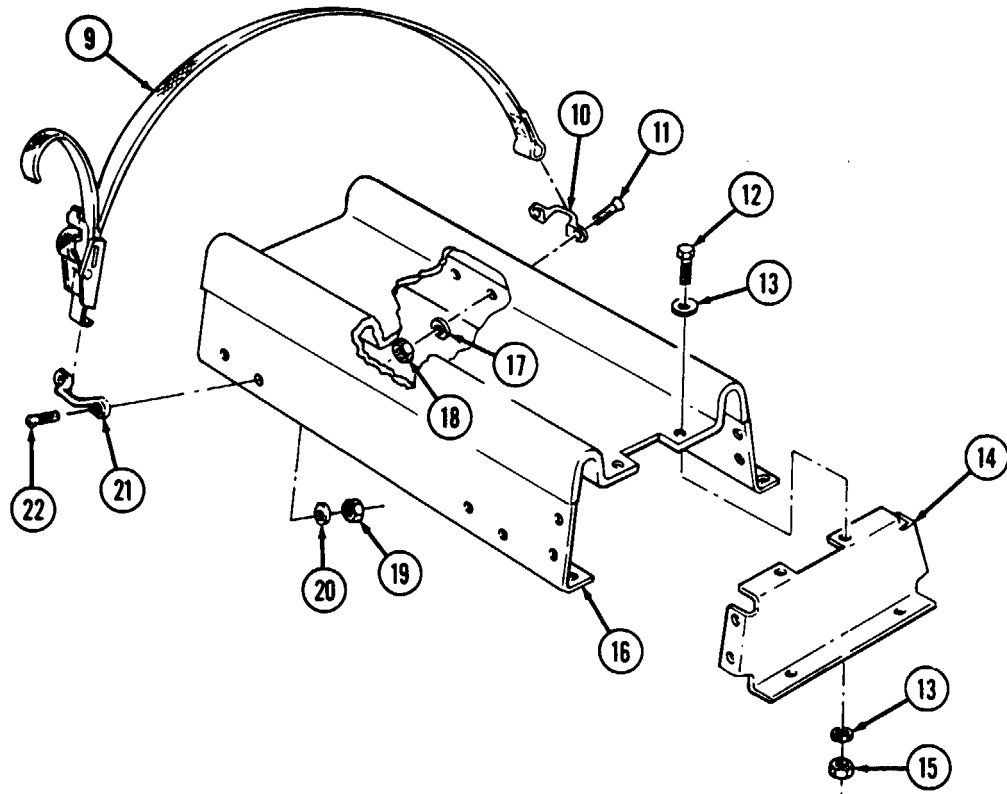
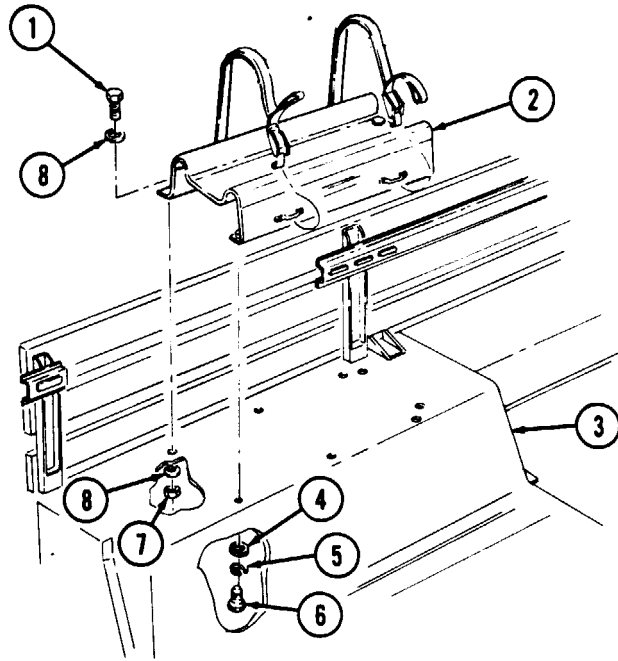
c. Assembly

1. Install two footman loops (21) on tray (16) with four screws (22), washers (20), and locknuts (19).
2. Install two footman loops (10) on two straps (9) and tray (16) with four screws (11), washers (17), and locknuts (18).
3. Latch straps (9) to footman loops (21).
4. Install support bracket (14) on tray (16) with six washers (13), capscrews (12), washers (13), and locknuts (15). Tighten locknuts (15) to 6 lb-ft (8 N•m).

d. Installation

1. Apply tape to bipod stowage tray (2).
2. Install bipod stowage tray (2) on wheelhouse (3) with three washers (4), lockwashers (5), and capscrews (6). Tighten capscrews (6) to 6 lb-ft (8 N•m).
3. Secure bipod stowage tray (2) to wheelhouse (3) with five washers (8), capscrews (1), washers (8), and locknuts (7). Tighten locknuts (7) to 6 lb-ft (8 N•m).

12-152. BIPOD STORAGE TRAY MAINTENANCE (Cont'd)



12-153. READY RACK REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M998, M998A1, M1038, M1038A1

Manual References

TM 9-2320-280-24P

Tools

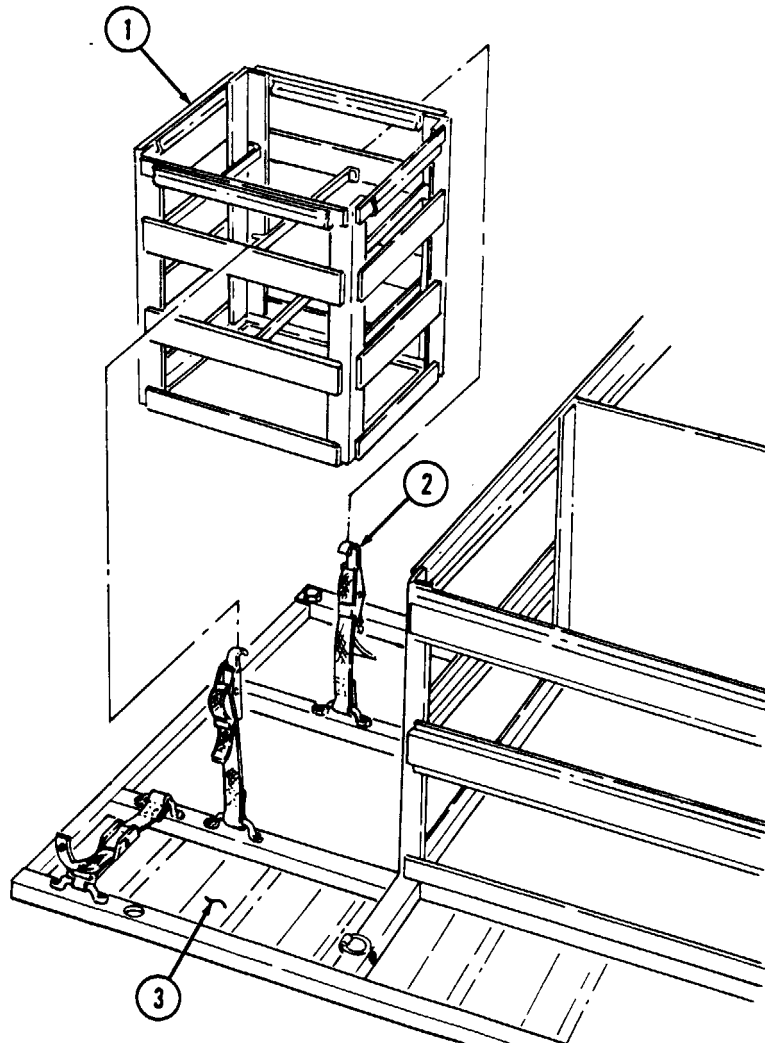
General mechanic's tool kit:
automotive (Appendix B, Item 1)

a. Removal

Unlatch two straps (2) and remove ready rack (1) from cargo floor (3).

b. Installation

Install ready rack (1) on cargo floor (3) with two straps (2).



12-154. READY RACK STRAP REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M998, M998A1, M1038, M1038A1

Manual References

TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

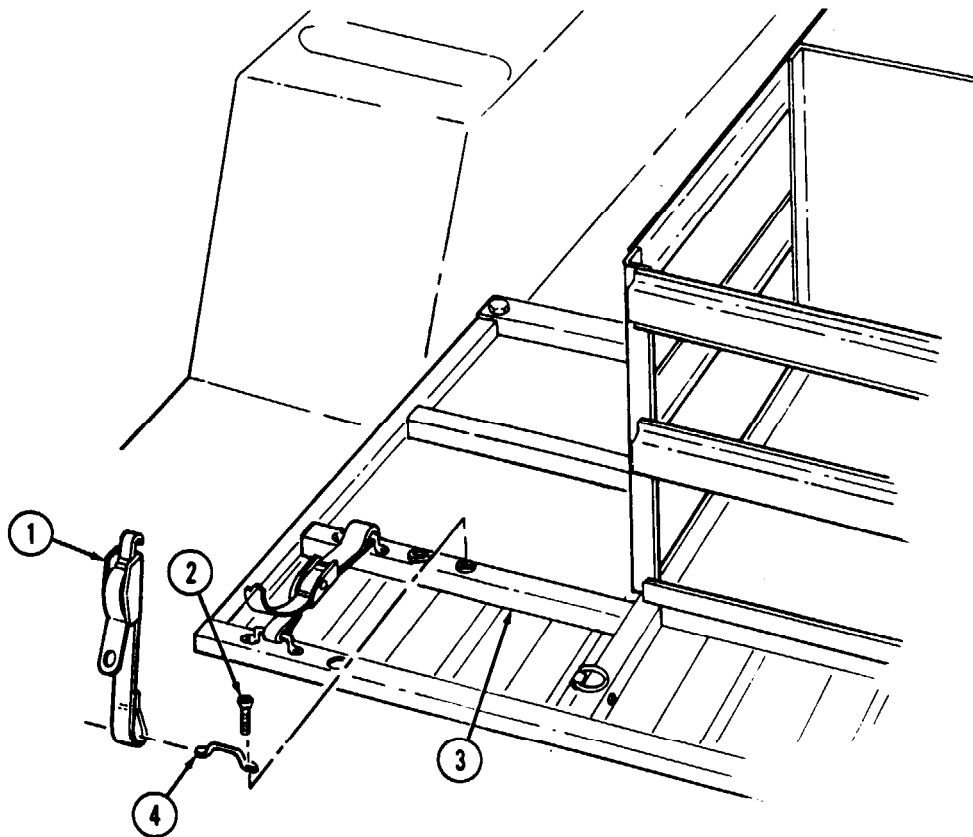
Ready rack removed (para. 12-153).

a. Removal

Remove two screws (2) securing footman loop (4) and strap (1) to ammo container (3) and remove footman loop (4) from strap (1).

b. Installation

Install footman loop (4) and strap (1) on ammo container (3) with two screws (2).



FOLLOW-ON TASK: Install ready rack (para. 12-153).

12-155. READY RACK HAND GUARD REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M998, M998A1, M1038, M1038A1

Manual References

TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

Ready rack removed (para. 12-153).

Materials/Parts

Adhesive (Appendix C, Item 2)

a. Removal

1. Remove hand guard (2) from ready rack (1).
2. Clean adhesive from ready rack (1).

b. Installation

Apply adhesive to hand guard (2) and ready rack (1). Install hand guard (2) on ready rack (1).



FOLLOW-ON TASK: Install ready rack (para. 12-153).

12-156. EQUIPMENT RACK REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M998, M998A1, M1038, M1038A1

Manual References

TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

- Tool chest straps removed (para. 12-157).
- Troop seat support pad removed (para. 12-158).

Materials/Parts

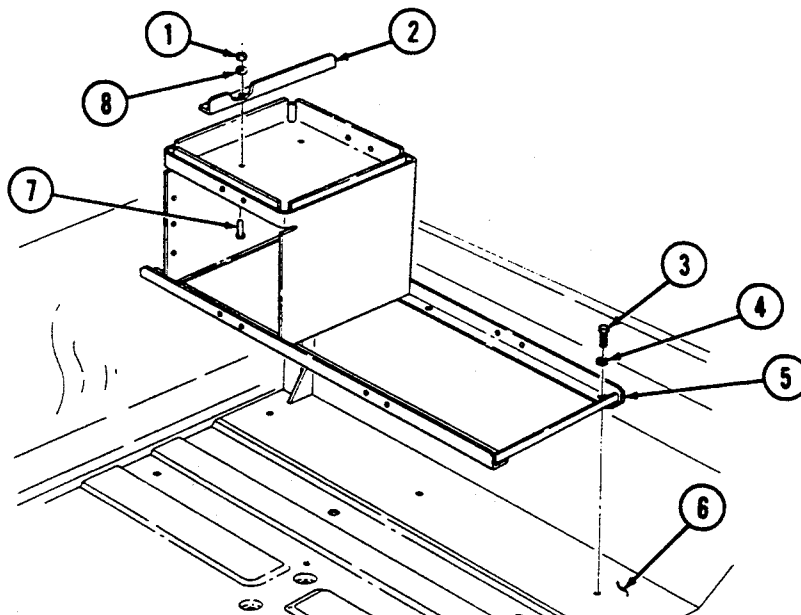
Tape (Appendix C, Item 50)
Six lockwashers (Appendix G, Item 134)
Two locknuts (Appendix G, Item 88)

a. Removal

1. Remove six capscrews (3), lockwashers (4), and equipment rack (5) from cargo floor (6). Discard lockwashers (4).
2. Remove two locknuts (1), washers (8), screws (7), and retainer bracket (2) from equipment rack (5). Discard locknuts (1).
3. Remove tape from equipment rack (5).

b. Installation

1. Apply tape to equipment rack (5).
2. Install retainer bracket (2) on equipment rack (5) with two washers (8), screws (7), and locknuts (1).
3. Install equipment rack (5) on cargo floor (6) with six lockwashers (4) and capscrews (3). Tighten capscrew (3) to 15 lb-ft (20 N·m).



- FOLLOW-ON TASKS:**
- Install troop seat support pad (para. 12-158).
 - Install tool chest straps (para. 12-157).

12-157. TOOL CHEST STRAP REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M998, M998A1, M1038, M1038A1

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Four locknuts (Appendix G, Item 88)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

Right troop seat raised (TM 9-2320-280-10).

a. Removal

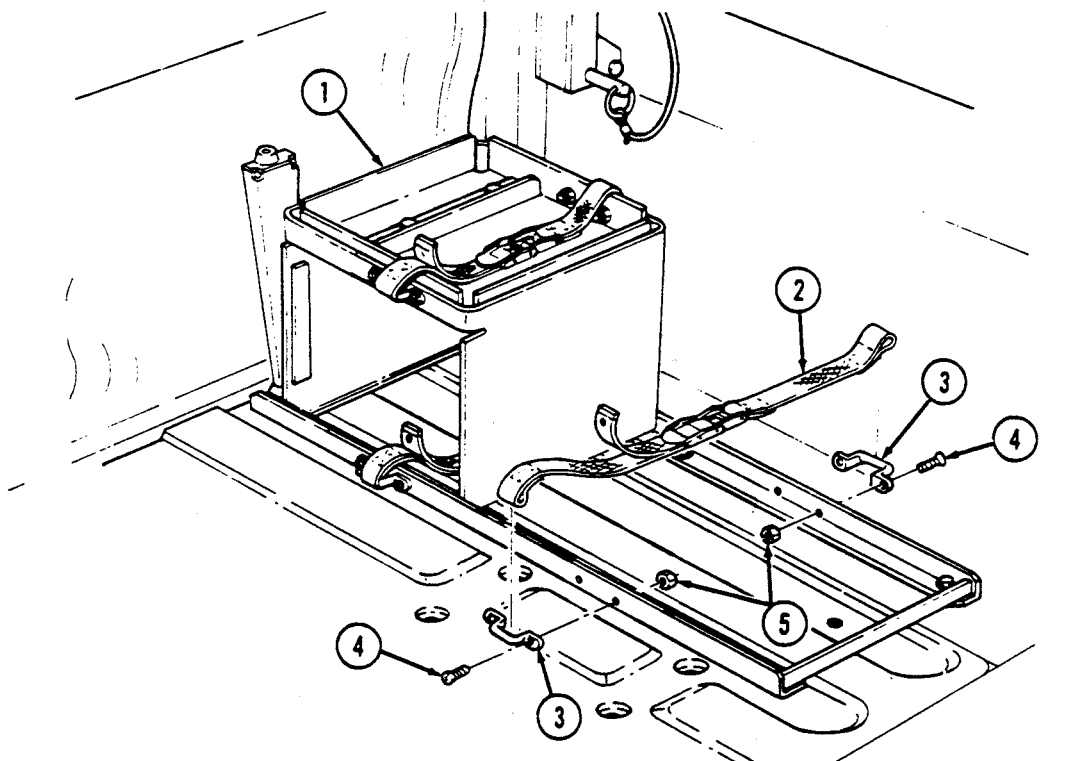
NOTE

The tool chest strap, M14 chest strap, and M166 chest strap are replaced basically the same. This procedure covers tool chest strap replacement.

Remove four locknuts (5), screws (4), two footman loops (3), and strap (2) from equipment rack (1). Discard locknuts (5).

b. Installation

Install two footman loops (3) and strap (2) on equipment rack (1) with four screws (4) and locknuts (5).



FOLLOW-ON TASK: Lower right troop seat (TM 9-2320-280-10).

12-158. TROOP SEAT SUPPORT PAD REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M998, M998A1, M1038, M1038A1

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Two locknuts (Appendix G, Item 70)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

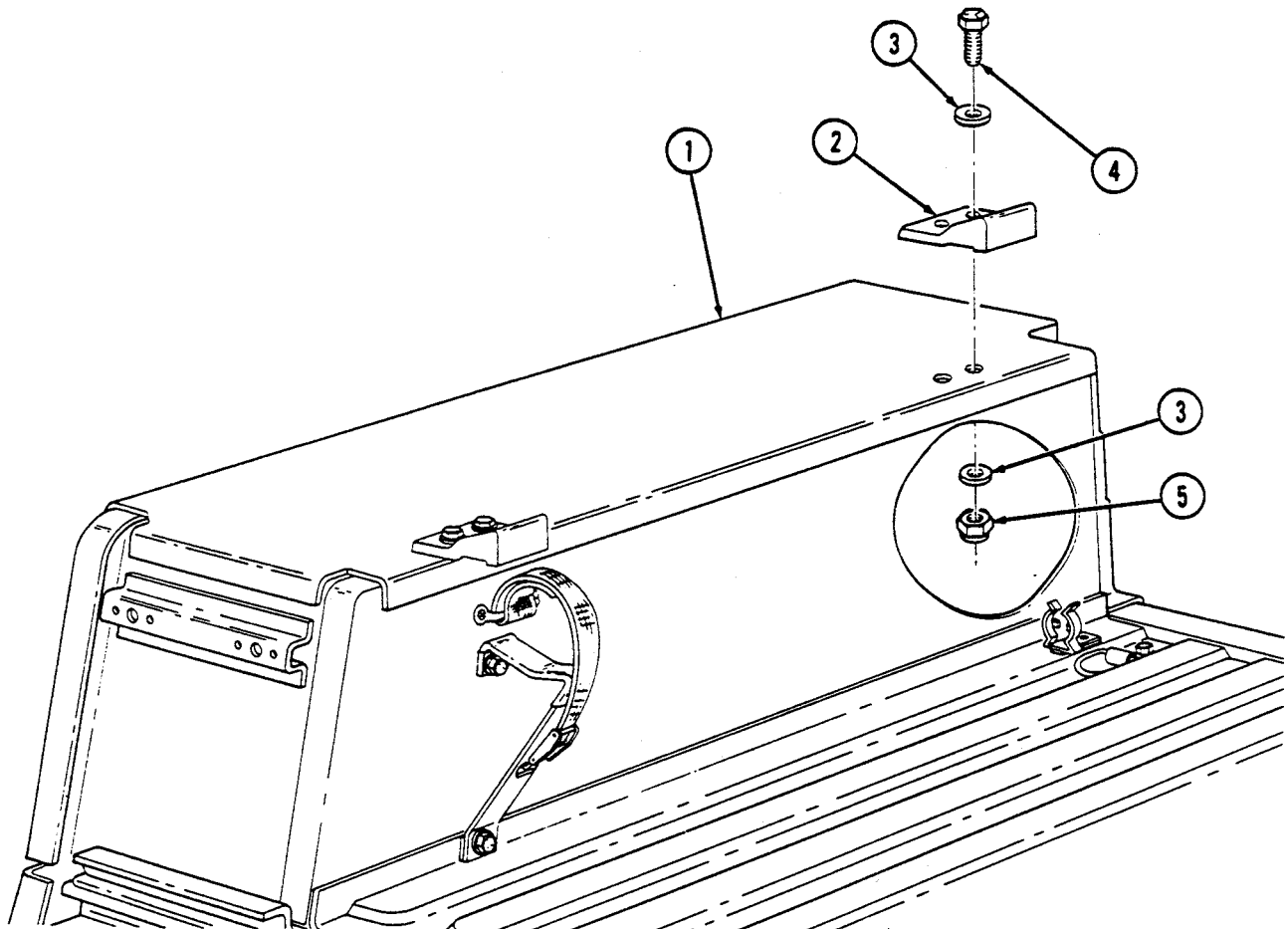
Right troop seat raised (TM 9-2320-280-10).

a. Removal

Remove two locknuts (5), washers (3), capscrews (4), washers (3), and pad (2) from wheelhouse (1). Discard locknuts (5).

b. Installation

Install pad (2) on wheelhouse (1) with two washers (3), capscrews (4), washers (3), and locknuts (5).



FOLLOW-ON TASK: Lower right troop seat (TM 9-2320-280-10).

12-159. MORTAR BARREL STOWAGE BRACKET REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M998, M998A1, M1038, M1038A1

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Tape (Appendix C, Item 50)
Three locknuts (Appendix G, Item 70)

Personnel Required

One mechanic
One assistant

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

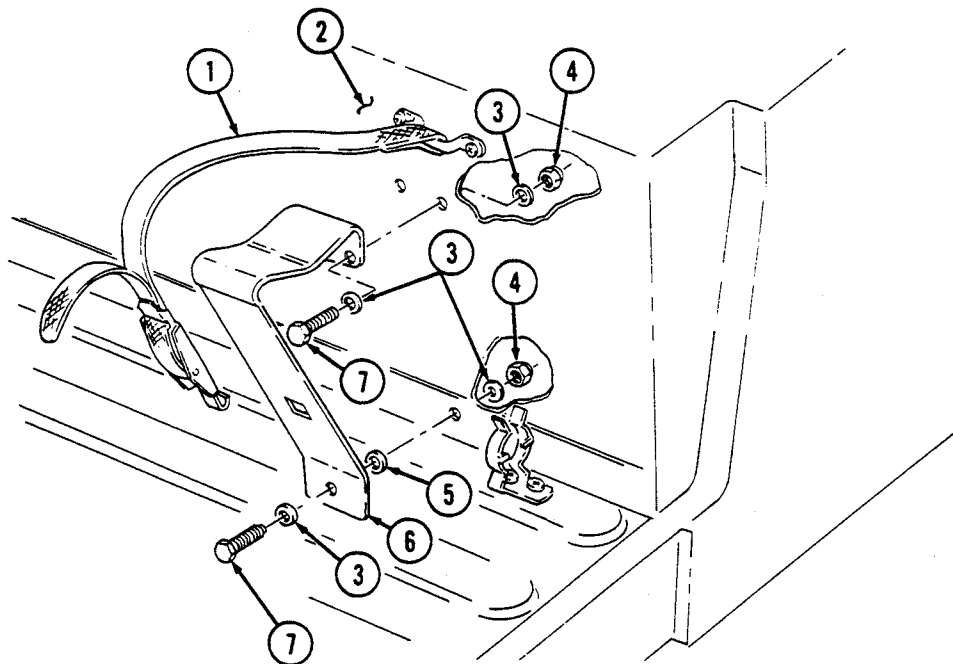
Tailgate lowered (TM 9-2320-280-10).

a. Removal

1. Unlatch strap (1) from bracket (6).
2. Remove three locknuts (4), washers (3), capscrews (7), washers (3), bracket (6), and washer (5) from wheelhouse (2). Discard locknuts (4).
3. Remove tape from bracket (6).

b. Installation

1. Apply tape to bracket (6).
2. Install washer (5) and bracket (6) on wheelhouse (2) with three washers (3), capscrews (7), washers (3), and locknuts (4). Tighten locknuts (4) to 6 lb-ft (8 N•m).
3. Latch strap (1) to bracket (6).



FOLLOW-ON TASK: Raise tailgate (TM 9-2320-280-10).

Section IX. TRAVERSING BAR KIT MAINTENANCE

12-160. TRAVERSING BAR KIT MAINTENANCE TASK SUMMARY

TASK PARA.	PROCEDURES	PAGE NO.
12-161.	Traversing Bar Kit Maintenance	12-252

12-161. TRAVERSING BAR KIT MAINTENANCE

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M1043, M1043A1, M1043A2, M1044, M1044A1

Manual References

TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

Hatch opened (TM 9-2320-280-10).

Materials/Parts

Six locknuts (Appendix G, Item 128)

NOTE

- This task covers the MK64 tri-mount and the .50 cal. machine gun mount.
- Perform steps 1 and 2 for the MK64 mount only.

a. Removal

1. Remove two locknuts (12), washers (13), capscrews (1), washers (13), and traversing bar (2) from upper mounts (6). Discard locknuts (12).
2. Remove four locknuts (3), washers (4), capscrews (7), washers (4), and upper mounts (6) from lower mount (5). Discard locknuts (3).

NOTE

Perform steps 3 and 4 for the .50 cal. machine gun mount only.

3. Remove two locknuts (12), washers (13), capscrews (1), washers (13), and traversing bar (2) from lower mount (5). Discard locknuts (12).
4. Remove three locknuts (9), washers (10), capscrews (11), washers (10), and lower mount (5) from armament panel (8). Discard locknuts (9).

b. Installation

NOTE

Perform steps 1 and 2 for the .50 cal. machine gun mount only.

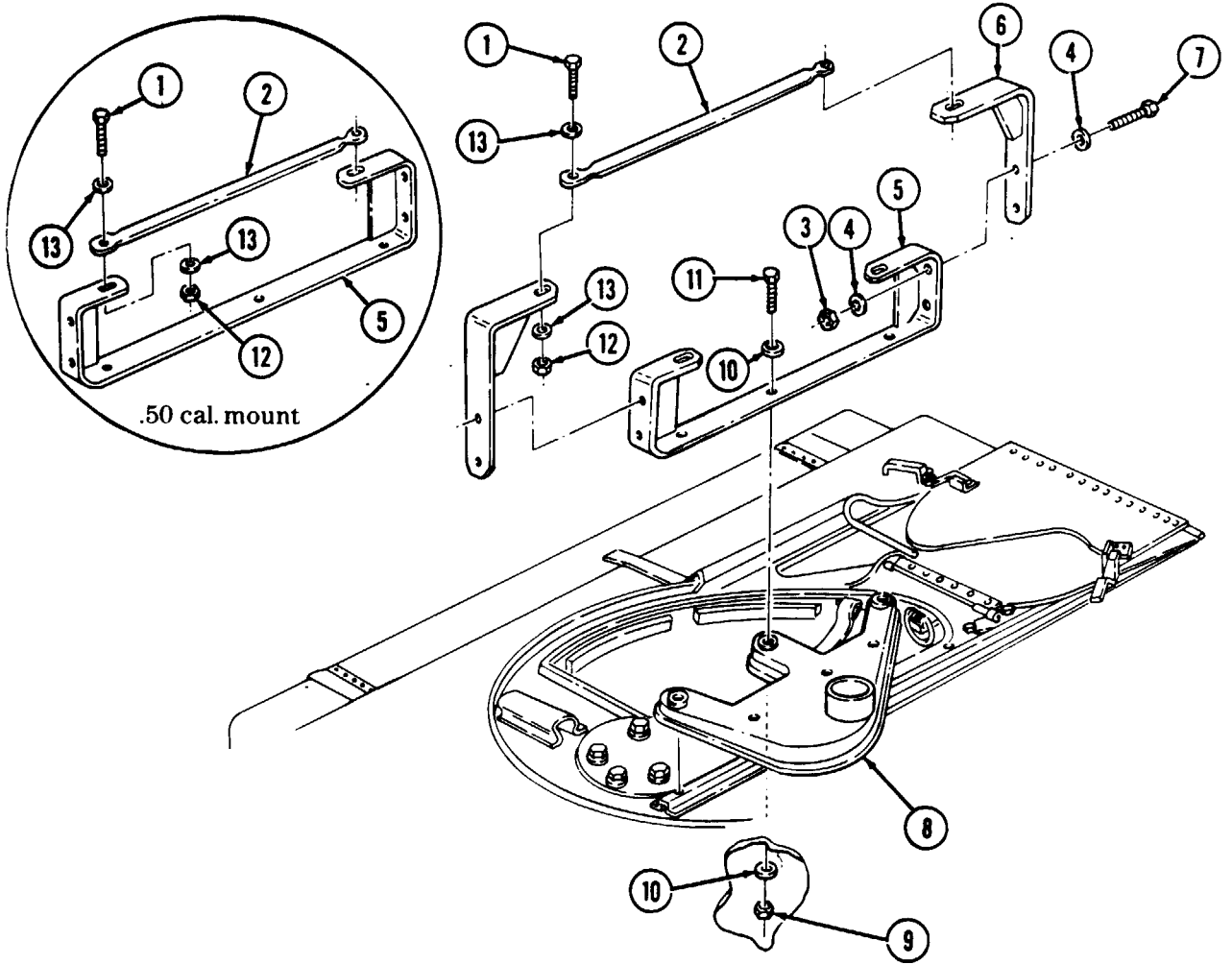
1. Install lower mount (5) on armament panel (8) with three washers (10), capscrews (11), washers (10), and locknuts (9). Tighten locknuts (9) to 37 lb-ft (50 N•m).
2. Install traversing bar (2) on lower mount (5) with two washers (13), capscrews (1), washers (13), and locknuts (12). Tighten locknuts (12) to 37 lb-ft (50 N•m).

NOTE

Perform steps 3 and 4 for the MK64 mount only.

3. Install upper mounts (6) on lower mount (5) with four washers (4), capscrews (7), washers (4), and locknuts (3). Tighten locknuts (3) to 37 lb-ft (50 N•m).
4. Install traversing bar (2) on upper mount (6) with two washers (13), capscrews (1), washers (13), and locknuts (12). Tighten locknuts (12) to 37 lb-ft (50 N•m).

12-161. TRAVERSING BAR KIT MAINTENANCE (Cont'd)



FOLLOW-ON TASK: Close hatch (TM 9-2320-280-10).

Section X. M1097, M1097A1, and M1097A2 SPECIAL PURPOSE KITS MAINTENANCE

12-162. M1097, M1097A1, AND M1097A2 SPECIAL PURPOSE KITS MAINTENANCE TASK SUMMARY
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TASK PARA.	PROCEDURES	PAGE NO.
12-163.	Trailer Connector and Wiring Harness Replacement (L119)	12-255
12-164.	Rear Bumper Replacement (L119)	12-257
12-165.	Rear Bumper Brace Bracket Replacement (L119)	12-258
12-166.	Rear Bumper Outer Brace Replacement (L119)	12-259
12-167.	Rear Bumper Outer Mounting Bracket Replacement (L119)	12-260
12-168.	Rear Bumper Inner Brace Replacement (L119)	12-261
12-169.	Rear Bumper Inner Mounting Bracket Replacement (L119)	12-262
12-170.	Pioneer Tool Stowage Rack Latch Strike Replacement (L119)	12-263
12-171.	Rear Bumper Lifting Shackle Replacement (L119)	12-264
12-172.	Rear Tiedown Bracket Replacement (L119)	12-265
12-173.	Ammo Tiedown Strap Replacement (L119)	12-266
12-174.	Ammo Divider Replacement (L119)	12-267
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12-179.	Sight Box Straps Replacement (L119)	12-272
12-180.	Water/Fuel Can Strap Replacement (L119)	12-273
12-181.	Ammo Rack Maintenance (L119)	12-274
12-182.	M60 Machine Gun Strap Replacement (L119)	12-277
12-183.	Camouflage Rack Maintenance	12-278

12-163. TRAILER CONNECTOR AND WIRING HARNESS REPLACEMENT (L119)

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M1097, M1097A1, M1097A2

Manual References

TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

Battery ground cable disconnected (para. 4-73).

Materials/Parts

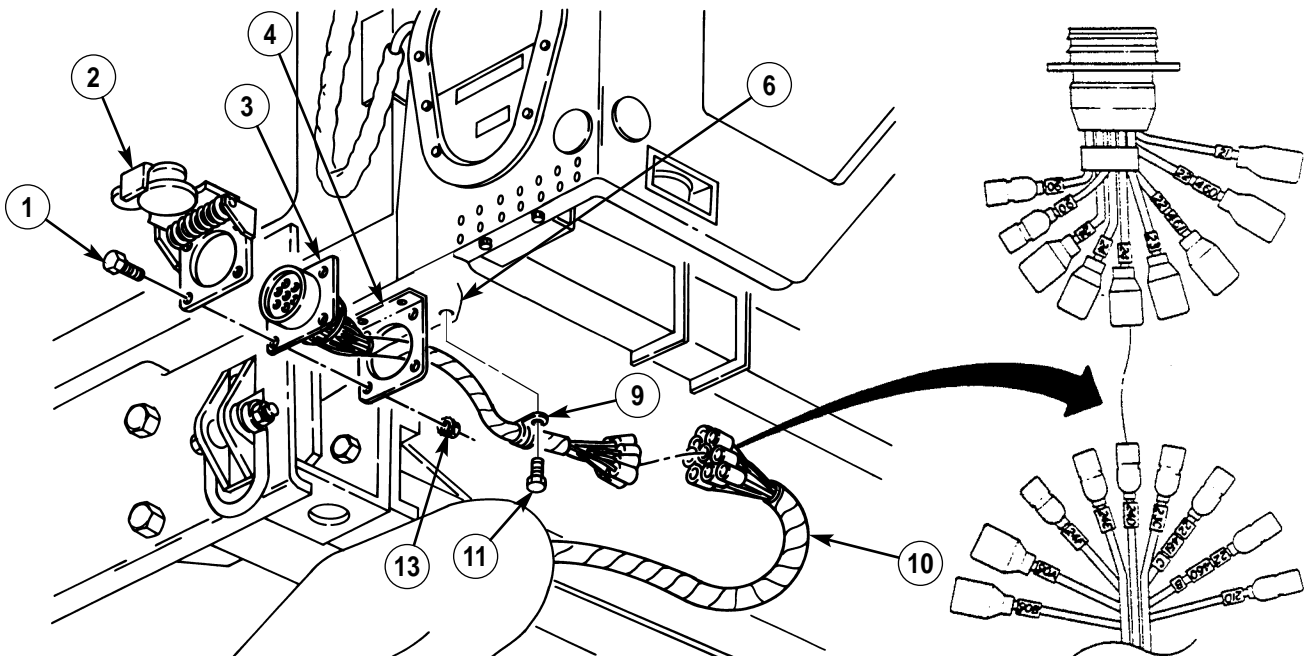
Four assembled locknuts
(Appendix G, Item 130)

NOTE

Prior to removal, tag leads for installation.

a. Removal

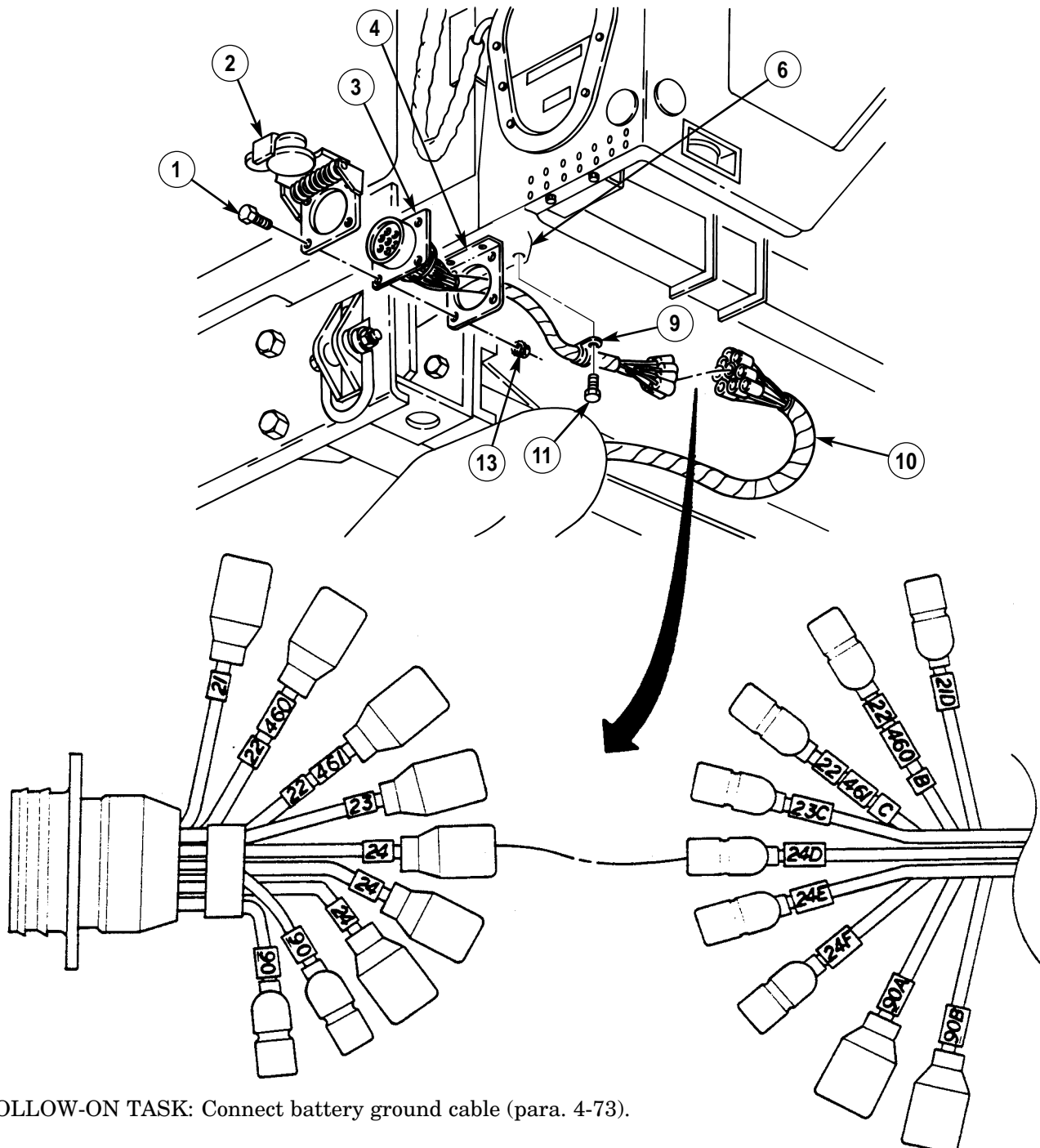
1. Remove four assembled locknuts (13), capscrews (1), and receptacle cover (2) from mounting bracket (4). Discard assembled locknuts (13).
2. Remove screw (11) and clamp (9) from D-beam (6).
3. Disconnect receptacle assembly (3) from body wiring harness (10) and remove receptacle assembly (3).
4. Deleted.



12-163. TRAILER CONNECTOR AND WIRING HARNESS REPLACEMENT (L119) (Cont'd)

b. Installation

1. Feed receptacle assembly (3) leads through bracket (4) and connect receptacle assembly (3) to body wiring harness (10).
2. Install clamp (9) on D-beam (6) with screw (11).
3. Install receptacle assembly (3) and receptacle cover (2) on mounting bracket (4) with four capscrews (1) and assembled locknuts (13).



FOLLOW-ON TASK: Connect battery ground cable (para. 4-73).

12-164. REAR BUMPER REPLACEMENT (L119)

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M1097, M1097A1, M1097A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Four locknuts (Appendix G, Item 81)

Equipment Condition

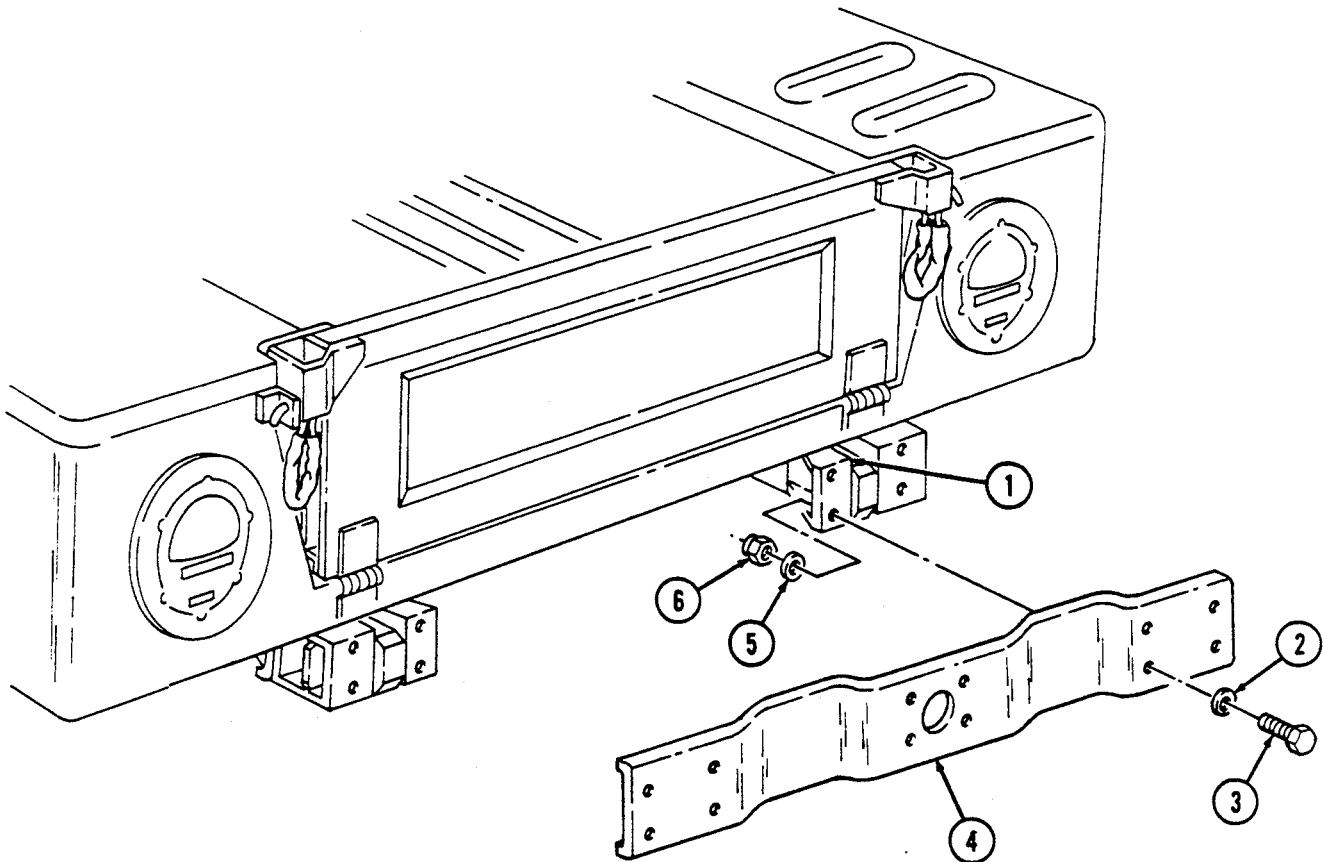
- Towing pintle removed (para 9-12).
- Rear tiedown brackets (L119) removed (para 12-172).

a. Removal

Remove four locknuts (6), washers (5), capscrews (3), washers (2), and bumper (4) from two inner mounting brackets (1). Discard locknuts (6).

b. Installation

Install bumper (4) on two inner mounting brackets (1) with four washers (2), capscrews (3), washers (5), and locknuts (6). Tighten locknuts (6) to 90 lb-ft (122 N·m).



FOLLOW-ON TASKS: • Install rear tiedown brackets (L119) (para 12-172).
• Install towing pintle (para 9-12).

12-165. REAR BUMPER BRACE BRACKET REPLACEMENT (L119)

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M1097, M1097A1, M1097A2

Manual References

TM 9-2320-280-10

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

- Pioneer tool stowage rack removed (TM 9-2320-280-10).
- Towing pintle removed (para 9-12).

Materials/Parts

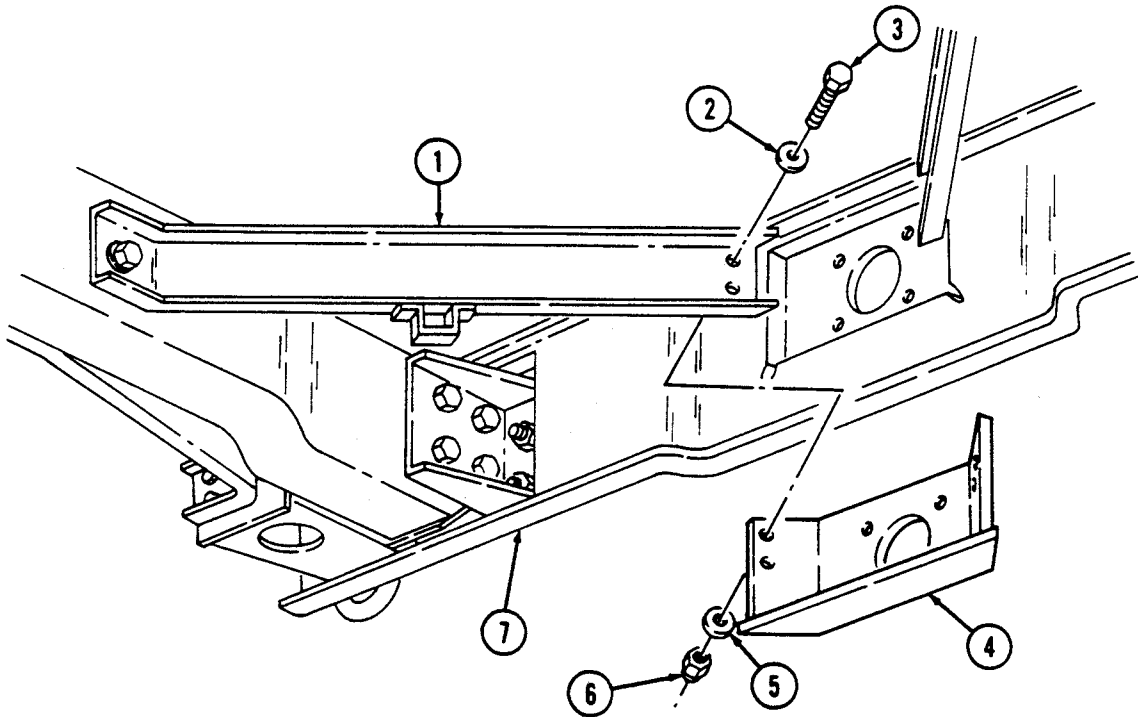
Four locknuts (Appendix G, Item 81)

a. Removal

Remove four locknuts (6), washers (5), capscrews (3), washers (2) and brace bracket (4) from rear bumper (7) and two inner braces (1). Discard locknuts (6).

b. Installation

1. Install brace bracket (4) on rear bumper (7) and two inner braces (1).
2. Secure brace bracket (4) to two inner braces (1) with four washers (2), capscrews (3), washers (5), and locknuts (6). Tighten locknuts (6) to 90 lb-ft (122 N·m).



- FOLLOW-ON TASKS:**
- Install towing pintle (para 9-12).
 - Install pioneer tool stowage rack (TM 9-2320-280-10).

12-166. REAR BUMPER OUTER BRACE REPLACEMENT (L119)

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M1097, M1097A1, M1097A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Three locknuts (Appendix G, Item 81)

Manual References

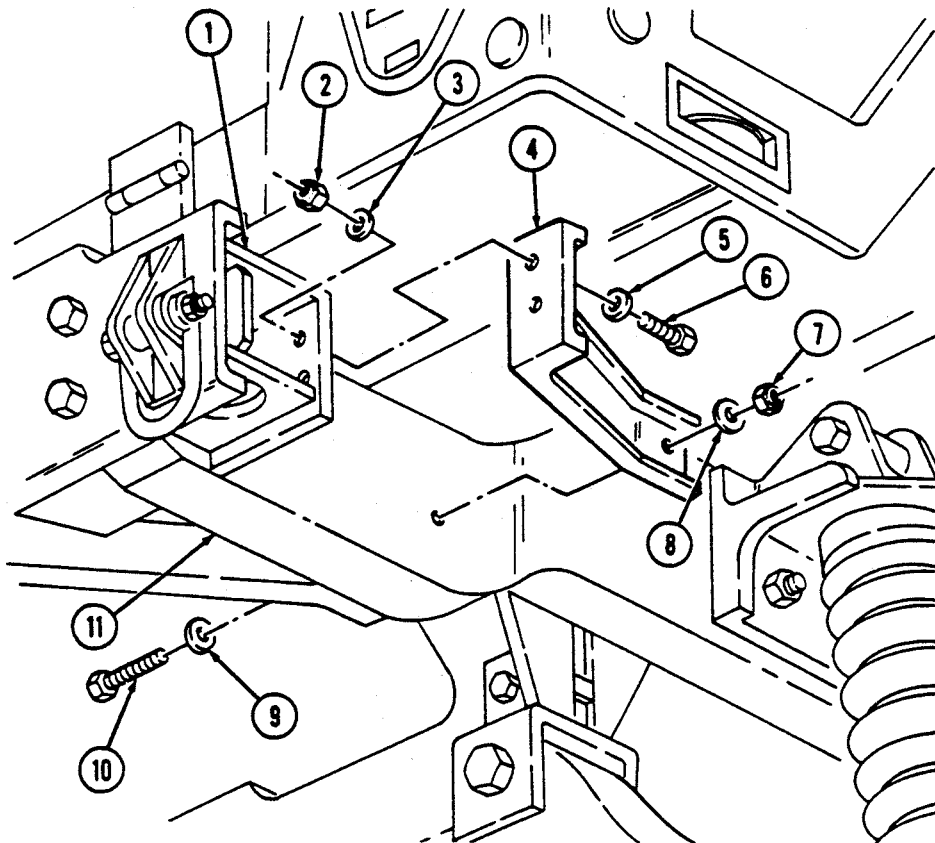
TM 9-2320-280-24P

a. Removal

1. Remove locknut (7), washer (8), capscrew (10), and washer (9) from outer brace (4) and frame (11). Discard locknut (7).
2. Remove two locknuts (2), washers (3), capscrews (6), washers (5), and outer brace (4) from outer mounting bracket (1). Discard locknuts (2).

b. Installation

1. Install outer brace (4) on outer mounting bracket (1) with two washers (5), capscrews (6), washers (3), and locknuts (2). Tighten locknuts (2) to 90 lb-ft (122 N·m).
2. Install outer brace (4) on frame (11) with washer (9), capscrew (10), washer (8), and locknut (7). Tighten locknut (7) to 90 lb-ft (122 N·m).



12-167. REAR BUMPER OUTER MOUNTING BRACKET REPLACEMENT (L119)

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M1097, M1097A1, M1097A2

Manual References

TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

Rear tiedown bracket removed (para 12-172).

Materials/Parts

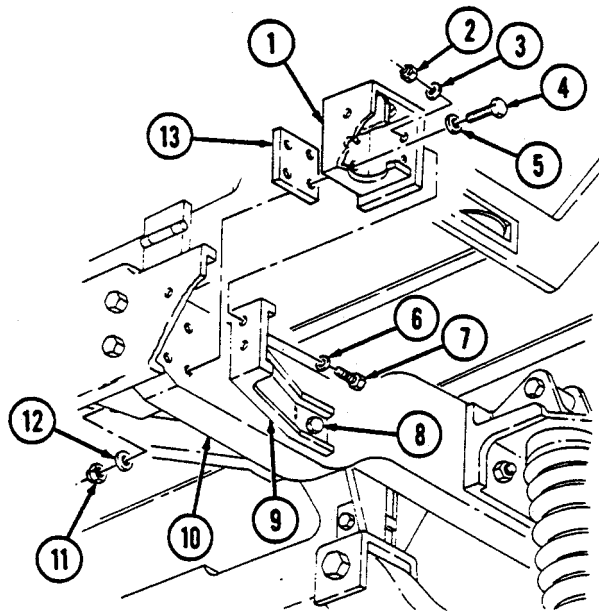
Six locknuts (Appendix G, Item 81)

a. Removal

1. Remove two locknuts (2), washers (3), capscrews (7), and washers (6) from outer mounting bracket (1) and outer brace (9). Discard locknuts (2).
2. Loosen locknut (8) from outer brace (9) and frame (10).
3. Remove four locknuts (11), washers (12), capscrews (4), washers (5), outer mounting bracket (1) and spacer (13) from frame (10). Discard locknuts (11).

b. Installation

1. Install outer mounting bracket (1) and spacer (13) on frame (10) with four washers (5), capscrews (4), washers (12), and locknuts (11). Tighten locknuts (11) to 90 lb-ft (122 N·m).
2. Install outer mounting bracket (1) on outer brace (9) with two washers (6), capscrews (7), washers (3), and locknuts (2). Tighten locknuts (2) to 90 lb-ft (122 N·m).
3. Tighten locknut (8) on outer brace (9) to 90 lb-ft (122 N·m).



FOLLOW-ON TASKS: Install rear tiedown bracket (para 12-172).

12-168. REAR BUMPER INNER BRACE REPLACEMENT (L119)

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M1097, M1097A1, M1097A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Three locknuts (Appendix G, Item 81)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

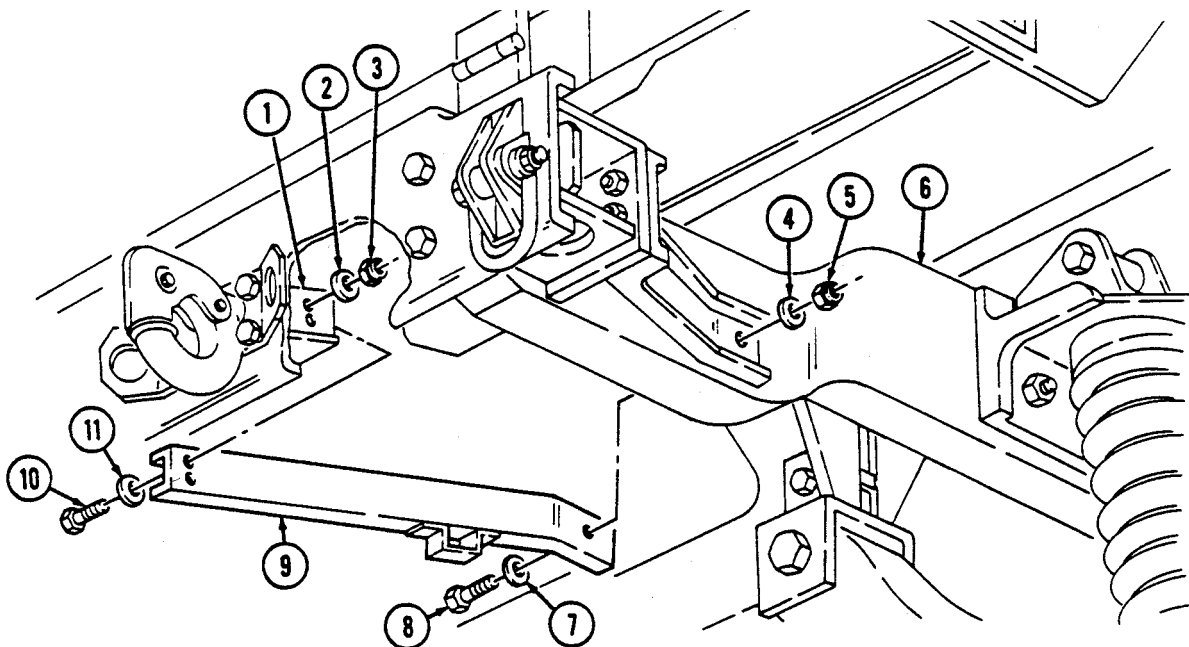
- Pioneer tool stowage rack removed (TM 9-2320-280-10).
- Pioneer tool stowage rack latch strike removed (para. 12-170).

a. Removal

1. Remove locknut (5), washer (4), capscrew (8), and washer (7) from inner brace (9) and frame (6). Discard locknut (5).
2. Remove two locknuts (3), washers (2), capscrews (10), washers (11), and inner brace (9) from brace bracket (1). Discard locknuts (3).

b. Installation

1. Install inner brace (9) on brace bracket (1) with two washers (11), capscrews (10), washers (2), and locknuts (3). Tighten locknuts (3) to 90 lb-ft (122 N·m).
2. Install inner brace (9) on frame (6) with washer (7), capscrew (8), washer (4), and locknut (5). Tighten locknut (5) to 90 lb-ft (122 N·m).



- FOLLOW-ON TASKS:
- Install pioneer tool stowage rack latch strike (para. 12-170).
 - Install pioneer tool stowage rack (TM 9-2320-280-10).

12-169. REAR BUMPER INNER MOUNTING BRACKET REPLACEMENT (L119)

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M1097, M1097A1, M1097A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Six locknuts (Appendix G, Item 81)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

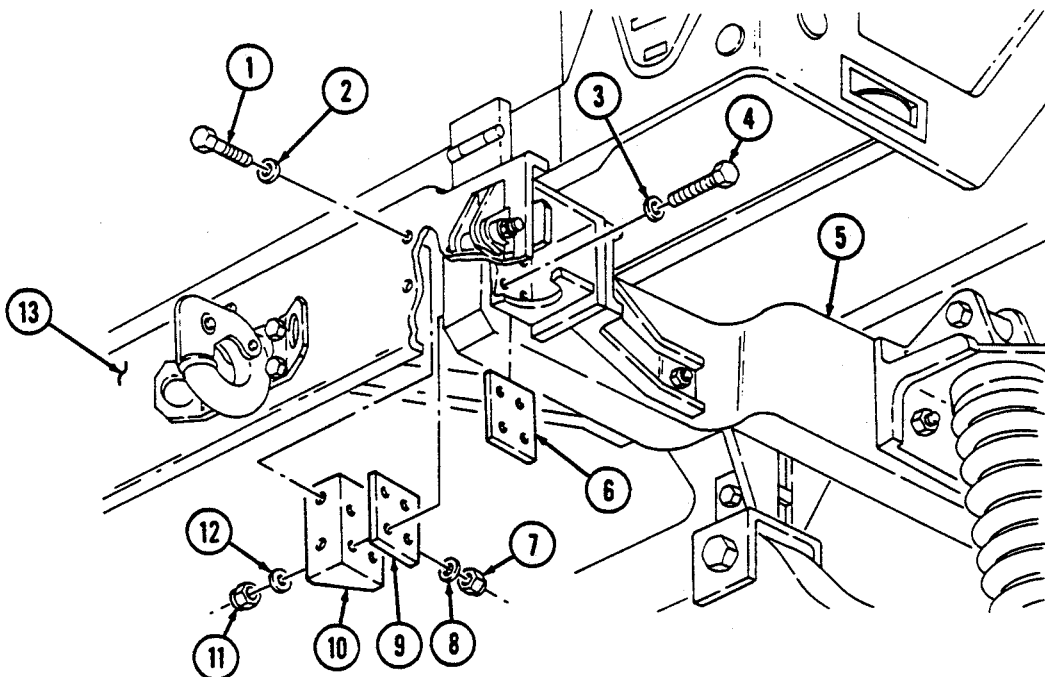
Pioneer tool stowage rack removed
(TM 9-2320-280-10).

a. Removal

1. Remove two locknuts (7), washers (8), capscrews (1), and washers (2) from inner mounting bracket (10) and bumper (13). Discard locknuts (7).
2. Remove four locknuts (11), washers (12), capscrews (4), washers (3), inner mounting bracket (10), and spacers (9) and (6) from frame (5).

b. Installation

1. Install inner mounting bracket (10) and spacers (9) and (6) on frame (5) with four washers (3), capscrews (4), washers (12), and locknuts (11). Tighten locknuts (11) to 90 lb-ft (122 N-m).
2. Install inner mounting bracket (10) on bumper (13) with two washers (2), capscrews (1), washers (8), and locknuts (7). Tighten locknuts (7) to 90 lb-ft (122 N-m).



FOLLOW-ON TASK: Install pioneer stowage rack (TM 9-2320-280-10).

12-170. PIONEER TOOL STOWAGE RACK LATCH STRIKE REPLACEMENT (L119)

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M1097, M1097A1, M1097A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Two lockwashers (Appendix G, Item 138)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

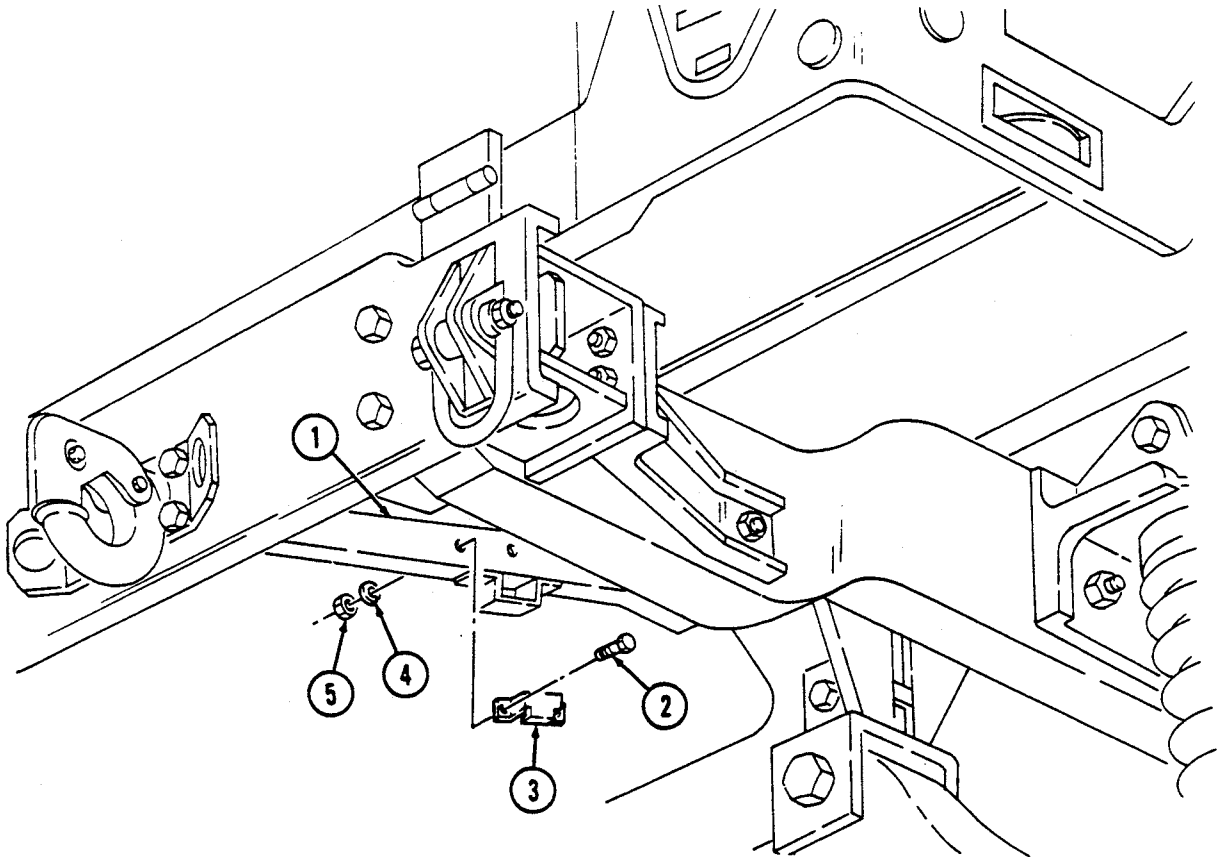
Pioneer tool stowage rack removed
(TM 9-2320-280-10).

a. Removal

Remove two nuts (5), lockwashers (4), screws (2), and latch strike (3) from rear bumper inner brace (1). Discard lockwashers (4).

b. Installation

Install latch strike (3) on rear bumper inner brace (1) with two screws (2), lockwashers (4), and nut (5).



FOLLOW-ON TASK: Install pioneer tool stowage rack (TM 9-2320-280-10).

12-171. REAR BUMPER LIFTING SHACKLE REPLACEMENT (L119)

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M1097, M1097A1, M1097A2

Materials/Parts

Cotter pin (Appendix G, Item 14)

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

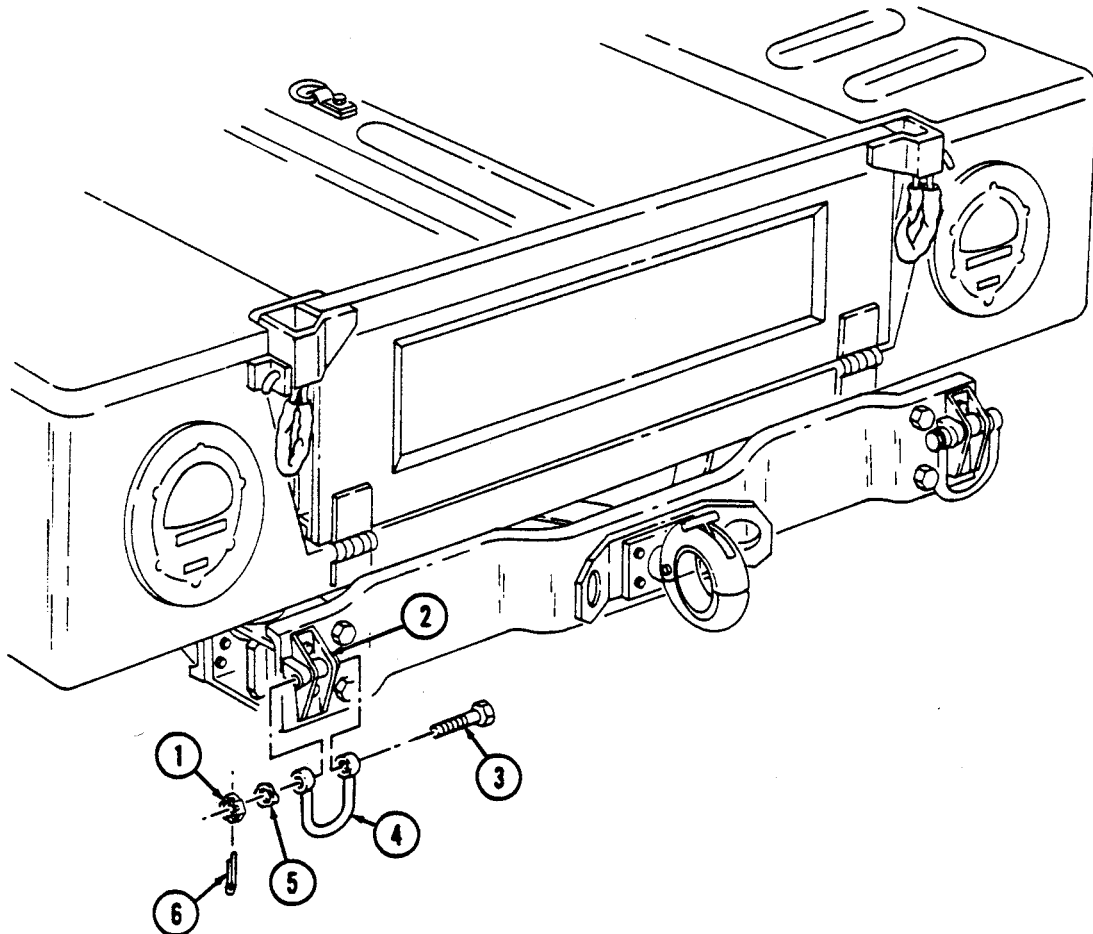
TM 9-2320-280-24P

a. Removal

Remove cotter pin (6), slotted nut (1), spring washer (5), capscrew (3), and shackle (4) from tiedown bracket (2). Discard cotter pin (6).

b. Installation

1. Install shackle (4) on tiedown bracket (2) with capscrew (3), spring washer (5), and slotted nut (1). Tighten slotted nut (1) enough to allow movement of shackle (4).
2. Install cotter pin (6) on slotted nut (1).



12-172. REAR TIEDOWN BRACKET REPLACEMENT (L119)

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M1097, M1097A1, M1097A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Two locknuts (Appendix G, Item 81)

Manual References

TM 9-2320-280-24P

Equipment Condition

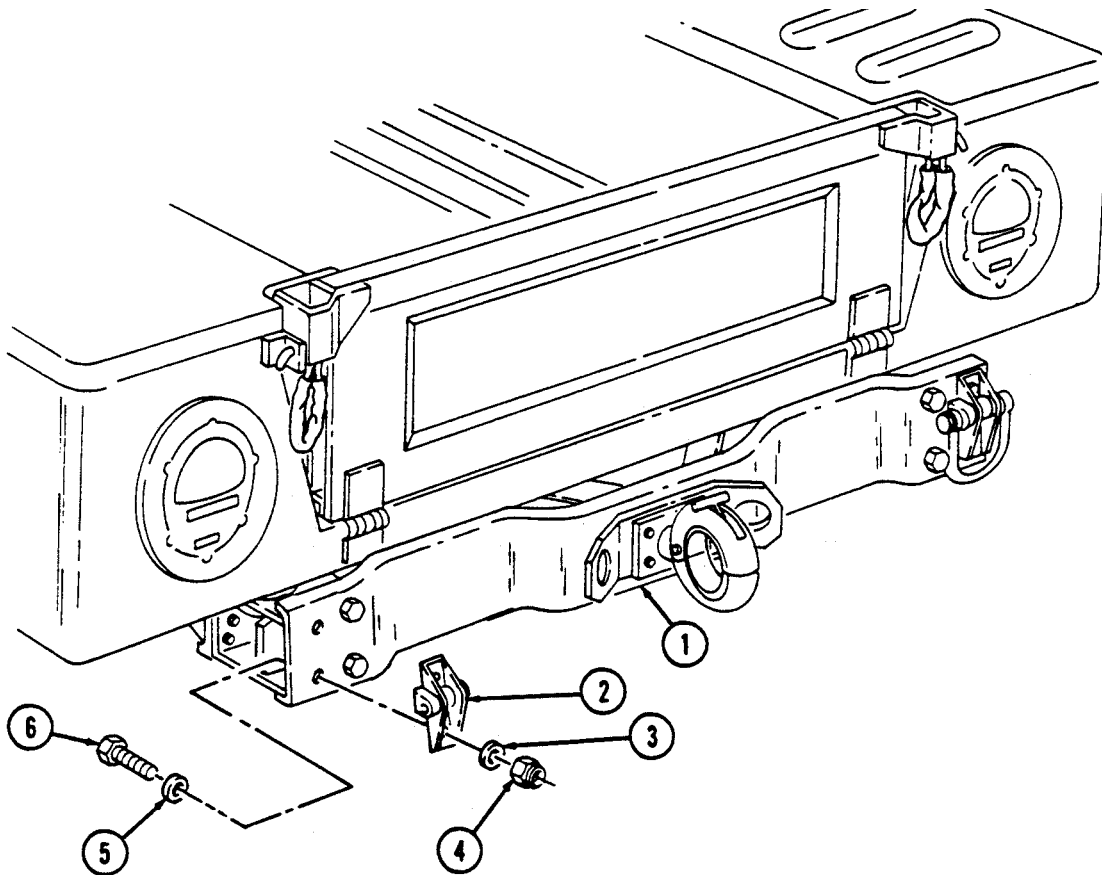
Rear bumper lifting shackle (L119) removed
(para. 12-171).

a. Removal

Remove two locknuts (4), washers (3), capscrews (6), washers (5), and tiedown bracket (2) from rear bumper (1).

b. Installation

Install tiedown bracket (2) on rear bumper (1) with two washers (5), capscrews (6), washers (3), and locknuts (4). Tighten locknuts (4) to 90 lb-ft (122 N·m).



FOLLOW-ON TASK: Install rear bumper lifting shackle (L119) (para. 12-171).

12-173. AMMO TIEDOWN STRAP REPLACEMENT (L119)

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M1097, M1097A1, M1097A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Two locknuts (Appendix G, Item 70)

Manual References

TM 9-2320-280-24P

Personnel Required

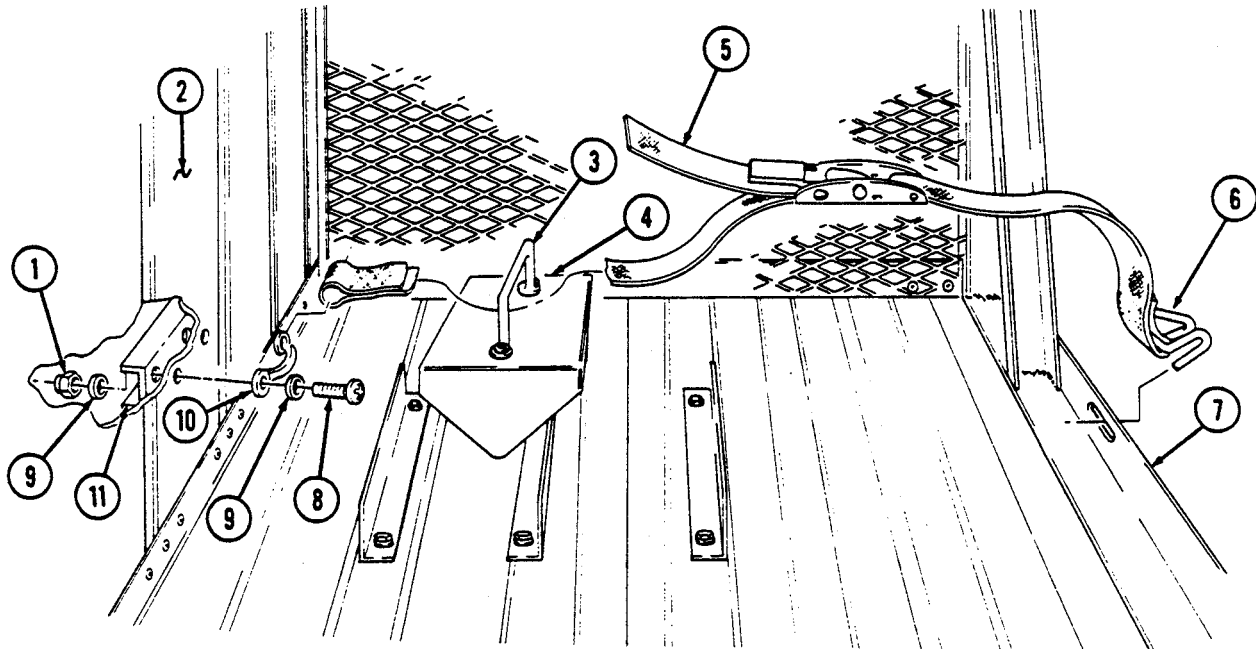
One mechanic
One assistant

a. Removal

1. Remove two locknuts (1), washers (9), reinforcement (11), screws (8), washers (9), and footman loop (10) from strap (5) and wheelhouse (2). Discard locknuts (1).
2. Slide strap (5) through footman loop (3) on wedge (4).
3. Remove strap hook (6) from slot in ammo rack assembly (7) and remove strap (5).

b. Installation

1. Slide strap (5) on footman loop (10). Install footman loop (10) and strap (5) on wheelhouse (2) with two washers (9), screws (8), reinforcement (11), washers (9), and locknuts (1).
2. Install strap (5) through footman loop (3) on wedge (4).
3. Attach strap hook (6) to slot in ammo rack assembly (7).



12-174. AMMO DIVIDER REPLACEMENT (L119)

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M1097, M1097A1, M1097A2

Manual References

TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

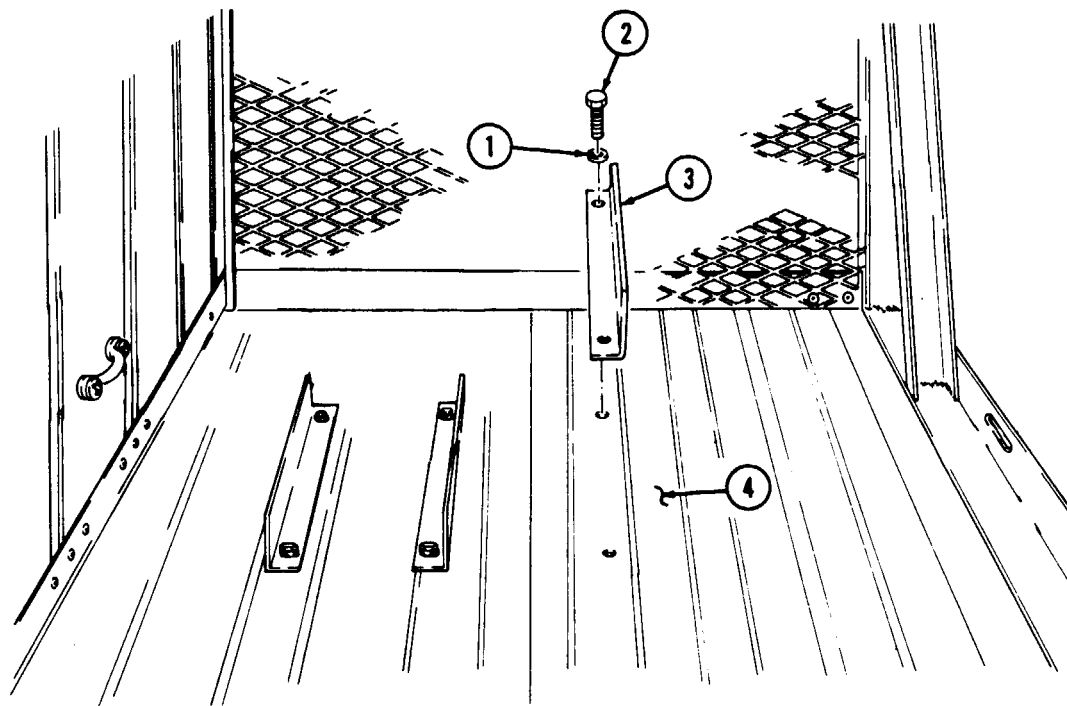
Ammo tiedown strap removed (para. 12-173).

a. Removal

Remove two capscrews (2), washers (1), and ammo divider (3) from cargo floor (4).

b. Installation

Install ammo divider (3) on cargo floor (4) with two washers (1) and capscrews (2).



FOLLOW-ON TASK: Install ammo tiedown strap (para. 12-173).

12-175. TELEPHONE STRAP REPLACEMENT (L119)

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M1097, M1097A1, M1097A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Two locknuts (Appendix G, Item 96)

Personnel Required

One mechanic
One assistant

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

Troop seat (R.H.) raised (TM 9-2320-280-10).

NOTE

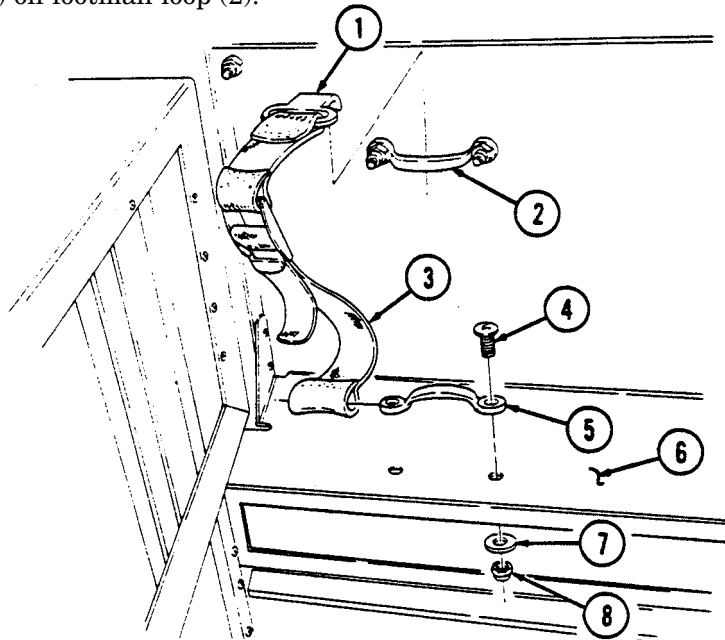
The telephone strap, remote strap, and cable reel strap are replaced basically the same. This procedure covers the telephone strap replacement.

a. Removal

1. Remove two locknuts (8), washers (7), and screws (4) footman loop (5), and strap (3) from fixed door (6). Discard locknuts (8).
2. Remove strap hook (1) from footman loop (2) and remove strap (3).

b. Installation

1. Slide strap (3) onto footman loop (5). Install footman loop (5) and strap (3) on fixed door (6) with two screws (4), washers (7), and locknuts (8).
2. Attach strap hook (1) on footman loop (2).



FOLLOW-ON TASK: Lower right troop seat (TM 9-2320-280-10).

12-176. SECTION CHEST STRAP REPLACEMENT (L119)

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M1097, M1097A1, M1097A2

Manual References

TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

NOTE

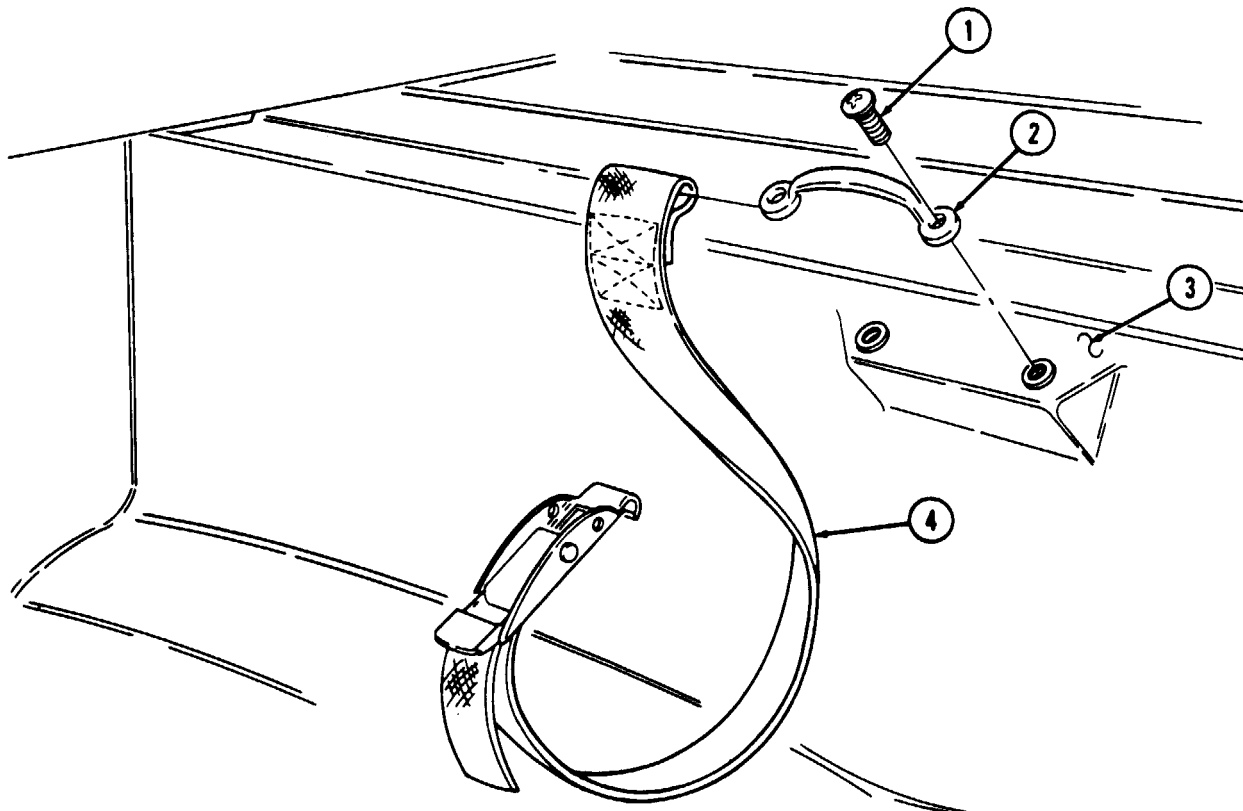
The section chest straps, aiming post straps, and spade straps are replaced basically the same. This procedure covers the section chest strap.

a. Removal

Remove two screws (1), footman loop (2), and strap (4) from body (3) and remove footman loop (2) from strap (4).

b. Installation

Slide strap (4) onto footman loop (2). Install footman loop (2) and strap (4) on body (3) with two screw (1).



12-177. TRIPOD STRAP REPLACEMENT (L119)

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M1097, M1097A1, M1097A2

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Equipment Condition

Troop seat (R.H.) raised (TM 9-2320-280-10).

Materials/Parts

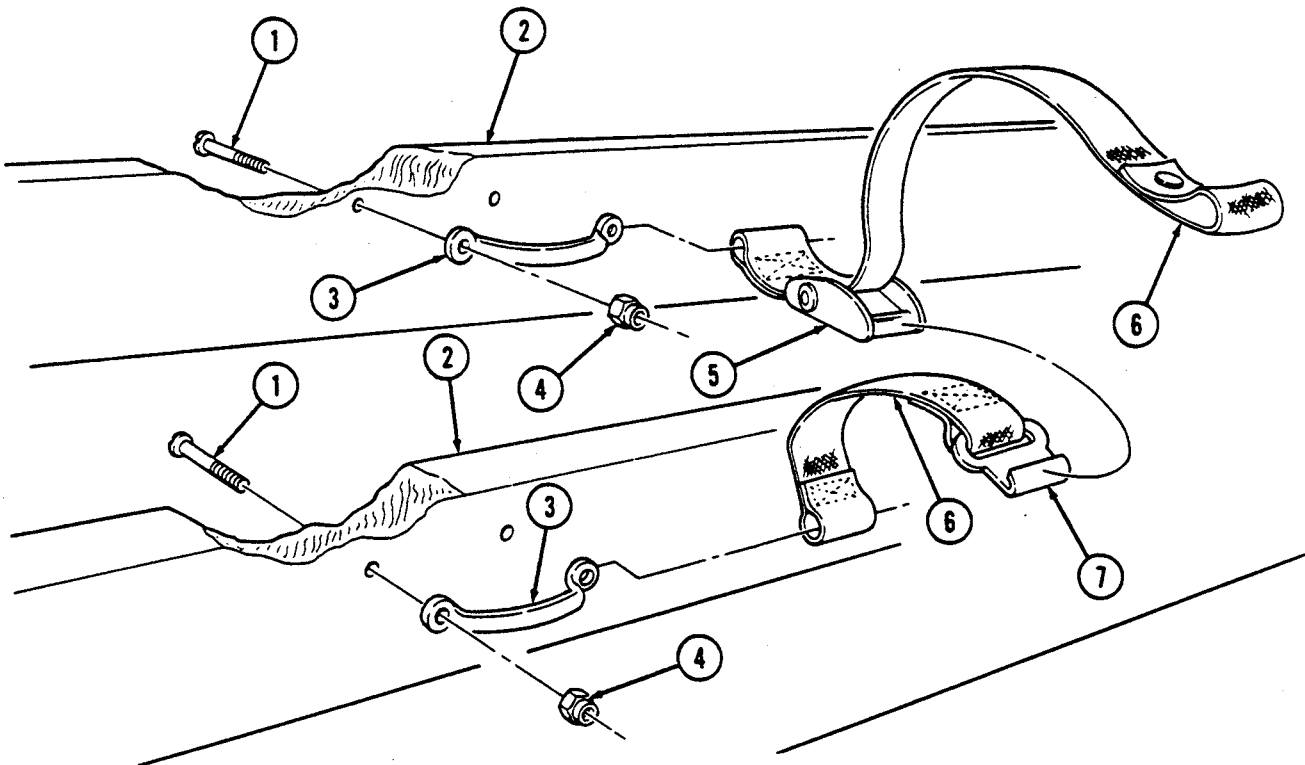
Four locknuts (Appendix G, Item 97)

a. Removal

1. Remove strap hook (7) from strap buckle (5).
2. Remove four locknuts (4), screws (1), two footman loops (3), and straps (6) from troop seat (2). Discard locknuts (4).

b. Installation

1. Slide straps (6) onto two footman loops (3). Install footman loops (3) and straps (6) on troop seat (2) with four screws (1) and locknuts (4).
2. Attach strap hook (7) on strap buckle (5).



FOLLOW-ON TASK: Lower right troop seat (TM 9-2320-280-10).

12-178. GUN DISPLAY UNIT BATTERY STRAP REPLACEMENT (L119)

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M1097, M1097A1, M1097A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Four locknuts (Appendix G, Item 97)

Personnel Required

One mechanic
One assistant

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

Left troop seat raised (TM 9-2320-280-10).

NOTE

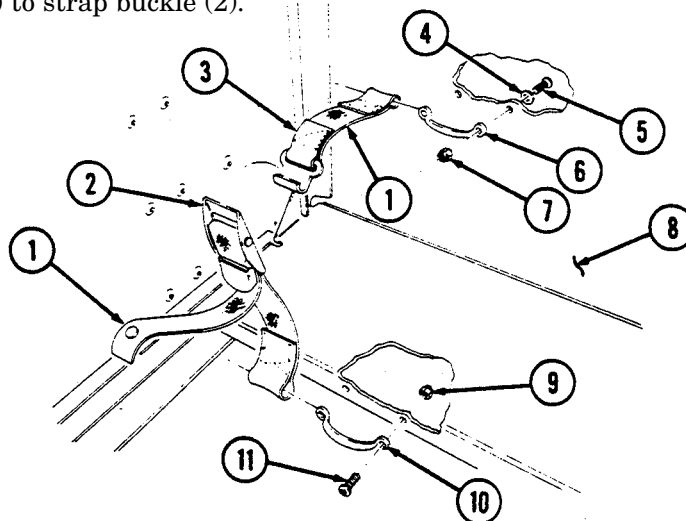
The G.D.U. battery strap and G.D.U. strap are replaced basically the same. This procedure covers the G.D.U. battery strap.

a. Removal

1. Remove strap hook (3) from strap buckle (2).
2. Remove two locknuts (7), screws (5), washers (4), footman loop (6), and strap (1) from fixed door (8). Discard locknuts (7).
3. Remove two locknuts (9), screws (11), footman loop (10), and strap (1) from fixed door (8). Discard locknuts (9).

b. Installation

1. Slide strap (1) onto footman loop (6). Install footman loop (6) and strap (1) on fixed door (8) with two washers (4), screws (5), and locknuts (7).
2. Slide strap (1) onto footman loop (10). Install footman loop (10) and strap (1) on fixed door (8) with two screws (11) and locknuts (9).
3. Attach strap hook (3) to strap buckle (2).



FOLLOW-ON TASK: Lower left troop seat (TM 9-2320-280-10).

12-179. SIGHT BOX STRAPS REPLACEMENT (L119)

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M1097, M1097A1, M1097A2

Materials/Parts

Six locknuts (Appendix G, Item 97)

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-24P

NOTE

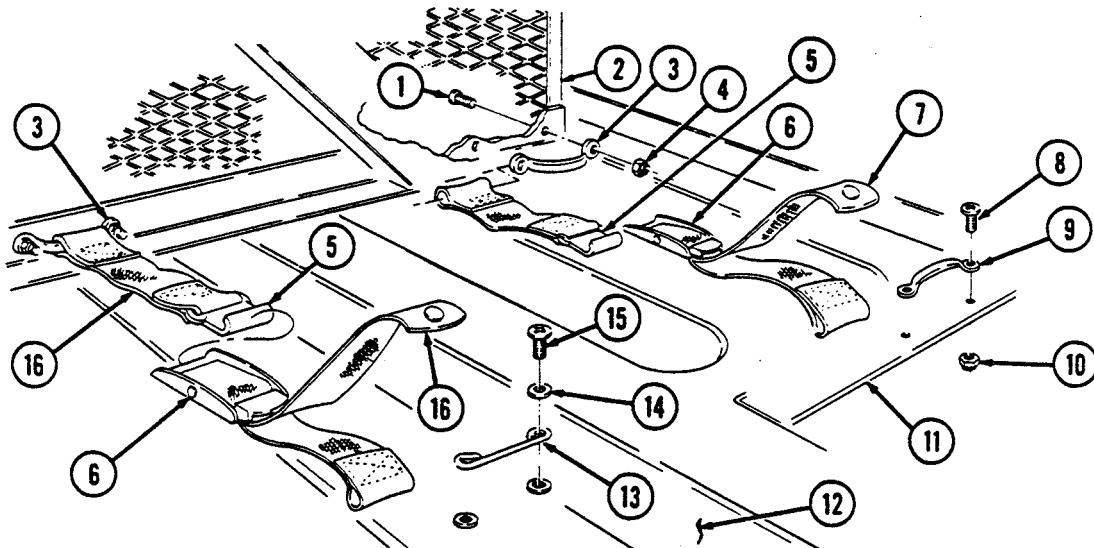
The sight box #1 straps and the sight box #2 strap are replaced basically the same. This procedure covers the sight box #1 straps.

a. Removal

1. Remove strap hooks (5) from strap buckles (6).
2. Remove four locknuts (4), screws (1), two footman loops (3), and straps (7) and (16) from ammo rack (2). Discard locknuts (4).
3. Remove two locknuts (10), screws (8), footman loop (9), and strap (7) from "C" beam (11). Discard locknuts (10).
4. Remove two screws (15), washers (14), flat footman loop (13), and strap (16) from cargo floor (12). Remove strap (16).

b. Installation

1. Slide strap (16) onto flat footman loop (13). Install flat footman loop (13) and strap (16) on cargo floor (12) with two screws (15) and washers (14).
2. Slide strap (7) onto footman loop (9). Install footman loop (9) and strap (7) on "C" beam (11) with two screws (8) and locknuts (10).
3. Slide straps (7) and (16) onto two footman loops (3). Install footman loops (3) and straps (7) and (16) on ammo rack (2) with four screws (1) and locknuts (4).
4. Attach strap hooks (5) on strap buckles (6).



12-180. WATER/FUEL CAN STRAP REPLACEMENT (L119)

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M1097, M1097A1, M1097A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Two locknuts (Appendix G, Item 97)

Manual References

TM 9-2320-280-24P

Personnel Required

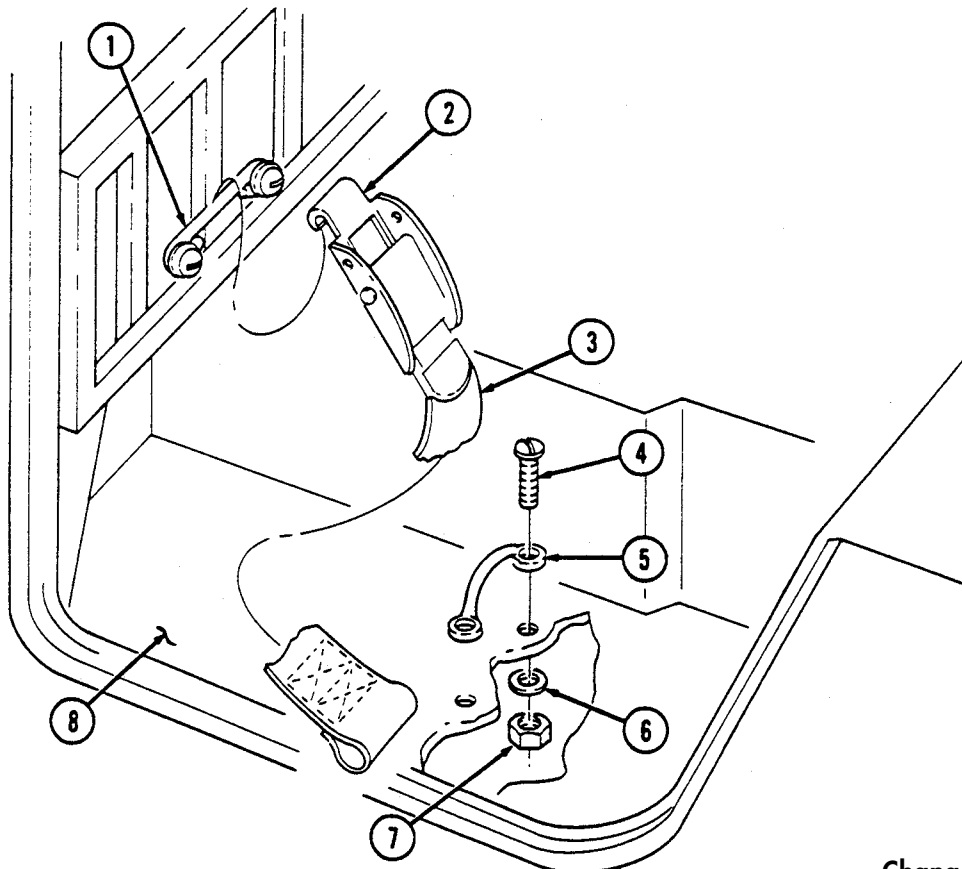
One mechanic
One assistant

a. Removal

1. Remove two locknuts (7), washers (6), screws (4), footman loop (5), and strap (3) from footwell (8). Discard locknuts (7).
2. Remove strap hook (2) from flat footman loop (1).

b. Installation

1. Slide strap (3) onto footman loop (5). Install footman loop (5) and strap (3) on footwell (8) with two screws (4), washers (6), and locknuts (7).
2. Attach strap hook (2) to flat footman loop (1).



12-181. AMMO RACK MAINTENANCE (L119)

This task covers:

- | | |
|----------------|-----------------|
| a. Removal | c. Assembly |
| b. Disassembly | d. Installation |

INITIAL SETUP:

Applicable Models

M1097, M1097A1, M1097A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Twelve locknuts (Appendix G, Item 70)
Twelve locknuts (Appendix G, Item 97)
Locknut (Appendix G, Item 81)
Four lockwashers (Appendix G, Item 135)

Personnel Required

One mechanic
One assistant

Manual References

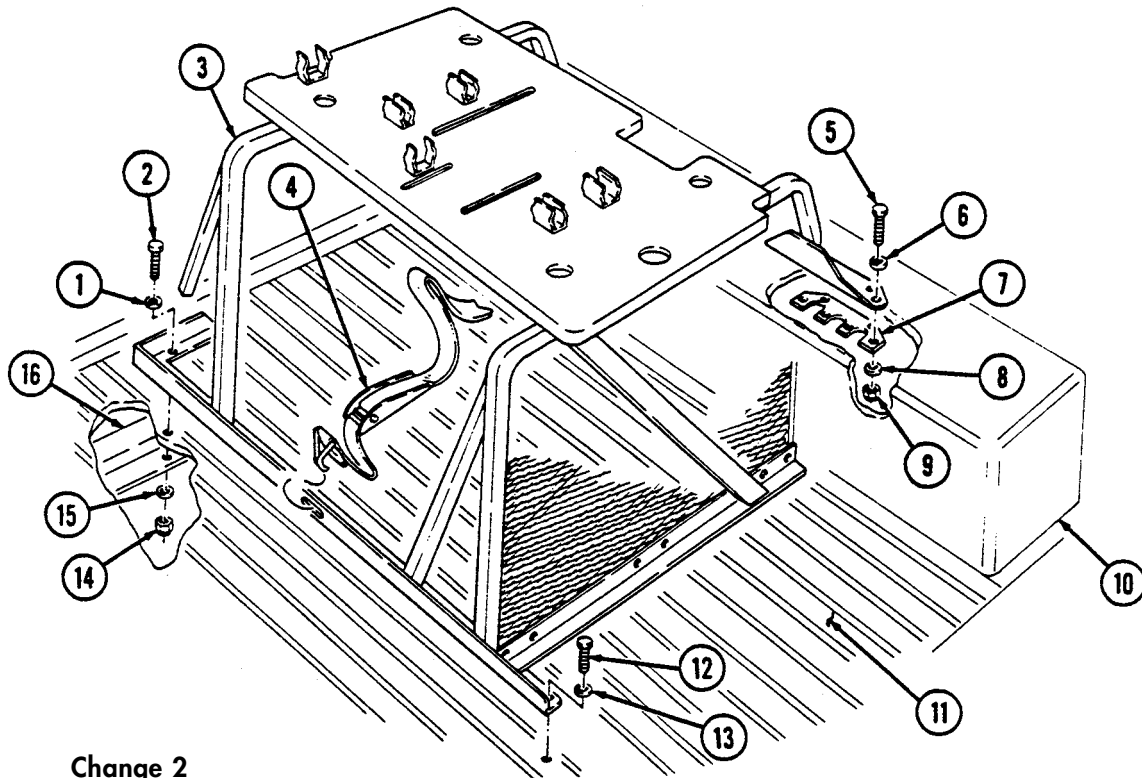
TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

- Tailgate lowered (TM 9-2320-280-10).
- Troop seat (L.H.) raised (TM 9-2320-280-10).
- Sight box straps removed (para. 12-179).
- M60 machine gun straps removed (para. 12-182).

a. Removal

1. Remove twelve locknuts (9), washers (8), capscrews (5), and washers (6) from ammo rack assembly (3), two plates (7), and wheelhouse (10). Discard locknuts (9).
2. Remove locknut (14), washer (15), capscrew (2), and washer (1) from ammo rack assembly (3) and "D" beam (16). Discard locknut (14).
3. Remove six capscrews (12) and washers (13) from ammo rack assembly (3) and cargo floor (11).
4. Remove ammo tiedown strap hook (4) from ammo rack assembly (3).
5. Remove ammo rack assembly (3).



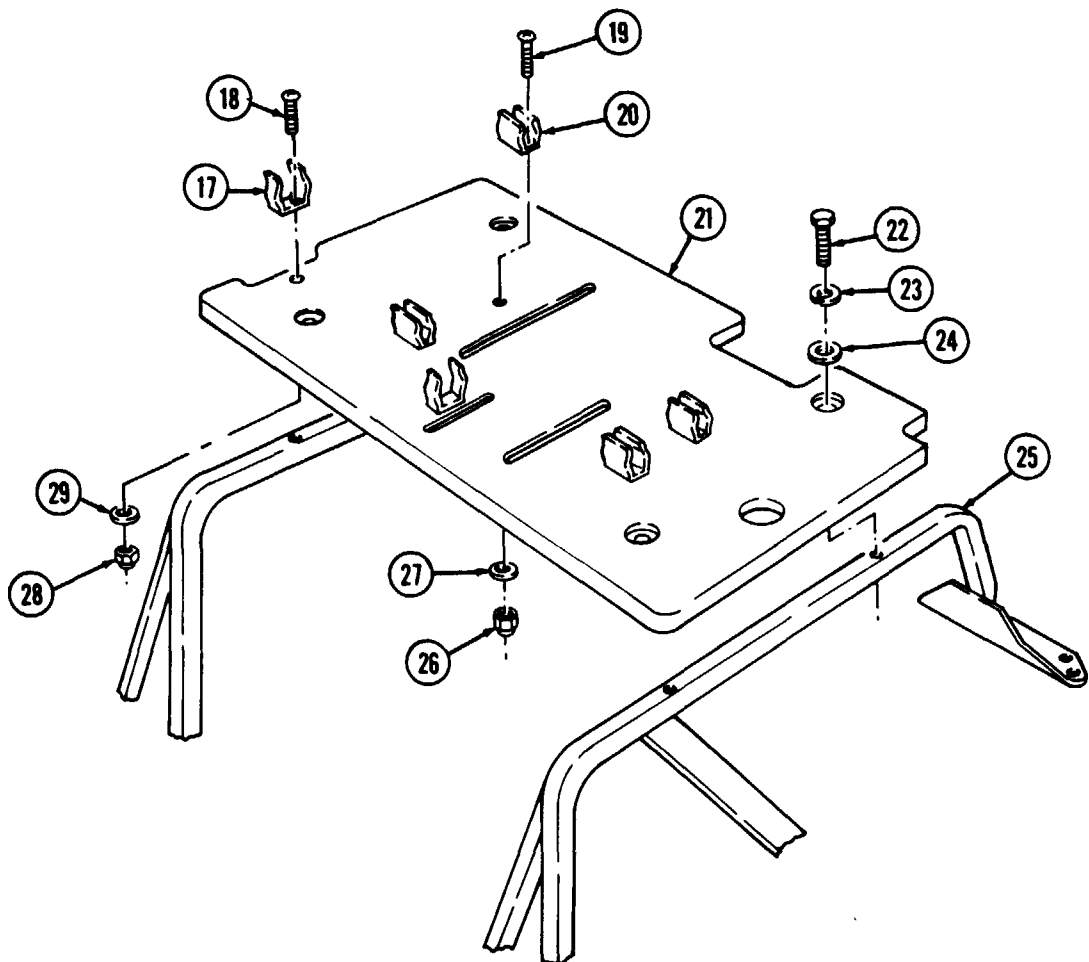
12-181. AMMO RACK MAINTENANCE (L119) (Cont'd)

b. Disassembly

1. Remove four locknuts (28), washers (29), screws (18), and two strut spring clips (17) from ammo rack top tray (21). Discard locknuts (28).
2. Remove eight locknuts (26), washers (27), screws (19), and four spike spring clips (20) from ammo rack top tray (21). Discard locknuts (26).
3. Remove four capscrews (22), lockwashers (23), washers (24), and ammo rack top tray (21) from ammo rack (25). Discard lockwashers (23).

c. Assembly

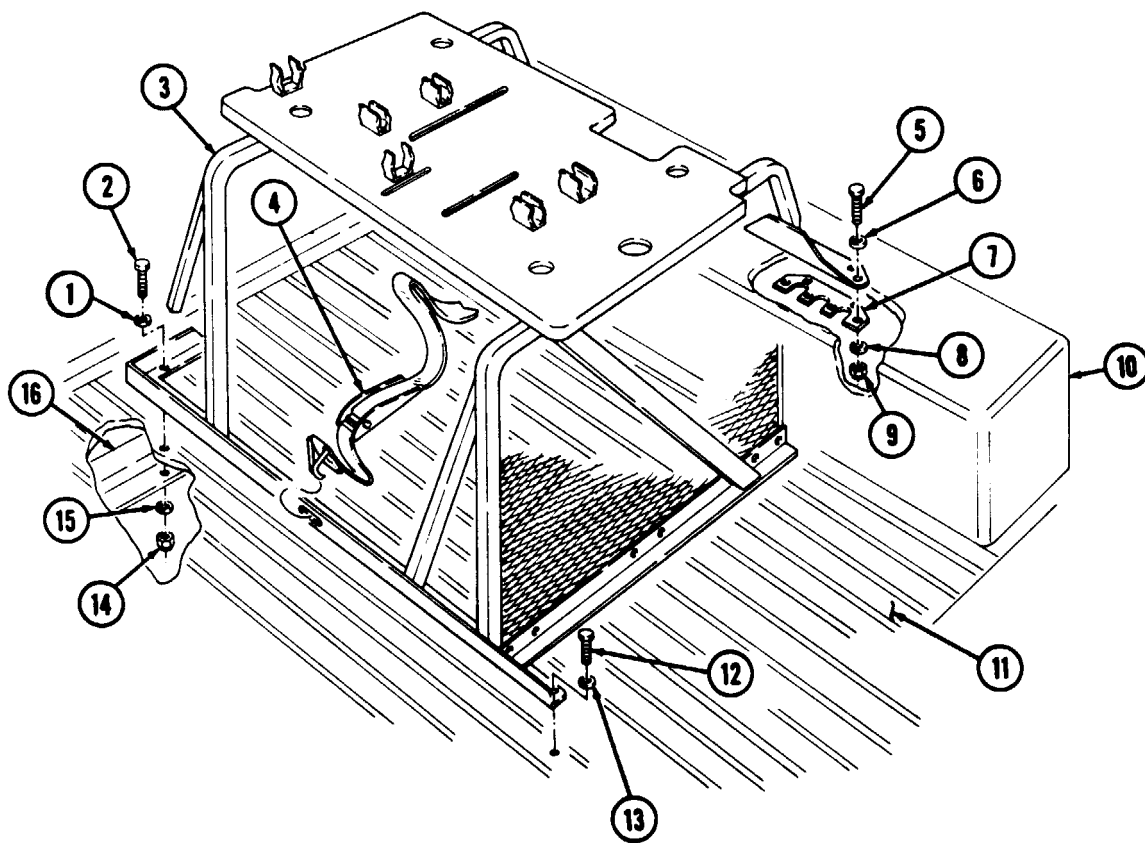
1. Install ammo rack top tray (21) on ammo rack (25) with four washers (24), lockwashers (23), and capscrews (22).
2. Install four spike spring clips (20) on ammo rack top tray (21) with eight screws (19), washers (27), and locknuts (26).
3. Install two strut spring clips (17) on ammo rack top tray (21) with four screws (18), washers (29), and locknuts (28).



12-181. AMMO RACK MAINTENANCE (L119) (Cont'd)

d. Installation

1. Install ammo rack assembly (3) on cargo floor (11) with six washers (13) and capscrews (12).
2. Install ammo rack assembly (3) on "D" beam (16) with washer (1), capscrew (2), washer (15), and locknut (14).
3. Install ammo rack assembly (3) and two plates (7) on wheelhouse (10) with twelve washers (6), capscrews (5), washers (8), and locknuts (9).
4. Attach ammo tiedown strap hook (4) to ammo rack assembly (3).



- FOLLOW-ON TASKS:
- Ž Install M60 machine gun straps (para. 12-182).
 - Ž Install sight box straps (para. 12-179).
 - Ž Lower troop seat (L. H.) (TM 9-2320-280-10).
 - Ž Raise tailgate (TM 9-2320-280-10).

12-182. M60 MACHINE GUN STRAP REPLACEMENT (L119)

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M1097, M1097A1, M1097A2,

Materials/Parts

Two locknuts (Appendix G, Item 97)

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

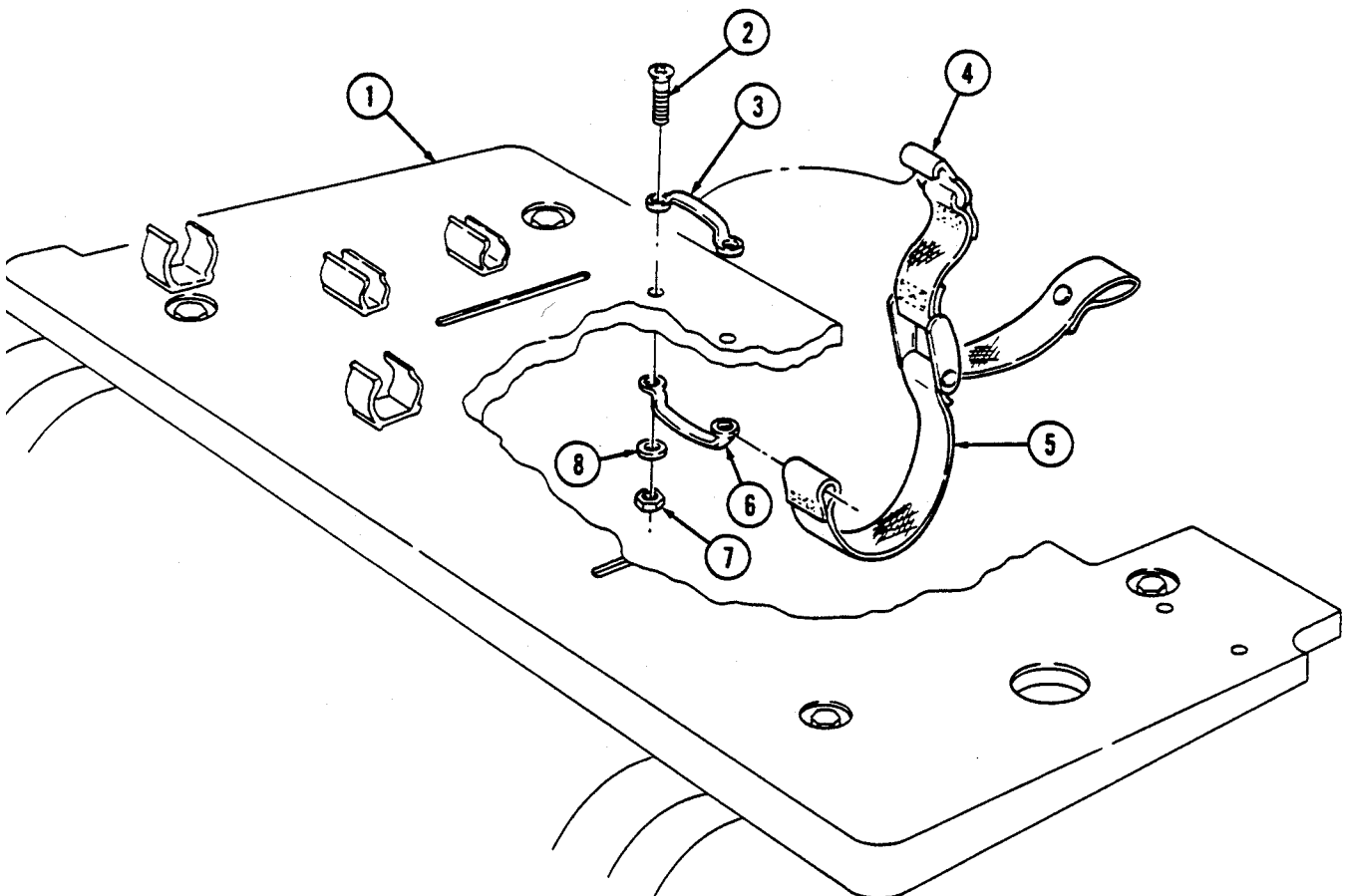
TM 9-2320-280-24P

a. Removal

1. Remove strap hook (4) from footman loop (3).
2. Remove two locknuts (7), washers (8), screws (2), footman loops (3) and (6), and strap (5) from ammo rack top tray (1). Remove strap (5) from loop (6). Discard locknuts (7).

b. Installation

1. Install strap (5) on loop (6) and footman loops (3) and (6) on ammo rack top tray (1) with two screws (2), washers (8), and locknuts (7).
2. Attach strap hook (4) to footman loop (3).



12-183. CAMOUFLAGE RACK MAINTENANCE

This task covers:

- | | |
|----------------|-----------------|
| a. Removal | c. Assembly |
| b. Disassembly | d. Installation |

INITIAL SETUP:

Applicable Models

M1097, M1097A1, M1097A2

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Materials/Parts

Twelve locknuts (Appendix G, Item 70)
Eight locknuts (Appendix G, Item 79)
Six locknuts (Appendix G, Item 128)

Manual References

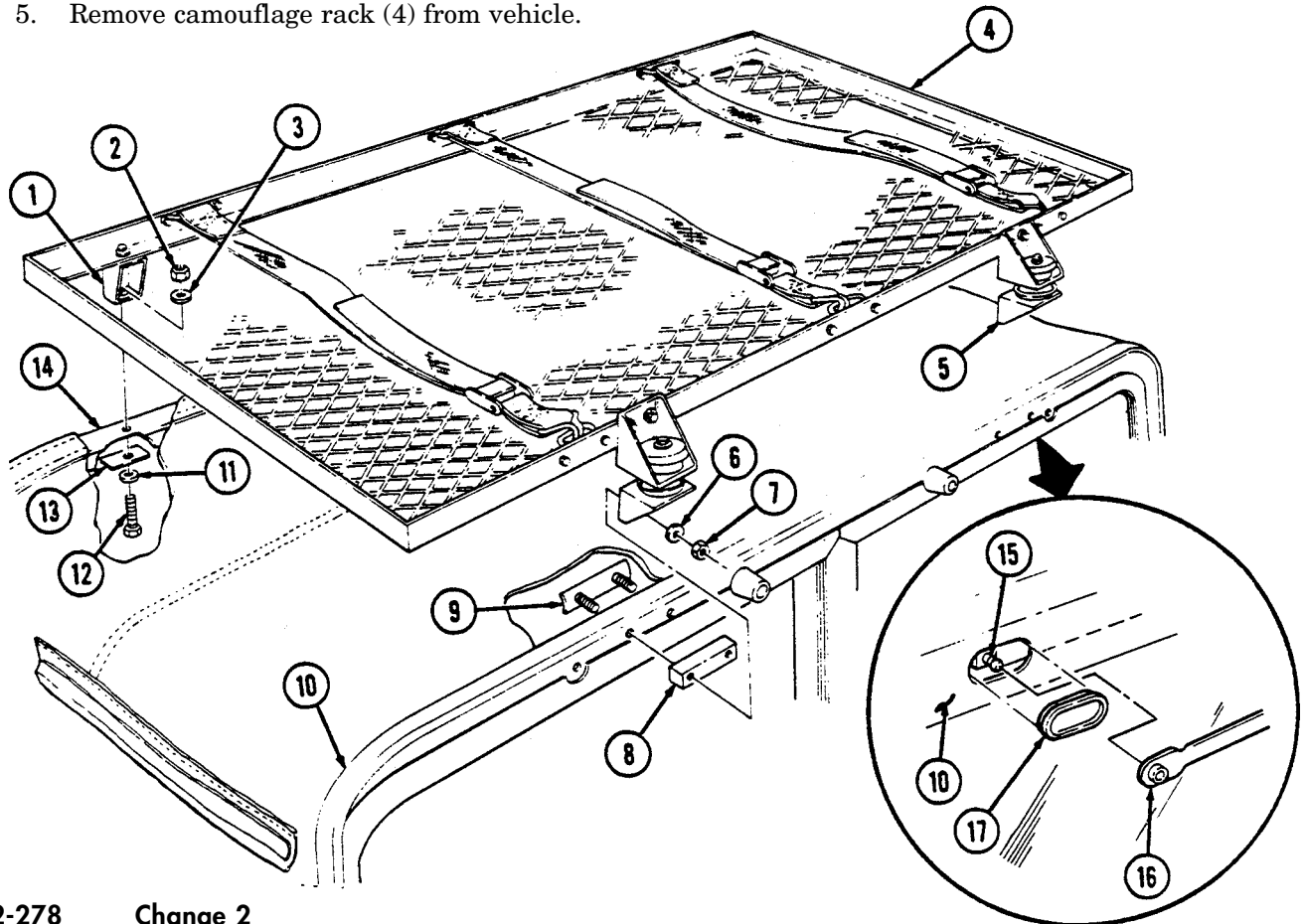
TM 9-2320-280-24P

Personnel Required

One mechanic
One assistant

a. Removal

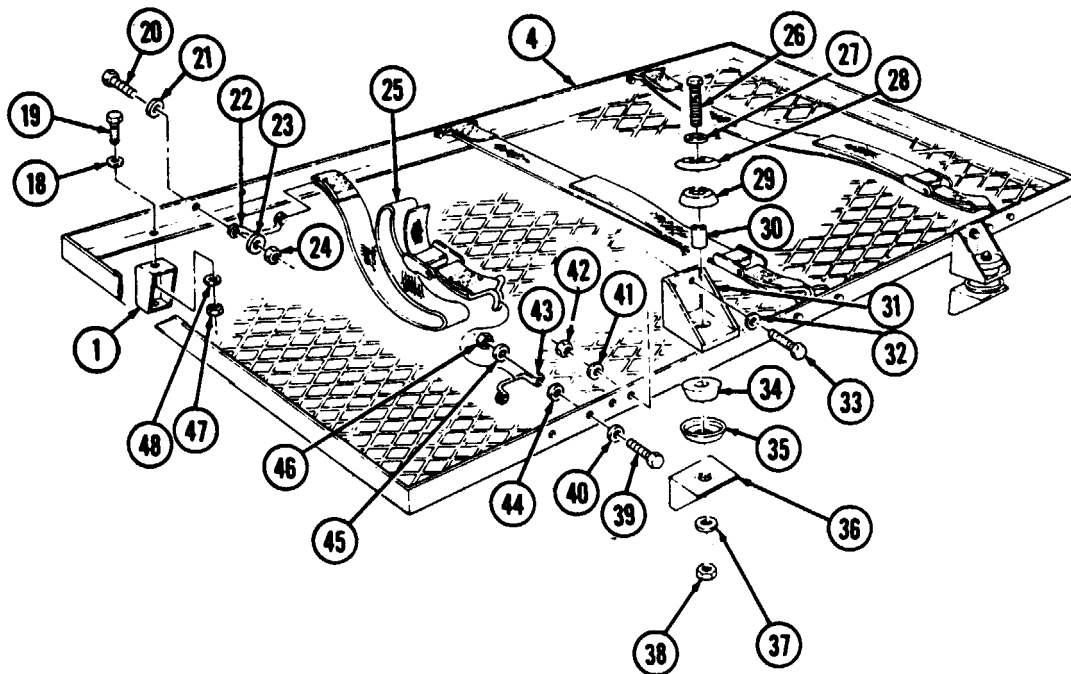
1. Remove two access covers (17) from windshield (10).
2. Disconnect connector arms (16) from wiper arm pivots (15).
3. Remove four locknuts (7), washers (6), two brackets (9), lower front mounting brackets (5), and spacers (8) from windshield (10). Discard locknuts (7).
4. Remove two capscrews (12), washers (11), locknuts (2), washers (3), and two rear mounting brackets (1) and plates (13) from "B" pillar (14). Discard locknuts (2).
5. Remove camouflage rack (4) from vehicle.



12-183. CAMOUFLAGE RACK MAINTENANCE (Cont'd)

b. Disassembly

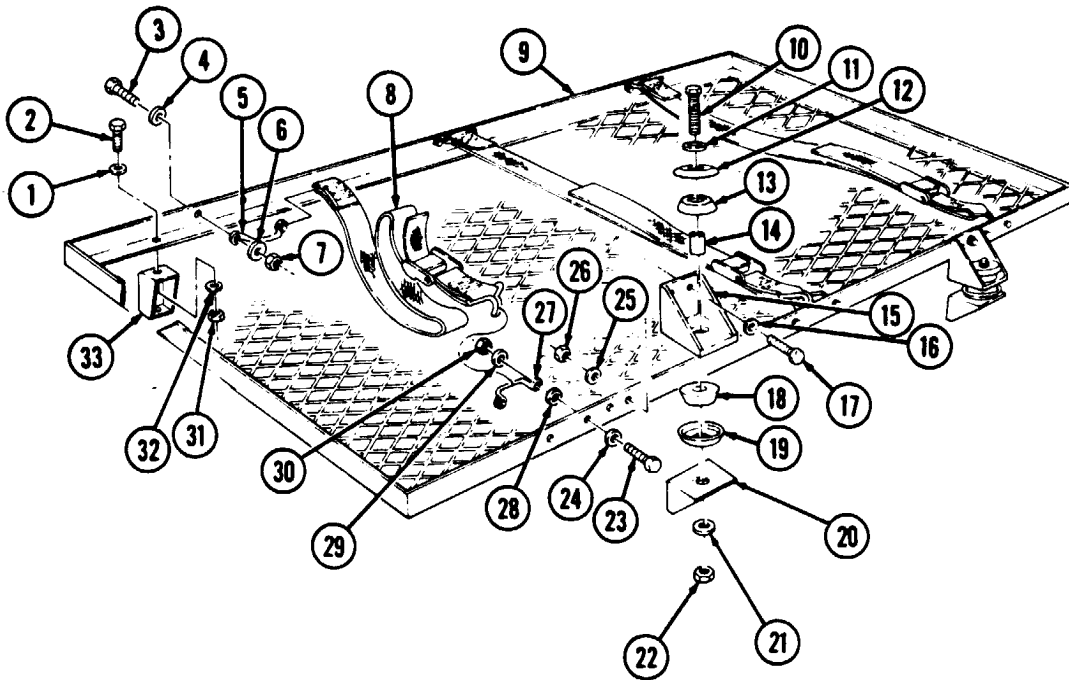
1. Remove two locknuts (38), washers (37), capscrews (26), washers (27), snubber plates (35), mounts (34), spacers (30), mounts (29), snubber plates (28), and two lower front mounting brackets (36) from upper front mounting brackets (31). Discard locknuts (38).
2. Remove four locknuts (42), washers (41), capscrews (33), washers (32), and two upper front mounting brackets (31) from camouflage rack (4). Discard locknuts (42).
3. Remove two locknuts (47), washers (46), capscrews (19), washers (18), and two rear mounting brackets (1) from camouflage rack (4). Discard locknuts (47).
4. Remove six locknuts (24), washers (23), capscrews (20), washers (21), three rear footman loops (22), and three straps (24) from camouflage rack (4). Discard locknuts (24).
5. Remove six locknuts (46), washers (45), capscrews (39), washers (40), three front footman loops (43), and six washers (44) from camouflage rack (4). Discard locknuts (46).



12-183. CAMOUFLAGE RACK MAINTENANCE (Cont'd)

c. Assembly

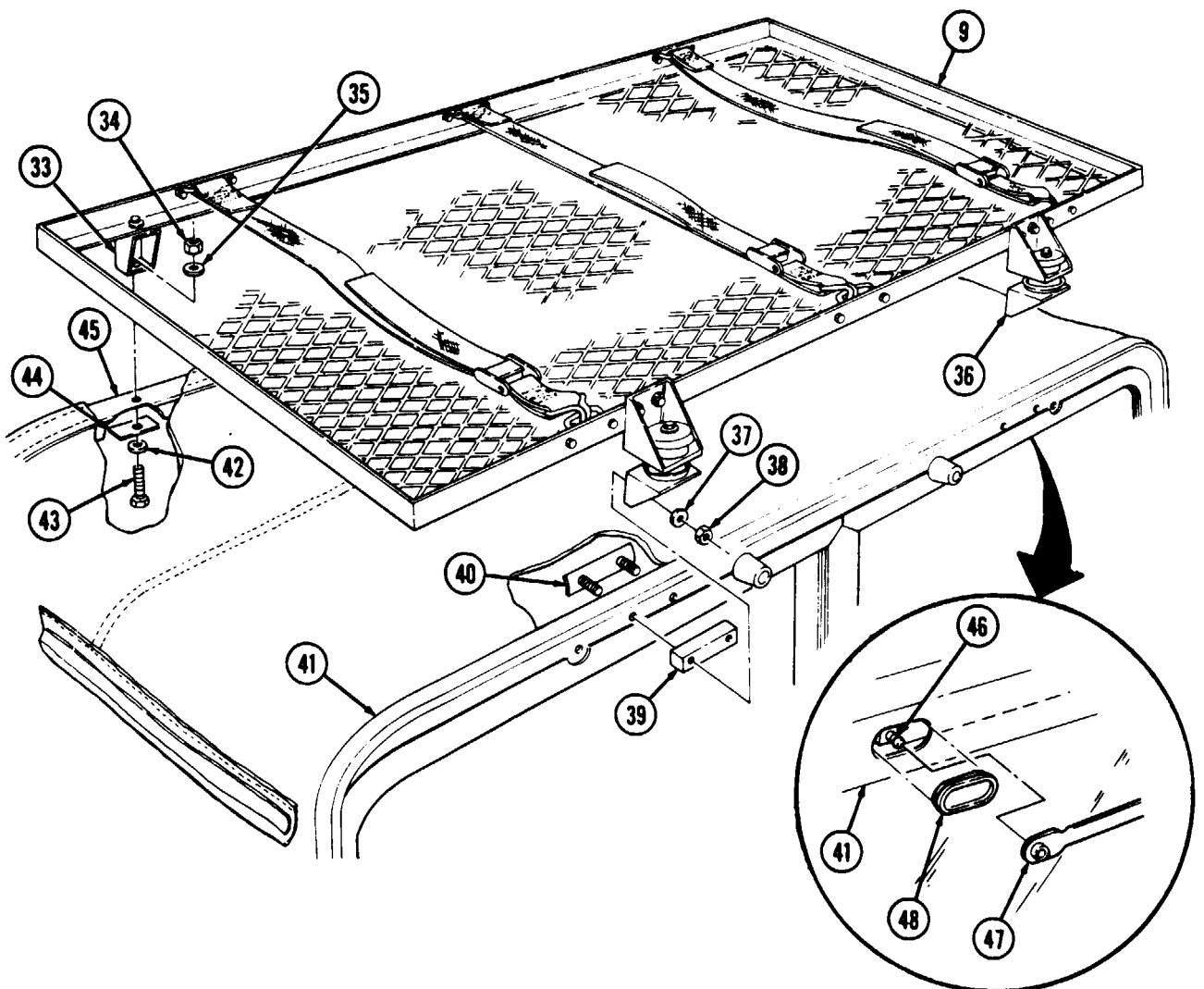
1. Install two rear mounting brackets (33) on camouflage rack (9) with two washers (1), capscrews (2), washers (32), and locknuts (31). Tighten locknuts (31) to 37 lb-ft (50 NŽm).
2. Install two upper front mounting brackets (15) on camouflage rack (9) with four washers (16), capscrews (17), washers (25), and locknuts (26). Tighten locknuts (26) to 21 lb-ft (29 NŽm).
3. Install two snubber plates (12), mounts (13), spacers (14), mounts (18), snubber plates (19), and lower front mounting brackets (20) on upper front mounting bracket (15) with two washers (11), capscrews (10), washers (21), and locknuts (22). Tighten locknuts (22) to 37 lb-ft (50 NŽm).
4. Install three rear footman loops (5) and three straps (8) on camouflage rack (9) with six washers (4), capscrews (3), washers (6), and locknuts (7). Tighten locknuts (7) to 6 lb-ft (8 NŽm).
5. Install six washers (28) and three front footman loops (27) on camouflage rack (9) with six washers (24), capscrews (23), washers (29), and locknuts (30). Tighten locknuts (30) to 6 lb-ft (8 NŽm).



12-183. CAMOUFLAGE RACK MAINTENANCE

d. Installation

1. Install camouflage rack (9) on vehicle.
2. Install two rear mounting brackets (33) and plates (44) on "B" pillar (45) with two washers (42), capscrews (43), washers (35), and locknuts (34). Tighten locknuts (34) to 37 lb-ft (50 N \cdot m).
3. Install two brackets (40), lower front mounting brackets (36), and spacers (39) on windshield (41) with four washers (37) and locknuts (38). Tighten locknuts (38) to 15 lb-ft (20 N \cdot m).
4. Connect connector arms (47) on wiper arm pivots (46).
5. Install access covers (48) on windshield (41).



Section XI. ACCESSORY KITS INSTALLATION

12-184. ACCESSORY KITS INSTALLATION TASK SUMMARY

TASK PARA.	PROCEDURES	PAGE NO.
12-185.	Siren and Warning Light Installation	12-282
12-186.	Underbody Protection Kit Replacement	12-296
12-187.	Brushguard Assembly Replacement	12-310
12-188.	Floor Drain Hole Plate Installation	12-312

12-185. SIREN AND WARNING LIGHT INSTALLATION

This task covers:

- | | |
|---|--|
| <ul style="list-style-type: none"> a. Manufactured Items b. Warning Light Assembly Installation c. Siren Assembly Installation d. Circuit Breaker and Relay Installation e. Siren and Warning Light Switch and Indicator Installation | <ul style="list-style-type: none"> f. Siren Electrical Wires Installation g. Passenger's Side Siren Switch and Driver's Side Siren Switch Installation h. Warning Light Assembly Electrical Wires Installation i. Siren Battery Wires Installation |
|---|--|

INITIAL SETUP:

Applicable Models

M1025, M1025A1, M1025A2, M1026, M1026A1

Tools

General mechanic's tool kit: automotive (Appendix B, Item 1)

Materials/Parts

- Adhesive (Appendix C, Item 1)
- Adhesive-sealant (Appendix C, Item 10)
- Siren mounting bracket (Appendix D, Fig. 68)
- Warning light mounting bracket (Appendix D, Fig. 69)
- Wire "D" (Appendix D, Fig. 70)
- Wire "F" (Appendix D, Fig. 71)
- Wire "G" (Appendix D, Fig. 72)
- Wire "L" (Appendix D, Fig. 73)
- Wire "K" (Appendix D, Fig. 74)
- Wire "I" (Appendix D, Fig. 75)
- Wire "N" (Appendix D, Fig. 76)
- Wire "H" (Appendix D, Fig. 77)
- Wire "J" (Appendix D, Fig. 78)

Material/Parts (Cont'd)

- Wire "A" (Appendix D, Fig. 79)
- Wire "B" (Appendix D, Fig. 80)
- Wire "M" (Appendix D, Fig. 81)
- Relay Connector (Appendix D, Fig. 82)
- Locknut (Appendix G, Item 126)
- Two lockwashers (Appendix G, Item 189)
- Eight lockwashers (Appendix G, Item 136)
- Ten locknuts (Appendix G, Item 127)
- Lockwasher (Appendix G, Item 141)
- Six lockwashers (Appendix G, Item 176)
- Lockwasher (Appendix G, Item 178)
- Packing (Appendix G, Item 223)
- Ten tiedown straps (Appendix G, Item 310)

Manual References

TM 9-2320-280-24P

Equipment Condition

- Batteries removed (para. 4-79).
- Engine access cover removed (para. 10-15).

a. Manufactured Items

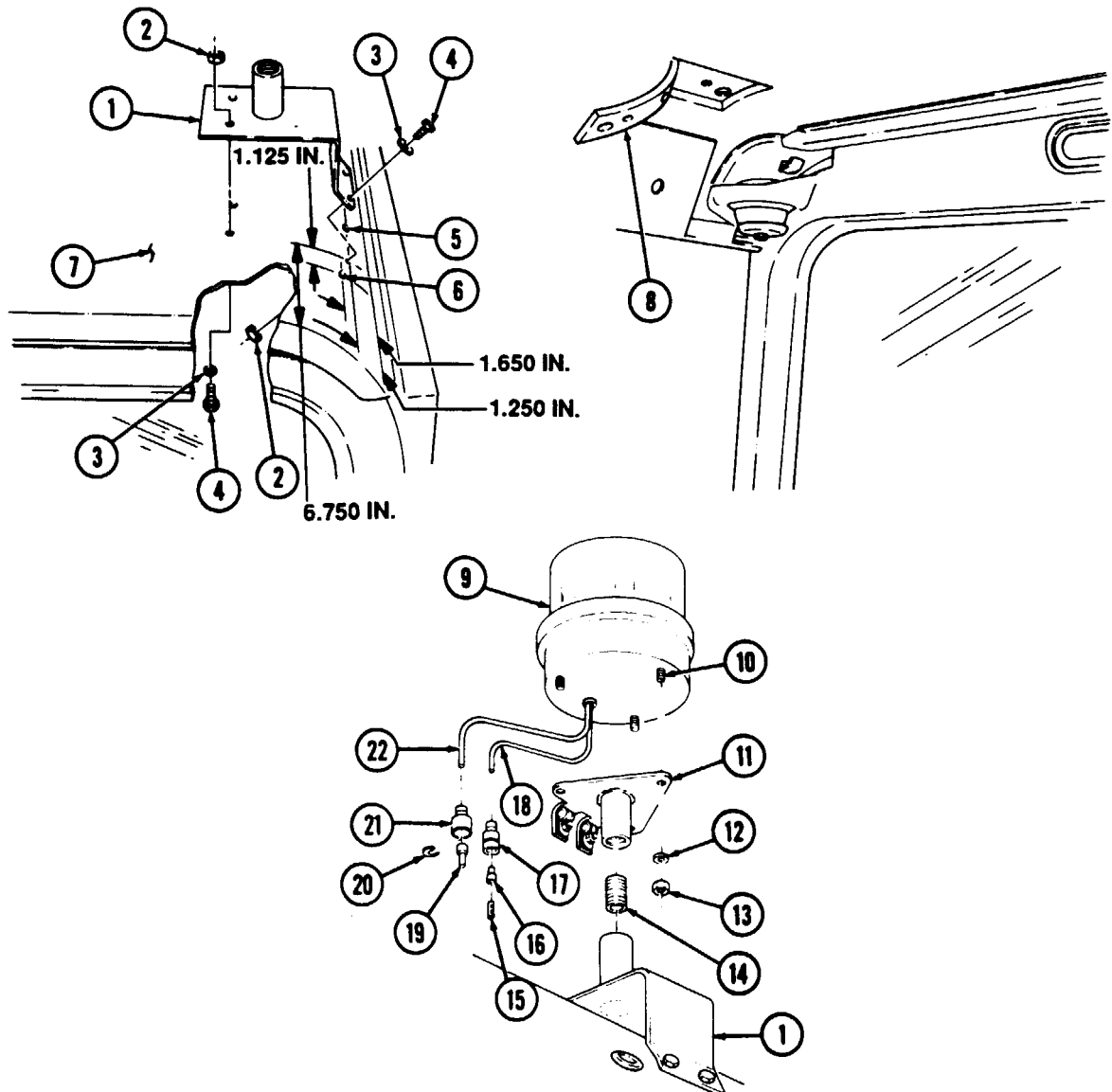
NOTE

Prior to installing the siren and warning light, assemble required materials listed in "Materials/Parts".

12-185. SIREN AND WARNING LIGHT INSTALLATION (Cont'd)

b. Warning Light Assembly Installation

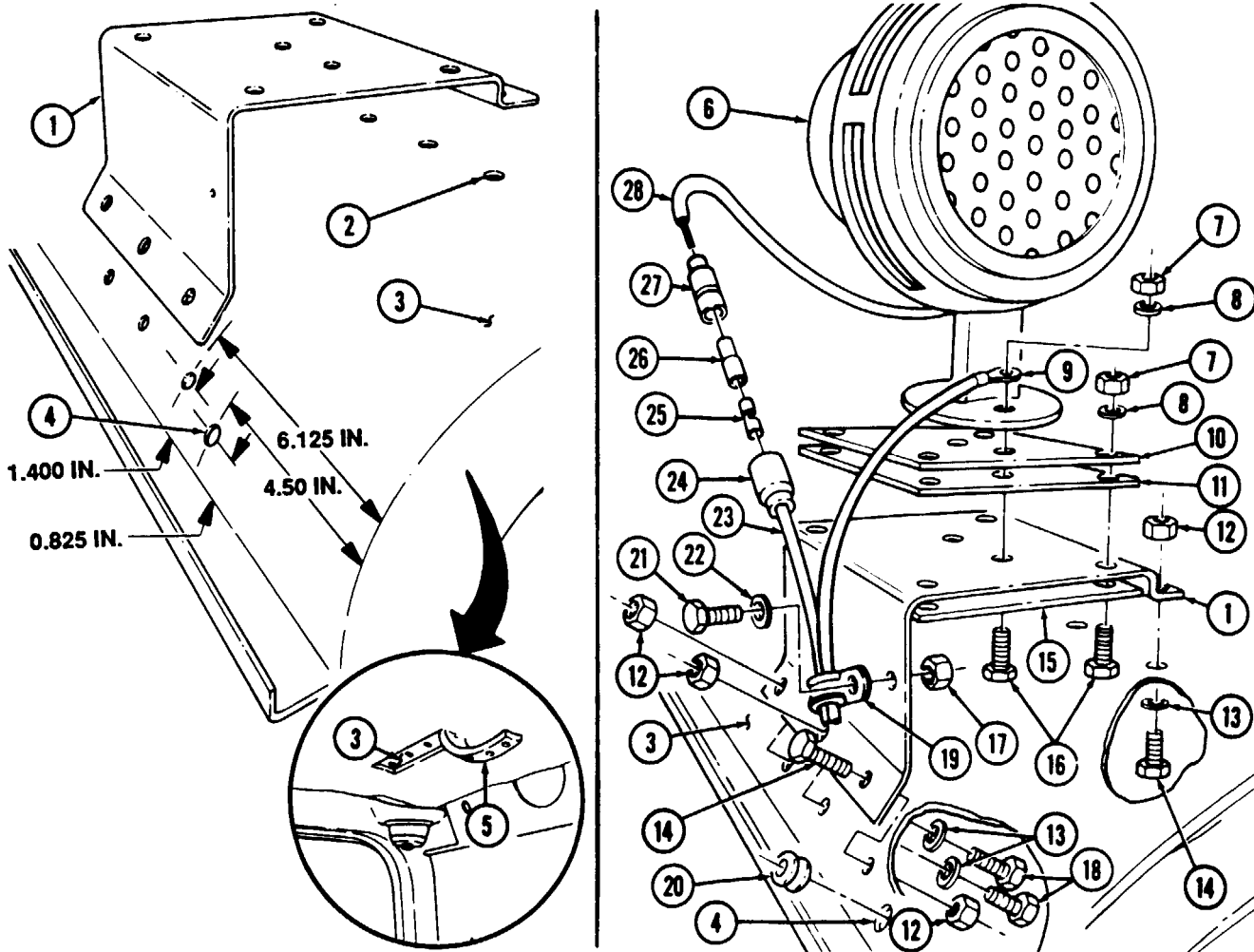
1. Using fabricated warning light bracket (1) as a template, locate, mark, and drill four 0.343-in. (8.7-mm) diameter holes (5) in left side of roof (7).
2. Locate, mark, and drill 0.750-in. (19.1-mm) diameter hole (6) in left side of roof (7).
3. Cut roof panel insulation (8) away for access to mounting hardware.
4. Install warning light bracket (1) on roof (7) with four washers (3), screws (4), and locknuts (2).
5. Install shell (21), washer (20), and terminal (19) on red lead (22) of warning light assembly (9).
6. Install shell (17), sleeve (16), and terminal (15) on black lead (18) of warning light assembly (9).
7. Install nipple (14) on plate (11).
8. Align studs (10) of warning light assembly (9) to holes in plate (11) and install three washers (12) and nuts (13).
9. Install warning light assembly (9) on warning light bracket (1).



12-185. SIREN AND WARNING LIGHT INSTALLATION (Cont'd)

c. Siren Assembly Installation

1. Using fabricated siren bracket (1) as a template, locate, mark, and drill six 0.343-in. (8.7-mm) diameter holes (2) in right side of roof (3).
2. Locate, mark, and drill 0.75-in. (19-mm) diameter hole (4) in right side of roof (3).
3. Cut roof panel insulation (5) away for access to mounting hardware.
4. Cut siren lead (28) to a length of 5.0 in. (12.7 cm).
5. Install shell (27), sleeve (26), and terminal (25) on siren lead (28).
6. Install gasket (11), plate (10), and panel (15) on siren bracket (1) with four capscrews (16), lockwashers (8), and nuts (7).
7. Install siren assembly (6) and fabricated ground wire "I" (9) on siren bracket (1) with two capscrews (16), lockwashers (8), and nuts (7).
8. Install siren bracket assembly (1) on roof (3) with four screws (14), two screws (18), six washers (13), and locknuts (12).
9. Connect connector (24) of fabricated wire "H" (23) to siren lead (28) and route wire "H" (23) and ground wire "I" (9) through hole (4).
10. Split grommet (20) and install grommet (20) in hole (4).
11. Install siren wires (23) and (9) on siren bracket (1) with clamp (19), washer (22), screw (21), and nut (17).



12-185. SIREN AND WARNING LIGHT INSTALLATION (Cont'd)

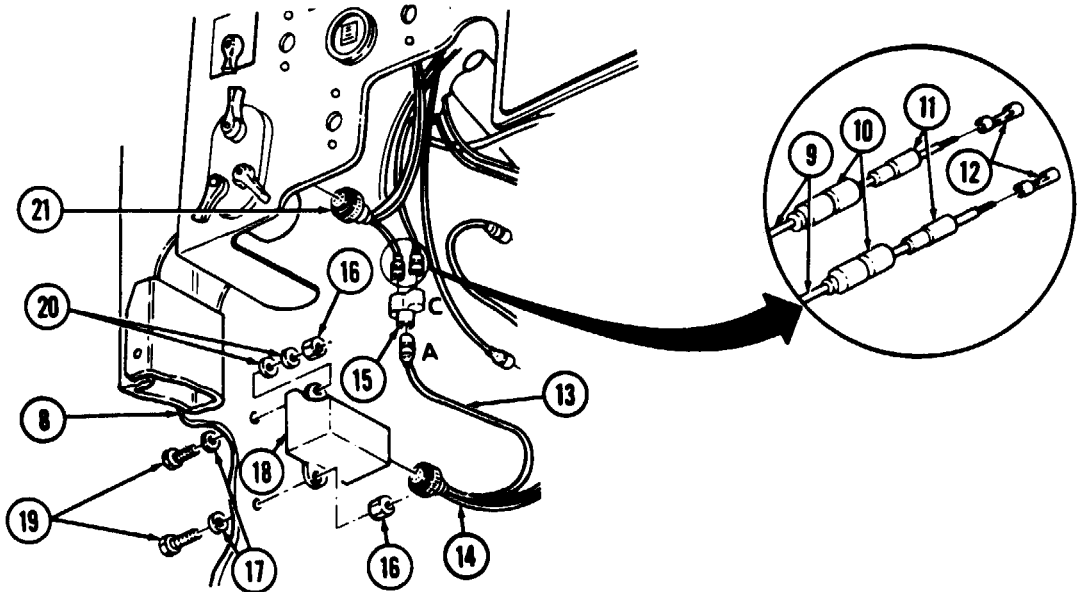
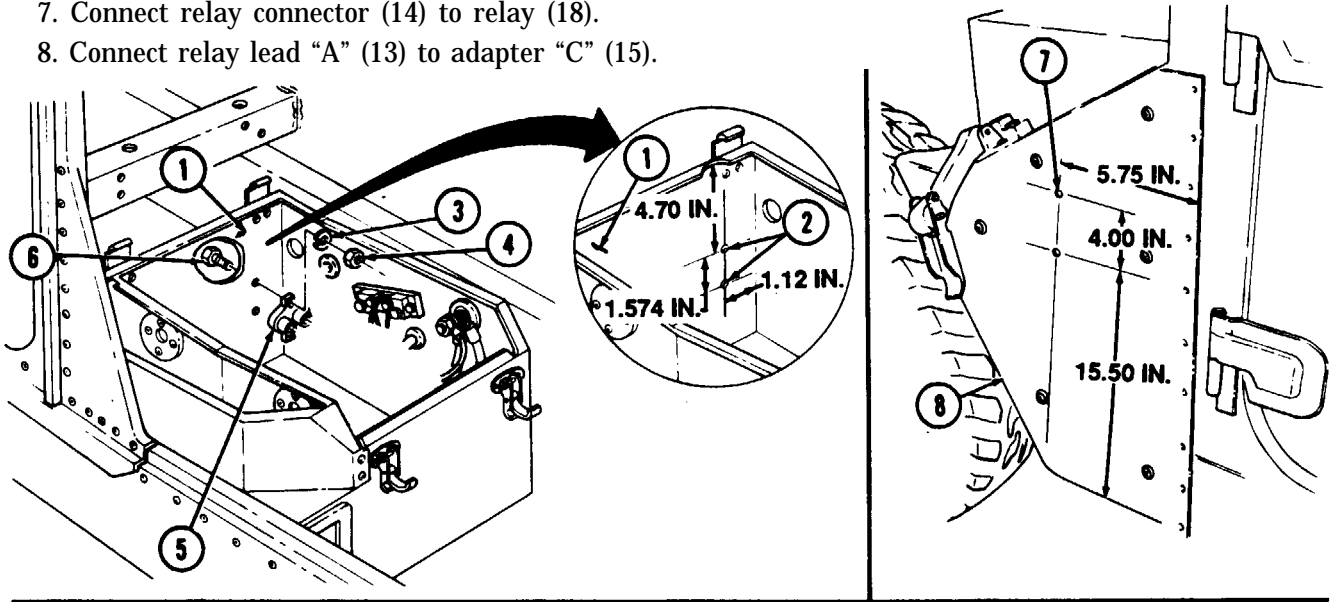
d Circuit Breaker and Relay Installation

1. Locate, mark, and drill two 0.187-in. (4.8-mm) diameter holes (2) in battery box panel (1).
2. Install circuit breaker (5) on battery box panel (1) with two screws (6), lockwashers (3), and nuts (4).
3. Locate, mark and drill two 0.281-in (7.1-mm) diameter holes (7) in body side panel (8).

NOTE

Note location of external-tooth lockwashers to top relay mounting screw when installing wires "I", "J", and "K" to relay mounting ground.

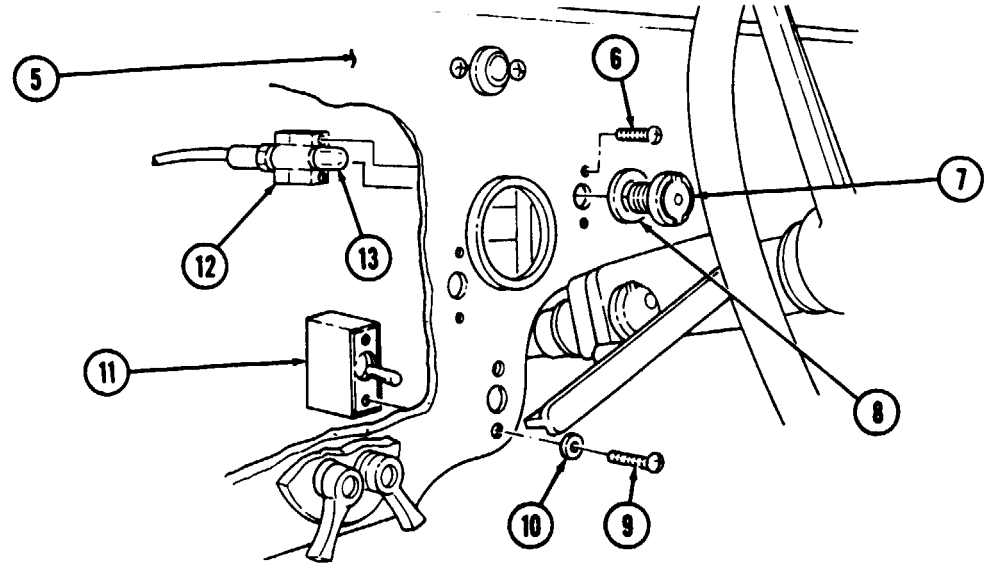
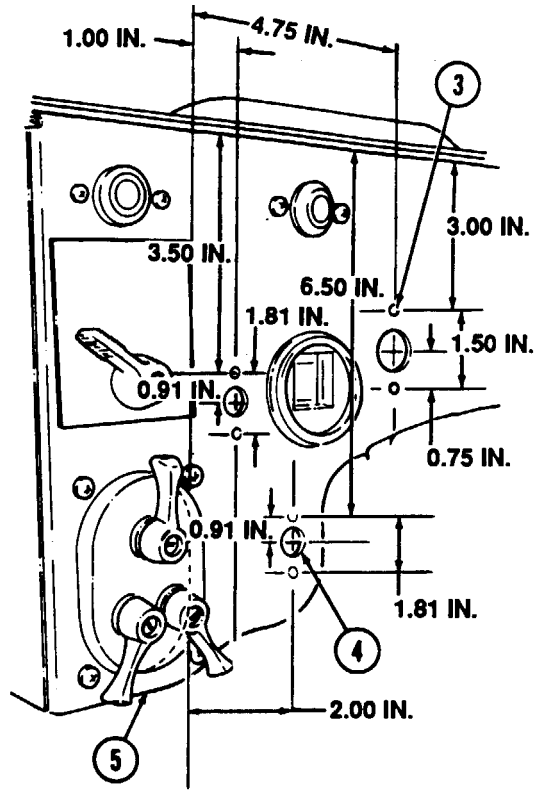
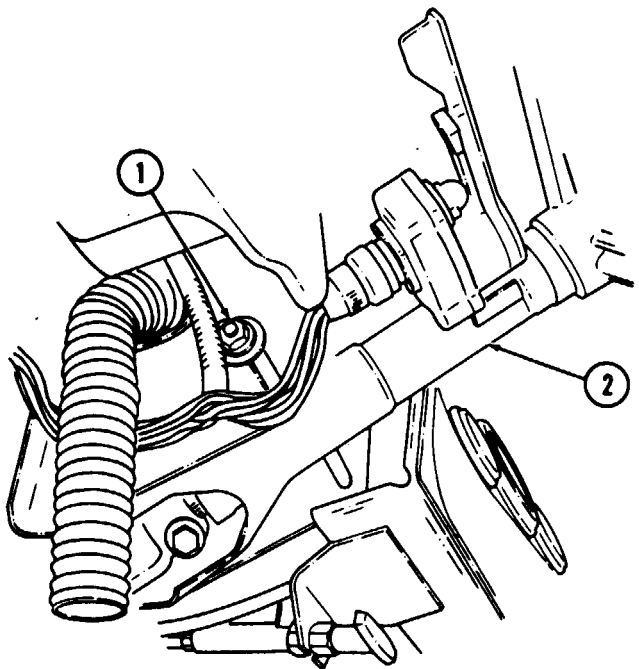
4. Install relay (18) on body side panel (8) with two washers (17), screws (19), lockwashers (20), and nuts (16). Finger tighten top nut (16).
5. Cut lead 467(A) (9) from main light switch connector (21) and install two shells (10), sleeves (11), and terminals (12) on ends of cut leads 467(A) (9).
6. Connect adapter connector "C" (15) to two leads 467(A) (9).
7. Connect relay connector (14) to relay (18).
8. Connect relay lead "A" (13) to adapter "C" (15).



12-185. SIREN AND WARNING LIGHT INSTALLATION (Cont'd)

e. Siren and Warning Light Switch and Indicator Installation

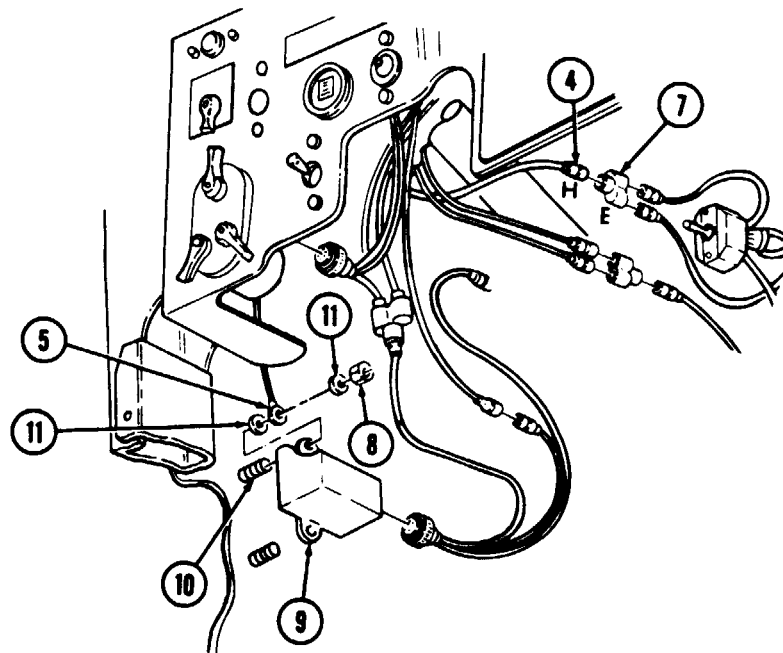
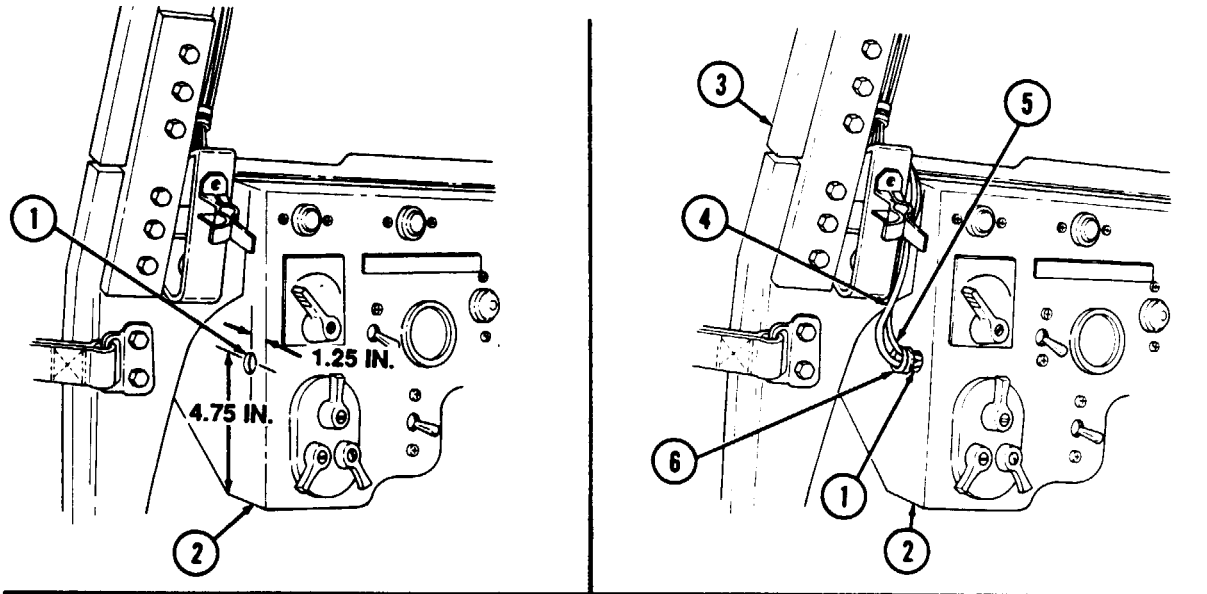
1. Loosen nut (1) and lower steering column (2).
2. Locate, mark, and drill six 0.187-in. (4.8-mm) diameter holes (3) in dash panel (5).
3. Locate, mark, and drill three 0.750-in. (19-mm) diameter holes (4) in dash panel (5).
4. Install warning light switch (11) on dash panel (5) with two lockwashers (10) and screws (9).
5. Install lamp (13) on indicator lamp assembly (12) and install indicator lamp assembly (12) on dash panel (5) with two screws (6).
6. Install packing (8) and lens (7) on dash panel (5).



12-185. SIREN AND WARNING LIGHT INSTALLATION (Cont'd)

f. Siren and Electrical Wires Installation

1. Locate, mark, and drill 0.625-in. (15.9-mm) diameter hole (1) in left side of dash panel (2).
2. Route siren wires "H" (4) and "I" (5) along top, and down left side, of windshield frame (3).
3. Route siren wires "H" (4) "I" (5) through hole (1) in left side of dash panel (2).
4. Split grommet (6) and install grommet (6) in hole (1).
5. Connect siren wire "H" (4) to adapter connector "E" (7).
6. Remove top nut (8) and lockwasher (11) from relay (9) and install siren wire "I" (5) on top mounting screw (10) of relay (9).



12-185. SIREN AND WARNING LIGHT INSTALLATION (Cont'd)

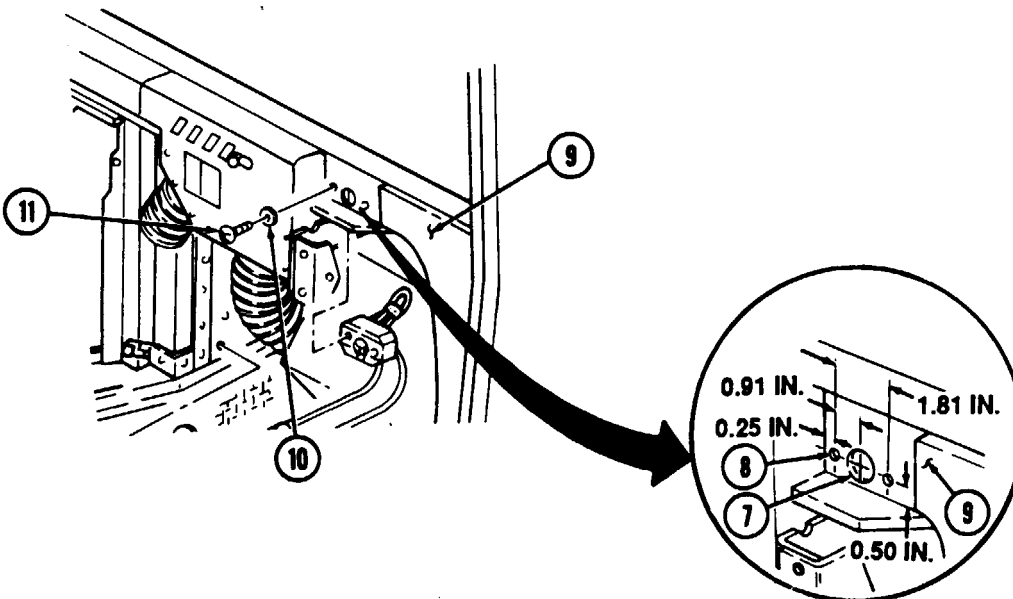
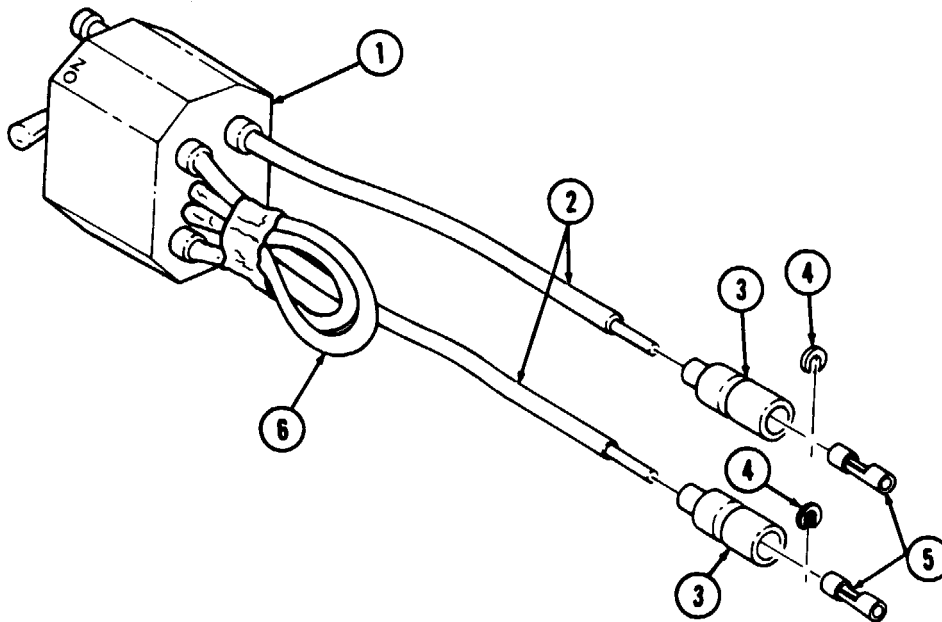
g. Passenger's Side Siren Switch and Driver's Side Siren Switch Installation

1. Install two shells (3), washers (4), and terminals (5) on leads (2) of passenger's side siren switch (1).
2. Tape and secure two unused leads (6) of passenger's siren switch (1).

NOTE

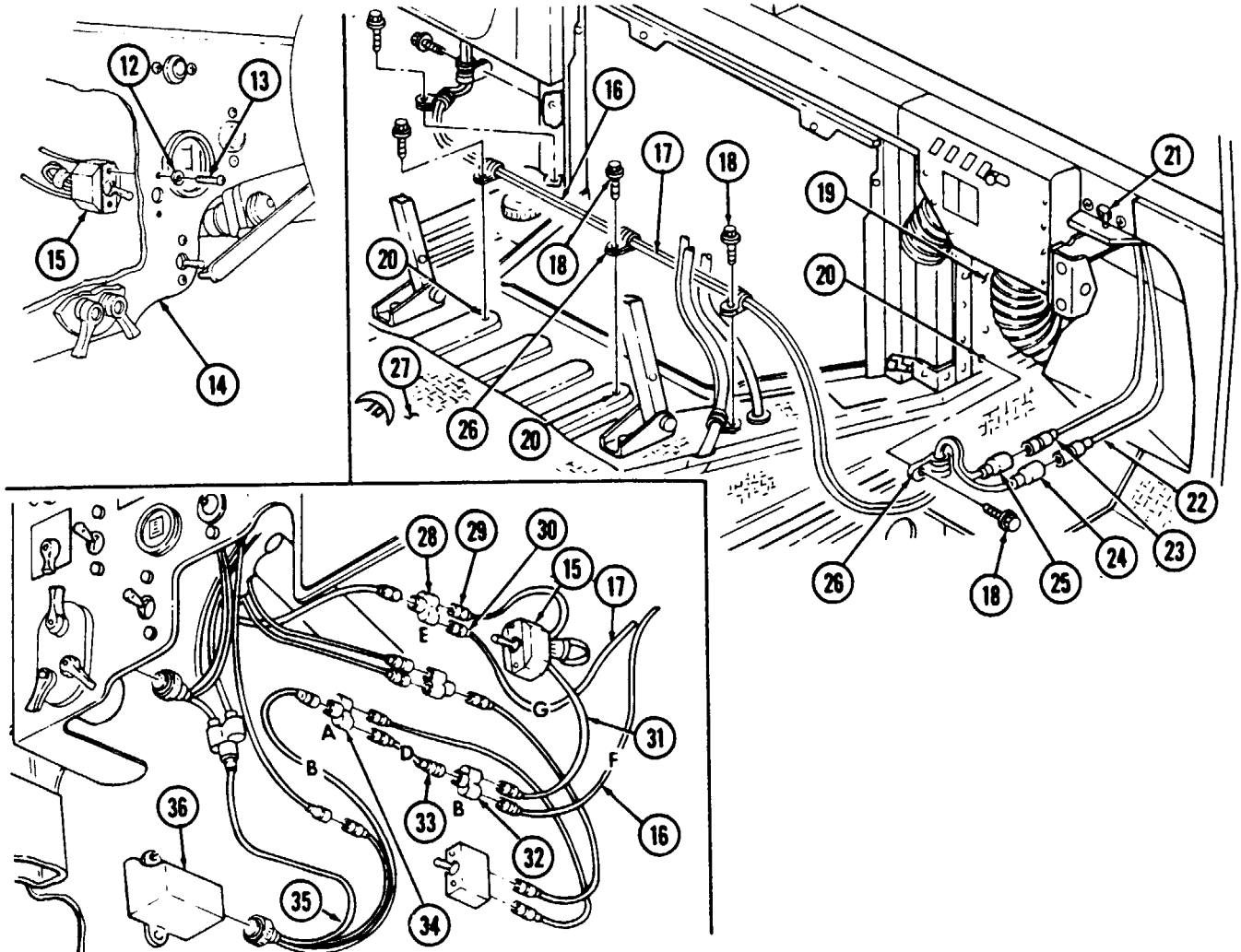
Passenger's side and driver's side siren switch are the same.
Repeat steps 1 and 2 for driver's side switch.

3. Locate, mark, and drill two 0.187-in. (4.8-mm) diameter holes (8) and 0.750-in. (19-mm) diameter hole (7) on "A" beam (9).
4. Install passenger's side siren switch (1) on "A" beam (9) with two lockwashers (10) and screws (11).



12-185. SIREN AND WARNING LIGHT INSTALLATION (Cont'd)

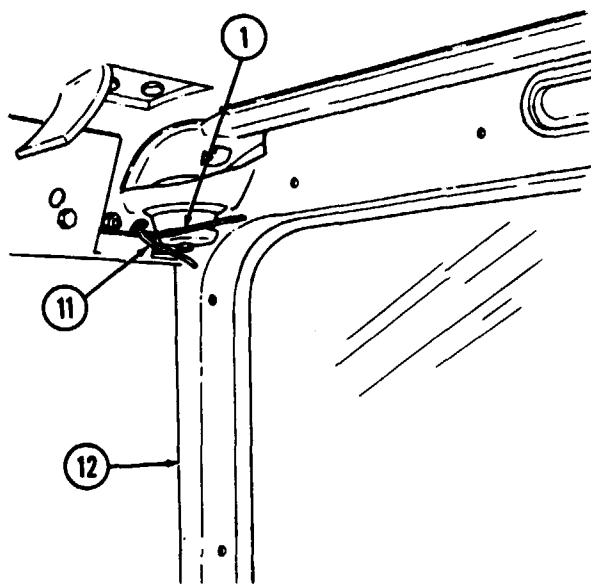
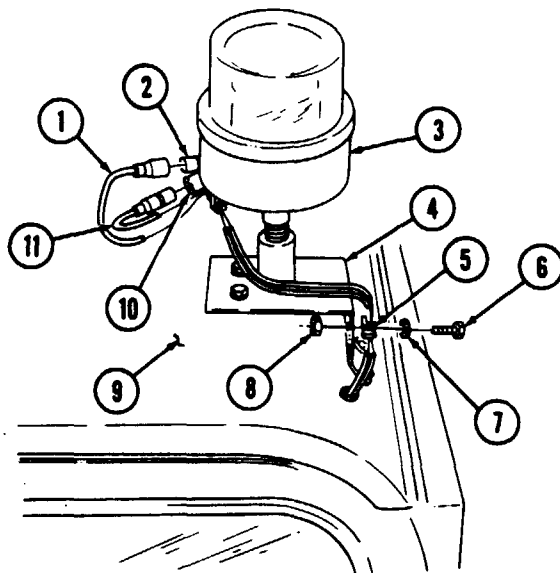
5. Install driver's side siren switch (15) on dash panel (14) with two lockwashers (12) and screws (13).
6. Route fabricated wire "G" (17) along tunnel (27) and connect connector (24) to lead (22) of passenger's side siren switch.
7. On driver's side, connect wire "G" (17) connector (30) to adapter connector "E" (28).
8. Connect lead (29) of driver's side siren switch (15) to adapter connector "E" (28).
9. Connect lead (31) of driver's side siren switch (15) to adapter connector "B" (32).
10. On driver's side, connect one end of fabricated wire "D" (33) to adapter "B" (32), and the other end to adapter connector "A" (34).
11. On driver's side, connect lead "B" (35) of relay (36) to adapter "A" (34).
12. Route fabricated wire "F" (16) along tunnel (27), and connect connector (25) to lead (23) of passenger's side siren switch (21).
13. On driver's side, connect wire "F" (16) to adapter connector "B" (32).
14. Locate, mark, and drill three 0.146-in. (3.7-mm) diameter holes (20) in right side engine panel (19) and vehicle tunnel (27).
15. Install wires "F" (16) and "G" (17) on panel (19) with clamp (26) and screw (18).
16. Install wires "F" (16) and "G" (17) on tunnel (27) with five clamps (26) and screws (18).
17. Tuck exposed wires under vehicle insulation on tunnel (27).



12-185. SIREN AND WARNING LIGHT INSTALLATION (Cont'd)

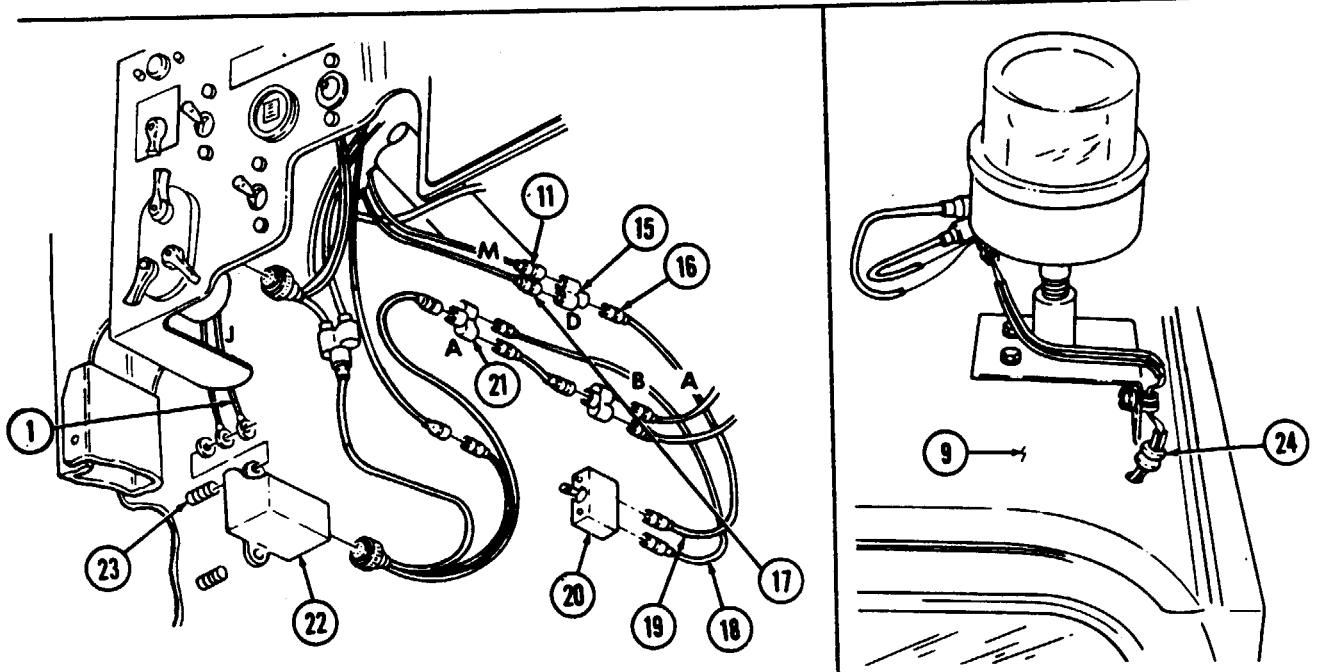
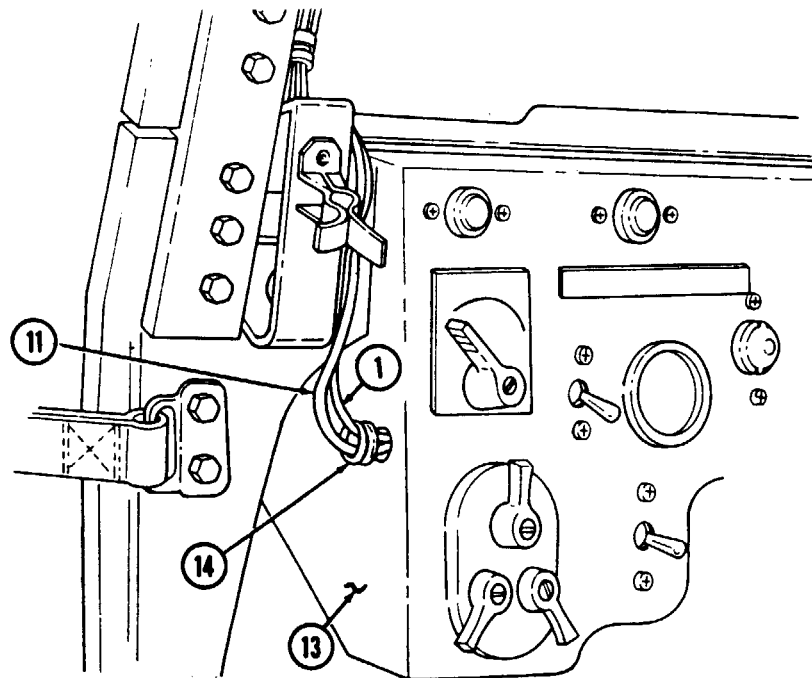
h. Warning Light Assembly Electrical Wires Installation

1. Install and connect fabricated wire "M" (11) to red lead (10), and wire "J" (1) to black lead (2) of warning light assembly (3).
2. Install fabricated wires "M" (11) and "J" (1) on bracket (4) with clamp (5), washer (7), screw (6), and locknut (8).
3. Route fabricated wires "M" (11) and "J" (1) in roof (9).
4. Route fabricated wires "M" (11) and "J" (1) downward along windshield frame (12).



12-185. SIREN AND WARNING LIGHT INSTALLATION (Cont'd)

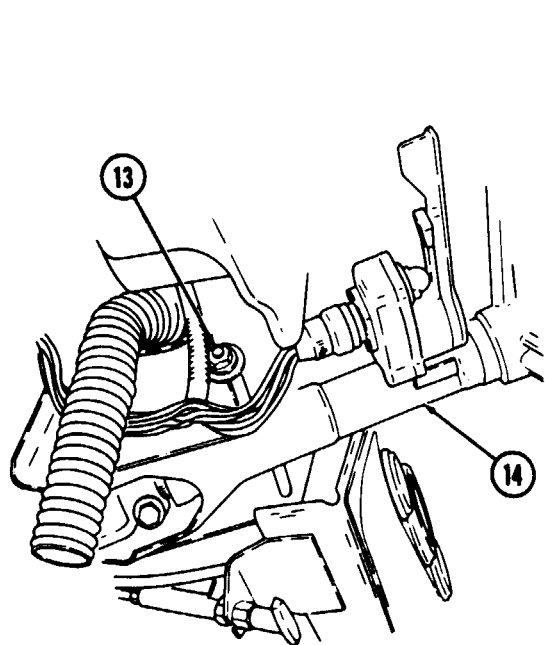
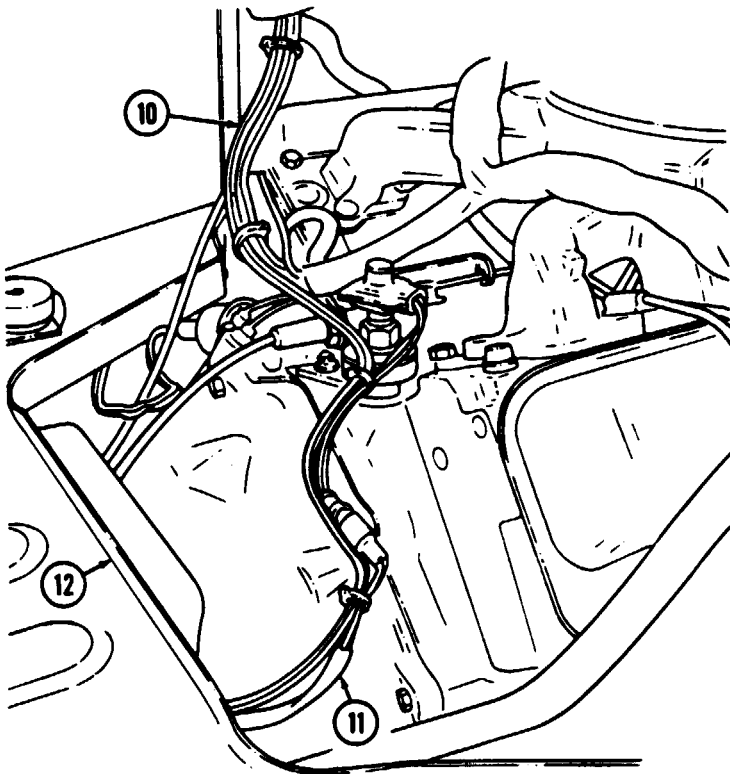
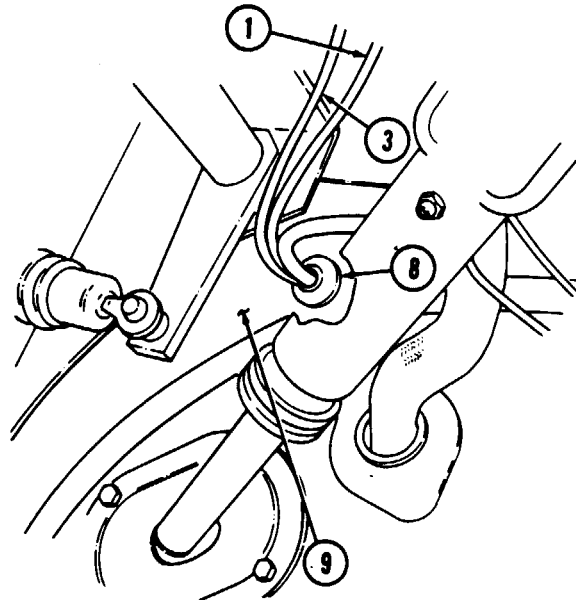
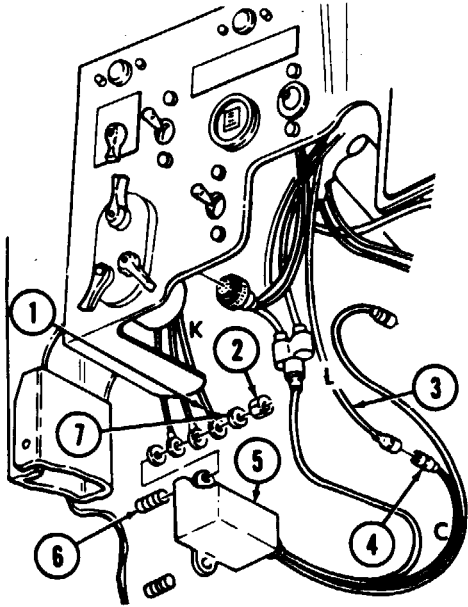
5. Route fabricated wires "M" (11) and "J" (1) through grommet (14) and hole in left side dash panel (13).
6. Connect fabricated wire "M" (11) to adapter (15).
7. Install fabricated wire "J" (1) on top mounting screw (23) of relay (22).
8. Connect indicator light lead (17) to adapter "D" (15).
9. Connect fabricated wire "A" (16) to adapter "D" (15) and connector (19) to light switch (20).
10. Connect fabricated wire "B" (18) to adapter "A" (21) and warning light switch (20).
11. Split grommet (24) and install grommet (24) on roof (9). Apply adhesive-sealant RTV on **grommet (24)**.



12-185. SIREN AND WARNING LIGHT INSTALLATION (Cont'd)

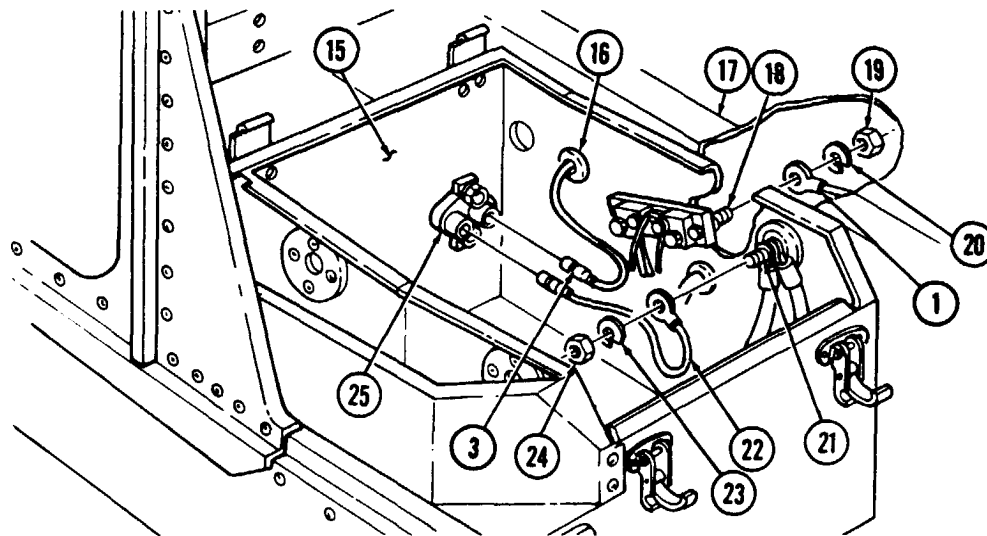
i. Siren Battery Wires Installation

1. Install fabricated wire "K" (1) on top mounting screw (6) of relay (5) with washer (7) and nut (2).
2. Install fabricated wire "L" (3) on lead "C" (4) of relay (5).
3. Route wires "K" (1) and "L" (3) through grommet opening (8) in firewall (9).
4. Route wires (10) along cable harness (11) in engine compartment (12).
5. Raise steering column (14) and tighten nut (13).



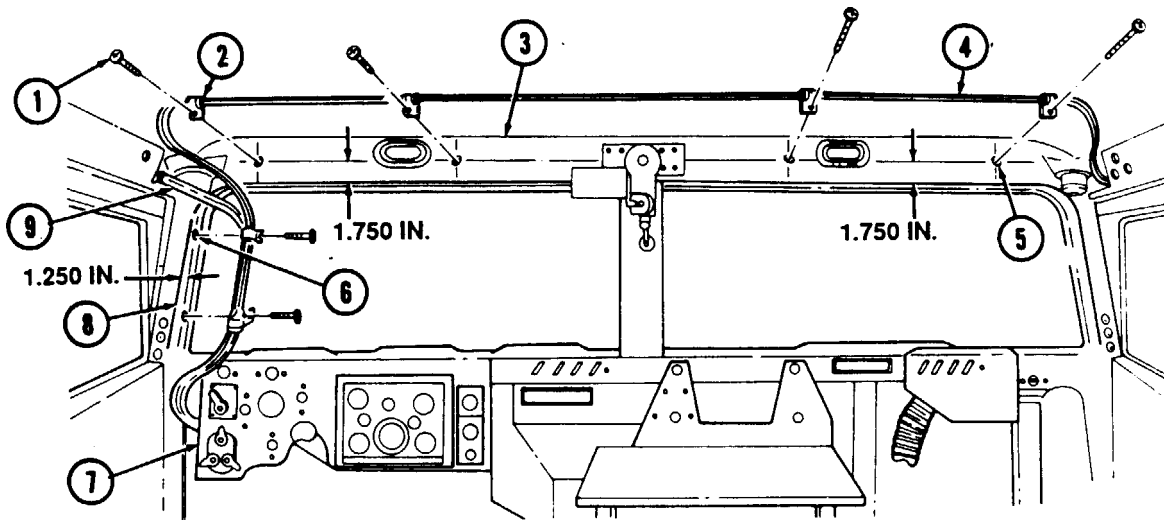
12-185. SIREN AND WARNING LIGHT INSTALLATION (Cont'd)

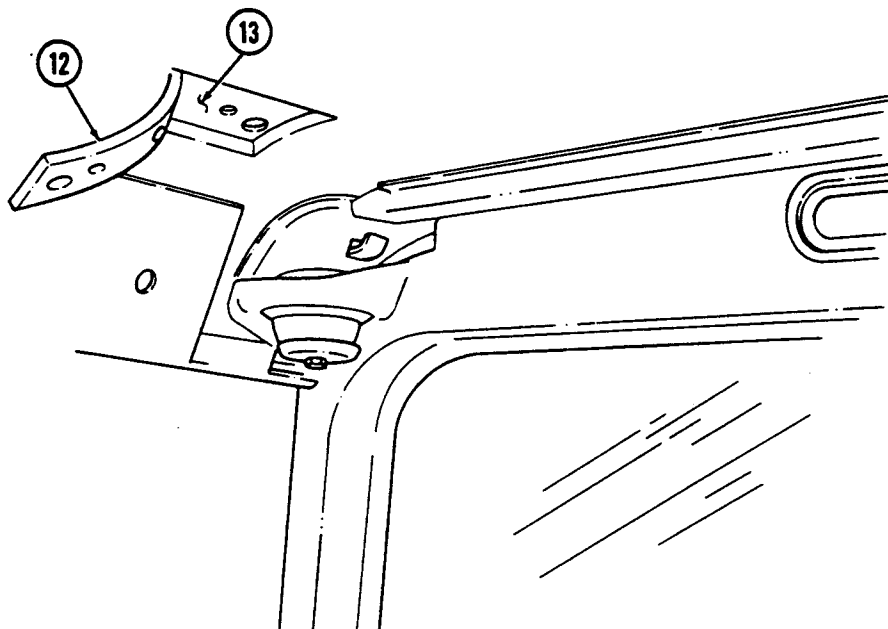
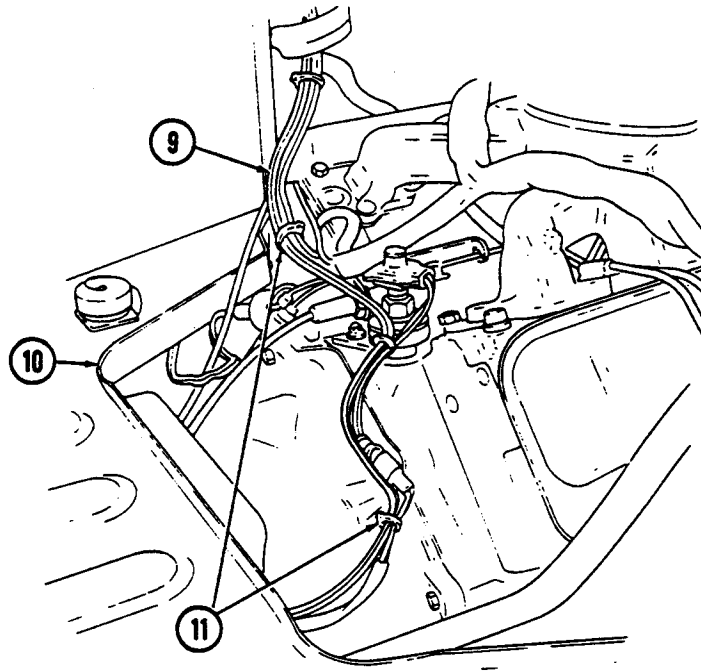
6. Route wire "L" (3) through grommet (16) in battery box (15).
7. Connect wire "L" (3) to circuit breaker (25).
8. Remove nut (19) and lockwasher (20) from ground stud (18). Discard lockwasher (20). Connect fabricated wire "K" (1) to ground stud (18) on vehicle body (17) and install wire "K" (1) with lockwasher (20) and nut (19).
9. Remove nut (24) and lockwasher (23) from positive power stud (21). Discard lockwasher (23). Connect fabricated wire "N" (22) to circuit breaker (25) and power stud (21). Install wire "N" (22) on stud (21) with lockwasher (23) and nut (24).



12-185. SIREN AND WARNING LIGHT INSTALLATION (Cont'd)

10. Locate, mark, and drill two 0.146-in. (3.7-mm) diameter holes (6), equally spaced, in left side windshield frame (8) and four 0.146-in. (3.7-mm) diameter holes (5), equally spaced, along top of windshield frame (3).
11. Install wires (4) and warning light wires (9) on left side windshield frame (8) and along top of windshield frame (3) with six clamps (2) and screws (1).
12. Install warning light wires (9) on wiring harness under dash (7) and engine compartment (10) with ten tiedown straps (11).
13. Apply adhesive to right and left side roof panel insulation (12), and install on roof (13).



12-185. SIREN AND WARNING LIGHT INSTALLATION (Cont'd)

- FOLLOW-ON TASKS:
- Install engine access cover (para. 10-15).
 - Install batteries (para. 4-79).
 - Check siren and warning light for proper operation.

12-186. UNDERBODY PROTECTION KIT REPLACEMENT

This task covers:

- | | |
|---------------------------------|--------------------------------------|
| a. Front Skid Plate Removal | g. Fuel Tank Shield Installation |
| b. Front Shield Removal | h. Rear Shield Installation |
| c. Intermediate Shield Removal | i. Transfer Case Shield Installation |
| d. Transfer Case Shield Removal | j. Intermediate Shield Installation |
| e. Rear Shield Removal | k. Front Shield Installation |
| f. Fuel Tank Shield Removal | l. Front Skid Plate Installation |

INITIAL SETUP:

Applicable Models

M997A2, M1025A2, M1035A2, M1043A2,
M1045A2, M1097A2, M1123

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Tools

General mechanic's tool kit: automotive
(Appendix B, Item 1)

General Safety Instructions

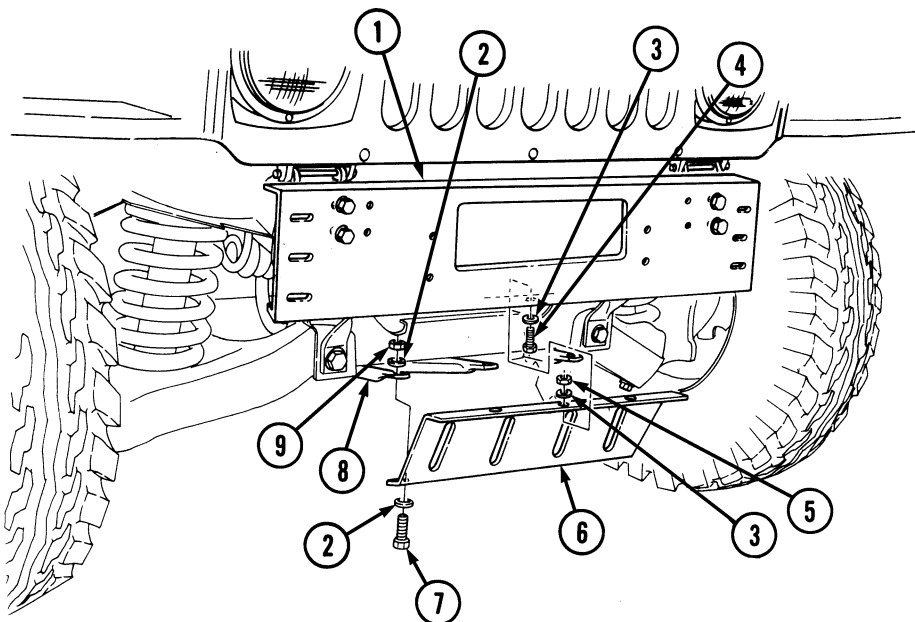
- Do not perform this procedure near fire, flames or sparks.
- Fuel tank must be supported during removal and installation.

Materials/Parts

Four flat washers (Appendix G, Item 36)
Twenty-five locknuts (Appendix G, Item 128)
Two locknuts (Appendix G, Item 81)
Seventeen locknuts (Appendix G, Item 79)

a. Front Skid Plate Removal

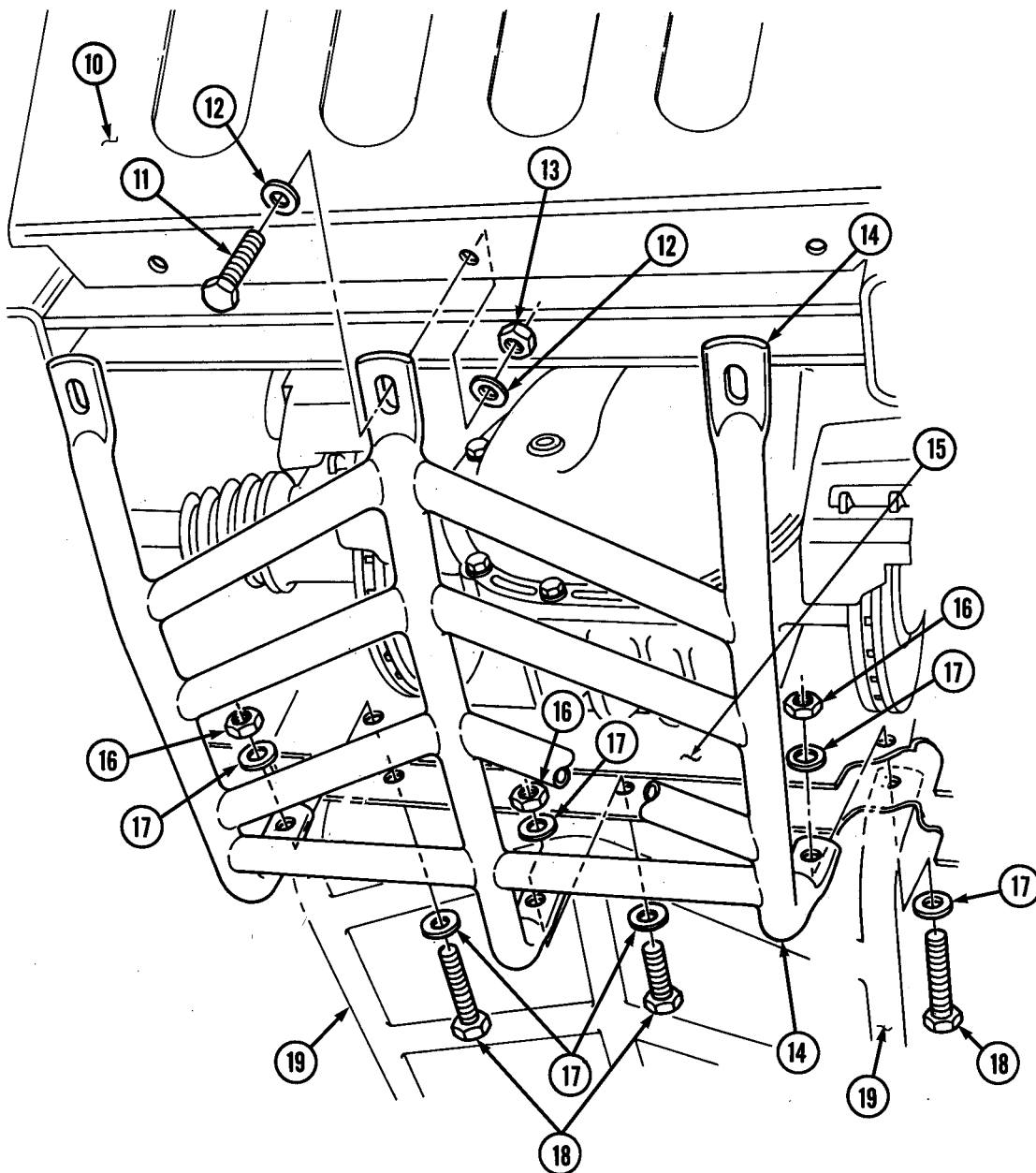
1. Remove three locknuts (9), six washers (2), three capscrews (7), and front skid plate (6) from front shield (8). Discard locknuts (9).
2. Remove three locknuts (5), six washers (3), three capscrews (4), and front skid plate (6) from front bumper (1). Discard locknuts (5).



12-186. UNDERBODY PROTECTION KIT REPLACEMENT (Cont'd)

b. Front Shield Removal

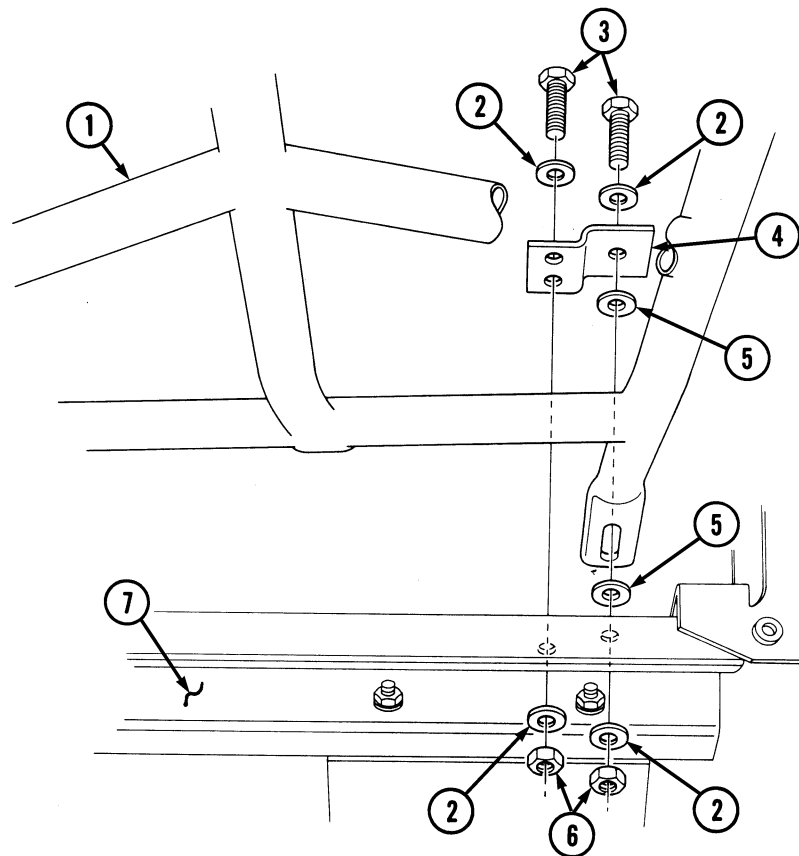
1. Remove three locknuts (16), six washers (17), and three capscrews (18) from front shield (14), front crossmember (15), and intermediate shield (19). Discard locknuts (16).
2. Remove three locknuts (13), six washers (12), three capscrews (11), and front shield (14) from front skid plate (10). Discard locknuts (13).



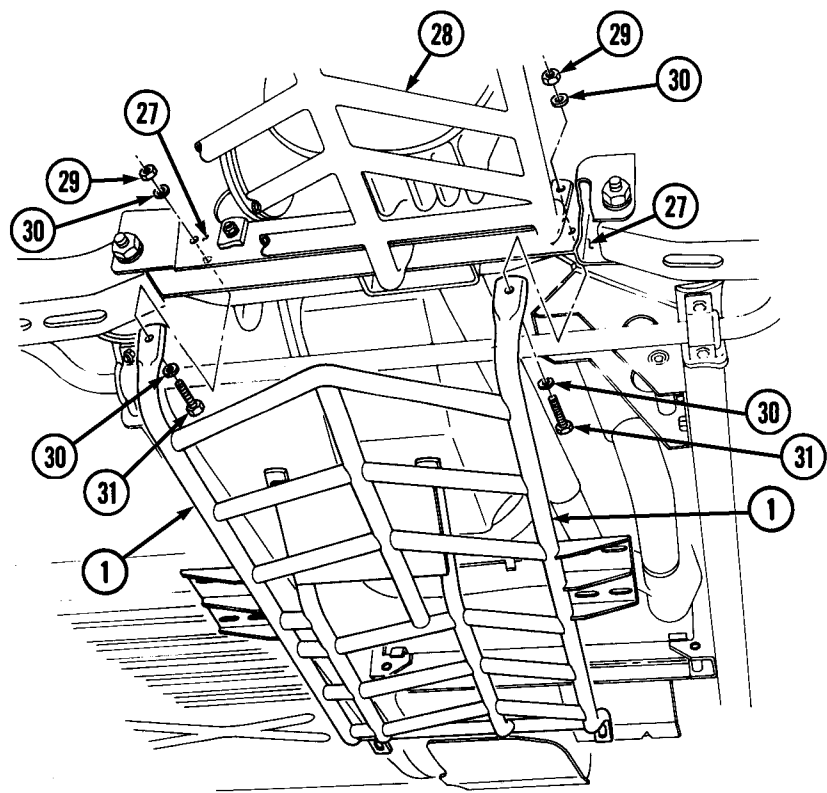
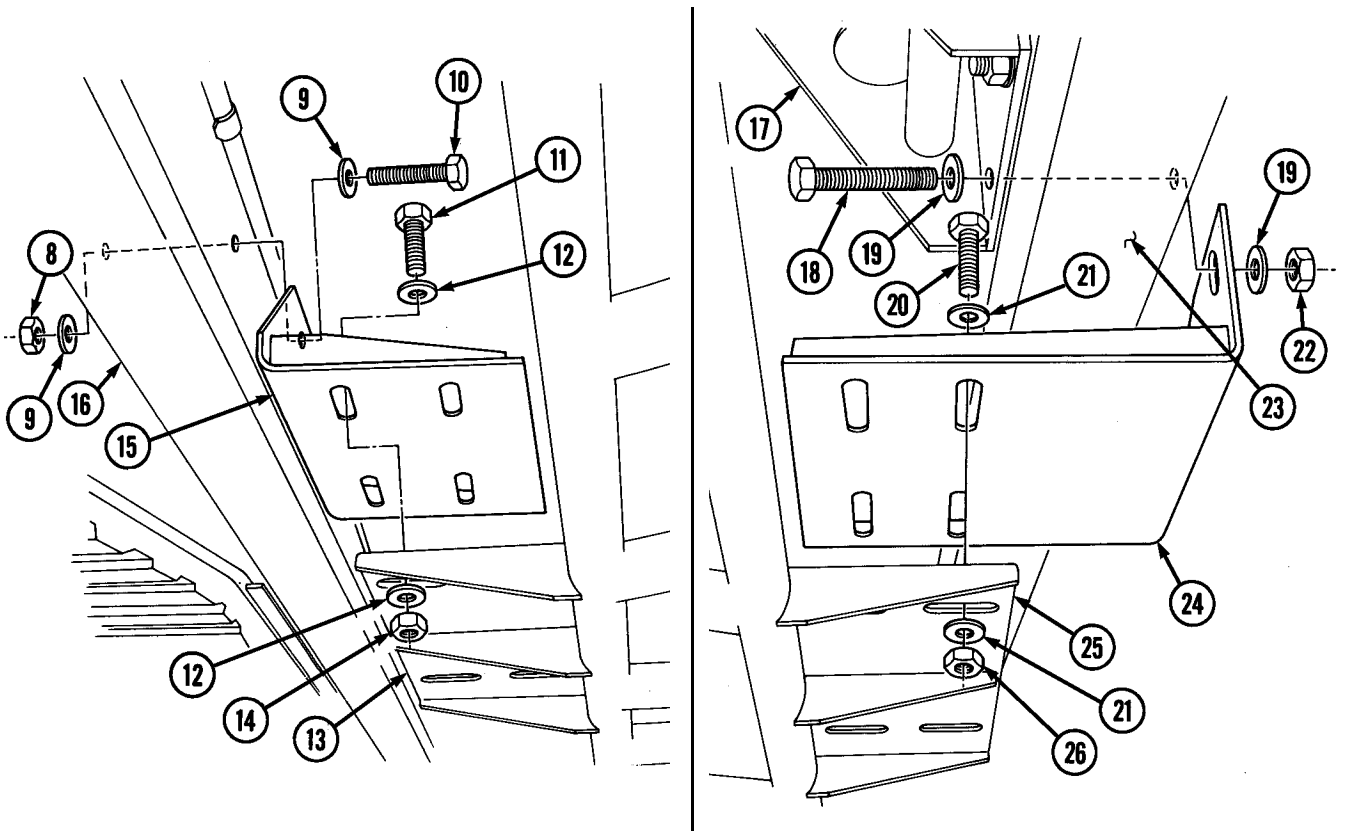
12-186. UNDERBODY PROTECTION KIT REPLACEMENT (Cont'd)

c. Intermediate Shield Removal

1. Remove six locknuts (6), twelve washers (2), six capscrews (3), four flat washers (5), and two transmission support brackets (4) from intermediate shield (1) and transmission mount cross-member (7). Discard locknuts (6) and flat washers (5).
2. Remove locknut (8), two washers (9), and capscrew (10) from right support bracket (15) and right side frame rail (16). Discard locknut (8).
3. Remove locknut (22), two washers (19), and capscrew (18) from left support bracket (24), engine mount bracket (17), and left side frame rail (23). Discard locknut (22).
4. Remove four locknuts (14), eight washers (12), four capscrews (11), and right side support bracket (15) from right side mounting bracket (13). Discard locknuts (14).
5. Remove four locknuts (26), eight washers (21), four capscrews (20), and left side support bracket (24) from left side mounting bracket (25). Discard locknuts (26).
6. Remove two locknuts (29), four washers (30), two capscrews (31), and intermediate shield (1) from front crossmember (27) and front shield (28). Discard locknuts (29).



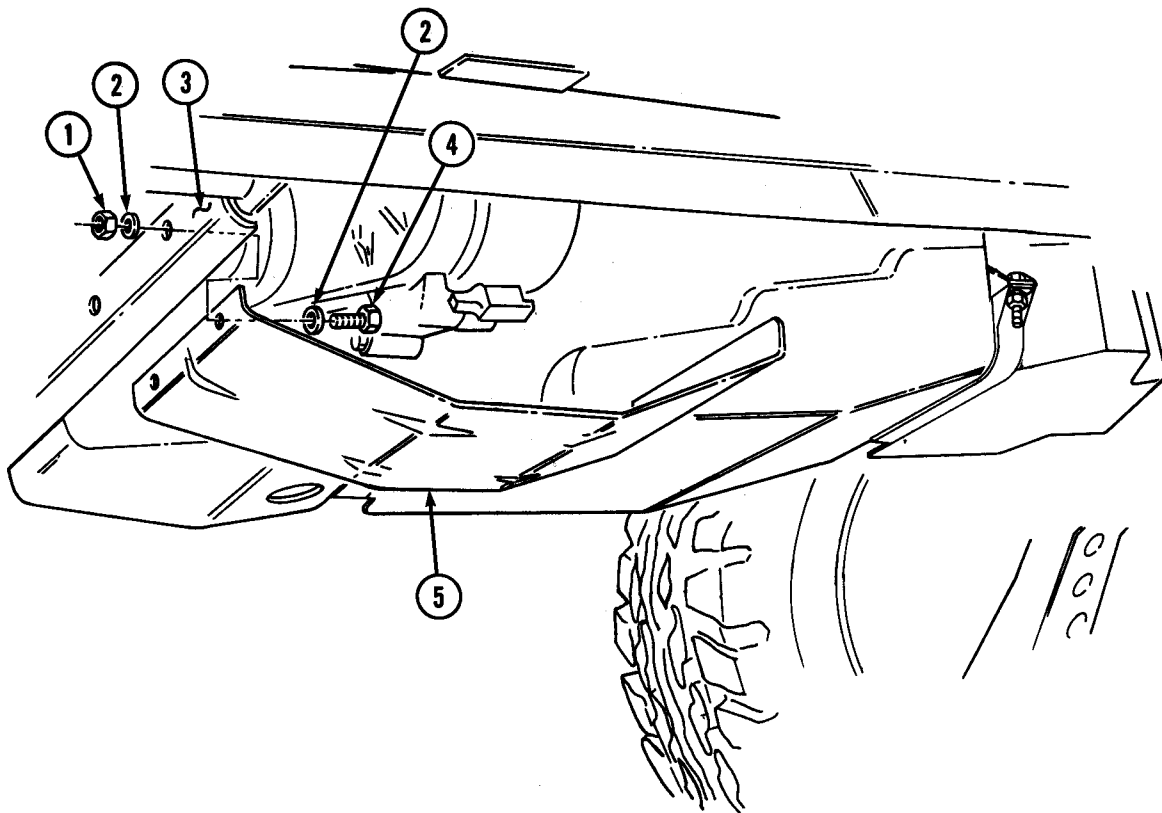
12-186. UNDERBODY PROTECTION KIT REPLACEMENT (Cont'd)



12-186. UNDERBODY PROTECTION KIT REPLACEMENT (Cont'd)

d. Transfer Case Shield Removal

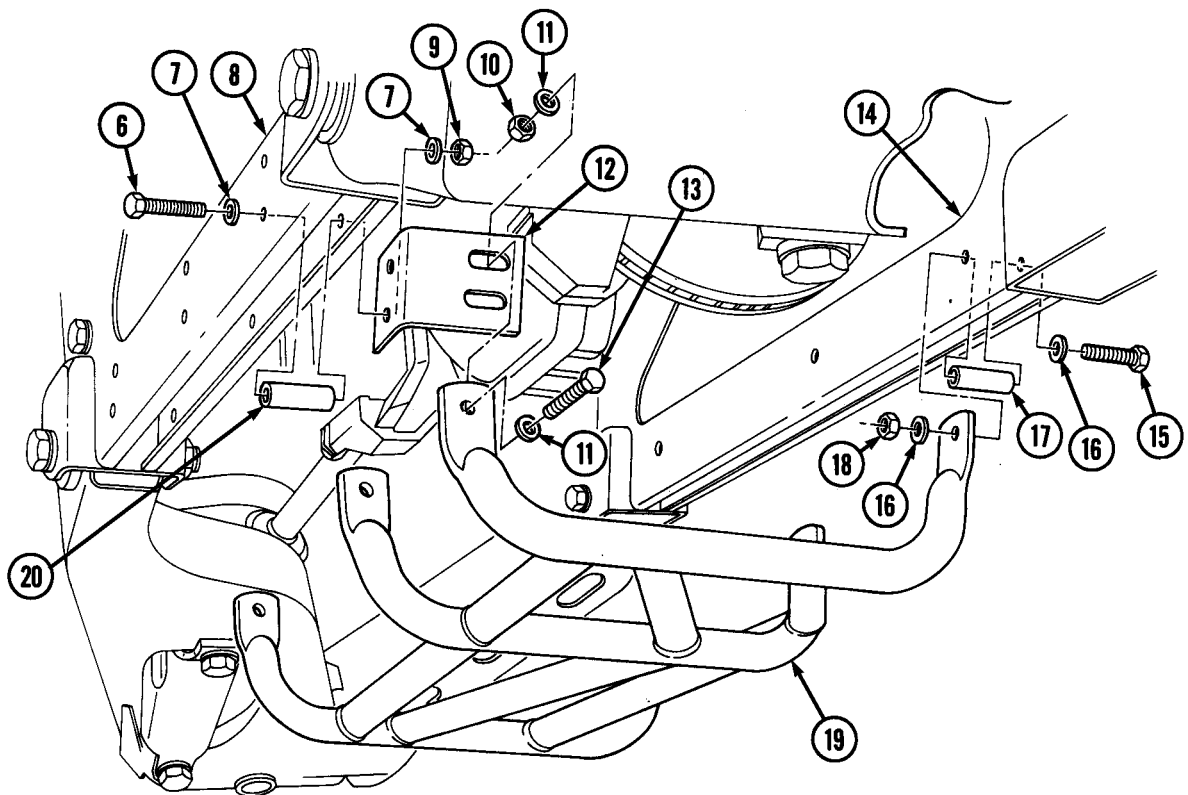
Remove two locknuts (1), four washers (2), two capscrews (4), and transfer case shield (5) from cross-member (3). Discard locknuts (1).



12-186. UNDERBODY PROTECTION KIT REPLACEMENT (Cont'd)

e. Rear Shield Removal

1. Remove three locknuts (18), six washers (16), three capscrews (15), and spacers (17) from rear shield (19) and rear-front crossmember (14). Discard locknuts (18).
2. Remove three locknuts (10), six washers (11), three capscrews (13), and rear shield (19) from three mounting brackets (12). Discard locknuts (19).
3. Remove six locknuts (9), twelve washers (7), six capscrews (6), spacers (20), and three mounting brackets (12) from rear-rear crossmember (8). Discard locknuts (9).



12-186. UNDERBODY PROTECTION KIT REPLACEMENT (Cont'd)

f. Fuel Tank Shield Removal

WARNING

- Fuel tank must be supported during removal and installation; failure to do so may cause damage to fuel tank or injury to personnel.
 - Diesel fuel is highly flammable. Do not perform this task near fire, flames, or sparks. Severe injury or death may result.
1. Drain fuel tank (1) (refer to para. 3-24).
 2. Remove two nuts (6), four washers (2), two capscrews (3), and support straps (5) from upper straps (4).
 3. Swing support straps (5) down and remove fuel tank shield (7).

g. Fuel Tank Shield Installation

WARNING

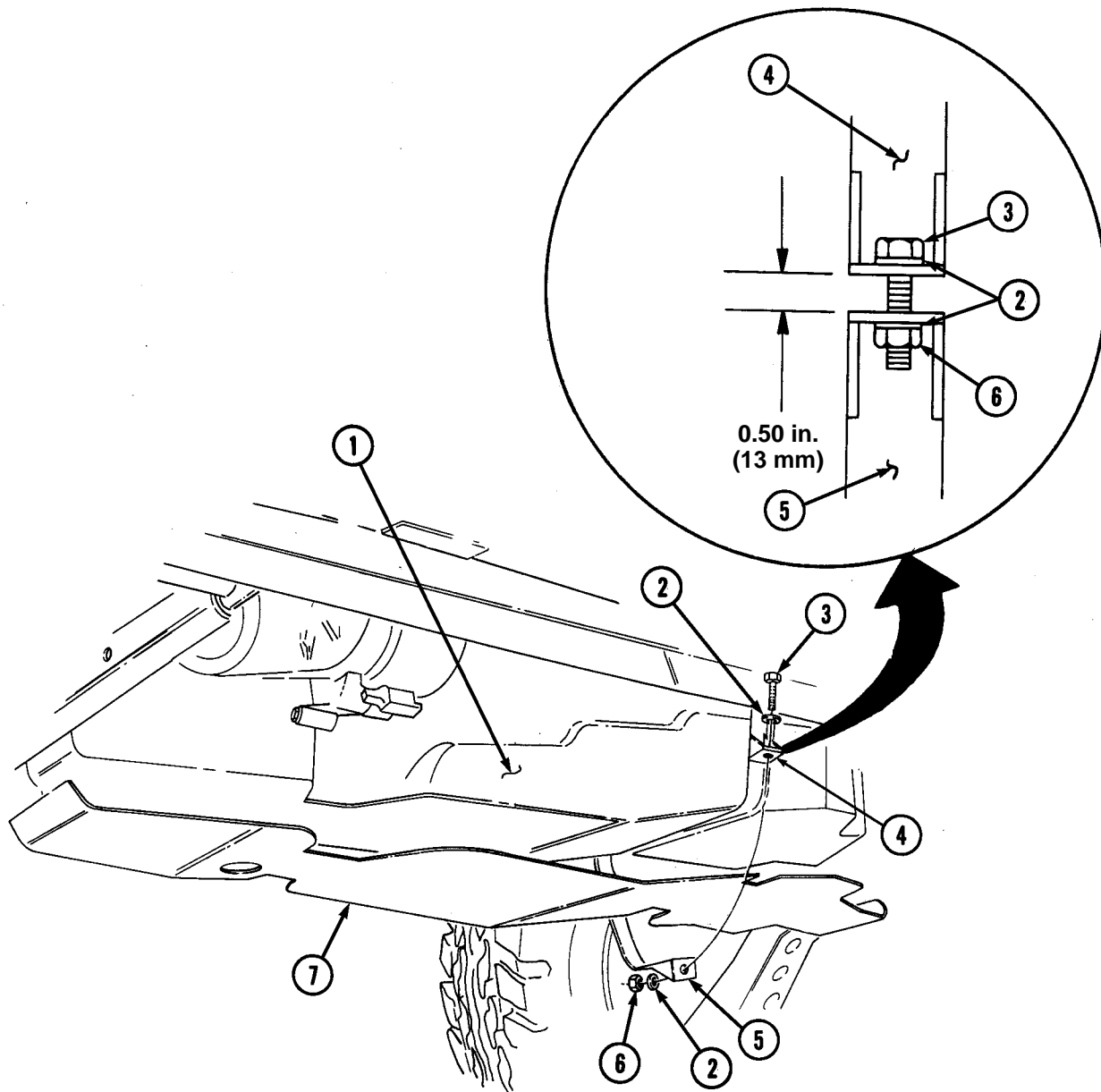
- Fuel tank must be supported during removal and installation; failure to do so may cause damage to fuel tank or injury to personnel.
 - Diesel fuel is highly flammable. Do not perform this task near fire, flames, or sparks. Severe injury or death may result.
1. Position fuel tank shield (7) on fuel tank (1) and raise support straps (5).

NOTE

Maintain 0.50 in. (13mm) clearance between upper and lower straps when tightening locknuts.

2. Install support straps (5) to upper straps (4) with two capscrews (3), four washers (2), and two nuts (6). Tighten nuts (6) to 37 lb-ft (50 N•m).
3. Fill fuel tank (1) (refer to TM 9-2320-280-10).

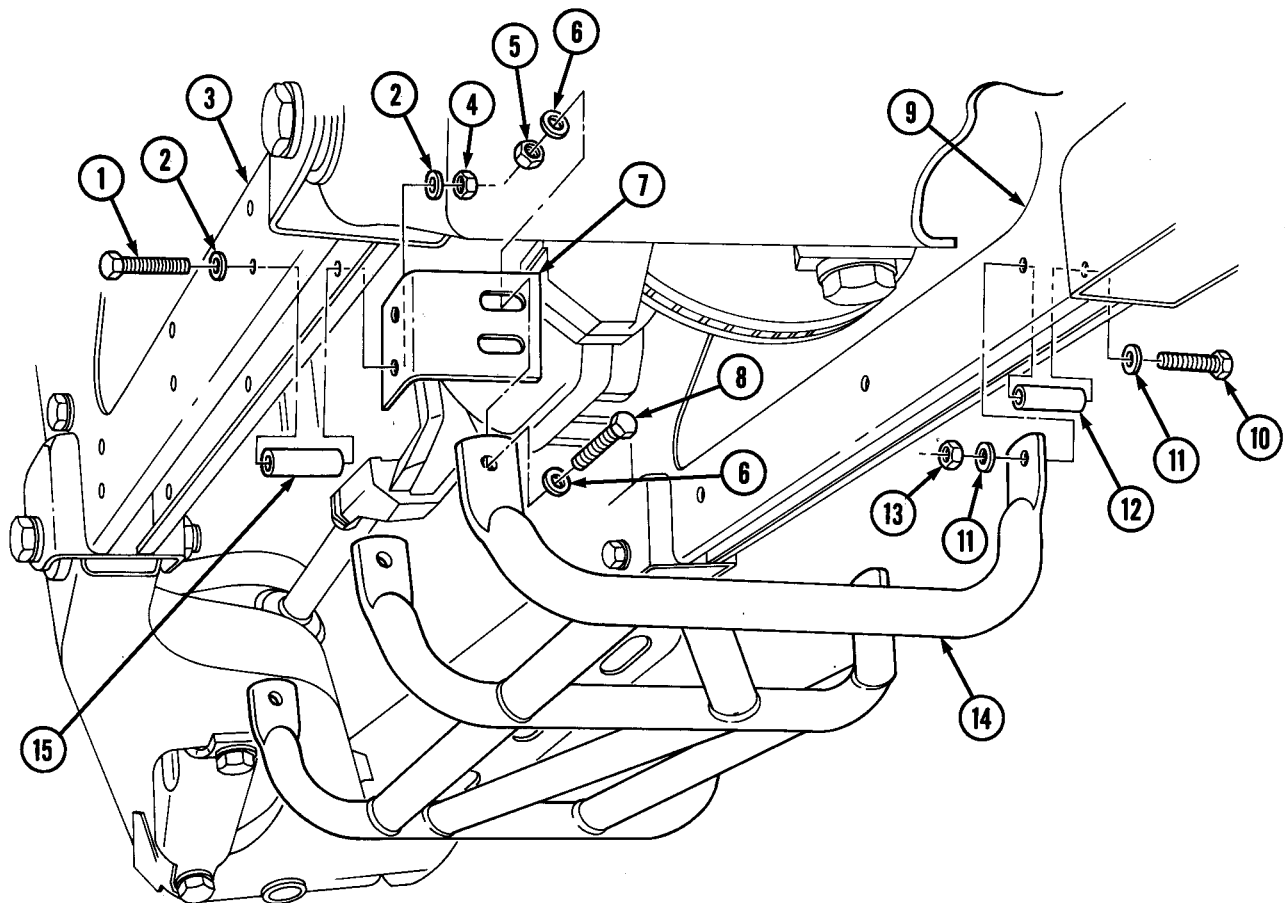
12-186. UNDERBODY PROTECTION KIT REPLACEMENT (Cont'd)



12-186. UNDERBODY PROTECTION KIT REPLACEMENT (Cont'd)

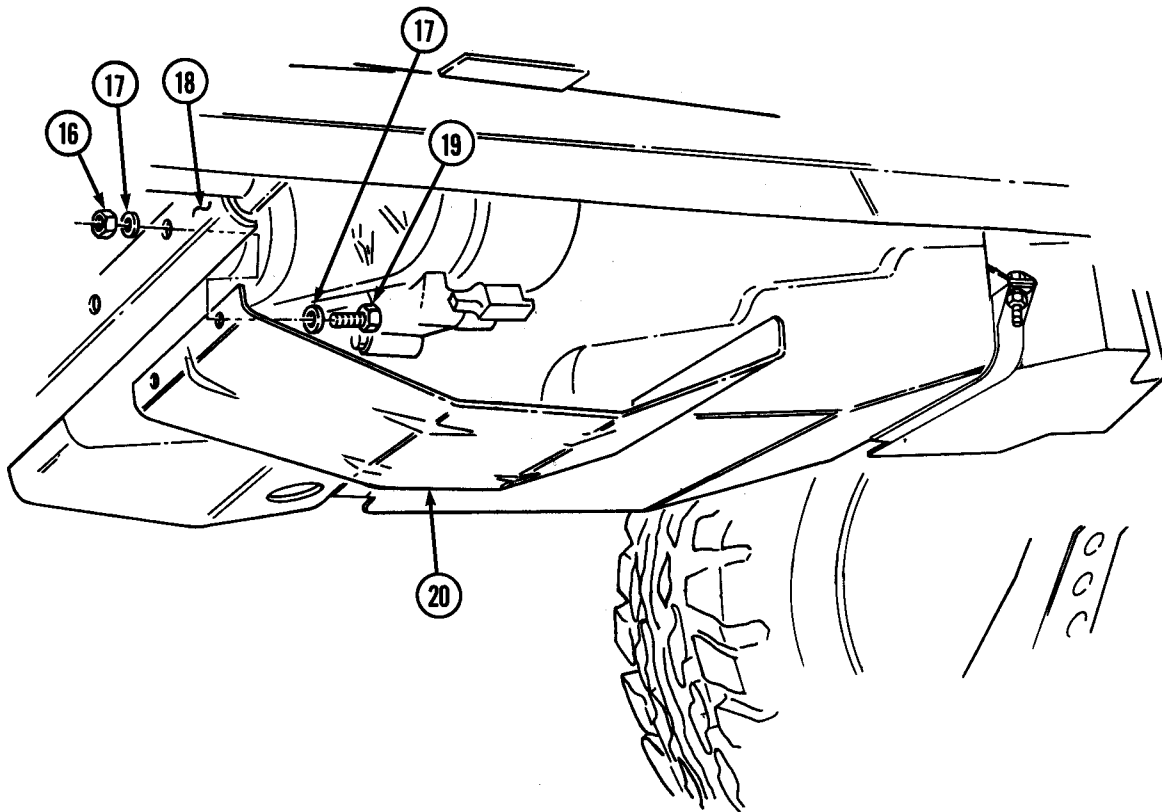
h. Rear Shield Installation

1. Install rear shield (14) to rear-front crossmember (9) with three spacers (12), capscrews (10), six washers (11), and three locknuts (13). Tighten locknuts (13) to 44 lb-ft (60 N•m).
2. Install rear shield (14) on three mounting brackets (7) with three capscrews (8), six washers (6), and three locknuts (5). Do not tighten locknuts (5).
3. Install three mounting brackets (7) on rear-rear crossmember (3) with six spacers (15), capscrews (1), twelve washers (2), and six locknuts (4). Tighten locknuts (4) to 24 lb-ft (33 N•m).
4. Tighten three locknuts (5) to 24 lb-ft (33 N•m).



12-186. UNDERBODY PROTECTION KIT REPLACEMENT (Cont'd)**i. Transfer Case Shield Installation**

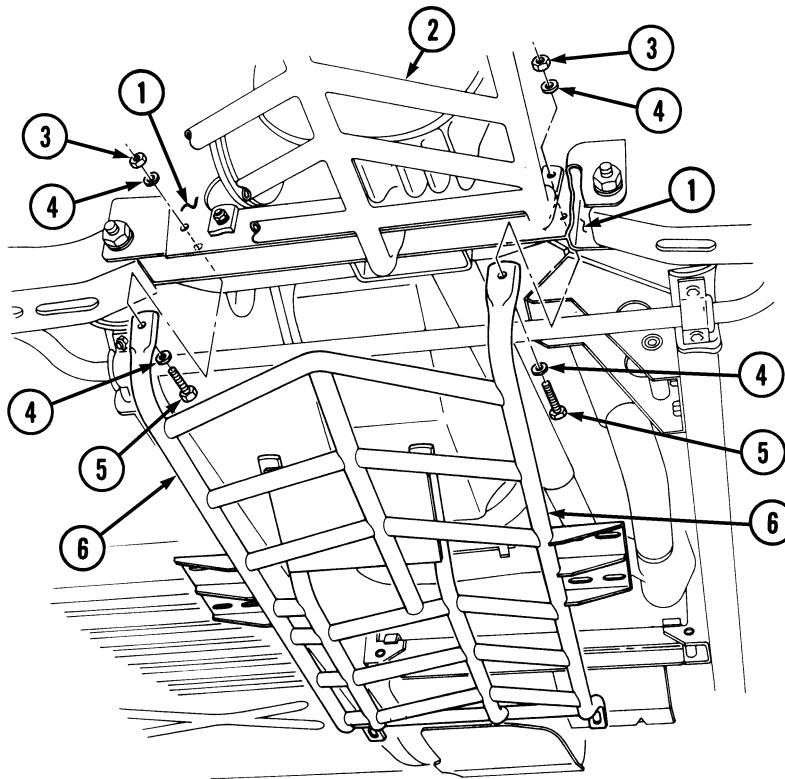
Install transfer case shield (20) on crossmember (18) with two capscrews (19), four washers (17), and two locknuts (16).



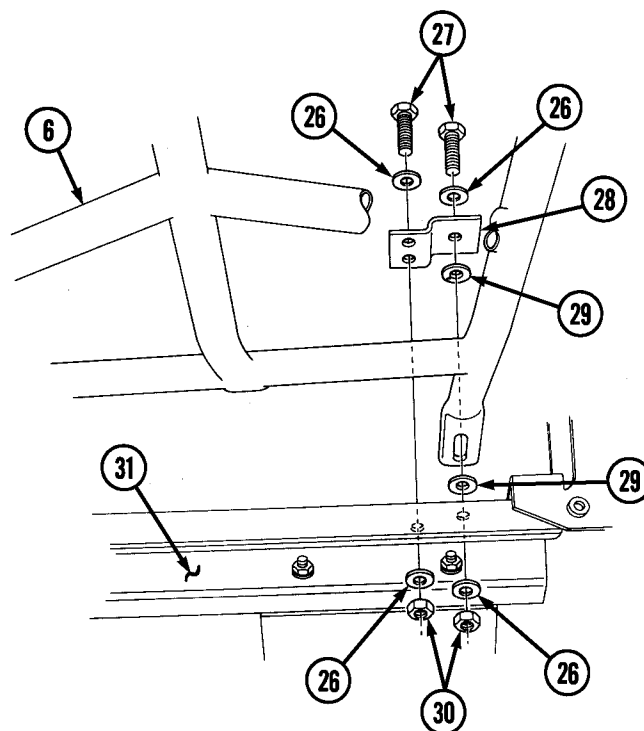
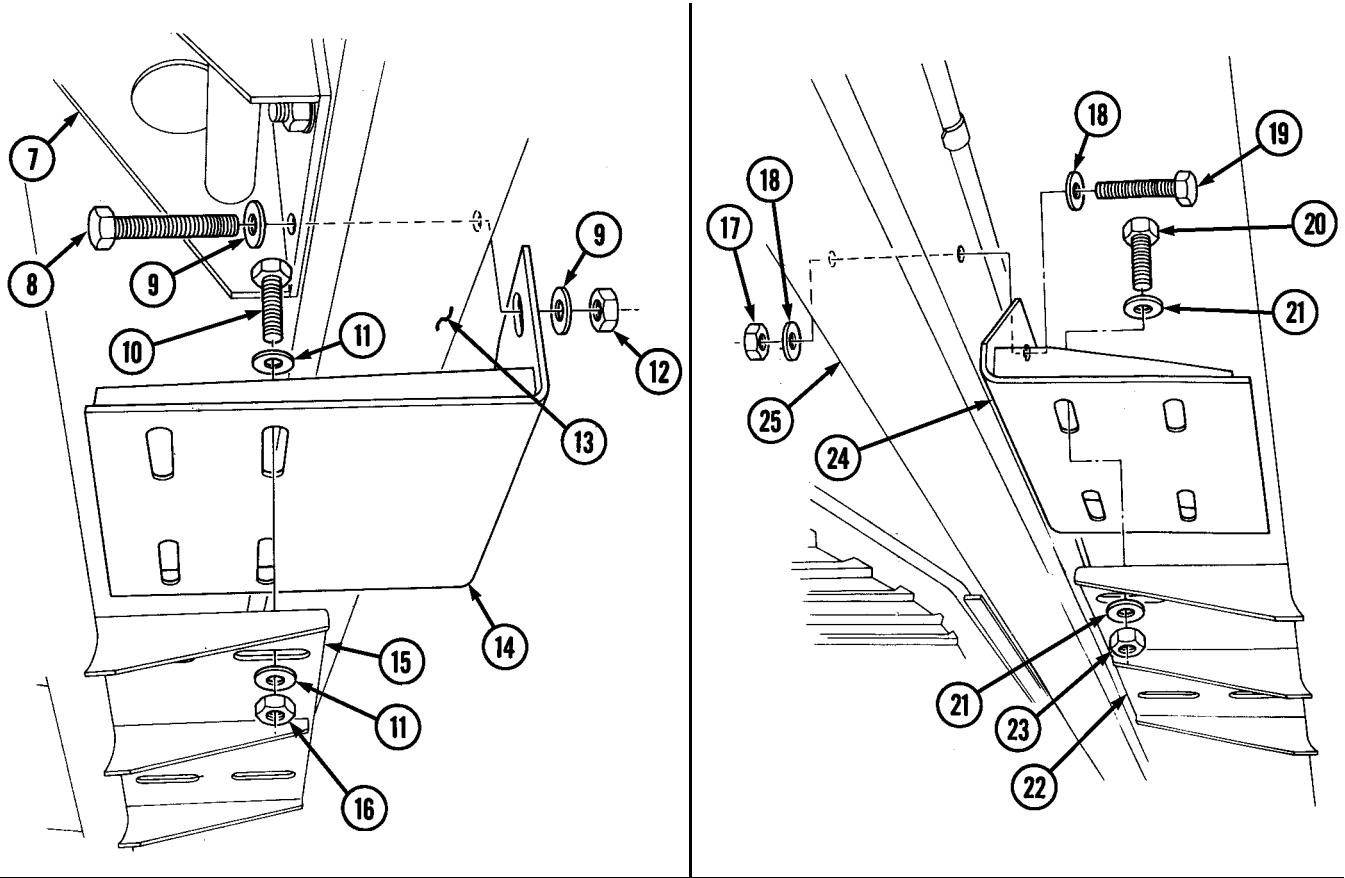
12-186. UNDERBODY PROTECTION KIT REPLACEMENT (Cont'd)

j. Intermediate Shield Installation

1. Install intermediate shield (6) and front shield (2) on front crossmember (1) with four washers (4), two capscrews (5), and locknuts (3). Tighten locknuts (3) to 44 lb-ft (60 N•m).
2. Install left side support bracket (14) on left side mounting bracket (15) with eight washers (11), four capscrews (10), and locknuts (16). Do not tighten locknuts (16).
3. Install right side support bracket (24) on right side mounting bracket (22) with eight washers (21), four capscrews (20), and locknuts (23). Do not tighten locknuts (23).
4. Install left side support bracket (14) on engine mount bracket (7) and left side frame rail (13) with two washers (9), capscrew (8), and locknut (12). Tighten locknut (12) to 105 lb-ft (142 N•m).
5. Install right side support bracket (24) on right side frame rail (25) with two washers (18), capscrew (19), and locknut (17). Tighten locknut (17) to 105 lb-ft (142 N•m).
6. Install two transmission support brackets (28) on intermediate shield (6) and transmission mount crossmember (31) with twelve washers (26), four flat washers (29), six capscrews (27), and locknuts (30). Tighten locknuts (30) to 30 lb-in. (3 N•m).
7. Tighten locknuts (16) and (23) to 24 lb-ft (33 N•m).



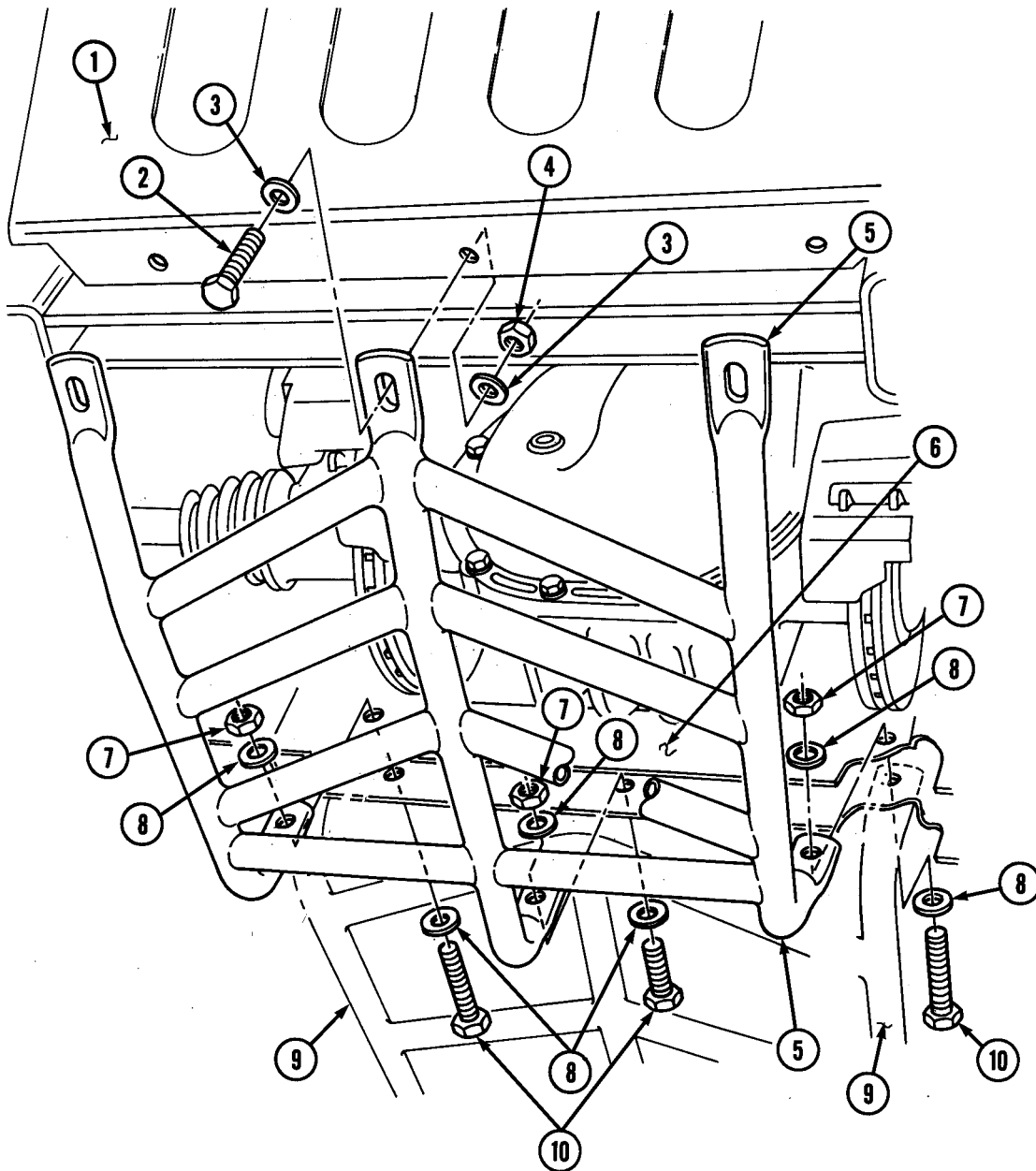
12-186. UNDERBODY PROTECTION KIT REPLACEMENT (Cont'd)



12-186. UNDERBODY PROTECTION KIT REPLACEMENT (Cont'd)

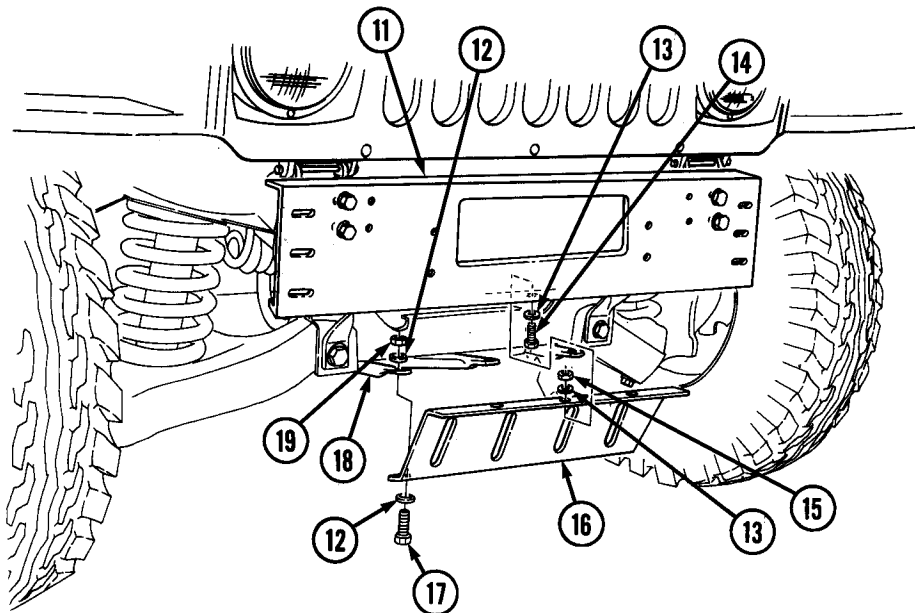
k. Front Shield Installation

1. Install front shield (5) on front skid plate (1) with six washers (3), three capscrews (2), and locknuts (4). Do not tighten locknuts (4).
2. Install front shield (5) on front crossmember (6) and intermediate shield (9) with six washers (8), three capscrews (10), and locknuts (7).
3. Tighten locknuts (4) and (7) to 44 lb-ft (60 N·m).



12-186. UNDERBODY PROTECTION KIT REPLACEMENT (Cont'd)**1. Front Skid Plate Installation**

1. Install front skid plate (16) on front bumper (11) with six washers (13), three capscrews (14), and locknuts (15). Tighten locknuts (15) to 24 lb-ft (33 N·m).
2. Install front skid plate (16) on front shield (18) with six washers (12), three capscrews (17), and locknuts (19). Tighten locknuts (19) to 44 lb-ft (60 N·m).



12-187. BRUSHGUARD ASSEMBLY REPLACEMENT

This task covers:

- | | |
|------------------------------------|------------------------------------|
| a. Brushguard Assembly Replacement | d. Quick-Release Brace Replacement |
| b. Tube Assembly Replacement | e. Lanyard Replacement |
| c. Pivot Brace Replacement | |

INITIAL SETUP:

Applicable Models

M997A2, M1025A2, M1035A2, M1043A2,
M1045A2, M1097A2, M1123

Manual References

TM 9-2320-280-24P

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

a. Brushguard Assembly Replacement

1. Remove two nuts (15), washers (16), capscrews (20), and washers (16) from pivot brace (13).
2. Remove two pins (18) from brushguard assembly (4) and quick-release brace (19) and remove brushguard assembly (4) from pivot brace (13).
3. Position brushguard assembly (4) on pivot brace (13) and install two pins (18) through brushguard assembly (4) on quick-release brace (19).
4. Install two washers (16), capscrews (20), washers (16), and nuts (15) on pivot brace (13).

b. Tube Assembly Replacement

NOTE

Perform these steps for three-piece brushguard only.

1. Remove two nuts (22), washers (2), capscrews (3), washers (2), and tube assembly (1) from brushguard assembly (4). Repeat step for other side.
2. Install tube assembly (1) on brushguard assembly (4) with two washers (2), capscrews (3), washers (2), and nuts (22). Repeat step for other side.

c. Pivot Brace Replacement

1. Remove brushguard assembly (4) (task a).
2. Remove two nuts (11), washers (12), capscrews (14), washers (12), and pivot brace (13) from bumper (8).
3. Install pivot brace (13) on bumper (8) with two washers (12), capscrews (14), washers (12), and nuts (11).
4. Install brushguard assembly (4) (task a).

d. Quick-Release Brace Replacement

1. Remove two pins (18) from brushguard assembly (4) and quick-release brace (13) and lower brushguard assembly (4).

NOTE

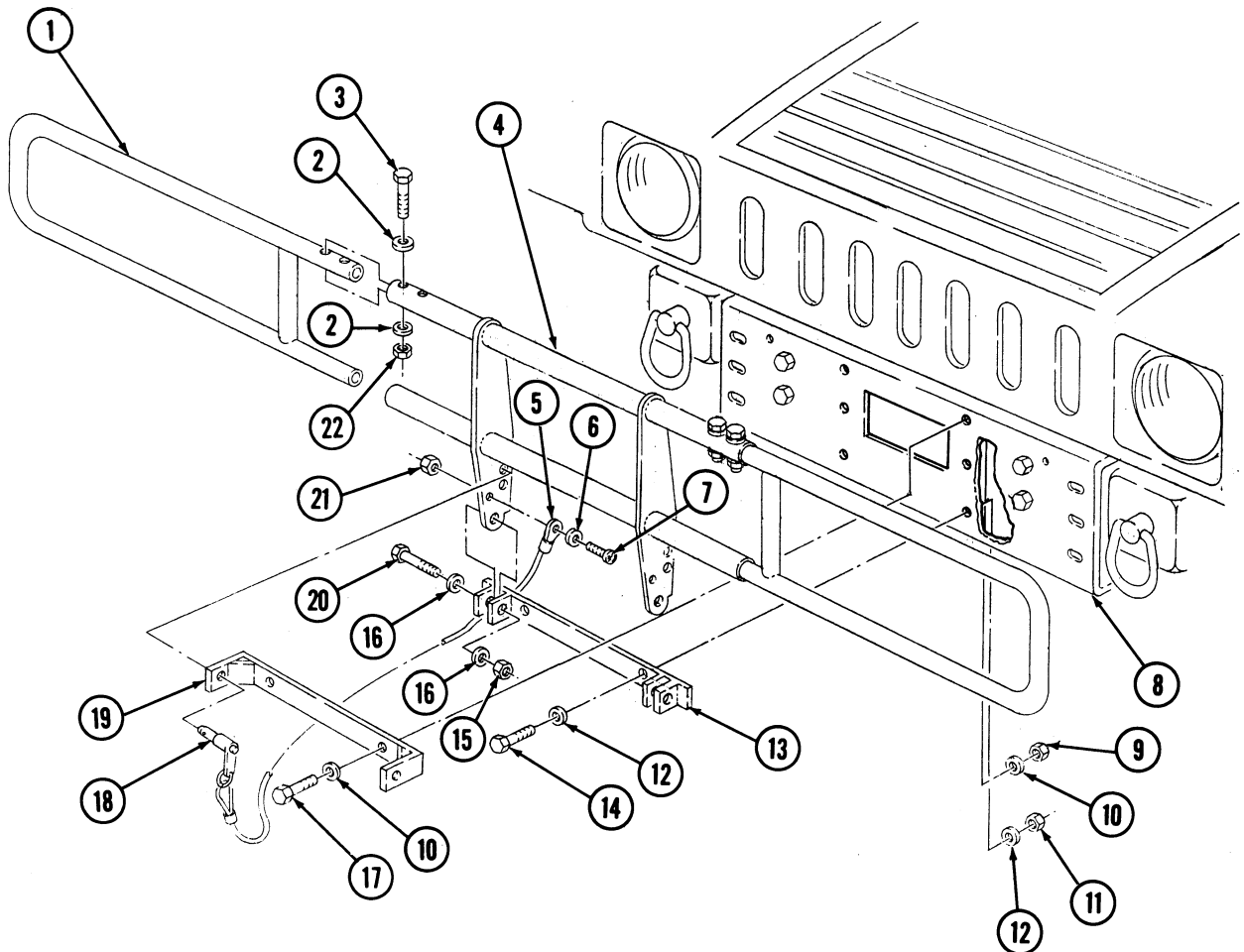
Vehicles equipped with winch will not have nuts and washers as indicated in steps 2 and 3.

2. Remove two nuts (9), washers (10), capscrews (17), washers (10), and brace (19) from bumper (8).
3. Install brace (19) on bumper (8) with two washers (10), capscrews (17), washers (10), and nuts (9).
4. Raise brushguard assembly (4) and install two pins (18) through brushguard assembly (4) and brace (19).

12-187. BRUSHGUARD ASSEMBLY REPLACEMENT (Cont'd)

e. Lanyard Replacement

1. Remove nut (21), screw (7), washer (6), lanyard (5), and pin (18) from brushguard assembly (4). Repeat step for other side.
2. Install pin (18) and lanyard (5) on brushguard assembly (4) with washer (6), screw (7), and nut (21). Repeat step for other side.



12-188. FLOOR DRAIN HOLE PLATE INSTALLATION

This task covers:

Installation

INITIAL SETUP:

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-24P
TM 43-0139

Materials/Parts

Adhesive sealant (Appendix C, Item 2.1)
Blind rivet (Appendix G, Item 243)
Blind rivet (Appendix G, Item 244)

Installation

NOTE

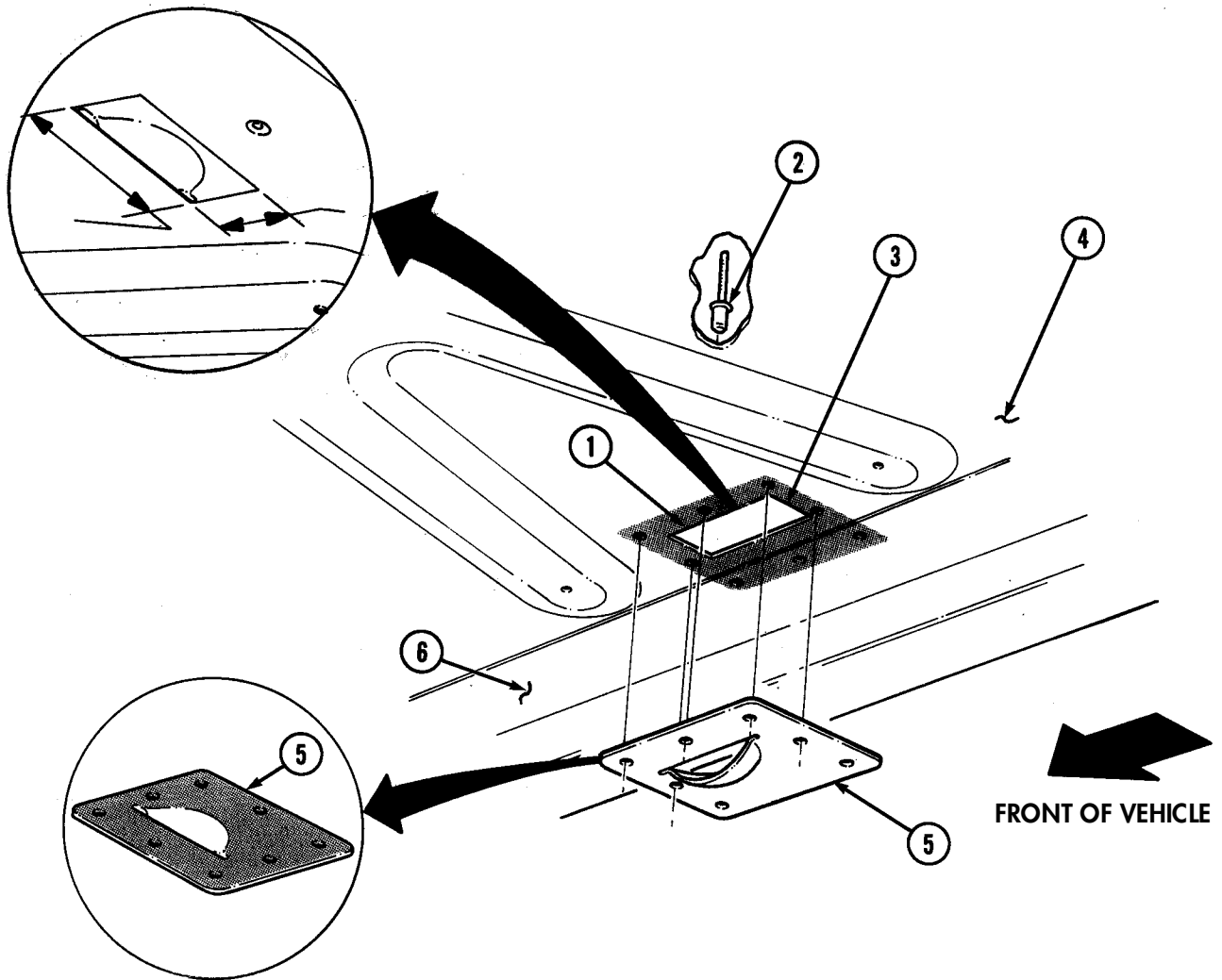
All drain hole plates are installed basically the same. This procedure covers one drain hole plate.

1. Mark on outline at drain hole (3) on floor panel (4).
2. Cut and remove drain hole material (1) from floor panel (4), and remove sharp edges and burrs from floor panel (4).
3. Mark underside of floor panel (4) with two lines centered over damaged floor drain area.
4. Using a 0.187-inch diameter drill, remove rivet (2) securing floor panel (4) to side body panel (6).

NOTE

- It may be necessary to bend or shape the drain hole plate to the contour of the floor panel.
 - When installed, the drain hole plate opening faces toward the center of the vehicle.
5. Position drain hole plate (5) to underside of floor panel (4). Bend or shape drain hole plate (5) to the contour of the floor panel (4).
 6. Using drain hole plate (5) as a template, locate, mark, and drill seven 0.187-in (4.8 mm) diameter holes on floor panel (4).
 7. Apply approximately 0.125 in. (3.175 mm) thickness of adhesive sealant to shaded mating surface on drain hole plate (5).
 8. Apply approximately 0.125 in. (3.175 mm) thickness of adhesive sealant to shaded mating surface on underside of floor panel (4) and side body panel (6).
 9. Position drain hole plate (5) to underside of floor panel (4) and install seven rivets (2) on floor panel (4) and drain hole plate (5).
 10. Using rivet hole drilled in step 4 as a template, drill 0.187-in. diameter hole through drain hole plate (5).
 11. Install rivet (2) on floor panel (4), side body panel (6), and drain hole plate (5).
 12. Remove adhesive and clean edges on floor panel (4) and drain hole plate (5).
 13. Spot paint floor panel (4) and drain hole plate (5) (TM 43-0139).

12-188. FLOOR DRAIN HOLE PLATE INSTALLATION (Contd)



Section XII. CARGO BARRIER AND NET KIT MAINTENANCE

12-189. CARGO BARRIER AND NET KIT MAINTENANCE TASK SUMMARY

TASK PARA.	PROCEDURES	PAGE NO.
12-190.	Cargo Barrier Channel Replacement	12-314
12-191.	Antiskid Strip Replacement	12-316

12-190. CARGO BARRIER CHANNEL REPLACEMENT

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP:

Applicable Models

M1025, M1025A1, M1026, M1026A1

Manual References

TM 9-2320-280-10
 TM 9-2320-280-24P

Tools

General mechanics's tool kit:
 automotive (Appendix B, Item 1)

Equipment Condition

Cargo barrier and net removed (TM 9-2320-280-10).

NOTE

Replacement procedure for left and right cargo barrier channels are the same. This procedure covers the left cargo barrier channel.

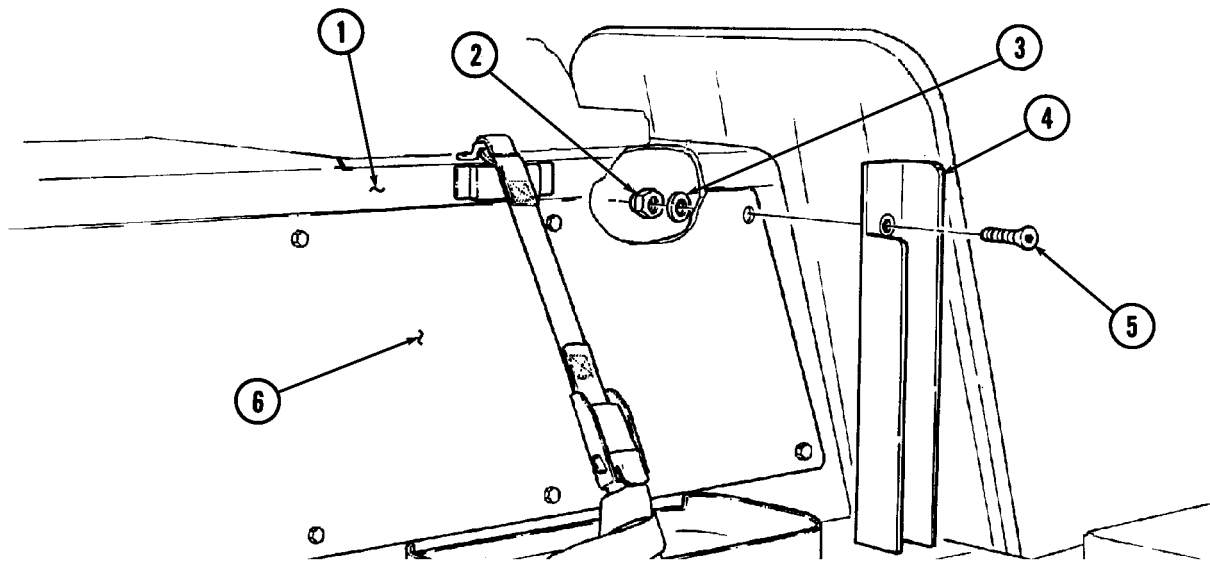
a. Removal

Remove two nuts (2), washers (3), screws (5), and channel (4) from armor plate (6) and wheelhouse (1).

b. Installation

Install channel (4) on armor plate (6) and wheelhouse (1) with two screws (5), washers (3), and nuts (2).

12-190. CARGO BARRIER CHANNEL REPLACEMENT (Cont'd)



FOLLOW-ON TASK: Install cargo barrier and net (TM 9-2320-280-10).

12-191. ANTISKID STRIP REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

M1025, M1025A1, M1026, M1026A1

Tools

General mechanic's tool kit:
automotive (Appendix B, Item 1)

Manual References

TM 9-2320-280-10
TM 9-2320-280-24P

Equipment Condition

Stowage compartment net removed
(TM 9-2320-280-10).

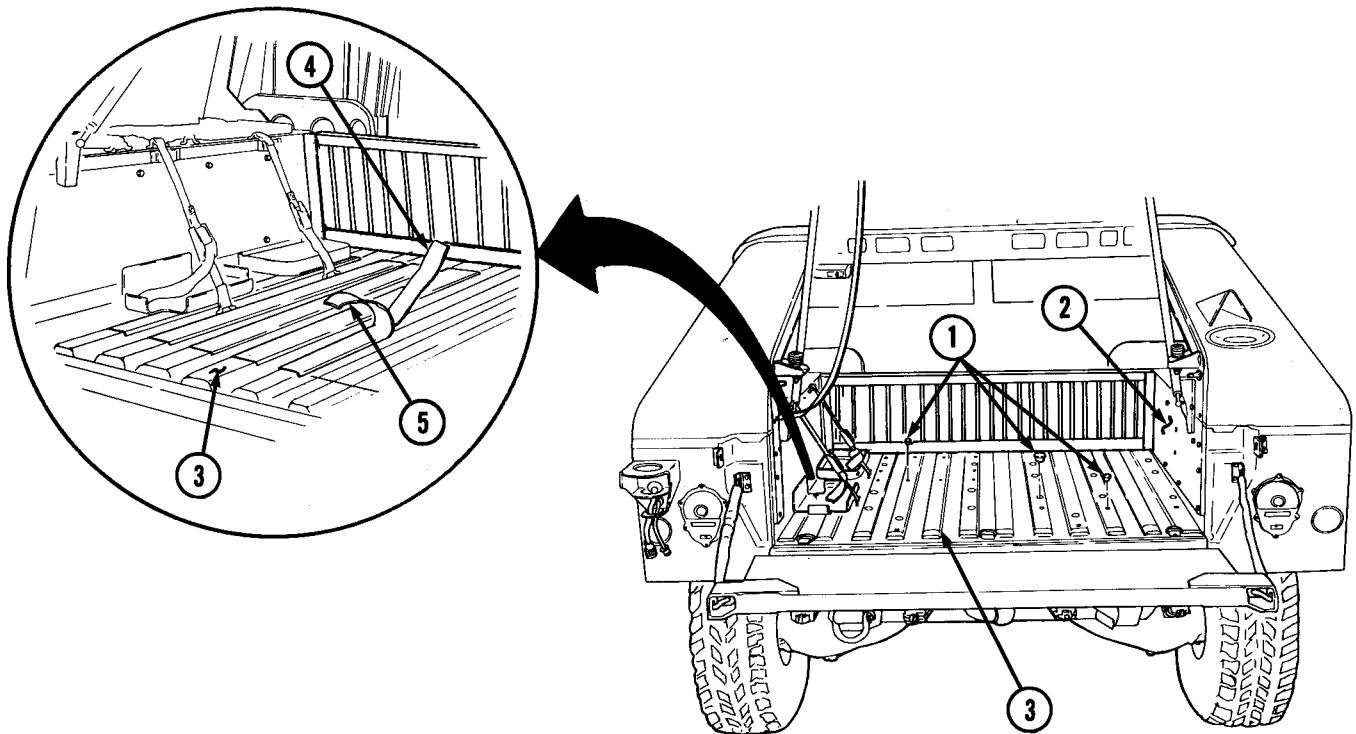
a. Removal

1. Remove antiskid strip (4) from cargo floor (3).
2. Clean remaining adhesive from cargo floor (3).
3. Inspect plugs (1) in cargo floor (3) and right wheelhouse (2), and replace plugs (1) if damaged.

b. Installation

1. Ensure surface of cargo floor (3) is free of dirt and oil.
2. Peel paper backing (5) from antiskid strip (4) and press antiskid strip (4) firmly onto cargo floor (3).

12-191. ANTISKID STRIP REPLACEMENT (Cont'd)



FOLLOW-ON TASK: Install stowage compartment net (TM 9-2320-280-10).

CHAPTER 13

PREPARATION FOR STORAGE OR SHIPMENT

Section I. GENERAL INSTRUCTIONS

13-1. SCOPE

- a. This chapter describes requirements for preparation of M998 series vehicles and components for shipment and limited storage.
- b. When vehicles are shipped or stored, the officer in charge is responsible for preparing the vehicles in a properly maintained and serviceable condition. Vehicles must be properly cleaned, preserved, painted, and lubricated. Vehicles, componentry, and BII must be prepared and protected to prevent corrosion, deterioration, and physical damage.

13-2. ADMINISTRATIVE STORAGE

- a. Administrative storage is the placement of a unit's organic material in a limited care and preservation status for short periods of time.
- b. Instructions and requirements pertaining to administrative storage are found in DA PAM 738-750.

13-3. SECURITY

- a. Equipment and vehicle security requirements are covered in AR 190-13 and AR 190-51.
- b. Cryptographic materials or COMSEC equipment will not be shipped with vehicles or remain in vehicles in storage. Refer to (C) AR 380-40 for information concerning COMSEC materials.
- c. Access to materiel in storage should be strictly controlled to prevent unauthorized cannibalization or pilferage. Refer to AR 750-1.

13-4. SPECIAL PACKAGING AND SHIPPING REQUIREMENTS

- a. When required, wrap, pack, mark, and stow uninstalled government furnished equipment and BII in accordance with MIL-B-12841, MIL-STD-129, MIL-V-62038, and TM 746-10.
- b. Height and width of vehicles prepared for rail transportation must not exceed the limitations of AR 700-15. Whenever possible, local transportation personnel must be consulted about limitations of particular railroad lines to be used for movement in order to avoid delays, dangerous conditions, or damage to equipment.
- c. Loading and blocking procedures must be in accordance with pamphlet no. MD-7, Rules Governing the Loading of Defense Material on Open-Top Cars, of Association of American Railroads.
- d. Loading and blocking of vehicles for highway shipment must be in accordance with Interstate Commerce Commission Publication "Motor Carrier Safety Regulations."
- e. For specific instructions concerning loading and blocking of M998 series vehicles for air, land, or sea shipment, refer to TM 55-2320-280-14.

Section II. PREPARATION FOR STORAGE AND SHIPMENT

13-5. GENERAL STORAGE AND SHIPPING INFORMATION

- a. Storage procedures will be such that the vehicle can be returned to service and operated with minimum delay. Disassembly should be limited to that necessary to clean and preserve exposed surfaces and equipment and to the maximum extent consistent with safe storage. The vehicle will be placed in storage in as nearly a completely assembled condition as practical.
- b. Storage site selection should offer maximum protection from the environment and provide access for inspection, maintenance, and vehicle exercise if necessary.
- c. For long term storage refer to MIL-V-62038 for information concerning preparation of vehicles and components.

13-6. CLEANING

- a. Before applying preservatives, thoroughly clean all vehicle surfaces of corrosion, soil, grease, damaged paint, or other foreign materials. Refer to TM 9-2320-280-10 for M998 series vehicles cleaning instructions.

WARNING

- Drycleaning solvent is flammable and will not be used near an open flame. A fire extinguisher will be kept nearby when the solvent is used. Use only in well-ventilated places. Failure to do this may result in injury to personnel and/or damage to equipment.
- Protective gloves, clothing, and/or respiratory equipment must be worn whenever caustic, toxic, or flammable cleaning solutions are used. Failure to do this may result in injury to personnel and/or damage to equipment.

CAUTION

- Do not allow cleaning compounds to come into contact with rubber, leather, vinyl, or canvas materials. Damage to equipment will result.
- Do not use compressed air when cleaning vehicle interiors. Damage to equipment can result.

- b. Descriptions and uses of cleaning compounds, solvents, drycleaning solutions, and corrosion removing compounds are found in TM 9-247. Refer to TM 9-2320-280-10 as a general guide of cleaning materials used in removing contaminants from M998 series vehicles.

13-7. INSPECTIONS, STOWAGE, AND INVENTORY

- a. Perform a semiannual (S) PMCS on vehicles intended for limited storage or shipment. (See table 2-1 in chapter 2.)
- b. Apply all urgent MWO's to vehicle and equipment (DA PAM 25-30).
- c. Inventory the vehicle and components (TM 9-2320-280-10-HR) and ensure proper stowage of components and BII (TM 9-2320-280-10).
- d. Prepare uninstalled BII and government furnished equipment in accordance with para. 13-4a.

13-8. REPAIR, PAINTING, AND PRESERVATION

- a.** All equipment deficiencies noted during inspections should be repaired in accordance with vehicle TM's.
- b.** All unpainted metal surfaces must be protected during storage or shipment. Inspect, clean, and spot paint metal surfaces as required in TM 9-2320-280-10. Unpainted exposed machined surfaces must be prepared with corrosion-preventive compounds or oil and grease as referenced in TM 9-2320-280-10. Be sure to select preservatives that will not harm vehicle interior components.
- c.** Sunlight, heat, moisture, and dirt accelerate deterioration. Install all covers authorized for the equipment. Close and secure all openings except those required for venting and drainage. Seal all openings to prevent the entry of rain, snow, or dust.
- d.** Inflate tires to a maximum of 30 psi (207 kPa).

13-9. LUBRICATION

Lubricate vehicles in accordance with TM 9-2320-280-10 and TM 9-2320-280-20-1 before shipment or storage.

13-10. RECORDS AND REPORTS

Maintenance records required by AR 750-1 will be maintained and reports submitted in accordance with DA PAM 738-750 and AR 220-1.

APPENDIX A REFERENCES

A-1. SCOPE

This appendix lists all forms, field manuals, technical manuals, and other publications required for use with this manual.

A-2. PUBLICATIONS INDEX

The following index should be consulted frequently for latest changes or revisions and for new publications relating to materiel covered in this manual.

Consolidated Index of Army Publications and Blank Forms DA PAM 25-30

A-3. FORMS

Recommended Changes to Publications and Blank Forms DA Form 2028
 Recommended Changes to Equipment Technical Publications DA Form 2028-2
 Hand Receipt/Annex Number DA Form 2062
 Exchange Tag DA Form 2402
 Equipment Inspection and Maintenance Worksheet DA Form 2404
 Maintenance Request DA Form 2407
 The Army Maintenance Management System (TAMMS) DA PAM 738-750
 Preventive Maintenance Schedule and Record DD Form 314
 Processing and Deprocessing Record for Shipping, Storage,
 and Issue of Vehicles and Spare Engines DD Form 1397
 Quality Deficiency Report Standard Form 368

A-4. FIELD MANUALS

NBC Protection FM 3-4
 NBC Decontamination FM 3-5
 Operation and Maintenance of Ordnance Materiel in Cold Weather (0° to -65°F) FM 9-207
 First Aid for Soldiers FM 21-11
 Manual for the Wheeled Vehicle Driver FM 21-305
 Browning Machinegun Caliber .50 HB, M2 FM 23-65
 Machinegun 7.62-MM, M60 FM 23-67
 Basic Cold Weather Manual FM 31-70
 Northern Operations FM 31-71
 Army Motor Transport Units and Operations FM 55-30
 Mountain Operations FM 90-6
 General Fabric Repair FM 10-16

A-5. TECHNICAL MANUALS

Inspection, Care and Maintenance of Antifriction Bearings TM 9-214
 Materials Used for Cleaning, Preserving, Abrading, and Cementing Ordnance
 Materiel and Related Materials (Including Chemicals) TM 9-247
 Operator's Manual for Machinegun, Caliber .50 Browning, M2 TM 9-1005-213-10
 Operator's Manual for M60, 7.62-MM Machinegun TM 9-1005-224-10

A-5. TECHNICAL MANUALS (Cont'd)

Operator's and Organizational Maintenance Manual for
TOW 2 Weapon System, Guided Missile System TM 9-1425-450-12

Operator's and Organizational Maintenance Manual for
TOW Weapon System, Guided Missile System TM 9-1425-472-12

■ Tactical Wheeled Vehicles: Repair of Frames TM 9-2300-247-40

Operator's Manual for Truck, 1-1/4 Ton, 4X4, M998 Series TM 9-2320-280-10

Unit, Direct Support and General Support Maintenance Repair Parts and
Special Tools List TM 9-2320-280-24P

Operator's, Unit, Direct Support and General Support Maintenance Manual For
Care, Maintenance, Repair and Inspection of Pneumatic Tires,
Inner Tubes, and Radial Tires TM 9-2610-200-14

Operator's, Organizational, Direct Support and
General Support Maintenance Manual for Lead-Acid Storage Batteries TM 9-6140-200-14

Marking, Packaging and Supplies and Equipment:
General Packaging Instructions for Field Use TM 746-10

Procedures for Destruction of Tank Automotive Equipment to Prevent Enemy Use . . . TM 750-244-6

Cooling Systems: Tactical Vehicles TM 750-254

Principles of Automotive Vehicles TM 9-8000

Painting Instructions for Army Materiel TM 43-0139

A-6. TECHNICAL BULLETINS

Solder and Soldering TB SIG-222

Security of Tactical Wheeled Vehicles TB 9-2300-422-20

■ Equipment Improvement Report and Maintenance Digest TB 43-0001-62

Use of Antifreeze Solutions and Cleaning Compounds
in Engine Cooling Systems TB 750-651

Corrosion Prevention and Control TB 43-0213

A-7. ARMY REGULATIONS

Identification and Distribution of DA Publications and Issue of
Agency and Command Administrative Publication AR 310-2

Dictionary of United States Army Terms AR 310-25

A-8. OTHER PUBLICATIONS

Army Acquisition Policy AR 70-1

The Army Physical Security Program AR 190-13

Security of Unclassified Army Properties AR 190-51

Unit Status Reporting AR 220-1

Policy for Safeguarding and Controlling Comsec Material AR 380-40

Prevention of Motor Vehicle Accidents AR 385-55

Packaging of Material AR 700-15

Army Material Maintenance Policy and Retail Maintenance Operation AR 750-1

Expendable/Durable Items (Except: Medical, Class V, Repair Parts and Heraldic Items) . . . CTA 50-970

■ Operator's Manual for Welding Theory and Application TC 9-237

Hand Receipt for Truck, 1-1/4 Ton, 4X4, M998 Series TM 9-2320-280-10 HR

Transportability Guidance TM 55-2320-280-14

APPENDIX B MAINTENANCE ALLOCATION CHART

Section I. INTRODUCTION

B-1. THE ARMY MAINTENANCE SYSTEM (MAC)

- a. This section provides a general explanation of all maintenance and repair functions authorized at various maintenance levels under the standard Army Maintenance System Concept.
- b. The Maintenance Allocation Chart (MAC) in section II designates overall authority and responsibility for the performance of maintenance functions on the identified end item or component. The application of the maintenance functions to the end item or component will be consistent with the capacities and capabilities of the designated maintenance levels, which are shown on the MAC in column (4) as:
 - Unit - includes two subcolumns, C (operator/crew) and O (unit) maintenance.
 - Direct Support - includes an F subcolumn.
 - General Support - includes an H subcolumn.
 - Depot - includes a D subcolumn.
- c. Section III lists the tools and test equipment (both special tools and common tool sets) required for each maintenance function as referenced from section II.
- d. Section IV contains supplemental instructions and explanatory notes for a particular maintenance function.

B-2. MAINTENANCE FUNCTIONS

Maintenance functions will be limited to and defined as follows:

- a. **Inspect.** To determine the serviceability of an item by comparing its physical, mechanical, and/or electrical characteristics with established standards through examination (e.g., by sight, sound, or feel).
- b. **Test.** To verify serviceability by measuring the mechanical, pneumatic, hydraulic, or electrical characteristics of an item and comparing those characteristics with prescribed standards.
- c. **Service.** Operations required periodically to keep an item in proper operating condition, i.e., to clean (includes decontaminate, when required), to preserve, to drain, to paint, or to replenish fuel, lubricants, chemical fluids, or gases.
- d. **Adjust.** To maintain or regulate, within prescribed limits, by bringing into proper or exact position, or by setting the operating characteristics to specified parameters.
- e. **Align.** To adjust specified variable elements of an item to bring about optimum or desired performance.
- f. **Calibrate.** To determine and cause corrections to be made or to be adjusted on instruments or test, measuring, and diagnostic equipment used in precision measurement. Consists of comparisons of two instruments, one of which is a certified standard of known accuracy, to detect and adjust any discrepancy in the accuracy of the instrument being compared.
- g. **Remove/Install.** To remove and install the same item when required to perform service or other maintenance functions. Install may be the act of emplacing, seating, or fixing into position a spare, repair part, or module (component or assembly) in a manner to allow the proper functioning of an equipment or system.
- h. **Replace.** To remove an unserviceable item and install a serviceable counterpart in its place. "Replace" is authorized by the MAC and is shown as the 3d position code of the SMR code.

i. Repair. The application of maintenance services, including fault location/troubleshooting, removal/installation, and disassembly/assembly procedures, and maintenance actions to identify troubles and restore serviceability to an item by correcting specific damage, fault, malfunction, or failure in a part, subassembly, module (component or assembly), end item, or system.

j. Overhaul. That maintenance effort (service/action) prescribed to restore an item to a completely serviceable/operational condition as required by maintenance standards in appropriate technical publications (i.e., DMWR). Overhaul is normally the highest degree of maintenance performed by the Army. Overhaul does not normally return an item to like-new condition.

k. Rebuild. Consists of those services/actions necessary for the restoration of unserviceable equipment to a like-new condition in accordance with original manufacturing standards. Rebuild is the highest degree of materiel maintenance applied to Army equipment. The rebuild operation includes the act of returning to zero those age measurements (hours/ miles, etc.) considered in classifying Army equipment/components.

B-3. EXPLANATION OF COLUMNS IN THE MAC, SECTION II

a. Column (1)-Group Number. Column 1 lists functional group code numbers, the purpose of which is to identify maintenance significant components, assemblies, subassemblies, and modules with the next higher assembly.

b. Column (2)-Component/Assembly. Column 2 contains the names of components, assemblies, subassemblies, and modules for which maintenance is authorized.

c. Column (3)-Maintenance Function. Column 3 lists the functions to be performed on the item listed in Column 2. (For detailed explanation of these functions, see para. B-2.)

d. Column (4)-Maintenance Category. Column 4 specifies, by the listing of a work time figure in the appropriate subcolumn(s), the category of maintenance authorized to perform the function listed in Column 3. This figure represents the active time required to perform that maintenance function at the indicated category of maintenance. If the number of complexity of the tasks within the listed maintenance function vary at different maintenance categories, appropriate work time figures will be shown for each category. The work time figure represents the average time required to restore an item (assembly, subassembly, component, module, end item, or system) to a serviceable condition under typical field operating conditions. This time includes preparation time (including any necessary disassembly/assembly time) troubleshooting/fault location time, and quality assurance/quality control time in addition to the time required to perform the specific tasks identified for the maintenance functions authorized in the maintenance allocation chart. The symbol designations for the various maintenance categories are as follows:

NOTE

When a complete replace or repair task performed at higher level maintenance includes lower level maintenance tasks (equipment condition/follow-on tasks), the lower level work time figures in the MAC must be added to the higher level work time shown in the MAC to determine the total time to accomplish that maintenance function.

- C Operator or crew
- O Unit maintenance
- F Direct Support maintenance
- H General Support maintenance
- D Depot maintenance

e. Column (5)-Tools and Equipment. Column 5 specifies, by code, those common tool sets (not individual tools) and special tools, TMDE, and support equipment required to perform the designated function.

f. Column (6)-Remarks. This column shall, when applicable, contain a letter code, in alphabetic order, which shall be keyed to the remarks contained in Section IV.

B-4. EXPLANATION OF COLUMNS IN TOOL AND TEST EQUIPMENT REQUIREMENTS, SECTION III

- a. **Column (1)-Reference Code.** The tool and test equipment reference code correlates with a code used in the MAC, Section II, Column 5.
- b. **Column (2)-Maintenance Category.** The lowest category of maintenance authorized to use the tool or test equipment.
- c. **Column (3)-Nomenclature.** Name or identification of the tool or test equipment.
- d. **Column (4)-National Stock Number.** The National stock number of the tool or test equipment.
- e. **Column (5)-Tool Number.** The manufacturer's part number.

B-5. EXPLANATION OF COLUMNS IN REMARKS, SECTION IV

- a. **Column (1)-Remarks Code.** The code recorded in column 6, Section II.
- b. **Column (2)-Remarks.** This column lists information pertinent to the maintenance function being performed as indicated in the MAC, Section II.

Section II. MAINTENANCE ALLOCATION CHART (Cont'd)

(1) Group Number	(2) Component/Assembly	(3) Maintenance Function	(4) Maintenance Level					(5) Tools and Equipment Ref Code	(6) Remarks Code
			Unit		Direct Support	General Support	Depot		
			C	O	F	H	D		
01	ENGINE								
0100	Engine Assembly	Inspect Test Service Adjust Replace Repair	0.2	0.7	1.0			1,20,21,22,26 1,2 41,42 25,145 1,7,10,43-45	G
	Mount, Engine	Inspect Replace		0.1	1.6			2,144,145 1,2,144- 146,149	
0101	Cylinder Head	Replace Repair			3.0		5.0	1,6 1,6,8,12-18	
	Block, Cylinder	Repair					10.0	1,6-8,12-18	
0102	Crankshaft	Replace					4.0	1	
	Pulley, Crankshaft	Replace					0.5	1,6	
	Damper, Vibration	Replace					0.5	1,6	
	Bearings, Crankshaft	Replace					4.0	1	
	Oil Seals, Crankshaft, Front	Replace					2.0	1	
	Oil Seals, Crankshaft, Rear	Replace					2.0	1,6,46	
0103	Flywheel	Replace					3.5	1,6	
0104	Pistons, Connecting Rods								
	Rods, Connecting	Replace					8.0	1,6	
	Bearings, Connecting Rod	Replace					2.0	1,6	
	Pistons	Replace					8.0	1,6	
	Rings, Piston	Replace					7.0	1,6,10	
0105	Valves, Camshaft, and Timing System								
	Cover, Rocker Arm	Replace					1.0	1,6	
	Valves, Intake and Exhaust	Replace Repair					3.0 3.0	6 6,8	
	Rocker Arm Assembly	Replace					2.1	1,6	
	Springs, Valve	Test Replace					0.5 2.3	1,8 1,6	
	Rods, Push	Replace					3.0	1	
	Lifters	Replace					6.0	1	

Section II. MAINTENANCE ALLOCATION CHART (Cont'd)

(1) Group Number	(2) Component/Assembly	(3) Maintenance Function	(4) Maintenance Level					(5) Tools and Equipment Ref Code	(6) Remarks Code
			Unit		Direct Support	General Support	Depot		
			C	O	F	H	D		
0106	Gears and Chain, Timing	Replace			4.0			1,6,10	
	Camshaft	Replace				4.0		1,6,10	
	Bearings, Camshaft	Replace				4.0		1,6,45,47	
	Engine Lubrication System								
	Pan, Oil	Replace		2.0				1,2	
	Pump, Oil	Replace			2.5			1,6	
	Filter, Oil	Replace		0.5				1,2	
	Dipstick and Tube	Replace		0.2				1,2,156	
	Oil Cooler Assembly	Inspect		0.1				1,2	
		Replace		0.5				1	
	Repair			1.0					
	Lines, Oil Cooler	Inspect		0.2					
		Replace		1.8				1	
	Valve, Crankcase Depression Regulator	Inspect		0.1					
		Test		0.3					L
		Service		0.3				1	
		Replace		0.3				1,2	
0108	Manifold, Intake	Replace			3.0			1,6	
	Manifold, Exhaust	Replace		3.0				1,146, 150,156	
03	FUEL SYSTEM								
0301	Injector Nozzle, Fuel	Test			0.5			1,9	
		Replace			0.7			1,6,49,134, 146,153	
0302	Lines, Injection Pump	Inspect		0.1					
		Replace			2.0			1,147,148	
	Pump, Injection	Inspect		0.1					
		Calibrate				A		1,9,59-65	A
		Replace			4.0			1,147	
		Repair			0.6	5.0		1,9,50-57, 158-161	O
	Fuel Pump	Test		0.3				1,2	
		Replace		1.0				1,2	
0304	Cleaner Assembly, Air	Inspect	0.2						
		Service	0.2	0.5				1	
		Replace		0.2				1	
	Horn, Air Induction	Inspect	0.1						
		Replace		0.3				1,2	
0306	Lines and Fittings, Fuel	Inspect		0.2					
		Replace		3.2				1	
	Tank, Fuel	Inspect		0.1					
		Replace		2.6				1,2	

Section II. MAINTENANCE ALLOCATION CHART (Cont'd)

(1) Group Number	(2) Component/Assembly	(3) Maintenance Function	(4) Maintenance Level					(5) Tools and Equipment Ref Code	(6) Remarks Code
			Unit		Direct Support	General Support	Depot		
			C	O	F	H	D		
0309	Filter Assembly, Fuel	Inspect Service Replace	0.1	0.1 0.5 0.5				1 2	B
0311	Glow Plugs	Test Replace		0.3 0.7				2 1,2,48,155	
0312	Accelerator Linkage	Inspect Adjust Replace		0.2 0.2 0.8				1 1,2	
	Hand Throttle	Inspect Adjust Replace	0.1	0.1 0.2 0.5				1 1,2	
04	EXHAUST SYSTEM								
0401	Muffler	Inspect Replace		0.2 1.9				1,2	
	Crossover Pipe	Inspect Replace		0.2 1.2				1,2,145, 150	
	Tailpipe	Inspect Replace		0.2 0.5				1,2	
05	COOLING SYSTEM								
0501	Radiator	Inspect Test Replace Repair	0.1	0.2 0.5 4.3	3.0			2,66 1 1	
	Surge Tank	Inspect Service Replace	0.1 0.1	0.5 0.6				1,2 1	C
0502	Shroud, Fan	Inspect Replace Repair		0.1 4.4 F				1	F,M
0503	Hoses, Lines, and Clamps	Inspect Replace	0.1	0.1 2.5				1	
	Thermostat	Test Replace		0.2 0.3				1,2	
0504	Pump, Water	Replace		3.5				1,6	
0505	Fan	Inspect Replace	0.1	0.1 1.0				1,2,161	
	Fan Drive	Repair			4.7			1,6	
	Pulley, Water Pump	Replace		4.8				1,157	

Section II. MAINTENANCE ALLOCATION CHART (Cont'd)

(1) Group Number	(2) Component/Assembly	(3) Maintenance Function	(4) Maintenance Level					(5) Tools and Equipment Ref Code	(6) Remarks Code
			Unit		Direct Support	General Support	Depot		
			C	O	F	H	D		
06	Belts, Drive	Inspect	0.1						
		Adjust		0.5				1,2,67	
		Replace		1.0				1,2,67	
0601	ELECTRICAL SYSTEM								
0603	Alternator (60 Ampere)	Inspect		0.1					
		Test		0.3				2,166	
		Adjust		0.3				1,163	
0603	Pulley, Alternator	Replace		1.0				1,2	
		Replace		1.2				1,2,67	
		Starter							
0607	Instrument Panel	Inspect		0.2				2	
		Test		0.3				1,2,145,	
		Replace		1.9				146,149	
0607	Switches	Repair			8.3			1,9	
		Replace		0.3				1	
		Inspect	0.1						
0608	Circuit Breakers	Replace		0.5				1	
		Replace		0.5				1	
		Control, Directional Signal							
0609	Protective Control Box	Inspect	0.1					1	
		Replace		0.3				1	
		Headlight							
0610	Headlight	Inspect	0.1					1,2	
		Adjust		0.2				1	
		Replace		0.5					
0611	Lights, Composite, Front and Rear	Inspect	0.1					1	
		Replace		0.1				2	
		Sending Units and Warning							
0611	Switches	Test		0.1				1	
		Replace		0.1					
		Horn Assembly							
0612	Horn Assembly	Inspect	0.1					2	
		Test		0.2				1	
		Replace		0.3				2	
0612	Switch, Horn	Test		0.2				1	
		Replace		0.2					
		Battery							
0612	Battery	Inspect	0.1					2	
		Test		0.5				1	
		Service		0.2				1	
0612	Cables, Battery	Replace		1.6				1	
		Inspect	0.2					1	
		Replace		0.8				1,2	
		Repair		0.5					

Section II. MAINTENANCE ALLOCATION CHART (Cont'd)

(1) Group Number	(2) Component/Assembly	(3) Maintenance Function	(4) Maintenance Level					(5) Tools and Equipment Ref Code	(6) Remarks Code	
			Unit		Direct Support	General Support	Depot			
			C	O	F	H	D			
0613	Wiring Harnesses									
	Wiring Harness, Engine	Inspect		0.3						
		Replace			4.5			1,6		
		Repair		0.5				1,2		
	Wiring Harness, STE/ICE-R	Inspect		0.3						
		Replace			3.7			1,6		
		Repair		0.5				1,2		
	Wiring Harness, Body	Inspect		0.4						
		Replace			3.5			1,6		
		Repair		0.5				1,2		
	Wiring Harness, Hood	Inspect		0.2						
		Replace		1.0				1		
		Repair		0.5				2		
	0615	Ambulance Electrical System								
		Spotlight and Ceiling	Inspect	0.1						
Light Bulbs		Replace		0.1				1		
Spotlight and Ceiling Light Assemblies		Inspect	0.1							
		Replace		0.2				1		
Blackout Light Switches		Inspect	0.1							
		Replace		0.2				1		
Backup Lights		Replace		0.3				1		
Control Box		Inspect	0.1							
		Replace		2.5				1		
Control Box Relays, Switches, Fuse Blocks		Replace		0.3				1		
Heat/Vent Control Panel (M996)		Replace		0.3				1		
Heat, Vent, and A/C Control Box (M997)		Replace			10.0			1		
Heat, Vent, and A/C Switches and Relays		Replace		0.3				1		
200 Ampere Alternator		Inspect		0.2						
	Test		0.3				2,166			
	Replace		1.1				1			
	Adjust		0.3							
	Repair			4.0						
Lighting Wiring Harness	Replace		3.5				1			
NBC Control Box and Wiring Harness	Replace		4.3							

Section II. MAINTENANCE ALLOCATION CHART (Cont'd)

(1) Group Number	(2) Component/Assembly	(3) Maintenance Function	(4) Maintenance Level					(5) Tools and Equipment Ref Code	(6) Remarks Code
			Unit		Direct Support	General Support	Depot		
			C	O	F	H	D		
07	TRANSMISSION (3L80)								
0705	Shift Control and Linkage	Inspect Adjust Replace Repair	0.1	0.2 0.5 1.5 1.0				1 1,2 6	
	Modulator, Mechanical	Adjust Replace		0.1 0.6				2 2	
	Switch Neutral Start	Replace		0.5				1	
	Detent Solenoid	Replace			1.7			1,2	
0708	Torque Converter	Replace			3.3			1,2	
0710	Transmission Assembly	Inspect Test Service Replace Repair	0.1		0.5 0.2 5.8			2,6,145 1,2 1,6,144 1,6,70,80	
	Transmission Mount	Inspect Replace		0.2 1.0				1,6	
	Gear Unit	Replace Repair				1.5 1.3		1,6,70-73 1,6,72-75	
0713	Forward Clutch	Replace Repair				2.0 0.6		1,6,70-73 1,6,76,77	
	Direct Clutch	Replace Repair				2.0 0.8		1,6,70-73,79 1,6,76,77	
	Intermediate Clutch	Replace Repair				2.0 0.8		1,6,70-73 1,6,74,75,79	
0714	Rear Servo	Replace Repair				1.0 0.3		1,6,78 1,6,78	
	Front Servo	Replace Repair				1.0 1.0		1,6 1,6	
	Band, Front and Rear	Replace				2.5		1,6,70-73,79	
	Governor	Inspect Replace			0.2 0.5			1,6	
	Control Valve	Replace Repair				1.3 1.0		1,6 1,6,10	
0721	Oil Pump, Transmission	Replace Repair				1.0 1.6		1,6,70,71,73,80 1,6,73-75	
	Seal, Oil Pump	Replace			0.3			1,6,80	
	Oil Filter, Transmission	Replace		1.5				1,2	
	Oil Cooler Lines	Inspect Replace		0.2 1.0				1	

Section II. MAINTENANCE ALLOCATION CHART (Cont'd)

(1) Group Number	(2) Component/Assembly	(3) Maintenance Function	(4) Maintenance Level					(5) Tools and Equipment Ref Code	(6) Remarks Code
			Unit		Direct Support	General Support	Depot		
			C	O	F	H	D		
0705	TRANSMISSION (4L80-E) Shift Control and Linkage	Inspect	0.1	0.2					
		Adjust		0.5				1	
		Replace		1.5				1,2	
0708	Throttle Position Sensor	Repair		1.0				1,2	
		Adjust		0.1				1,63,166,173	
		Replace		0.6				1,63,166,173	
0708	Switch, Neutral Start	Replace		0.5				1	
0710	Torque Converter	Replace			3.3			1,2	
0710	Transmission Assembly	Inspect	0.1						
		Test			0.5				1,2,6, 93.1,93.2, 145,166,173
		Service		0.2					1,2
0713	Transmission Mount	Replace			5.8			1,2,6,144	
		Repair				4.0		1,6,70,71,81	
		Overhaul				13.5		1,6,70-73, 79,81-84, 92,93,95,172	
0713	Gear Unit	Inspect		0.2					
		Replace		1.0				1,2	
		Replace				1.5		1,6,84	
0713	Forward Clutch	Repair				1.3		1,6,84	
		Replace				2.0		1,6,85, 87,88,172	
		Repair				0.6		1,6,85-88, 172	
0714	Direct Clutch	Replace				2.0		1,6,79, 87,88, 172	
		Repair				0.8		1,6,79, 86-88	
		Replace				2.0		1,6,84	
0714	Intermediate Clutch	Repair				0.8		1,6,79,84	
		Replace				2.0		1,6,86-88	
		Repair				0.8		1,6,87-89	
0714	Fourth Clutch	Replace				2.0		1,6	
		Repair				0.8		1,6,79,86,90	
		Replace				2.0		1,6	
0714	Turbine Shaft and Overdrive Carrier	Repair				0.8		1,6	
		Replace				1.0		1,6	
		Repair				0.3		1,6	
0714	Rear Servo	Replace				1.0		1,6	
		Repair				0.3		1,6	
		Replace				1.0		1,6	
0714	Front Servo	Repair				1.0		1,6	
		Replace				1.0		1,6	
		Replace				2.5		1,6,92,93	
0714	Band, Front and Rear	Replace				2.5		1,6,92,93	
		Inspect			0.2			1,6	
		Replace			0.5			1,6	
0714	Governor	Replace				1.3		1,6	
		Repair				1.0		1,6,10	
		Control Valve				1.3		1,6	
		Repair				1.0		1,6,10	

Section II. MAINTENANCE ALLOCATION CHART (Cont'd)

(1) Group Number	(2) Component/Assembly	(3) Maintenance Function	(4) Maintenance Level					(5) Tools and Equipment Ref Code	(6) Remarks Code
			Unit		Direct Support	General Support	Depot		
			C	O	F	H	D		
0721	Oil Pump, Transmission	Replace Repair				1.0 1.6		1,6,83 1,6,83,91	
	Seal, Oil Pump	Replace			0.3			1,6,80	
	Oil Filter, Transmission	Replace		1.5				1,2	
	Lines, Oil Cooler	Inspect Replace		0.2 1.0				1,2	
08	TRANSFER								
0801	Transfer Case	Inspect Service Replace Repair Overhaul		0.1 0.5				2 1,6,144 1,6,75,94-106 1,6,10,75 94,106,144	P
	Seal, Oil, Input and Output Shaft	Replace		1.3				1,2,94	
	Yokes, Front and Rear	Replace		1.2				1,2	
	Bearings, Output Shaft	Replace				3.0		1,2,75,95-100	
	Gear, Speedometer Driven	Replace		0.5				1,2,107	
0803	Shift Control and Linkage	Inspect Adjust Replace Repair	0.1	0.2 0.5 1.0				1 1,2 1,2	D
09	PROPELLER SHAFTS								
0900	Shafts, Propeller, Front	Service Replace Repair		0.2 1.0 0.5		1.2		1,2 1,2 1,2,6	E
	Shaft, Propeller, Rear	Service Replace Repair		0.2 1.0 1.2				1,2 1,2 1,2	
	Joints, Universal	Inspect Service Replace		0.1 0.3 1.5				2 1,2	
10	FRONT AXLE								
1000	Halfshaft	Inspect Replace Repair		0.2 2.2 1.0				1,2 1,2	

Section II. MAINTENANCE ALLOCATION CHART (Cont'd)

(1) Group Number	(2) Component/Assembly	(3) Maintenance Function	(4) Maintenance Level					(5) Tools and Equipment Ref Code	(6) Remarks Code	
			Unit		Direct Support	General Support	Depot			
			C	O	F	H	D			
1002	Differential Assembly	Inspect		0.1						
		Service		0.5				1,2		
		Replace			5.0			1,2		
		Repair				10.2		1,7,75,94, 117-124		
1004	Seal, Output Shaft, Differential	Replace			1.0			1,6,117		
		Seal, Pinion, Differential	Replace			0.3			1,6,94	
			Replace		0.5				1,2	H
		Differential Cover	Inspect		0.1				1,2	
Service			0.5				1,2			
1100	Knuckle and Geared Hub	Replace			2.0			1,2,167		
		Repair			1.2			1,2,6,75, 126-128,129	K	
		Adjust		0.9				1,2,127		
	Bearing, Spindle, Geared Hub	Replace		2.0				1,2,75,126		
		Replace		1.0				1,2,75,127,128	I	
	Seal, Input, Geared Hub	Adjust		0.5				2		
		Replace		0.3				2		
	Upper Control Arm	Inspect		0.1				1,2		
		Replace		1.0				1,2		
		Repair			1.0			1,2		
	Lower Control Arm	Inspect		0.1				1,2		
		Replace		2.6		1.0		1,2		
Ball Joint, Upper and Lower	Repair		0.6				1,2,129,146, 151			
	Replace									
11	REAR AXLE									
1102	Halfshaft	Inspect		0.2						
		Replace		1.8				1,2		
		Repair		1.0				1,2		
1102	Differential Assembly	Inspect		0.1						
		Service		0.5				1,2		
		Replace			5.0			1,2		
		Repair				10.0		1,7,75,94, 117-124		
Seal, Output Shaft, Differential	Replace				1.0			1,6,117		
	Replace				0.3			1,6,94		

Section II. MAINTENANCE ALLOCATION CHART (Cont'd)

(1) Group Number	(2) Component/Assembly	(3) Maintenance Function	(4) Maintenance Level					(5) Tools and Equipment Ref Code	(6) Remarks Code
			Unit		Direct Support	General Support	Depot		
			C	O	F	H	D		
1104	Knuckle and Geared Hub	Inspect		0.1				2,167 1,2,75,126, 128,129 1,2,127 1,2,75,126 1,2,75,127, 128 1,2 1,2 1,2 1,2 1,2,129,146, 151	K
		Service		0.5					
		Replace			2.0				
		Repair			1.2				
	Bearing, Spindle, Geared Hub	Adjust		0.9					
		Seal, Input, Geared Hub	Replace			2.0			
	Seal, Spindle, Geared Hub	Replace		1.0					
		Upper Control Arm	Inspect		0.1				
	Lower Control Arm	Replace		1.0					
		Repair			1.0				
Ball Joint, Upper and Lower	Inspect		0.1						
	Replace		2.6		1.0				
12	BRAKES	Replace		0.6					
		1201	Parking Brake Lever	Adjust	0.3				
1201	Parking Brake Lever	Replace		1.0					
		Parking Brake Cable	Adjust	0.5					
	Parking Brake Cable	Replace		1.0					
		Parking Disc Brake Pad	Inspect		0.2				
	Dual Service/Parking Brake Cable, Right Rear	Replace		1.0					
		Adjust		0.5					
	Dual Service/Parking Brake Cable, Left Rear	Replace		0.7					
		Adjust		0.5					
	Dual Service/Parking Calipers, Rear	Replace		0.5					
		Inspect	0.1						
Dual Service/Parking Pads, Rear	Replace		1.0						
	Inspect		0.2						
1202	Service Brakes	Test	0.1						
		Calipers, Front and Rear	Replace		1.0				
	Pads, Front and Rear	Repair			0.5				
		Inspect		0.2					
Rotor, Front and Rear	Replace		1.0						
	Inspect		0.1						
		Replace		1.2					
		Repair			1.5				

Section II. MAINTENANCE ALLOCATION CHART (Cont'd)

(1) Group Number	(2) Component/Assembly	(3) Maintenance Function	(4) Maintenance Level					(5) Tools and Equipment Ref Code	(6) Remarks Code
			Unit		Direct Support	General Support	Depot		
			C	O	F	H	D		
1204	Master Cylinder	Inspect Service Replace	0.1	0.2 0.5				2 1,2	
	Brake Lines	Inspect Replace		0.2 1.5				1	
	Proportioning Valve	Replace		0.6				1,2	
1205	Hydro-Boost	Replace		1.3				1,2	
1206	Pedal, Brake	Replace		1.0				1,2,146,153	
13	WHEELS AND TIRES								
1301	Front Wheel Toe-In	Align		0.5				1	
	Rear Wheel Toe-Out	Align		0.5				1	
1311	Wheel and Tire Assembly	Inspect Service Replace Repair	0.1 0.2 0.4	0.1 0.1 0.5				1,2 1,2,130	N
	Runflat Assembly	Replace		2.2				1,2,4,144, 154,131	J
14	STEERING								
1401	Mechanical Steering								
	Wheel, Steering	Replace		0.7				1,2	
	Column, Steering	Inspect Replace		0.1 1.8				1,2	
	Intermediate Shaft, Steering	Service Replace		0.2 0.5				1,2 1,2	
	Tie Rod Assembly	Inspect Service Adjust Replace		0.1 0.2 0.5 0.5				1,2 1,2,167 1,2,129	
	Center Link	Inspect Replace		0.1 0.3				1,2 1,2,167	
	Pitman Arm	Inspect Replace		0.1 1.0				1,2,129	
	Idler Arm	Inspect Replace		0.1 0.3				1,2,129	
	Camber/castor	Adjustment				2.2		1,138.1	
1407	Gear, Power Steering	Inspect Replace Repair		0.2 0.5	3.7			1,2 1,6,132, 133,135	

Section II. MAINTENANCE ALLOCATION CHART (Cont'd)

(1) Group Number	(2) Component/Assembly	(3) Maintenance Function	(4) Maintenance Level					(5) Tools and Equipment Ref Code	(6) Remarks Code
			Unit		Direct Support	General Support	Depot		
			C	O	F	H	D		
1410	Pump, Power Steering	Inspect Test	0.1	0.1 0.5				1,2, 136-138	
		Service Replace Repair		0.2 1.0 1.0				1,2 1,2 1,2	
	Pulley, Power Steering Pump	Replace		0.5				1,2,137	
1411	Hoses, Lines, and Fittings Power Steering	Inspect Replace		0.2 1.0				1	
15	FRAME								
1501	Frame Assembly	Inspect Repair		0.5		F		1,5	F
	Crossmember, Transmission	Replace		2.0				1	
	Crossmember, Suspension, Front, Brackets, and Supports	Inspect Replace Repair		0.2	4.5 2.0			1,6 1,5	
	Crossmember, Rear	Replace		2.0				1,2	
	Bumpers	Replace		0.5				1,2	
1503	Pintle, Towing	Inspect Service Replace Repair	0.1	0.1 1.0 0.2				1 1,2 1,2	
16	SPRINGS AND SHOCK ABSORBERS								
1601	Springs	Inspect Replace		0.1 1.0				1,2	
1604	Absorbers, Shock	Inspect Replace	0.1	0.1 0.8				1,2	
1605	Rod, Stabilizer	Replace		1.5				1,2	
	Rod, Radius	Inspect Replace Repair		0.1 1.0 0.5				1,2 1,2	
18	BODY AND HOOD								
1801	Body	Inspect Service Replace Repair	0.1	1.0		F F		1 1,6 1,2,139,140	F F
	Hood	Inspect Replace Repair	0.1	1.3	F			1,2 1,6	F

Section II. MAINTENANCE ALLOCATION CHART (Cont'd)

(1) Group Number	(2) Component/Assembly	(3) Maintenance Function	(4) Maintenance Level					(5) Tools and Equipment Ref Code	(6) Remarks Code
			Unit		Direct Support	General Support	Depot		
			C	O	F	H	D		
1802	Doors, Rear	Inspect Replace Repair	0.1	0.2	F			1 1,5,139	F
	Cover, Engine Access	Inspect Replace Repair	0.1	0.1	F			1 1,5,139	F
	Windshield Assembly, Folding	Inspect Replace Repair	0.1	2.0	F			1,2 1,5,139	F
	Windshield Assembly, Fixed	Inspect Replace Repair	0.1		2.0 F			1,6 1,5,139	F
1806	Windshield Glass	Inspect Replace	0.1	1.0					
	Seats	Inspect Replace Repair	0.1	1.0 1.0				1,2 1,2	
1808	Seatbelts	Inspect Replace	0.1	0.8				1,2	
	Stowage Racks, Boxes, and Straps	Inspect Replace Repair	0.1	F F				1,2 1,2	F F
1812	Tailgate	Inspect Replace Repair	0.1	0.4	1.0			1,2 1,5,139	
	TOW Carrier and Armament Carrier (M966, M966A1, M1025, M1025A1, M1025A2, M1026, M1026A1, M1036, M1043, M1043A1, M1043A2, M1044, M1044A1, M1045, M1045A1, M1045A2, M1046, M1046A1, M1121)								
	Doors, Crew	Inspect Adjust Replace Repair	0.1	0.3 0.2	F			1,2 1 1,5,139	F
	Door, Cargo Shell	Inspect Adjust Replace Repair	0.1	0.3 2.5 F				1,2 1,2 1,2,139	F
	Glass, Door	Inspect Replace	0.1	1.0				1	
	Weapon Station	Inspect Replace	0.1	1.5				1,6	
	Gunners Platform	Inspect Replace	0.1	0.5				1	

Section II. MAINTENANCE ALLOCATION CHART (Cont'd)

(1) Group Number	(2) Component/Assembly	(3) Maintenance Function	(4) Maintenance Level					(5) Tools and Equipment Ref Code	(6) Remarks Code
			Unit		Direct Support	General Support	Depot		
			C	O	F	H	D		
	S250 Shelter Carrier (M1037, M1042)								
	Support, Shelter	Inspect Replace	0.1	2.0				1,2	
	Sling, Tiedown	Inspect Replace	0.1	0.3				1	
	Soft Top Ambulance (M1035, M1035A1)								
	Rack, Litter	Inspect Replace	0.1	1.5				1,2,	
	Ambulance – 2-Litter (M996, M996A1), 4-Litter (M997, M997A1 M997A2)								
	Door, Rear	Inspect Adjust Replace	0.1	0.4 0.3				1,2 1,2	
	Door Latch and Handles, Rear	Inspect Replace	0.1 0.5						
	Steps, Rear	Inspect Replace Repair	0.1	0.5 0.6				1,2 1,2	
	Litter Rack, Upper	Inspect Replace	0.1	1.5				1,2	
	Doors, Stowage	Inspect Replace	0.1	1.0				1,2,139	
	Doors, Bulkhead	Inspect Replace	0.1	2.0				1,2,139	
	Extension Rails, Litter	Repair		1.2				1,2	
	NBC Heaters and Brackets	Inspect Replace	0.1	0.8				1,2	
	NBC Filters and Brackets	Inspect Replace	0.1	0.7				1,2	
	Ambulatory Patient Seat	Inspect Replace	0.1	0.6				1,2	
	Heat/Vent Panel (M996, M996A1)	Replace		0.3				1,2	
	Heater (M996, M996A1)	Adjust Replace Repair		1.5 0.8 3.5				1,6 1,2 1,6	
	Heater (M997, M997A1, M997A2)	Adjust Replace Repair		1.5 0.8 3.5				1,6 1,2 1,6	

Section II. MAINTENANCE ALLOCATION CHART (Cont'd)

(1) Group Number	(2) Component/Assembly	(3) Maintenance Function	(4) Maintenance Level					(5) Tools and Equipment Ref Code	(6) Remarks Code
			Unit		Direct Support	General Support	Depot		
			C	O	F	H	D		
20	WINCH								
2001	Winch Assembly	Service Replace Repair		0.2 0.6				1,2 1,9,159	
	Cable, Winch	Inspect Service Replace	0.5	0.5 0.4	4.0			1 1,2	
	Control Assembly, Winch	Inspect Replace	0.1	0.1				1,2	
22	BODY ACCESSORY ITEMS								
2201	Bows	Inspect Service Replace Repair	0.5	0.1 1.0 0.5				1 1	
	Cover, 2-Door Cab	Inspect Service Replace Repair	0.5	0.1 0.5	F			1 1,7	F
	Cover, 4-Door Cab	Inspect Service Replace Repair	0.5	0.1 1.5	F			1 1,7	F
	Cover, 2-Door Cargo	Inspect Service Replace Repair	0.5	0.1 1.0	F			1 1,7	F
	Cover, 4-Door Cargo	Inspect Service Replace Repair	0.5	0.1 1.0	F			1 1,7	F
	Door, Front	Inspect Service Adjust Replace Repair	0.1 0.1	0.4 0.2	F			1,2 1 1,7	F F
	Cover, Rear Door	Inspect Service Replace Repair	0.1 0.1	0.2	F			1 1,7	F
	Curtain, Body Cover	Inspect Service Replace Repair	0.5	0.1 1.0	F			1 1,7	F

Section II. MAINTENANCE ALLOCATION CHART (Cont'd)

(1) Group Number	(2) Component/Assembly	(3) Maintenance Function	(4) Maintenance Level					(5) Tools and Equipment Ref Code	(6) Remarks Code
			Unit		Direct Support	General Support	Depot		
			C	O	F	H	D		
2202	Motor, Windshield Wiper	Test		0.3				2	
		Replace		0.5				1,2	
	Arm Assembly, Wiper	Inspect	0.1						
		Replace		0.2				1,2	
	Linkage, Wiper	Replace		0.5				1	
	Motor and Reservoir Assembly, Washer	Test		0.2				2	
		Service		0.2				1	
		Replace		0.1				1,2	
	Nozzle, Washer	Replace		0.5				1	
	Mirror, Rearview	Inspect	0.1						
	Adjust	0.1							
	Replace		0.2				1,2		
	Reflectors	Replace		0.2			1		
	Steering Wheel Lock	Replace		1.0			1,139		
2207	Ducting, Defroster and Heater	Replace		1.0			1		
	Controls, Defroster and Heater	Replace		1.0			1		
	Heater Assembly	Replace		1.4			1,2		
2210	Data Plates	Replace		0.5			1,139		
33	SPECIAL PURPOSE KITS								
3303	Arctic Winterization Kit	Install			8.0			6,139-142	
	Arctic Heater Kit	Install			8.0			6,139-142	
	Pump and Lines, Fuel	Inspect	0.1	0.2					
		Replace		1.0				1,2	
	Heater	Inspect	0.1						
		Replace		0.2				1	
	Control, Heater	Replace		0.5				1	
		Repair		1.0				1	
	2-Man Crew Top Kit	Install			2.0			139	
	Cover, 2-Door Cab	Inspect	0.1						
	Replace		0.5				1		
	Repair			F			7	F	
	Curtain, Body Cover	Inspect	0.1						
		Replace		0.5			1		
		Repair			F		7	F	
3305	Deep Water Fording Kit	Install		4.0				1,2	
	Snorkel, Intake and Exhaust	Inspect	0.2	0.2					
		Install	2.0						
		Replace		1.5				2	
	Venting	Inspect	0.1	0.1					
	Replace		1.0				1		

Section II. MAINTENANCE ALLOCATION CHART (Cont'd)

(1) Group Number	(2) Component/Assembly	(3) Maintenance Function	(4) Maintenance Level					(5) Tools and Equipment Ref Code	(6) Remarks Code
			Unit		Direct Support	General Support	Depot		
			C	O	F	H	D		
3307	100 AMP Alternator Kit	Inspect Test Install Replace Repair		0.2 0.3 2.5 1.0				4 2 2 9	
	Troop Seat Kit	Inspect Install Replace Repair	0.1		1.0				
	Communications Kit	Install Replace		2.0 0.8 1.0				1,2 2 4	
				3.0 F				1,2 1	F
47	GAGES (NON-ELECTRICAL)								
4701	Speedometer	Replace		0.2				1	
	Cable and Housing	Replace		0.5				1	
4702	Gage, Air Restriction	Inspect Replace	0.1					1	
52	AIR CONDITIONER								
	Ambulance (M997, M997A1, M997A2)								
5203	Compressor, A/C	Replace Repair			1.5 3.0			1,2,19,19.1 1,2,143	
	Bracket Mounting, Compressor	Replace			0.4			1	
5205	Service Valve, A/C	Replace			0.6			2,19,19.1	
5217	A/C Lines and Fittings	Inspect Replace		0.1		1.5		1,6,19,19.1	
	Air Conditioner	Inspect Test Service	0.1						
				0.3		1.6		2,19,19.1,143	
5230	Coil, Condensor	Replace				1.6		2,19	
5241	Coil, Evaporator	Replace Repair				2.0 0.4		2,19 2	
5243	Blower Motor, Condenser	Replace		0.8				1	
	Blower Motor, Evaporator	Replace Repair		1.0 0.6				1	
5246	Bottle, Dryer	Replace			0.3			1	

Section III. TOOL AND TEST EQUIPMENT REQUIREMENTS

(1) Reference Code	(2) Maintenance Category	(3) Nomenclature	(4) National/NATO Stock Number	(5) Tool Number
1	O	Tool Kit, General Mechanic's Automotive	5180-00-177-7033	SC5180-90-CL-N26
2	O	Shop Equipment, Automotive Maintenance and Repair: Organizational Maintenance, Common #1, Less Power	4910-00-754-0654	SC4910-95-CLA74
3	O	Shop Equipment, Automotive Maintenance and Repair: Organizational Maintenance, Supplemental #1, Less Power	4910-00-754-0653	SC4910-95-CLA73
4	O	Shop Equipment, Automotive Maintenance and Repair: Organizational Maintenance, Common #2, Less Power	4910-00-754-0650	SC4910-95-CLA72
5	O	Tool Kit, Body and Fender	5180-00-754-0643	SC5180-90-N34
6	F	Shop Equipment, Automotive Maintenance and Repair: Field Maintenance, Basic, Less Power	4910-00-754-0705	SC4910-95-CLA31
7	F	Shop Equipment, Automotive Maintenance and Repair: Field Maintenance, Supplemental #1, Less Power	4910-00-754-0706	SC4910-95-CLA62
8	F	Shop Equipment, Automotive Maintenance and Repair: Field Maintenance, Supplemental #2, Less Power	4910-00-754-0707	SC4910-95-CLA63
9	F	Shop Equipment, Fuel and Electrical System Engine: Field Maintenance, Basic, Less Power	4940-00-754-0714	SC4910-95-CLA01
10	F	Shop Equipment, Automotive Maintenance and Repair: Field Maintenance, Wheeled Vehicles, Post, Camp and Station, Set A	4910-00-348-7696	SC4910-95-CLA02
11	O	Special Tool Kit, Organizational	5180-01-387-5455	57K0267
11.1	O	Special Tool Kit, Organizational, Supplemental ("A2" series only)	5180-01-410-8467	57K3219
12	F	Special Tool Kit, Direct Support	5180-01-389-7560	57K0268
13	H	Special Tool Kit, General Support	5180-01-389-7561	57K0266
13.1	H	Special Tool Kit, General Support, Supplemental ("A2" series only)	5180-01-408-7050	57K3218
13.2	H	Special Tool Kit, General Support, Supplemental Transmission	5180-01-357-9692	57K0236

Section III. TOOL AND TEST EQUIPMENT REQUIREMENTS

(1) Reference Code	(2) Maintenance Category	(3) Nomenclature	(4) National/NATO Stock Number	(5) Tool Number
NOTE				
The optional metric tool sets listed below are required for maintenance of this vehicle.				
14	O	Metric Wrench Set, 10-32 mm, Open End/Box End	5120-01-119-0010	OEXM719K
15	O	Metric Socket Set, 6-26 mm, Std., 6 pt., 3/8 in. Drive	5120-01-117-3876	221FSMY
16	F	Metric Socket Set, Std., 6 pt., 3/8 in. Drive, Deep Reach	5120-01-112-9543	B107.5
17	F	Metric Allen Wrench Kit	5120-01-046-5079	B18.3.2M
18	F	Metric Tap and Die Kit	5136-01-119-0005	TDM99117
19	F	Tool Kit, Service Refrigeration Unit	5180-00-596-1474	SC5180-90-CL-N18
19.1	F	Parts Kit, FR-12 Refrigerant	4130-01-452-8773	57K3534
01 ENGINE				
20	F	Adapter, Compression Gage	4910-01-238-2551	J 26999-30
21	F	Quick Disconnect	4730-01-842-5266	J 25209
22	F	90° Elbow	4730-00-985-4804	MS51815-4P
23	F	Remover, Hydraulic Valve Lifter	5120-01-209-6870	J 29834
24		DELETED		
25	F	Engine Lifting Sling	4910-01-193-7808	J 33139
26	F	Tester, Engine Compression	4910-00-785-6437	J 6692A
27		DELETED		
28		DELETED		
29		DELETED		
30		DELETED		
31		DELETED		
32		DELETED		
33		DELETED		
34		DELETED		
35		DELETED		
36		DELETED		
37		DELETED		

Section III. TOOL AND TEST EQUIPMENT REQUIREMENTS

(1) Reference Code	(2) Maintenance Category	(3) Nomenclature	(4) National/NATO Stock Number	(5) Tool Number
38		DELETED		
39		DELETED		
40		DELETED		
41	F	Gauge, Timing	6620-01-231-3671	MT95
42	F	Meter, Dynamic Timing	5180-01-186-3114	J 33127
43		DELETED		
44	H	Stand – Engine Repair	4910-00-506-0037	1725A
45		DELETED		
46	H	Installer, Crankshaft Rear Oil Seal (6.2L)	5120-01-210-8792	J 33153
	H	Installer, Crankshaft Rear Oil Seal (6.5L)	5120-01-422-0334	J 39084
47	H	Remover and Installer, Camshaft Bearings	5120-01-206-3818	J 35178
48	O	Pliers, Needle Nose, 90°	5120-01-174-4496	497ACP
		03 FUEL SYSTEM		
49	F	Remover, Fuel Injection Nozzle	5120-01-171-5233	J 29873
50	H	Installer, Drive Shaft Bearing	5120-01-208-7771	23805
51	H	Installer, Drive Shaft Seal	5120-01-208-7752	22727
52	H	Kit, Throttle and Shutoff Shaft Bushing	5180-01-189-0448	18411
53	H	Socket, Torx Drive, T27	5120-01-367-3534	FTX27A
54	H	Support, Governor Weight	5120-01-197-0236	16313
55	H	Wrench, End Cap	5120-01-207-5563	20548
56	H	Roller to Roller Setting Tool	5120-01-200-4526	19969
57	H	Fixture, Holding	5120-01-208-7753	23615
58	H	Mandrel, Pilot Tube	5120-01-208-1767	16314
59	H	Extractor, Delivery Valve Test Set	5120-00-816-7059	26081
60		DELETED		
61	H	Linkage Gap Tool	5210-01-249-0370	23080
62	H	Indicator, Automatic Advance	5210-01-249-0368	23745
63	O	Block, Throttle Lever Gauge	4820-01-179-4869	J 33043
64	H	Protractor	6675-01-247-2286	22089

Section III. TOOL AND TEST EQUIPMENT REQUIREMENTS

(1) Reference Code	(2) Maintenance Category	(3) Nomenclature	(4) National/NATO Stock Number	(5) Tool Number
65	H	Gage, Air Timing	5220-01-247-0361	23715
05 COOLING SYSTEM				
66	O	Tester, Radiator	4910-00-728-8227	ST255A
67	O	Gage, Belt Tension	6635-01-093-3710	J 23600B
06 ELECTRICAL SYSTEM				
68	F	Socket, Torx	5120-01-227-3159	TLE60
69	O	Starter Pinion Core Shaft Nut Driver	9530-00-236-7723	MS14267C001
07 TRANSMISSION (3L80)				
70	H	Fixture, Transmission Holding	5120-01-198-7583	J 8763-02
71	H	Base, Transmission Holding Fixture	5120-01-144-4484	J 3289-20
72	H	Holding Tool, Transmission Gear Unit Assembly	4910-01-178-8865	J 21795-02
73	H	Adapter, Slide Hammer, 3/8-16	5120-01-130-8865	J 6471-2
74	H	Bushing Service Set	5180-01-195-9777	J 21465-01
75	O	Driver Handle	5120-00-677-2259	J8092
76	H	Compressor, Clutch Spring	5120-01-210-8793	J 4670-01
77	H	Adapter, Clutch Spring Compressor	4910-01-210-1318	J 21664
78	H	Gage, Band Apply Selector	4910-01-178-0722	J 21370
79	H	Alignment Tool, Intermediate Clutch Pack	4910-01-209-0729	J 24396
80	F	Installer, Oil Pump Seal	5120-01-176-1845	J 21359A
07 TRANSMISSION (4L80-E)				
81	H	Adapter, Holding Tool, Use W/J 8763-02	5120-01-422-1326	J 38655
82	H	Adapter, Torque, 3/8	5120-01-367-3536	FTX40A
83	H	Removal/Installer Tool, Oil Pump	5120-01-422-1308	J 37789-A
84	H	Installer/Remover, Gear Unit	5120-01-422-1300	J 38868-A
85	H	Adapter, Clutch Compressor Spring , Use W/J 23327	5120-01-422-1329	J 38734

Section III. TOOL AND TEST EQUIPMENT REQUIREMENTS

(1) Reference Code	(2) Maintenance Category	(3) Nomenclature	(4) National/NATO Stock Number	(5) Tool Number
86	H	Seal Protectors, Forward Clutch Piston, Kit Includes J 38732-1 and J 21362-1	5120-01-422-1301	J 38732
87	H	Compressor, Clutch Spring	4910-01-178-0724	J 23327
88	H	Adapter, Compressor, Clutch Spring, Use W/J 23327	5120-01-410-8216	J 25018-A
89	H	Seal Piston and Housing, Fourth Clutch, Includes J38731-1, J38731-2, J38731-3	5180-01-422-0138	J 38731
90	H	Installer/Sizer/Pusher, Turbine Shaft Seal, Includes J38736-1, J38736-2, J38736-3, J38736-4, J38736-5, J38736-6	5120-01-422-7051	J 38736
91	H	Installer/Sizer/Pusher, Oil Pump Seal Ring J 38739-1, J 38739-2, J 38739-3	5180-01-422-1294	J 38739
92	H	Gauge Pin, Band Apply, Use W/J 38737	5120-01-422-0032	J 21370-10
93	H	Tool Pin Checking, Band Apply	5120-01-422-1313	J 38737
93.1	O	Jumper, Throttle Position Sensor Adjustment	6150-01-412-7774	12460120
93.2	O	Case, Transmission Diagnostic Cable	5120-01-408-8173	12460136
93.3	O	Diagnostic Switch Cable	6150-01-410-8215	12460137
		08 TRANSFER (218)		
94	O	Installer, Yoke Seal	4910-01-179-5530	J 29162
95	H	Adapter, Slide Hammer	5120-01-391-5131	J 6471-8
96	H	Installer, Front Output Shaft Rear Bearing	5120-01-195-2721	J 29163
97	H	Installer, Rear Output Shaft Bearing	5120-01-196-0084	J 29166
98	H	Installer, Front Output Shaft Front Bearing	5120-01-170-3278	J 29167
99	H	Remover, Front Output Shaft Front Bearing	5120-01169-4876	J 29168
100	H	Remover, Universal Bearing and Bushing	5120-01-201-7857	J 29369
101	H	Remover, Input Gear Bearing	5120-01-195-4551	J 29170
102	H	Installer, Input Gear Bearing	5120-01-185-7955	J 29169

Section III. TOOL AND TEST EQUIPMENT REQUIREMENTS

(1) Reference Code	(2) Maintenance Category	(3) Nomenclature	(4) National/NATO Stock Number	(5) Tool Number
103	H	Installer, Rear Retainer Bearing	5120-01-185-8024	J 7818
104	H	Installer, Main Shaft Bearing	5120-01-265-4872	J 36307
105	H	Remover, Annulus Gear Bushing	5120-01-185-7956	J 29185
106	H	Installer, Annulus Gear Bushing	5120-01-247-6629	J 29185-2
107	O	Mirror, Inspection	5120-00-618-6902	J 35219
08 TRANSFER (242)				
108	H	Installer, Bushing Remover/Bearing	5120-01-357-3633	J 33826
109	H	Installer, Mainshaft Pilot Bearing	5120-01-389-9992	J 39636
110	H	Installer, Input Gear Seal	5120-01-357-3632	J 33831
111	H	Installer, Output Shaft Front Bearing	5120-01-357-3630	J 33833
112	H	Installer, Output Shaft Seal	5120-01-227-1680	J 22661
113	H	Remover, Extension Housing Bushing	5120-01-357-3631	J 33839
114	H	Bearing Tool	5120-01-357-9123	J 9276-3
115	H	Installer, Extension Housing Seal	5120-01-361-3101	J 33843
116	H	Installer, Bearing and Bushing	5120-01-185-7960	J 29174
116.1	O	Installer, Inserter	5120-01-144-1849	J 38869
116.2	O	Installer, Seal	5120-01-437-0480	6888
116.3	O	Handle, Drive	5120-01-026-1666	C-4171
116.4	H	Installer, Output Shaft, Rear Bearing	5120-01-477-6860	J 33832 or 5742628
10 AND 11 FRONT AND REAR AXLE				
117	F	Installer, Axle Shaft and Seal	5120-01-187-3659	J 33142
118	H	Adapters, Axle Holding Fixture	5120-01-218-8235	J 33149-A
119	H	Spreader, Differential Housing	4910-00-105-2823	W129
120	H	Remover, Pinion Rear Bearing Cup	5120-01-185-7957	J 21786
121	H	Remover, Pinion Front Bearing Cup	5120-01-187-3660	J21787
122	H	Installer, Pinion Rear Bearing Cup	5120-01-185-7962	J 8608
123	H	Installer, Pinion Front Bearing Cup	5120-01-185-7964	J 8611-01
124	H	Set, Pinion Setting Gage	5180-01-216-8643	J 35199
125	H	Set, Pinion Setting Gauge	5180-01-363-8079	J 39524
126	O	Installer, Geared Hub Input Seal	5120-01-187-3607	J 33143

Section III. TOOL AND TEST EQUIPMENT REQUIREMENTS

(1) Reference Code	(2) Maintenance Category	(3) Nomenclature	(4) National/NATO Stock Number	(5) Tool Number
127	O	Wrench, Geared Hub Locknut	5120-01-185-7963	J 33144
128	O	Installer, Geared Hub Spindle Seal	5120-01-229-0842	J 35184
129	O	Pickle Fork	5120-00-880-4268	11595179
13 WHEELS AND TIRES				
130	O	Bubble Balancer	4910-01-093-0167	MIL-B-45989
131	O	Runflat Compressor	5120-01-335-5847	J 39250 or 528236
14 STEERING SYSTEM				
132	F	Remover and Installer, Adjuster Plug Bearing	5120-01-185-7965	J 6221
133	F	Remover and Installer, Pitman Shaft Bearing	5120-01-082-6447	J 6278
134	F	Wrench, Spanner	5120-01-082-6436	J 7624
135	F	Arbor, Rack Piston	5120-01-179-1032	J 21552
136	O	Analyzer, Power Steering	4910-01-185-7966	12342943
137	O	Installer, Power Steering Pump Pulley	4910-01-179-2517	J 25033-B
138	O	Adapter	5120-01-231-1709	J 33141
138.1	H	Equipment, Alignment	4910-01-154-1820	DFP 134
18 BODY AND HOOD				
139	O	Tool Kit, Riveter	5180-01-201-4978	D-100-MIL-1
140	F	Puller, Head, Right Angle	5130-01-044-7196	H763-456
141	F	Puller, Head, Offset	5130-01-329-0509	H781-456
142	F	Puller, Head, Straight	5130-01-104-5370	H749A-456
52 AIR CONDITIONER				
143	F	Tool Kit, Compressor	5180-01-267-2907	J 29642-C
MULTIPURPOSE TOOLS				
144	O	Adapter, Torque, 9/16 in.	5120-01-367-3582	SRES 18

Section III. TOOL AND TEST EQUIPMENT REQUIREMENTS

(1) Reference Code	(2) Maintenance Category	(3) Nomenclature	(4) National/NATO Stock Number	(5) Tool Number
145	O	Adapter, Torque, 3/4 in.	5120-01-367-3585	SRES 24
146	O	Adapter, Socket, 3/8 in. to 1/2 in. Drive	5120-00-240-8702	11655788-2
147	F	Crowfoot, 3/8 in. Drive, 16 mm	5120-01-242-8165	J 35159
148	F	Crowfoot, 1/2 in. Drive, 19 mm	5120-01-230-9421	J 35160
149	O	Crowfoot, 3/8 in. Drive, 5/8 in.	5120-00-184-8398	FC20
150	O	Crowfoot, 3/8 in. Drive, 9/16 in.	5120-01-335-1094	FC 18A
151	O	Crowfoot, 3/8 in. Drive, 15/16 in.	5120-01-335-1100	FC-30A
152	O	Crowfoot, 3/8 in. Drive, 14 mm	5120-01-079-8023	FCOM14
153	O	Crowfoot, 3/8 in. Drive, 7/8 in.	5120-01-335-1099	FC-28A
154	O	Crowfoot, 3/8 in. Drive, 11/16 in.	5120-01-335-1096	FC-22A
155	O	Socket, Deep Well, 12 pt., 3/8 in.	5120-00-277-1463	FVS121
156	O	Driver, Hex-Head, 8 mm	5120-01-053-4159	FAM8A
157	O	Driver, Hex-Head, 6 mm	5120-01-055-1308	FAM6A
158	O	Driver, Hex-Head, 1/8 in.	5120-01-016-9202	J 35171
159	F	Driver, Hex-Head, 5/32 in.	5120-01-367-3456	FA5A
160	O	Driver, Hex-Head, 1/4 in.	5120-00-596-8508	FA8A
161	O	Driver, Hex-Head, 5/16 in.	5120-00-683-8602	FA10B
162	O	Driver, Hex-Head, 7 mm	5120-01-437-3658	FAM 7
163	O	Driver, Hex-Head, 3/16 in.	5120-00-683-8597	FA6A
164	O	"C" Clamp	5120-01-180-0908	A-A-429
165	O	Connector Repair Kit	5180-00-876-9336	7550526
166	O	Multimeter	6625-01-139-2512	AN/PSM-45
167	O	Puller, Mechanical	5120-01-011-7938	C-3894-A
168	O	Socket, 1-1/2 in. Drive 3/4 in.	5120-00293-0094	47148
169	O	Puller, Steering Wheel	5120-00-620-0020	6200020
170	O	Vice Insert	5120-00-221-1506	404-4
171	O	Universal Joint Bearing Kit	5120-01-210-4096	7057
172	F	Indicator, Dial	5120-00-277-8840	196A
173	F	Gauge, Pressure, Dial	6685-00-880-8753	8030176
174	F	Center Support Thread Reamer		J39919

Section IV. REMARKS

(1) REMARKS CODE	(2) REMARKS
A	Calibration time will be established when support equipment requirements are identified.
B	Operator drains water from fuel filter assembly. All other service is performed at unit level.
C	Operator replenishes coolant. All other service is performed at unit level.
D	Operator inspects shift lever. All other inspections are performed at unit level.
E	Direct support maintenance repairs coupling shaft by replacing center bearing. All other repair is performed at unit level.
F	In this category, no specific times can be established. Time required for repair will depend on the extent of repair required for damaged components.
G	Simplified test equipment/internal combustion engine (STE/ICE-R) testing times may vary depending on the type of tests being performed.
H	For vehicles with new brake adapters, P/N 10453002.
I	It is authorized to remove spindle to replace the seal. All other repair is performed at direct support level.
J	Runflat compressor to be used with rubber runflat.
K	If the puller kit is not available at unit level, it can be found in the GSA catalogue, Blind Hole Puller Set, NSN 5120-00-140-3557.
L	This tool can be found in the MCRL or GSA catalogue, Manometer, U-Tube, NSN 6685-00-857-4895.
M	Fan shroud repair is limited to repairs that can be made using fiberglass repair kit (Appendix C, Item 50). Only these repairs that can be made while the shroud is installed on the vehicle are authorized.
N	Operator can remove and replace wheel assembly, but must notify unit maintenance to tighten lug nuts to proper torque as soon as possible.
O	Direct support replaces fuel injection pump governor cover gasket, shut-off solenoid, and cold advance solenoid.
P	Direct support can reseal transfer case and rear transfer case housing with silicone sealant (RTV), NSN 6850-01-159-4844.

APPENDIX C

EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST

SECTION I. INTRODUCTION

C-1. SCOPE

This appendix lists expendable/durable supplies and materials you will need to maintain the M998 series vehicles. These items are authorized to you by CTA 50-970, Expendable Items (Except Medical, Class V, Repair Parts, and Heraldic Items).

C-2. EXPLANATION OF COLUMNS

- a. Column (1)-Item Number.** This number is assigned to each entry in the listing and is referenced in “Initial Setup” of applicable tasks under the heading of “Materials/Parts.”
- b. Column (2)-Level.** This column identifies the lowest level of maintenance that requires the listed item.
 - C — Operator/Crew
 - O — Unit Maintenance
- c. Column (3) – National Stock Number.** This is the National stock number assigned to the item; use it to request or requisition the item.
- d. Column (4) – Description.** Indicates the Federal item name and, if required, a description to identify the item. The last line for each item listing indicates the Commercial and Government Entity Code (CAGEC) in parentheses followed by the part number.
- e. Column (5) – Unit of Measure (U/M).** Indicates the measure used in performing the actual maintenance function. This measure is expressed by an alphabetical abbreviation (QT, GAL.). If the unit of measure differs from the unit of issue, requisition the lowest unit of issue that will satisfy your requirements.

Section II. EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) DESCRIPTION	(5) U/M
1	O		ADHESIVE: plastic cement (04963) 1099	
		8040-01-126-1422	1 Quart Can	QT
2	O		ADHESIVE: ethyl-2-cyanoacrylate, low viscosity (81349) MIL-A-46050C	
		8040-00-826-3535	1 Ounce Bottle	OZ
2.1	O		ADHESIVE: sealant, gray, Uniroyal (89619) SILAPRENE M6325-11	
		8030-01-347-0964	11 Ounce Cartridge	OZ
3	O		ADHESIVE: silicone, black (01139) RTV-103	
		8040-00-865-8991	12 Ounce Cartridge	OZ
4	O		ADHESIVE: synthetic, rubber (GA100AJ1)	
		8040-00-165-8614	1 Quart Can	QT
5	O		ADHESIVE: silicone, RTV (81349) MIL-A-46164	
		8040-00-938-1535	12 Ounce Cartridge	OZ
6	O		ADHESIVE: plumbing, solvent cement (81349) MIL-A-22010	
		8040-00-573-1502	1 Pint Container	PT
7	O		ADHESIVE: type II, class II (80244) MIL-A-46050-C	
		8040-01-167-2613	5 Ounce Tube	OZ
		8040-01-090-9320	1 Pint	PT
8	O		ADHESIVE: general trim, spray (04963) 051135 08080	
		8040-01-215-3426	24 Ounce Can	OZ
9	O		ADHESIVE SEALANT: RTV silicone rubber, clear (71984) SILASTIC 737 RTV	
		N/A	3 Ounce Tube	OZ
		N/A	10.3 Ounce Cartridge	OZ
		N/A	5.5 Gallon Pail	GAL.
9.1	O		ADHESIVE: (71984) 732 RTV	
		8040-00-078-9774	6 Ounce Cartridge	OZ

Section II. EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST (Cont'd)

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) DESCRIPTION	(5) U/M
10	O	8040-00-833-9563	ADHESIVE-SEALANT: silicone, RTV, general purpose (80244) MIL-A-46106, type I 5 Ounce Tube	OZ
11	C	6850-00-174-1806	ANTIFREEZE: arctic-type (81349) MIL-A-11755 55 Gallon Drum	GAL.
12	C	6850-00-181-7929	ANTIFREEZE: ethylene glycol, inhibited heavy-duty, single package (81349) MIL-A-46153 1 Gallon Container	GAL.
		6850-00-181-7933	5 Gallon Container	GAL.
13	O	8030-00-059-2761	ANTISEIZE COMPOUND: conductive (81349) MIL-A-907 1 Pound Can	LB
14	C	9150-01-102-9455	BRAKE FLUID: silicone, automotive, all weather, operational and preservative (81349) MIL-B-46176 1 Gallon Can	GAL.
		9150-01-123-3152	5 Gallon Can	GAL.
15		7510-00-223-6701	CHALK, MARKING: (81348) SS-C-255 1 Gross	GR.
16	O	6850-00-003-5295	CLEANING AND LUBRICATING COMPOUND: electrical (81349) MIL-C-83360 16 Ounce Can	OZ
17	C	7930-00-282-9699	DETERGENT: general purpose, liquid (81349) MIL-D-16791 1 Gallon Container	GAL.
17.1	C	7930-00-985-6904	DETERGENT: laundry (81348) PD-245 20 oz. box	OZ
18	C	6850-00-110-4498	DRYCLEANING SOLVENT: (81348) P-D-680, type II 1 Pint Can	PT
		6850-00-274-5421	5 Gallon Drum	GAL.
		6850-00-285-8011	55 Gallon Drum	GAL.
		6850-00-637-6135	Bulk	GAL.

Section II. EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST (Cont'd)

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) DESCRIPTION	(5) U/M
19	C		FUEL OIL: diesel, regular, DF-2 (81348) VV-F-800	
		9140-00-286-5295	5 Gallon Can	GAL.
		9140-00-286-5296	55 Gallon Drum	GAL.
20	C		FUEL OIL: diesel, winter, DF-1 (81348) VV-F-800	
		9140-00-286-5287	5 Gallon Drum	GAL.
		9140-00-286-5288	55 Gallon Drum	GAL.
21	C		FUEL OIL: diesel, arctic, DF-A (81348) VV-F-800	
		9140-00-286-5282	5 Gallon Can	GAL.
		9140-00-286-5284	55 Gallon Drum	GAL.
22	C		GREASE: automotive and artillery (81349) MIL-G-10924	
		9150-00-935-1017	14 Ounce Cartridge	OZ
		9150-00-190-0904	1-3/4 Pound Can	LB
23	O		GREASE: ball and roller bearing (73219) 18901	
		9150-01-095-5512	Case, 24/14 Ounce Cans	OZ
24	O	N/A	GREASE: dielectric colloid (72872) 112X	
			1 Gallon Container	GAL.
25	O		GREASE: lithium base w/molybdenum disulfide (60218) LS2267	
		9150-01-015-1542	14.5 Ounce Cartridge	OZ
26	C		HYDRAULIC FLUID: transmission (24617) Dexron® II	
		9150-00-698-2382	1 Quart Can	QT
		9150-00-657-4959	5 Gallon Can	GAL.
27	C		HYDRAULIC FLUID: transmission (24617) Dexron® III	
		9150-01-353-4799	1 Quart Can	QT
		1950-01-114-9968	55 Gallon Drum	GAL.
27.1	O		LUBRICANT: run flat (62161) 12460308-1 55 Gallon Drum	GAL.

Section II. EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST (Cont'd)

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) DESCRIPTION	(5) U/M
28	C		LUBRICATING OIL: gear, multipurpose, GO 75 (81349) MIL-L-2105	
		9150-01-035-5390	1 Quart Can	QT
		9150-01-035-5391	5 Gallon Drum	GAL.
29	C		LUBRICATING OIL: gear, multipurpose, GO 80/90 (81349) MIL-L-2105	
		9150-01-035-5392	1 Quart Can	QT
		9150-01-035-5393	5 Gallon Drum	GAL.
30	C		LUBRICATING OIL: internal combustion engine, arctic, OEA (81349) MIL-L-46167	
		9150-00-402-4478	1 Quart Can	QT
		9150-00-402-2372	5 Gallon Drum	GAL.
31	C	9150-00-491-7197	55 Gallon Drum	GAL.
			LUBRICATING OIL: internal combustion engine, tactical service, OE/HDO 10 (81349) MIL-L-2104	
		9150-00-189-6727	1 Quart Can	QT
32	C	9150-00-186-6668	5 Gallon Can	GAL.
		9150-00-191-2772	55 Gallon Drum	GAL.
			LUBRICATING OIL: internal combustion engine, tactical service, OE/HDO 30 (81349) MIL-L-2104	
33	O	9150-00-186-6681	1 Quart Can	QT
		9150-00-188-9858	5 Gallon Drum	GAL.
		9150-00-189-6729	55 Gallon Drum	GAL.
34	C	9150-00-273-2389	LUBRICATING OIL: general purpose, corrosion resistant and oxidation resistant (92895) PQRUSTPREVENTIVENO172 4 Ounce Can	OZ
			LUBRICATING OIL: internal combustion engine, tactical service, OE/HDO 15/40 (81349) MIL-L-2104	
		9150-01-152-4117	1 Quart Can	QT
		9150-01-152-4118	5 Gallon Drum	GAL.
		9150-01-152-4119	55 Gallon Drum	GAL.

Section II. EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST (Cont'd)

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) DESCRIPTION	(5) U/M
35	C	8010-01-826-3535	PRIMER, ADHESIVE: spray (81349) MIL-A-46050C 15 Ounce Can	OZ
36	C	7920-00-205-1711	RAG: wiping, cotton and cotton-synthetic (58536) A-A-531 50 Pound Bale	LB
37	O	2090-00-372-6064	REPAIR KIT, Glass Reinforcement Plastic Laminate (81349) MIL-R-19907D 1 Kit	KT
38	O	6850-01-159-4844	SEALANT: silicone, RTV (11862) 1052734 8-1/2 Ounce Tube	OZ
39	O	8030-01-374-3504	SEALING COMPOUND (05972) 51831 50 Milliliter Tube	ML
		8030-01-374-2338	300 Milliliter Cartridge	ML
40	O	8030-01-347-0964	SEALING COMPOUND: adhesive, elastomeric (00333) M6325-11OZ 11 Ounce Cartridge	OZ
41	O	8030-01-171-7628	SEALING COMPOUND: anaerobic, adhesive/sealant (05972) 272-40 50 CC Bottle	CC
42	O	8040-01-010-8758	SEALING COMPOUND: canvas (81349) MIL-A-46106 1 Quart	QT
43	O	8030-00-009-5023	SEALING COMPOUND: corrosion-resistant (81349) MIL-S-81733, type II Kit	EA
44	O	8030-01-054-0740	SEALING COMPOUND: pipe, anaerobic, with teflon (05972) 59231 50 Milliliter Tube	ML
45	O	8030-00-148-9833	SEALING COMPOUND: thread-locking, high strength (80244) MIL-S-46163, type I, grade K 10 CC Bottle	CC

Section II. EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST (Cont'd)

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) DESCRIPTION	(5) U/M
46	O		SEALING COMPOUND: thread-locking, medium strength (80244) MIL-S-46163, type II, grade N	
		8030-01-025-1692	250 CC Bottle	CC
47	O		SEALING COMPOUND: windshield (04963) 847H	
		8030-00-165-6547	1 Quart Container	QT
47.1	O		SEALING COMPOUND: electrical components silicone rubber, clear (71984) RTV 737	
		8030-01-328-0574	3 Ounce Cartridge	OZ
48	O		SILICONE COMPOUND: dielectric colloid, non-melting, heat stable, NATO code no. S-736 (81349) MIL-S-8660	
		6850-00-880-7616	8 Ounce Tube	OZ
		6850-00-295-7685	10 Pound Can	LB
49	O		SODIUM BICARBONATE: technical (baking soda) (81348) O-S-576	
		6810-00-264-6618	1 Pound Box	LB
		6810-00-290-5574	100 Pound Bag	LB
50	O		TAPE: pressure-sensitive adhesive, polyester film, transparent, 1 in. wide, 2 mil thick (80063) SMA597833-3	
		7510-00-149-0732	72 Yard Roll	YD
51	O		TAPE: pressure-sensitive adhesive, masking, flat, 1 in. width (19203) 8790710	
		7510-00-283-0612	60 Yard Roll	YD
52	O		TAPE: hook and pile material (81349) MIL-F-211840	
		8315-01-115-7617		YD
53	O		TWINE: fibrous, cotton (string) 16-ply (81348) T-T-871	
		4020-00-291-5901	375 Yard Spool	YD

APPENDIX D ILLUSTRATED LIST OF MANUFACTURED ITEMS

Section I. INTRODUCTION

D-1. SCOPE

This appendix includes complete instructions for making items authorized to be manufactured or fabricated at unit maintenance.

D-2. GENERAL

- a. A part number index in alphanumeric order is provided for cross-referencing the part number of the item to be manufactured to the figure which covers fabrication criteria.
- b. All bulk materials needed for manufacture of an item are listed by part number or specification number in a tabular list on the illustration.

Table D-1. Manufactured Items Part Number Index.

PART NO.	FIGURE NO.	PART NO.	FIGURE NO.	PART NO.	FIGURE NO.
MS51331-1	D-88	5573534	D-35	5584373	D-37
MT161A	D-90	5574986	D-21	5584383	D-15
M23053/1-204-0	D-61	5575468	D-24	5584707	D-21
M23053/7-204-2	D-61	5577552	D-35	5584813	D-22
M23053/4-303-0	D-1	5578874	D-39	5584836	D-22
M23053/4-303-2	D-1	5578875	D-39	5584892	D-39
M232053/4-304-2	D-2	5578876	D-39	5584893	D-39
RR-C-271	D-15.1	5578877	D-39	5588617-7.5	D-33
RR-C-271-6	D-3	5578878	D-39	5588618-13	D-32
SF5575898	D-7	5578887	D-9	5588698	D-8
SF5585243	D-16	5578910	D-10	5588767	D-11
SF5585245	D-16	5578911	D-11	5589086	D-29
SF5585258	D-16	5578940	D-30	5589275	D-31
SF5589035	D-4	5578999	D-12	5590023	D-14
SF5589036	D-4	5579007	D-11	5590024	D-14
SF5589037	D-5	5579008	D-10	5590025	D-14
SF5590706	D-26	5579997	D-13	5591157	D-37
SF5591372	D-6	5581213	D-27	5591158	D-37
SF5591612	D-25	5581366	D-34	5591159	D-37
SF5592748	D-4	5582451	D-62	5591161	D-37
12338591-1	D-94	5582479	D-14	5591168	D-37
12342947	D-94	5582641	D-37	5591180	D-15
12446730	D-95	5582642	D-37	5591210	D-36
12446770	D-86	5582643	D-37	5591253	D-37
12446771	D-87	5582645	D-37	5591482	D-37
12446821	D-62.1	5582646	D-37	5591483	D-37
14066306	D-18	5582648	D-15	5591681	D-15
15667	D-91	5582649	D-15	5591707	D-37
15847	D-38	5583183	D-14	5591937	D-14
15848	D-38	5583855	D-15	5591938	D-14
1775-826	D-17	5584173	D-37	5592085	D-58
23500024	D-11	5584188	D-28	5594083	D-36
23500084	D-19	5584372	D-15	5594278	D-23

Table D-1. Manufactured Items Part Number Index (Cont'd).

PART NO.	FIGURE NO.	PART NO.	FIGURE NO.	PART NO.	FIGURE NO.
5595995	D-23	5597995	D-59	5598815	D-54
5597214	D-60	5597997	D-59	5598816	D-45
5597215	D-60	5597998	D-59	5598817	D-46
5597216	D-60	5597999	D-59	5598818	D-48
5597217	D-60	5598000	D-59	5598819	D-41
5597218	D-60	5598029	D-59	5598820	D-47
5597219	D-60	5598030	D-59	5598821	D-53
5597220	D-60	5598031	D-59	5598825	D-63
5597221	D-60	5598032	D-59	5598826	D-63
5597222	D-60	5598033	D-59	5598827	D-64
5597223	D-60	5598034	D-59	5598828	D-65
5597224	D-60	5598035	D-59	5598829	D-66
5597225	D-60	5598036	D-59	5598830	D-67
5597226	D-60	5598061	D-59	5598832	D-68
5597227	D-60	5598062	D-59	5598833	D-69
5597228	D-60	5598063	D-59	5598834	D-70
5597229	D-60	5598064	D-59	5598835	D-71
5597230	D-60	5598065	D-59	5598836	D-72
5597231	D-60	5598132	D-60	5598837	D-73
5597232	D-60	5598133	D-60	5598838	D-74
5597722	D-60	5598134	D-60	5598839	D-75
5597723	D-60	5598236	D-44	5598840	D-76
5597724	D-60	5598237	D-43	5598841	D-77
5597725	D-60	5598238	D-40	5598842	D-78
5597726	D-60	5598239	D-57	5598843	D-79
5597727	D-60	5598240	D-55	5598844	D-80
5597728	D-60	5598241	D-49	5598845	D-81
5597730	D-60	5598242	D-50	5598846	D-82
5597957	D-60	5598243	D-56	5598847	D-83
5597958	D-60	5598245	D-52	5740702	D-10
5597970	D-60	5598813	D-42	8434398	D-114
5597994	D-59	5598814	D-51		

Section II. ILLUSTRATED MANUFACTURING INSTRUCTIONS

MATERIAL BLOCK		
STOCK SIZE	DESCRIPTION	SPECIFICATION
0.470 IN. INSIDE DIAMETER	INSULATION SLEEVING, HEAT SHRINK	MIL-I-23053

HEAT SHRINK INSULATION SLEEVING		
INSULATION PART NUMBER	CUT LENGTH (INCHES)	MANUFACTURED FROM PART NUMBER (CAGEC)
M23053/4-303-0	1.5	M23053/4-303-0 (81349)
M23053/4-303-2	1.5	M23053/4-303-2 (81349)

Figure D-1. Heat Shrink Insulation Sleeving

INSTRUCTIONS:

Cut insulation to length shown.

MATERIAL BLOCK		
STOCK SIZE	DESCRIPTION	SPECIFICATION
0.940 IN. INSIDE DIAMETER	INSULATION SLEEVING, HEAT SHRINK	MIL-I-23053

HEAT SHRINK INSULATION SLEEVING		
INSULATION PART NUMBER	CUT LENGTH (INCHES)	MANUFACTURED FROM PART NUMBER (CAGEC)
M23053/4-304-2	2.0	M23053/4-304-2 (81349)

Figure D-2. Heat Shrink Insulation Sleeving

INSTRUCTIONS:

Cut insulation to length shown.

Section II. ILLUSTRATED MANUFACTURING INSTRUCTIONS (Cont'd)

MATERIAL BLOCK		
STOCK SIZE	DESCRIPTION	SPECIFICATION
10 LINKS	CHAIN, WELDLESS	RR-C-271, TYPE II, CLASS 2

TOWING PINTLE LOCK CHAIN		
CHAIN PART NUMBER	CUT LENGTH	MANUFACTURED FROM NSN
RR-C-271-6	6 LINKS	4010-00-129-3321

Figure D-3. Towing Pintle Lock Chain

INSTRUCTIONS:

Cut chain to length shown.

MATERIAL BLOCK		
STOCK SIZE	DESCRIPTION	SPECIFICATION
20 IN. INSIDE DIAMETER	DUCT, FLEX	ASTM D 1149

DEFROSTER FLEX DUCTING			
ITEM NO.	DUCTING PART NUMBER	CUT LENGTH (INCHES)	MANUFACTURED FROM PART NUMBER (CAGEC)
1	SF5589035	37	FLX4001-16057600 (16632)
2	SF5589036	7	FLX4001-16057600 (16632)
3	SF5592748	19	FLX4001-16057600 (16632)

Figure D-4. Defroster Flex Ducting

INSTRUCTIONS:

Determine ducting part number needed from RPSTL and cut ducting to length shown.

Section II. ILLUSTRATED MANUFACTURING INSTRUCTIONS (Cont'd)

MATERIAL BLOCK		
STOCK SIZE	DESCRIPTION	SPECIFICATION
1.50 IN. INSIDE DIAMETER	DUCT, FLEX	ASTM D1149

DEFROSTER FLEX DUCTING		
DUCTING PART NUMBER	CUT LENGTH (INCHES)	MANUFACTURED FROM PART NUMBER (CAGEC)
SF5589037	33-1/2	FLX4001-12057600 (16632)

Figure D-5. Defroster Flex Ducting

INSTRUCTIONS:

Cut duct to length shown.

MATERIAL BLOCK		
STOCK SIZE	DESCRIPTION	SPECIFICATION
3.00 IN. INSIDE DIAMETER	DUCT, FLEX	ASTM D1149

DEFROSTER FLEX DUCTING		
DUCTING PART NUMBER	CUT LENGTH (INCHES)	MANUFACTURED FROM PART NUMBER (CAGEC)
SF5591372	8.50	FLX4001-24057600 (16632)

Figure D-6. Defroster Flex Ducting

INSTRUCTIONS:

Cut duct to length shown.

Section II. ILLUSTRATED MANUFACTURING INSTRUCTIONS (Cont'd)

MATERIAL BLOCK		
STOCK SIZE	DESCRIPTION	SPECIFICATION
0.200 IN. HEIGHT 0.162 IN. WIDTH 0.085 IN. OPENING	GROMMET, NONMETALLIC	ASTM D-4066

BATTERY CABLE EDGE PROTECTOR		
EDGE PROTECTOR PART NUMBER	CUT LENGTH (INCHES)	MANUFACTURED FROM NSN
SF5575898	3-7/8	5325-00-074-3301

Figure D-7. Battery Cable Edge Protector

INSTRUCTIONS:

Cut edge protector to length shown.

MATERIAL BLOCK		
STOCK SIZE	DESCRIPTION	SPECIFICATION
0.312 IN. ± 0.016 IN. INSIDE DIAMETER 0.562 IN. ± 0.023 IN. OUTSIDE DIAMETER	HOSE	GM-6165-M

ARCTIC/AMBULANCE HEATER FUEL SUPPLY HOSE		
HOSE PART NUMBER	CUT LENGTH (INCHES)	MANUFACTURED FROM: PART NUMBER (CAGEC)
5588698	2-13/16	9438306 (11862)

Figure D-8. Arctic/Ambulance Heater Fuel Supply Hose

INSTRUCTIONS:

Cut hose to length shown.

Section II. ILLUSTRATED MANUFACTURING INSTRUCTIONS (Cont'd)

MATERIAL BLOCK		
STOCK SIZE	DESCRIPTION	SPECIFICATION
0.500 IN. INSIDE DIAMETER 0.750 IN. OUTSIDE DIAMETER	HOSE, NONMETALLIC	GM06147-M

FUEL CAN DRAIN HOSE		
HOSE PART NUMBER	CUT LENGTH (INCHES)	MANUFACTURED FROM PART NUMBER (CAGEC)
5578887	10-1/2	9436581 (11862)

Figure D-9 Fuel Can Drain Hose

INSTRUCTIONS:

Cut hose to length shown.

MATERIAL BLOCK		
STOCK SIZE	DESCRIPTION	SPECIFICATION
0.375 IN. ± 0.016 IN. INSIDE DIAMETER 0.625 IN. ± 0.023 IN. OUTSIDE DIAMETER	HOSE, NONMETALLIC	GM-6165-M

FUEL SUPPLY HOSE			
ITEM NO.	HOSE PART NUMBER	CUT LENGTH (INCHES)	MANUFACTURED FROM NSN
1	5578910	6-1/2	4720-01-159-5796
2	5579008	2-13/16	4720-01-159-5796
3	5740702	10	4720-01-185-9473

Figure D-10. Fuel Supply Hose

INSTRUCTIONS:

Determine hose part number needed from RPSTL and cut hose to length shown.

Section II. ILLUSTRATED MANUFACTURING INSTRUCTIONS (Cont'd)

MATERIAL BLOCK		
STOCK SIZE	DESCRIPTION	SPECIFICATION
0250 IN. ± 0.016 IN. INSIDE DIAMETER 0.500 IN. ± 0.023 IN. OUTSIDE DIAMETER	HOSE, NONMETALLIC	GM-6165-M

FUEL HOSE			
ITEM NO.	HOSE PART NUMBER	CUT LENGTH (INCHES)	MANUFACTURED FROM NSN
1	23500024	22	4720-01-155-7784
2	5578911	9	4720-01-155-7784
3	5579007	2-13/16	4720-01-155-7784
4	5588767	26	4720-01-155-7784

Figure D-11. Fuel Hose

INSTRUCTIONS:

Determine hose part number needed from RPSTL and cut hose to length shown.

MATERIAL BLOCK		
STOCK SIZE	DESCRIPTION	SPECIFICATION
0.290 IN. ± 0.040 IN. INSIDE DIAMETER	HOSE, NONMETALLIC	ASTM D2000

OVERFLOW HOSE		
HOSE PART NUMBER	CUT LENGTH (INCHES)	MANUFACTURED FROM NSN
5578999	18-5/16	4720-01-185-6673

Figure D-12. Overflow Hose

INSTRUCTIONS:

Cut hose to length shown.

Section II. ILLUSTRATED MANUFACTURING INSTRUCTIONS (Cont'd)

MATERIAL BLOCK		
STOCK SIZE	DESCRIPTION	SPECIFICATION
0.62 IN. INSIDE DIAMETER 0.94 IN. OUTSIDE DIAMETER	HOSE, NONMETALLIC	SAE 20R3, CLASS D-1

HEATER HOSE		
HOSE PART NUMBER	CUT LENGTH (INCHES)	MANUFACTURED FROM NSN
5579997	2-1/2	4720-00-241-4435

Figure D-13. Heater Hose

INSTRUCTIONS:

Cut hose to length shown.

MATERIAL BLOCK		
STOCK SIZE	DESCRIPTION	SPECIFICATION
0.367 IN. ± 0.023 IN. INSIDE DIAMETER 0.656 IN. ± 0.031 IN. OUTSIDE DIAMETER	HOSE, NONMETALLIC	GM-6210-M

CONNECTOR HOSES			
ITEM NO.	HOSE PART NUMBER	CUT LENGTH (INCHES)	MANUFACTURED FROM NSN
1	5582479	3	4720-01-186-2358
2	5583183	19	4720-01-186-2358
3	5590023	23	4720-01-186-2358
4	5590024	41	4720-01-297-0255
5	5590025	27	4720-01-271-6955
6	5591937	7-1/4	4720-01-186-2358
7	5591938	10	4720-01-186-2358

Figure D-14. Transmission Cooling Lines Connector Hoses and Steering Hydraulic System Hoses

INSTRUCTIONS:

Determine hose part number needed from RPSTL and cut hose to length shown.

Section II. ILLUSTRATED MANUFACTURING INSTRUCTIONS (Cont'd)

MATERIAL BLOCK		
STOCK SIZE	DESCRIPTION	SPECIFICATION
0.250 IN. INSIDE DIAMETER 0.500 IN. OUTSIDE DIAMETER	HOSE, NONMETALLIC	N/A

VENT LINE HOSE PART NUMBER			
ITEM NO.	HOSE PART NUMBER	CUT LENGTH (INCHES)	MANUFACTURED FROM NSN
1	5582648	4	4720-00-289-9625
2	5582649	25	4720-01-325-0204
3	5583855	42	4720-00-289-9625
4	5584372	8	4720-00-289-9625
5	5584383	32	4720-00-289-9625
6	5591180	2	4720-00-289-9625
7	5591681	18	4720-00-289-9625

Figure D-15. Vent Line Hose.

INSTRUCTIONS:

Determine hose part number needed from RPSTL and cut hose to length shown.

MATERIAL BLOCK		
STOCK SIZE	DESCRIPTION	SPECIFICATION
BULK	CHAIN, WELDLESS	RR-C-271, TYPE II, CLASS 7-16

FUEL CAP CHAIN		
PART NUMBER	CUT LENGTH (INCHES)	MANUFACTURED FROM NSN
RR-C-271	8	4010-00-958-0633

Figure D-15.1. Fuel Cap Chain.

INSTRUCTIONS:

Cut chain to length shown.

Section II. ILLUSTRATED MANUFACTURING INSTRUCTIONS (Cont'd)

MATERIAL BLOCK		
STOCK SIZE	DESCRIPTION	SPECIFICATION
0.190 IN. INSIDE DIAMETER	HOSE, NONMETALLIC	ASTM D1149

WINDSHIELD WASHER HOSE			
ITEM NO.	HOSE PART NUMBER	CUT LENGTH (INCHES)	MANUFACTURED FROM PART NUMBER (CAGEC)
1	SF5585243	16	846-50 (11288)
2	SF5585245	36	846-50 (11288)
3	SF5585258	27	846-50 (11288)

Figure D-16. Windshield Washer Hose

INSTRUCTIONS:

Determine hose part number needed from RPSTL and cut hose to length shown.

MATERIAL BLOCK		
STOCK SIZE	DESCRIPTION	SPECIFICATION
0.125 IN. INSIDE DIAMETER 0.25 IN. INSIDE DIAMETER	HOSE, NONMETALLIC	N/A

AIR RESTRICTION HOSE		
HOSE PART NUMBER	CUT LENGTH (INCHES)	MANUFACTURED FROM NSN
1775-826	84	4720-01-188-3190

Figure D-17. Air Restriction Hose

INSTRUCTIONS:

Cut hose to length shown.

Section II. ILLUSTRATED MANUFACTURING INSTRUCTIONS (Cont'd)

MATERIAL BLOCK		
STOCK SIZE	DESCRIPTION	SPECIFICATION
0.156 IN. INSIDE DIAMETER 0.281 IN. OUTSIDE DIAMETER	HOSE, NONMETALLIC	N/A

FUEL DRAIN BACK HOSE		
HOSE PART NUMBER	CUT LENGTH (INCHES)	MANUFACTURED FROM NSN
14066306	7	4720-01-184-0432

Figure D-18. Fuel Drain Back Hose

INSTRUCTIONS:

Cut hose to length shown.

MATERIAL BLOCK		
STOCK SIZE	DESCRIPTION	SPECIFICATION
0.750 IN. INSIDE DIAMETER 1.00 IN. OUTSIDE DIAMETER	HOSE, NONMETALLIC	N/A

THERMOSTAT BYPASS HOSE		
HOSE PART NUMBER	CUT LENGTH (INCHES)	MANUFACTURED FROM NSN
23500084	5	4720-01-845-9211

Figure D-19. Thermostat Bypass Hose

INSTRUCTIONS:

Cut hose to length shown.

Section II. ILLUSTRATED MANUFACTURING INSTRUCTIONS (Cont'd)

MATERIAL BLOCK		
STOCK SIZE	DESCRIPTION	SPECIFICATION
0.25 IN. INSIDE DIAMETER 0.50 IN. OUTSIDE DIAMETER	HOSE, NONMETALLIC	GM-6163-M

FUEL DRAIN BACK HOSE		
HOSE PART NUMBER	CUT LENGTH (INCHES)	MANUFACTURED FROM NSN
9439363	7	4720-01-163-7833

Figure D-20. Fuel Drain Back Hose

INSTRUCTIONS:

Cut hose to length shown.

MATERIAL BLOCK		
STOCK SIZE	DESCRIPTION	SPECIFICATION
0.280 IN. WIDTH 0.370 IN. HEIGHT	PAD, CUSHIONING	N/A

EDGE PROTECTOR			
ITEM NO.	EDGE PROTECTOR PART NUMBER	CUT LENGTH (INCHES)	MANUFACTURED FROM NSN
1	5574986	5-11/16	2590-01-196-7281
2	5584707	8-7/8	2590-01-196-7281

Figure D-21. Handle Edge Protector

INSTRUCTIONS:

Determine edge protector part number needed from RPSTL and cut edge protector to length shown.

Section II. ILLUSTRATED MANUFACTURING INSTRUCTIONS (Cont'd)

MATERIAL BLOCK		
STOCK SIZE	DESCRIPTION	SPECIFICATION
0.75 IN. ± 0.09 IN., SQUARE	RUBBER, NEOPRENE	N/A

FIXED DOOR SEAL			
ITEM NO.	SEAL PART NUMBER	CUT LENGTH (INCHES)	MANUFACTURED FROM PART NUMBER (CAGEC)
1	5584813	49-7/16	R-421-N (82942)
2	5584836	21-15/16	R-421-N (82942)

Figure D-22. Fixed Door Seal

INSTRUCTIONS:

Determine seal part number needed from RPSTL and cut seal to length shown.

MATERIAL BLOCK		
STOCK SIZE	DESCRIPTION	SPECIFICATION
0.56 IN. WIDTH 1.00 IN. HEIGHT	CHANNEL, NONMETALLIC	N/A

EDGE PROTECTOR			
ITEM NO.	EDGE PROTECTOR PART NUMBER	CUT LENGTH (INCHES)	MANUFACTURED FROM PART NUMBER (CAGEC)
1	5594278	6-1/2	ZX-4295 (76385)
2	5595995	8-1/2	

Figure D-23. Handle Edge Protector

INSTRUCTIONS:

Determine edge protector part number needed from RPSTL and cut edge protector to length shown.

Section II. ILLUSTRATED MANUFACTURING INSTRUCTIONS (Cont'd)

MATERIAL BLOCK		
STOCK SIZE	DESCRIPTION	SPECIFICATION
0.10 IN. THICK	RUBBER STRIP	N/A

ANTI-NOISE PAD		
PAD PART NUMBER	CUT (INCHES)	MANUFACTURED FROM NSN
5575468	1-1/2 X 1-3/16	5330-01-198-3521

Figure D-24. Anti-Noise Pad

INSTRUCTIONS:

Cut pad to size shown.

MATERIAL BLOCK		
STOCK SIZE	DESCRIPTION	SPECIFICATION
0.250 IN. THICK 0.50 IN. WIDTH	SEAL	ASTM D 1056 ASTM D-903

WINDSHIELD LOWER SEAL		
SEAL PART NUMBER	CUT LENGTH (INCHES)	MANUFACTURED FROM PART NUMBER (CAGEC)
SF5591612	83-1/2	68-412121-2 (82942)

Figure D-25. Windshield Lower Seal

INSTRUCTIONS:

Cut seal to length shown.

Section II. ILLUSTRATED MANUFACTURING INSTRUCTIONS (Cont'd)

MATERIAL BLOCK		
STOCK SIZE	DESCRIPTION	SPECIFICATION
0.188 IN. THICK 0.50 IN. WIDTH	SEAL	ASTM D-1056 ASTM D-903

WINDSHIELD LOWER SEAL		
SEAL PART NUMBER	CUT LENGTH (INCHES)	MANUFACTURED FROM PART NUMBER (CAGEC)
SF5590706	80-1/2	68-412121-1 (82942)

Figure D-26. Windshield Lower Seal

INSTRUCTIONS:

Cut seal to length shown.

MATERIAL BLOCK		
STOCK SIZE	DESCRIPTION	SPECIFICATION
N/A	SEAL, RUBBER	N/A

RUBBER LOWER SEAL		
SEAL PART NUMBER	CUT LENGTH (INCHES)	MANUFACTURED FROM NSN
5581213	17-1/4	5330-01-288-7822

Figure D-27. Rubber Lower Seal

INSTRUCTIONS:

Determine seal part number needed from RPSTL and cut seal to length shown.

Section II. ILLUSTRATED MANUFACTURING INSTRUCTIONS (Cont'd)

MATERIAL BLOCK		
STOCK SIZE	DESCRIPTION	SPECIFICATION
0.520 IN. THICK 1.136 IN. WIDTH	SEAL, NONMETALLIC	ASTM D 1056

TRAY ASSEMBLY SEAL		
SEAL PART NUMBER	CUT LENGTH (INCHES)	MANUFACTURED FROM NSN
5584188	100	5330-01-202-8360

Figure D-28. Tray Assembly Seal

INSTRUCTIONS:

Cut seal to length shown.

MATERIAL BLOCK		
STOCK SIZE	DESCRIPTION	SPECIFICATION
1.00 IN. THICK 1.75 IN. WIDTH	SEAL, RUBBER	MIL-I-14511B

ARCTIC CURTAIN SEAL		
SEAL PART NUMBER	CUT LENGTH (INCHES)	MANUFACTURED FROM PART NUMBER (CAGEC)
5589086	30	1C-100-01 (55674)

Figure D-29. Arctic Curtain Seal

INSTRUCTIONS:

Cut seal to length shown.

Section II. ILLUSTRATED MANUFACTURING INSTRUCTIONS (Cont'd)

MATERIAL BLOCK		
STOCK SIZE	DESCRIPTION	SPECIFICATION
0.50 IN. INSIDE DIAMETER	CHAFE GUARD, SPIRAL WRAP	N/A

SPIRAL WRAP CHAFE GUARD		
GUARD PART NUMBER	CUT LENGTH (INCHES)	MANUFACTURED FROM PART NUMBER (CAGEC)
5578940	3	25FT2661-16P-120.00 (98441)

Figure D-30. Spiral Wrap Chafe Guard

INSTRUCTIONS:

Cut chafe guard to length shown.

MATERIAL BLOCK		
STOCK SIZE	DESCRIPTION	SPECIFICATION
0.25 IN. THICK 0.50 IN. WIDTH	STRIP FOAM, INSULATION	MIL-I-14511B

FOAM INSULATION STRIP		
INSULATION PART NUMBER	CUT LENGTH (INCHES)	MANUFACTURED FROM PART NUMBER (CAGEC)
5589275	12	1C-025-02 (55674)

Figure D-31. Foam Insulation Strip

INSTRUCTIONS:

Cut insulation to length shown.

Section II. ILLUSTRATED MANUFACTURING INSTRUCTIONS (Cont'd)

MATERIAL BLOCK		
STOCK SIZE	DESCRIPTION	SPECIFICATION
3.0 IN. WIDTH	TAPE, ADHESIVE	N/A

RUN FLAT LUBE PACKAGE TAPE		
TAPE PART NUMBER	CUT LENGTH (INCHES)	MANUFACTURED FROM PART NUMBER (CAGEC)
5588618-13	13	Y-9485 (04963)

Figure D-32. Run Flat Lube Package Tape

INSTRUCTIONS:

Cut tape to length shown.

Section II. ILLUSTRATED MANUFACTURING INSTRUCTIONS [Cont'd)

MATERIAL BLOCK		
STOCK SIZE	DESCRIPTION	SPECIFICATION
0.75 IN. WIDE	TAPE, FILAMENT	N/A

FILAMENT TAPE		
TAPE PART NUMBER	CUT LENGTH (INCHES)	MANUFACTURED FROM NSN
5588617-7.5	7.5	7510-00-802-8311

Figure D-33. Filament Tape

INSTRUCTIONS:

Cut tape to length shown,

MATERIAL BLOCK		
STOCK SIZE	DESCRIPTION	SPECIFICATION
0.75 IN. WIDTH 0.045 IN. THICK	TAPE, FOAM	N/A

FOAM TAPE		
TAPE PART NUMBER	CUT LENGTH (INCHES)	MANUFACTURED FROM NSN
5581366	81-1/2	9320-01-155-2369

Figure D-34. Foam Tape

INSTRUCTIONS:

Cut tape to length shown.

Section II. ILLUSTRATED MANUFACTURING INSTRUCTIONS (Cont'd)

MATERIAL BLOCK		
STOCK SIZE	DESCRIPTION	SPECIFICATION
0.375 IN. INSIDE DIAMETER 0.50 IN. OUTSIDE DIAMETER	TUBING, NONMETALLIC	SAE J844

FUEL SYSTEM VENT LINE			
ITEM NO.	VENT LINE PART NUMBER	CUT LENGTH (INCHES)	MANUFACTURED FROM NSN
1	5573534	27	4720-01-003-6706
2	5577552	43	4720-01-003-6706

Figure D-35. Fuel System Vent Line

INSTRUCTIONS:

Determine vent line part number needed from RPSTL and cut vent line to length shown.

MATERIAL BLOCK		
STOCK SIZE	DESCRIPTION	SPECIFICATION
0.312 IN. INSIDE DIAMETER 0.375 IN. OUTSIDE DIAMETER	TUBING, NONMETALLIC	SAE J844

FUEL SYSTEM VENT LINE			
ITEM NO.	VENT LINE PART NUMBER	CUT LENGTH (INCHES)	MANUFACTURED FROM PART NUMBER (CAGEC)
1	5591210	11	PFT-6B (87373)
2	5594083	91	PFT-6B (87373)

Figure D-36. Fuel Tank Vent Line

INSTRUCTIONS:

Cut vent line to length shown.

Section II. ILLUSTRATED MANUFACTURING INSTRUCTIONS (Cont'd)

MATERIAL BLOCK		
STOCK SIZE	DESCRIPTION	SPECIFICATION
0.180 IN. INSIDE DIAMETER 0.250 IN. OUTSIDE DIAMETER	TUBING, NONMETALLIC	SAE J844, TYPE A

VENT LINE TUBE			
ITEM NO.	TUBE PART NUMBER	CUT LENGTH (INCHES)	MANUFACTURED FROM NSN
1	5582641	4	4720-01-071-4042
2	5582642	11	4720-01-071-4042
3	5582643	15	4720-01-071-4042
4	5582645	24	4720-01-071-4042
5	5582646	32	4710-01-347-6368
6	5584173	8	4720-01-071-4042
7	5584373	26	4720-01-071-4042
8	5591157	40	4720-01-071-4042
9	5591158	35-1/2	4720-01-071-4042
10	5591159	7	4720-01-071-4042
11	5591161	10	4720-01-071-4042
12	5591168	64	4720-01-071-4042
13	5591253	41	4720-01-071-4042
14	5591482	12	4720-01-071-4042
15	5591483	14	4720-01-071-4042
16	5591707	70	4120-01-071-4042

Figure D-37. Vent Line Tube

INSTRUCTIONS:

Determine tube part number needed from RPSTL and cut tube to length shown.

Section II. ILLUSTRATED MANUFACTURING INSTRUCTIONS (Cont'd)

MATERIAL BLOCK		
STOCK SIZE	DESCRIPTION	SPECIFICATION
4 IN. GAGE, TYPE 1, CLASS A	WIRE, ELECTRICAL	MIL-C-13486

WINCH BATTERY CABLE					
ITEM NO.	CABLE PART NUMBER	CUT LENGTH (INCHES)	MANUFACTURED FROM NSN	END TERMINALS NSN	END INSULATOR
1	15847	74	6145-00-538-8219	5940-00-520-2447 5940-00-197-3664	M23053/03-0 (81349)
2	15848	87-1/2	6145-00-538-8219	5940-00-520-2447 5940-00-197-3664	M23053/03-0 (81349)

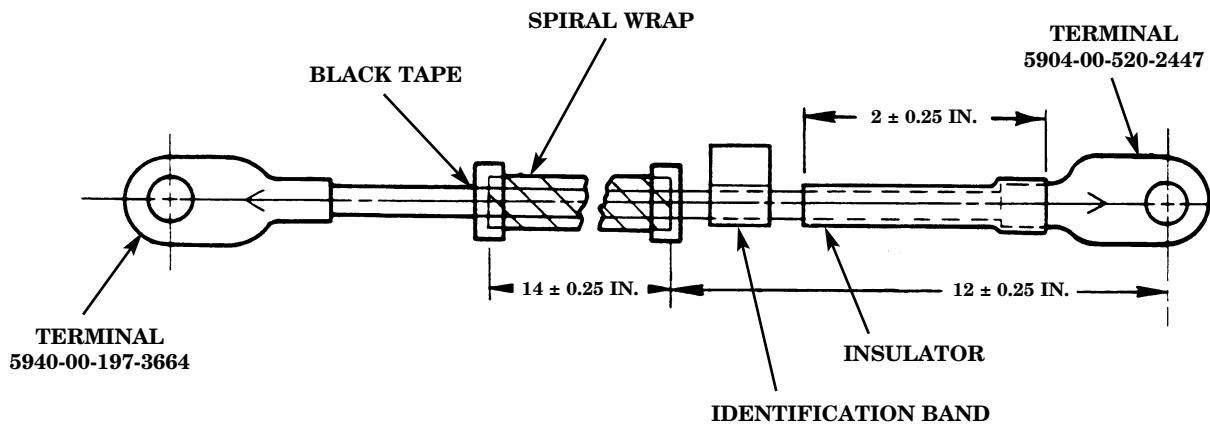


Figure D-38. Winch Battery Cable

INSTRUCTIONS:

1. Determine cable number needed from RPSTL and cut cable 6145-00-538-8219 to length as shown.
2. Select and solder proper end terminals to cable ends as shown. (Refer to TC 9-237 for soldering instructions.)
3. Install insulator as shown.
4. Cut 14 inches of spiral wrap from bulk 25 FT 2661-8P (98441) and install as shown. Spiral wrap is held in position with black tape at both ends.
5. Mark and install identification band using old cable as reference.

Section II. ILLUSTRATED MANUFACTURING INSTRUCTIONS (Cont'd)

MATERIAL BLOCK		
STOCK SIZE	DESCRIPTION	SPECIFICATION
"0" GAGE	WIRE, ELECTRICAL	MIL-C-13486

BATTERY CABLE ASSEMBLY					
ITEM NO.	CABLE PART NUMBER	CUT LENGTH (INCHES)	MANUFACTURED FROM NSN	END TERMINALS NSN	END INSULATORS NSN
1	5578874	21	6145-00-705-6674	5940-00-705-6732 5940-00-705-6732	5970-01-174-9449 5970-01-174-9449
2	5578875	25	6145-00-705-6674	5940-00-735-5520 5940-00-705-6732	5970-01-174-9449 5970-01-174-9449
3	5578876	13	6145-00-705-6674	5940-00-705-6732 5940-00-705-6732	5970-01-174-9449 5970-01-174-9449
4	5578877	36	6145-00-705-6674	5940-00-735-5520 5940-00-705-6732	5970-01-174-9449 5970-01-174-9449
5	5578878	32	6145-00-705-6674	5940-00-705-6732 5940-00-705-6732	5970-01-174-9449 5970-01-174-9449
6	5584892	31	6145-00-705-6674	5940-00-735-5520 5940-00-735-5520	5970-01-174-9449 5975-01-208-9618
7	5584893	31	6145-00-705-6674	5940-00-735-5520 5940-00-705-6732	5970-01-174-9449 5970-01-174-9449

Section II. ILLUSTRATED MANUFACTURING INSTRUCTIONS (Cont'd)

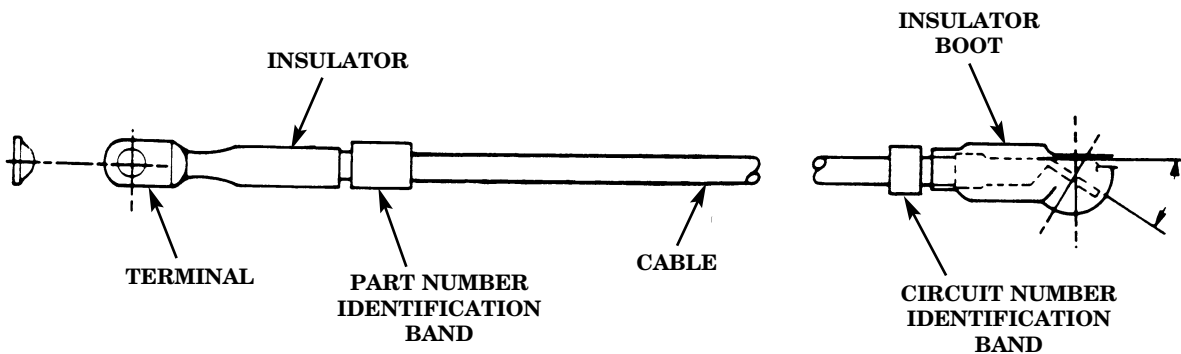


Figure D-39. Battery Cable Assembly

INSTRUCTIONS:

1. Determine cable number needed from RPSTL and cut wire 6154-00-705-6674 to length as shown.

NOTE

- Items 1, 4, 5, 6, and 7: flat of terminals to be 90° offset as shown without wire twist.
- Item 6: one terminal end is bent 30°.

2. Select and solder proper end terminals to cable ends as shown. (Refer to TC 9-237 for soldering instructions.)

NOTE

Insulator boot 5582481 is installed on 30° bent terminal end of item 6.

3. Select and install proper insulators as shown.
4. Mark and install circuit number identification band and part number identification band using old cable as reference.

Section II. ILLUSTRATED MANUFACTURING INSTRUCTIONS (Cont'd)

MATERIAL BLOCK		
STOCK SIZE	DESCRIPTION	SPECIFICATION
1.00 THICK	FOAM, ACOUSTIC	ASTM D-903 UL 94 HF-1

AIR CONDITIONING COMPARTMENT INSULATION		
INSULATION PART NUMBER	CUT (INCHES)	MANUFACTURED FROM PART NUMBER (CAGEC)
5598238	13 X 10.55	C 540 B H52 (28818)

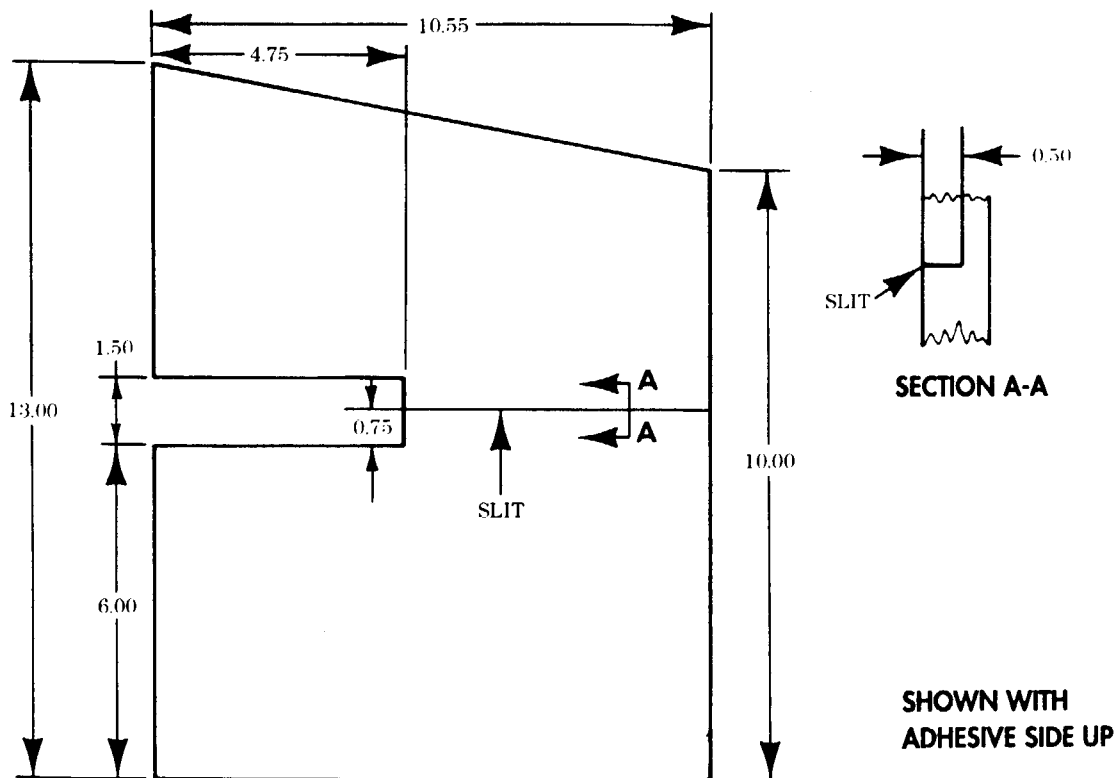


Figure D-40. A/C Compartment Side Front Insulation

INSTRUCTIONS:

Cut insulation to dimensions shown.

Section II. ILLUSTRATED MANUFACTURING INSTRUCTIONS (Cont'd)

MATERIAL BLOCK		
STOCK SIZE	DESCRIPTION	SPECIFICATION
1.00 THICK	FOAM, ACOUSTIC	ASTM D-903 UL 94 HF-1

AIR CONDITIONING COMPARTMENT INSULATION		
INSULATION PART NUMBER	CUT (INCHES)	MANUFACTURED FROM PART NUMBER (CAGEC)
5598819	21.80 X 29.50	C 540 B H52 (28818)

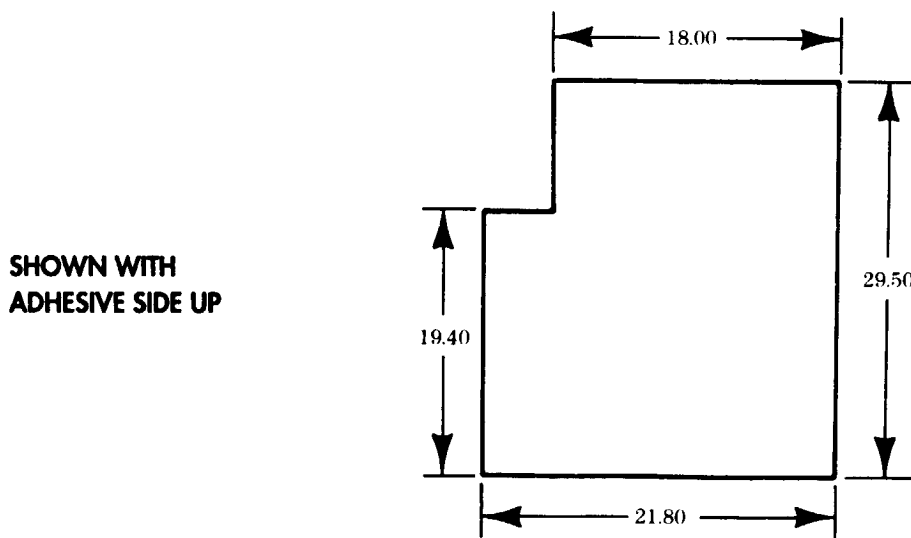


Figure D-41. A/C Compartment Passenger Side Ceiling Insulation

INSTRUCTIONS:

Cut insulation to dimensions shown.

Section II. ILLUSTRATED MANUFACTURING INSTRUCTIONS (Cont'd)

MATERIAL BLOCK		
STOCK SIZE	DESCRIPTION	SPECIFICATION
1.00 THICK	FOAM, ACOUSTIC	ASTM D-903 UL 94 HF-1

AIR CONDITIONING COMPARTMENT INSULATION		
INSULATION PART NUMBER	CUT (INCHES)	MANUFACTURED FROM PART NUMBER (CAGEC)
5598813	24.55 X 13.50	C 540 B H52 (28818)

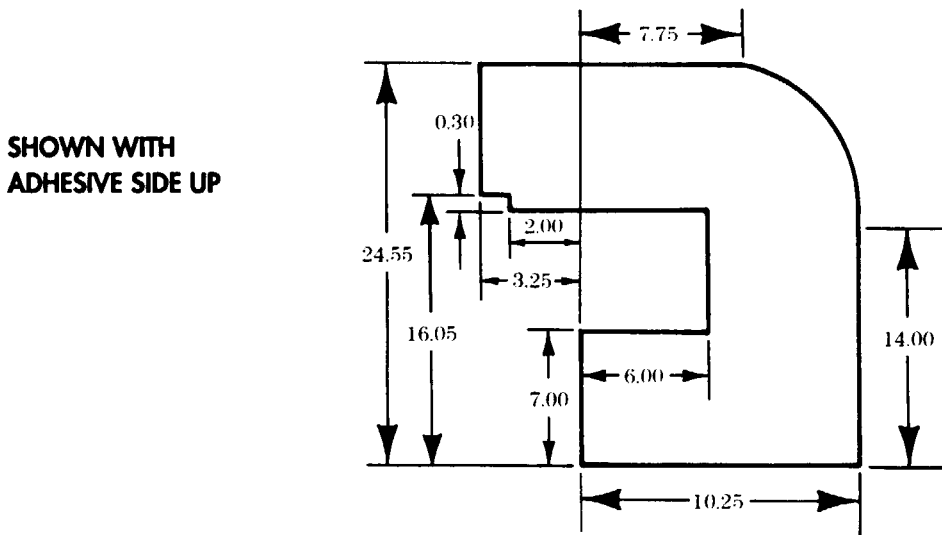


Figure D-42. A/C Compartment Bulkhead Outboard Insulation

INSTRUCTIONS:

Cut insulation to dimensions shown.

Section II. ILLUSTRATED MANUFACTURING INSTRUCTIONS (Cont'd)

MATERIAL BLOCK		
STOCK SIZE	DESCRIPTION	SPECIFICATION
1.00 THICK	FOAM, ACOUSTIC	ASTM D-903 UL 94 HF-1

AIR CONDITIONING COMPARTMENT INSULATION		
INSULATION PART NUMBER	CUT (INCHES)	MANUFACTURED FROM PART NUMBER (CAGEC)
5598237	28.90 X 12.00	C 540 B H52 (28818)

SHOWN WITH
ADHESIVE SIDE UP

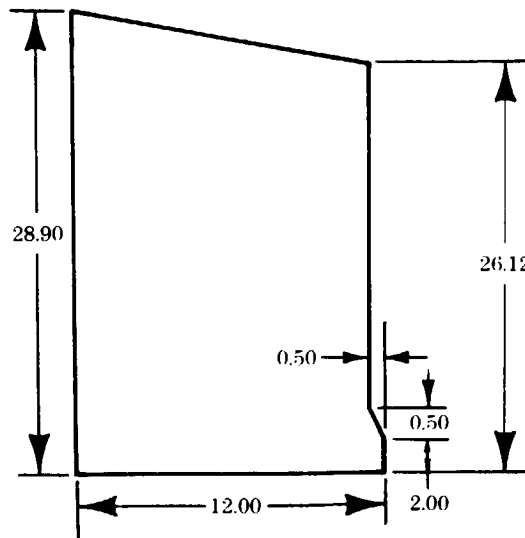


Figure D-43. A/C Compartment Side Rear Insulation

INSTRUCTIONS:

Cut insulation to dimensions shown.

Section II. ILLUSTRATED MANUFACTURING INSTRUCTIONS (Cont'd)

MATERIAL BLOCK		
STOCK SIZE	DESCRIPTION	SPECIFICATION
1.00 THICK	FOAM, ACOUSTIC	ASTM D-903 UL 94 HF-1

AIR CONDITIONING COMPARTMENT INSULATION		
INSULATION PART NUMBER	CUT (INCHES)	MANUFACTURED FROM PART NUMBER (CAGEC)
5598236	28.50 X 22.00	C 540 B H52 (28818)

SHOWN WITH
ADHESIVE SIDE UP

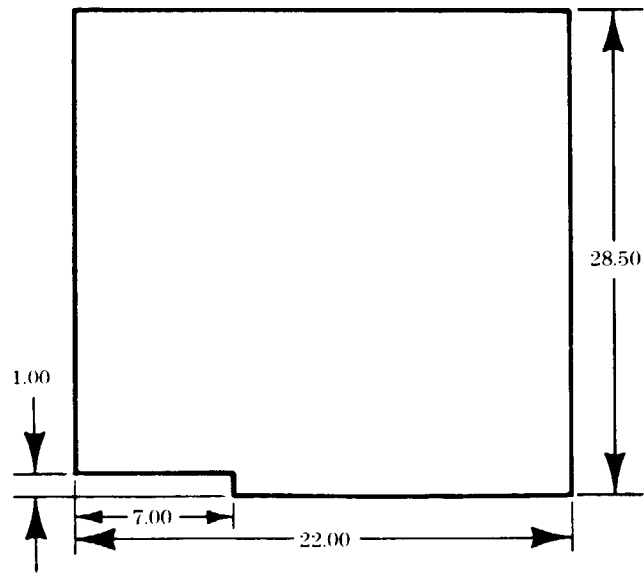


Figure D-44. A/C Compartment Roof Insulation

INSTRUCTIONS:

Cut insulation to dimensions shown.

Section II. ILLUSTRATED MANUFACTURING INSTRUCTIONS (Cont'd)

MATERIAL BLOCK		
STOCK SIZE	DESCRIPTION	SPECIFICATION
1.00 THICK	FOAM, ACOUSTIC	ASTM D-903 UL 94 HF-1

AIR CONDITIONING COMPARTMENT INSULATION		
INSULATION PART NUMBER	CUT (INCHES)	MANUFACTURED FROM PART NUMBER (CAGEC)
5598816	12.80 X 10.75	C 540 B H52 (28818)

Figure D-45. A/C Compartment Front Closeout Insulation

INSTRUCTIONS:

Cut insulation to dimensions shown.

MATERIAL BLOCK		
STOCK SIZE	DESCRIPTION	SPECIFICATION
1.00 THICK	FOAM, ACOUSTIC	ASTM D-903 UL 94 HF-1

AIR CONDITIONING COMPARTMENT INSULATION		
INSULATION PART NUMBER	CUT (INCHES)	MANUFACTURED FROM PART NUMBER (CAGEC)
5598817	23.70 X 18.50	C 540 B H52 (28818)

Figure D-46. A/C Compartment Front Ceiling Insulation

INSTRUCTIONS:

Cut insulation to dimensions shown.

Section II. ILLUSTRATED MANUFACTURING INSTRUCTIONS (Cont'd)

MATERIAL BLOCK		
STOCK SIZE	DESCRIPTION	SPECIFICATION
1.00 THICK	FOAM, ACOUSTIC	ASTM D-903 UL 94 HF-1

AIR CONDITIONING COMPARTMENT INSULATION		
INSULATION PART NUMBER	CUT (INCHES)	MANUFACTURED FROM PART NUMBER (CAGEC)
5598820	9.40 X 33.70	C 540 B H52 (28818)

Figure D-47. A/C Compartment Driver Compartment Above Door Insulation

INSTRUCTIONS:

Cut insulation to dimensions shown.

Section II. ILLUSTRATED MANUFACTURING INSTRUCTIONS (Cont'd)

MATERIAL BLOCK		
STOCK SIZE	DESCRIPTION	SPECIFICATION
1.00 THICK	FOAM, ACOUSTIC	ASTM D-903 UL 94 HF-1

AIR CONDITIONING COMPARTMENT INSULATION		
INSULATION PART NUMBER	CUT (INCHES)	MANUFACTURED FROM PART NUMBER (CAGEC)
5598818	32.90 X 24.80	C 540 B H52 (28818)

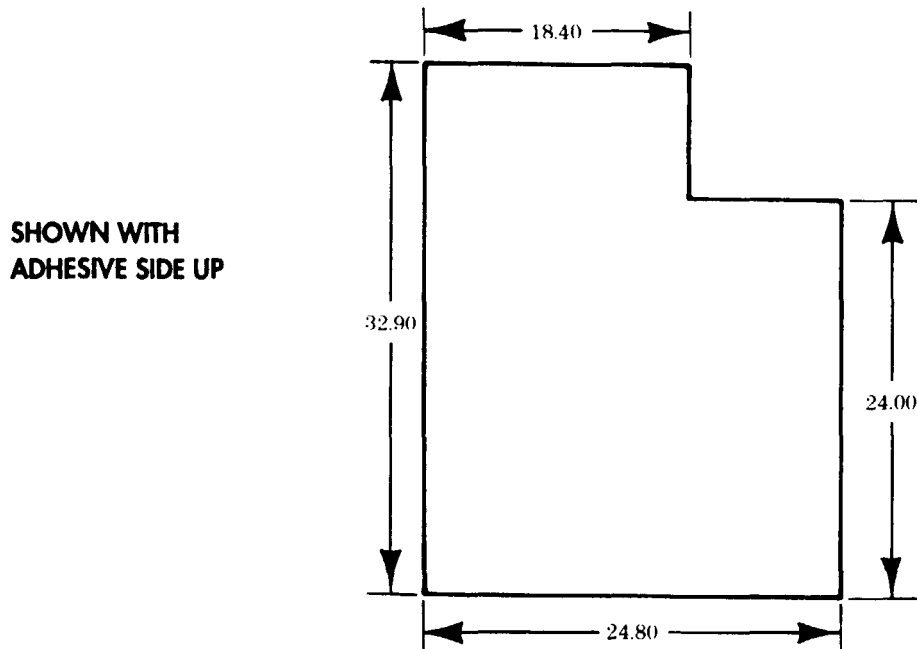


Figure D-48. A/C Compartment Driver Side Ceiling Insulation

INSTRUCTIONS:

Cut insulation to dimensions shown.

Section II. ILLUSTRATED MANUFACTURING INSTRUCTIONS (Cont'd)

MATERIAL BLOCK		
STOCK SIZE	DESCRIPTION	SPECIFICATION
1.00 THICK	FOAM, ACOUSTIC	ASTM D-903 UL 94 HF-1

AIR CONDITIONING COMPARTMENT INSULATION		
INSULATION PART NUMBER	CUT (INCHES)	MANUFACTURED FROM PART NUMBER (CAGEC)
5598241	14.75 X 4.20	C 540 B H52 (28818)

SHOWN WITH
ADHESIVE SIDE UP

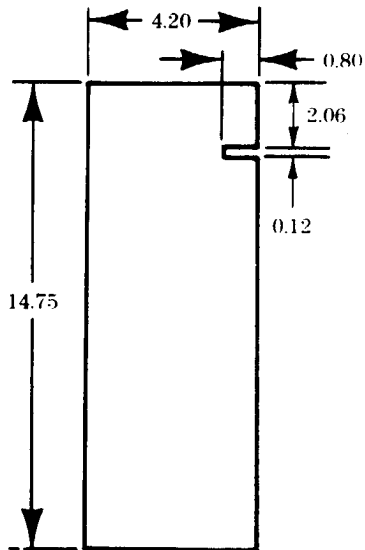


Figure D-49. A/C Compartment Condenser Top Outer Insulation

INSTRUCTIONS:

Cut insulation to dimensions shown.

Section II. ILLUSTRATED MANUFACTURING INSTRUCTIONS (Cont'd)

MATERIAL BLOCK		
STOCK SIZE	DESCRIPTION	SPECIFICATION
1.00 THICK	FOAM, ACOUSTIC	ASTM D-903 UL 94 HF-1

AIR CONDITIONING COMPARTMENT INSULATION		
INSULATION PART NUMBER	CUT (INCHES)	MANUFACTURED FROM PART NUMBER (CAGEC)
5598242	12.50 X 19.80	C 540 B H52 (28818)

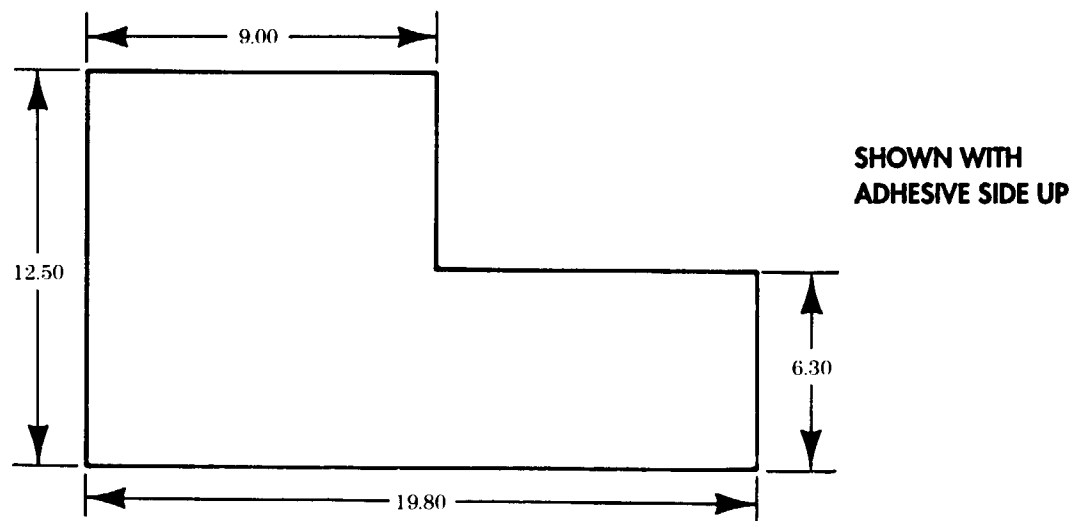


Figure D-50. A/C Compartment Condenser Top Inner Insulation

INSTRUCTIONS:

Cut insulation to dimensions shown.

Section II. ILLUSTRATED MANUFACTURING INSTRUCTIONS (Cont'd)

MATERIAL BLOCK		
STOCK SIZE	DESCRIPTION	SPECIFICATION
1.00 THICK	FOAM, ACOUSTIC	ASTM D-903 UL 94 HF-1

AIR CONDITIONING COMPARTMENT INSULATION		
INSULATION PART NUMBER	CUT (INCHES)	MANUFACTURED FROM PART NUMBER (CAGEC)
5598814	10.00 X 13.50	C 540 B H52 (28818)

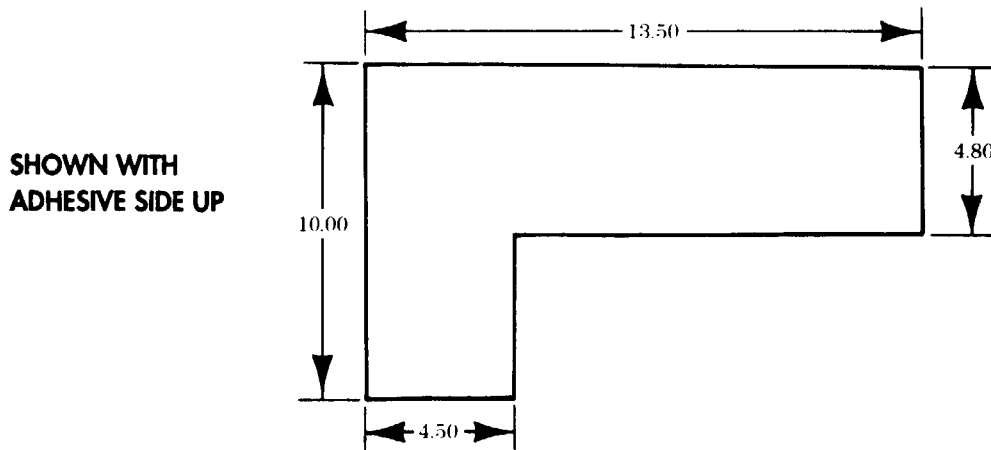


Figure D-51. A/C Compartment Bulkhead Upper Inboard Insulation

INSTRUCTIONS:

Cut insulation to dimensions shown.

Section II. ILLUSTRATED MANUFACTURING INSTRUCTIONS (Cont'd)

MATERIAL BLOCK		
STOCK SIZE	DESCRIPTION	SPECIFICATION
1.00 THICK	FOAM, ACOUSTIC	ASTM D-903 UL 94 HF-1

AIR CONDITIONING COMPARTMENT INSULATION		
INSULATION PART NUMBER	CUT (INCHES)	MANUFACTURED FROM PART NUMBER (CAGEC)
5598245	22.62 X 26.20	C 540 B H52 (28818)

SHOWN WITH
ADHESIVE SIDE UP

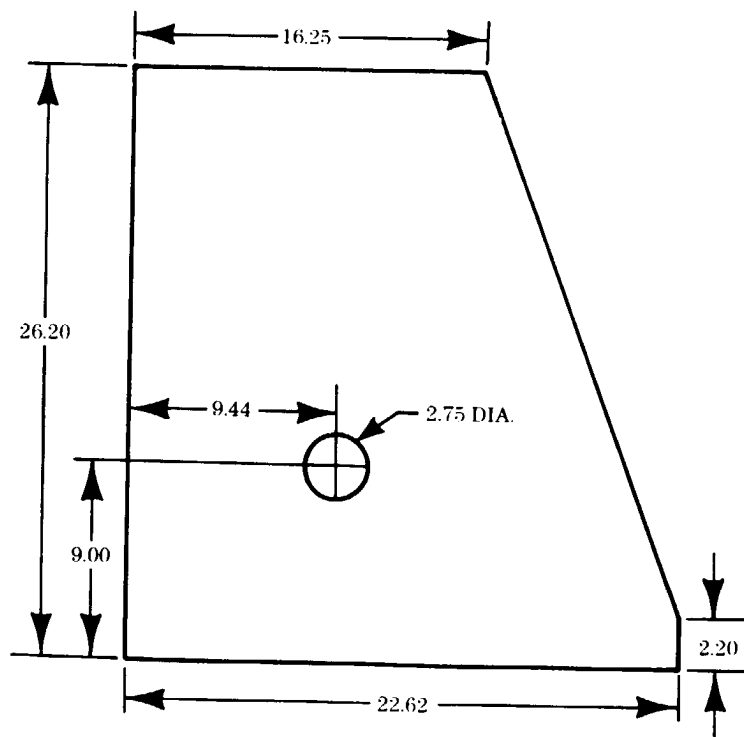


Figure D-52. A/C Compartment Access Door Insulation

INSTRUCTIONS:

Cut insulation to dimensions shown.

Section II. ILLUSTRATED MANUFACTURING INSTRUCTIONS (Cont'd)

MATERIAL BLOCK		
STOCK SIZE	DESCRIPTION	SPECIFICATION
1.00 THICK	FOAM, ACOUSTIC	ASTM D-903 UL 94 HF-1

AIR CONDITIONING COMPARTMENT INSULATION		
INSULATION PART NUMBER	CUT (INCHES)	MANUFACTURED FROM PART NUMBER (CAGEC)
5598821	7.80 X 5.60	C 540 B H52 (28818)

Figure D-53. A/C Compartment Access Door Insulation

INSTRUCTIONS:

Cut insulation to dimensions shown.

Section II. ILLUSTRATED MANUFACTURING INSTRUCTIONS (Cont'd)

MATERIAL BLOCK		
STOCK SIZE	DESCRIPTION	SPECIFICATION
1.00 THICK	FOAM, ACOUSTIC	ASTM D-903 UL 94 HF-1

AIR CONDITIONING COMPARTMENT INSULATION		
INSULATION PART NUMBER	CUT (INCHES)	MANUFACTURED FROM PART NUMBER (CAGEC)
5598815	5.70 X 12.30	C 540 B H52 (28818)

SHOWN WITH
ADHESIVE SIDE UP

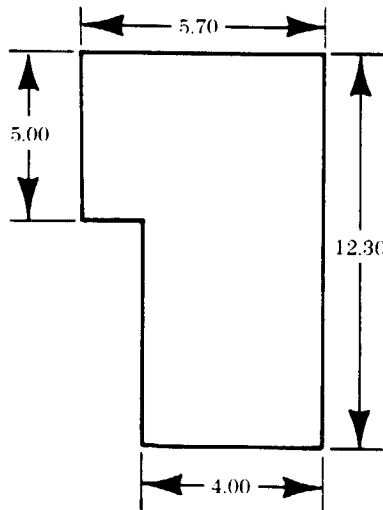


Figure D-54. A/C Compartment Condenser Side Inner Insulation

INSTRUCTIONS:

Cut insulation to dimensions shown.

Section II. ILLUSTRATED MANUFACTURING INSTRUCTIONS (Cont'd)

MATERIAL BLOCK		
STOCK SIZE	DESCRIPTION	SPECIFICATION
1.00 THICK	FOAM, ACOUSTIC	ASTM D-903 UL 94 HF-1

AIR CONDITIONING COMPARTMENT INSULATION		
INSULATION PART NUMBER	CUT (INCHES)	MANUFACTURED FROM PART NUMBER (CAGEC)
5598240	6.50 X 12.10	C 540 B H52 (28818)

SHOWN WITH
ADHESIVE SIDE UP

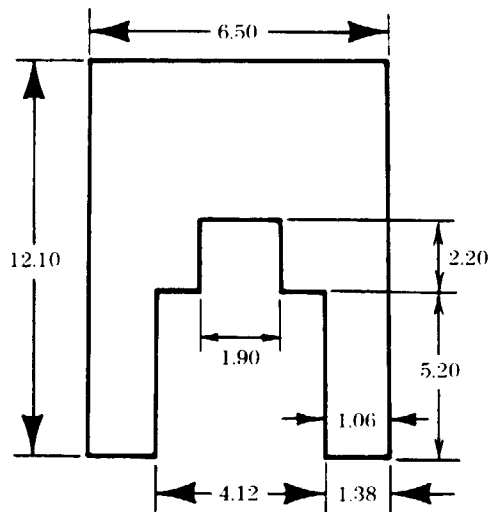


Figure D-55. A/C Compartment Condenser Side Insulation

INSTRUCTIONS:

Cut insulation to dimensions shown.

Section II. ILLUSTRATED MANUFACTURING INSTRUCTIONS (Cont'd)

MATERIAL BLOCK		
STOCK SIZE	DESCRIPTION	SPECIFICATION
1.00 THICK	FOAM, ACOUSTIC	ASTM D-903 UL 94 HF-1

AIR CONDITIONING COMPARTMENT INSULATION		
INSULATION PART NUMBER	CUT (INCHES)	MANUFACTURED FROM PART NUMBER (CAGEC)
5598243	8.75 X 11.25	C 540 B H52 (28818)

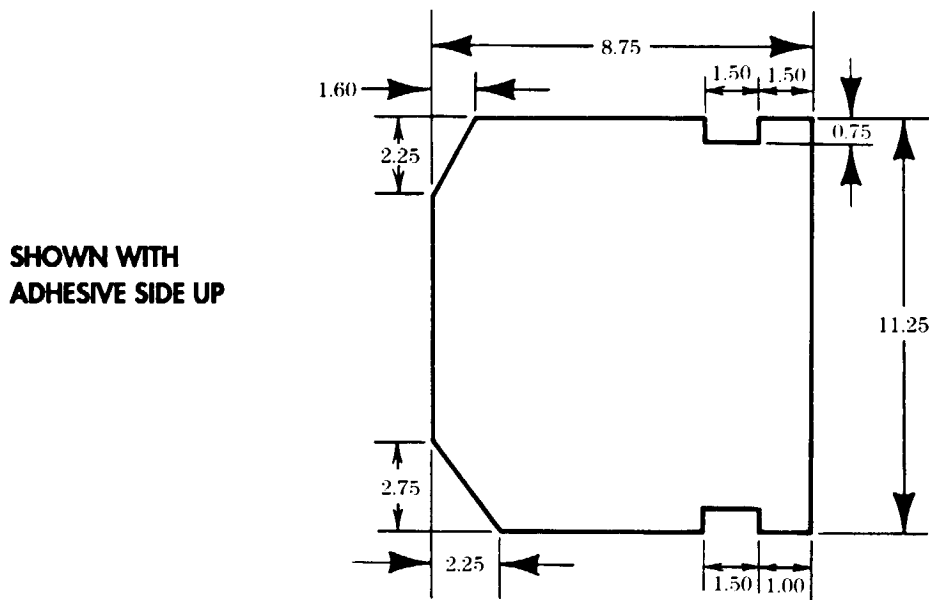


Figure D-56. A/C Compartment Condenser Closeout Panel Insulation

INSTRUCTIONS:

Cut insulation to dimensions shown.

Section II. ILLUSTRATED MANUFACTURING INSTRUCTIONS (Cont'd)

MATERIAL BLOCK		
STOCK SIZE	DESCRIPTION	SPECIFICATION
1.00 THICK	FOAM, ACOUSTIC	ASTM D-903 UL 94 HF-1

AIR CONDITIONING COMPARTMENT INSULATION		
INSULATION PART NUMBER	CUT (INCHES)	MANUFACTURED FROM PART NUMBER (CAGEC)
5598239	11 X 10.50	C 540 B H52 (28818)

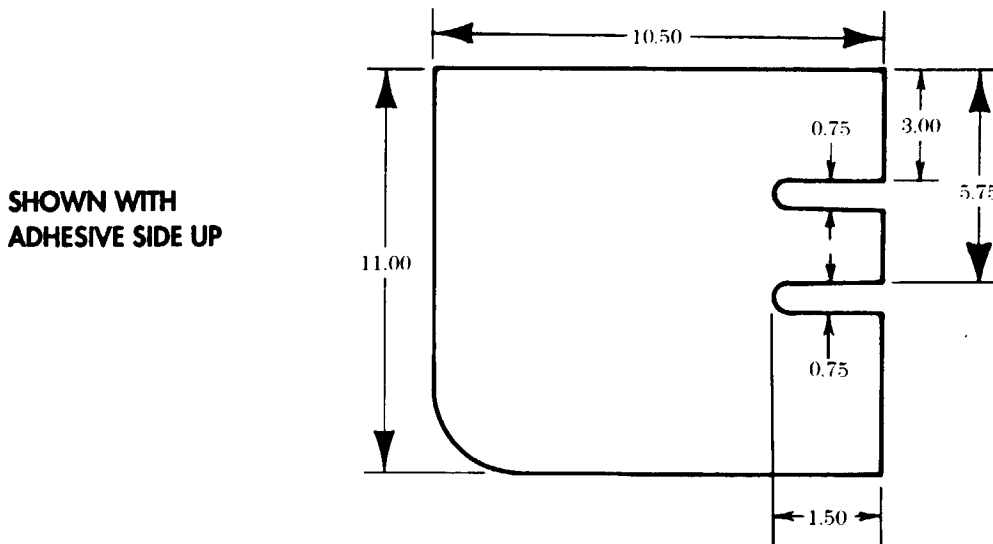


Figure D-57. A/C Compartment Condenser Side Insulation

INSTRUCTIONS:

Cut insulation to dimensions shown.

Section II. ILLUSTRATED MANUFACTURING INSTRUCTIONS (Cont'd)

MATERIAL BLOCK		
STOCK SIZE	DESCRIPTION	SPECIFICATION
0.38 THICK 0.42 WIDE	WEATHERSEAL	MIL-STD-1180

LITTER STOWAGE DOOR SEAL		
INSULATION PART NUMBER	CUT LENGTH (INCHES)	MANUFACTURED FROM PART NUMBER (CAGEC)
5592085	48	ZX-2004 (76385)

Figure D-58. Litter Stowage Door Seal

INSTRUCTIONS:

Cut seal to length shown.

Section II. ILLUSTRATED MANUFACTURING INSTRUCTIONS (Cont'd)

MATERIAL BLOCK		
STOCK SIZE	DESCRIPTION	SPECIFICATION
0.060 THICK 0.50 WIDE	SEAL, RUBBER	ASTM D 1056 MIL-STD-1180

NBC DOOR AND ACCESS PANEL SEALS			
ITEM NO.	SEAL PART NUMBER	CUT LENGTH (INCHES)	MANUFACTURED FROM PART NUMBER (CAGEC)
1	5597994	14.70	R-495-T (79101)
2	5597995	16.98	R-495-T (79101)
3	5597997	33.56	R-495-T (79101)
4	5597998	4.72	R-495-T (79101)
5	5597999	31.28	R-495-T (79101)
6	5598000	11.56	R-495-T (79101)
7	5598029	10.62	R-495-T (79101)
8	5598030	18.92	R-495-T (79101)
9	5598031	16.66	R-495-T (79101)
10	5598032	13.76	R-495-T (79101)
11	5598033	4.38	R-495-T (79101)
12	5598034	29.86	R-495-T (79101)
13	5598035	29.42	R-495-T (79101)
14	5598036	24.50	R-495-T (79101)
15	5598061	5.56	R-495-T (79101)
16	5598062	7.56	R-495-T (79101)
17	5598063	3.28	R-495-T (79101)
18	5598064	2.50	R-495-T (79101)
19	5598065	3.72	R-495-T (79101)

Figure D-59. NBC Door and Access Panel Seals

INSTRUCTIONS:

Determine seal part number needed from RPSTL and cut seal to length shown.

Section II. ILLUSTRATED MANUFACTURING INSTRUCTIONS (Cont'd)

MATERIAL BLOCK		
STOCK SIZE	DESCRIPTION	SPECIFICATION
0.75 INSIDE DIAMETER	TUBING, PVC	ASTM 1784 ASTM D 2846 FMVSS-302

NBC SYSTEM PVC TUBING			
ITEM NO.	TUBING PART NUMBER	CUT LENGTH (INCHES)	MANUFACTURED FROM NSN
1	5597214	1.62	4710-00-112-8626
2	5597215	1.81	4710-00-112-8626
3	5597216	2.00	4710-00-112-8626
4	5597217	2.12	4710-00-112-8626
5	5597218	2.38	4710-00-112-8626
6	5597219	3.75	4710-00-112-8626
7	5597220	3.25	4710-00-112-8626
8	5597221	4.62	4710-00-112-8626
9	5597222	4.25	4710-00-112-8626
10	5597223	4.38	4710-00-112-8626
11	5597224	4.75	4710-00-112-8626
12	5597225	5.25	4710-00-112-8626
13	5597226	6.87	4710-00-112-8626
14	5597227	10.62	4710-00-112-8626
15	5597228	15.31	4710-00-112-8626
16	5597229	15.88	4710-00-112-8626
17	5597230	30.12	4710-00-112-8626
18	5597231	31.38	4710-00-112-8626
19	5597232	6.81	4710-00-112-8626
20	5597722	1.31	4710-00-112-8626
21	5597723	8.75	4710-00-112-8626
22	5597724	5.80	4710-00-112-8626
23	5597725	1.38	4710-00-112-8626
24	5597726	1.75	4710-00-112-8626
25	5597727	4.65	4710-00-112-8626
26	5597728	7.45	4710-00-112-8626
27	5597730	6.12	4710-00-112-8626
28	5597957	2.70	4710-00-112-8626

Figure D-60. NBC System PVC Tubing

Section II. ILLUSTRATED MANUFACTURING INSTRUCTIONS (Cont'd)

NBC SYSTEM PVC TUBING (Cont'd)			
ITEM NO.	TUBING PART NUMBER	CUT LENGTH (INCHES)	MANUFACTURED FROM NSN
29	5597958	7.50	4710-00-112-8626
30	5597970	14.12	4710-00-112-8626
31	5598132	10.28	4710-00-112-8626
32	5598133	2.88	4710-00-112-8626
33	5598134	3.03	4710-00-112-8626

Figure D-60. NBC System PVC Tubing (Cont'd)

INSTRUCTIONS:

NOTE

Make sure tubing is cut square at ends, and ends are free of nicks, burrs, and cracks.

Determine tubing part number needed from RPSTL and cut tube to length shown.

MATERIAL BLOCK		
STOCK SIZE	DESCRIPTION	SPECIFICATION
0.625 IN. INSIDE DIAMETER	INSULATION SLEEVING, HEAT SHRINK	MIL-I-23053

HEAT SHRINK INSULATION SLEEVING		
INSULATION PART NUMBER	CUT LENGTH (INCHES)	MANUFACTURED FROM PART NUMBER (CAGEC)
M23053/1-204-0	2.0	M23053/1-204-0 (81349)
M23053/1-204-2	2.0	M23053/1-204-2 (81349)

Figure D-61. Heat Shrink Insulation Sleeving

INSTRUCTIONS:

Cut insulation to length shown.

Section II. ILLUSTRATED MANUFACTURING INSTRUCTIONS (Cont'd)

MATERIAL BLOCK		
STOCK SIZE	DESCRIPTION	SPECIFICATION
"O" GAGE	WIRE, ELECTRICAL	MIL-C-13486

200 AMP ALTERNATOR CABLE ASSEMBLY				
CABLE PART NUMBER	CUT LENGTH (INCHES)	MANUFACTURED FROM NSN	END TERMINAL NSN	END INSULATOR NSN
5582451	58	6145-00-705-6674	5940-00-735-5520	5970-00-174-9449

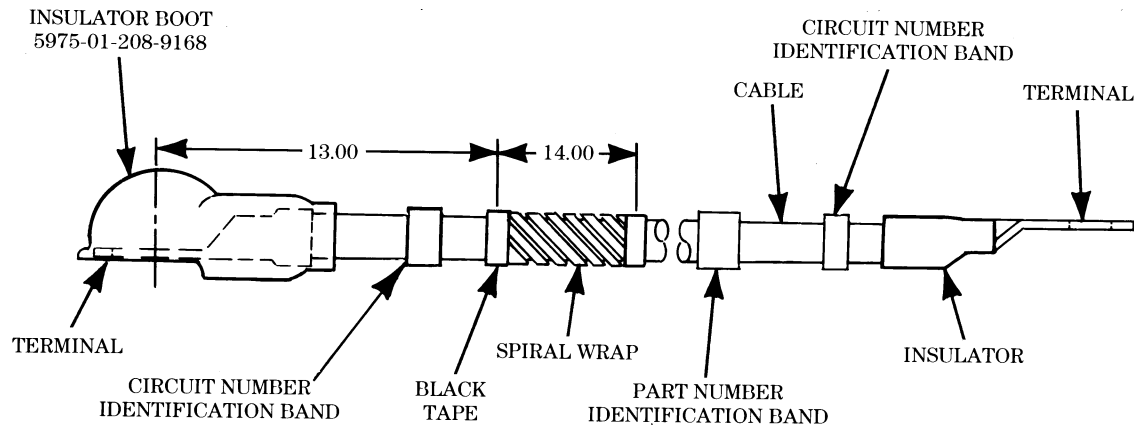


Figure D-62. 200 Amp Alternator Cable Assembly.

INSTRUCTIONS:

1. Cut cable to length as shown.
2. Cut 14 inches of spiral wrap from bulk and install as shown. Secure spiral wrap in position with black tape at both ends.
3. Select and solder proper end terminals to cable ends as shown. (Refer to TC 9-237 for soldering instructions.)
4. Install insulator and insulator boot to cable ends as shown.
5. Mark and install identification bands using old cable as reference.

Section II. ILLUSTRATED MANUFACTURING INSTRUCTIONS (Cont'd)

MATERIAL BLOCK		
STOCK SIZE	DESCRIPTION	SPECIFICATION
"O" GAGE	WIRE, ELECTRICAL	MIL-C-13486

12 VOLT ALTERNATOR CABLE ASSEMBLY				
CABLE PART NUMBER	CUT LENGTH (INCHES)	MANUFACTURED FROM P/N	END TERMINAL PART NUMBER	END INSULATOR PART NUMBER
12446821	102	M13486/1-9	MS20659-108	12460417

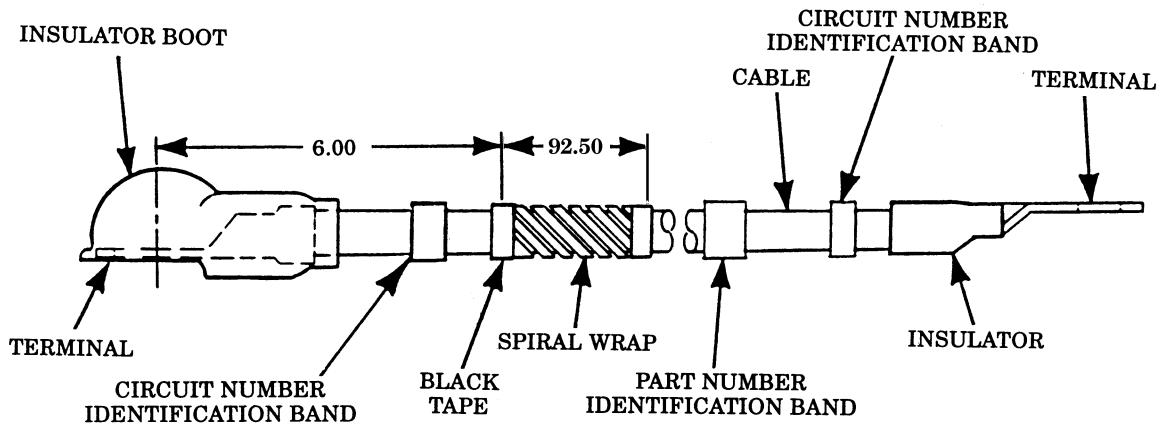


Figure D-62.1. 12 Volt Alternator Cable Assembly.

INSTRUCTIONS:

1. Cut cable to length as shown.
2. Cut of 92.50 inches spiral wrap from bulk and install as shown. Secure spiral wrap in position with tape at both ends.
3. Select and solder proper end terminals to cable ends as shown. (Refer to TC 9-237 for soldering instructions.)
4. Install insulator and insulator boot to cable ends as shown.
5. Mark and install identification bands using old cable as reference.

Section II. ILLUSTRATED MANUFACTURING INSTRUCTIONS (Cont'd)

MATERIAL BLOCK		
STOCK SIZE	DESCRIPTION	SPECIFICATION
0.250-IN. DIAMETER	TUBE, METALLIC	MIL-T-6845
0.250-IN. (NOM) INSIDE DIAMETER 0.438-IN. (NOM) OUTSIDE DIAMETER	HOSE, NONMETALLIC	MIL-H-13444

FUEL FILTER BLEEDER TOOL			
ITEM NO.	TOOL PART NUMBER	CUT LENGTH (INCHES)	MANUFACTURED FROM NSN
1	5598825	1-1/2	4710-00-825-5894
2	5598826	24	4720-00-542-3304

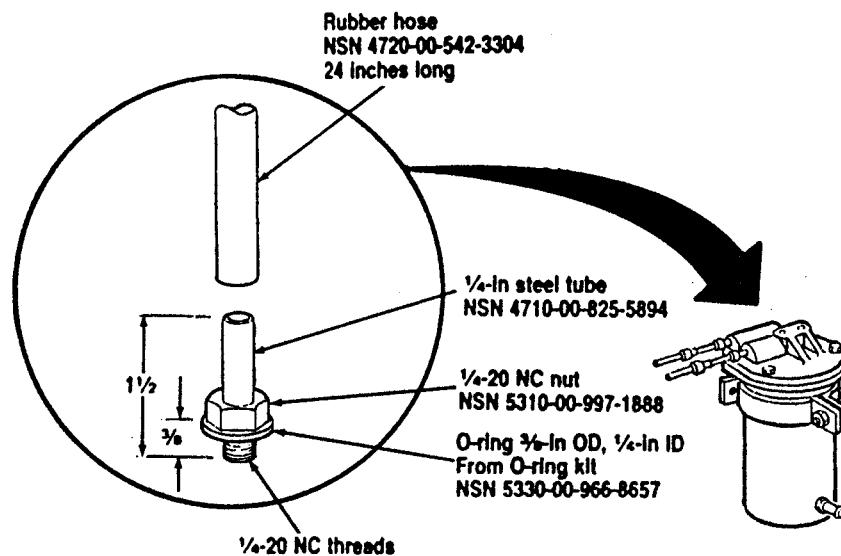


Figure D-63. Fuel Filter Bleeder Tool.

INSTRUCTIONS:

1. Cut steel tube, NSN 4710-00-825-5894, to length as shown.
2. Thread one end of the tube 5/8 inch.
3. Install nut, NSN 5310-00-997-1888, and O-ring, NSN 5330-00-966-8657, on threaded end of tube.
4. Install 24-inch rubber hose, NSN 4720-00-542-3304, to the other end of the tube.

Section II. ILLUSTRATED MANUFACTURING INSTRUCTIONS (Cont'd)

MATERIAL BLOCK		
STOCK SIZE	DESCRIPTION	SPECIFICATION
1. .125 IN. THICK	FLAT STEEL	N/A
2. .375 IN. DIAMETER	ROUND STEEL	N/A

GLOW PLUG TOOL		
ITEM NO.	CUT LENGTH (INCHES)	MANUFACTURED FROM PART NUMBER (FSCM)
1	as shown	9515-00-204-3994
2	as shown	9510-00-189-0652

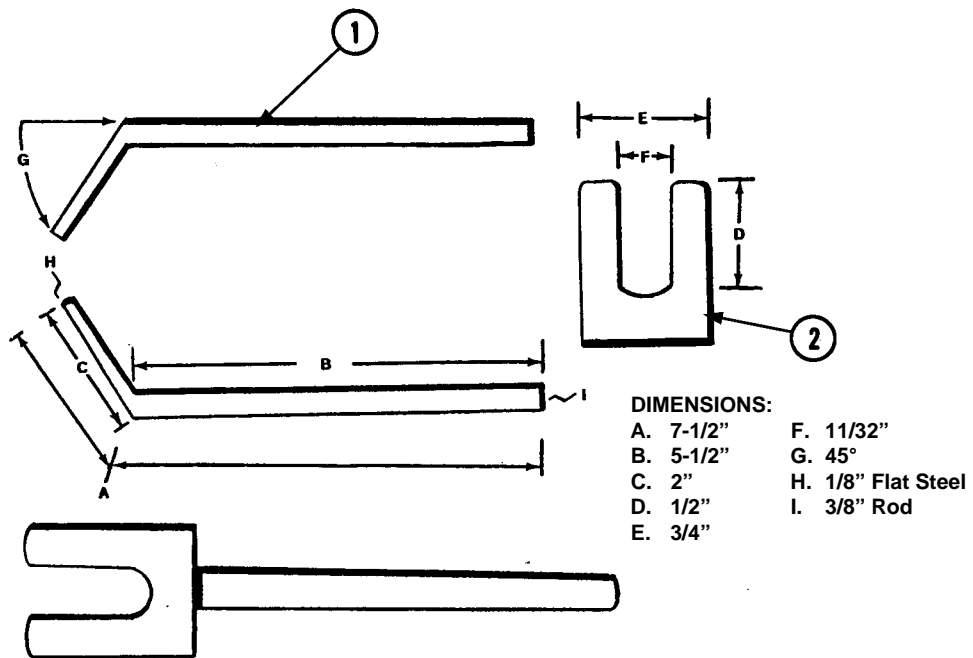


Figure D-63.1. Glow Plug Tool Assembly.

INSTRUCTIONS:

1. Cut steel to lengths as shown.
2. Weld flat steel and round steel together at angle as shown.
3. Forked end (dimension F) must fit behind hex-head of glow plug. Thickness may have to be ground down from .125 inch to .0625 inch to insure proper fit.

Section II. ILLUSTRATED MANUFACTURING INSTRUCTIONS (Cont'd)

MATERIAL BLOCK		
STOCK SIZE	DESCRIPTION	SPECIFICATION
0.002-IN. (NOM) THICK 26-IN. (NOM) WIDTH	PLASTIC SHEET, PRESS	N/A

PLASTIC SHEET		
PLASTIC SHEET PART NUMBER	CUT LENGTH (INCHES)	MANUFACTURED FROM NSN
5598827	AS REQUIRED	9330-00-618-7214

Figure D-64. Plastic Sheet

INSTRUCTIONS:

Cut two pieces of plastic large enough to cover small hole or crack with enough to overlap about 1/4 in. around damaged area of window.

Section II. ILLUSTRATED MANUFACTURING INSTRUCTIONS (Cont'd)

MATERIAL BLOCK		
STOCK SIZE	DESCRIPTION	SPECIFICATION
12 x 4-FT SHEET 0.060 THICK	ALUMINUM ALLOY TEMPER T-4	ASTM B 209-90

PROTECTIVE SHIELD		
PROTECTIVE SHIELD PART NUMBER	CUT TO SIZE (INCHES)	MANUFACTURED FROM NSN
5598828	AS SHOWN	9535-00-541-7194

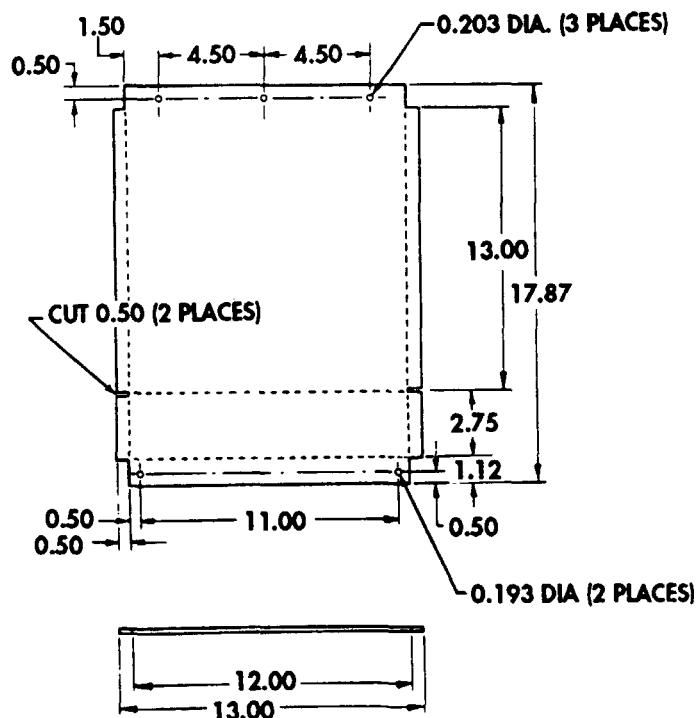
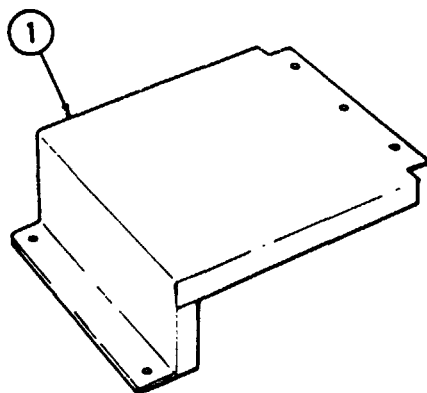


Figure D-65. Protective Shield

INSTRUCTIONS:

1. Cut aluminum sheet metal to size as shown.
2. Locate, mark, and drill two 0.193-in. diameter holes in protective shield (1).
3. Locate, mark, and drill three 0.203-in. diameter holes in protective shield (1).
4. Make two 0.50-in. relief cuts in sides of protective shield (1).
5. Bend edges (90° bend along dotted lines) on protective shield (1).
6. Remove all burrs and sharp edges.
7. Paint protective shield (1) as required. Refer to TM 43-0139.

Section II. ILLUSTRATED MANUFACTURING INSTRUCTIONS (Cont'd)

MATERIAL BLOCK		
STOCK SIZE	DESCRIPTION	SPECIFICATION
0.750-IN. THICK	PLYWOOD, 4 X 8 FT. SHEET	MIL-STD-731A

PROTECTIVE ENGINE COVER		
COVER PART NUMBER	CUT (INCHES)	MANUFACTURED FROM PART NUMBER NSN
5598829	34 X 60	N/A

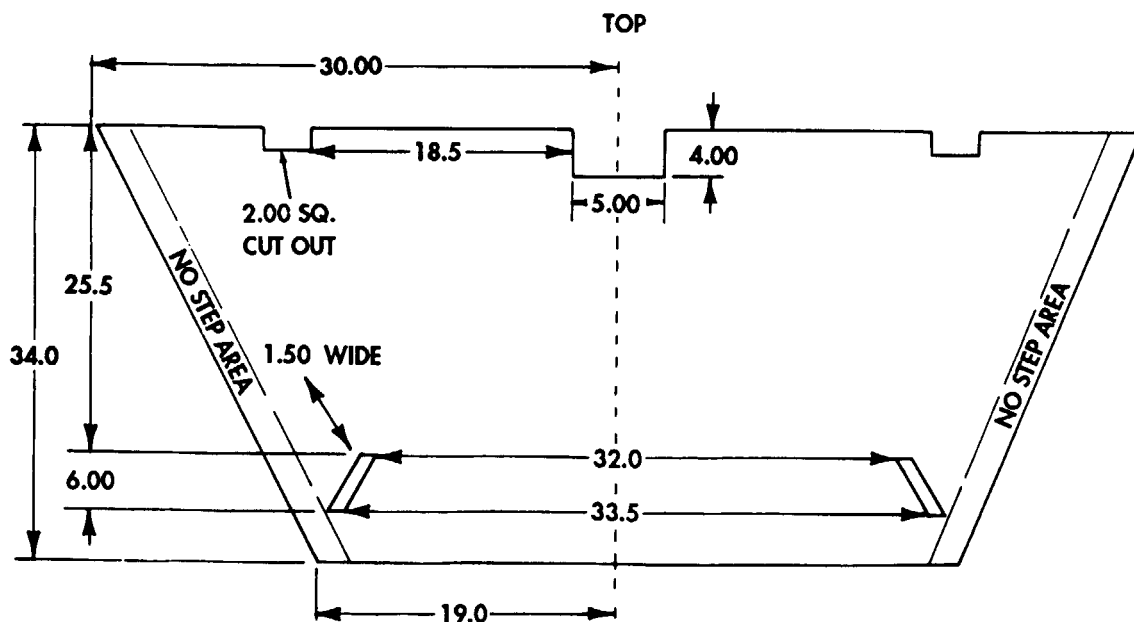


Figure D-66. Protective Engine Cover

INSTRUCTIONS:

1. Cut plywood to dimensions shown. If necessary, modify plywood for proper fit.
2. Paint cover and outline with yellow safety boarder, 4-inches wide on outside edges.
3. Stencil "NO STEP AREA" caution on outside edges.
4. Prior to installing protective engine cover, remove both plate covers and seals from airlift brackets.
5. Store flat or hang on wall to prevent warpage.

Section II. ILLUSTRATED MANUFACTURING INSTRUCTIONS (Cont'd)

MATERIAL BLOCK		
STOCK SIZE	DESCRIPTION	SPECIFICATION
0.750-IN. THICK	PLYWOOD, 4 X 8 FT. SHEET	MIL-STD-731A

PROTECTIVE ENGINE COVER		
COVER PART NUMBER	CUT (INCHES)	MANUFACTURED FROM PART NUMBER NSN
5598830	40.0 x 46.5	N/A

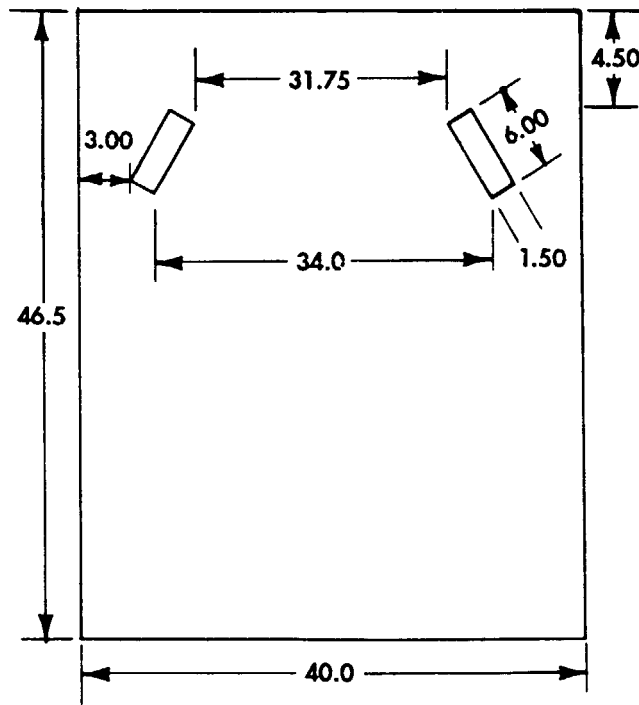


Figure D-67. Cooler Fin Protective Cover

INSTRUCTIONS:

1. Cut plywood to dimensions shown. If necessary, modify plywood for proper fit.
2. Never use cover with engine running; engine damage will occur.
3. Stencil "NO STEP" caution to top of cover.
4. Prior to installing cooler fin protective cover, remove both plate covers and seals from airlift bracket.
5. Store flat or hang on wall to prevent warpage.

Section II. ILLUSTRATED MANUFACTURING INSTRUCTIONS (Cont'd)

MATERIAL BLOCK		
STOCK SIZE	DESCRIPTION	SPECIFICATION
.1196-IN. THICK	STEEL, CARBON HR, CQ, P&O	ASTM A569

SHEET		
PART NUMBER	CUT LENGTH (INCHES)	MANUFACTURED FROM NSN
5598832	AS SHOWN	N/A

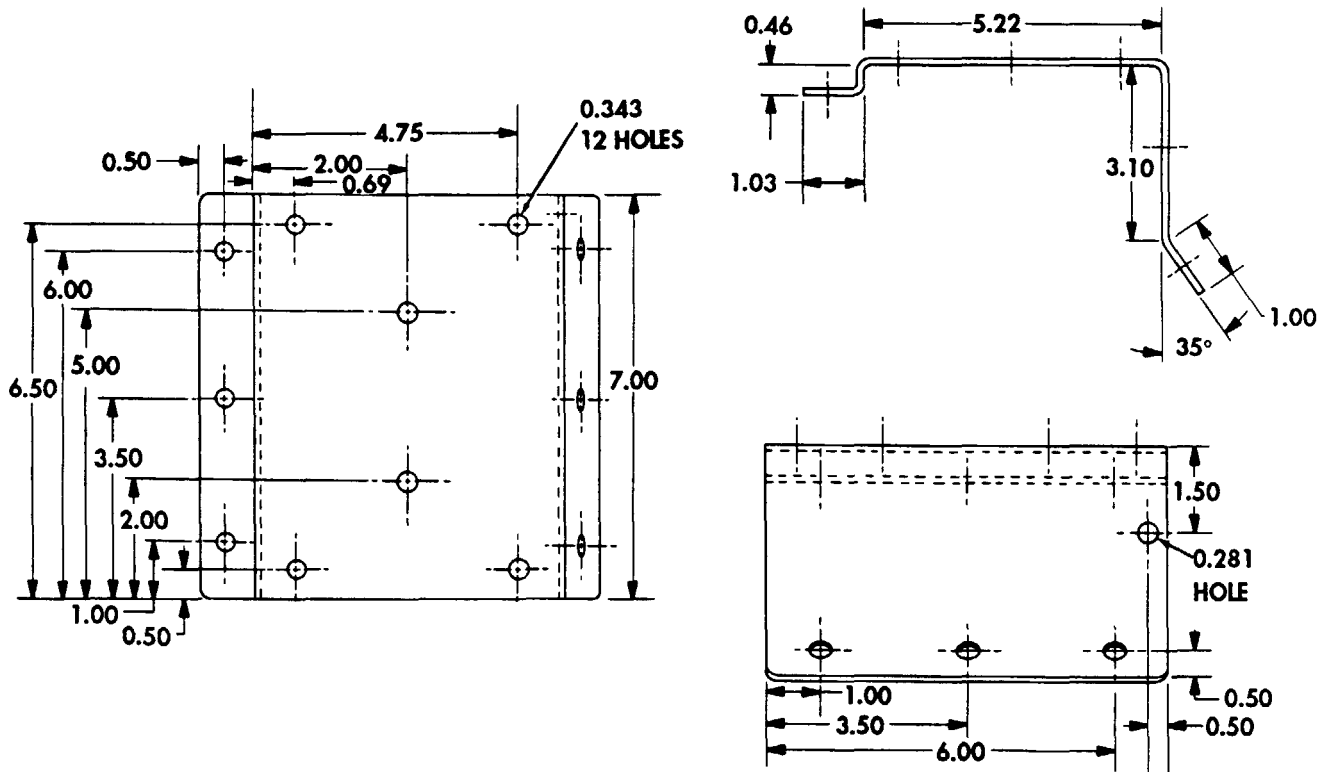


Figure D-68. Siren Mounting Bracket

INSTRUCTIONS:

1. Fabricate siren mounting bracket according to dimensions shown.
2. Remove all burrs and sharp edges.
3. Clean per SPEC TT-C-490. Treat per SPEC Type I or II, or SPEC TT-C-490.
4. Prime per SPEC MIL-P-52192, MIL-P-53022, or MIL-P-53030.
5. Finish-paint per SPEC MIL-C-46168.

Section II. ILLUSTRATED MANUFACTURING INSTRUCTIONS (Cont'd)

MATERIAL BLOCK		
STOCK SIZE	DESCRIPTION	SPECIFICATION
.1196-IN. THICK	STEEL, CARBON HR, CQ, P&O	ASTM A569

SHEET		
PART NUMBER	CUT LENGTH (INCHES)	MANUFACTURED FROM NSN
5598833	AS SHOWN	N/A

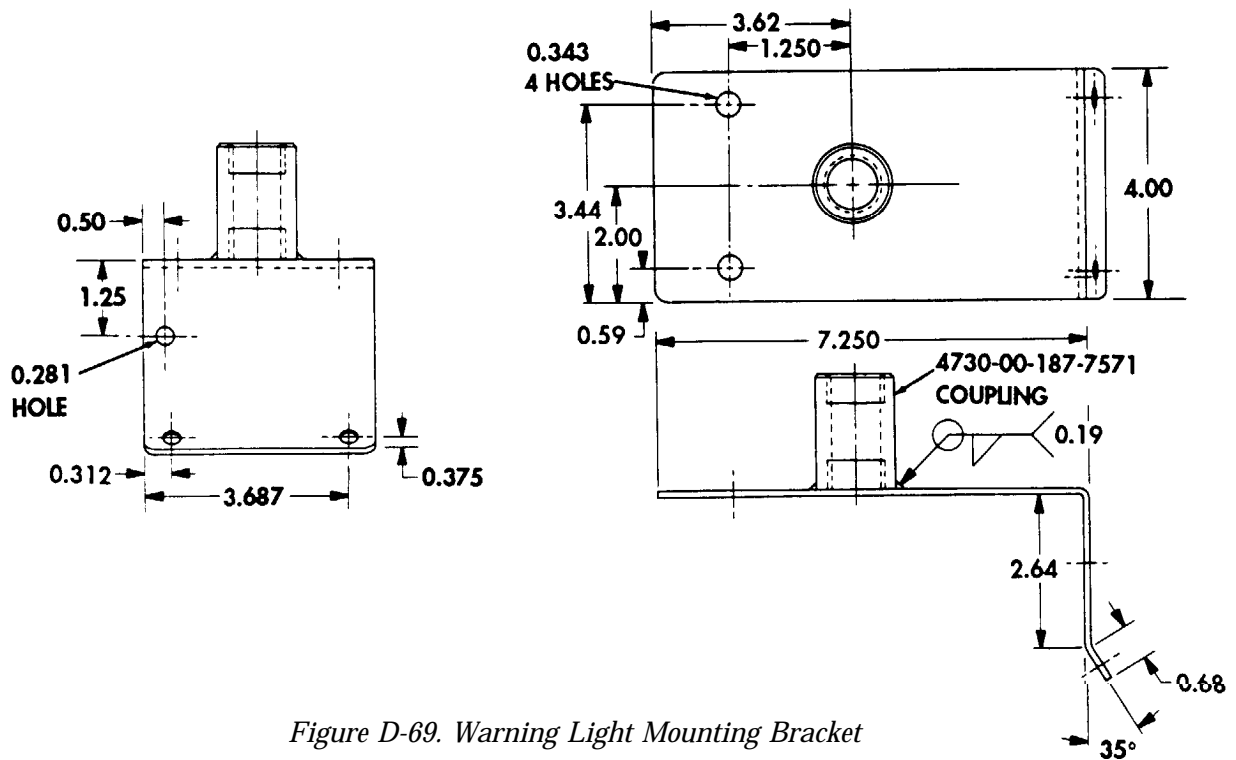


Figure D-69. Warning Light Mounting Bracket

INSTRUCTIONS:

1. Fabricate warning light mounting bracket according to dimensions shown.
2. Weld sizes are minimum. Weld per SPEC MIL-STD-1261.
3. Remove all burrs and sharp edges.
4. Clean per SPEC TT-C-490. Treat per SPEC Type I or II, or SPEC TT-C-490.
5. Prime per SPEC MIL-P-52192, MIL-P-53022, or MIL-P-53030.
6. Finish-paint per SPEC MIL-C-46168.

Section II. ILLUSTRATED MANUFACTURING INSTRUCTIONS (Cont'd)

MATERIAL BLOCK		
STOCK SIZE	DESCRIPTION	SPECIFICATION
12 AWG	WIRE, ELECTRICAL	MIL-C-13486

WIRE "D"		
WIRE PART NUMBER	CUT LENGTH (INCHES)	MANUFACTURED FROM NSN
5598834	5.0	2. 6145-00-705-6678
SHELL NSN	TERMINAL INSULATOR NSN	WASHER NSN
1. 2590-00-695-9076 (2 EACH)	4. 5940-00-399-6676 (2 EACH)	3. 5310-00-298-8903 (2 EACH)

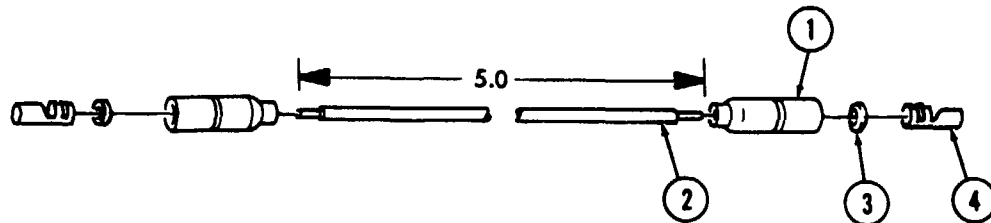


Figure D-70. Wire "D" - Adapter "A" to Adapter Connector "B"

MATERIAL BLOCK		
STOCK SIZE	DESCRIPTION	SPECIFICATION
12 AWG	WIRE, ELECTRICAL	MIL-C-13486

WIRE "F"		
WIRE PART NUMBER	CUT LENGTH (INCHES)	MANUFACTURED FROM NSN
5598835	123.0	4. 6145-00-705-6678
SHELL NSN	TERMINAL INSULATOR NSN	WASHER NSN
1. 5935-00-695-9077 5. 2590-00-695-9076	3. 5999-00-925-6495 7. 5940-00-399-6676	2. 5310-00-595-7044 6. 5310-00-298-8903

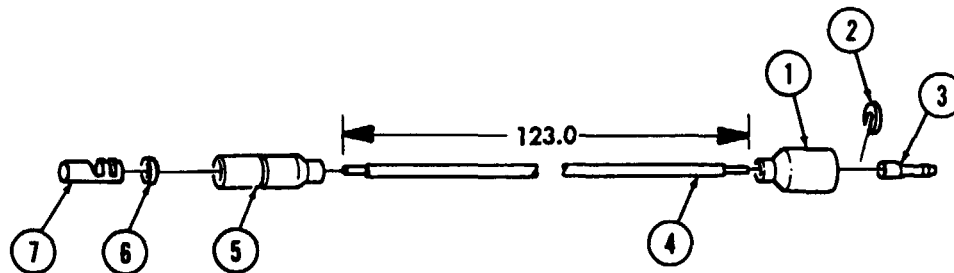


Figure D-71. Wire "F" - Passenger Side Siren Switch to Adapter Connector "B"

Section II. ILLUSTRATED MANUFACTURING INSTRUCTIONS (Cont'd)

MATERIAL BLOCK		
STOCK SIZE	DESCRIPTION	SPECIFICATION
12 AWG	WIRE, ELECTRICAL	MIL-C-13486

WIRE "G"		
WIRE PART NUMBER	CUT LENGTH (INCHES)	MANUFACTURED FROM NSN
5598836	117.0	4. 6145-00-705-6678
SHELL NSN 1. 5935-00-695-9077 5. 2590-00-695-9076	TERMINAL INSULATOR NSN 3. 5999-00-925-6495 7. 5940-00-399-6676	WASHER NSN 2. 5310-00-595-7044 6. 5310-00-298-8903

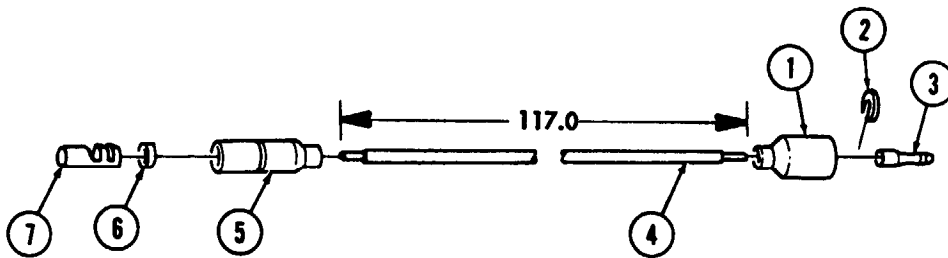


Figure D-72. Wire "G" - Passenger Side Siren Switch Adapter Connector "E"

MATERIAL BLOCK		
STOCK SIZE	DESCRIPTION	SPECIFICATION
12 AWG	WIRE, ELECTRICAL	MIL-C-13486

WIRE "L"		
WIRE PART NUMBER	CUT LENGTH (INCHES)	MANUFACTURED FROM NSN
5598837	113.0	4. 6145-00-705-6678
SHELL NSN 1. 5935-00-695-9077 5. 2590-00-695-9076	TERMINAL INSULATOR NSN 3. 5999-00-925-6495 7. 5940-00-399-6676	WASHER NSN 2. 5310-00-595-7044 6. 5310-00-298-8903

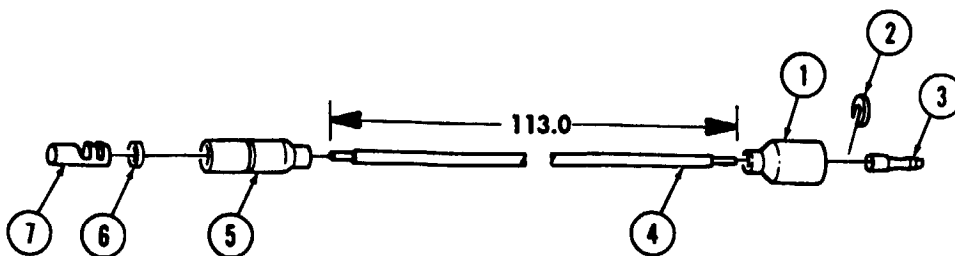


Figure D-73. Wire "L" - Relay Lead "C" to Circuit Breaker in Battery Box

Section II. ILLUSTRATED MANUFACTURING INSTRUCTIONS (Cont'd)

MATERIAL BLOCK		
STOCK SIZE	DESCRIPTION	SPECIFICATION
12 AWG	WIRE, ELECTRICAL	MIL-C-13486

WIRE "K"		
WIRE PART NUMBER	CUT LENGTH (INCHES)	MANUFACTURED FROM NSN
5598838	104.0	2. 6145-00-705-6678
	TERMINAL INSULATOR NSN 1. 5940-00-682-2445 3. 5940-00-113-8183	

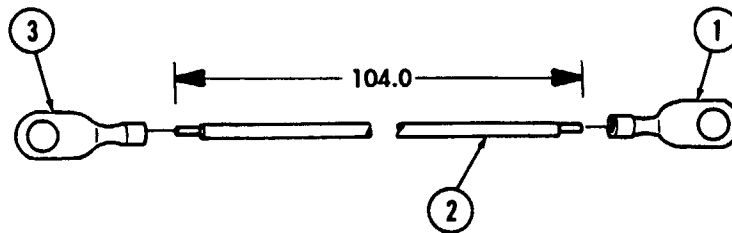


Figure D-74. Wire "K" - Battery Ground Stud by Relay Mounting Ground

MATERIAL BLOCK		
STOCK SIZE	DESCRIPTION	SPECIFICATION
12 AWG	WIRE, ELECTRICAL	MIL-C-13486

WIRE "I"		
WIRE PART NUMBER	CUT LENGTH (INCHES)	MANUFACTURED FROM NSN
5598839	127.0	2. 6145-00-705-6678
	TERMINAL INSULATOR NSN 1. 5940-00-113-8183 (2 EACH)	

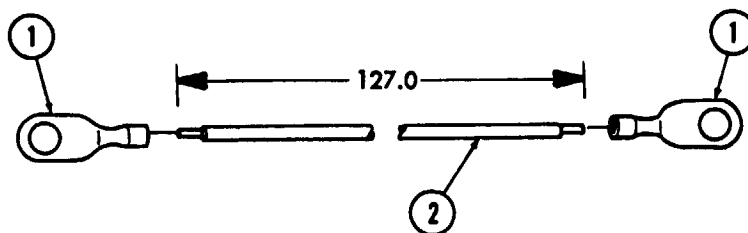


Figure D-75. Wire "I" - Siren Assembly Mount to Relay Mounting Ground

Section II. ILLUSTRATED MANUFACTURING INSTRUCTIONS (Cont'd)

MATERIAL BLOCK		
STOCK SIZE	DESCRIPTION	SPECIFICATION
12 AWG	WIRE, ELECTRICAL	MIL-C-13486

WIRE "N"		
WIRE PART NUMBER	CUT LENGTH (INCHES)	MANUFACTURED FROM NSN
5598840	22.0	2. 6145-00-705-6678
SHELL NSN 3. 2590-00-695-9076	TERMINAL INSULATOR NSN 1. 5940-00-682-2445 5. 5940-00-399-6676	WASHER NSN 4. 5310-00-298-8903

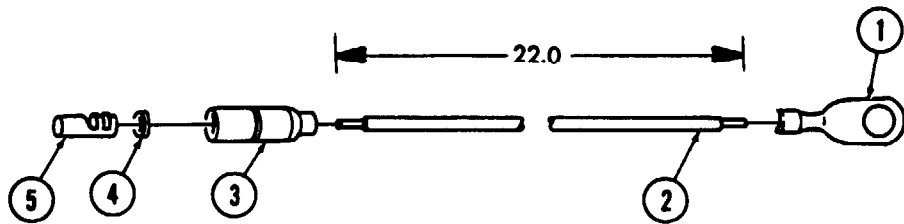


Figure D-76. Wire "N" - Circuit Breaker to Battery Stud (Positive)

MATERIAL BLOCK		
STOCK SIZE	DESCRIPTION	SPECIFICATION
14 AWG	WIRE, ELECTRICAL	MIL-C-13486

WIRE "H"		
WIRE PART NUMBER	CUT LENGTH (INCHES)	MANUFACTURED FROM NSN
5598841	120.0	4. 6145-00-152-6499
SHELL NSN 1. 5970-00-906-0159 5. 5935-00-833-8561	TERMINAL INSULATOR NSN 3. 5995-00-057-2929 7. 1015-00-798-2997	SLEEVE/WASHER NSN 2. 5310-00-833-8567 6. 5970-00-833-8562

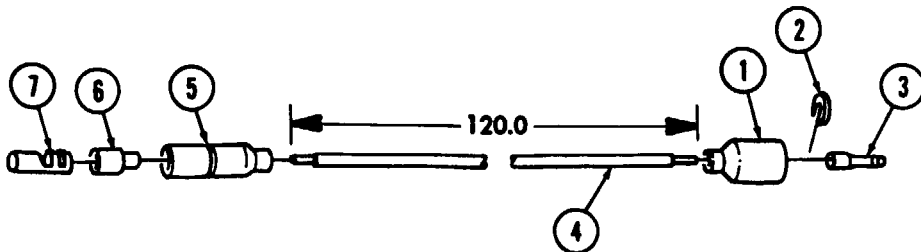


Figure D-77. Wire "H" - Siren Hot Side to Adapter Connector "E" .

Section II. ILLUSTRATED MANUFACTURING INSTRUCTIONS (Cont'd)

MATERIAL BLOCK		
STOCK SIZE	DESCRIPTION	SPECIFICATION
14 AWG	WIRE, ELECTRICAL	MIL-C-13486

WIRE "J"		
WIRE PART NUMBER	CUT LENGTH (INCHES)	MANUFACTURED FROM NSN
5598842	57.0	4. 6145-00-152-6499
SHELL NSN 1. 5970-00-906-0159	TERMINAL INSULATOR NSN 5. 5940-00-283-5281 3. 5995-00-057-2929	WASHER NSN 2. 5310-00-833-8567

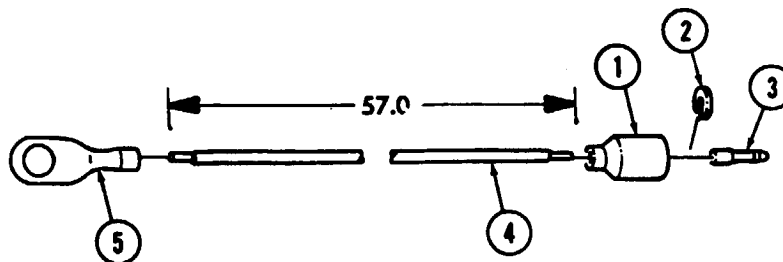


Figure D-78. Wire "J" - Warning Light Black Lead to Relay Mounting Ground

MATERIAL BLOCK		
STOCK SIZE	DESCRIPTION	SPECIFICATION
14 AWG	WIRE, ELECTRICAL	MIL-C-13486

WIRE "A"		
WIRE PART NUMBER	CUT LENGTH (INCHES)	MANUFACTURED FROM NSN
5598843	6.75	1. 6145-00-152-6499
SHELL NSN 2. 5933-00-833-8561 (2 EACH)	TERMINAL INSULATOR NSN 4. 1015-00-748-2997 (2 EACH)	SLEEVE NSN 3. 5970-00-833-8562 (2 EACH)

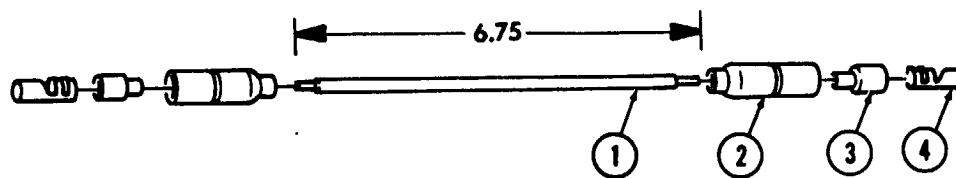


Figure D-79. Wire "A" - Light Toggle Switch to Adapter Connector "D"

Section II. ILLUSTRATED MANUFACTURING INSTRUCTIONS (Cont'd)

MATERIAL BLOCK		
STOCK SIZE	DESCRIPTION	SPECIFICATION
14 AWG	WIRE, ELECTRICAL	MIL-C-13486

WIRE "B"		
WIRE PART NUMBER	CUT LENGTH (INCHES)	MANUFACTURED FROM NSN
5598844	9.50	1. 6145-00-152-6499
SHELL NSN 2. 5933-00-833-8561 (2 EACH)	TERMINAL INSULATOR NSN 4. 1015-00-748-2997 (2 EACH)	SLEEVE NSN 3. 5970-00-833-8562 (2 EACH)

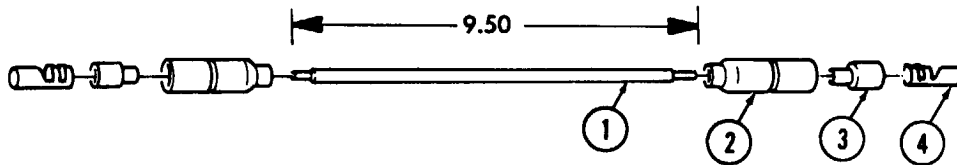


Figure D-80. Wire "B" - Light Toggle Switch Adapter Connector "A"

MATERIAL BLOCK		
STOCK SIZE	DESCRIPTION	SPECIFICATION
14 AWG	WIRE, ELECTRICAL	MIL-C-13486

WIRE "M"		
WIRE PART NUMBER	CUT LENGTH (INCHES)	MANUFACTURED FROM NSN
5598845	47.0	1. 6145-00-152-6499
SHELL NSN 2. 5933-00-833-8561 (2 EACH)	TERMINAL INSULATOR NSN 4. 1015-00-748-2997 (2 EACH)	SLEEVE NSN 3. 5970-00-833-8562 (2 EACH)

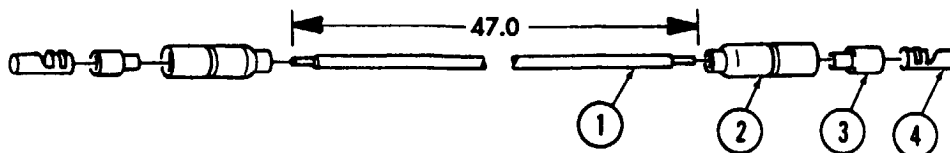


Figure D-81. Wire "M" - Warning Light Red Lead to Adapter Connector "D"

Section II. ILLUSTRATED MANUFACTURING INSTRUCTIONS (Cont'd)

MATERIAL BLOCK		
STOCK SIZE	DESCRIPTION	SPECIFICATION
A=14 AWG, B=12 AWG	WIRE, ELECTRICAL	MIL-C-13486

RELAY CONNECTOR		
WIRE PART NUMBER	CUT LENGTH (INCHES)	MANUFACTURED FROM NSN
5598846	5. A 17.0 6. B 15.0, AND 10.0	6. 6145-00-705-6678 5. 6145-00-152-6499
SHELL ASSEMBLY/SHELL NSN 1. 5935-00-686-2609 7. 5935-00-833-8561 12. 2590-00-695-9076 (2 EACH)	TERMINAL INSULATOR NSN 9. 1015-00-798-2997 10. 5940-00-399-6676 (2 EACH)	SLEEVE/WASHER NSN 8. 5970-00-833-8562 11. 5310-00-298-8903 (2 EACH)
NUT NSN 3. 5310-00-655-9860 4. 5935-00-335-9414		GROMMET 2. 5365-00-752-7633

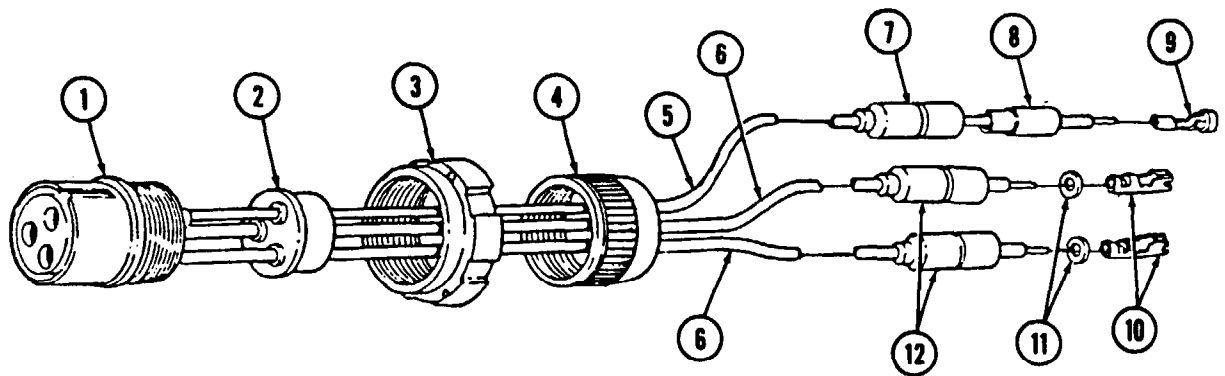


Figure D-82. - Relay Connector

Section II. ILLUSTRATED MANUFACTURING INSTRUCTIONS (Cont'd)

MATERIAL BLOCK		
STOCK SIZE	DESCRIPTION	SPECIFICATION
	STRAP WEBBING	N/A
N/A	THREAD	N/A

GRAB LOOP		
GRAB LOOP PART NUMBER	CUT LENGTH (INCHES)	MANUFACTURED FROM NSN
5598847	12 in.	8315-00-634-3304

INSTRUCTIONS:

1. Remove cargo shell door strap from vehicle. Refer to para. 11-22.
2. Position grab loop one-third of the way down strap. Fold strap into thirds and mark top fold.
3. Secure grab loop to strap with thread using box stitch and string. Refer to FM 10-16.
4. Install cargo shell door strap on vehicle with grab loop facing the rear. Refer to para. 11-22.

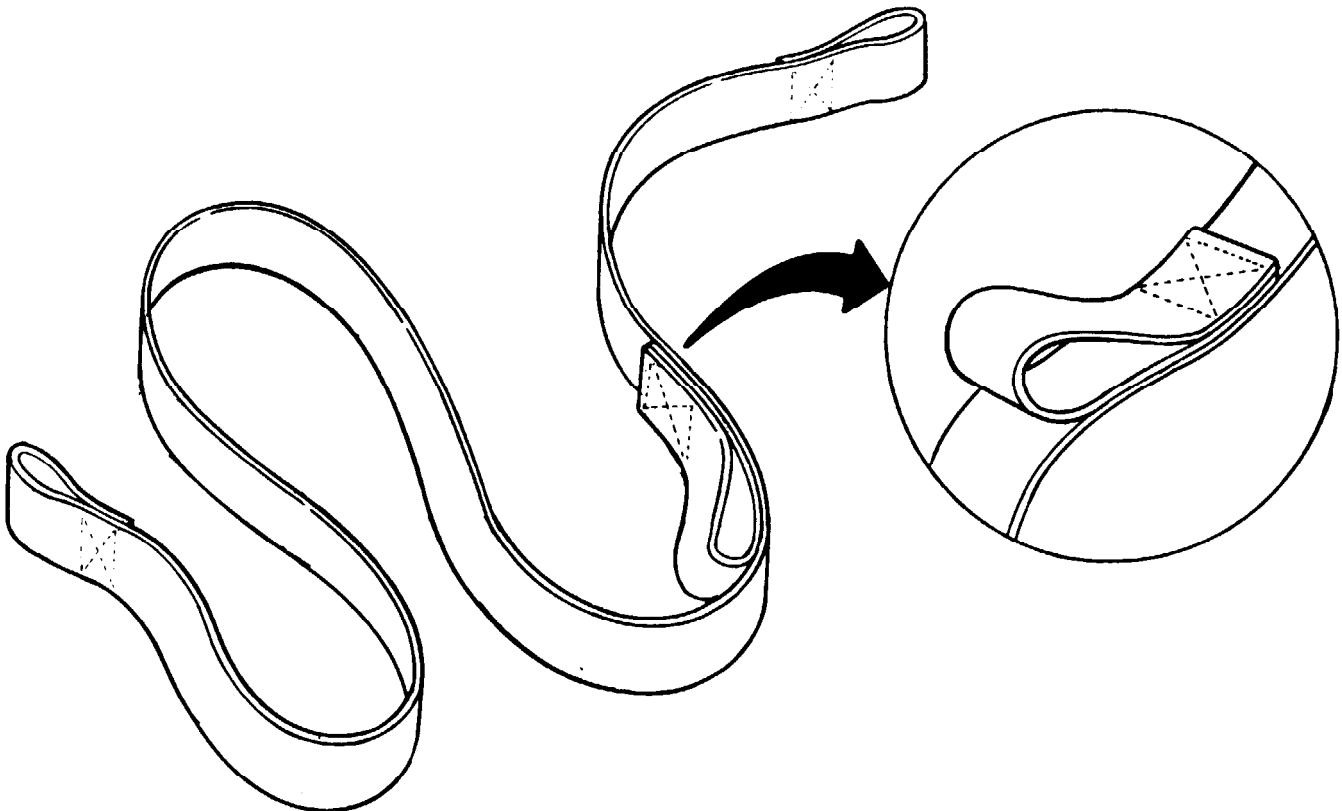


Figure D-83. Grab Loop

Section II. ILLUSTRATED MANUFACTURING INSTRUCTIONS (Cont'd)

MATERIAL BLOCK		
STOCK SIZE	DESCRIPTION	SPECIFICATION
100 FT.	FELT, MECHANICAL	MILG20241

NOTE:
ALL DIMENSIONS ARE IN INCHES

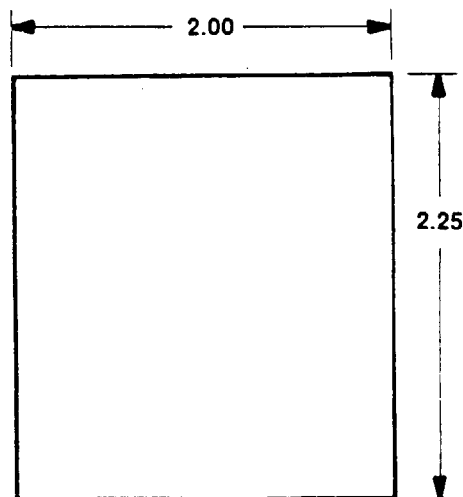


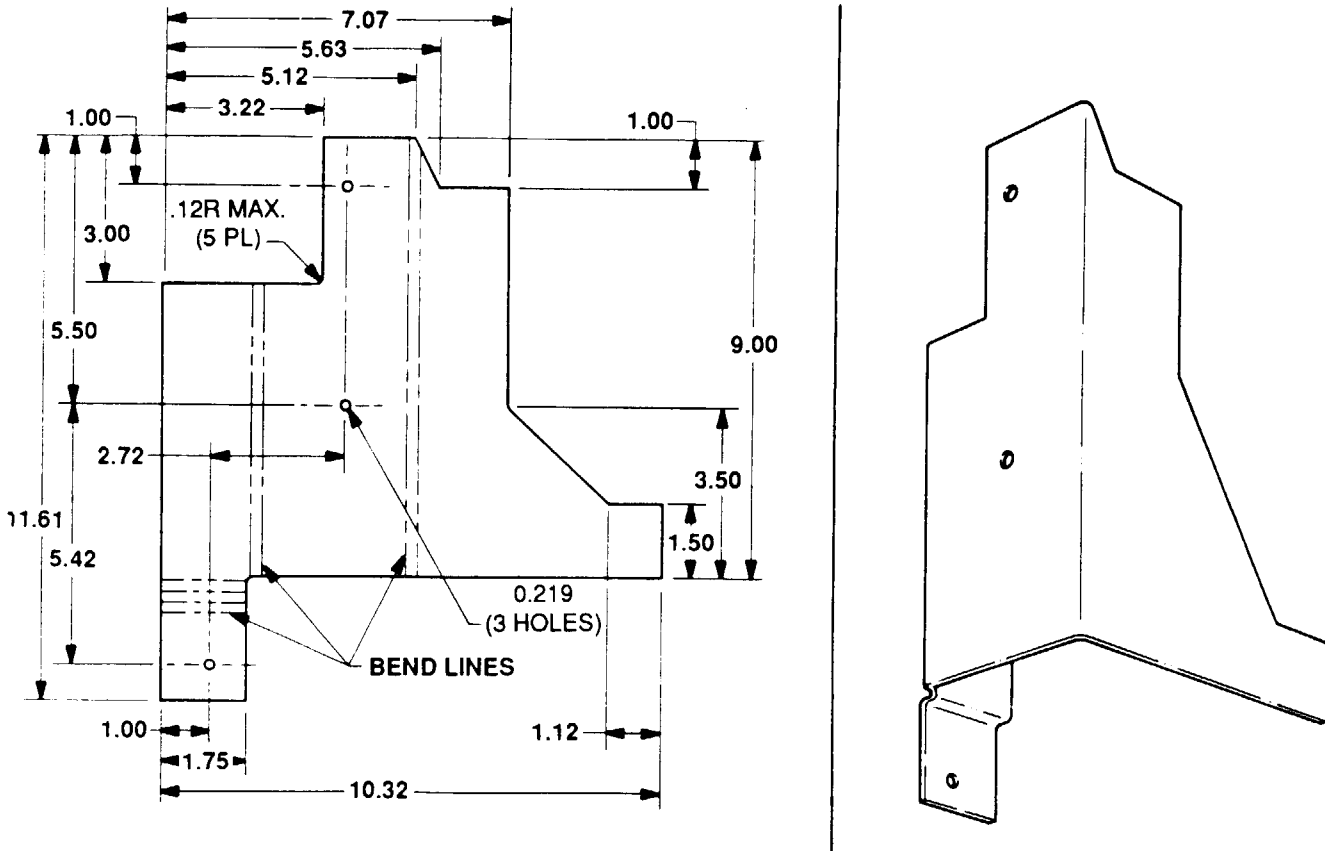
Figure D-84. Felt Sheet

INSTRUCTIONS:

Cut felt to dimensions shown.

Section II. ILLUSTRATED MANUFACTURING INSTRUCTIONS (Cont'd)

MATERIAL BLOCK		
STOCK SIZE	DESCRIPTION	SPECIFICATION
0.63 THICK	HEAT SHIELD	N/A



NOTE: All dimensions are in inches.

Figure D-85. Heat Shield Extension

INSTRUCTIONS:

All inside bend radius to 6.12 unless otherwise specified.

Section II. ILLUSTRATED MANUFACTURING INSTRUCTIONS (Cont'd)

MATERIAL BLOCK		
STOCK SIZE	DESCRIPTION	SPECIFICATION
10 X 12-FT SHEET. 0.08 IN. THICK	ALUMINUM ALLOY 6061-T6	IAW QQ-A-225/8

LEFT SPLASH SHIELD ACCESS COVER		
ACCESS COVER PART NUMBER	CUT TO SIZE (INCHES)	MANUFACTURED FROM NSN
12446770	AS SHOWN	9530-01-071-2140

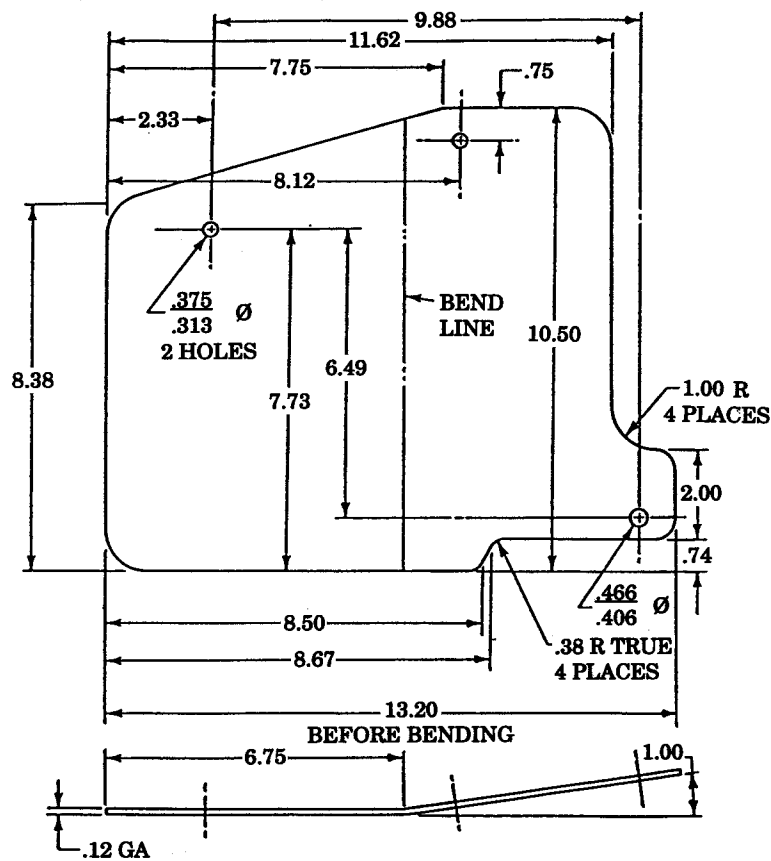


Figure D-86. Left Splash Shield Access Cover.

INSTRUCTIONS:

1. Cut aluminum sheet metal to size as shown.
2. Locate, mark, and drill two .313-.375-in. diameter holes in left splash shield access cover as shown.
3. Locate, mark, and drill one .406-.466-in. diameter hole in left splash shield access cover as shown.
4. Remove all burrs and sharp edges.
5. Paint left splash shield access cover as required. (Refer to TM 43-0139.)

Section II. ILLUSTRATED MANUFACTURING INSTRUCTIONS (Cont'd)

LEFT SPLASH SHIELD		
SPLASH SHIELD PART NUMBER	CUT (INCHES)	MANUFACTURED FROM PART NUMBER
12446771	AS SHOWN	12340361

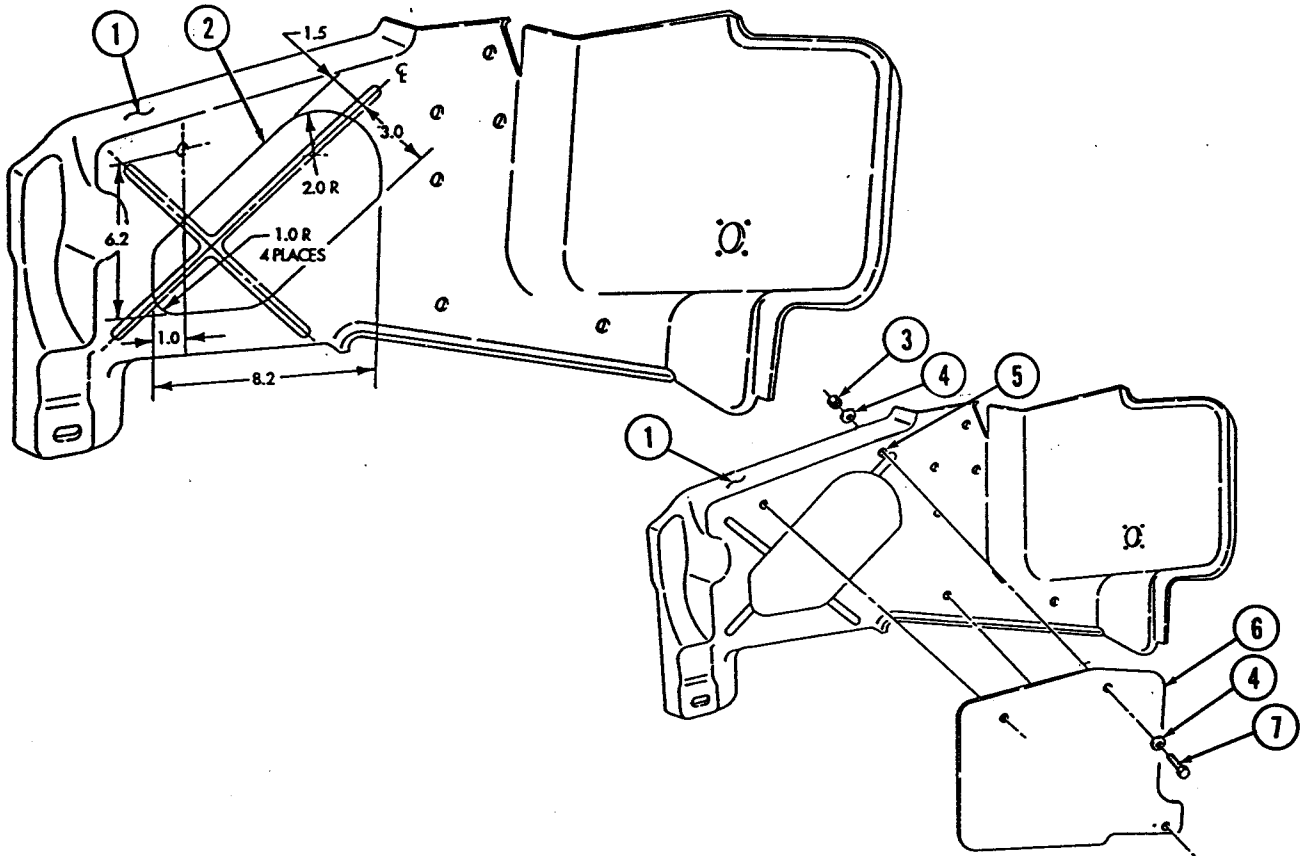


Figure D-87. Left Splash Shield.

INSTRUCTIONS:

1. Remove left splash shield. (Refer to para. 10-17.)
2. Cut hole (2) in left splash shield (1) as shown.
3. Using fabricated access cover (6) as a template, locate, mark, and drill a 0.312-inch diameter hole (5) through left splash shield (1) as shown.

NOTE

Existing mounting hardware is used to secure bottom right-hand hole.

4. Secure top two holes of access cover (6) to left splash shield (1) with two NSN 5306-00-225-8499 washers (4), NSN 5306-00-225-8499 screws (7), NSN 5310-00-087-7493 washers (4), and NSN 5310-00-814-0673 nuts (3) as shown.
5. Install modified left splash shield. (Refer to para. 10-17.)

Section II. ILLUSTRATED MANUFACTURING INSTRUCTIONS (Cont'd)

MATERIAL BLOCK		
STOCK SIZE	DESCRIPTION	SPECIFICATION
0.125 IN. THICK	ALUMINUM ALLOY TEMPER 6061	QQ-A-250/11

VEHICULAR SPLASH GUARD NSN 1. 2540-00-843-7043 (2 EACH)	CAPSCREWS NSN 6. 5305-00-269-3241 (4 EACH)	WASHERS NSN 3. 5310-00-087-7493 (4 EACH)
LOCKNUTS NSN 4. 5310-00-959-1488 (4 EACH)	90° ANGLE BRACKET NSN 5. 9540-00-140-2417 (2 EACH)	

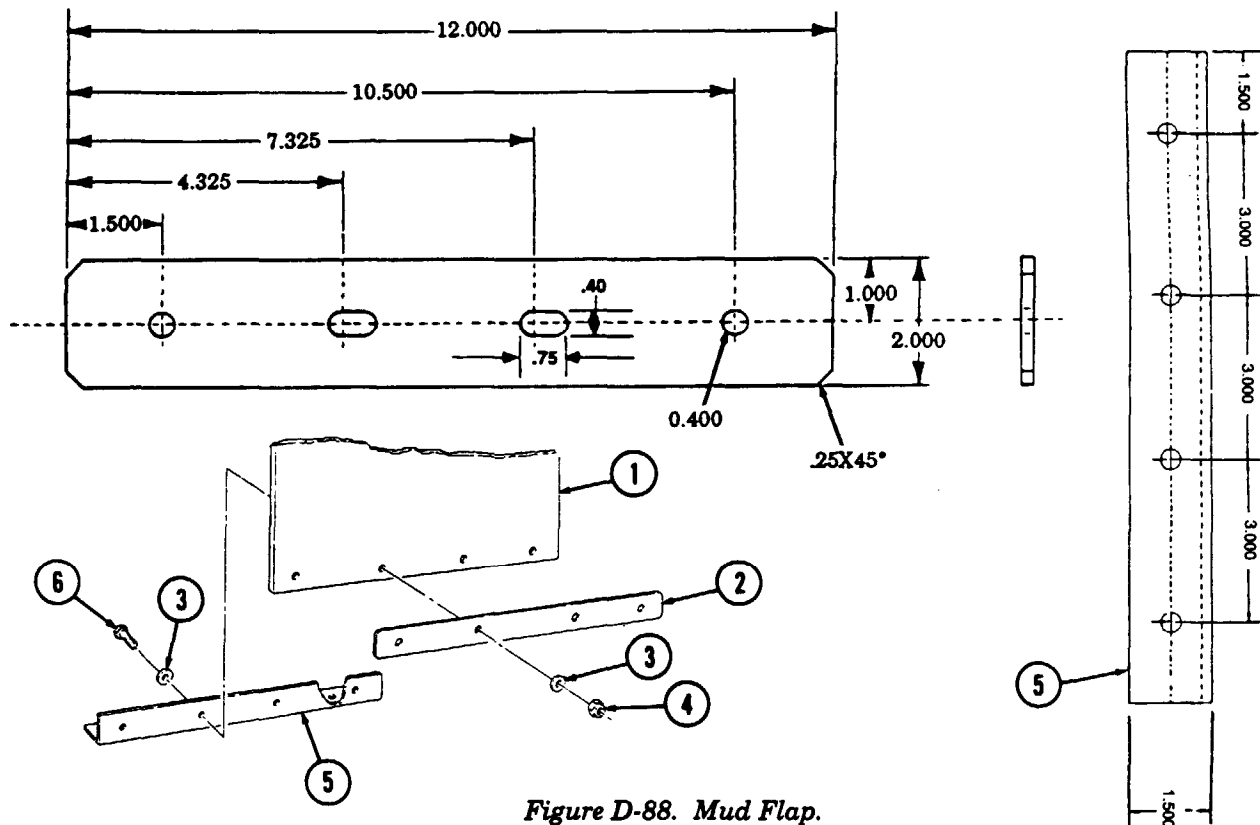


Figure D-88. Mud Flap.

INSTRUCTIONS:

1. Cut aluminum sheet metal to size as shown.
2. Locate, mark, and drill two .75 X .40 in. slots in mud flap plate.
3. Locate, mark, and drill two .40 in. diameter holes in mud flap plate.
4. Remove all burrs and sharp edges.
5. Locate, mark, and drill eight holes in angle bracket (5) as shown.
6. Paint as required. Refer to TM 43-0139.
7. Install mud flap (1) between mounting bracket (2) and angle bracket plate (5) with four washers (3), cap screws (6), washers (3), and locknuts (4).

Section II. ILLUSTRATED MANUFACTURING INSTRUCTIONS (Cont'd)

MATERIAL BLOCK		
STOCK SIZE	DESCRIPTION	SPECIFICATION
0.0500 IN. THICK	ALUMINUM ALLOY TEMPER	QQ-A-250/11

REINFORCEMENT BRACKET		
PART NUMBER	CUT TO SIZE (INCHES)	MANUFACTURED FROM NSN
N/A	AS SHOWN	9535-00-541-7194

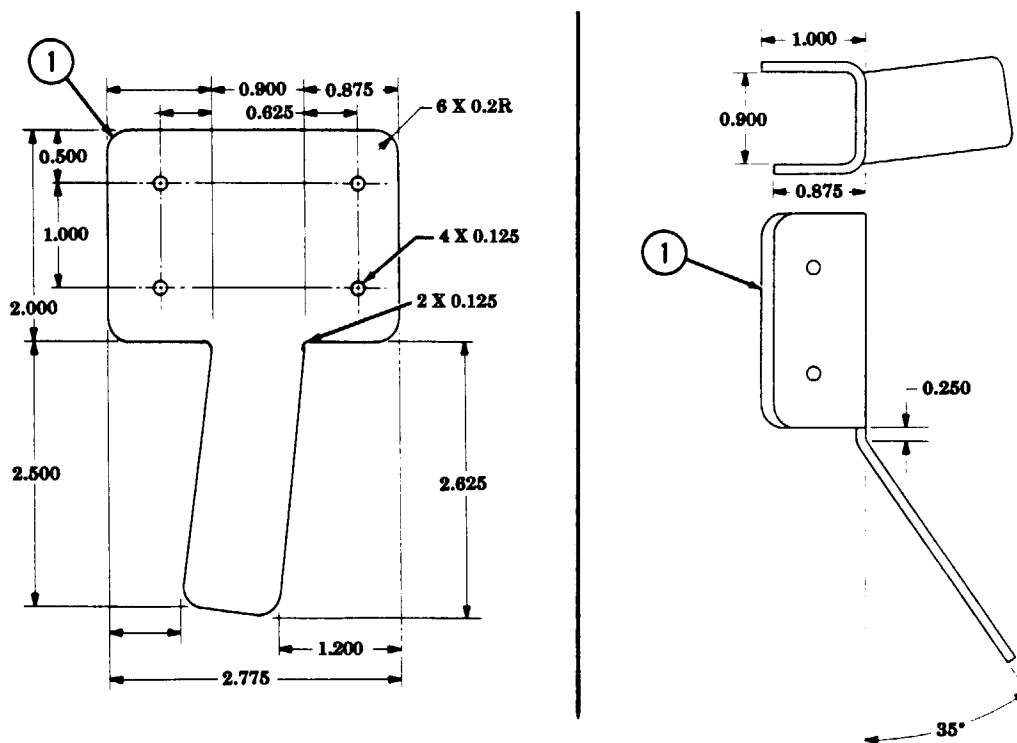


Figure D-89. "C" Pillar Reinforcement Bracket.

INSTRUCTIONS:

1. Cut two pieces of aluminum sheet metal to size as shown.
2. Locate, mark, and drill four 0.125-inch diameter holes in reinforcement brackets (1).
3. Bend left reinforcement bracket (1).
4. Bend right reinforcement bracket (1) in opposite direction.

Section II. ILLUSTRATED MANUFACTURING INSTRUCTIONS (Cont'd)

MATERIAL BLOCK		
STOCK SIZE	DESCRIPTION	SPECIFICATION
N/A	SEAL, NONMETALLIC	N/A

TURRET BEARING SEAL		
SEAL PART NUMBER	CUT LENGTH (FEET)	MANUFACTURED FROM NSN
MT161A	22	5330-01-282-2213

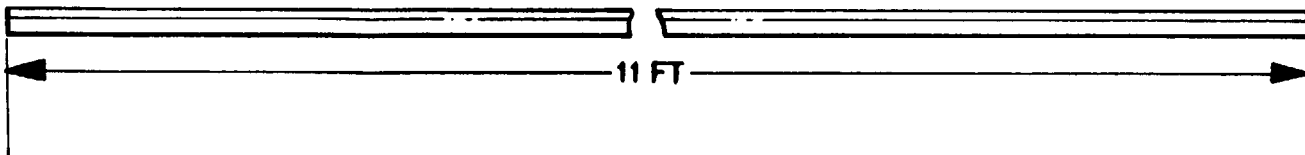


Figure D-90. Turret Bearing Seal.

INSTRUCTIONS:

1. Cut seal to length shown.

Section II. ILLUSTRATED MANUFACTURING INSTRUCTIONS (Cont'd)

WINCH WIRE ROPE ASSEMBLY					
ASSEMBLY PART NUMBER	CUT LENGTH (INCHES)	MANUFACTURED FROM PART NUMBER (CAGEC)	TERMINAL PART NUMBER (CAGEC)	CLAMP PART NUMBER (CAGEC)	THIMBLE PART NUMBER (CAGEC)
15667	1200.0	21451 (27647)	16464 (27647)	MS16843-5 (96906)	G-408-3/8 (75535)

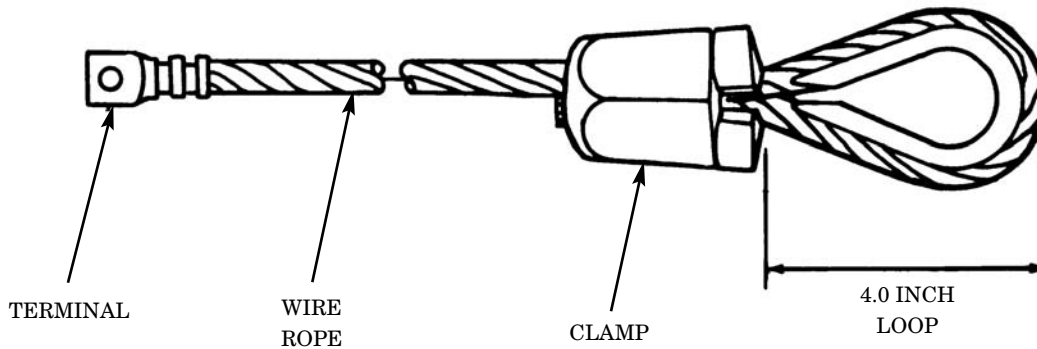


Figure D-91, Winch Wire Rope Assembly

INSTRUCTIONS:

- (a) Properly seize wire rope end before cutting. To seize wire rope end, follow these instructions.

NOTE

- Ensure each wrap is tight to the preceding wrap.
- Ensure the length of the seizing is not less than the diameter of the wire rope.

- (1) Wrap the seizing wire around the wire rope as tight as possible.
- (2) Twist the ends of the seizing together by hand counterclockwise so that the twist is near the middle of the seizing.

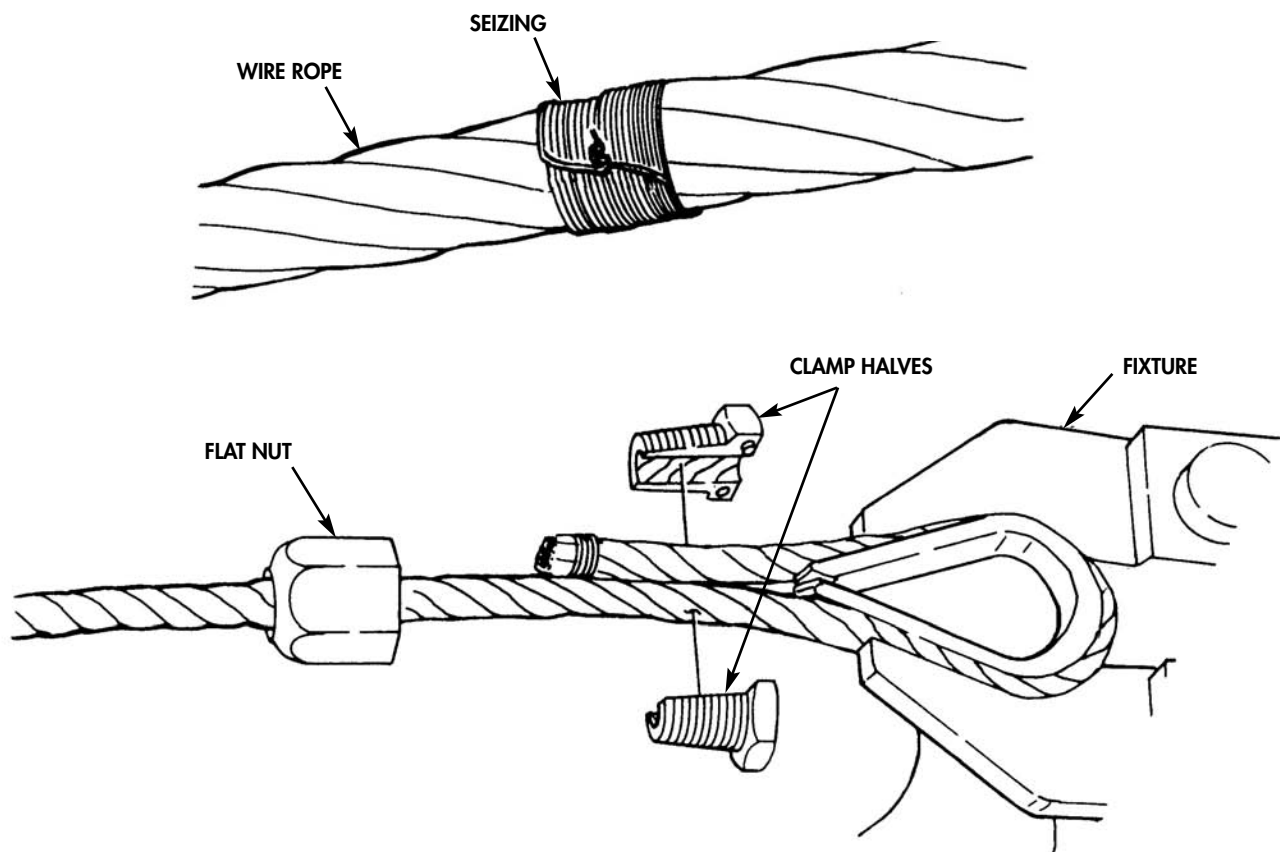
NOTE

Do not try to tighten the seizing by twisting.

- (3) Tighten the twist just enough to take up the slack.
 - (4) Tighten the seizing by prying the twist away from the axis of the wire rope.
 - (5) Tighten the twist again as described in step (3).
 - (6) Repeat the process until the seizing can not be pryed away from the axis of the wire rope.
 - (7) Cut off wire ends and pound the twist into contact with the seizing.
- (b) Cut wire rope to length as shown and install part of clamp with nut on wire rope.

Section II. ILLUSTRATED MANUFACTURING INSTRUCTIONS (Cont'd)

2. Position rope after seizing in a suitable fixture to make a loop, leaving enough rope to wrap around thimble and enclose in clamp.
3. Insert thimble and close jaws of fixture to enable rope to conform to groove of thimble.
4. Place one half of clamp in position and adjust rope accordingly. The seized portion of the wire rope should equal one rope diameter and protrude entirely beyond the threaded end of the clamp half.
5. Install clamp nut. Holding both threaded halves in position, push the nut into both halves through the first two threads. Ensure proper alignment of both threaded halves, and that there is no cross-threading.
6. Remove rope, clamp and thimble while still connected.
7. Hold opposing flats of clamp halves in suitable fixture and properly lubricate exposed threads with high-viscosity lubricating oil.
8. Using a permanent marker, mark one flat nut to ensure the same opposing flats are checked before and after tightening the clamp.
9. Using calipers, measure 1/8 inch across the flat nut from the bottom and note measurement.
10. Check to make sure clamp halves are properly secured in fixture, and tighten with appropriate wrench.
11. Using calipers, again take measurement of the same flat nuts as was done before tightening of the nut. If the increment dilation is between 0.004 and 0.007 inches, clamp is tight.
12. Using arbor press, crimp terminal to opposite end of wire rope.



Section II. ILLUSTRATED MANUFACTURING INSTRUCTIONS (Cont'd)

MATERIAL BLOCK		
STOCK SIZE	DESCRIPTION	SPECIFICATION
.050 X 36 IN. THICK	ALUMINUM ALLOY 6061-T6	QQ-A-250/11

RETAINER		
SEAL PART NUMBER	CUT LENGTH (FEET)	MANUFACTURED FROM NSN
N/A	8	9535-00-250-6503

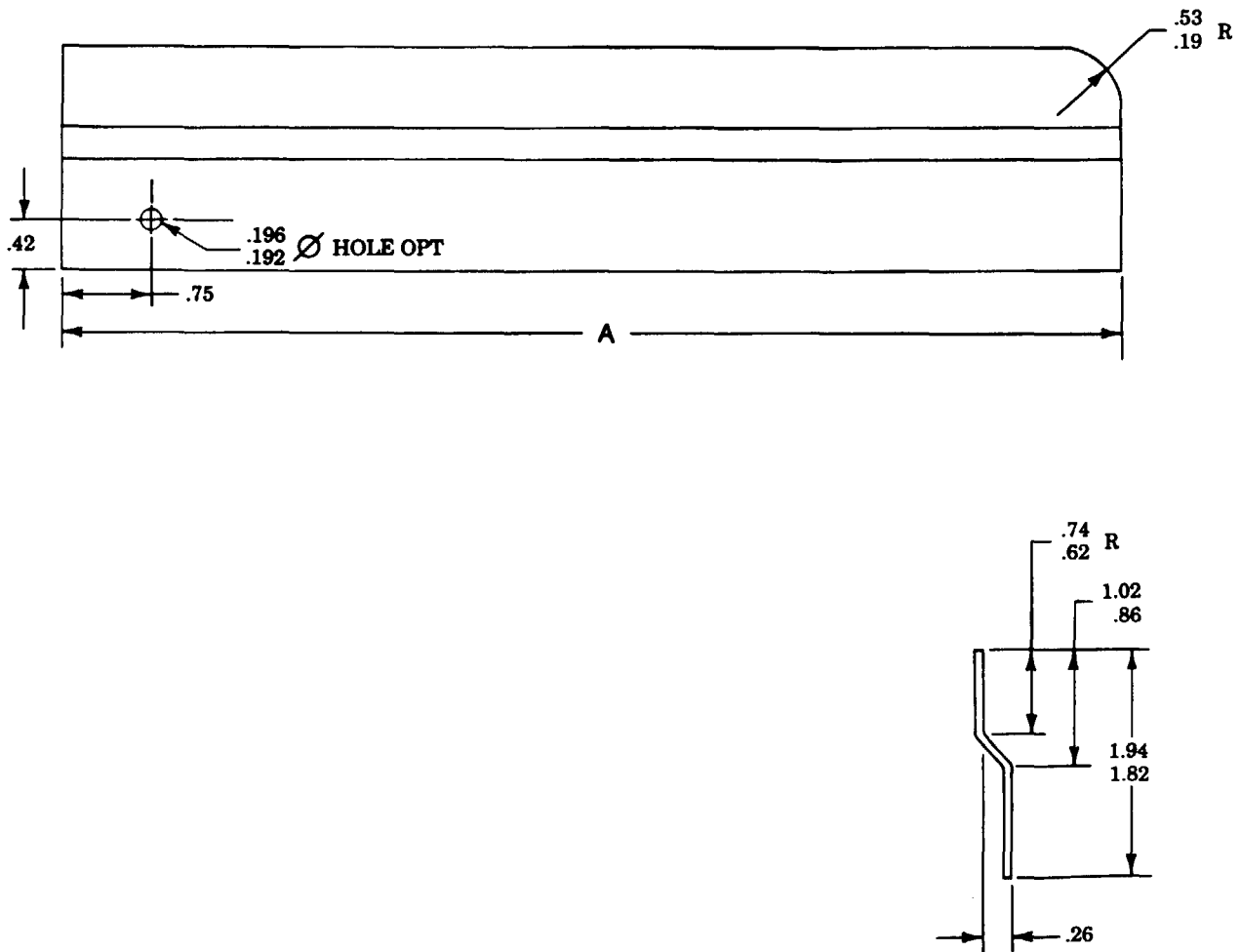


Figure D-92. Ambulance Bulkhead Door Retainer.

INSTRUCTIONS:

1. Cut retainer to length shown.
2. Remove all burrs and sharp edges.

Section II. ILLUSTRATED MANUFACTURING INSTRUCTIONS (Cont'd)

MATERIAL BLOCK		
STOCK SIZE	DESCRIPTION	NSN
N/A	1/4 IN. CAPSCREW	5305-00-068-0515
N/A	1/4 IN. NUT	5310-00-768-0319
N/A	1/4 IN. LOCKWASHER	5310-00-582-5965
N/A	CLAMP	5340-01-159-1321
N/A	CHAIN, CUT TO DESIRED LENGTH	4010-00-129-3221

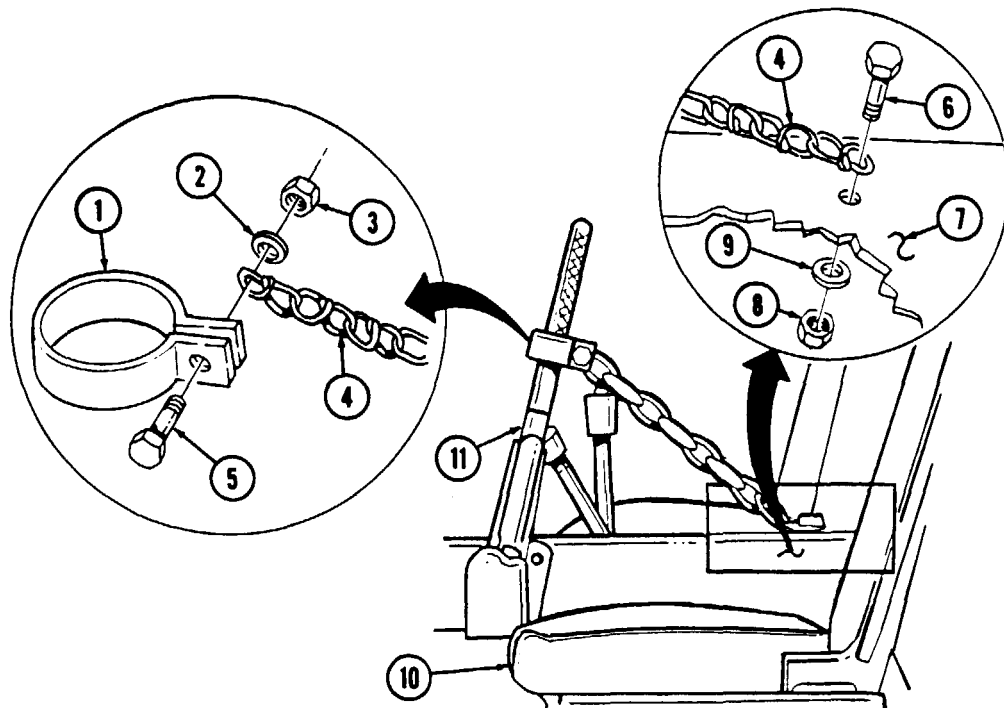


Figure D-93. Parking Brake Lever.

INSTRUCTIONS:

CAUTION

When drilling through the transmission cowl, be careful not to drill into the transmission housing.

NOTE

The location of the mounting hole will vary depending on vehicle configuration. Locate the hole in a suitable place, near the driver's seat

1. Drill a 1/4-in. hole in the transmission cowl (7), near the driver's seat (10).
2. Cut chain (4) to desired length and install the clamp (1) on chain (4) with cap screw (5), lockwasher (2), and nut (3).
3. Install chain (4) on transmission cowl (7) with cap screw (6), lockwasher (9), and nut (8).
4. With the parking brake applied, slip clamp (1) over lever (11) to lock it in place. When not in use, stow the chain lock out of the way.
5. Paint chain lock red for easy identification.

Section II. ILLUSTRATED MANUFACTURING INSTRUCTIONS (Cont'd)

MATERIAL BLOCK		
13. HOSE, NON-METALLIC 4720-01-394-3747	15. FITTING 4730-00-278-3721	14. QUICK-DISCONNECT 4730-01-399-0241

INSTRUCTIONS:

1. Disconnect battery ground cable (Refer to para. 4-73).

NOTE

Have container available to catch fluid drainage from hydraulic hoses.

2. Remove clamp (4) and hydraulic hose (5) from elbow fitting (2).
3. Disconnect fan drive hydraulic hose (11) from fitting (12).
4. Remove elbow fitting (2) from adapter bushing (9).
5. Remove nut (3), washer (6), and washer (8) securing adapter bushing (9) to fan shroud (7).
6. Remove fan drive hydraulic hose (11) from elbow fitting (10).
7. Remove fitting (12) from fan drive (1).

NOTE

Apply sealing compound (appendix C, item 44) to all pipe threads during installation.

8. Install hose (13) on elbow fitting (10).
9. Install quick-disconnect (14) on fitting (15).
10. Install fan drive hydraulic hose (13) in quick-disconnect (14).
11. Install fitting (15) in fan drive (1).
12. Install adapter bushing (9) and washer (8) in fan shroud (7) with washer (6) and nut (3).
13. Install elbow fitting (2) in adapter bushing (9).
14. Install hydraulic hose (5) on elbow fitting (2) with clamp (4).
15. Connect battery ground cable (para. 4-73).
16. Bleed power steering system (para. 8-29).

Section II. ILLUSTRATED MANUFACTURING INSTRUCTIONS (Cont'd)

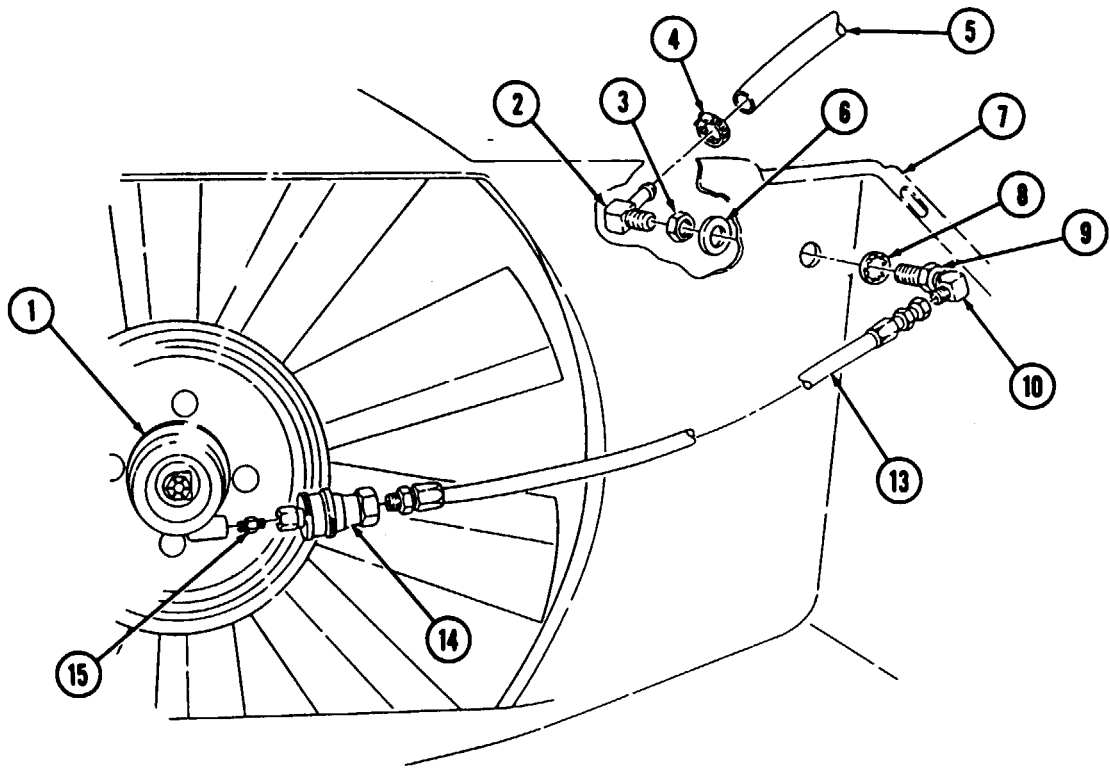
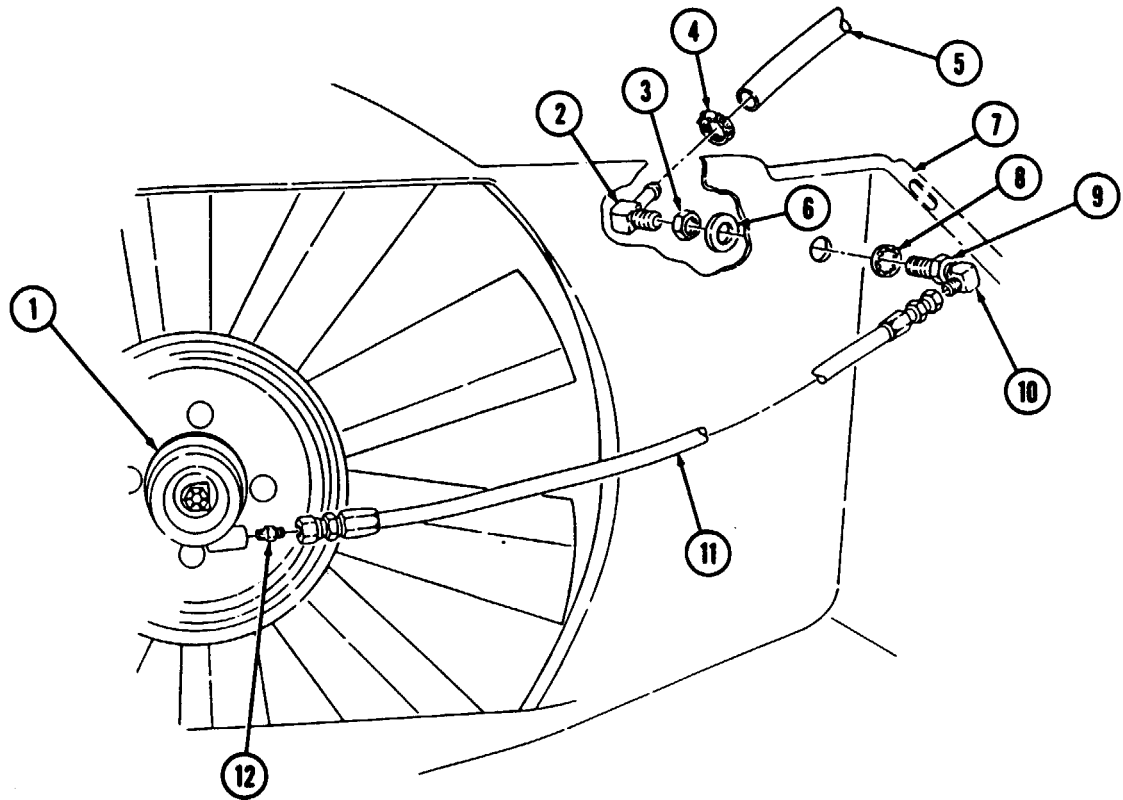


Figure D-94. Fan Drive Quick-Disconnect.

Section II. ILLUSTRATED MANUFACTURING INSTRUCTIONS (Cont'd)

MATERIAL BLOCK		
STOCK SIZE	DESCRIPTION	NSN
N/A	LOCKNUT	5310-00-241-6658
N/A	WASHER	5310-01-119-1024
N/A	BOLT	5306-00-050-1237
N/A	HANDLE	P/N 12446730

INSTRUCTIONS:

1. Using existing turret handle (1) as a template, scribe two reference lines (2) on weapon station (4).
2. Locate and mark the center of six spot welds (3) on turret handle (1).

NOTE

Ensure drill does not penetrate weapon station.

3. Using 0.313-inch diameter drill bit, drill out six spot welds (3) in turret handle (1).
4. Using chisel, remove turret handle (1) from weapon station (4).

NOTE

When grinding weapon station, ensure that the two reference lines are not removed.

5. Grind off any remaining spot weld (3) material flush with weapon station (4).
6. Using two reference lines (2) marked in step 1, position turret handle (5) on weapon station (4).
7. Using turret handle (5) as a template, drill four 0.344-inch diameter holes (6) in weapon station (4).
8. Spot paint weapon station (4) (refer to TM 43-0139).
9. Install turret handle (5) on weapon station (4) with four washers (8), capscrews (7), washers (8), and locknuts (9).
10. Spot paint capscrews (7) and locknuts (9) (refer to TM 43-0139).

Section II. ILLUSTRATED MANUFACTURING INSTRUCTIONS (Cont'd)

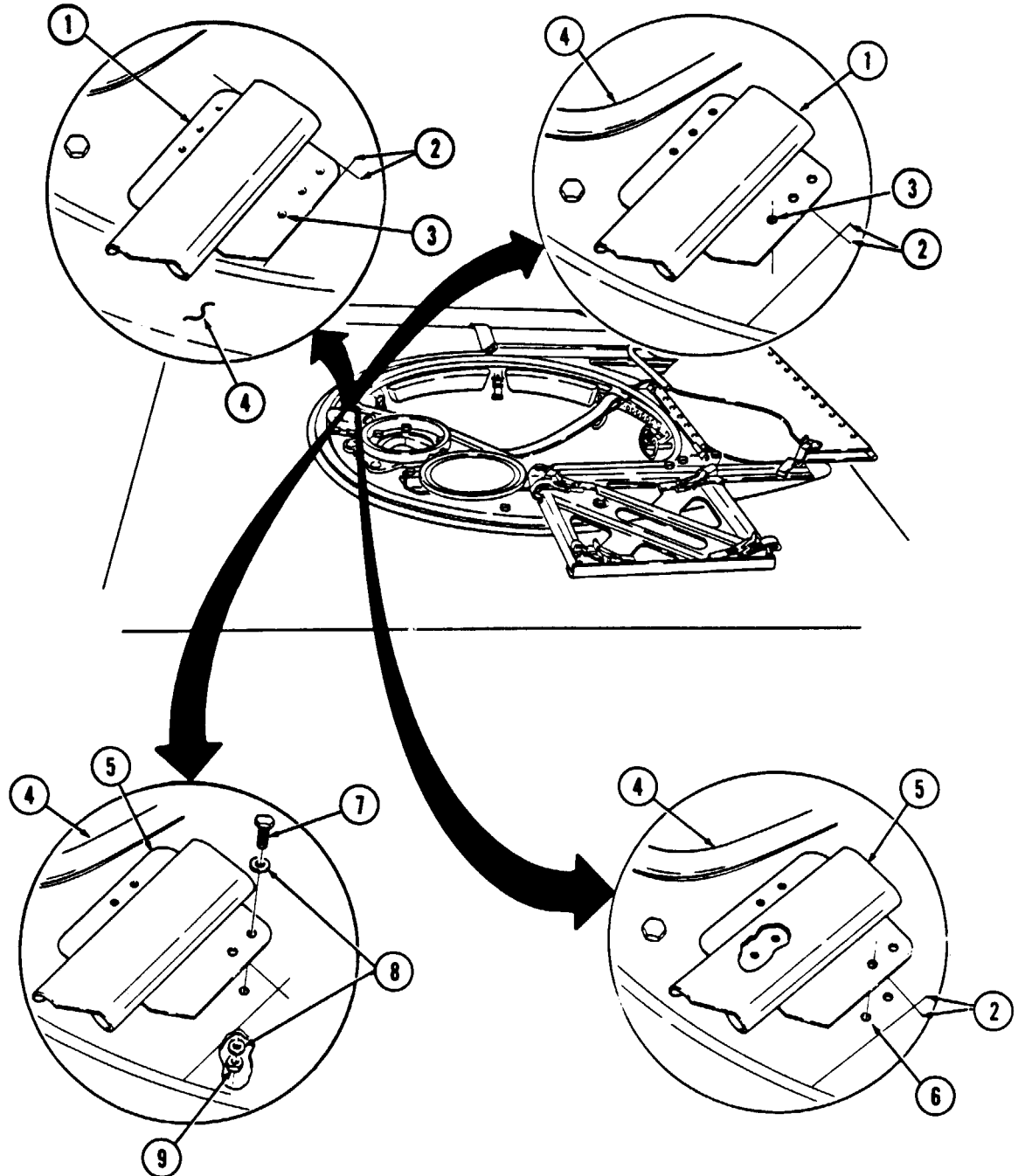


Figure D-95. Turret Handle Replacement.

Section II. ILLUSTRATED MANUFACTURING INSTRUCTIONS (Cont'd)

MATERIAL BLOCK		
STOCK SIZE	DESCRIPTION	SPECIFICATION
14 AWG N/A	WIRE, ELECTRICAL INSULATION SLEEVING	MIL-C-13486 MIL-I-23053/2

ITEM NO.	REQ'D	MATERIALS	
		DESCRIPTION	NSN/PART NUMBER
1	8	Insulation Sleeving: 2 in.	5970-01-815-1295
2	8	Electrical Wire: 48 in.	6145-00-152-6499
3	8	Wire Marker	46F5981
4	5	Tiedown Strap	5975-00-074-2072
5	1	Receptacle	5935-00-738-8328

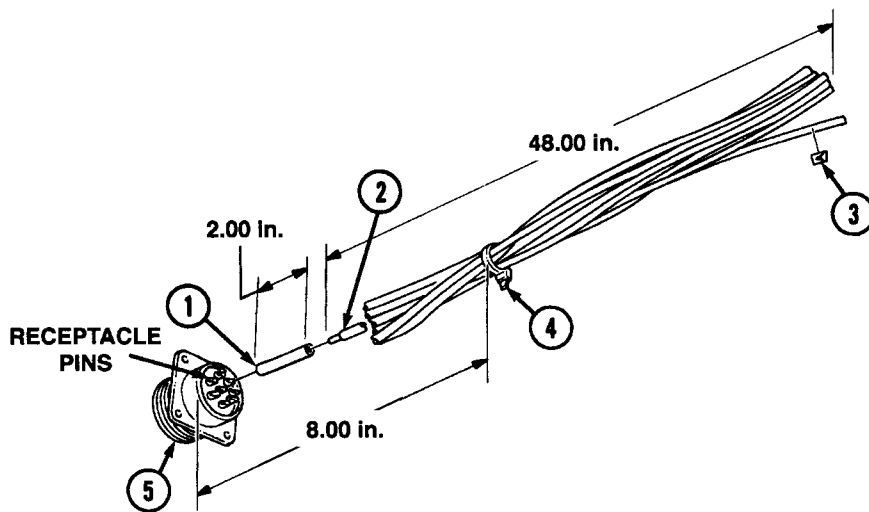


Figure D-96. Body Harness Receptacle Fabrication.

INSTRUCTIONS:

NOTE

When connecting electrical wire to connector pins on engine harness plug connector, use NSN 3439-00-133-1108 solder. (Refer to TB SIG-222 for soldering.)

1. Cut eight sections of wire (2) to length as shown.
2. Cut eight sections of insulation sleeving (1) as shown.
3. Position eight sections of insulation sleeving (1) on wires (2).
4. Connect eight sections of wire (2) to receptacle pins marked A, B, C, D, E, F, G, and H on receptacle (5). Place insulation sleeving (1) over wires (2) and receptacle pins and into position as shown.
5. Apply sealant NSN 8040-00-225-4918 to receptacle pins, wires, and sleeving.
6. Use wire markers (3) on eight sections of wire (2) to locate and mark wires. Secure eight sections of wire (2) with five tiedown straps (4).

Section II. ILLUSTRATED MANUFACTURING INSTRUCTIONS (Cont'd)

MATERIAL BLOCK		
STOCK SIZE	DESCRIPTION	SPECIFICATION
14 AWG	WIRE, ELECTRICAL	MIL-C-13486

ITEM NO.	REQ'D	MATERIALS	
		DESCRIPTION	NSN/PART NUMBER
1	1	Grommet	5365-00-772-2322
2	8	Electrical Wire: 48 in.	6145-00-152-6499
3	8	Wire Marker	46F5981
4	5	Tiedown Strap	5975-00-074-2072
5	1	Grommet Retaining Nut	5935-00-333-9414
6	1	Coupling Nut	5310-00-655-9860
7	1	Plug Shell Assembly	5935-00-686-2608

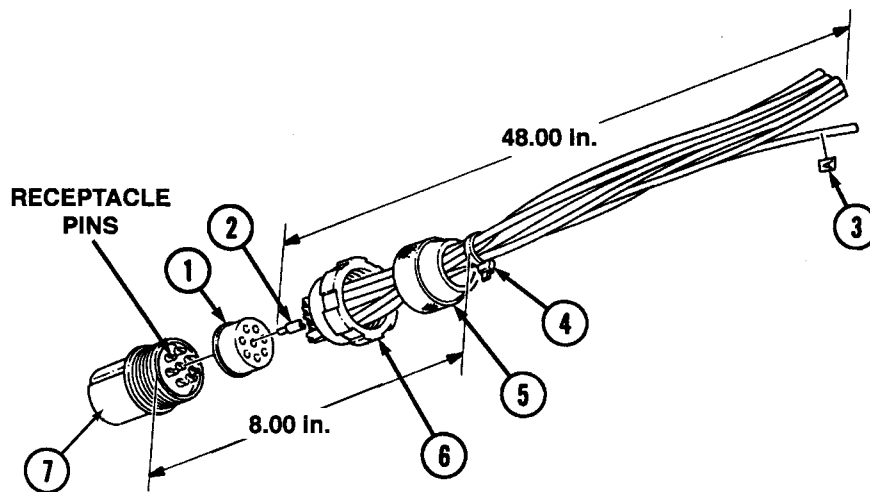


Figure D-97. Body Harness Connector Fabrication.

INSTRUCTIONS:

NOTE

When connecting electrical wires to connector pins on body harness connector, use NSN 3439-00-133-1108 solder. (Refer to TB SIG-222 for soldering.)

1. Cut eight sections of wire (2) to length as shown.
2. Place grommet retaining nut (5) over eight sections of wire (2).
3. Position eight sections of wire (2) in grommet (1).
4. Place coupling nut (6) over plug shell assembly (7).
5. Connect eight sections of wire (2) to receptacle pins marked A, B, C, D, E, F, G, and H on plug shell assembly (7).
6. Position grommet (1) in plug shell assembly (7) and secure with grommet retaining nut (5).
7. Use wire markers (3) on eight sections of wire (2) to locate and mark wires. Secure eight sections of wire (2) with five tiedown straps (4).

Section II. ILLUSTRATED MANUFACTURING INSTRUCTIONS (Cont'd)

MATERIAL BLOCK		
STOCK SIZE	DESCRIPTION	SPECIFICATION
14 AWG	WIRE, ELECTRICAL	MIL-C-13486
8 AWG	WIRE, ELECTRICAL	MIL-C-13486/1
N/A	INSULATION SLEEVING	MIL-I-23053/2

ITEM NO.	REQ'D	MATERIALS	
		DESCRIPTION	NSN/PART NUMBER
1	1	Plug Connector	5935-01-173-7654
2	6	Electrical Wire: 60 in.	6145-00-538-8222
3	9	Wire Marker	46F5981
4	6	Tiedown Strap	5975-00-074-2072
5	1	Coupling Nut	5310-00-655-9860
6	3	Electrical Wire: 60 in.	6145-00-152-6499
7	3	Insulation Sleeving: 3 in.	5970-00-812-2967

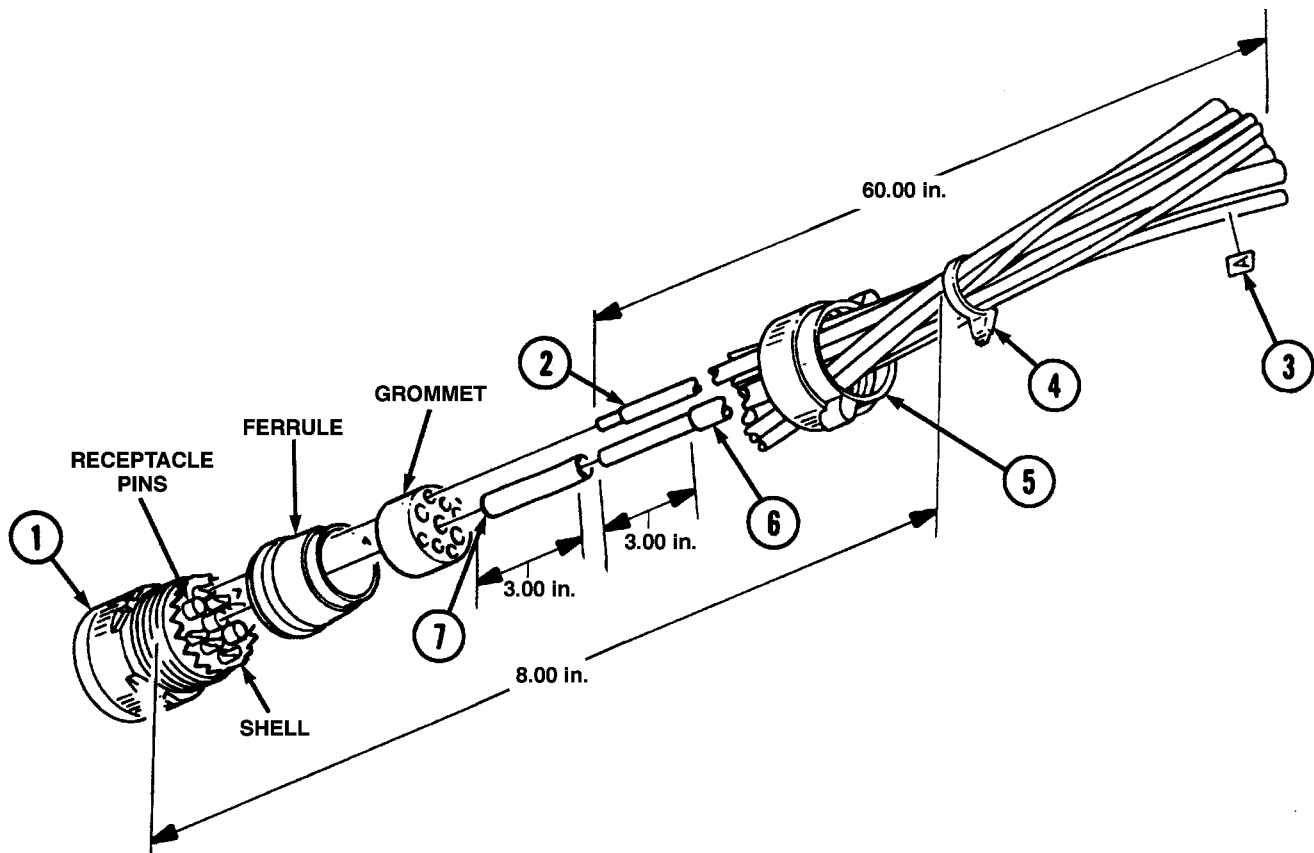


Figure D-98. Engine Harness Plug Connector Fabrication.

Section II. ILLUSTRATED MANUFACTURING INSTRUCTIONS (Cont'd)**INSTRUCTIONS:****NOTE**

When connecting electrical wire to connector pins on engine harness plug connector, use NSN 3439-00-133-1108 solder. (Refer to TB SIG-222 for soldering.)

1. Cut three sections of electrical wire (6) to length as shown.
2. Remove 3-in. (76.2 mm) section of electrical insulation from electrical wire (6).
3. Cut three sections of insulation sleeving (7) to length as shown.
4. Position three sections of insulation sleeving (7) over wires (6).
5. Using plug connector (1), disassemble shell, coupling nut (5), ferrule, and grommet.
6. Place coupling nut (5) and ferrule over three wires (6).
7. Place three wires (6) in holes marked D, E, and F in grommet.
8. Connect three wires (6) to receptacle pins marked D, E, and F on shell.
9. Cut six sections of electrical wire (2) to length as shown.
10. Place six wires (2) in coupling nut (5), ferrule, and holes marked A, B, C, G, H, and I on grommet.
11. Connect six wires (2) to receptacle pins marked A, B, C, G, H, and I on shell.
12. Position grommet and ferrule in shell and secure with coupling nut (5). Using three wires (6) with insulation, heat-shrink sleeving (7) in position.
13. Apply sealant NSN 8040-00-225-4918 to three wires (6) and insulation sleeving (7) on plug connector (1).
14. Using plug connector (1) and wire markers (3), locate and mark nine wires. Secure nine wires with six tiedown straps (4).

Section II. ILLUSTRATED MANUFACTURING INSTRUCTIONS (Cont'd)

MATERIAL BLOCK		
STOCK SIZE	DESCRIPTION	SPECIFICATION
14 AWG	WIRE, ELECTRICAL	MIL-C-13486
14 AWG	WIRE, ELECTRICAL	MIL-C-13486/1
N/A	INSULATION SLEEVING	MIL-I-23053/2
N/A	INSULATION SLEEVING	MIL-I-23053/5

ITEM NO.	REQ'D	MATERIALS	
		DESCRIPTION	NSN/PART NUMBER
1	3	Insulation Sleeving: 1-1/2 in. (38.1 mm)	5970-00-812-2967
2	3	Electrical Wire: 60 in. (1,524 mm)	6145-00-538-8222
3	9	Wire Marker	46F5981
4	6	Tiedown Strap	5975-00-074-2072
5	6	Electrical Wire: 60 in. (1,524 mm)	6145-00-152-6499
6	6	Insulation Sleeving: 1-1/2 in. (38.1 mm)	5970-00-815-1295
7	1	Receptacle Connector	5935-01-149-5163

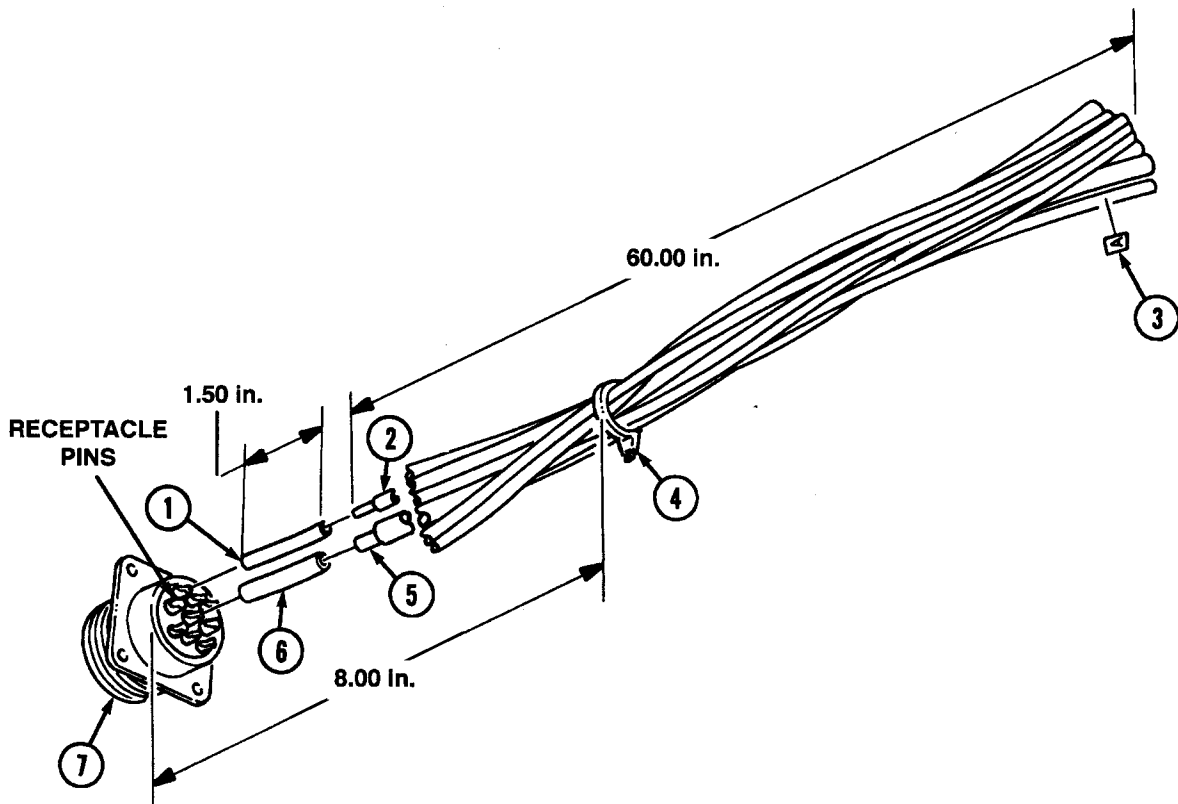


Figure D-99. Engine Harness Receptacle Fabrication.

Section II. ILLUSTRATED MANUFACTURING INSTRUCTIONS (Cont'd)**INSTRUCTIONS:****NOTE**

When connecting electrical wire to connector pins on engine harness receptacle, use NSN 3439-00-133-1108 solder. (Refer to TB SIG-222 for soldering.)

1. Cut three sections of electrical wire (2) to length as shown.
2. Cut three sections insulation sleeving (1) to length as shown.
3. Position three sections of insulation sleeving (1) on wires (2).
4. Connect three wires (2) to receptacle pins marked D, E, and F on receptacle connector (7). Place insulation sleeving (1) over wires (2) and receptacle pins and heat-shrink insulation sleeving (1) into position.
5. Apply sealant NSN 8040-00-225-4918 to three wires (2) and insulation sleeving (1) on receptacle connector (7).
6. Cut six sections of electrical wire (5) to length as shown.
7. Cut six sections of insulation sleeving (6) to length as shown.
8. Position six sections of insulation sleeving (6) on wires (5).
9. Connect six wires (5) to receptacle pins marked A, B, C, G, H, and I on receptacle connector (7). Place electrical insulating sleeving (6) over wires (5) and receptacle pins and heat-shrink insulation sleeving (6) into position.
10. Use wire markers (3) on nine sections of wire to locate and mark wires. Secure wires with six tiedown straps (4).

Section II. ILLUSTRATED MANUFACTURING INSTRUCTIONS (Cont'd)

ITEM NO.	REQ'D	MATERIALS	
		DESCRIPTION	NSN/PART NUMBER
4	1	Mini-box (bottom section)	5999-00-971-8848
7	6	Screw	5305-00-958-4353
8	6	Washer	5310-00-880-5976
9	6	Non-metallic Bumper	5340-01-219-6733
10	6	Nut	5310-00-934-9753

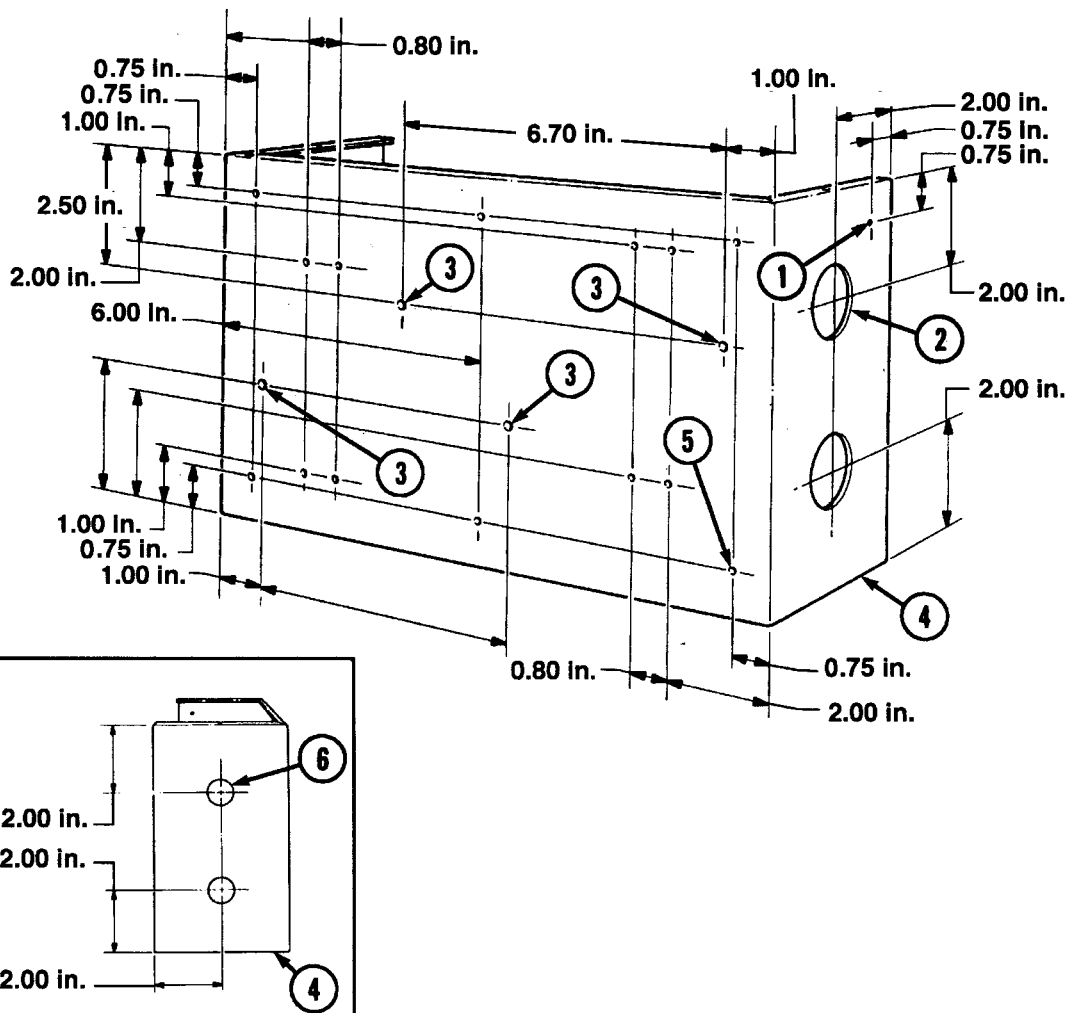


Figure D-100. Mini-box Bottom Section Drill Procedure.

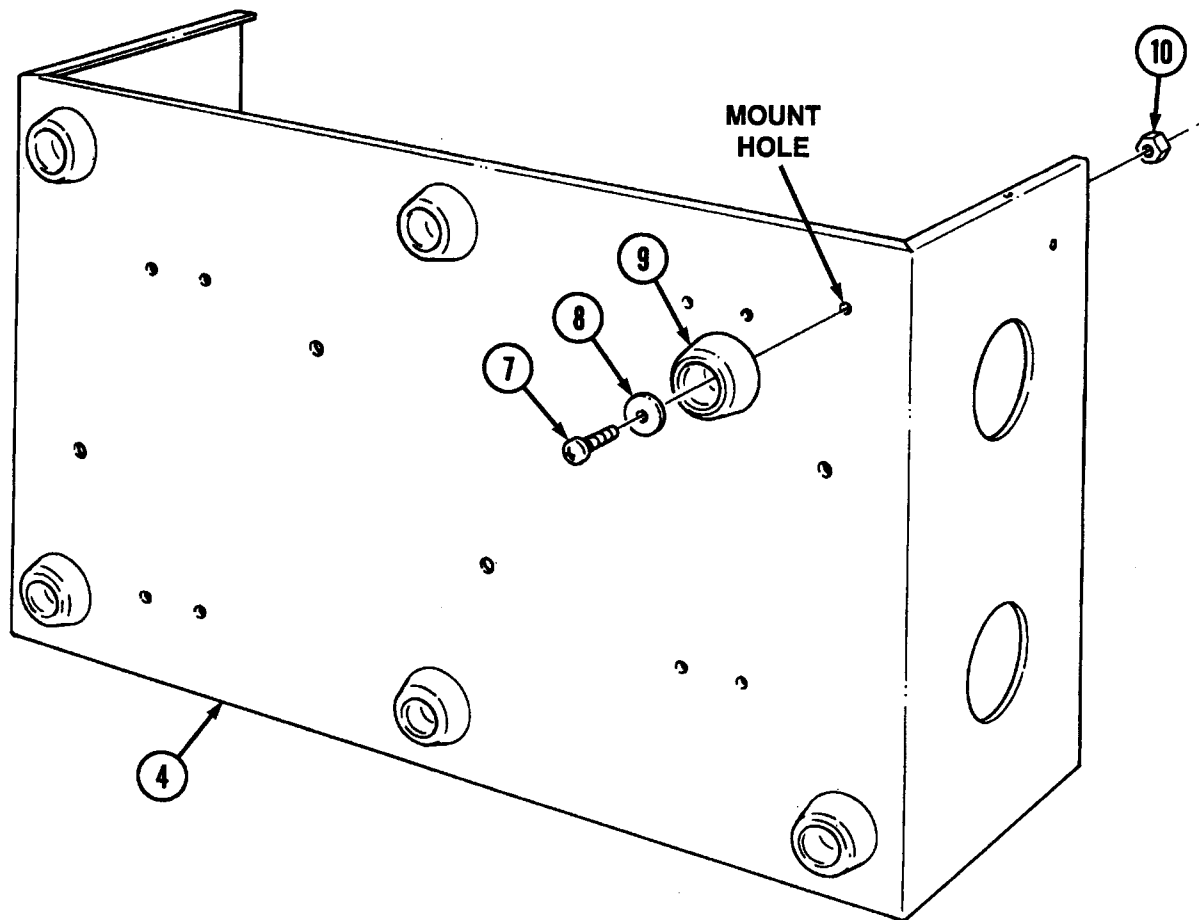


Figure D-100. Mini-box Bottom Section Drill Procedure (Cont'd).

INSTRUCTIONS:

1. Locate, mark, and drill 0.138-in. diameter hole (1) in mini-box bottom section (4) as shown.
2. Locate, mark, and drill two 1.250-in. diameter holes (2) in mini-box bottom section (4) as shown.
3. Locate, mark, and drill four 0.190-in. diameter holes (3) in mini-box bottom section (4) as shown.
4. Locate, mark, and drill fourteen 0.138-in. diameter holes (5) in mini-box bottom section (4) as shown.
5. Locate, mark, and drill two 0.750-in. diameter holes (6) in mini-box bottom section (4) as shown.
6. Install six non-metallic bumpers (9) on mount holes on mini-box bottom section (4) with washers (8), screws (7), and nuts (10) as shown.

Section II. ILLUSTRATED MANUFACTURING INSTRUCTIONS (Cont'd)

MATERIAL BLOCK		
STOCK SIZE	DESCRIPTION	SPECIFICATION
3 ft	CHANNEL	N/A

PRE-PUNCHED CHANNEL		
CHANNEL PART NUMBER	CUT LENGTH	MANUFACTURED FROM NSN
67	AS SHOWN	N/A

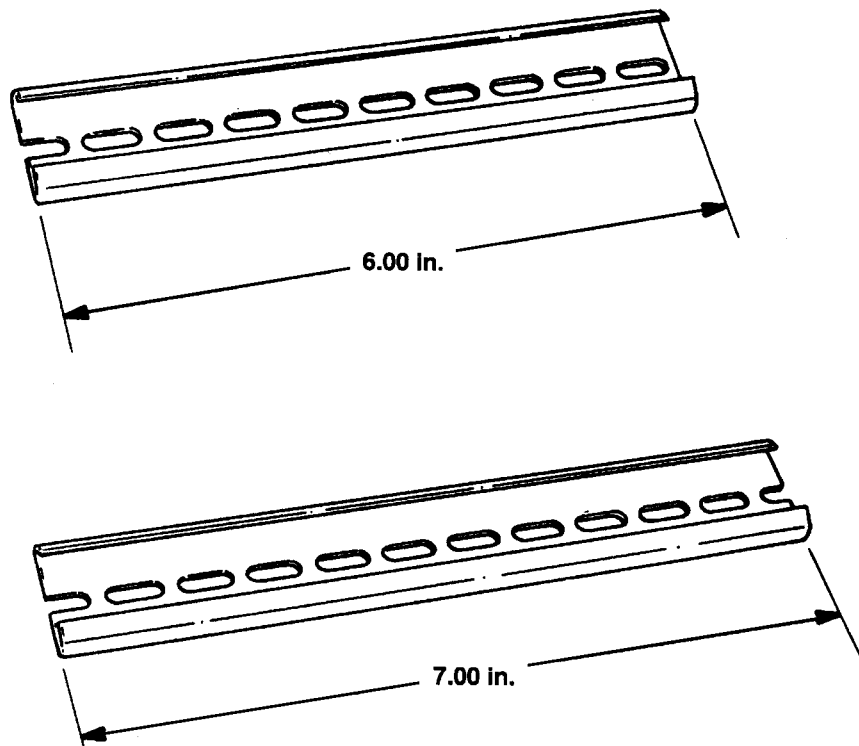


Figure D-101. Pre-punched Channel.

INSTRUCTIONS:

Cut two channels to length shown.

Section II. ILLUSTRATED MANUFACTURING INSTRUCTIONS (Cont'd)

ITEM NO.	REQ'D	MATERIALS	
		DESCRIPTION	PART NUMBER
1	1	Channel, Pre-punched: 7 in.	67
2	6	Terminal Block	0621
3	3	Terminal Block	0624
4	1	End Section	0630
5	2	Channel Clamp	68

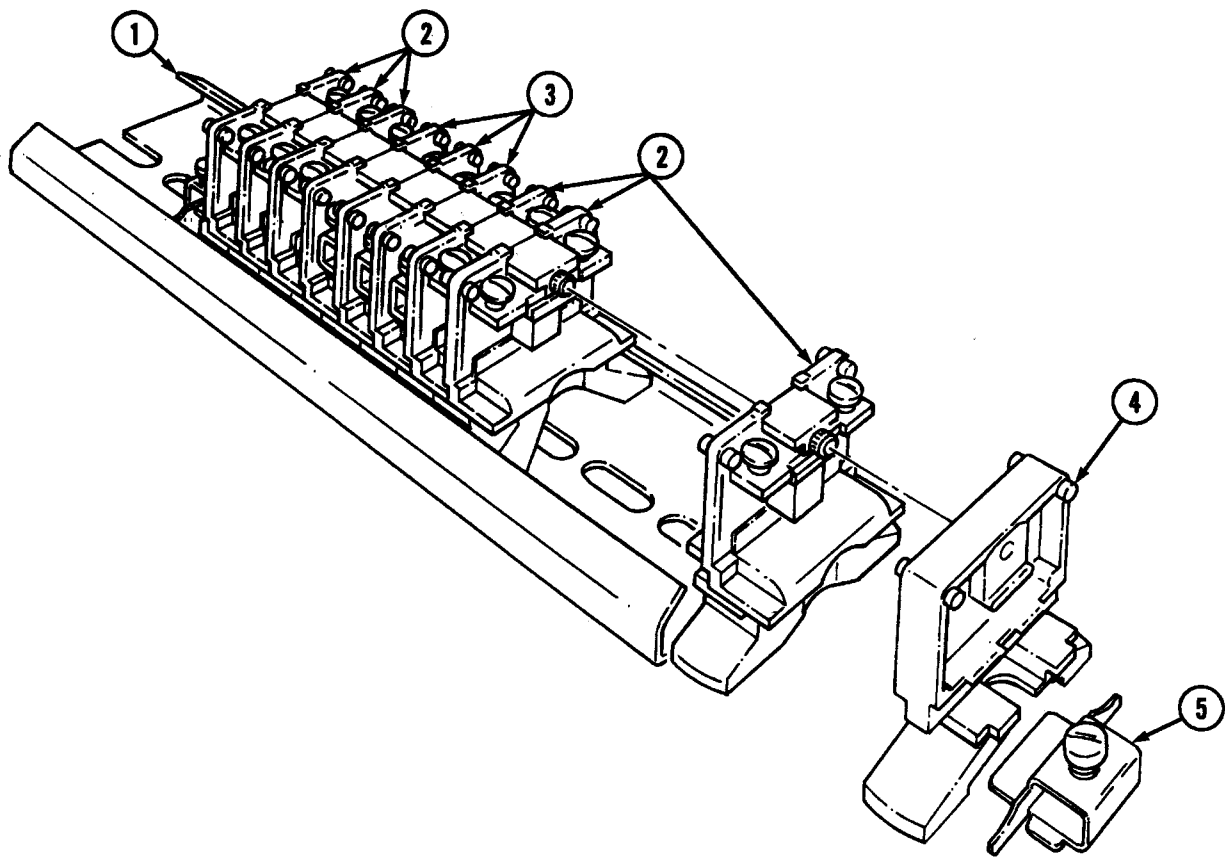


Figure D-102. Channel, 7.00-in. and Terminal Block Assembly.

INSTRUCTIONS:

Install three terminal blocks (2), terminal blocks (3), terminal blocks (2), and end section (4) on channel (1) with two channel clamps (5).

Section II. ILLUSTRATED MANUFACTURING INSTRUCTIONS (Cont'd)

ITEM NO.	REQ'D	MATERIALS	
		DESCRIPTION	PART NUMBER
1	1	Channel, Pre-punched: 6 in.	67
2	8	Terminal Block	0621
3	1	End Section	0630
4	2	Channel Clamp	68

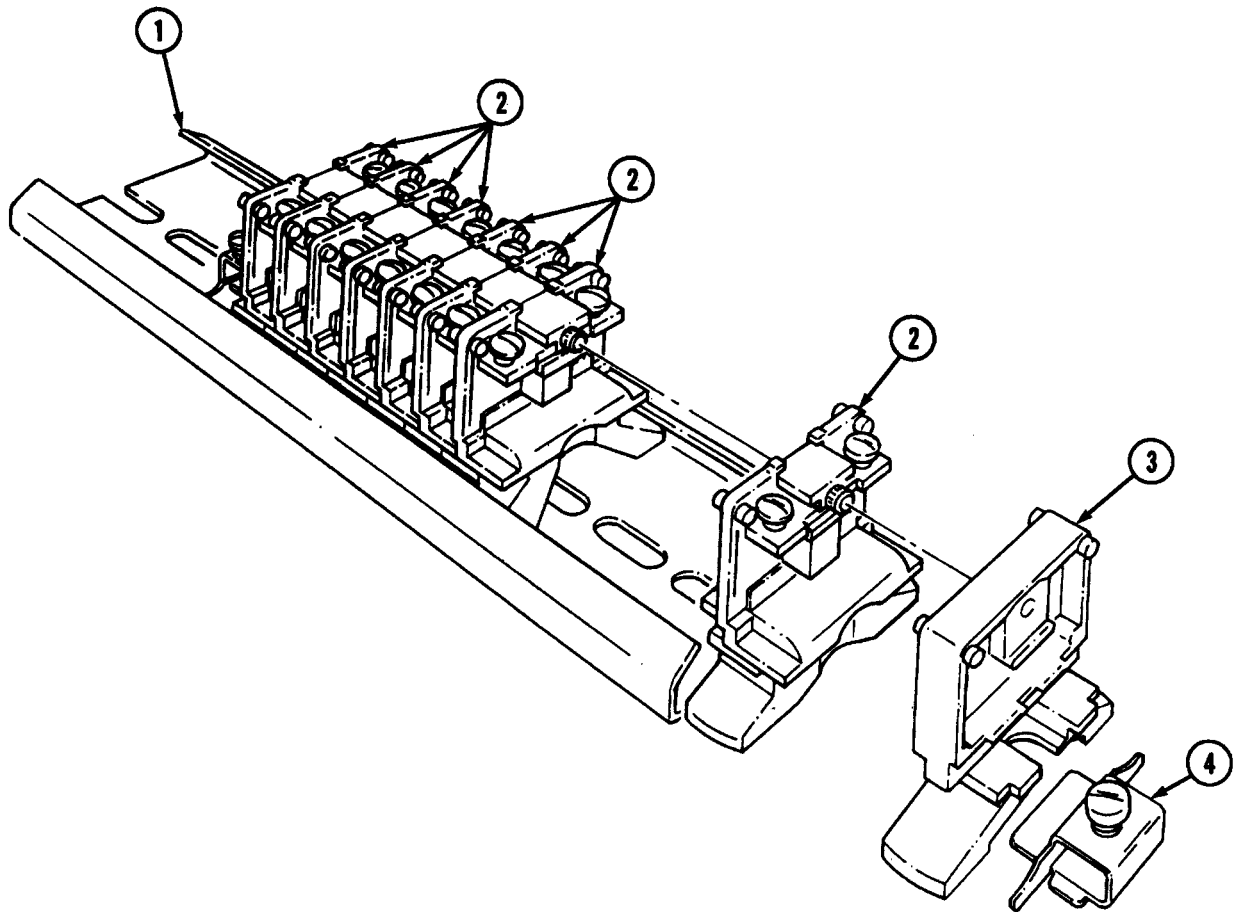


Figure D-103. Channel, 6.00-in. and Terminal Block Assembly.

INSTRUCTIONS:

Install eight terminal blocks (2) and end section (3) on channel (1) with two channel clamps (4).

Section II. ILLUSTRATED MANUFACTURING INSTRUCTIONS (Cont'd)

ITEM NO.	REQ'D	MATERIALS	
		DESCRIPTION	NSN/PART NUMBER
1	2	Grommet, Non-metallic	5325-00-270-8890
2	4	Cable Tie Holder	MB4A
3	8	Screw	5305-00-958-4353
4	4	Screw	5305-00-984-6210
5	1	Mini-box (bottom section)	5999-00-971-8848
6	2	Grommet, Non-metallic	5325-00-309-7164
7	1	Wire Marker	46F5981
8	4	Nut	5310-00-934-9758
9	4	Washer	5310-00-883-9384
10	8	Washer	5310-00-880-5976
11	8	Nut	5310-00-934-9753

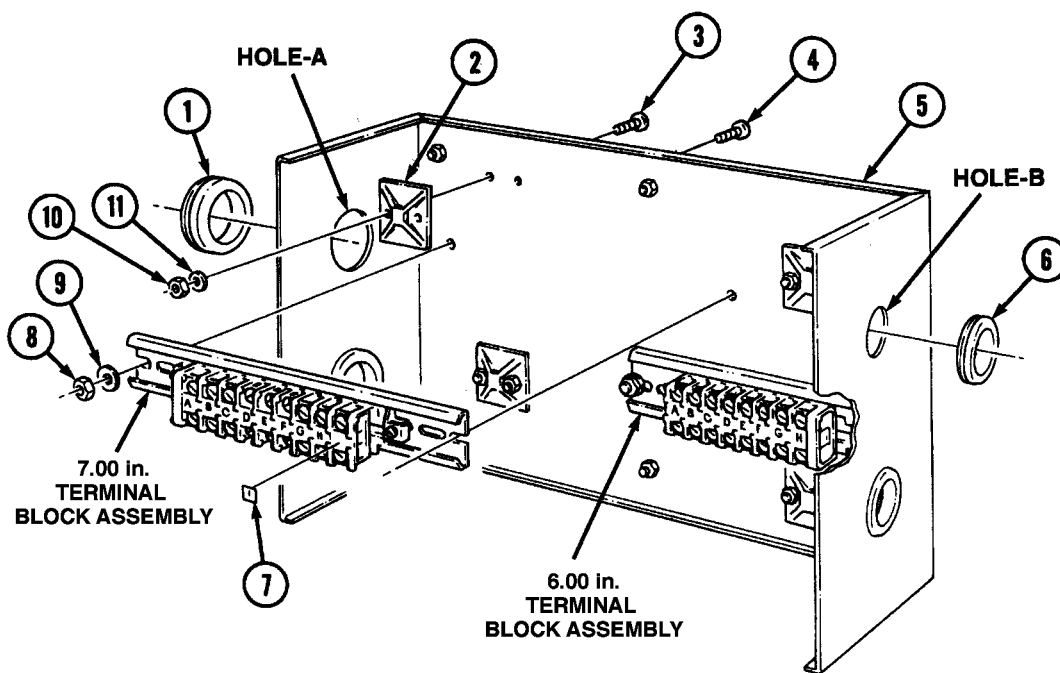


Figure D-104. Terminal Block Assemblies and Cable Tie Holder Installation.

INSTRUCTIONS:

1. Using wire marker (7) and 6-in. and 7-in. terminal block assemblies, locate and mark sections as shown.
2. Install 6-in. and 7-in. terminal block assemblies in mini-box bottom section (5) with four screws (4), washers (9), and nuts (8).
3. Install four cable tie holders (2) in mini-box bottom section (5) with eight screws (3), washers (10), and nuts (11).
4. Install two non-metallic grommets (1) in holes A on mini-box bottom section (5).
5. Install two non-metallic grommets (6) in holes B on mini-box bottom section (5).

Section II. ILLUSTRATED MANUFACTURING INSTRUCTIONS (Cont'd)

MATERIAL BLOCK		
STOCK SIZE	DESCRIPTION	SPECIFICATION
14 AWG	WIRE, ELECTRICAL	MIL-C-13486/1

ITEM NO.	REQ'D	MATERIALS	
		DESCRIPTION	NSN/PART NUMBER
1	16	Receptacle Pin	1-87756-6
2	14	Electrical Wire: 12 in.	6145-00-808-4849
3	14	Wire Marker	46F5981
4	11	Terminal Lug	5940-00-577-3807
5	1	Receptacle Plug	103308-8

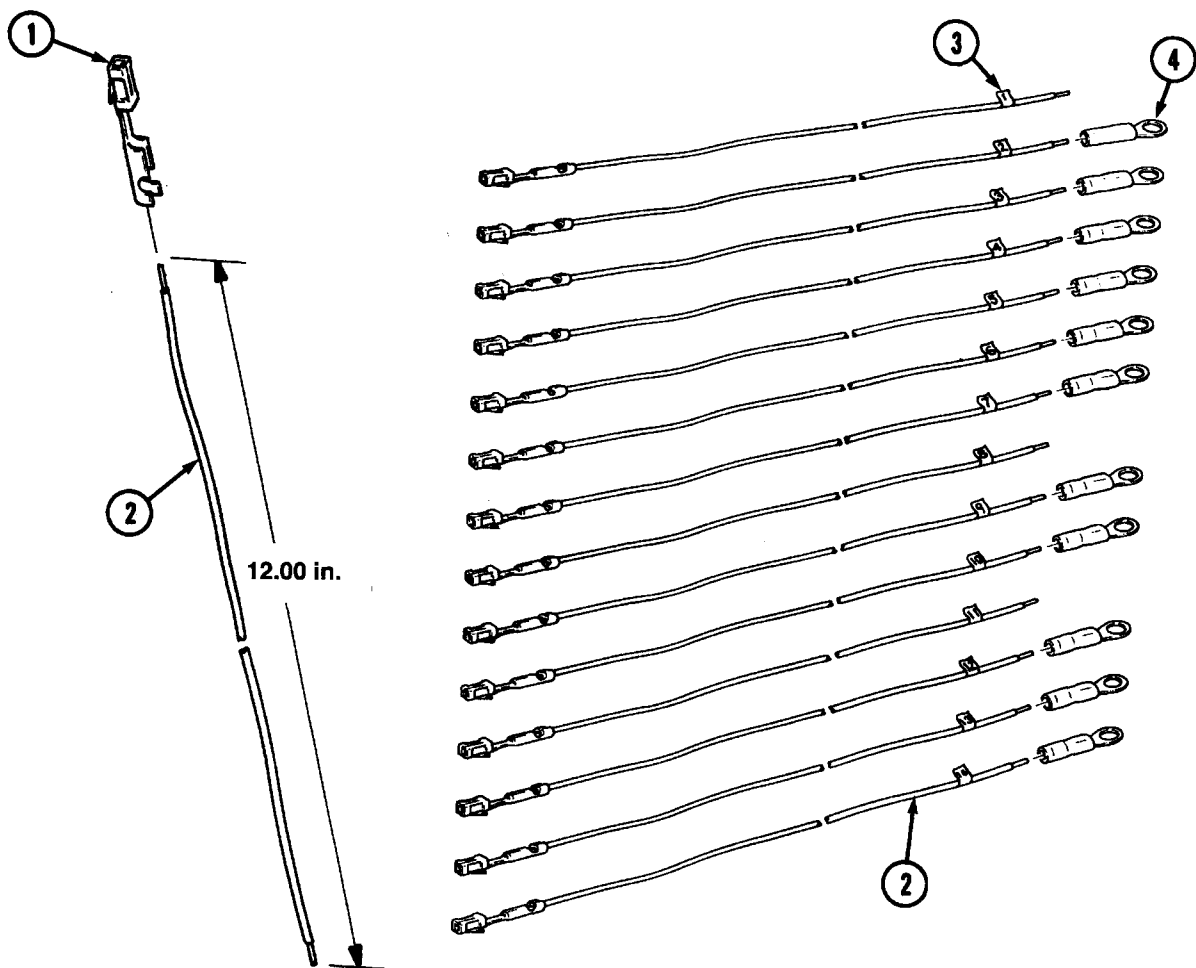


Figure D-105. Receptacle Plug and Pin Assemblies.

Section II. ILLUSTRATED MANUFACTURING INSTRUCTIONS (Cont'd)

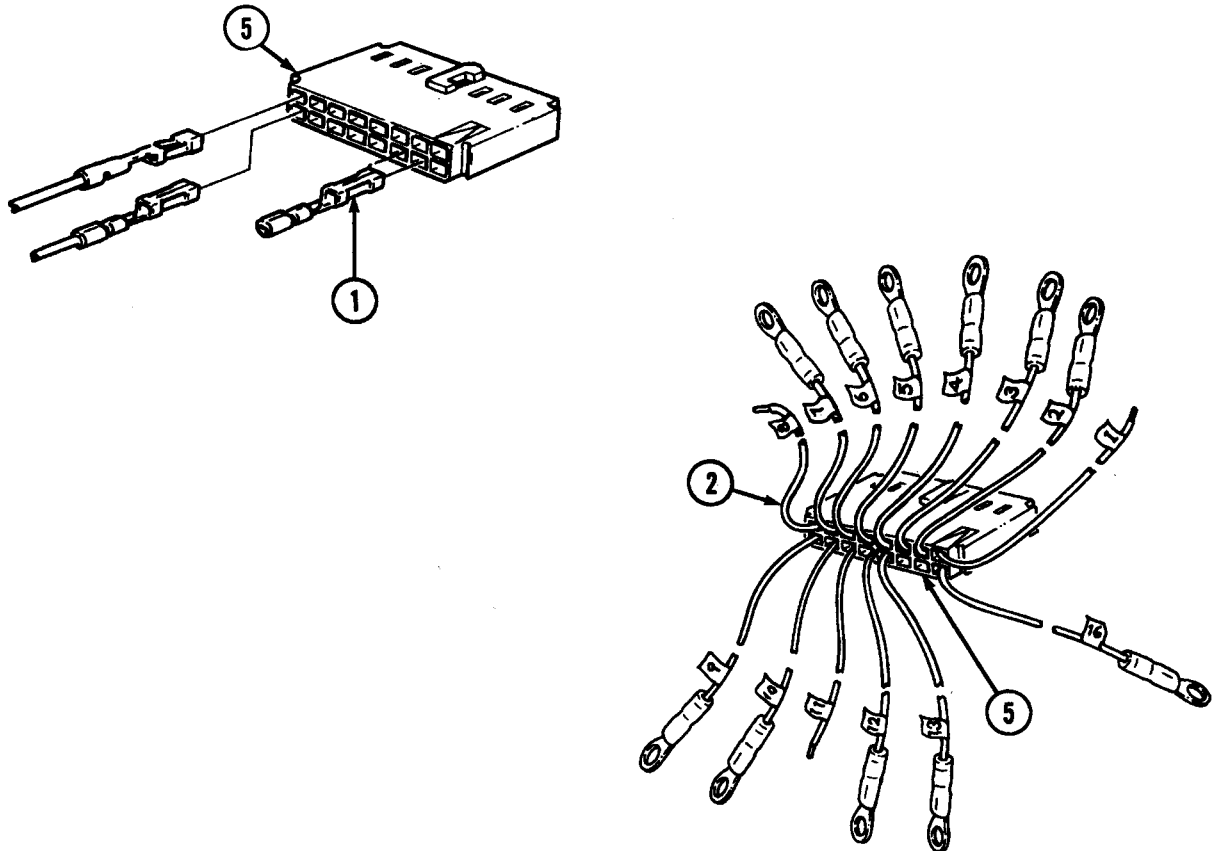


Figure D-105. Receptacle Plug and Pin Assemblies (Cont'd).

INSTRUCTIONS:

1. Cut fourteen sections of electrical wire (2) to length as shown.
2. Install fourteen receptacle pins (1) on wires (2) as shown.
3. Using fourteen wire markers, mark wires (2) with numbers 1 through 13 and 16 as shown.
4. Install eleven terminal lugs (4) on wires (2) marked 2, 3, 4, 5, 6, 7, 9, 10, 12, 13, and 16 as shown.
5. Install two receptacle pins (1) (without wires) in slotted positions marked 14 and 15 on receptacle plug (5).
6. Install fourteen receptacle pins (1) (with wires connected) in slotted positions marked 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, and 16 on receptacle plug (5).

Section II. ILLUSTRATED MANUFACTURING INSTRUCTIONS (Cont'd)

ITEM NO.	REQ'D	MATERIALS	
		DESCRIPTION	NSN
3	28	Terminal Lug	5940-00-283-5280

INSTRUCTIONS:

NOTE

- Ensure wire markers match letter identification for connector and receptacle harness assemblies.
- Trim excess wire to required length when installing wire and terminal lugs to terminal block assembly.

1. Route wires (5) from body harness receptacle (6) through grommet (7).
2. Install eight terminal lugs (3) on wires (5) from body harness receptacle (6).
3. Install wires (5) marked A, B, C, D, E, F, G, and H on body harness receptacle (6) to matching letters on terminal block assembly (4).
4. Route wires (10) from body harness connector (8) through grommet (9).
5. Install eight terminal lugs (3) on wires (10) from body harness connector (8).
6. Install wires (10) marked A, B, C, D, E, F, G, and H on body harness connector (8) to matching letters on terminal block assembly (4).
7. Route wires (13) on engine harness connector (14) through grommet (15).
8. Connect three wires (12) marked D, E, and F on engine harness connector (14) to matching letters on terminal block assembly (11). Do not tighten screws.
9. Install six terminal lugs (3) on wires (13) from engine harness connector (14)
10. Install wires (13) marked A, B, C, G, H, and I on engine harness connector (14) to matching letters on terminal block assembly (11).
11. Route wires (2) on engine harness receptacle (1) through grommet (16).
12. Connect three wires (12) marked D, E, and F on engine harness receptacle (1) to matching letters on terminal block assembly (11).
13. Install six terminal lugs (3) on wires (2) from engine harness receptacle (1).
14. Install wires (2) marked A, B, C, G, H, and I on engine harness receptacle (1) to matching letters on terminal block assembly (11).

Section II. ILLUSTRATED MANUFACTURING INSTRUCTIONS (Cont'd)

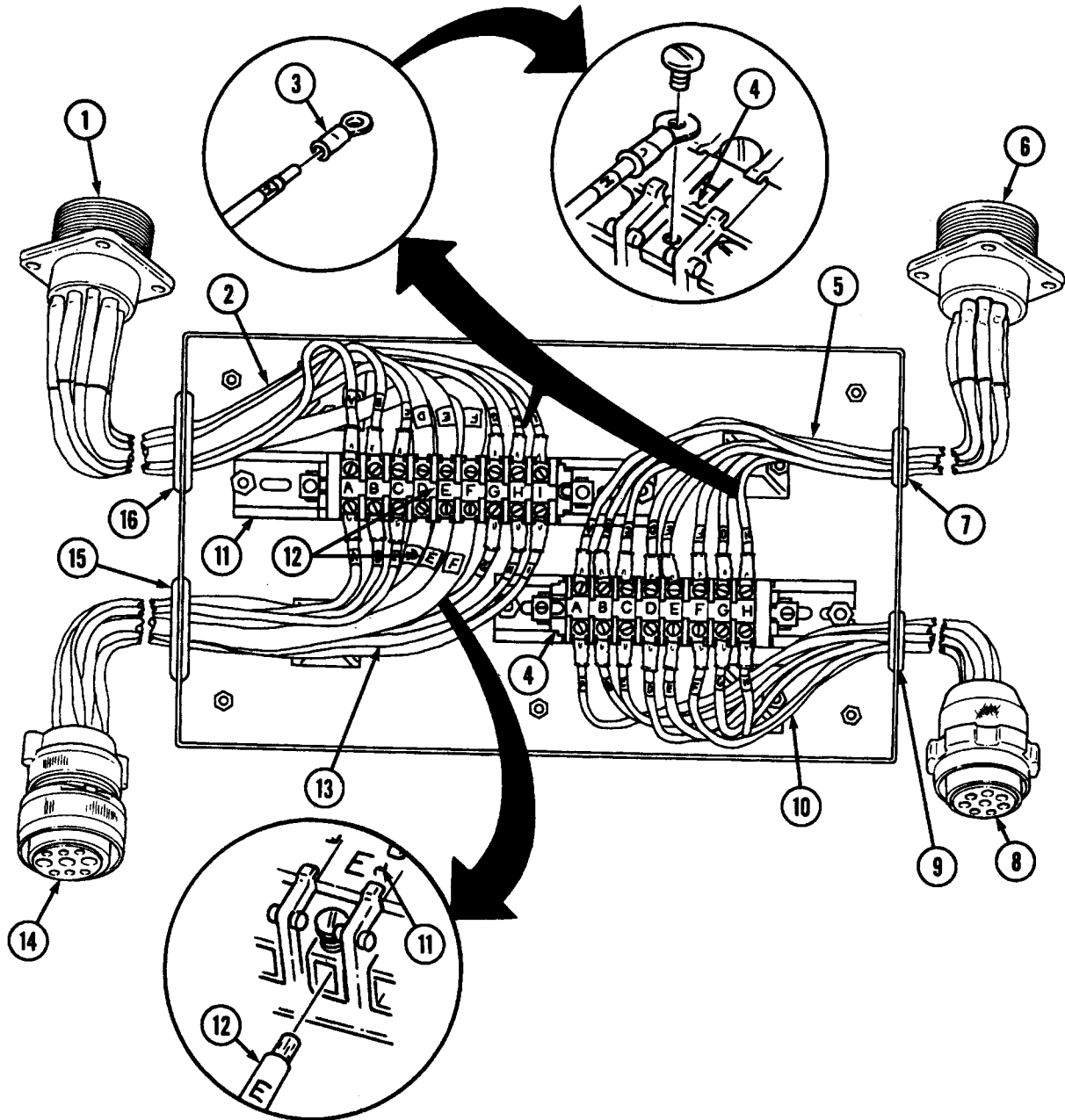


Figure D-106. Body, Engine Harness Connector, and Receptacle Installation.

Section II. ILLUSTRATED MANUFACTURING INSTRUCTIONS (Cont'd)

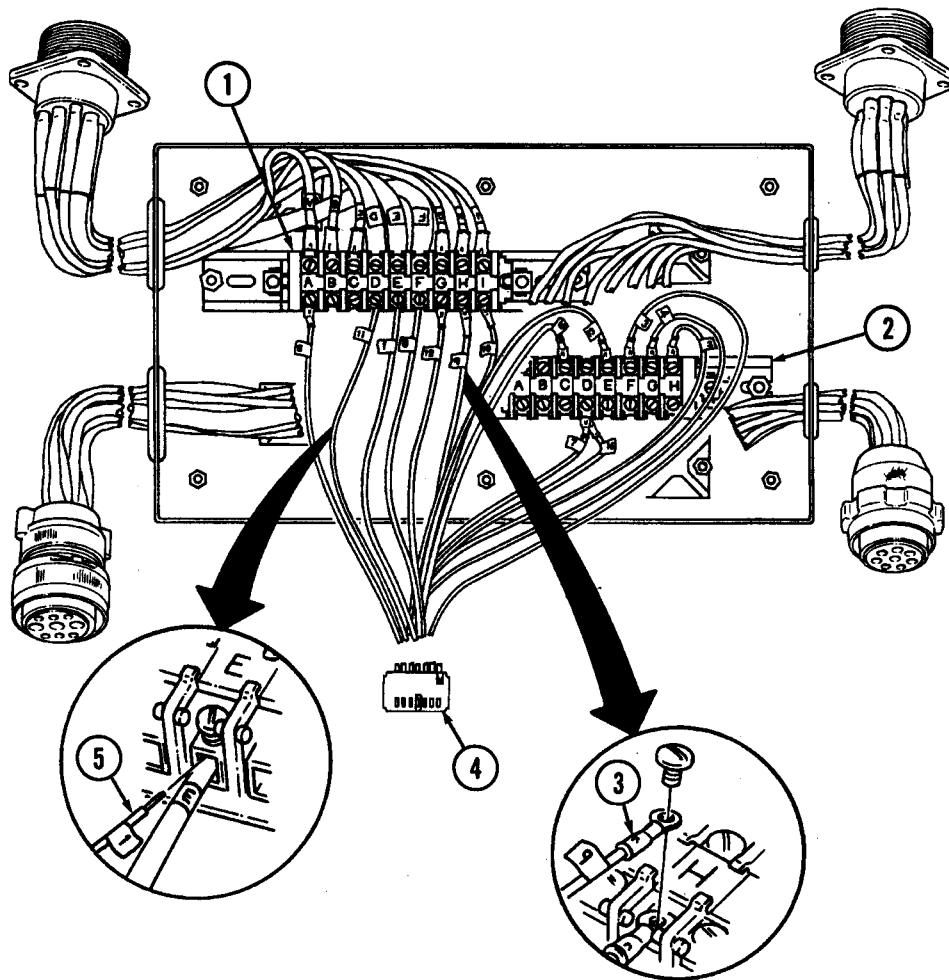


Figure D-107. Receptacle Plug Installation.

INSTRUCTIONS:

NOTE

- Ensure wire markers match letter identification for connector and receptacle harness assemblies.
- Trim excess wire to required length when installing wire and terminal lugs to terminal block assembly.

1. Connect wires (3) marked 2, 3, 4, 6, 7, and 16 on receptacle plug (4) to terminal strip (2) marked H, F, G, C, D, and B.
2. Connect wire (3) marked 13 on receptacle plug (4) to terminal strip (2) marked E.
3. Connect wires (5) marked 1, 8, 11 on receptacle plug (4) to terminal strip (1) marked E, F, D.
4. Connect wires (3) marked 5, 9, 10, and 12 on receptacle plug (4) to terminal strip (1) marked A, H, I, and G.

Section II. ILLUSTRATED MANUFACTURING INSTRUCTIONS (Cont'd)

ITEM NO.	REQ'D	MATERIALS	
		DESCRIPTION	NSN/PART NUMBER
3	4	Screw	5305-00-984-6210
4	2	Loop Clamp	5340-00-057-2904
5	2	Conduit Insulation: 48 in.	68240
6	AR	Tape	7510-00-802-8311
8	4	Washer	5310-00-883-9384
9	4	Nut	5310-00-934-9758
11	4	Tiedown Strap	5975-00-074-2072
12	2	Loop Clamp	5434-00-724-7038
13	2	Conduit Insulation: 54 in.	68243

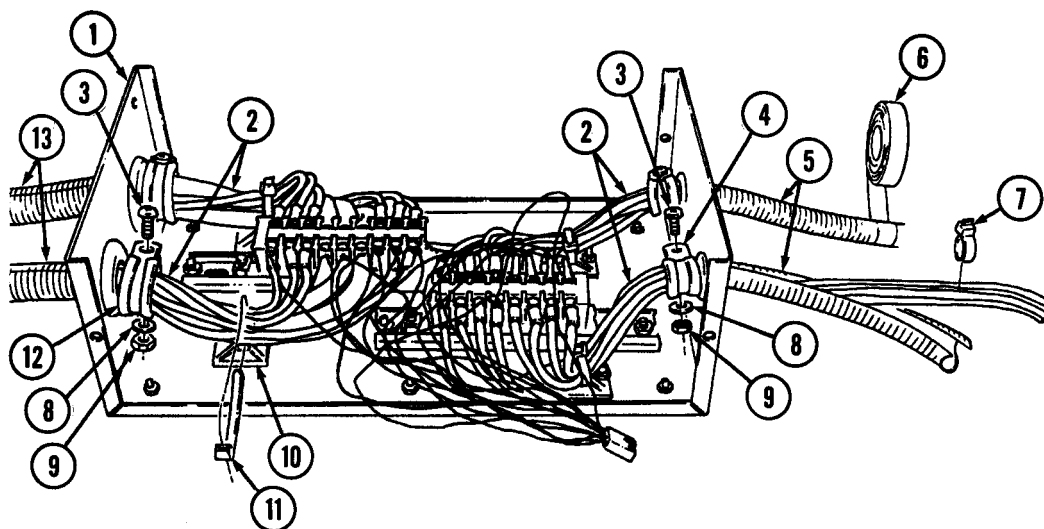


Figure D-108. Terminal Strip Installation.

INSTRUCTIONS:

1. Install four tiedown straps (11) in cable tie holders (10) and secure wires (2) to cable tie holders (10) with tiedown straps (11).
2. Install two loop clamps (4) on wires (2) of body harness connector and receptacle with screws (3), washers (8), and nuts (9).
3. Install two loop clamps (12) on wires (2) of engine harness connector and receptacle with screws (3), washers (8), and nuts (9).
4. Cut two 48-in. (1,219.2 mm) sections of conduit insulation (5).
5. Remove ten tiedown straps (7) from wires (2) of body harness connector and receptacle.
6. Position two sections of conduit insulation (5) over wires (2) of body harness connector and receptacle and secure with tape (6).
7. Cut two 54-in. (1,371.6 mm) sections of conduit insulation (13).
8. Remove twelve tiedown straps (7) from wires on engine harness connector and receptacle.
9. Position sections of conduit insulation (13) over wires (2) on engine harness connector and receptacle and secure with tape (6).

Section II. ILLUSTRATED MANUFACTURING INSTRUCTIONS (Cont'd)

MATERIAL BLOCK		
STOCK SIZE	DESCRIPTION	SPECIFICATION
14 AWG N/A	WIRE, ELECTRICAL INSULATION SLEEVING	MIL-C-13486/1 MIL-I-23053/5

ITEM NO.	REQ'D	MATERIALS	
		DESCRIPTION	NSN
1	5	Electrical Wire: 12 in.	6145-00-152-6499
2	5	Tip Jack	5935-00-683-7651
3	5	Insulation Sleeving: 1 in.	5970-00-815-1295

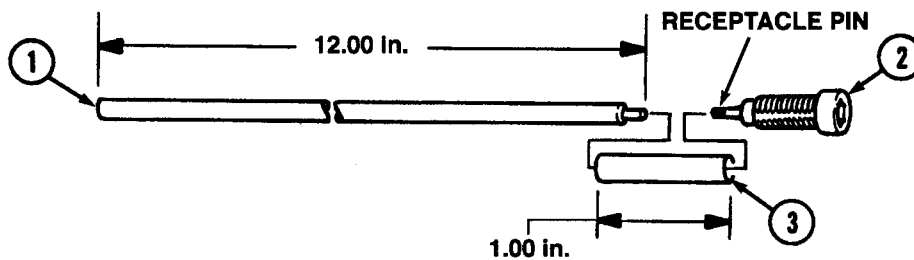


Figure D-109. Tip Jack Lead Assembly.

INSTRUCTIONS:

NOTE

When connecting electrical wire to receptacle pins on tip jacks, use NSN 3493-00-133-1108 solder. (Refer to TB SIG-222 for soldering.)

1. Cut wire (1) into five 12-in. sections as shown.
2. Cut insulation sleeving (3) into five 1-in. sections as shown.
3. Connect five wires (1) to receptacle pins on tip jacks (2).
4. Place insulation sleeving (3) over wires (1) and receptacle pins and heat-shrink insulation sleeving (3) into position.

Section II. ILLUSTRATED MANUFACTURING INSTRUCTIONS (Cont'd)

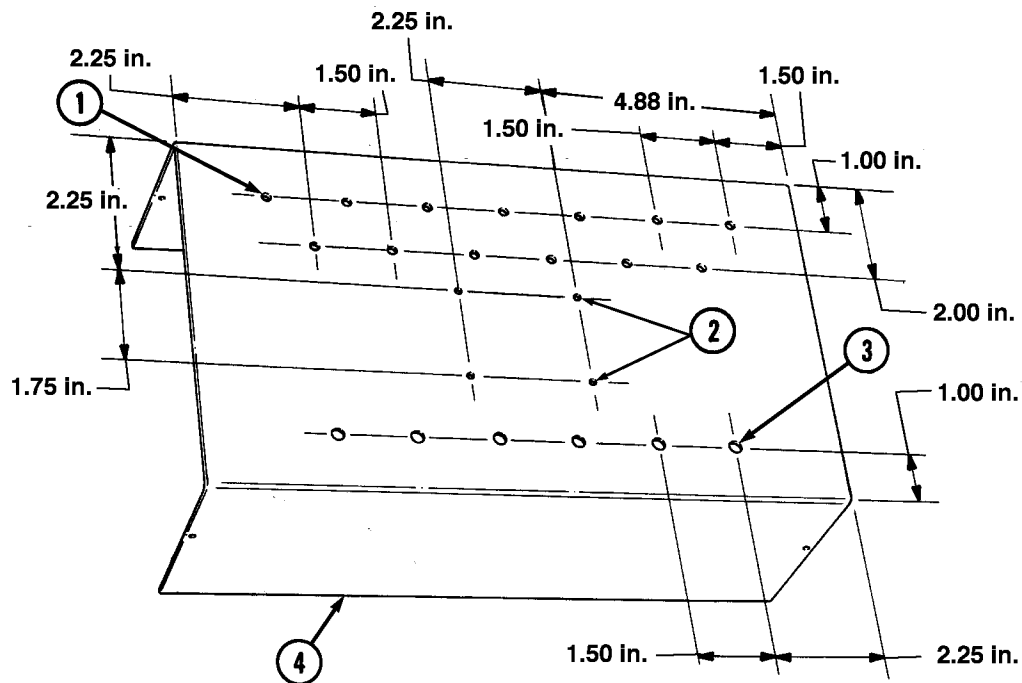


Figure D-110. Mini-box Top Section Drill Procedure.

INSTRUCTIONS:

1. Locate, mark, and drill thirteen 0.156-in. diameter holes (1) in mini-box top section (4).
2. Locate, mark, and drill six 0.205-in. diameter holes (3) in mini-box top section (4).
3. Locate, mark, and drill four 0.138-in. diameter holes (2) in mini-box top section (4).

Section II. ILLUSTRATED MANUFACTURING INSTRUCTIONS (Cont'd)

ITEM NO.	REQ'D	MATERIALS	
		DESCRIPTION	NSN
	1	Data Mark Set	7510-01-040-7110
	1	Data Mark Set	7510-01-158-1037
2	13	Led	5980-01-288-0188
3	1	Mini-Box (top section)	5999-00-971-8848
4	5	Tip Jack (assembled in figure D-109)	5935-00-683-7651
7	5	Terminal Lug	5940-00-283-5280
10	1	Tip Jack	5935-00-683-7651
13	25	Insulation Sleeving: 1 in.	5970-00-812-2974

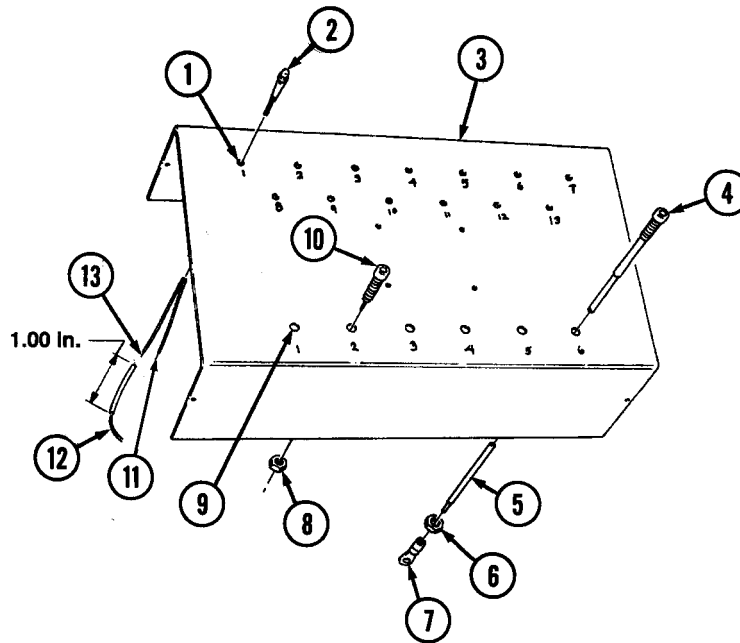


Figure D-110. Mini-box Top Section Drill Procedure (Cont'd).

INSTRUCTIONS (CONT'D):

4. Using data mark set, mark location of thirteen holes (1) on mini-box top section (3).
5. Using data mark set, mark location of six holes (9) on mini-box top section (3).
6. Install tip jack (10) and nut (8) in hole (9) marked 2 on mini-box top section (3).
7. Install five tip jacks (4) with wires (5) and nuts (6) in holes (9) marked 1, 3, 4, 5, and 6 on mini-box top section (3).
8. Install five terminal lugs (7) to wires (5) on tip jacks (4).
9. Install thirteen LEDs (2) in holes (1) marked 1 through 13 on mini-box top section (3).
10. Cut electrical insulation sleeving (13) into twenty-five sections as shown.
11. Place twelve sections of electrical insulation sleeving (13) over red (+) wires (11) marked 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, and 13 on LEDs (2).
12. Place thirteen sections of electrical insulation sleeving (13) over black (-) wires (12) marked 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, and 13 on LEDs (2).

Section II. ILLUSTRATED MANUFACTURING INSTRUCTIONS (Cont'd)

MATERIAL BLOCK		
STOCK SIZE	DESCRIPTION	SPECIFICATION
N/A	WIRE, ELECTRICAL	MIL-W-16878/4
N/A	PUNCH BOARD	64P44EP

ITEM NO.	REQ'D	MATERIALS	
		DESCRIPTION	NSN/PART NUMBER
1	1	Punch Board: 2 x 3 in.	64P44EP
2	31	Electrical Wire: 5 in.	6145-00-808-4849

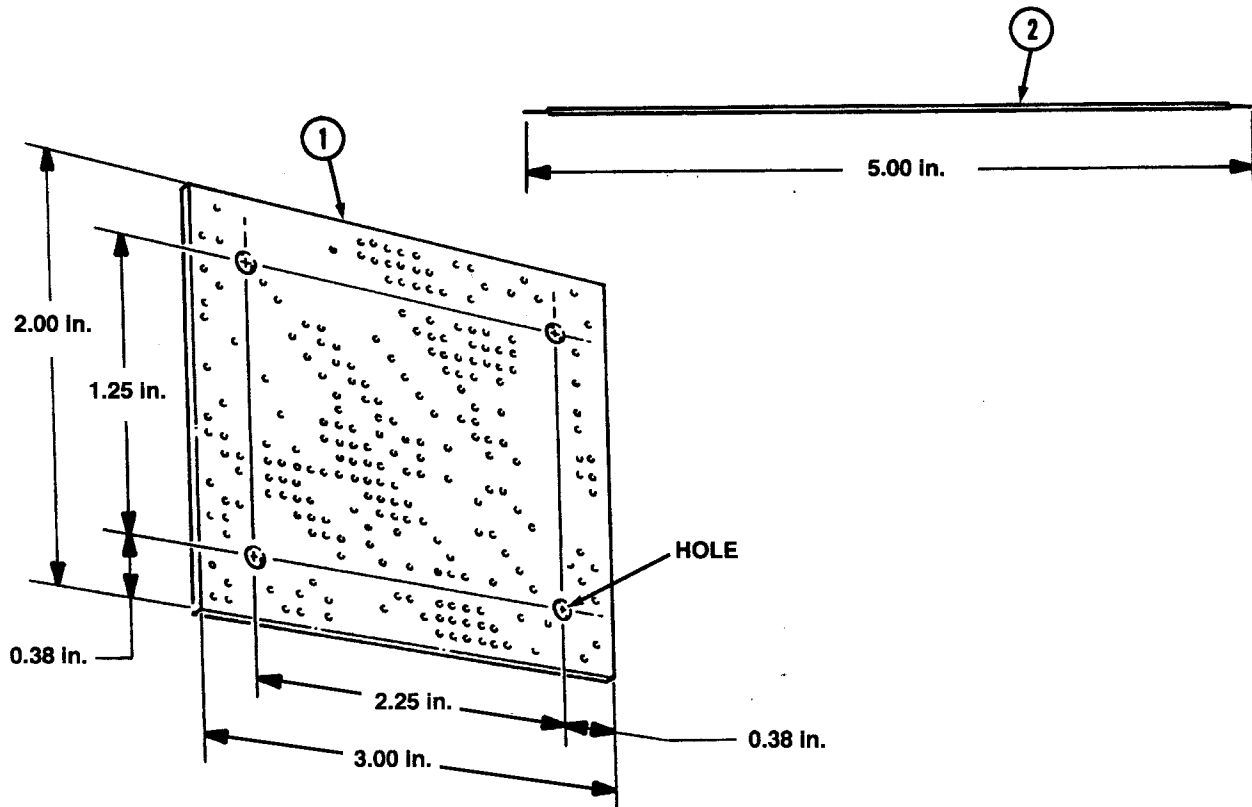


Figure D-111. Punch Board and Electrical Wire.

INSTRUCTIONS:

1. Cut punch board (1) to size as shown.
2. Locate, mark, and drill four 0.375-in. diameter holes in punch board (1) as shown.
3. Cut thirty-one 5-in. sections of electrical wire (2) as shown.

Section II. ILLUSTRATED MANUFACTURING INSTRUCTIONS (Cont'd)

ITEM NO.	REQ'D	MATERIALS	
		DESCRIPTION	NSN/PART NUMBER
1	1	Plug Connector	5935-01-230-9304
2	1	Punch Board (fabricated in figure D-99)	64P44EP
3	1	Isolated Resistor Network	13F170
4-6	3	Diode	ECG125
7	1	Bussed Resistor Network	13F171
31		Wire (cut in figure D-99)	

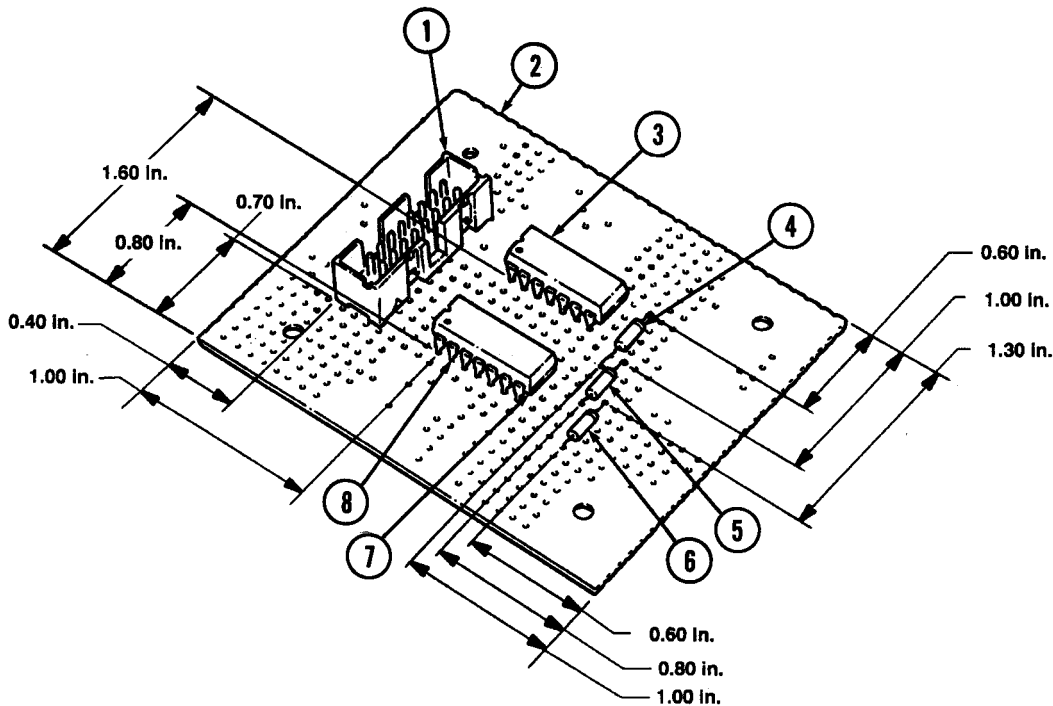


Figure D-112. Punch Board Assembly.

INSTRUCTIONS:

1. Install plug connector (1) on punch board (2).
2. Install fourteen wires to pins (8) marked 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, and 16 on plug connector (1).
3. Install insulated resistor network (3) on punch board (2).
4. Install six wires to pins (8) marked 1, 4, 7, 8, 11, and 14 on isolated resistor network (3).
5. Install bussed resistor network (7) on punch board (2).
6. Install eleven wires to pins (8) marked 1, 2, 3, 4, 5, 8, 9, 10, 11, 12, and 14 on bussed resistor network (7).
7. Install diodes (4), (5), and (6) on punch board (2).

Section II. ILLUSTRATED MANUFACTURING INSTRUCTIONS (Cont'd)

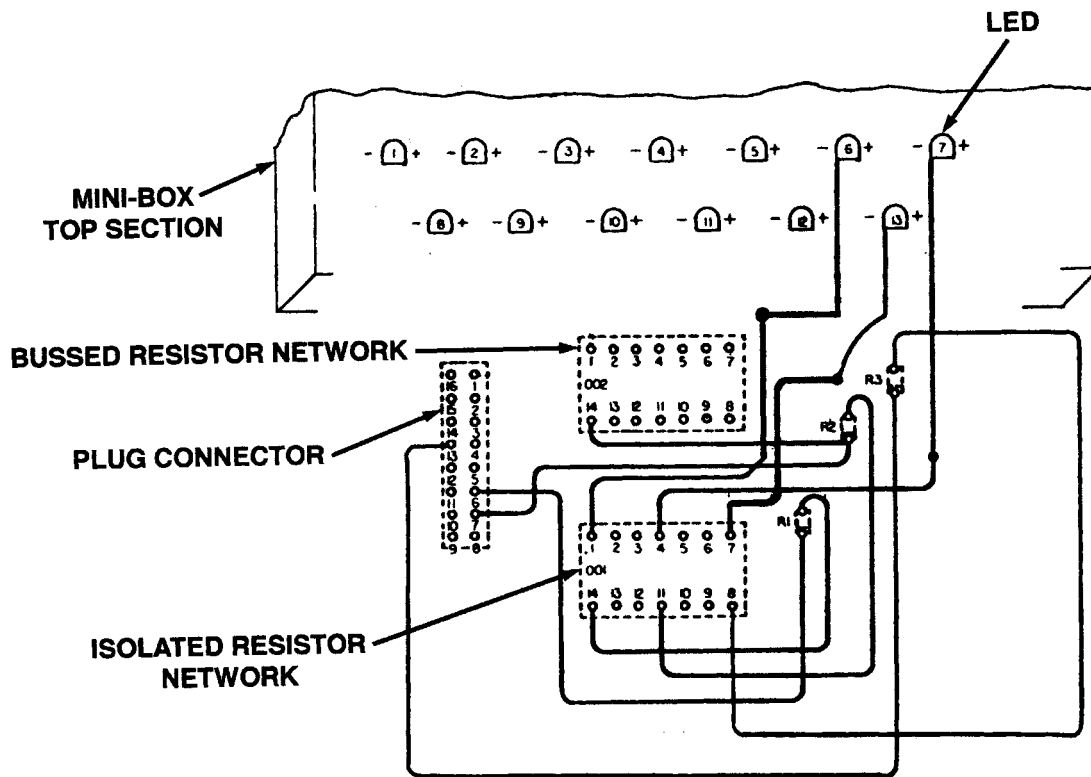


Figure D-113. Test Module Assembly.

INSTRUCTIONS:

1. Connect wire marked 6 on plug connector to banded end of diode R1.
2. Connect wire marked 14 on isolated resistor network to bandless end of diode R1.
3. Connect wire marked 7 on plug connector and wire marked 14 on bussed resistor network to banded end of diode R2.
4. Connect wire marked 13 on plug connector to bandless end of diode R3.
5. Connect wire marked 11 on isolated resistor network to bandless end of diode R2.
6. Connect wire marked 8 on isolated resistor network bandless end of diode R3.
7. Connect wire marked 1 on isolated resistor network to black (-) wire marked 6 on LED on mini-box top section.
8. Connect wire marked 4 on isolated resistor network to black (-) wire marked 7 on LED.
9. Connect wire marked 7 on isolated resistor network to black (-) wire marked 13 on LED.

Section II. ILLUSTRATED MANUFACTURING INSTRUCTIONS (Cont'd)

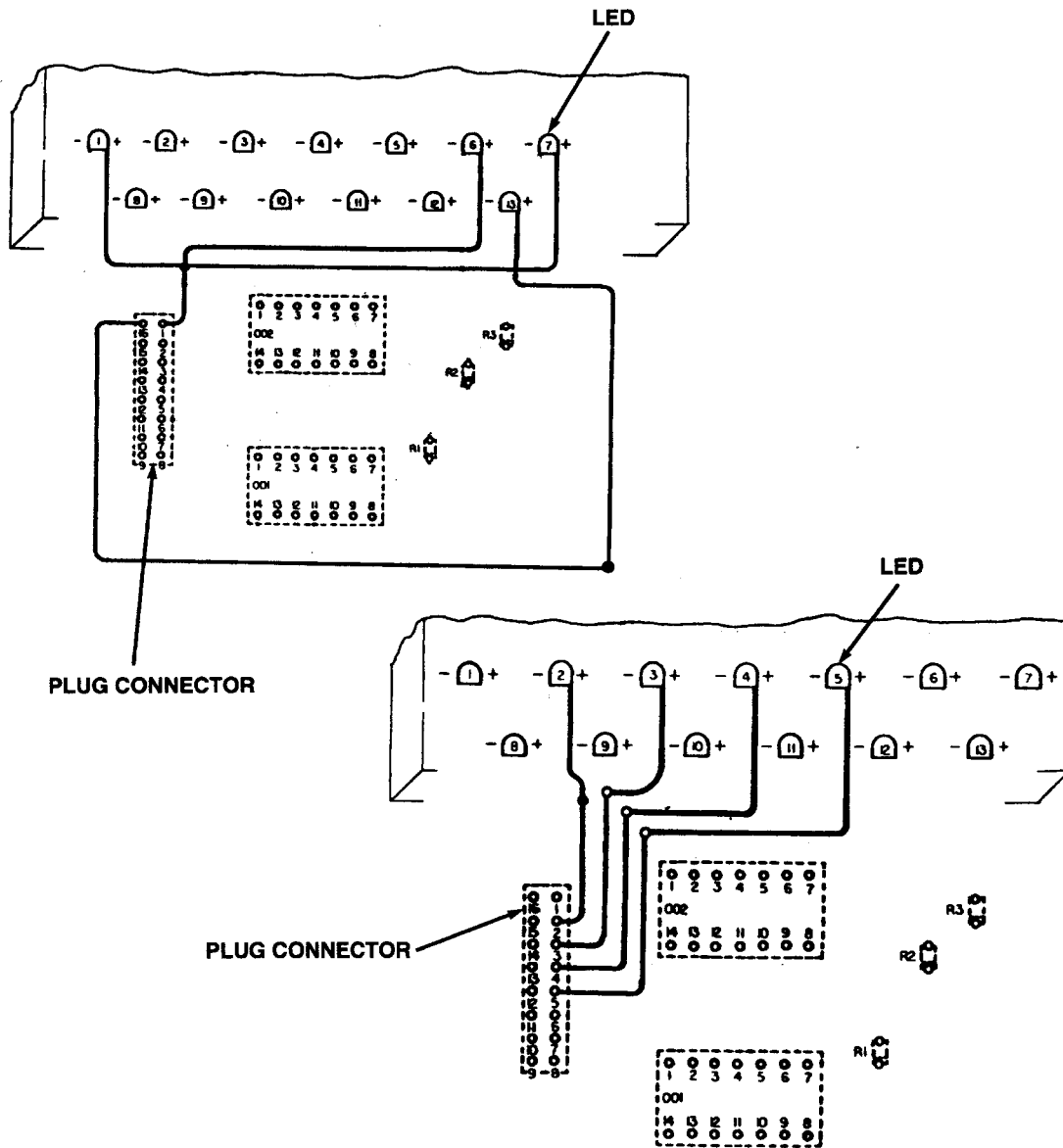


Figure D-113. Test Module Assembly (Cont'd).

INSTRUCTIONS (CONT'D):

10. Connect wire marked 16 on plug connector to red (+) wire marked 13 on LED.
11. Connect wire marked 1 on plug connector to three red (+) wires marked 1, 6, and 7 on LED.
12. Connect wire marked 2 on plug connector to red (+) wire marked 2 on LED.
13. Connect wire marked 3 on plug connector to red (+) wire marked 3 on LED.
14. Connect wire marked 4 on plug connector to red (+) wire marked 4 on LED.
15. Connect wire marked 5 on plug connector to red (+) wire marked 5 on LED.

Section II. ILLUSTRATED MANUFACTURING INSTRUCTIONS (Cont'd)

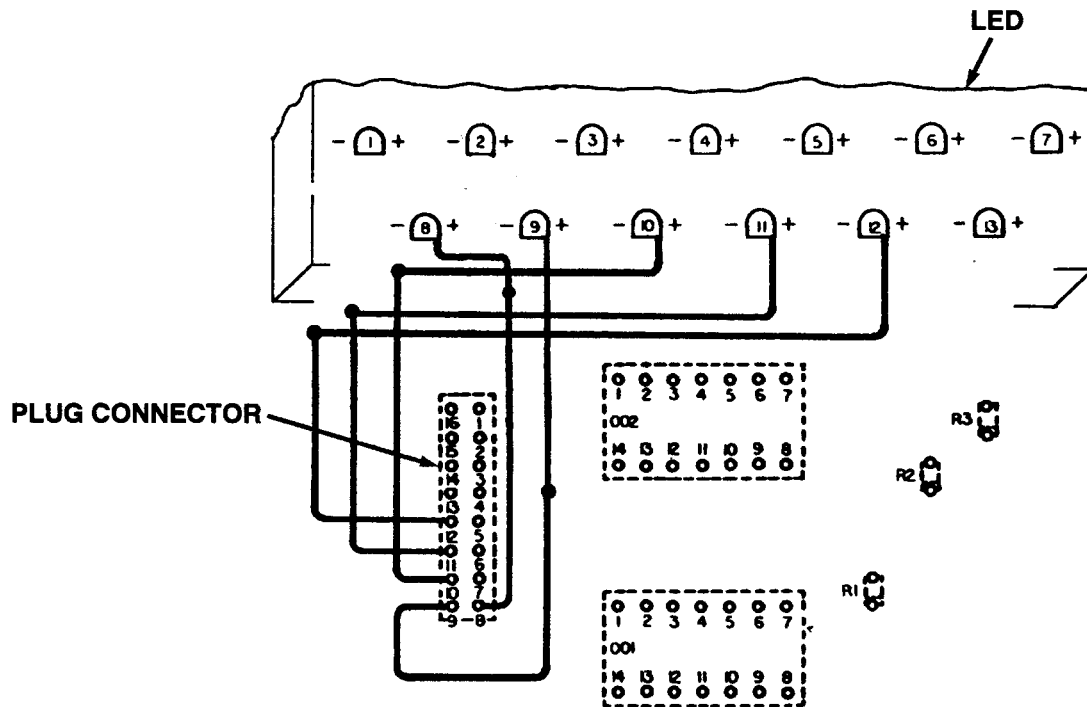


Figure D-113. Test Module Assembly (Cont'd).

INSTRUCTIONS (CONT'D):

16. Connect wire marked 8 on plug connector to red (+) wire marked 8 on LED.
17. Connect wire marked 9 on plug connector to red (+) wire marked 9 on LED.
18. Connect wire marked 10 on plug connector to red (+) wire marked 10 on LED.
19. Connect wire marked 11 on plug connector to red (+) wire marked 11 on LED.
20. Connect wire marked 12 on plug connector to red (+) wire marked 12 on LED.

Section II. ILLUSTRATED MANUFACTURING INSTRUCTIONS (Cont'd)

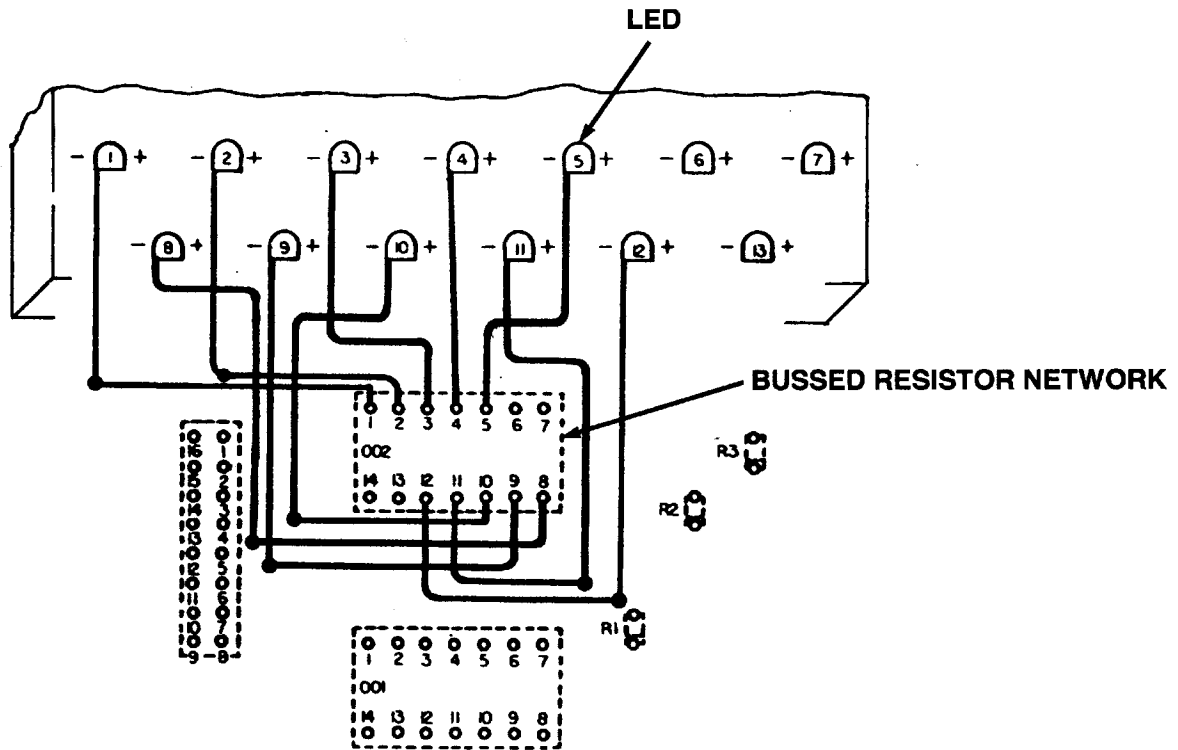


Figure D-113. Test Module Assembly (Cont'd).

INSTRUCTIONS (CONT'D):

21. Connect wire marked 1 on bussed resistor network to black (-) wire marked 1 on LED.
22. Connect wire marked 2 on bussed resistor network to black (-) wire marked 2 on LED.
23. Connect wire marked 3 on bussed resistor network to black (-) wire marked 3 on LED.
24. Connect wire marked 4 on bussed resistor network to black (-) wire marked 4 on LED.
25. Connect wire marked 5 on bussed resistor network to black (-) wire marked 5 on LED.
26. Connect wire marked 8 on bussed resistor network to black (-) wire marked 8 on LED.
27. Connect wire marked 9 on bussed resistor network to black (-) wire marked 9 on LED.
28. Connect wire marked 10 on bussed resistor network to black (-) wire marked 10 on LED.
29. Connect wire marked 11 on bussed resistor network to black (-) wire marked 11 on LED.
30. Connect wire marked 12 on bussed resistor network to black (-) wire marked 12 on LED.

Section II. ILLUSTRATED MANUFACTURING INSTRUCTIONS (Cont'd)

ITEM NO.	REQ'D	MATERIALS	
		DESCRIPTION	NSN/PART NUMBER
2	4	Spacer	313-1437-024
3	25	Insulation Sleeving (install in figure D-110)	5970-00-812-2974
4	4	Screw	5305-00-928-9021
8	4	Washer	5310-00-880-5976
9	4	Nut	5310-00-934-9753

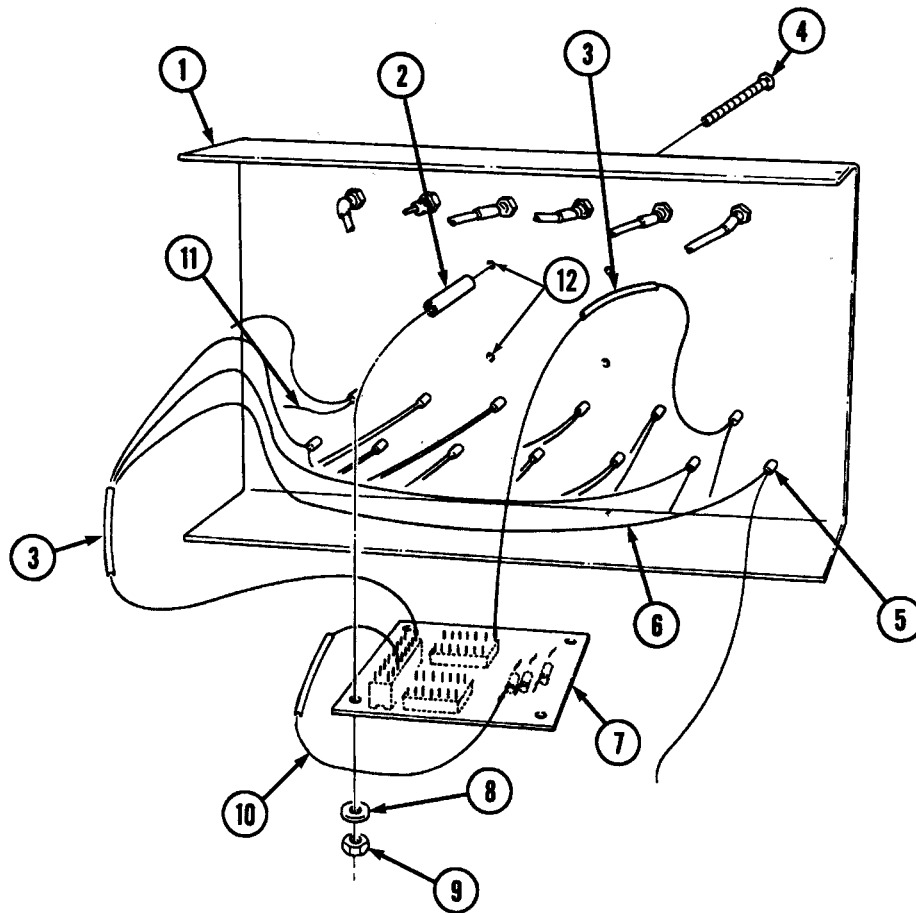


Figure D-113. Test Module Assembly (Cont'd).

INSTRUCTIONS (CONT'D):

31. Place electrical insulation sleeving (3) over wire (10) marked 1 on plug connector.
32. Place twenty-four sections of insulation sleeving (3) over connected wires (6) and (11) on LEDs (5) and heat-shrink into position.
33. Install four screws (4) in mount holes (12) on mini-box top section (1) and position four spacers (2) and punch board (7) on screws (4) and secure with four washers (8) and nuts (9).

Section II. ILLUSTRATED MANUFACTURING INSTRUCTIONS (Cont'd)

MATERIAL BLOCK		
STOCK SIZE	DESCRIPTION	SPECIFICATION
14 AWG	WIRE ELECTRICAL	MIL-C-13486/1

ITEM NO.	REQ'D	MATERIALS	
		DESCRIPTION	NSN
1	2	Terminal Lug	5940-00-577-3807
2	1	Electrical Wire: 12 in.	6145-00-808-4849
7	1	Screw	5305-00-984-6210
8	1	Nut	5310-00-934-9758
11	1	Washer	5310-00-883-9384

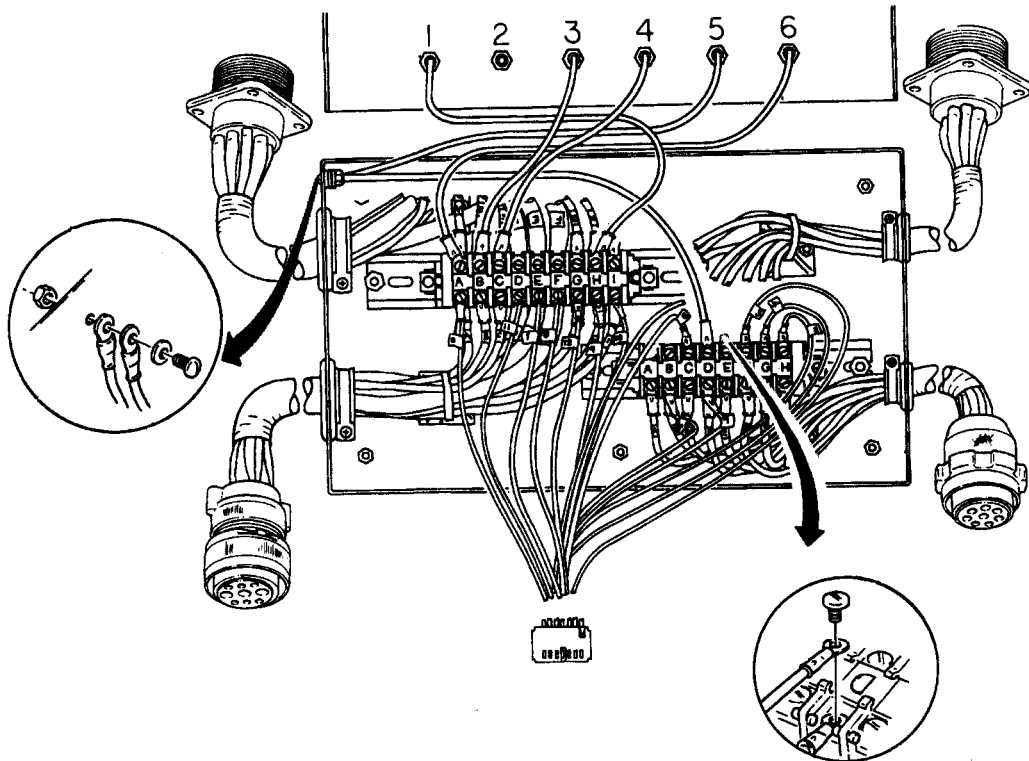
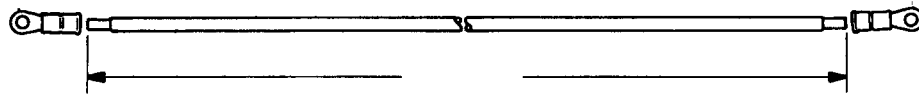


Figure D-113. Test Module Assembly (Cont'd).

Section II. ILLUSTRATED MANUFACTURING INSTRUCTIONS (Cont'd)

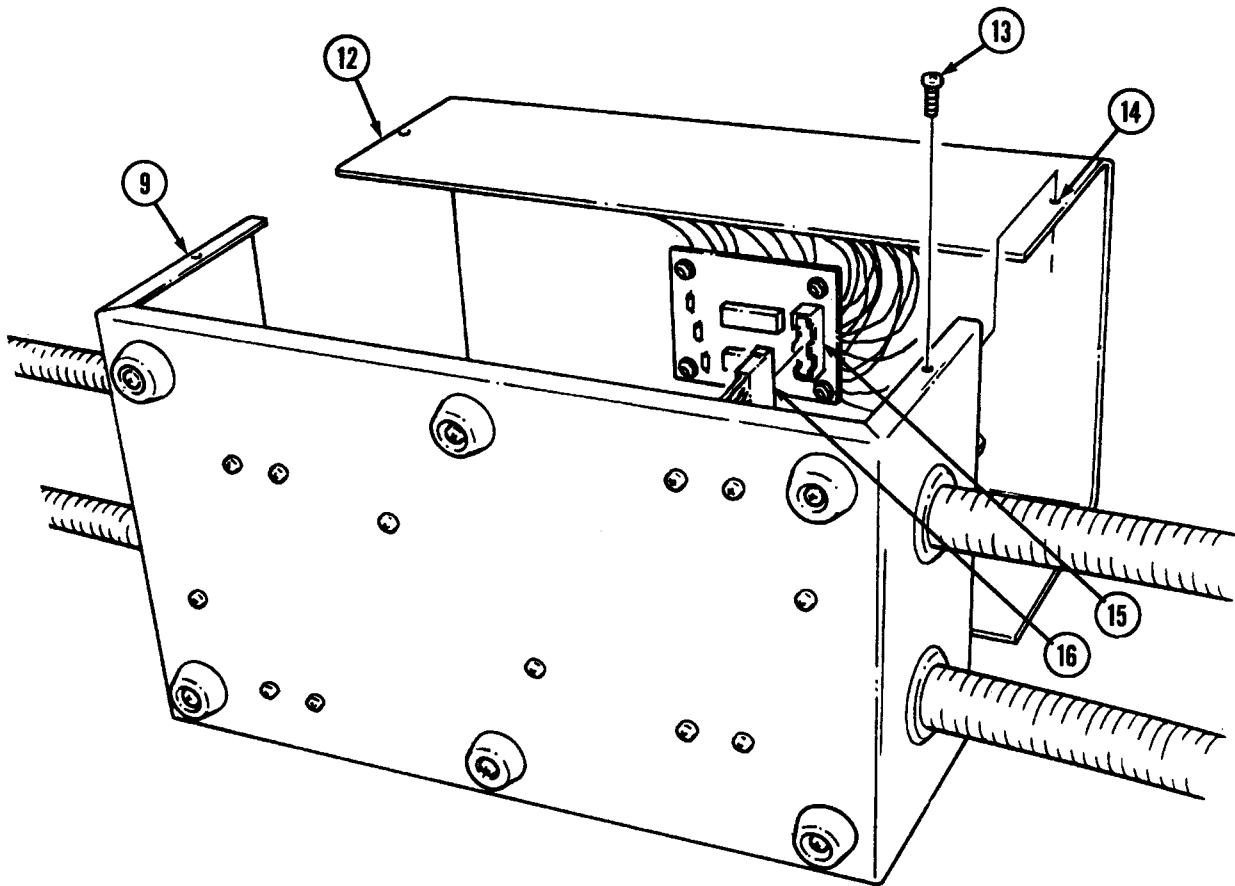


Figure D-113. Test Module Assembly (Cont'd).

INSTRUCTIONS (CONT'D):

34. Cut electrical wire (2) to length as shown.
35. Connect two terminal lugs (1) on wire (2).
36. Install wire (2) and tip jack lead (3) marked 5 on mount hole (10) on mini-box bottom section (9) with washer (11), screw (7), and nut (8).
37. Connect wire (2) to terminal strip (4) marked D with screw (5).
38. Connect tip jack lead (3) marked 1 to terminal strip (6) marked H with screw (5).
39. Connect tip jack lead (3) marked 3 to terminal strip (6) marked B with screw (5).
40. Connect tip jack lead (3) marked 4 to terminal strip (6) marked C with screw (5).
41. Connect tip jack lead (3) marked 6 to terminal strip (6) marked A with screw (5).
42. Using existing drive pin, punch out four screw mount holes (14) in mini-box top section (12).
43. Install plug (16) and connector (15) as shown.
44. Install mini-box top (12) on bottom section (9) with four existing screws (13).

Section II. ILLUSTRATED MANUFACTURING INSTRUCTIONS (Cont'd)

MATERIAL BLOCK		
STOCK SIZE	DESCRIPTION	SPECIFICATION
39.00 IN. MINIMUM	CLOTH, COATED PLASTIC, VINYL BOTH SIDES	11 TYPE AND 2 CLASS

GREEN RUBBER CANVAS		
PART NO.	CUT LENGTH (INCHES)	MANUFACTURED FROM NSN
8434398	2 at 3X12 4 at 4X15 2 at 36X6	8305-00-616-0022

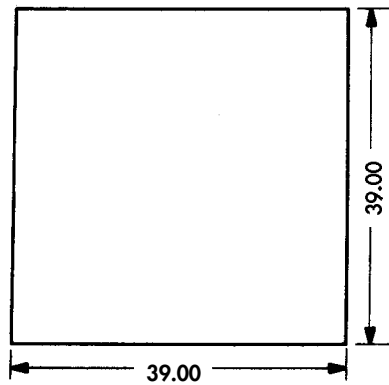
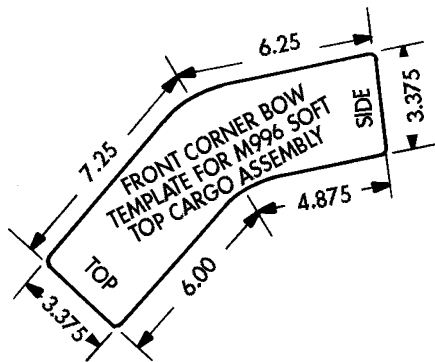


Figure D-114. Green Rubber Canvas Straps.

INSTRUCTIONS:

1. Cut canvas, NSN 8305-00-616-0022, into eight reinforcement straps for lengths shown.
2. Secure six grommets, NSN 5325-00-281-8643, and six stud turn buttons, NSN 5325-00-930-7607, to canvas straps using twelve clinch plate turn buttons, NSN 5325-00-371-8108.

Section II. ILLUSTRATED MANUFACTURING INSTRUCTIONS (Cont'd)

MATERIAL BLOCK		
STOCK SIZE	DESCRIPTION	SPECIFICATION
0.188 IN. THICK	STRIP, METAL	ASTM-A569

HEX WRENCH		
PART NO.	CUT LENGTH (INCHES)	MANUFACTURED FROM NSN
N/A	as shown	9515-00-814-7316

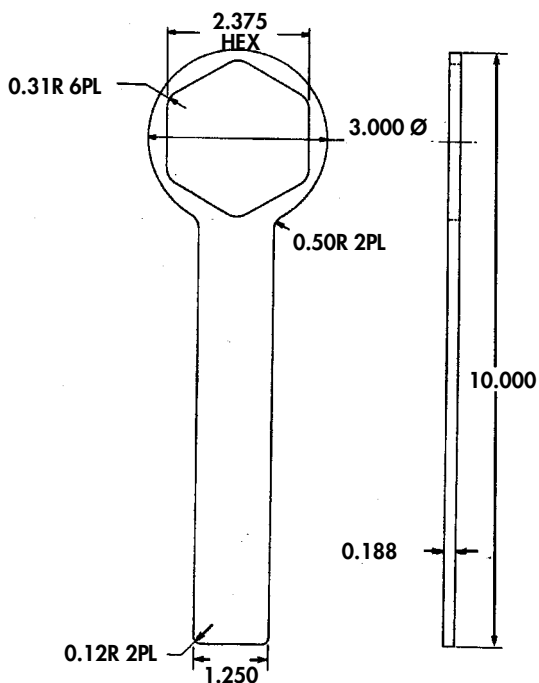


Figure D-115. Hex Wrench.

INSTRUCTIONS:

1. Cut piece of steel sheet metal to size as shown.
2. Remove all burrs and sharp edges.

Section II. ILLUSTRATED MANUFACTURING INSTRUCTIONS (Cont'd)

MATERIAL BLOCK		
STOCK SIZE	DESCRIPTION	SPECIFICATION
0.700 IN. THICK	ALUMINUM ALLOY	N/A

SHEET		
PART NO.	CUT LENGTH (INCHES)	MANUFACTURED FROM NSN
N/A	as shown	9530-00-226-0380

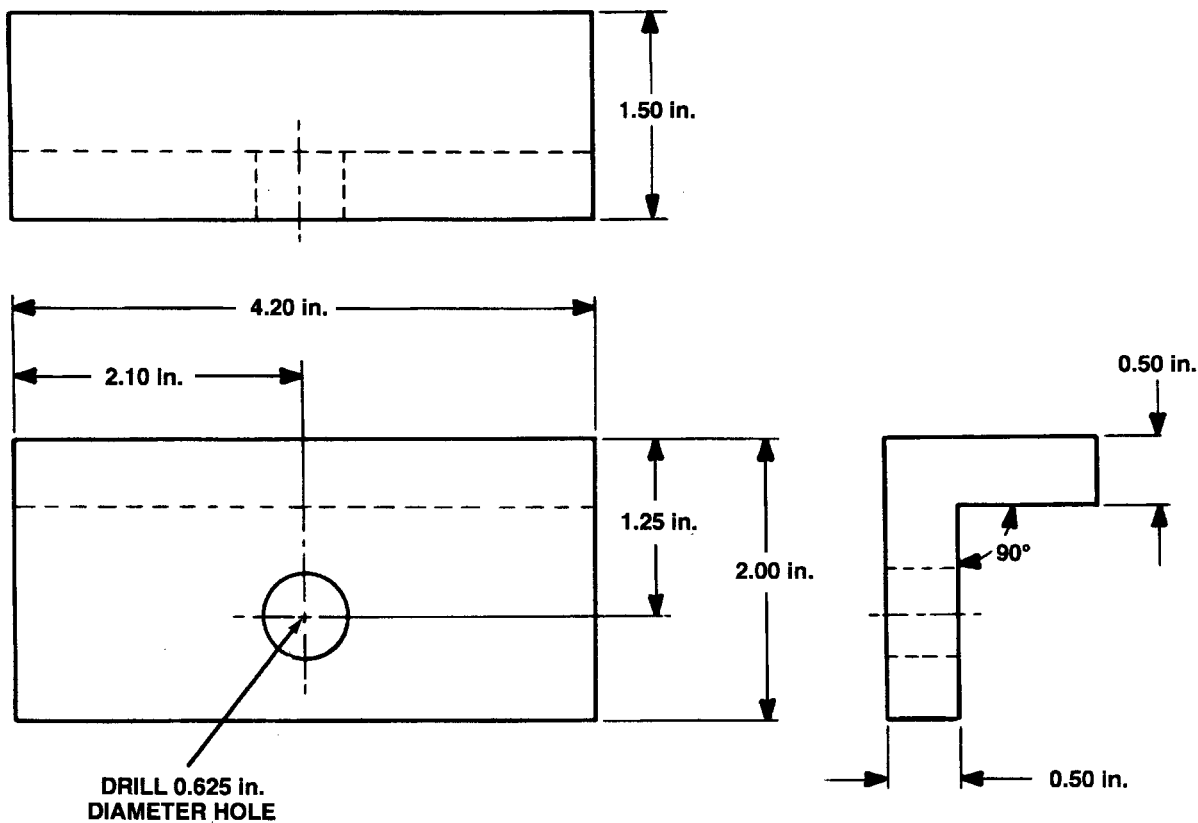


Figure D-117. Fixture Fabrication.

INSTRUCTIONS:

1. Fabricate fixture according to dimensions as shown.
2. Remove all burrs and sharp edges.

Section II. ILLUSTRATED MANUFACTURING INSTRUCTIONS (Cont'd)

MATERIAL BLOCK		
STOCK SIZE	DESCRIPTION	SPECIFICATION
N/A	BAR, METAL	ASTM A108

SHEET		
PART NO.	CUT LENGTH (INCHES)	MANUFACTURED FROM NSN
N/A	as shown	9510-00-229-4822

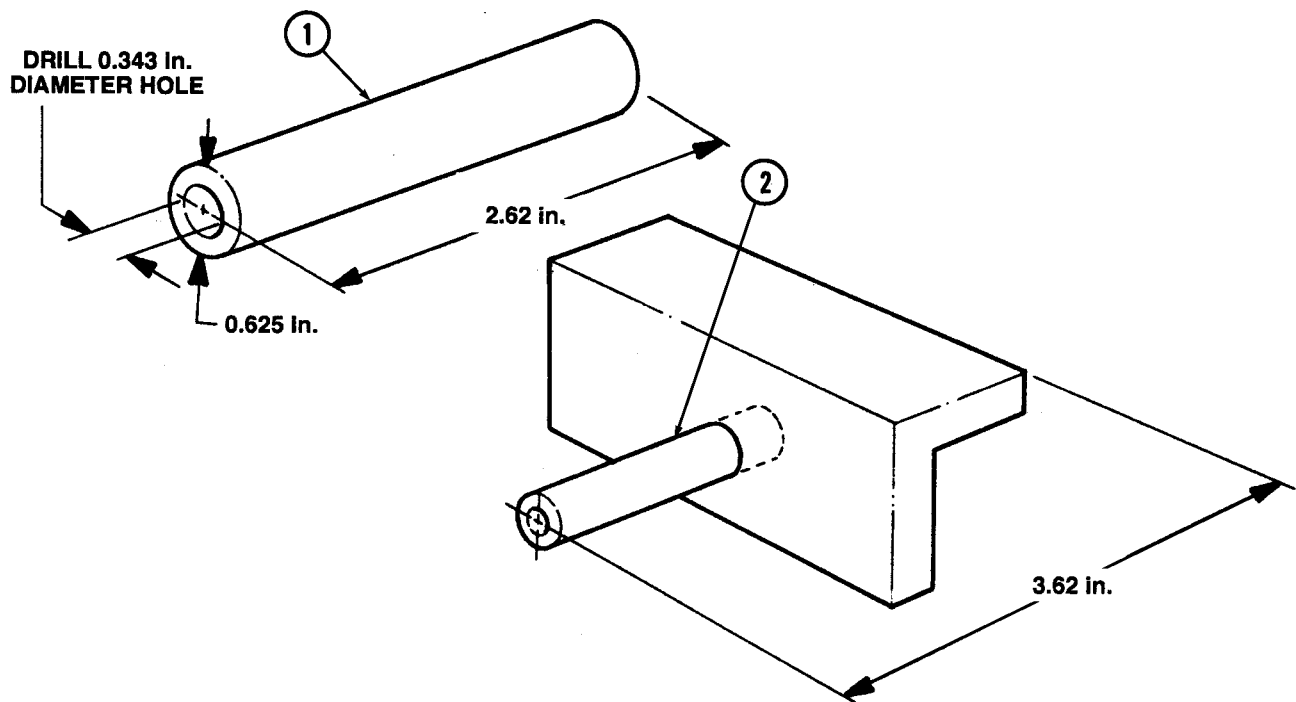


Figure D-118. Bushing Fabrication.

INSTRUCTIONS:

1. Using NSN 9510-00-229-4822 metal bar, fabricate bushing (1) as shown.
2. Remove all burrs and sharp edges.
3. Press bushing (1) into fixture hole (2) (fixture fabricated in figure D-117).

Section II. ILLUSTRATED MANUFACTURING INSTRUCTIONS (Cont'd)

MATERIAL BLOCK		
STOCK SIZE	DESCRIPTION	SPECIFICATION
0.375 IN. INSIDE DIAMETER 0.625 IN. OUTSIDE DIAMETER	HOSE, WIRE BRAIDED	N/A

ITEM NO.	REQ'D	MATERIALS	
		DESCRIPTION	NSN
	AR	Sealing Compound	8030-01-054-0740
1	1	Adapter, Straight Swivel	4730-00-547-0941
2	1	Adapter, Straight	4730-01-309-0949
3	2	Clamp, Hose	4730-00-024-3971
5	1	Adapter, Straight	4730-00-140-3770
6	1	Coupling, Pipe	4730-01-071-2859
7	1	Nipple, Pipe	4730-00-193-2709

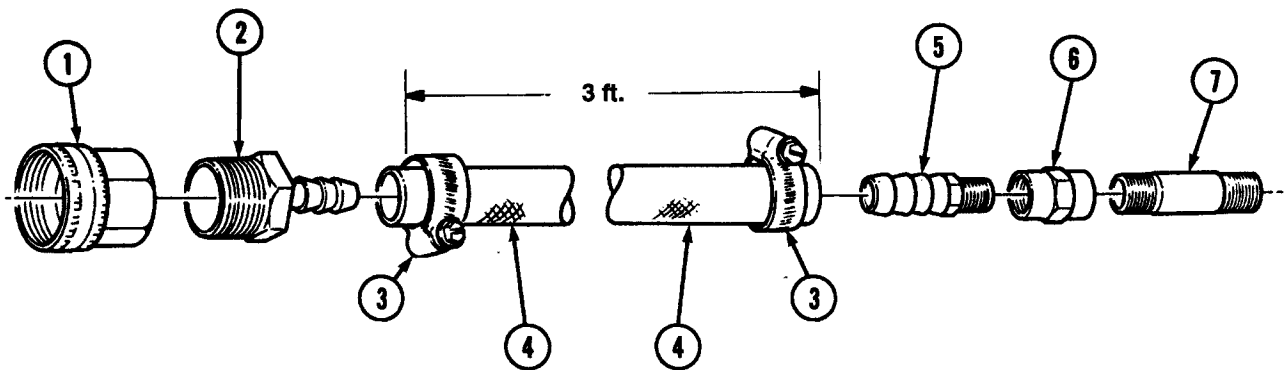


Figure D-119. Hose.

INSTRUCTIONS:

NOTE

Do not apply sealing compound to first two threads of straight adapter.

1. Connect clamp (3), straight adapter (2), and straight swivel adapter (1) to hose (4). Tighten clamp (3).
2. Connect clamp (3), straight adapter (5), pipe coupling (6), and pipe nipple (7) to hose (4). Tighten clamp (3).

Section II. ILLUSTRATED MANUFACTURING INSTRUCTIONS (Cont'd)

MATERIAL BLOCK		
STOCK SIZE	DESCRIPTION	SPECIFICATION
0.125 X 2.57 X 3.50 IN.	ALUMINUM FLAT SHEET	IAW ASTM B 209
0.125 X 0.75 X 24.0 IN.	ALUMINUM RECTANGLE	IAW ASTM B 211

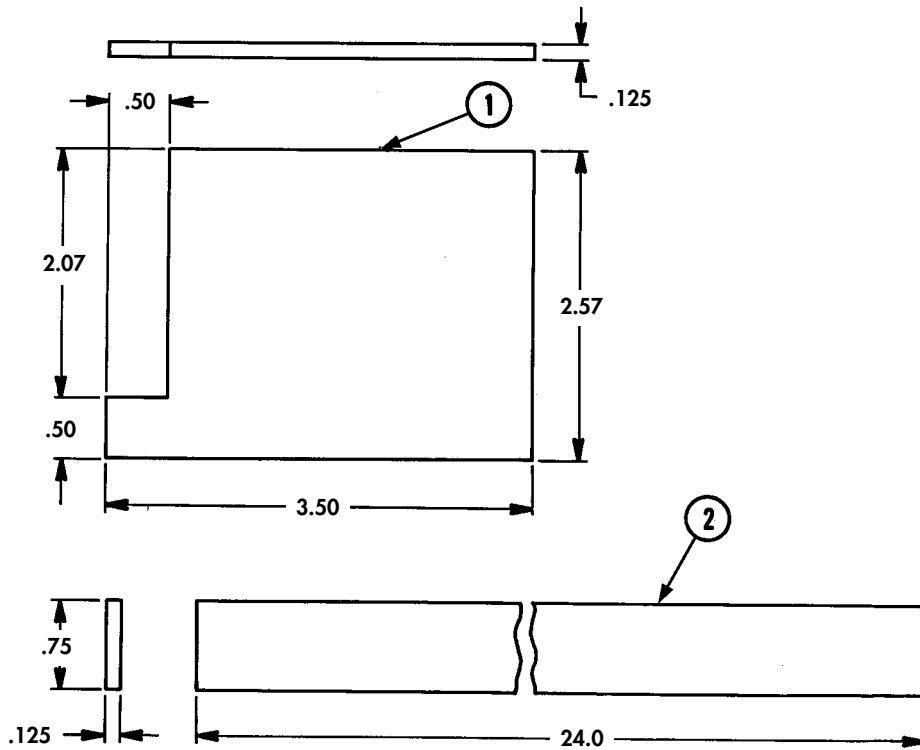


Figure D-120. Pulley Alignment Tool Fabrication.

INSTRUCTIONS:

NOTE

- Remove all burrs and sharp edges from aluminum sheet and rectangle.
- Pulley alignment tool can be assembled using nuts, bolts, rivets, or by welding.

1. Cut aluminum sheet (1) to size as shown.
2. Position aluminum rectangle (2) on top of aluminum sheet (1) as shown in figure D-130.

NOTE

Check all measurements before welding, riveting, or bolting pulley alignment tool together.

3. Assemble pulley alignment tool as shown in figure D-130.

Section II. ILLUSTRATED MANUFACTURING INSTRUCTIONS (Cont'd)

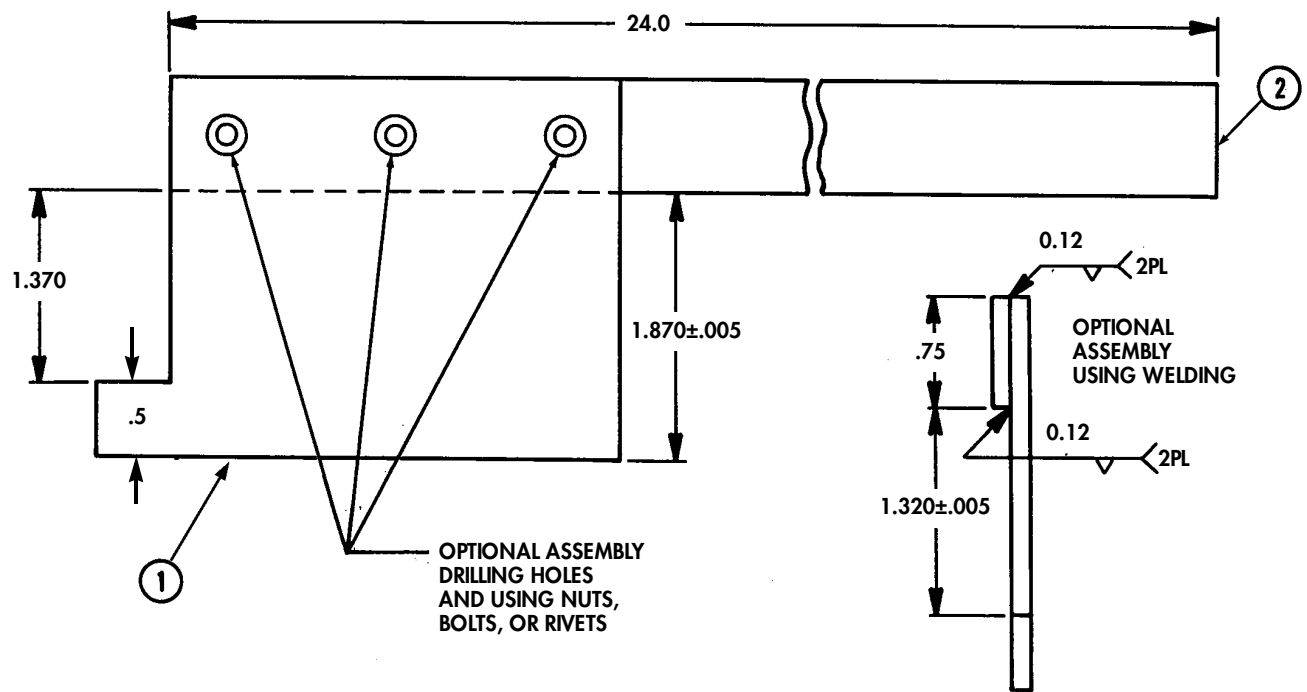


Figure D-120. Pulley Alignment Tool Fabrication (Cont'd).

MATERIAL BLOCK		
STOCK SIZE	DESCRIPTION	SPECIFICATION
18 AWG	WIRE, ELECTRICAL (WITH INSULATION)	MIL-C-13486

ITEM NO.	REQ'D	MATERIALS	
		DESCRIPTION	NSN/PART NUMBER
1	1	Terminal Lug	5940-00-113-8184
2	1	Terminal Lug	5940-00-504-4703
3	1	Electrical Wire: 9.7 in.	6145-00-570-0516

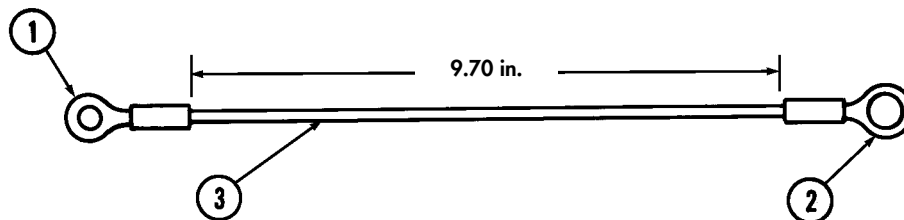


Figure D-121. Grounding Jumper Wire.

INSTRUCTIONS:

1. Cut a electrical wire (3) to length as shown.
2. Install terminal lugs (1) and (2) as shown.

APPENDIX E TORQUE LIMITS

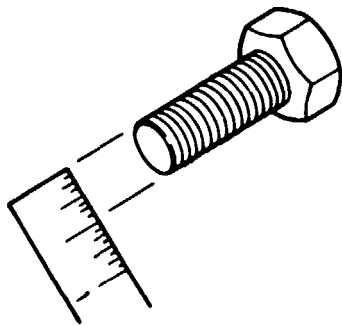
E-1. GENERAL

This section provides general torque limits for screws used on the M998 series vehicles. Special torque limits are indicated in the maintenance procedures for applicable components. The general torque limits given in this appendix shall be used when specific torque limits are not indicated in the maintenance procedure. Unless otherwise specified, standard torque tolerance shall be $\pm 10\%$. These general torque limits cannot be applied to screws that retain rubber components. The rubber components will be damaged before the correct torque limit is reached. If a special torque limit is not given in the maintenance instructions, tighten the screw or nut until it touches the metal bracket, then tighten it one more turn.

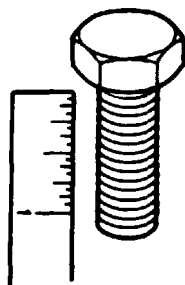
E-2. TORQUE LIMITS

Table E-1 lists dry torque limits. Dry torque limits are used on screws that do not have lubricants applied to the threads. Table E-2 lists wet torque limits. Wet torque limits are used on screws that have high pressure lubricants applied to the threads.

E-3. HOW TO USE TORQUE TABLE



a. Measure the diameter of the screw you are installing.



b. Count the number of threads per inch.

- c. Under the heading **SIZE**, look down the left-hand column until you find the diameter of the screw you are installing (there will usually be two lines beginning with the same size).
- d. In the second column under **SIZE**, find the number of threads per inch that matches the number of threads you counted in step b.

CAPSCREW HEAD MARKINGS

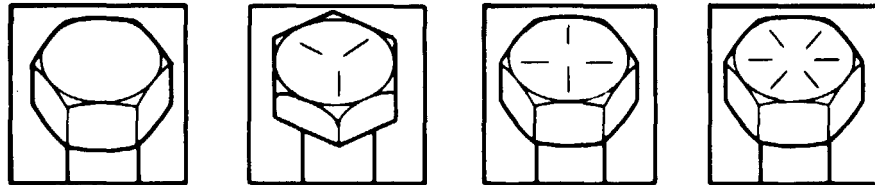
Manufacturer's marks may vary.
These are all SAE Grade 5
(3-line).



- e. To find the grade screw you are installing, match the markings on the head to the correct picture of **CAPSCREW HEAD MARKINGS** on the torque table.
- f. Look down the column under the picture you found in step e. until you find the torque limit (in lb-ft or NŹm) for the diameter and threads per inch of the screw you are installing.

Table E-1. Torque Limits for Dry Fasteners

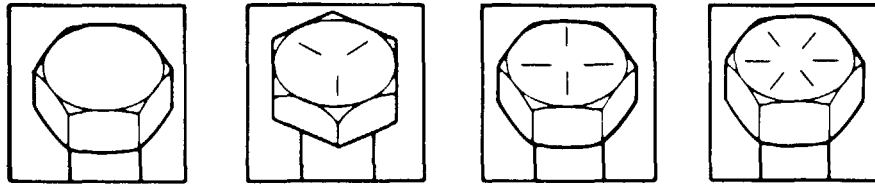
CAPSCREW HEAD MARKINGS



SIZE			TORQUE							
			SAE GRADE NO. 1 or 2		SAE GRADE NO. 5		SAE GRADE NO. 6 or 7		SAE GRADE NO. 8	
DIA. INCHES	THREADS PER INCH	MILLIMETERS	POUND FEET	NEWTON METERS	POUND FEET	NEWTON METERS	POUND FEET	NEWTON METERS	POUND FEET	NEWTON METERS
1/4	20	6.35	5	6.78	8	10.85	10	13.56	12	16.27
1/4	28	6.35	6	8.14	10	13.56	-	-	14	18.98
5/16	18	7.94	11	14.92	17	23.05	19	25.76	24	32.52
5/16	24	7.94	13	17.63	19	25.76	-	-	27	36.61
3/8	16	9.53	18	24.41	31	42.04	34	46.10	44	59.66
3/8	24	9.53	20	27.12	35	47.46	-	-	49	66.44
7/16	14	11.11	28	37.97	49	66.44	55	74.58	70	94.92
7/16	20	-	30	40.68	55	74.58	-	-	78	105.77
1/2	13	12.70	39	52.88	75	101.70	85	115.26	105	142.38
1/2	20	-	41	55.60	85	115.26	-	-	120	162.72
9/16	12	14.29	51	69.16	110	149.16	120	162.72	155	210.18
9/16	18	-	55	74.58	120	162.72	-	-	170	230.52
5/8	11	15.88	63	85.43	150	203.40	167	226.45	210	284.76
5/8	18	-	95	128.82	170	230.52	-	-	240	325.44
3/4	10	19.05	105	142.38	270	366.12	280	379.68	375	508.50
3/4	16	-	115	155.94	295	400.02	-	-	420	569.52
7/8	9	22.23	160	216.96	395	535.62	440	596.64	605	820.38
7/8	14	-	175	237.30	435	589.86	-	-	675	915.30
1	8	25.40	235	318.66	590	800.04	660	894.96	910	1233.96
1	14	-	250	339.00	660	894.96	-	-	990	1342.44
1-1/8	-	25.58	-	-	800- 880	1084.8- 1193.3	-	-	1280- 1440	1735.7- 1952.8
1-1/4	-	31.75	-	-	-	-	-	-	1820- 2000	2467.9- 2712.0
1-3/8	-	34.93	-	-	1460- 1680	1979.8 2278.1	-	-	2380- 2720	3227.3- 3688.3
1-1/2	-	38.10	-	-	1940- 2200	2630.6- 2983.2	-	-	3160- 3560	4285.0- 4827.4

Table E-2. Torque Limits for Wet Fasteners

CAPSCREW HEAD MARKINGS



SIZE			TORQUE							
			SAE GRADE NO. 1 or 2		SAE GRADE NO. 5		SAE GRADE NO. 6 or 7		SAE GRADE NO. 8	
DIA. INCHES	THREADS PER INCH	MILLIMETERS	POUND FEET	NEWTON METERS	POUND FEET	NEWTON METERS	POUND FEET	NEWTON METERS	POUND FEET	NEWTON METERS
1/4	20	6.35	4.5	6.10	7.2	9.76	9.0	12.20	10.8	14.64
1/4	28	6.35	5.4	7.33	9.0	12.20	-	-	12.6	17.08
5/16	18	7.94	9.9	13.43	15.3	20.75	17.1	23.18	21.6	29.27
5/16	24	7.94	11.7	15.87	17.1	23.18	-	-	24.3	32.95
3/8	16	9.53	16.2	21.97	27.9	37.84	30.6	41.49	39.6	53.69
3/8	24	9.53	18.0	24.41	31.5	42.71	-	-	44.1	59.80
7/16	14	11.11	25.2	34.17	44.1	59.80	49.5	67.12	63.0	85.42
7/16	20	-	27.0	36.61	49.5	67.12	-	-	70.2	95.19
1/2	13	12.70	35.1	47.59	67.5	91.53	76.5	103.73	94.5	128.14
1/2	20	-	36.9	50.04	76.5	103.73	-	-	108.0	146.45
9/16	12	14.29	45.9	62.24	99.0	134.24	108.0	146.45	139.5	189.16
9/16	18	-	49.5	67.12	108.0	146.45	-	-	153.0	207.47
5/8	11	15.88	56.7	76.89	135.0	183.06	150.3	203.80	189.0	256.28
5/8	18	-	85.5	115.94	153.0	207.47	-	-	216.0	296.90
3/4	10	19.05	94.5	128.14	243.0	329.51	252.0	341.71	337.5	457.65
3/4	16	-	103.5	140.35	265.5	360.02	-	-	378.0	536.87
7/8	9	22.23	144.0	195.26	355.5	482.06	396.0	536.98	544.5	738.34
7/8	14	-	157.5	213.57	391.5	530.87	-	-	607.5	823.77
1	8	25.40	211.5	286.79	531.0	720.04	594.0	805.46	819.0	1110.56
1	14	-	225.0	305.10	594.0	805.46	-	-	891.0	1208.20
1-1/8	-	25.58	-	-	720.0- 792.0	976.32- 1073.97	-	-	1152.0- 1296.0	1562.13- 1757.52
1-1/4	-	31.75	-	-	-	-	-	-	1638- 1800	2221.11- 2440.80
1-3/8	-	34.93	-	-	1314.0- 1512.0	1781.82- 2050.29	-	-	2142.0- 2448.0	2904.57- 3319.47
1-1/2	-	38.10	-	-	1746.0- 1980.0	2367.54- 2684.88	-	-	2844.0- 3204.0	3856.5- 4344.66

APPENDIX E (Cont'd)

E-5. CONVERSION FORMULA

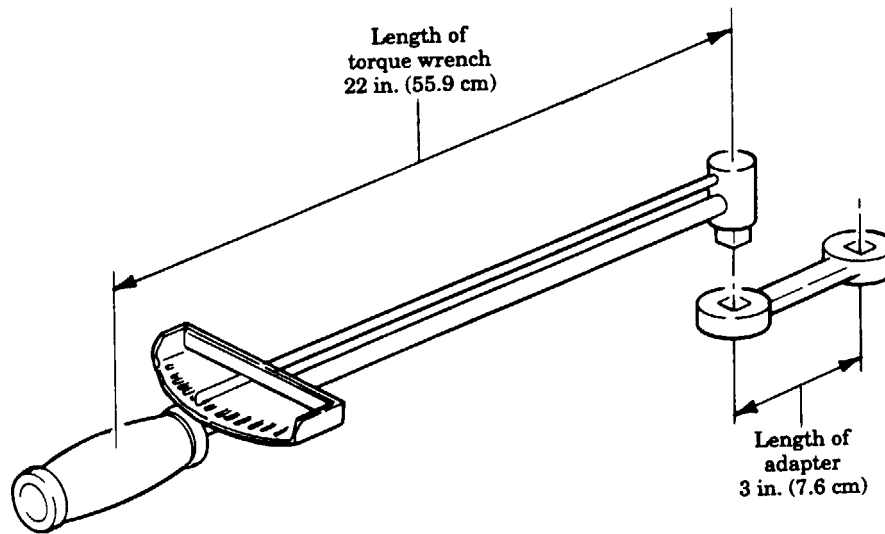
Corrected dial or scale readings are determined by the use of the following formula:

$$\text{Corrected reading} = \text{Required torque value} + \frac{\text{Length of torque wrench} + \text{Length of adapter}}{\text{Length of Torque Wrench}}$$

NOTE

The length of the torque wrench is measured from the center of the handle to the center of the drive. The length of the adapter is measured from the center of the drive to the center of the winch.

Example:



In this example, the torque wrench measures 22 in. (55.9 cm) and the adapter is 3 in. (7.6 cm). The required torque is 19 lb-ft (25.8 N·m).

$$\text{Corrected reading} = 19 \text{ lb-ft (25.8 N}\cdot\text{m)} + \frac{22 \text{ in. (55.9 cm)} + 3 \text{ in. (7.6 cm)}}{22 \text{ in. (55.9 cm)}}$$

$$\text{Corrected reading} = 19 \text{ lb-ft (25.8 N}\cdot\text{m)} + \frac{25 \text{ in. (63.5 cm)}}{22 \text{ in. (55.9 cm)}}$$

$$\text{Corrected reading} = 19 \text{ lb-ft (25.8 N}\cdot\text{m)} + 1.14$$

$$\text{Corrected reading} = 17 \text{ lb-ft (23.1 N}\cdot\text{m)}$$

APPENDIX F

WIRING DIAGRAMS AND SCHEMATIC

F-1. GENERAL

This appendix contains wiring diagrams of special vehicle equipment and an overall vehicle electrical system schematic you will need to maintain M998 series vehicles.

F-2. WIRING DIAGRAM AND SCHEMATIC INDEX

FIGURE NO.	TITLES	PAGE NO.
F-1	Winch Wiring Diagram	F-2
F-2	Arctic Winterization Kit Wiring Diagram	F-3
F-3	AN/GRC-160 Communications Kit Wiring Diagram	F-4
F-4	Slave Receptacle and TOW Harness Wiring Diagram	F-5
F-5	M1097, "A1", and "A2" Series Vehicles, Switch and Lamp Transfer Case Low Lock Indicator Wiring Diagram	F-6
F-6	M1097, "A1", and "A2" Series Vehicles, Auxiliary Power Supply Wiring Diagram	F-7
F-7	Siren and Warning Light Wiring Diagram	F-8
F-8	Glow Plug Control Functional Logic Diagram	F-9
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FO-1	Electrical System Wiring Diagram	FP-1
FO-2	Electrical System Wiring Diagram (M996 and M996A1)	FP-3
FO-3	Electrical System Wiring Diagram (M997 and M997A1)	FP-7
FO-4	Electrical System Wiring Diagram (M1025A2, M1035A2, M1043A2, and M1045A2)	FP-11
FO-5	Electrical System Wiring Diagram (M1097A2)	FP-13
FO-6	Electrical System Wiring Diagram (M997A2)	FP-15

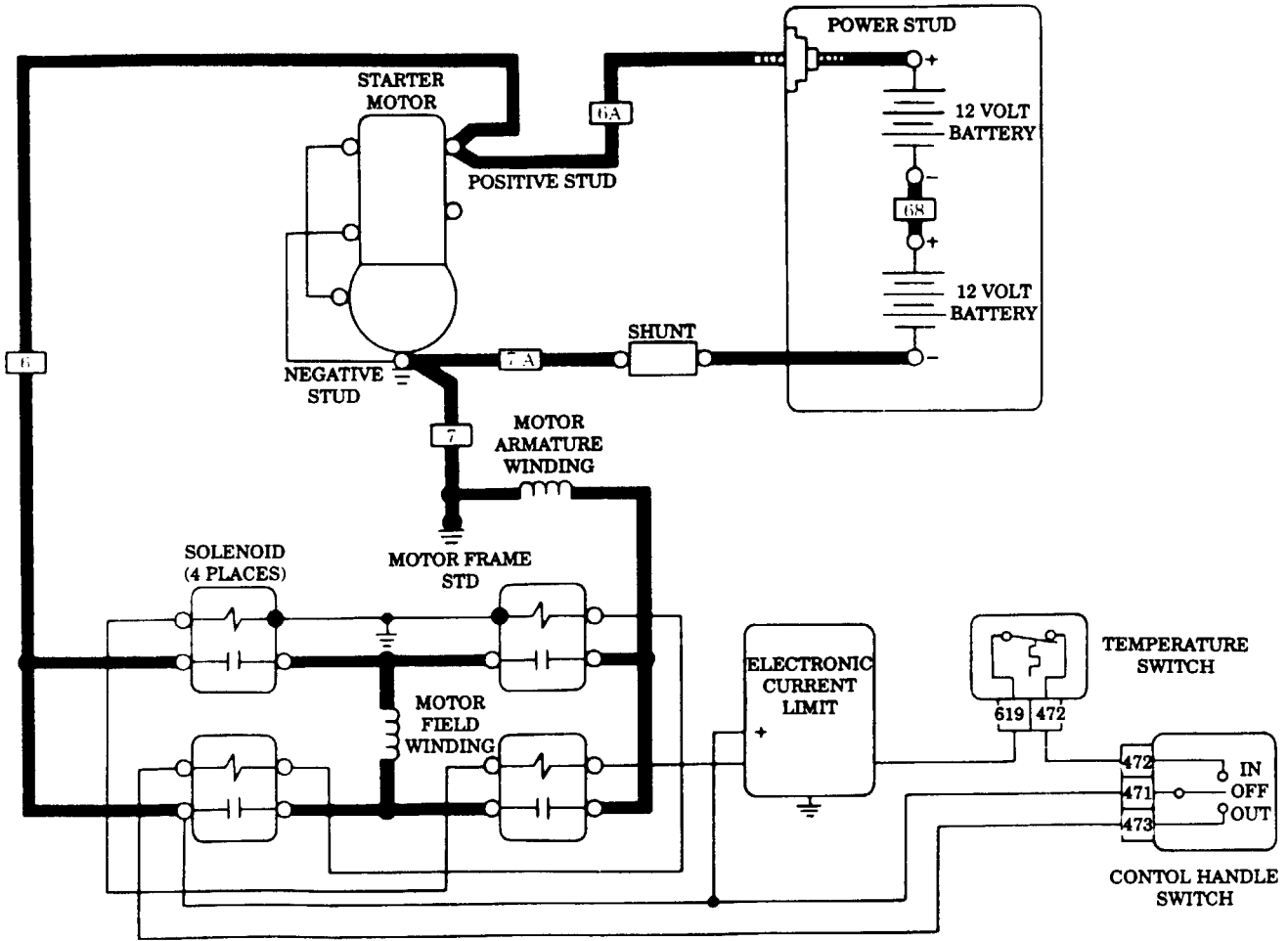


Figure 1. Winch Wiring Diagram.

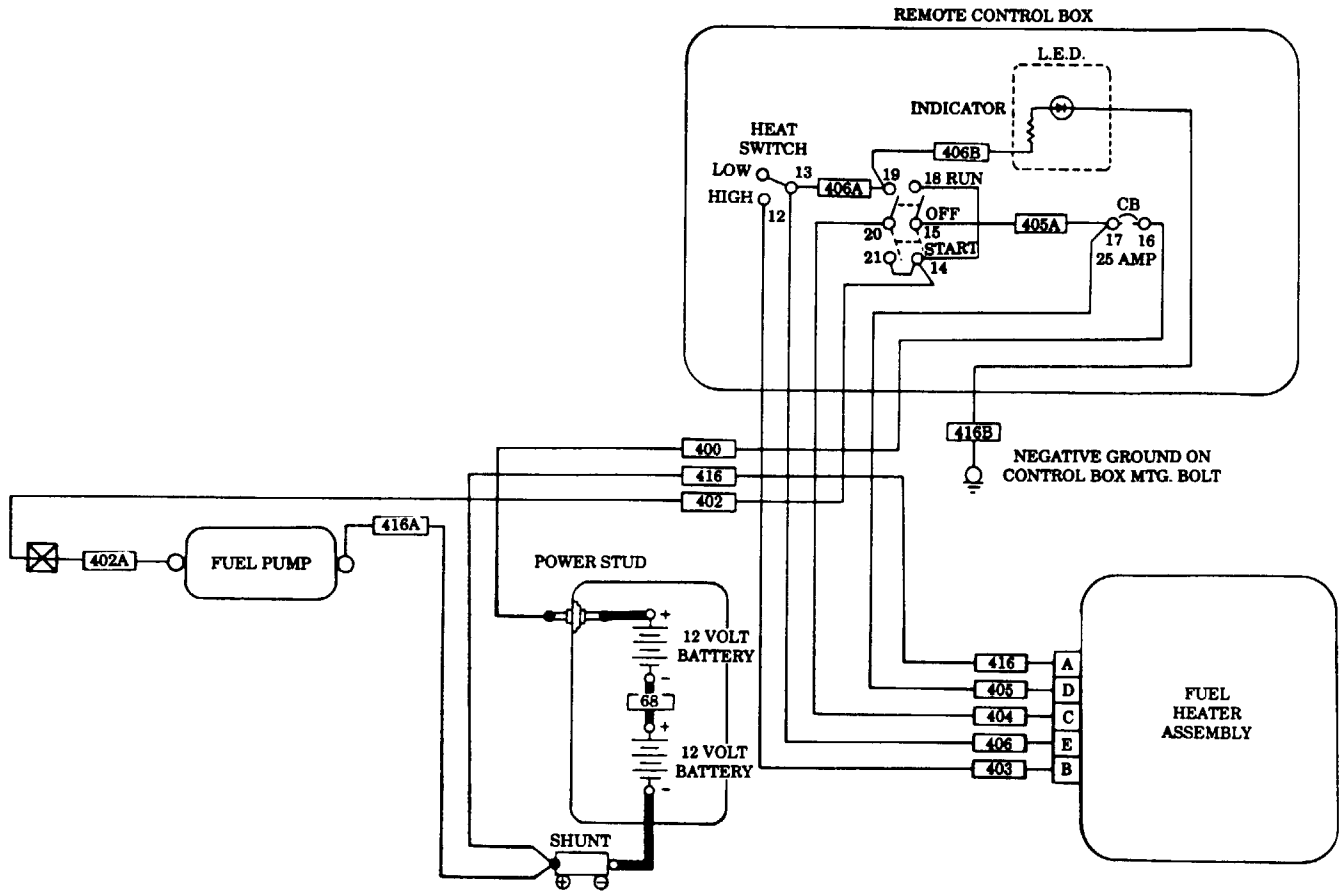


Figure 2. Arctic Winterization Kit Wiring Diagram.

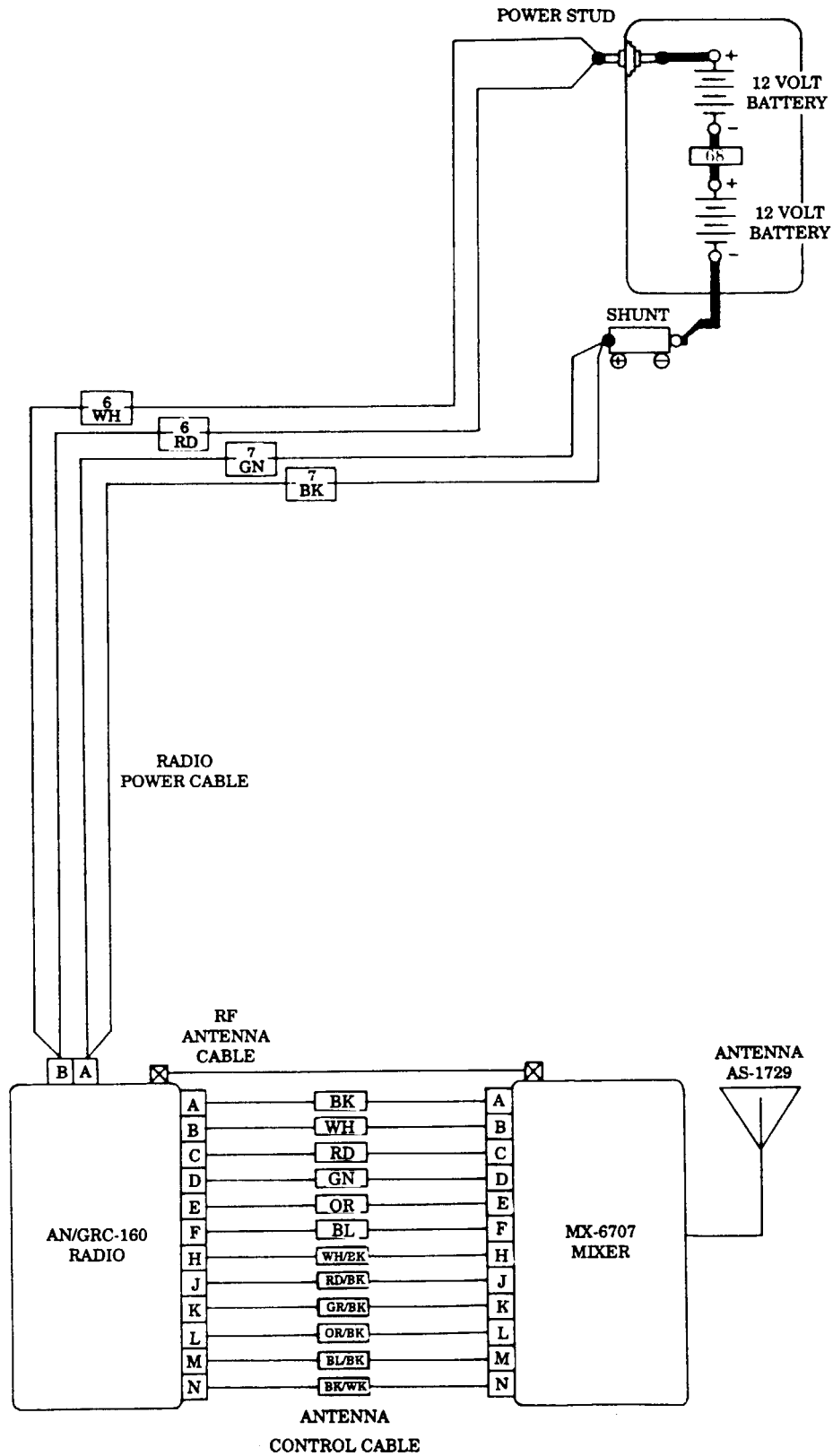


Figure 3. AN/GRC-160 Communications Kit Wiring Diagram.

The following applies to vehicles with serial number 100,000 and above and vehicles with kits 5705623 and 5705624 installed.

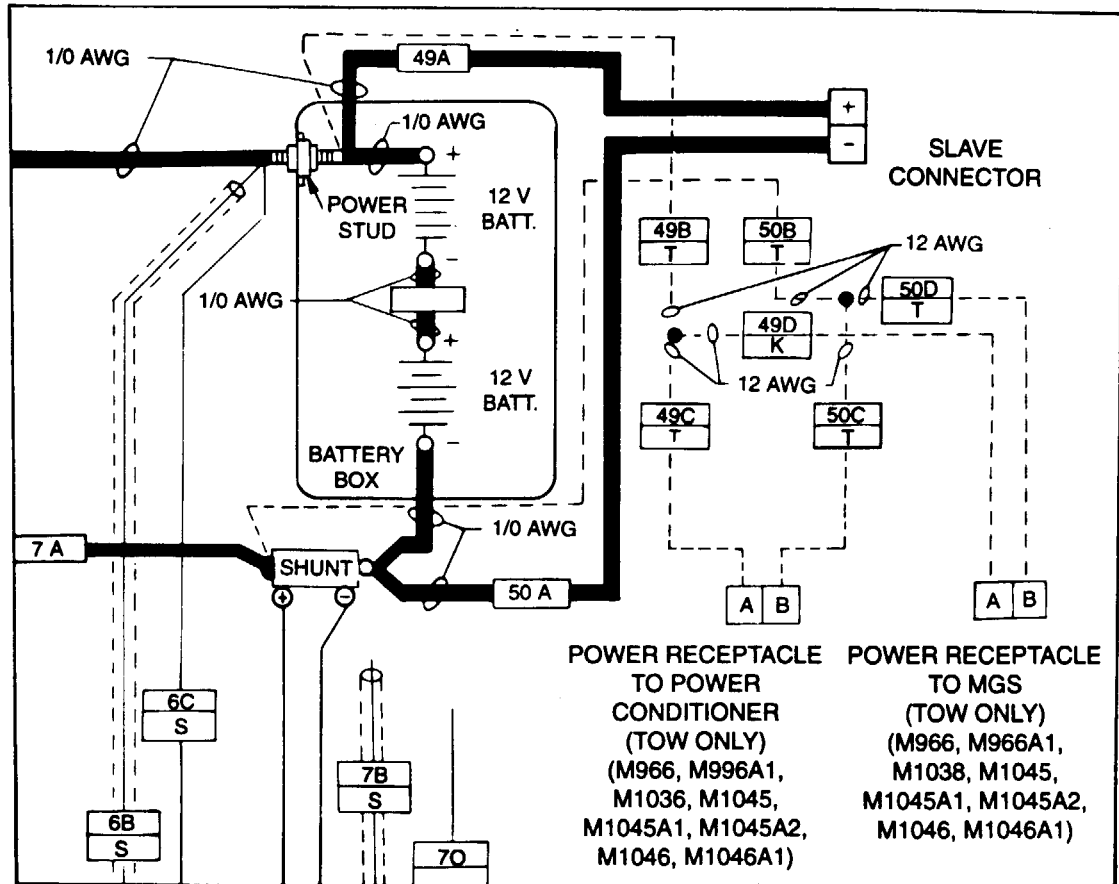


Figure 4. Slave Receptacle and TOW Harness Wiring Diagram.

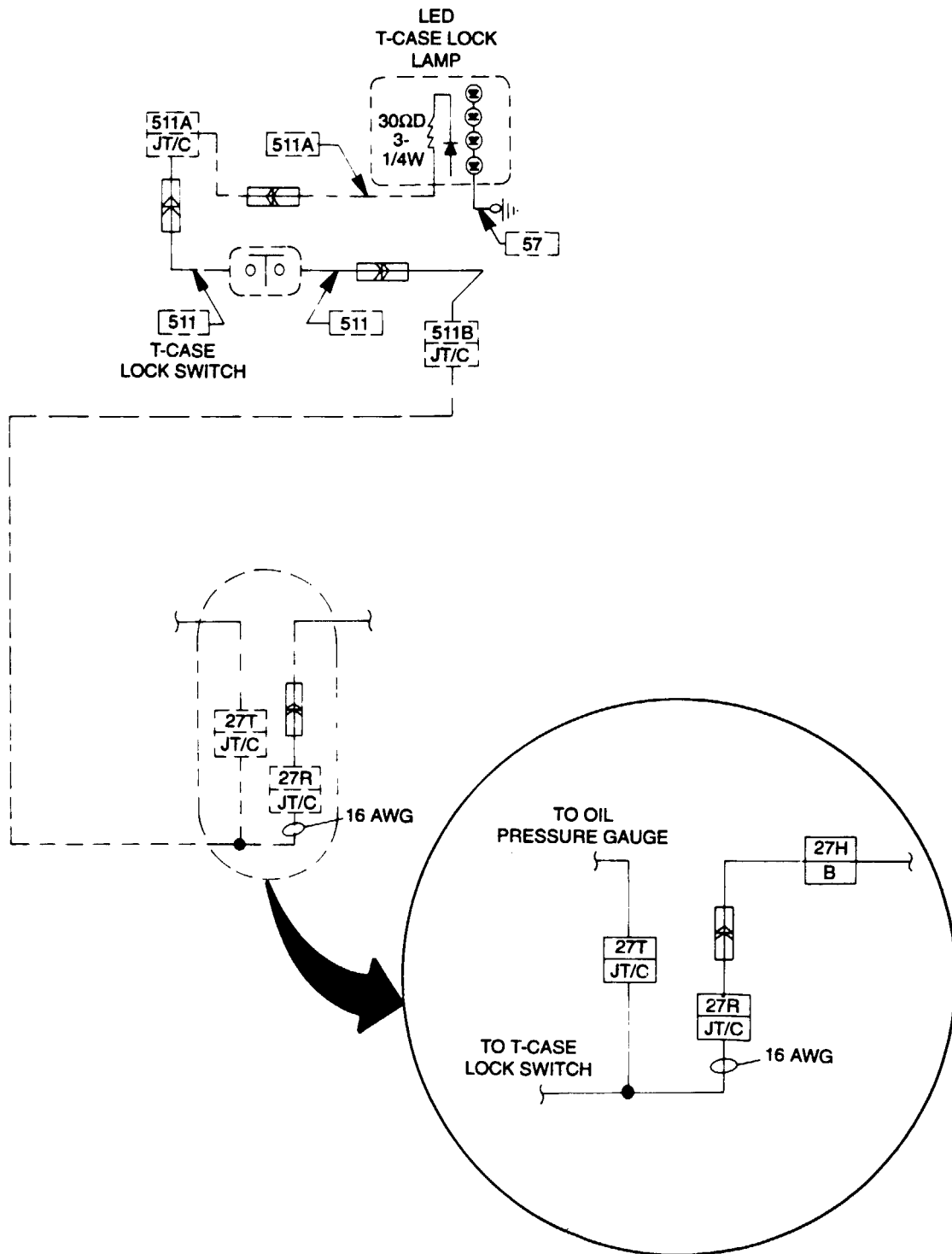


Figure F-5. M1097, "A1", and "A2" Series Vehicles, Switch and Lamp Transfer Case Low Lock Indicator Wiring Diagram.

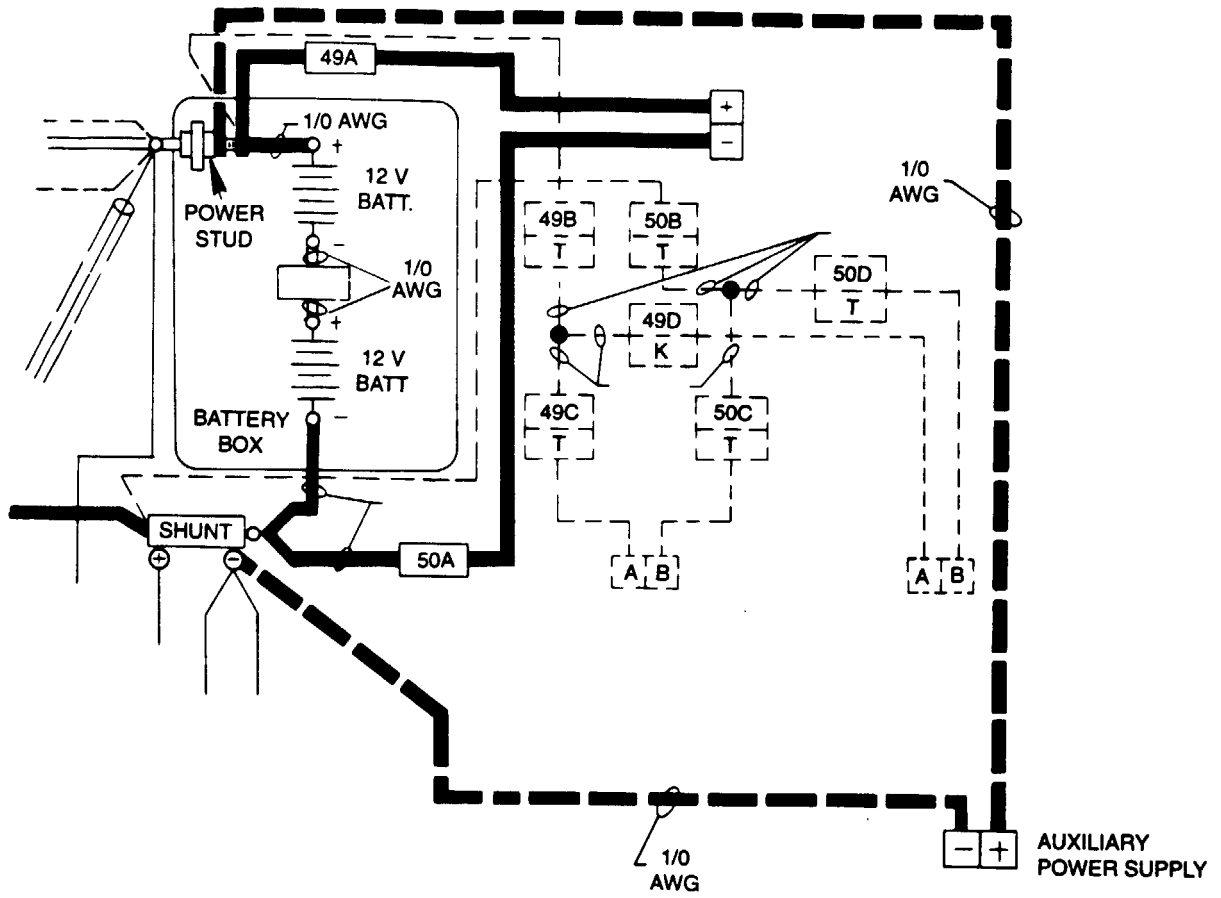


Figure F-6. M1097, "A1", and "A2" Series Vehicles, Auxiliary Power Supply Wiring Diagram.

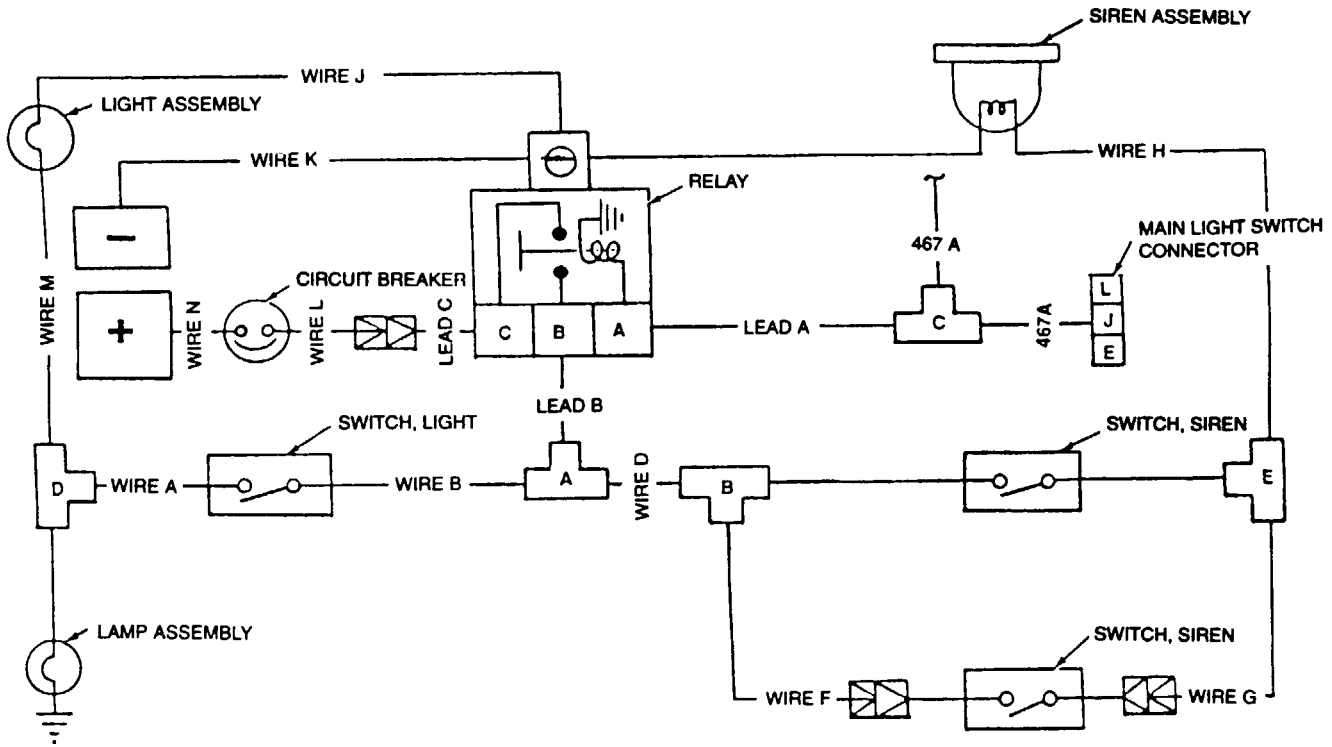


Figure F-7. Siren and Warning Light Wiring Diagram.

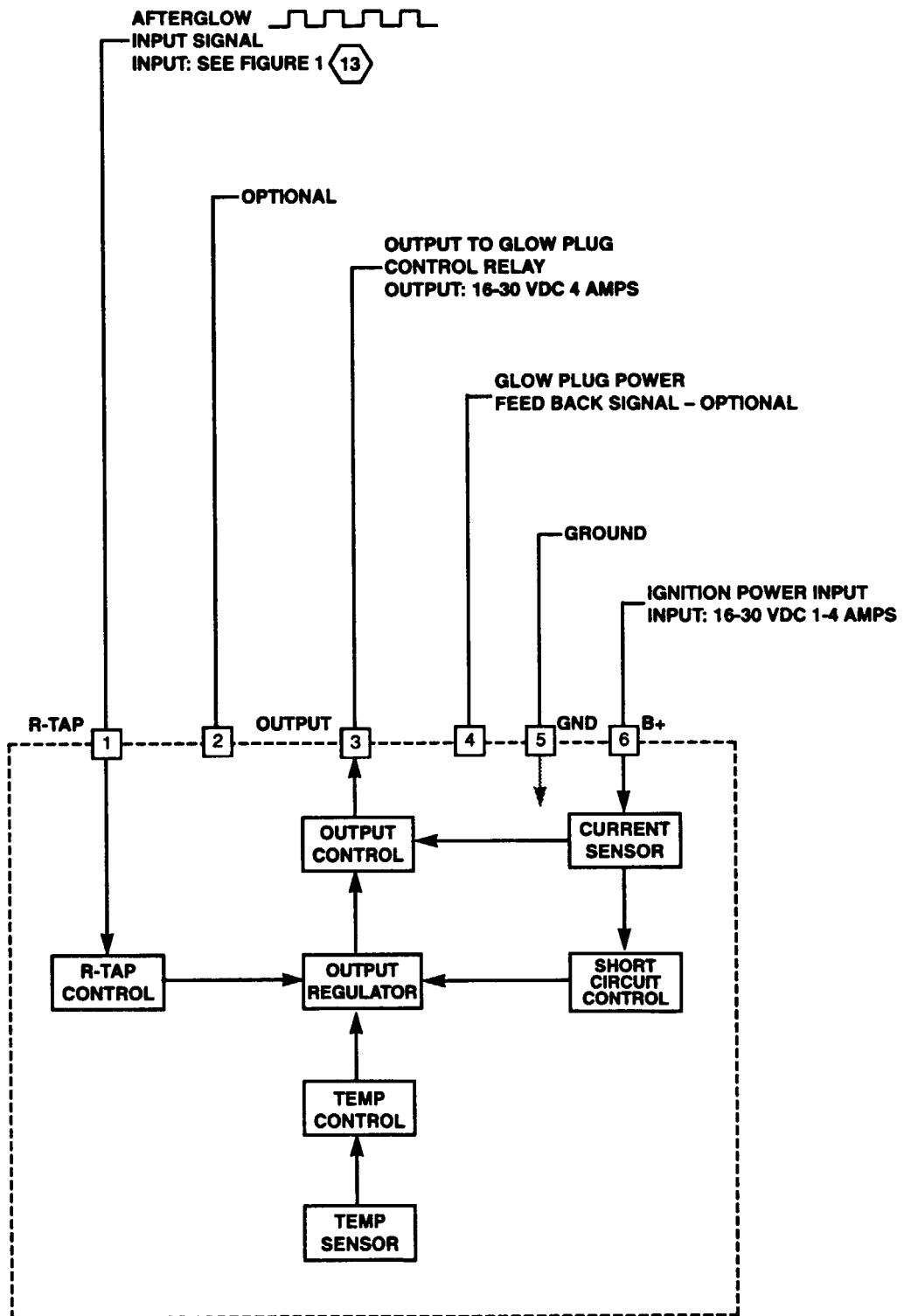


Figure F-8. Glow Plug Control Functional Logic Diagram.

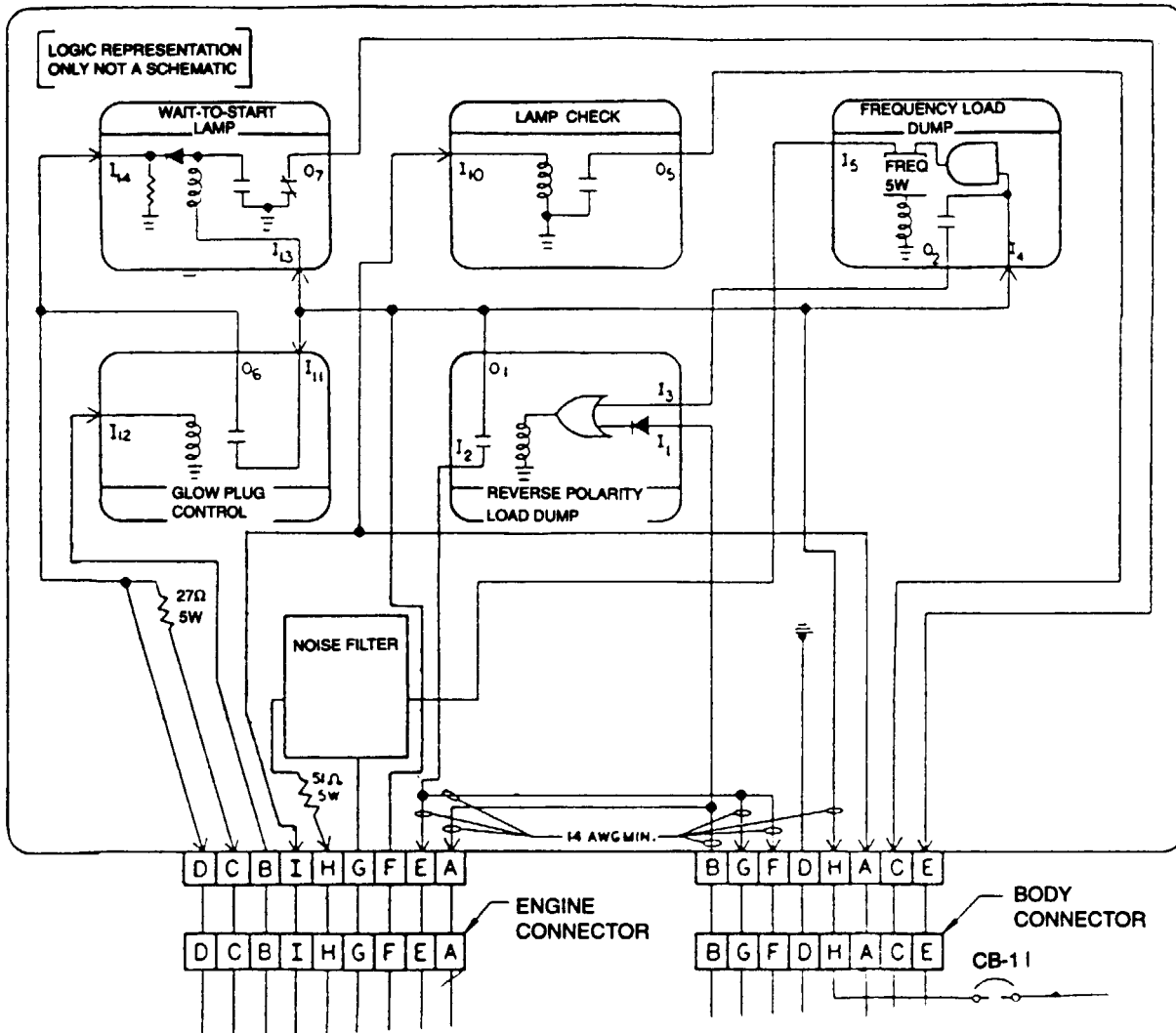


Figure F-9. Protective Control Box ("A2" Series Vehicles).

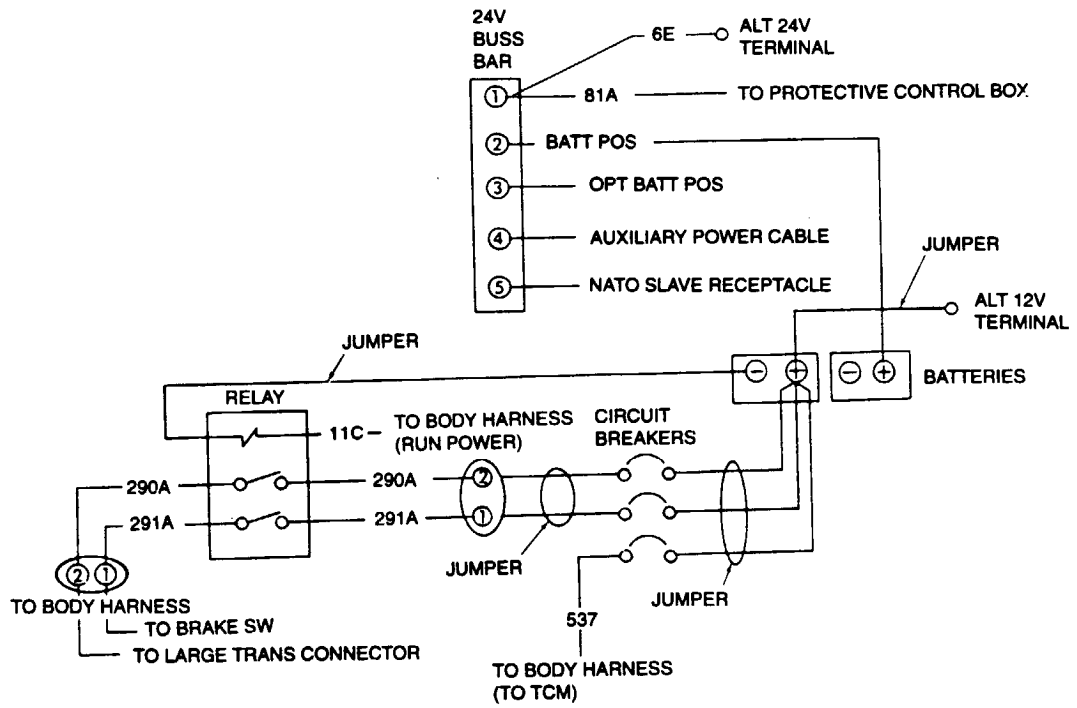


Figure F-10. Buss Bar & 12 Volt Transmission Power ("A2" Series Vehicles).

*Figure FO-1. Electrical System Wiring Diagram
(Located at Back of Manual).*

APPENDIX G

MANDATORY REPLACEMENT PARTS

Section I. INTRODUCTION

G-1. SCOPE

This appendix lists mandatory replacement parts you will need to maintain M998 series vehicles.

G-2. EXPLANATION OF COLUMNS

- a. **Column (1) - Item Number.** This number is assigned to each entry in the listing and is referenced in the “Initial Setup” of applicable tasks under the heading of “Materials/Parts”.
- b. **Column (2) - Nomenclature.** Name or identification of the part.
- c. **Column (3) - Part Number.** The manufacturer’s part number.
- d. **Column (4) - National Stock Number.** The national stock number of the part.

Section II. MANDATORY REPLACEMENT PARTS

(1) ITEM NO	(2) NOMENCLATURE	(3) PART NUMBER	(4) NATIONAL/NATO STOCK NUMBER
1	Access Cover Gasket	12338585	5330-01-194-0473
2	Balance Weights	5595966	6670-01-261-6844
3	Bearing, Sleeve	12L18F	3120-00-485-1017
4	Bolt	5597252	5306-01-264-3531
5	Bolt	12340845-3	5306-01-270-5448
6	Bolt	9423557	5306-01-360-1123
7	Boot Service Kit	287-0006 (fixed)	2530-01-191-8741
		5705606 (plunged)	2530-01-191-8740
		2880019 (fixed)	2530-01-394-6168
		M1097 and A1 series	
		57K2074 (plunged)	2530-01-394-3748
		2990054 A2 series (shaft, fixed L.H.)	2530-01-459-9493
		2990055 A2 series (shaft, fixed R.H.)	2530-01-459-9494
8	Button, Plug	12340258	5340-01-332-7599
9	Capscrew	160046	5305-00-068-0508
10	Clip	354-280308-00-0078	5325-01-197-3460
11	Cotter Pin	A-82-1	5315-00-839-2325
12	Cotter Pin	MS24665-283	5315-00-842-3044
13	Cotter Pin	MS24665-377	5315-00-285-7161
14	Cotter Pin	MS24665-355	5315-00-012-0123
15	Cotter Pin	PK379	5315-00-816-1794
16	Cotter Pin	MS24665-134	5315-00-839-5820
17	Cotter Pin	103384	5315-01-191-2611
18	Cotter Pin	MS24665-351	5315-00-839-5821
19	Cotter Pin	MS24665-319	5315-01-267-7570
20	Cotter Pin	MS24665-513	5315-00-239-8032
21	Cotter Pin	MS24665-423	5315-00-013-7228
22	Cotter Pin	MS24665-628	5315-00-846-0126
23	Cotter Pin	MS24665-298	5315-00-234-1861
24	Cotter Pin	MS24665-132	5315-00-839-2325
25	Cotter Pin	G121224	5315-01-206-7135

Section II. MANDATORY REPLACEMENT PARTS

(1) ITEM NO	(2) NOMENCLATURE	(3) PART NUMBER	(4) NATIONAL/NATO STOCK NUMBER
26	Cotter Pin	MS24665-208	5315-00-829-1480
27	Door Seal	R-451-N	5330-01-041-9721
28	Drive Screw	MS21318-47	5305-00-253-5626
29	Dust Cap	211121X	5340-01-188-1017
30	Fastener, Spring Tension	M36-0790-10	5325-01-257-0801
31	Filter Assembly	6437741	2940-01-121-6350
32	Filter Element Kit	A910044	4330-01-190-3579
33	Filter Element Kit	8684221	2520-01-398-4589
34	Filter, Particulate	197-54-692	4240-00-866-1825
35	Flat Washer	MS27183-20	5310-00-068-5285
36	Flat Washer	12447149	5310-01-465-9727
37	Flat Washer	12339052	5310-01-185-7214
38	Flat Washer	5582366	5310-01-189-8476
39	Flat Washer	5597347	5310-01-259-7554
40	Fuel Pump Gasket	1538769	5330-00-700-6868
40.1	Gasket	12341904	5330-01-298-8126
41	Gasket	12338382	5330-01-246-1822
42	Gasket	12338339	5330-01-200-0466
43	Gasket	12342104	5330-01-314-6781
44	Gasket	12342105	5330-01-315-1609
45	Gasket	7539072	5330-00-753-9072
46	Gasket	DC8226	5330-01-076-6172
47	Gasket	61-2028-01	5330-01-218-1196
48	Gasket	8655625	5330-01-148-7492
49	Gasket	12341487	5330-01-272-7471
50	Gasket	5574856	5330-01-194-0472
51	Gasket	10137488	5330-01-149-0874
52	Gasket	12356789	5330-01-319-7302
53	Gasket	5577933	5330-01-184-6500
54	Gasket	12551591	5330-01-434-8611
55	Gasket	C5136338	5330-01-309-4340
56	Gasket	MA128-21182	5330-01-037-0663
57	Gasket	12460095	5330-01-413-2118

Section II. MANDATORY REPLACEMENT PARTS (Cont'd)

(1) ITEM NO	(2) NOMENCLATURE	(3) PART NUMBER	(4) NATIONAL/NATO STOCK NUMBER
58	Gasket	8677743	5330-01-360-5271
59	Gasket	5741141	5330-01-211-1343
60	Gasket	5688049	5330-00-848-4439
61	Gasket, Oil Pan	OS34400	5330-01-310-6780
62	Gasket, Water Pump	10137492	5330-01-147-9808
62.1	Gasket, Water Pump	12553488	5330-01-476-3866
63	Grommet, Nonmetallic	12340526	5325-01-437-4175
64	Hex Nut	7063812	5310-00-126-3842
65	Key Washer	5584462	5310-01-213-4185
66	Kit, Universal Parts	5-213X	2520-01-189-2135
67	Lining, Friction	4026-38368-01	2930-01-189-8643
68	Lockbolt	5589067	5306-01-204-2139
69	Lockbolt	5597349	5306-01-276-1621
70	Locknut	MS51943-31	5310-00-061-4650
71	Locknut	9419471	5310-01-432-6727
72	Locknut	MS21044C3	5310-00-208-9255
73	Locknut	MS21245-L10	5310-00-449-2381
73.1	Locknut	MS21245-L12	5310-00-419-0876
74	Locknut	5593048	5310-01-252-0481
75	Locknut	83320	5815-01-186-6930
76	Locknut	5593035	5310-01-255-2695
77	Locknut	MS27183-10	5310-00-809-4058
78	Locknut	M45913/3-4FG8C	5310-00-935-9022
79	Locknut	MS51943-33	5310-00-814-0673
80	Locknut	12387349-43	5310-00-061-4651
81	Locknut	MS51943-39	5310-00-488-3889
82	Locknut	MS21245-8	5310-00-449-2376
83	Locknut	MS51967-6	5310-00-931-8167
84	Locknut	MS21044-N4	5310-00-877-5796
85	Locknut	12339728-3	5310-01-198-3487
86	Locknut	MS51943-34	5310-00-241-6658
87	Locknut	12339730	5310-01-254-4284

Section II. MANDATORY REPLACEMENT PARTS (Cont'd)

(1) ITEM NO	(2) NOMENCLATURE	(3) PART NUMBER	(4) NATIONAL/NATO STOCK NUMBER
88	Locknut	5584710	5310-01-203-3217
89	Locknut	MS51943-45	5310-00-409-3333
90	Locknut	5591514	5310-01-217-0715
91	Locknut	NAS1022-N08	5310-00-721-5447
92	Locknut	MS210-83-N08	5310-00-941-6019
93	Locknut	MS21045-7	5310-00-274-9364
93.1	Locknut	274209	5310-00-420-9713
94	Locknut	5590556	5310-01-208-5252
95	Locknut	454748	5310-01-038-9579
96	Locknut	131245	5310-00-013-1245
97	Locknut	9411893	5310-00-251-4503
98	Locknut	MS51967-12	5310-00-896-0903
99	Locknut	9442939	5310-01-149-4407
100	Locknut	8712289-4	5310-00-840-6222
101	Locknut	MS51968-15	5310-00-943-2141
102	Locknut	MS35649-205	5310-00-934-9764
103	Locknut	8712289-5	5310-00-044-3342
104	Locknut	MS51943-36	5310-00-814-0672
105	Locknut	9422299	5310-01-150-4003
106	Locknut	12339206	5310-01-439-1154
107	Locknut	AN365-1024A	5310-00-208-1918
108	Locknut	9411807	5310-01-461-8043
109	Locknut	MS21042L5	5310-00-807-1476
110	Locknut	MS21042L6	5310-00-807-1477
111	Locknut	MS21042L4	5310-00-807-1475
112	Locknut	190254	5320-01-219-7261
113	Locknut	5592958	5310-01-253-1615
114	Locknut	9416918	5310-01-012-8962
115	Locknut	12339501	5310-01-198-7585
116	Locknut	89325	5310-01-212-2215
117	Locknut	MS21044-N3	5310-00-877-5797
118	Locknut	454749	5310-00-164-1790

Section II. MANDATORY REPLACEMENT PARTS (Cont'd)

(1) ITEM NO	(2) NOMENCLATURE	(3) PART NUMBER	(4) NATIONAL/NATO STOCK NUMBER
119	Locknut	MS17829-4F	5310-00-483-8791
120	Locknut	192481	5310-01-058-3353
121	Locknut	190171	5310-00-774-9073
122	Locknut	2INE-040	5310-01-066-6759
123	Locknut	9419456	5310-01-318-5237
124	Locknut	272739	5310-01-317-8164
125	Locknut	190139	5310-00-088-0553
126	Locknut	M45913/1-4CG5C	5310-00-088-1251
127	Locknut	M45913/1-5CG5C	5310-00-984-3806
128	Locknut	MS51943-35	5310-00-935-9021
129	Locknut	11516075	5310-01-206-5479
130	Locknut, Assembled	271172	5310-01-152-0598
131	Locknut, Assembled	5593033	5310-01-252-2999
132	Lockpin	10392	5315-01-280-6185
133	Lockwasher	MS35338-46	5310-00-637-9541
134	Lockwasher	MS35338-45	5310-00-407-9566
135	Lockwasher	MS35338-44	5310-00-582-5965
136	Lockwasher	MS35338-42	5310-00-045-3299
137	Lockwasher	MS51415-9	5310-01-216-7390
138	Lockwasher	MS35338-43	5310-00-045-3296
139	Lockwasher	120217	5310-00-922-2017
140	Lockwasher	MS35336-53	5310-00-957-2677
141	Lockwasher	85031	5310-01-186-7066
142	Lockwasher	2434	5310-00-775-5139
143	Lockwasher	MS35338-41	5310-00-045-4007
144	Lockwasher	MS45904-60	5310-00-080-9786
145	Lockwasher	11500177	5310-01-185-7218
146	Lockwasher	MS35338-65	5310-00-011-5093
147	Lockwasher	MS35338-50	5310-00-820-6653
148	Lockwasher	MS35338-103	5310-00-184-8971
149	Lockwasher	2436162	5310-01-119-1024
150	Lockwasher	MS35338-67	5310-00-011-6121

Section II. MANDATORY REPLACEMENT PARTS (Cont'd)

(1) ITEM NO	(2) NOMENCLATURE	(3) PART NUMBER	(4) NATIONAL/NATO STOCK NUMBER
151	Lockwasher	MS35338-49	5310-00-167-0680
152	Lockwasher	9424258	5310-01-199-3440
153	Lockwasher	26351	5310-01-210-0819
154	Lockwasher	11503962	5310-01-444-3084
155	Lockwasher	MS35338-141	5310-00-984-7042
156	Lockwasher	1104018SS	5310-00-933-8119
157	Lockwasher	5593285	5310-01-250-7836
158	Lockwasher	MS35338-8	5310-00-261-7340
159	Lockwasher	202751	5310-00-274-8710
160	Lockwasher	12341800	5310-01-327-0387
161	Lockwasher	MS35333-47	5310-00-550-3714
162	Lockwasher	MS35333-44	5310-00-194-1483
163	Lockwasher	120380	5310-00-209-2946
164	Lockwasher	MS35338-27	5310-00-543-5101
165	Lockwasher	5596566	5310-01-253-8440
166	Lockwasher	210104-8S	5310-00-003-4094
167	Lockwasher	12338339	5330-01-200-0466
168	Lockwasher	MS35333-121	5310-00-905-5454
169	Lockwasher	MS35337-22	5310-00-596-7674
170	Lockwasher	123153	5310-01-185-4672
171	Lockwasher	MS35338-100	5310-00-261-8278
172	Lockwasher	120214	5310-00-012-0214
173	Lockwasher	MS122031	5310-00-285-7037
174	Lockwasher	2436161	5310-01-102-3270
175	Lockwasher	MS35333-40	5310-00-550-1130
176	Lockwasher	MS45904-68	5310-00-889-2528
177	Lockwasher	MS35338-63	5310-00-274-8715
178	Lockwasher	MS35338-48	5310-00-584-5272
179	Lockwasher	QR816	5310-00-007-1607
180	Lockwasher	MS51848-13	5310-01-016-9348
181	Lockwasher	AN8013-2	5310-00-167-0893
182	Lockwasher	202755	5310-01-270-2661

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(1) ITEM NO	(2) NOMENCLATURE	(3) PART NUMBER	(4) NATIONAL/NATO STOCK NUMBER
183	Lockwasher	MS35340-43	5310-00-721-7809
184	Lockwasher	36896	5310-01-162-9661
185	Lockwasher	N9459	5310-01-348-8393
186	Lockwasher	N9461	5310-01-348-8392
187	Lockwasher	N9015	5310-01-046-0186
188	Lockwasher	MS35338-47	5310-00-209-0965
189	Lockwasher	MS35335-33	5310-00-209-0786
190	Lockwasher	120384	5310-00-482-9493
191	Lockwasher	11500207	5310-01-206-7306
192	Lockwasher	5550554	5310-01-144-2779
193	Lockwasher	MS35333-43	5310-00-685-3228
194	Lockwasher	MS51415-7	5310-01-218-7137
195	Lockwasher	MS35338-27	5310-00-543-2705
196	Lubricant	D528235H-1	2640-01-419-6200
197	Manifold Seal Assembly	12338342	5330-01-189-9738
198	Mounting Plate Gasket	12560223	5330-01-472-8179
199	Nut, Plain-Assembled	272474	5310-01-204-1039
200	Nut, Plain-Assembled	511-120800-00	5310-01-995-4130
201	Nut, Plain-Assembled	271169	5310-00-124-9265
202	Nut, Plain-Assembled	271163	5310-01-069-5243
203	Nut, Plain-Assembled	31WLF3816	5310-00-355-5645
204	Nut, Plain-Assembled	G-00271166	5310-01-251-0760
205	Nut, Plain-Assembled	271184	5310-00-933-4310
206	Oil Filter	PH13	2940-00-082-6034
206.1	Oil Filter	PF1218	4330-01-398-8484
207	Oil Seal Retainer	14022683 (6.2L) 23502587 (6.5L)	5330-01-150-7744 5331-01-378-8572
208	O-Ring	5740436	5331-01-157-1884
209	O-Ring	274244	5331-00-935-9136
210	O-Ring	M83461/1-020	5331-01-107-4950
211	O-Ring	M83461/1-236	5331-01-183-0971
212	O-Ring	MS28775-110	5331-00-585-6663

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(1) ITEM NO	(2) NOMENCLATURE	(3) PART NUMBER	(4) NATIONAL/NATO STOCK NUMBER
213	O-Ring	12339002	5331-01-195-8889
214	O-Ring	5591345	5331-01-176-0923
215	O-Ring	12342933	5331-01-477-3657
216	O-Ring	12338998	5331-01-216-7392
217	O-Ring	12342633	5331-01-335-8878
218	O-Ring	2938-2	5331-00-580-6586
219	O-Ring	12342794	5331-01-346-3806
220	O-Ring	11639519-1	5331-00-463-0200
221	O-Ring	11639519-2	5331-00-462-0907
222	O-Ring	7700242	5331-01-770-0242
223	Packing, Preformed	7358626	5330-00-297-6329
224	Packing, Preformed	2-113N497-70	5330-01-184-6492
225	Platenut	MS51941-10	5310-01-025-6444
226	Push On Nut	12339313	5310-01-188-6861
227	Push On Nut	62229	5310-01-161-7308
228	Push On Nut	C183-012-4	5310-01-213-1333
229	Retainer, Packing	12342886	5330-01-381-1810
230	Retainer, Packing	8658110	5330-01-043-5572
231	Retaining Ring	MS16633-1050	5325-00-442-5845
232	Retaining Ring	MS16624-1062	5325-00-803-7305
233	Retaining Ring	5741098	5325-01-212-2403
234	Retaining Ring	012351	5325-01-135-4290
235	Retaining Ring	11505885	5325-01-196-5631
236	Rivet	BALM-6BP-14	5320-01-254-2283
237	Rivet, Blind	CR3213-6-2	5320-01-143-5075
238	Rivet, Blind	CR-213-4-2	5320-01-258-2576
239	Rivet, Blind	CR-3242-6-2	5320-01-033-8643
240	Rivet, Blind	NAS9301BNS-4-04	5320-01-143-5079
241	Rivet, Blind	5593050	5320-01-254-4251
242	Rivet, Blind	CR-3213-6-8	5320-01-086-1144
243	Rivet, Blind	AD42BS	5320-00-899-0981
244	Rivet, Blind	NAS9301BNS-6-04	5320-01-136-1782

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(1) ITEM NO	(2) NOMENCLATURE	(3) PART NUMBER	(4) NATIONAL/NATO STOCK NUMBER
245	Rivet, Blind	MSC66	5320-01-219-7261
246	Rivet, Blind	12339998-14	5310-01-198-1723
247	Rivet, Blind	CR213-4-3	5320-01-138-4239
248	Rivet, Blind	CR3243-6-3	5320-01-033-8638
249	Rivet, Blind	CR3242-6-4	5320-01-033-9126
250	Rivet, Blind	MGLP-B6-4	5320-01-271-6357
251	Rivet, Blind	12339355-2	5320-01-264-5978
252	Rivet, Blind	CR-213-4-5	5320-01-259-7423
253	Rivet, Blind	ADS43	5320-00-083-5009
254	Rivet, Blind	M24243/1-A404	5320-01-023-2529
255	Rivet, Blind	M24243/1-A408	5320-00-850-3282
256	Rivet, Blind	CR3243-6-5	5320-01-034-1884
257	Rivet, Blind	CR-213-6-3	5320-01-135-7319
258	Rivet, Blind	BAPKTR-64	5320-01-275-1998
259	Rivet, Blind	CR3213-6-7	5320-01-085-9995
260	Rivet, Blind	CR3213-6-5	5320-01-084-9235
261	Rivet, Blind	NAS9302BNS-6-05	5320-01-136-1787
262	Rivet, Blind	M24243/1-B604	5320-00-493-4101
263	Rivet, Blind	5982526	5310-01-198-1722
264	Rivet, Blind	M24243/1-A402	5320-01-019-5694
265	Rivet, Blind	AD45BS	5320-00-275-8344
266	Rivet, Blind	CR3243-6-4	5320-01-033-8637
267	Rivet, Solid	MS20426-AD6-9	5320-00-117-7289
268	Rivet, Solid	MS20470-AD6-10	5320-00-721-9062
269	Rivet, Solid	5575940	5320-01-271-1834
270	Rivet, Solid	MS20470-AD6-8	5320-00-117-6853
271	Rivet, Solid	5575936	5320-01-259-6155
272	Rivet, Solid	MS20426-AD6-7	5320-00-117-7287
273	Rivet, Solid	MS20426-AD10-16	5320-00-117-6910
274	Rivnut, Blind	ALS4-420-165	5310-01-411-3422
275	Rivnut, Blind	MS27130-CR31	5310-01-283-8482
276	Runflat Belt Repair Kit	J-39295	2530-01-338-3056

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(1) ITEM NO	(2) NOMENCLATURE	(3) PART NUMBER	(4) NATIONAL/NATO STOCK NUMBER
277	Runflat Belt Repair Kit	D-528240	4310-01-345-5723
278	Screw, Assembled Washer	5593006	5305-01-256-0406
279	Screw, Assembled Washer	5593313	5305-01-254-2459
280	Screw, Assembled Washer	10-35936-7	5305-00-543-4709
281	Screw, Assembled Washer	454542	5305-00-499-7694
282	Screw, Machine	MS35206-245	5305-00-984-6193
283	Screw, Tapping	12340792	5305-01-264-5874
284	Screw, Tapping	5592970	5305-01-255-2675
285	Seal	MT161A	5330-01-282-2213
286	Seal, Nonmetallic Round	12267802	5330-01-080-3253
287	Seal, Nonmetallic Round	5582936	5310-01-203-9187
288	Seal, Nonmetallic SP	12447172	5330-01-447-4762
289	Seal, Nonmetallic ST	12342343	5330-01-318-1998
290	Seal, Plain	2994-2106	5330-01-180-9099
291	Seal, Plain, Encased	CR535094-60	5330-01-203-6551
291.1	Seal Service Kit	7848522	5330-01-044-0703
292	Seal, Washer	4210973	5310-01-186-5237
293	Socket, Turnbutton Fastener	91-BS-78403-1E	5325-00-281-8642
294	Sound Dampener	12339029-1	2540-01-192-9716
295	Sound Dampener	12339029-2	2540-01-192-5948
296	Spacer, Plate	5584436	5365-01-201-4749
297	Spider, Universal Joint	CPL6N8	2520-00-352-2168
298	Spring Pin	MS16562-256	5315-00-753-3895
299	Spring Pin	NAS561C4-18	5315-00-559-7467
299.1	Spring	2-300.P5	5360-01-282-9316
300	Strip, Rubber	12342344	5330-01-318-9780
301	Strip, Rubber	12342345	5330-01-317-5393
302	Strip, Rubber	12342248	5330-01-317-5392
303	Stud, Turnbutton Fastener	XB78323-05001	5325-00-823-5999
304	Thermaseal, Heater	12275161	2540-01-123-1218
305	Tiedown Strap	MS3367-4-2	5975-00-903-2288
306	Tiedown Strap	MS3367-3-9	5975-00-451-5001

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(1) ITEM NO	(2) NOMENCLATURE	(3) PART NUMBER	(4) NATIONAL/NATO STOCK NUMBER
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308	Tiedown Strap	MS3367-3-0	5975-00-985-6630
309	Tiedown Strap	MS3367-7-0	5975-01-034-5871
310	Tiedown Strap	MS3367-1-0	5975-00-984-6582
311	Tiedown Strap	MS3367-4-0	5975-00-903-2248
312	Tiedown Strap	MS3367-7-9	5975-00-570-9598
313	Tiedown Strap	MS3367-5-0	5975-00-133-8687
314	Tiedown Strap	MS3367-1-9	5975-00-074-2072
315	Tiedown Strap	MS3367-2-9	5975-00-156-3253
316	Turnbutton, Clinch Plate	BS78505	5325-00-371-8108
317	Washer, Spring Tension	4004616	5310-01-189-8485
318	Washer, Spring Tension	N9018	5310-01-032-4827
319	Washer, Spring Tension	12338124	5310-01-413-2049
320	Washer, Spring Tension	B0625-022-S	5310-01-203-3230
321	Woodruff Key	MS35756-8	5315-00-616-5526
322	Woodruff Key	MS35756-17	5315-00-012-4553

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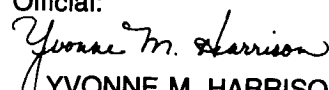
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PUBLICATION/FORM NUMBER TM 9-2320-280-20-3	DATE 31 JAN 96	TITLE TECHNICAL MANUAL UNIT MAINTENACE
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ITEM NO.	PAGE NO.	PARA-GRAPH	LINE NO.*	FIGURE NO.	TABLE NO.	RECOMMENDED CHANGES AND REASON (Provide exact wording of recommended changes, if possible).
1	10-107	10-66			10-1	Drill size for 5/32 rivet diameter should be #21.
2	12-60	12-41				We are using a cotter pin to install elbow on exhaust pipe elbow.

SAMPLE

**Reference to line numbers within the paragraph or subparagraph.*

TYPED NAME, GRADE, OR TITLE Pat Smith, ILT	TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION AV272-4162	SIGNATURE <i>Pat Smith, ILT</i>
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PUBLICATION/FORM NUMBER	DATE	TITLE
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PAGE NO.	COLM NO.	LINE NO.	NATIONAL STOCK NUMBER	REFERENCE NO.	FIGURE NO.	ITEM NO.	TOTAL NO. OF MAJOR ITEMS SUPPORTED	RECOMMENDED ACTION
<h1>SAMPLE</h1>								

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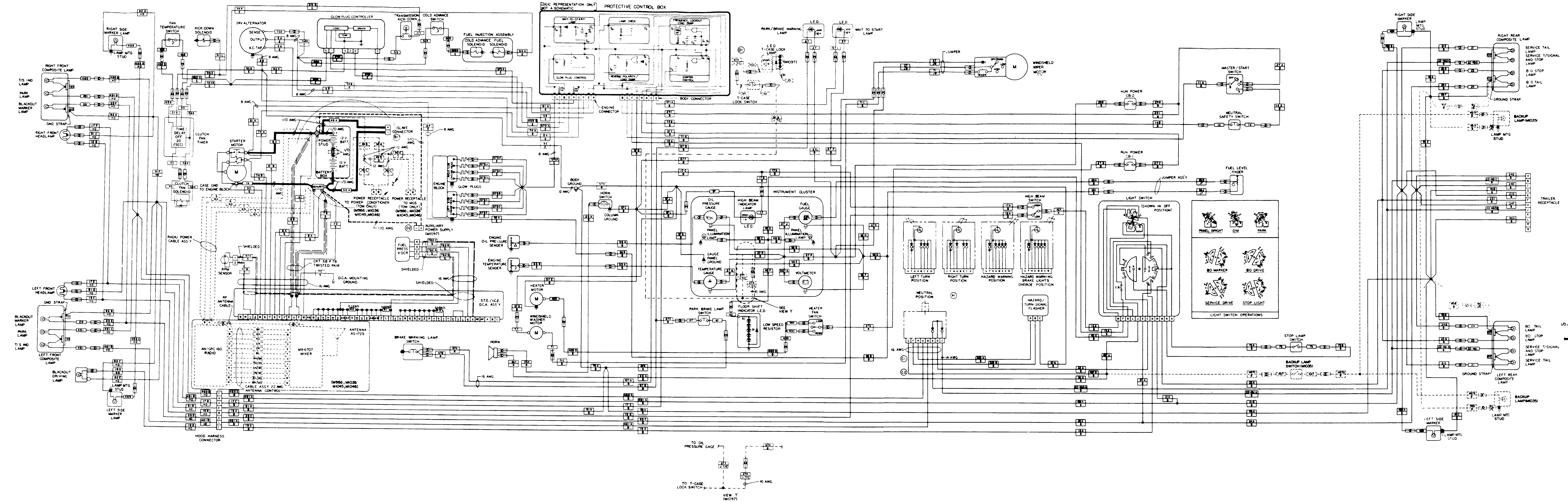
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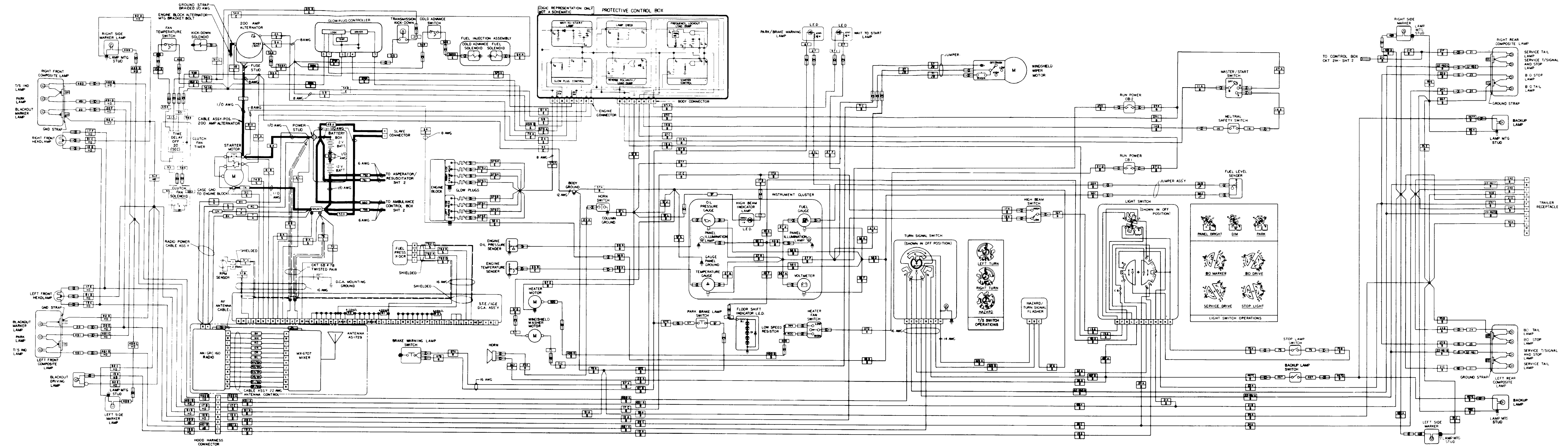
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PAGE NO.	COLM NO.	LINE NO.	NATIONAL STOCK NUMBER	REFERENCE NO.	FIGURE NO.	ITEM NO.	TOTAL NO. OF MAJOR ITEMS SUPPORTED	RECOMMENDED ACTION

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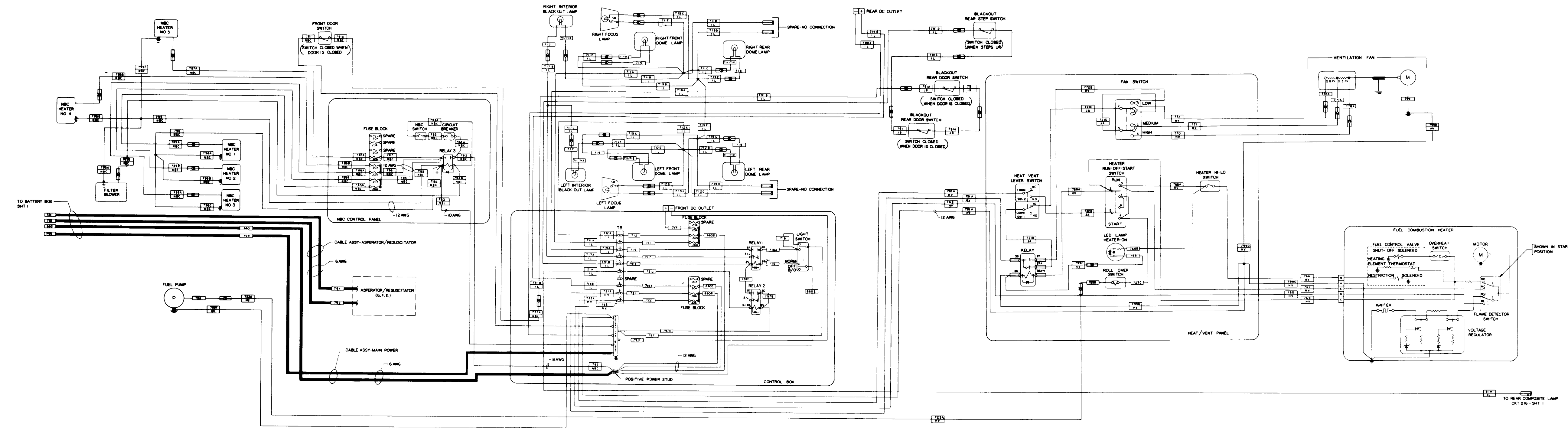
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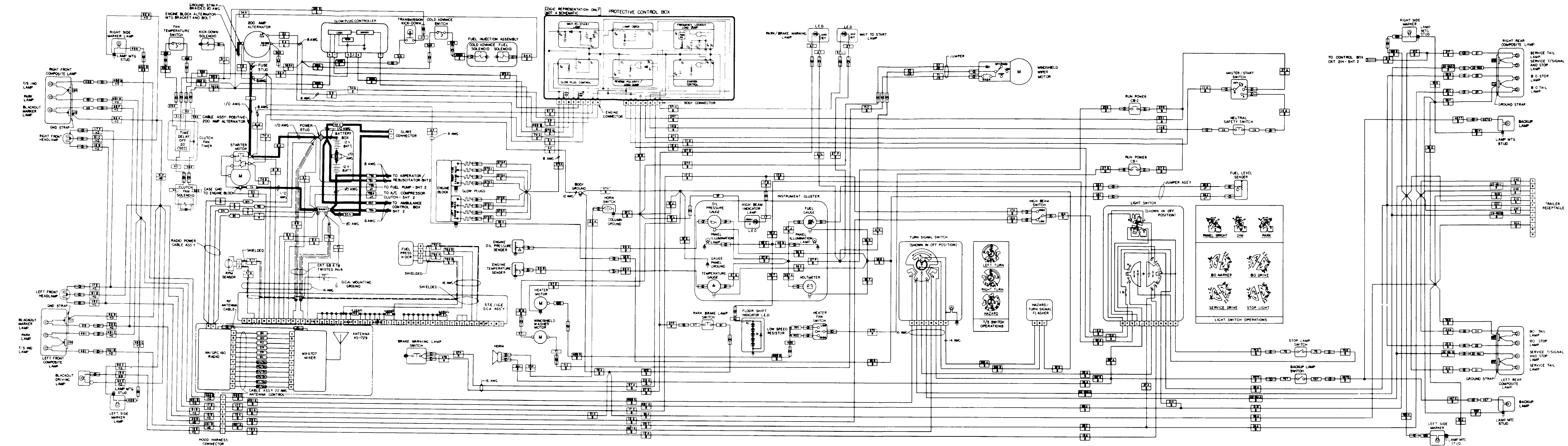


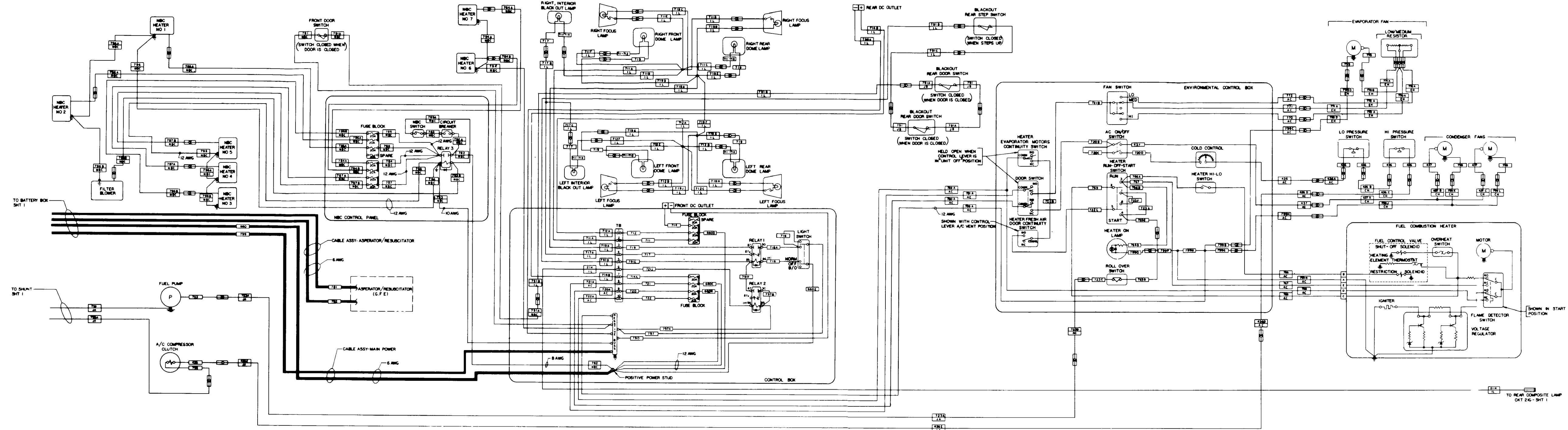
FO-1. Electrical System Wiring Diagram.

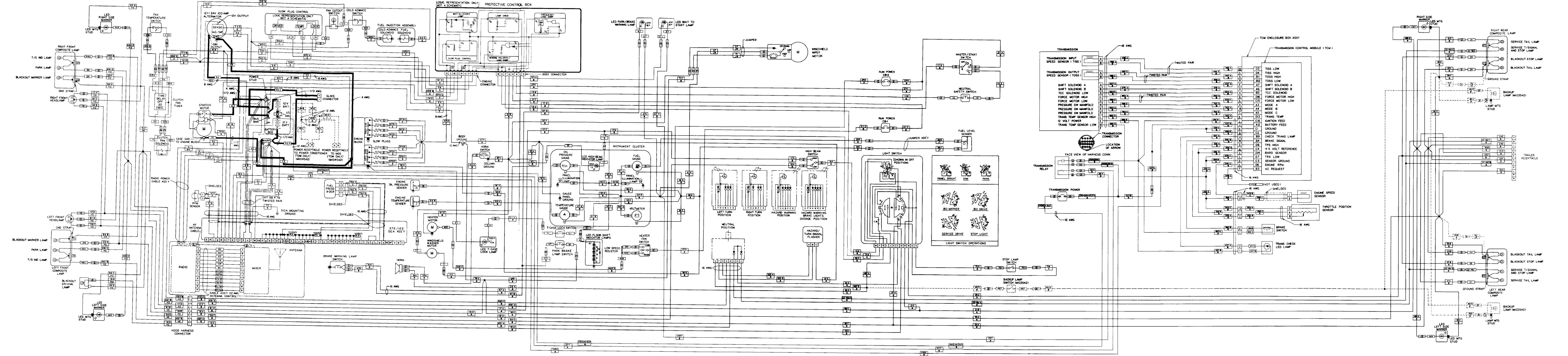


FO-2. Electrical System Wiring Diagram (M996 and M996A1).

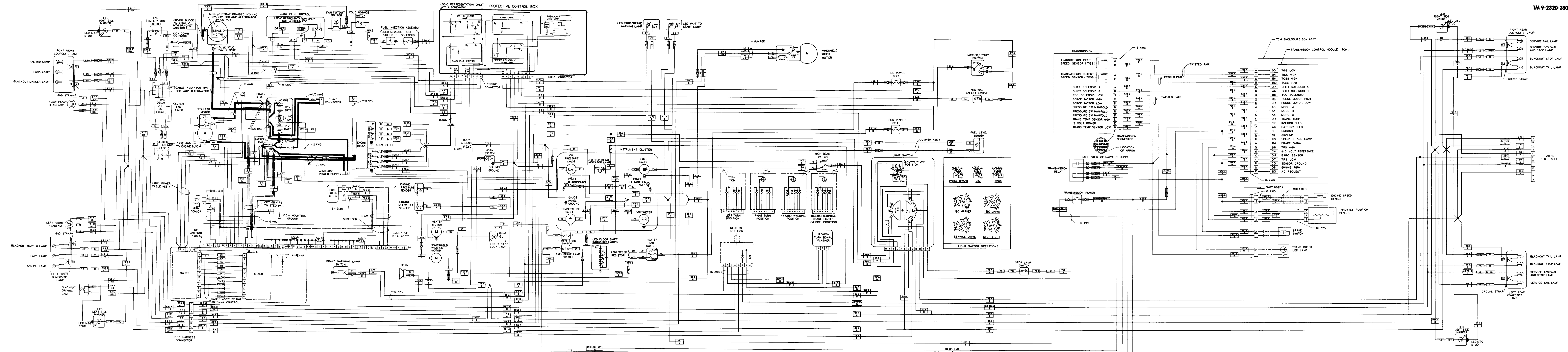




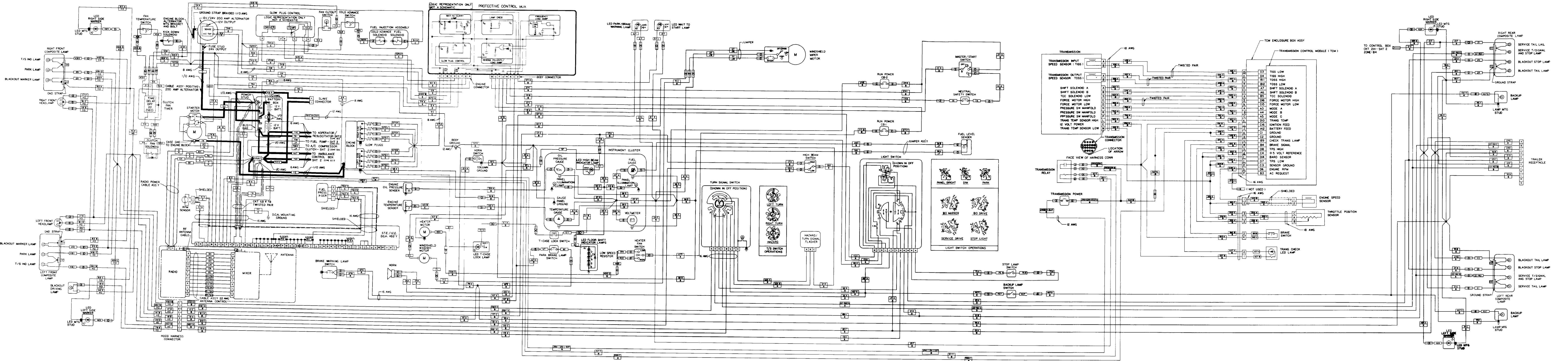




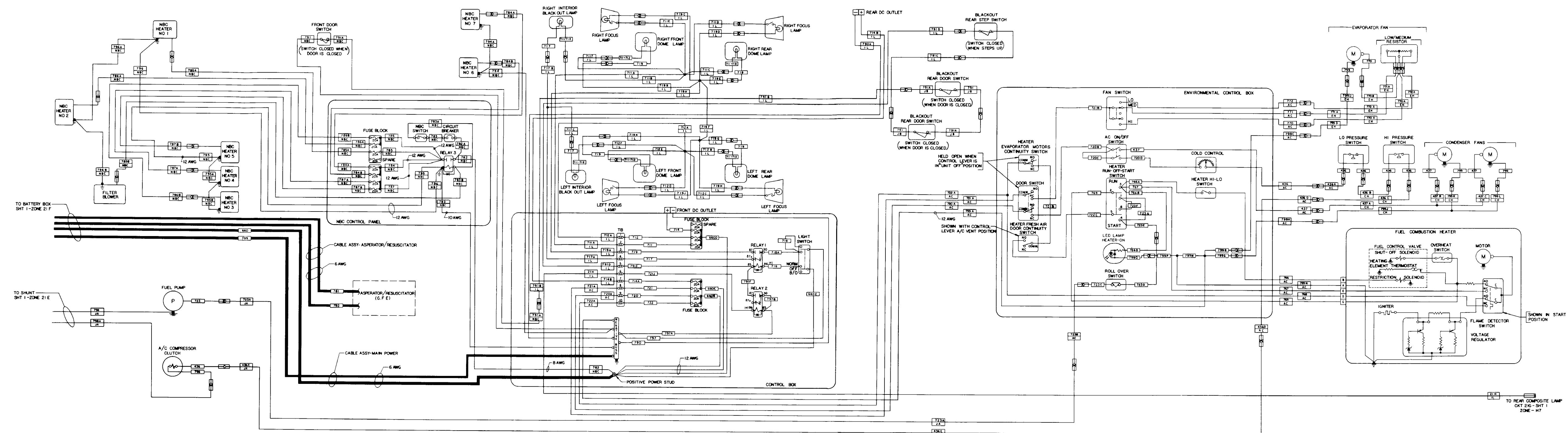
PO-4. Electrical System Wiring Diagram (M1025A2, M1035A2, M1043A2, M1045A2).



FO-5. Electrical System Wiring Diagram (M1097A2).



FO-6. Electrical System Wiring Diagram (M97A2).



THE METRIC SYSTEM AND EQUIVALENTS

LINEAR MEASURE

- 1 Centimeter = 10 Millimeters = 0.01 Meters = 0.3937 Inches
- 1 Meter = 100 Centimeters = 1,000 Millimeters = 39.37 Inches
- 1 Kilometer = 1,000 Meters = 0.621 Miles

SQUARE MEASURE

- 1 Sq Centimeter = 100 Sq Millimeters = 0.155 Sq Inches
- 1 Sq Meter = 10,000 Sq Centimeters = 10.76 Sq Feet
- 1 Sq Kilometer = 1,000,000 Sq Meters = 0.386 Sq Miles

CUBIC MEASURE

- 1 Cu Centimeter = 1,000 Cu Millimeters = 0.06 Cu Inches
- 1 Cu Meter = 1,000,000 Cu Centimeters = 35.31 Cu Feet

LIQUID MEASURE

- 1 Milliliter = 0.001 Liters = 0.0338 Fluid Ounces
- 1 Liter = 1,000 Milliliters = 33.82 Fluid Ounces

TEMPERATURE

- Degrees Fahrenheit (F) = $^{\circ}\text{C} \cdot 9 \div 5 + 32$
- Degrees Celsius (C) = $\text{F}^{\circ} - 32 \cdot 5 \div 9$
- 212° Fahrenheit is equivalent to 100° Celsius
- 90° Fahrenheit is equivalent to 32.2° Celsius
- 32° Fahrenheit is equivalent to 0° Celsius

WEIGHTS

- 1 Gram = 0.001 Kilograms = 1,000 Milligrams = 0.035 Ounces
- 1 Kilogram = 1,000 Grams = 2.2 Lb
- 1 Metric Ton = 1,000 Kilograms = 1 Megagram = 1.1 Short Tons

APPROXIMATE CONVERSION FACTORS

TO CHANGE	TO	MULTIPLY BY
Inches	Millimeters	25.4
Inches	Centimeters	2.540
Feet	Meters	0.305
Yards	Meters	0.914
Miles	Kilometers	1.609
Square Inches	Square Centimeters	6.451
Square Feet	Square Meters	0.093
Square Yards	Square Meters	0.836
Square Miles	Square Kilometers	2.590
Acres	Square Hectometers	0.405
Cubic Feet	Cubic Meters	0.028
Cubic Yards	Cubic Meters	0.765
Fluid Ounces	Milliliters	29.573
Pints	Liters	0.473
Quarts	Liters	0.946
Gallons	Liters	3.785
Ounces	Grams	28.349
Pounds	Kilograms	0.4536
Short Tons	Metric Tons	0.907
Pound-Feet	Newton-Meters	1.356
Pounds Per Square Inch	Kilopascals	6.895
Miles Per Gallon	Kilometers Per Liter	0.425
Miles Per Hour	Kilometers Per Hour	1.609
TO CHANGE	TO	MULTIPLY BY
Millimeters	Inches	0.03937
Centimeters	Inches	0.3937
Meters	Feet	3.280
Meters	Yards	1.094
Kilometers	Miles	0.621
Square Centimeters	Square Inches	0.155
Square Meters	Square Feet	10.764
Square Meters	Square Yards	1.196
Square Kilometers	Square Miles	0.386
Square Hectometers	Acres	2.471
Cubic Meters	Cubic Feet	35.315
Cubic Meters	Cubic Yards	1.308
Milliliters	Fluid Ounces	0.034
Liters	Pints	2.113
Liters	Quarts	1.057
Liters	Gallons	0.264
Grams	Ounces	0.035
Kilograms	Pounds	2.2046
Metric Tons	Short Tons	1.102
Newton-Meters	Pound-Feet	0.738
Kilopascals	Pounds Per Square Inch	0.145
Kilometers Per Liter	Miles Per Gallon	2.354
Kilometers Per Hour	Miles Per Hour	0.621

