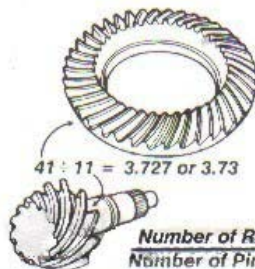




DANA 60

Read this entire sheet carefully before beginning the installation. Correct installation can be the difference between quiet, extended gear life . . . or noisy, premature wear and failure.



Before you begin the installation, check the new gear set to determine if you have the proper gear ratio. Calculate the gear ratio by counting the number of ring gear teeth and dividing this number by the number of teeth on the pinion gear. (see drawing).

$$\frac{\text{Number of Ring Gear Teeth}}{\text{Number of Pinion Gear Teeth}} = \text{Gear Set Ratio}$$

All Precision Gear ring & pinion gear "sets" are lapped in matched pairs and should never be mixed with another gear set. Check the gears for "set" markings (Illustration "A"). Each gear set is pre-run and marked on the pinion head with either its true mounting dimension or its checking distance (Illustrations "A & B"). A pinion setting tool must be used to measure the position of the pinion to determine the correct pinion depth shim thickness. Study all the illustrations and familiarize yourself with the terms: Toe, Heel, Coast, Drive, Root and Crown as they relate to the gear teeth. Also, be sure to understand what is meant by backlash, mounting dimension or checking distance. Deviations from the mounting specifications or contact pattern will result in premature wear and/or noise and failure.

Remove the differential case assembly. Disassemble and clean the axle housing and differential parts thoroughly with solvent. Clean the new Precision Gear ring & pinion gear set to remove any protective coating or packing debris. After cleaning, dry all parts with an air supply (wear eye protection). Examine the ring gear mounting surface and mating surface of the differential for any possible nicks or burrs which might prevent a flush mounting of the ring gear. Ring & pinion tooth depth and backlash variations can result from a ring gear that is "cocked" on its mounting surface. These nicks & burrs can be removed by using a small file and crocus cloth. After dressing, rewash and dry. Mount the ring gear to the differential preferably using a press and guide pins to align the ring gear bolt holes with the carrier. Then, install the ring gear bolts, using Loctite™ on the threads and torque to specifications.

You must position the pinion gear in the housing per the pinion depth dimension. This depth is obtained by using pinion shims located between the housing and the inner pinion bearing cup (Illustration "B"). The thickness of the pinion shims is determined by using a pinion depth setting tool to measure the mounting dimension or checking distance. Obtaining the correct pinion depth is very critical.

Some sets are marked with a (+) or (-) instead of the mounting/checking distance. In those cases the checking distance equals the nominal 3.125" (+) or (-) the indicated number measured in thousandths of an inch. For example, a +2 would have a checking distance of 3.127" (3.125" + .002").

After obtaining the correct pinion depth setting, install the proper amount of pinion preload shims to obtain the correct pinion preload or "torque to turn the pinion shaft by itself after full torque has been applied to the pinion nut (see specification chart). Adding shims decreases the preload. Removing shims will increase the preload or the "torque to turn" the pinion shaft. **Never reuse a pinion nut.**

After the Precision Gear pinion gear is properly installed, position the differential case assembly with the new ring gear into the housing. Be sure that the carrier bearings are properly seated in their bearing cups and that the whole assembly with the shims fits **snugly** into the housing. Mount a dial indicator on the axle housing in such a manner that the indicator plunger will be moving in a line that is tangent to the rotation of the ring gear (Illustration "C"). While holding the pinion fixed, rotate the ring gear in both directions and observe the dial indicator. The total movement of the dial indicator is the backlash. Measure the backlash in three places equally spaced around the ring gear. This will provide you with an accurate backlash reading. Adjust the backlash to specifications by the use of shims located between the carrier bearings and the differential case. A total backlash variance of .003" is acceptable.

As a final step, you must check the tooth contact pattern with gear marking compound to assure that the specifications produced the correct contact pattern. The desired pattern should be as indicated in either box "A" or "B" of the tooth contact pattern chart. For gears that do not have mounting dimensions or checking distances indicated, the use of gear marking compound to obtain the desired contact pattern is the only possible way to establish the proper set-up.

INSTALLATION HINTS

In order to obtain the correct set-up without a pinion depth setting tool, the following procedure is suggested. Press the new inner pinion bearing onto the new pinion shaft. If the original pinion used an inner pinion oil slinger, be sure to install one again. Remove the old inner bearing cup from the housing and grind away just enough of the outside diameter of the cup to allow it to be installed or removed from the housing by hand. This will be your "set-up" cup. Install the original thickness of pinion depth shims into the housing and then install the "set-up" cup. If the housing originally had a pinion oil baffle, be sure to use one again. Install the new pinion gear into the housing without any preload shims and temporarily reuse the old outer pinion bearing and old pinion nut to secure the yoke. Tighten the old pinion nut enough so as to establish a light drag on the pinion bearings as checked by rotating the pinion shaft by hand.

Grind the inside diameter of the old carrier bearings to allow them to be slipped by hand on and off of the differential. These will be your "set-up" carrier bearings. Install the original thickness of carrier shims onto each journal and slide the set-up bearings on the differential. Install the new bearing cups and position the carrier with the new Precision Gear ring gear installed onto the housing. Be sure both carrier bearings are firmly seated in their bearing cups but not so tight as to require driving the bearings into the housing. Then check and adjust the backlash to approximately .008" to .010" by changing the thickness of the shims on each side of the differential assembly. Check the tooth contact pattern using gear marking compound. The desired pattern which should be attained is as indicated in box "A" or "B" of the tooth contact chart. Add or subtract pinion depth shims in increments no greater than .003" to obtain the correct contact pattern. Always check the pattern using the desired .008" to .010" backlash setting.

After the proper pattern has been established, the pinion gear can then be removed and the new inner bearing cup installed using the shims just determined. The pinion preload shims are then installed to obtain the specified pinion preload. Once this has been established, the new pinion nut can be installed and torqued to specification. The new carrier bearings are then installed on the differential after adding .003" additional shim on each side to provide proper carrier bearing preload. Reinstall the differential and recheck all torques and contact pattern.

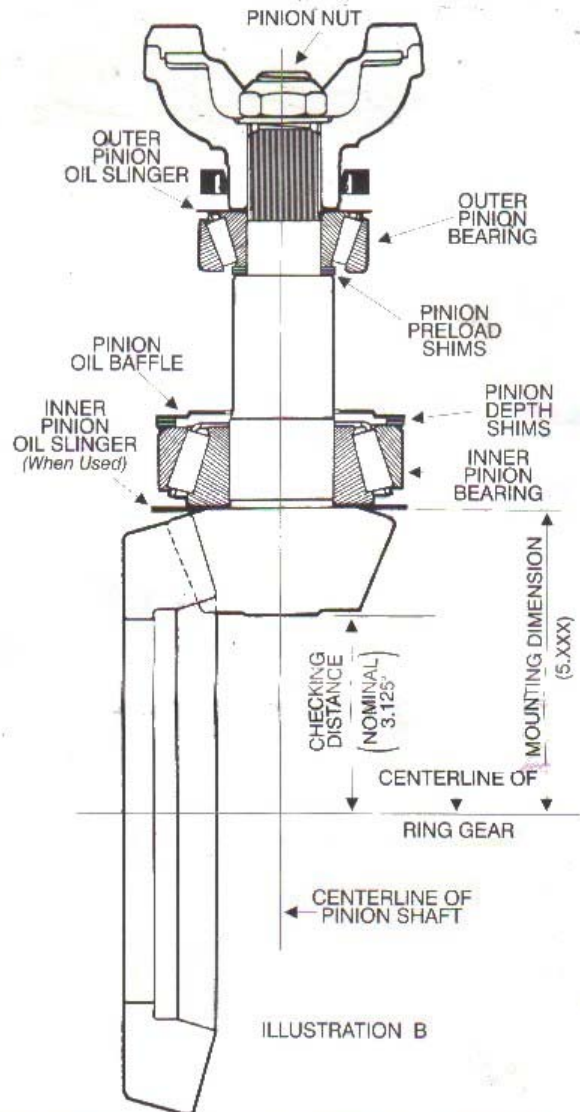


ILLUSTRATION B

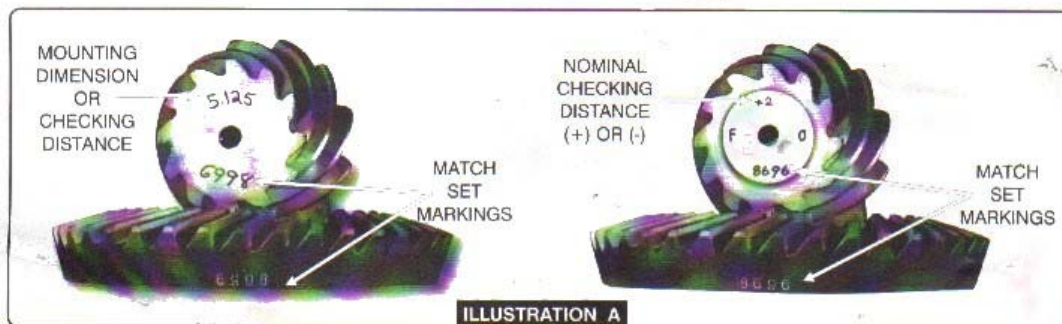


ILLUSTRATION A

Checking Backlash



ILLUSTRATION C

BACKLASH IS THE FREE MOVEMENT OF THE RING GEAR WITH THE PINION HELD FIXED IN PLACE.

BACKLASH SPECIFICATION .008" — .010"

BACKLASH CHANGE REQUIRED (INCH)	SIDE TO SIDE CHANGE REQUIRED (INCH)	BACKLASH CHANGE REQUIRED (INCH)	SIDE TO SIDE CHANGE REQUIRED (INCH)
.001	.002	.009	.012
.002	.003	.010	.014
.003	.004	.011	.014
.004	.005	.012	.016
.005	.006	.013	.018
.006	.008	.014	.018
.007	.010	.015	.020
.008	.010		

SPECIFICATIONS	
DESCRIPTION	TORQUE
Differential Bearing Cap Bolts	80-90 ft. lbs.
Cover Bolts	25-30 ft. lbs.
Ring Gear Bolts ¹ (R.H. Threads)	100-110 ft. lbs.
Pinion Preload ² (Torque to turn)	20-25 in. lbs.
Pinion Nut	240-260 ft. lbs.
Fluid Capacity	approx. 5 pints

- 1 coat with Loctite.
- 2 Torque required to rotate pinion shaft alone with new bearings installed and correct amount of preload shims.

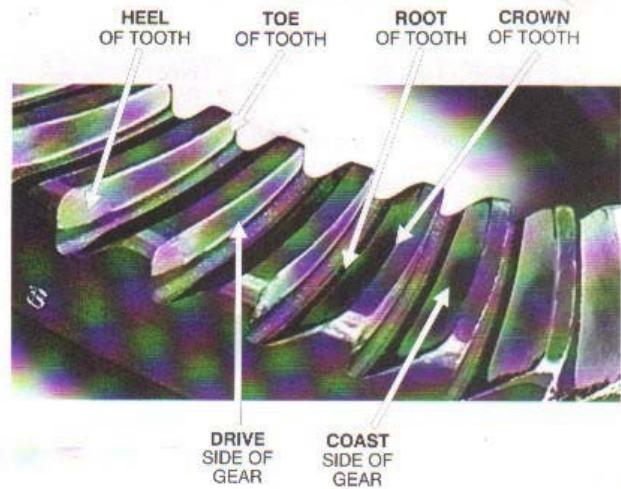
INSTALLATION KIT

Precision Gear installation kits are available for the Dana 60. The kit has all the necessary parts for easy installation including:



- pinion nut
- pinion seal
- pinion nut washer
- shim kit
- pinion bearings
- gasket
- ring gear bolts
- outer oil slinger
- baffle
- Loctite
- marking compound

* A master overhaul kit containing everything above plus carrier bearings is also available.



TOOTH CONTACT PATTERNS - (Drive Side of R/G)			
Letter	Tooth Contact	Condition	Remedy
A	HEEL TOE	IDEAL CONTACT Pattern is spread evenly over tooth profile with concentration nearer toe than heel	
B	HEEL TOE	COMPETITION CONTACT Pattern concentrated just up from the toe covering 1/3 to 1/2 of the tooth.	
C	HEEL TOE	HIGH CONTACT Pattern is concentrated at the crown of the drive gear tooth.	Move the pinion deeper in towards the differential carrier (add pinion shim).
D	HEEL TOE	LOW CONTACT Pattern is concentrated in the root of the drive gear tooth.	Move the pinion out away from the differential carrier (subtract pinion shim).
E	HEEL TOE	HEEL CONTACT Pattern is concentrated off the heel end of the drive gear tooth.	Move the ring gear closer to the pinion (decrease backlash) while maintaining minimum backlash.
F	HEEL TOE	TOE CONTACT Pattern is concentrated off the toe end of the drive gear tooth.	Move the ring gear away from the pinion (increase backlash) while maintaining minimum backlash.

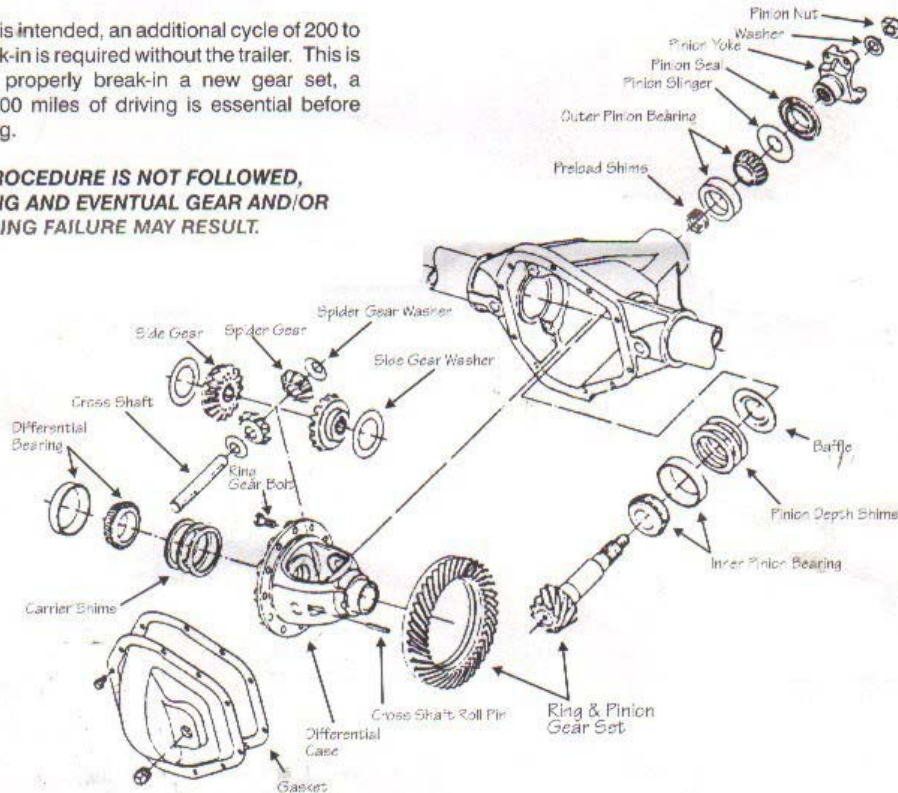
BREAK-IN PROCEDURE

All Precision Gear ring & pinion sets require a brief break-in period in order to ensure long life and quiet operation. The following break-in procedure is recommended before applying a heavy load and/or constant usage.

1. Insure that the axle has been filled to the correct level with proper hypoid lubricant, (GL5 or better).
2. Bring the axle to normal operating temperature by driving the vehicle (unloaded) for approximately 15 to 20 miles. Do not create any shock loads.
3. Let the axle assembly cool completely.
4. For the next 200 miles of operation, drive gently, without any heavy loads.
5. If trailer towing is intended, an additional cycle of 200 to 300 miles break-in is required without the trailer. This is important! To properly break-in a new gear set, a minimum of 500 miles of driving is essential before constant towing.

**IF THIS PROCEDURE IS NOT FOLLOWED,
OVERHEATING AND EVENTUAL GEAR AND/OR
BEARING FAILURE MAY RESULT.**

WARRANTY NOTICE: The manufacturer's obligation for warranty is limited to defects in either material and/or workmanship of the product. Returns shall be limited to either repairing, replacing or crediting at the MANUFACTURER'S OPTION any parts found to be defective. This warranty is void on all products which show any evidence of misapplication, improper installation, lack of lubrication, improper lubrication, abuse, negligence or alteration of design. In no event shall the manufacturer have any liability for related charges of any kind. This warranty is in lieu of any other warranties, either expressed or implied, including any implied warrants of merchantability of fitness for any particular purpose.



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