

CHAPTER 21

OFF-ROAD AND WINTER DRIVING

Off-road and winter driving conditions present special challenges for the vehicle driver. This chapter gives guidance on driving off-road and during winter conditions.

OFF-ROAD DRIVING

CAUTION

The operator should first check the vehicle technical manual for the equipment operated and follow instructions for driving under other than normal conditions. Driving techniques differ for rear-wheel drive, front-wheel drive, and all-wheel drive vehicles.

Ditches

Cross shallow ditches by shifting into low gear or range and proceeding slowly. Enter the ditch obliquely so that one wheel leaves the ditch as the other wheel on the same side enters it. When crossing deep ditches, use the lowest forward gear and four-wheel drive if the vehicle is so equipped. When you reach the bottom, accelerate the motor enough to keep rolling as you go up the other side. If the ditch is deep and has very steep sides, you may have to cut away the tops of the banks before trying to cross.

Gullies and Ravines

Gullies and ravines are natural formations caused by running water. Look these formations over carefully to find a place to cross and to ensure that your vehicle can get across. Examine both banks. If water is flowing in the ravine, check its depth. Put your vehicle in low gear and slowly approach the ravine at a right angle to the edge. Using the foot brake, ease the front wheels into the gully; take care to have them strike the bottom at the same time. Bring your engine up to normal operating speed as your wheels hit the bottom. Accelerate enough to climb as your front wheels touch the opposite bank.

Woods

Woods help to conceal you and your vehicle from air observation, but they present certain problems. Fairly open woods with trees at least as far apart as the width of your vehicle will allow passage if you can maneuver your vehicle around the trees. Use an established trail if possible. Do not plan to return on the same route because these same saplings may stop or damage your vehicle when braced against it. If the trees are too dense and prevent your passage, drive as closely as possible to the edge of the woods using shadows for concealment. Although woods can be an obstacle to vehicles, they are not to the foot soldier. Wooded areas are likely spots for guerrillas, partisans, or enemy troops. Be alert to the possibility of an ambush.

Stumps. A high tree stump, if straddled by your vehicle, can seriously damage the vehicle axles and other low parts. Moreover, stumps can injure your tires. Check ground clearances and drive with caution.

Low Limbs. When you drive through wooded areas, whether on country roads or cross-country, low-hanging limbs may break your tarp bows or rip your top and radio antennas. (It is usually best to remove the canvas top and the bows for field operation.) Survey the route to determine if your vehicle can proceed without damage from low-hanging limbs or if it is practicable to remove obstructing limbs.

Timber. Fallen trees may often be crossed by piling dirt or other material on each side and then driving over it if required and if angle crossings cannot be achieved.

Rocky Terrain

Do not try to straddle large boulders; they will damage axles and other low parts of your vehicle. Move very slowly when driving in very rocky terrain. Carry an extra spare tire if one is available as there is greater danger of flats. Remove stones between dual tires as often as possible to prevent breaking the sidewalls of the tires.

Mud and Swamps

Every military vehicle has enough power in its lowest gear to pull out of mud if it gets traction. Try to pull out slowly in low gear or low range if your vehicle is equipped with an automatic transmission. Placing boards, brush, or similar material under the vehicle's wheels can increase traction. Remember the following points:

- Select the gear that will get you through. Roll onto the soft area at a medium speed for the selected gear. Carefully maintain a steady throttle until you reach solid ground.
- If stopped by mud rolling up in front of your wheels, you may have to back off and hit it again with regained momentum. Under most conditions, this technique requires prompt action. Otherwise, the mud will fill the tracks behind your wheels and slow or stop your backing. You must have solid footing within reach of your vehicle to do this.
- If you get stuck in a vehicle equipped with an automatic transmission, try to pull out slowly in low gear or low range. If you cannot pull out and if brush or boards do not provide the needed traction, get another vehicle to pull you out. When other vehicles are not available and your vehicle is equipped with a winch, attach your winch cable to a tree or solid object and pull yourself out with winch power. Do not rock your vehicle; it will only dig in.

Streams

Your vehicle technical manual/order contains specific instructions on fording streams. In addition to those instructions, follow these precautions before fording

- Check the stream bottom to determine how firm a support you can expect.
- If you expect some sinking, determine if this sinking added to the water depth will exceed your vehicle's fording limit. If the fording limit will be exceeded, find another crossing point.

After reaching dry land, test your brakes while moving at a reduced speed. If your brakes do not

operate properly, continue at a slow speed while maintaining a light steady pressure on the brake pedal to cause a slight drag on them. The heat should dry your brakes.

NOTE: See the appropriate vehicle -10 TM for correct procedure.

Sand

Procedures. The main objective when driving in sand is to maintain movement with the least amount of strain on the vehicle, its engine, and its power train. To do this—

- Estimate if a sandy area is drivable.
- Adjust the tire pressure to meet changing conditions.
- Use various aids to improve bearing surfaces.
- Exercise sound driving techniques.

Your ability to do these things well comes only through experience.

Tire Pressure. Reduce tire pressure when driving in soft sand and over dunes. This increases the amount of tire surface in contact with the sand to provide better flotation (support). However, never reduce tire pressure so much that the tire slips on the rim. Refer to your vehicle technical manual/order for proper tire pressure. When operating with reduced tire pressure, drive at low speed. Inflate tires to normal pressure (for cross-country or hard surface, as appropriate) as soon as the situation permits.

Accessories. To help you meet, take proper action for, and overcome the many difficult conditions associated with extended driving in sand, you should be provided with —

- A tire gauge.
- The means to inflate tires if your vehicle is not so equipped.
- Spare valve cores.
- Readily available material for use under wheels in extremely soft areas.

- Shovels and tow chains or cables.
- Vehicle lubrication and servicing at more frequent intervals as specified by your unit commander.

Driving. To start on sand-

- Be sure tires have proper tire pressure.
- Follow normal engine-starting procedures.
- Select a gear or range that will start you with a minimum of, or no, clutch slippage and wheel spinning.
- Accelerate gradually.

To drive on sand -

- Maintain a steady and even rate of movement.
- Avoid unnecessary shifting of gears. If your vehicle is equipped with an automatic transmission, keep it in low range.
- Anticipate difficult spots and try to bypass them.
- Head for a small stretch of soft sand with increased speed, when necessary, to take advantage of momentum.
- Stop before entering an extensive stretch of soft sand. Reduce the tire pressure, if necessary. Start off in a gear or range that you think will take you through with little need for further shifting and a minimum of clutch slippage and wheel spinning. As soon as the need for low tire pressure ceases, stop and reinflate to appropriate pressure.
- Approach a dune (hill of sand piled up by the wind) from the windward (most gradual) slope at a 90-degree angle. Select the proper gear or range to avoid shifting while on the slope. Maintain as much momentum as possible while going up the slope; be prepared to change direction as you reach the crest. Ride the crest if necessary to seek a safe route. If you must use the lee (steepest) slope, select a point where the angle of approach will allow the front bumper to clear.

- Follow in the tracks of preceding vehicles or break a new path depending on conditions.
- Make wide turns. Sharp turns can stall or even overturn your vehicle.

To stop in sand -

- Let your vehicle roll to a halt if practicable. Otherwise, brake gradually. This prevents tires from digging in, which happens when brakes are used.
- Try to stop on a downhill slope. This gives you an advantage when starting.

Freeing Vehicle. At the first sign that your vehicle is bogging down, try a lower gear. If it still bogs down -

- Stop power to the driving wheels. If you continue to use the motor to force the vehicle out of the sand, it will only sink deeper. It will be more difficult to get out.
- Check tires for sand operation inflation. High temperature may have built up the pressure.
- Lower the tire pressure, if necessary, for emergency movement over a short distance. (Check the vehicle technical manual/order for the allowable minimum tire pressure.)
- As soon as the need for low tire pressure ceases, stop and reinflate tire to appropriate pressure.
- Try to drive on.

If lowered tire pressure is not enough to free the vehicle, use any or all of the following procedures:

- Shovel a clear path ahead of the wheels.
- Lay boards, brush channels, canvas, wire netting rope ladders, or some similar material under and in front of the tires for better flotation and traction.
- Use the winch or a tow if you see that continued operation of the vehicle under its own power will only cause it to sink deeper into the sand.

- If a vehicle is bellied down and must be pulled out, unload the vehicle to the extent needed.
- As soon as the need for low pressure ceases, stop and reinflate tire to appropriate pressure.

Vehicle Care. In addition to responsibilities contained in your vehicle technical manual/order, you must —

- Keep valve caps on all tires.
- Check engine temperature and oil pressure frequently.
- If overheating occurs, check for loose or broken fan belt. Correct as necessary.
- Clean the oil spout before adding oil. Remove any accumulation of sand or dirt around the filler hole.
- Clean the spouts of gasoline containers before using them for refueling. Under extremely dirty conditions, falter gasoline when filling tank.
- Inspect nuts, bolts, springs, mountings, and accessories frequently for evidence of looseness or damage.
- When halted overnight or for any extended period, park with the rear of the vehicle toward the wind. If this is not possible, cover the windshield and radiator with a tarpaulin to prevent sand from accumulating in the engine compartment and damage to the windshield.

WINTER DRIVING

Particularly during cold weather, exercise extreme care starting and operating your vehicle. Keep your vehicle in the best mechanical condition possible. Otherwise, it will not operate properly. Carbon monoxide poisoning is an added hazard. This poisoning from inhaling the exhaust fumes of the vehicle usually results in death. To avoid it, never sleep in the cab of your vehicle with the engine or heater running. Whenever the heater is used while driving, leave a window open slightly. Inspect the vehicle exhaust manifold, muffler, and tail pipe for serviceability and tightness daily. Never leave the

engine ruining while working on the vehicle in a closed building. Remember these points:

- Vehicles equipped with mud and snow tires will slide more on icy road surfaces than those with commercial tread. Mud and snow treads are more effective on roads covered with loosely packed snow.
- All-wheel drive vehicles without chains generally perform better than two-wheel drive vehicles with chains on rear wheels.
- Chains give a good bite in snow or mud but tend to slide and slip on ice and packed snow.
- Sand, cinders, or dirt scattered on icy road surfaces gives more traction than chains.
- Fresh snow may conceal an icy road surface.
- Although snow or ice may be melting on roads, it may remain solidly packed or frozen on bridges.
- Better traction is gained when the load is distributed evenly on all wheels.
- Three to eleven times more distance is required to stop a vehicle on pavement covered with ice or snow.
- Isolated patches of ice may be on an otherwise clear road, especially in shaded areas.

Cold weather engine starting and warm-up procedures apply. Avoid excessive use of the choke because unburned gasoline will wash down the cylinder walls, destroying the oil film and diluting the engine oil. Do not race a cold engine.

As a last resort when the engine will not start, tow the vehicle with another or call your unit maintenance crew according to unit policies. Do not push the vehicle.

Start driving in second or third gear rather than first or low. Engage the clutch gradually (or in D2, high, with automatic transmission), and accelerate no more than necessary to keep from stalling.

Avoid quick acceleration on slick roads. It will probably cause you to skid.

Driving methods and practices discussed in Chapter 8 apply, modified as follows:

- Drive at reduced speeds so you can stop quicker.
- Give turn signals sooner than usual. This gives other drivers more time to react.
- Pump your brakes to warn early of your intention to stop.
- Maintain at least double the normal distance from the vehicle ahead.

Good all-around visibility is the first requirement for safe driving. Keep windshields, windows, mirrors, headlights, spotlights, and body lights clean and free of snow and ice. If defrosters are not available, keep windshields clean by using the windshield wiper, wedging the rear of the hood open so motor heat is vented toward the windshield, or thoroughly ventilating inside the vehicle. Cover windshields of vehicles parked in open lots with cardboard or canvas to prevent overnight frosting.

Descend moderate grades in the gear normally used to climb the same grade. On steep or very slippery grades, use at least one gear lower and go slower.

When visibility is poor, use low-beam headlights to warn other drivers of your position. Stop, park off the roadway, and wait for conditions to improve if visibility is zero. If you absolutely must continue, have an assistant driver or passenger walk in front of the vehicle as a guide.

Avoid vehicle tracks, rocks, and other objects that might throw the vehicle sideways and start a skid.

Keep the cab door open when crossing frozen streams. You may need to get out in a hurry if the ice thins.

After driving through slush or water, test your brakes while moving at a reduced speed. If your brakes do not operate normally, continue at a slow speed while maintaining moderate pressure on your brake pedal to create a slight drag. The heat generated by friction between the brake shoe and brake drum will dry your brakes.

On roads that slope toward side ditches, you may need to straddle the center or crown to avoid sliding to the side. Watch carefully for approaching traffic.

WARNING

Drivers of large vehicles should be aware that the shoulder of the road may give way due to vehicle weight.

If unsure about a difficult stretch of road, stop and inspect it carefully before going across. Select a gear that will get you through. If following a vehicle, wait until it crosses. You may need to render assistance if it gets stuck.

To drive through heavy slush, shift down before entering it and keep moving. If wheels begin to spin, disengage the clutch at once, back up, and try again or try rocking by shifting rapidly between forward and reverse gears.

At traffic stops -

- Gradually ease up on the gas. Leave vehicle in gear.
- Apply brakes intermittently and lightly. Use engine compression as much as possible to assist braking.
- Disengage the clutch at the last possible moment to prevent stalling.
- Avoid sudden braking on slick roads so you will not skid.

When parking -

- Place brush, boards, or other suitable material beneath wheels when parking for an extended period on wet, slushy, or muddy surfaces. This keeps the tires from freezing to the ground or being "pocketed" in ice.
- Do not set the parking brake when parking brake linings may freeze to the brake drums. Instead, block the wheels and place the transmission in the appropriate gear for parking as directed by the vehicle technical manual/order.

Tire Chains

Chains are designed to creep or move on the tires. Tighten them by hand, never with tools. Creeping or moving of chains reduces the possibility of the links gouging into tires. When using chains continuously, check their fit and condition at each halt. Install repair links as soon as one of the cross chains is broken.

When installing tire chains under normal conditions —

- Check the chains' condition. Eliminate twists.
- On some vehicles, tire chains must be installed on all driving wheels. Check the vehicle operator's TM.
- Drape chains over tires with OPEN ENDS OF CROSS CHAIN HOOKS AWAY FROM THE TIRE and with fasteners on the trailing ends of the side chains.
- Tuck the first cross chain under the front of the tire. Move the vehicle forward until the fasteners are hub high.
- Straighten and center the chains.
- Lift the ends of the side chains to determine which links will be hooked into the fasteners.
- If installing on duals, first fasten chains between wheels, then inner chains, and finally the outer chain. If installing on singles, fasten the inner chain before the outer chain.

When the vehicle is mired —

- Determine if you want to install your chains with a forward or backward wheel motion.
- Check the chains' condition. Eliminate twists.
- Drape chains over tires with OPEN ENDS OF CROSS CHAIN HOOKS AWAY FROM THE TIRE and with fasteners on the trailing ends of the side chains.
- Locate the first cross chain near mud or snow line.

- If the chains are dual, fold the inner half of the chain over top of the outer half. This makes a doubled chain on the outer wheel. For this reason, the methods listed below then apply to either dual or single wheels.
- Secure one end of each side chain to the wheel by a strong wire, cord, or chain passed through the opening in the wheel and fasten to the inner and outer side chains adjacent to the first cross chain.
- Pull the chain back to take up slack and align with tire. To keep the loose chain from one wheel from being caught up by the other, pile it close behind the wheel to which it is secured.
- Revolve wheels slowly to draw chains around tires. Stop when fasteners are at the top of the tires.
- Pull side chains up tight to select links to be hooked into fasteners. Hook the inner side chain first.
- When the vehicle has been moved to solid ground, loosen and remove the temporary wires, cords, or chains. Adjust the chains to their proper position.

Vehicle Care

In addition to the responsibilities contained in your vehicle technical manual/order, follow these procedures for vehicle care in cold weather.

Keep all fuel tanks and containers as nearly full as possible to keep moisture from condensing inside the fuel tanks and containers. Moisture not only contaminates the gasoline but also may freeze in the fuel lines. Filter the gasoline through a chamois to remove water.

Drain the air tanks in your vehicle each time it is stopped long enough for the tanks to become cold. This reduces the chance of moisture collecting in the tanks, entering the brake lines, freezing and making the brakes inoperative.

On brief halts during extremely cold weather, let the engine run at a fast idle so that the ammeter shows a charge. A fast idle results in better

burning of fuel and a more even engine temperature. Under normal operating conditions, stop the engine during brief halts. This will prevent plug fouling and overheating.

On long halts, park your vehicle with the rear end toward the wind to keep snow out of the engine.

When it is very cold, cover the radiator and hood with a tarpaulin or other suitable material.

In severe cold, start the engine frequently between operating periods to keep it warm.