

Drive Axles

SPICER (DANA) IFS AXLE

Ford, Front Axle

NOTE: FRONT AXLE USAGE — The Spicer (Dana) models 44-IFS, 44-IFS-HD & 50-IFS are used as front axles only. The 44-IFS is used on vehicles with front coil springs. The 44-IFS-HD and 50-IFS axles are used on vehicles with leaf springs.

NOTE: For removal and installation instructions, see appropriate articles on Locking Hubs and 4-Wheel Drive Steering Knuckles in this section.

DESCRIPTION

The Independent Front Suspension (IFS) front axle is of the integral carrier-housing, hypoid-gear type. The centerline of drive pinion is mounted above centerline of ring gear.

The drive pinion bearing preload, and side bearing preload are all set or adjusted by shims. Other than the components required for front wheel drive units, drive pinion depth and some torque specifications, service and overhaul procedures for all axle models are the same.

AXLE RATIO & IDENTIFICATION

All Spicer (Dana) drive axles have a removable rear cover plate. The cover plate has a unique shape that allows positive identification of Spicer (Dana) drive axles on any vehicle. See Fig. 1.

A metal tag, stamped with gear ratio and part number is secured to housing by 2 carrier bolts. If axle is equipped with limited slip differential, the axle I.D. tag will have the letters "LS" following the part numbers. The axle model can be determined by measuring the diameter of ring gear. See the Model Identification Table. To determine the drive axle ratio, refer to Drive Axle Ratio Identification in this section.

Fig. 1: Spicer (Dana) Housing Cover Gasket

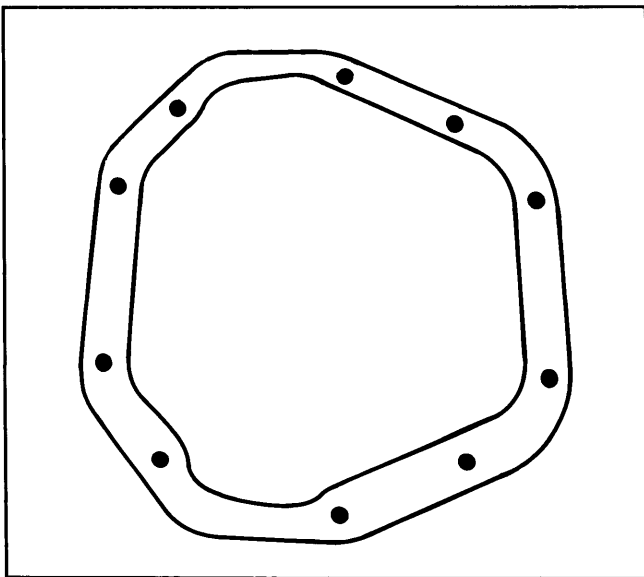


Illustration for identification purposes.

MODEL IDENTIFICATION BY RING GEAR DIAMETER

Model	Ring Gear Diameter
44	8.50"
50	9.25"

REMOVAL & INSTALLATION

AXLE SHAFTS & BEARINGS

Removal

1) Raise vehicle and support with safety stands. If equipped with locking hubs, see removal and installation instructions for Locking Hubs and 4-Wheel Drive Steering Knuckles in appropriate articles in this section.

2) Remove wheel and brake caliper assembly. Remove hub dust cover and snap ring. Remove drive gear and pressure spring. Remove wheel bearing lock nut, lock ring, and adjusting nut, using front wheel bearing spanner (T59T-1197-B for F150/250 and Bronco, or T78T-1197-A for F350).

3) Remove hub and disc assembly. Remove spindle retaining nuts. Carefully remove spindle from knuckle studs and axle shaft. It may be necessary to tap spindle with a soft mallet to break it loose. Remove spindle, splash shield, and axle shaft assembly.

4) Remove stub shaft and slip yoke assembly by removing 3 bolts attaching retainer plate to carrier housing. Place axle shaft in vise, and drill a 1/4" (6.35 mm) hole in housing retainer ring to a depth 3/4 of the rings thickness.

5) With a chisel placed across hole, strike sharply with mallet to remove retaining ring. Replace bearing retaining ring upon assembly. Press bearing from axle shaft, using special axle bearing removal tools (T80T-4000-M and T80T-4000-L).

6) Remove seal and retainer plate from stub shaft. Discard and replace with new seal upon assembly. Do not strike axle shaft to free it. Do not use heat from any source to remove retaining ring.

7) If old bearing is to be reused and is still installed on axle shaft, lubricate it as follows:

- Push bearing retainer and seal toward flange end of shaft, being careful that seal does not come off machined part of shaft.
- Fill cavity between seal and bearing with grease.
- Wrap masking tape around seal and bearing to retain grease.
- With masking tape in place, pull seal up toward bearing, forcing grease into bearing.
- If grease does not appear at small end of rollers, repeat procedure. See Fig. 2.

Installation

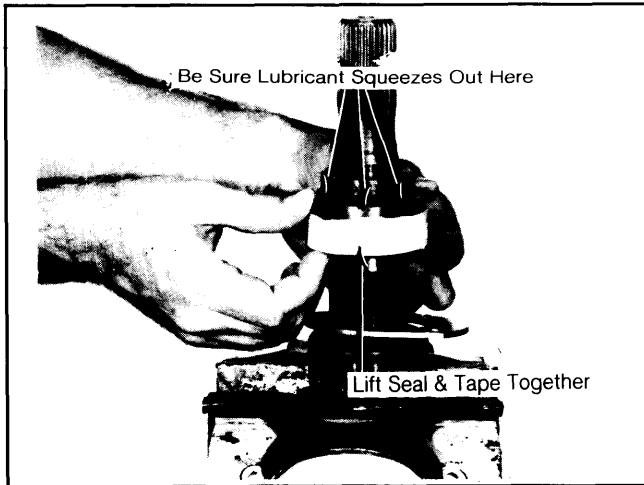
1) Inspect retainer plate and stub shaft for nicks or burrs. Replace if necessary. Install retainer plate and new seal on shaft. Coat oil seal with grease. Place bearing on shaft.

2) Use axle bearing installer (T80T-4000-N) and pinion bearing cone remover (T71P-4621-B) to press bearing onto shaft. A .0015" (.04 mm) feeler gauge should not fit between bearing seat and bearing.

3) Install stub shaft in carrier, and install 3 retainer bolts. Tighten to specifications. Install right-hand axle shaft assembly into slip yoke. There is a blind spline on axle shaft assembly.

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Fig. 2: Lubricating Bearing Installed on Axle Shaft



Grease must appear at small end of rollers.

4) Install splash shield and spindle, using new nuts. Tighten to specifications. Install hub and disc assembly. Install caliper and wheel assembly.

PINION YOKE & SEAL

NOTE: Pinion seal can be serviced with axle assembly installed in vehicle.

Removal

1) Disconnect drive shaft, and scribe a line down pinion shaft, yoke and nut. Remove nut and yoke. Do not hammer yoke off. Damage to pinion gear, ring gear and bearing could result.

2) Pry seal from bore, using care not to damage machined surfaces.

Installation

1) Lubricate cavity between seal lips with high melting point lubricant. Install seal into bore, making sure it bottoms against shoulder.

2) Place flange on shaft and draw it down with pinion nut. Tighten nut to specifications. Install drive shaft.

CAUTION: Failure to tighten pinion nut to full specifications will result in flange or pinion shaft failure.

AXLE ASSEMBLY

Removal

Raise vehicle on hoist, supporting axle assembly to take weight off springs. Disconnect drive shaft at pinion flange and tie out of the way. Remove hub and disc assemblies. Disconnect vent tube (if equipped), and disconnect shock absorber at axle brackets. Disconnect springs and remove axle.

Installation

Reverse removal procedures to complete installation.

OVERHAUL

DISASSEMBLY

NOTE: Axle housing does not need to be removed to overhaul assembly. However, it is suggested

that the entire axle unit be removed from vehicle and held tight in a stand or rack.

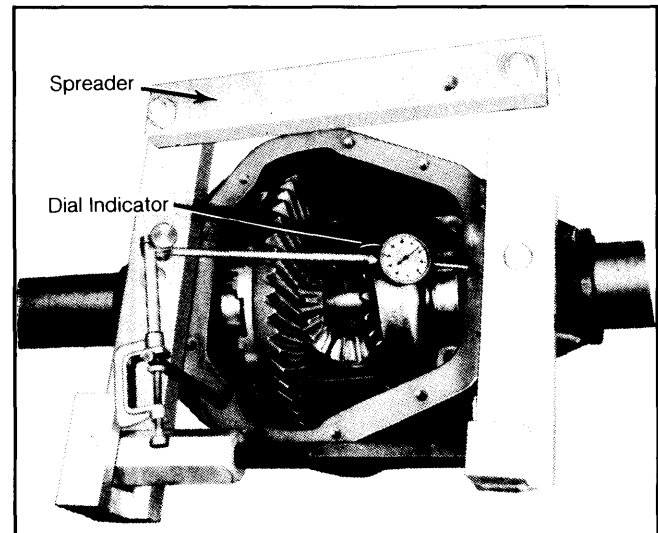
1) Remove housing cover, and mark differential bearing caps for alignment reference. Loosen bearing cap bolts and install axle housing spreader tool (D-113) with holding clamps.

CAUTION: Do not spread housing more than .010" (.25 mm). Permanent damage to housing could result.

2) Mount dial indicator on axle housing to measure amount of spread. Remove dial indicator after housing has been spread. Remove bearing cap bolts. Note the matched numbers or letters stamped on the cap and carrier. These letters must be matched upon reassembly.

3) Carefully pry differential assembly out of housing. Remove spreader tool immediately so that housing does not take set. See Fig. 3.

Fig. 3: Spreading Spicer (Dana) Carrier Housing



Do not spread housing more than .010" (.25 mm).

4) Mount differential in vise. Remove ring gear bolts. Using brass drift and hammer, remove ring gear. Remove pinion mate lockpin with small punch. Remove pinion mate shaft and thrust block.

5) Rotate pinion gears until gears are aligned with case opening. Remove gears and thrust washers. Remove pinion nut. With puller remove pinion yoke. Using soft-faced mallet, drive pinion shaft out of housing.

NOTE: Pinion bearing adjusting shims may remain on pinion shaft, stick to bearing, or fall loose. Collect them and save for reassembly.

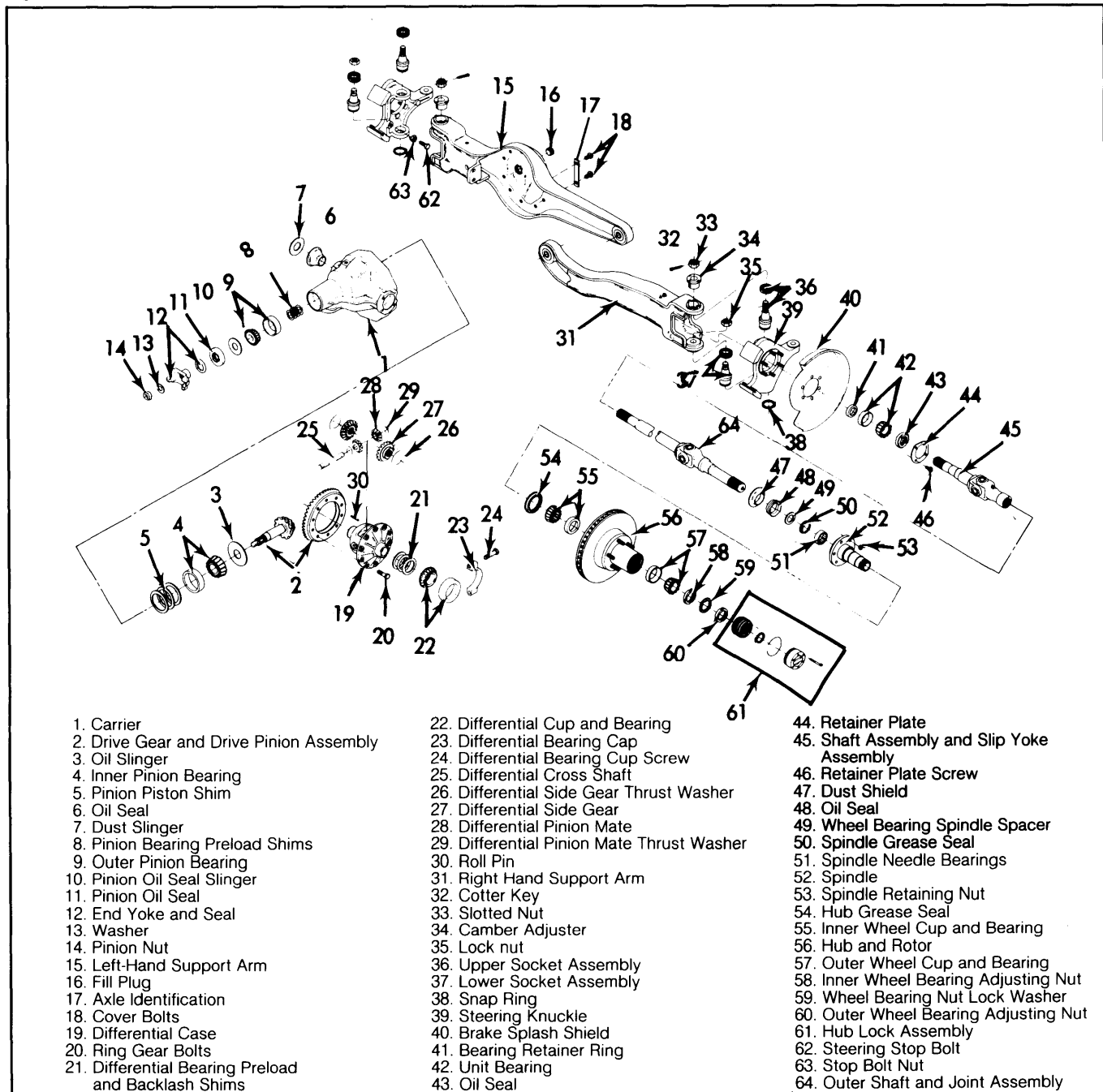
6) From pinion shaft bore, remove oil seal and discard. Remove bearing cone. A baffle or oil slinger may also be present. Record the order in which they were removed so that they may be installed correctly.

7) Press pinion bearing off shaft. Using a puller, remove side bearings from differential case. During removal of side bearings, shims between bearings and case may be mutilated. If so, shims must be individually measured and their thicknesses recorded, so that new shim packs can be secured.

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Fig. 4: Exploded View of Spicer (Dana) Model 44-IFS Front Drive Axle



REASSEMBLY & ADJUSTMENT

Case Assembly

1) Place differential case in holding fixture or vise. Lubricate side gears, pinion gears and all thrust washers. Install in case. Rotate side gears until holes in pinion gears and washers line up with holes in case.

2) Install spacer block (if equipped) and differential pinion shaft. If old thrust washers are used, check for preload of side gears. Clearance between side gears and case should be .000-.006" (.00-.15 mm). If not, shims can be installed (at least 1 on each side) or new thrust washers used.

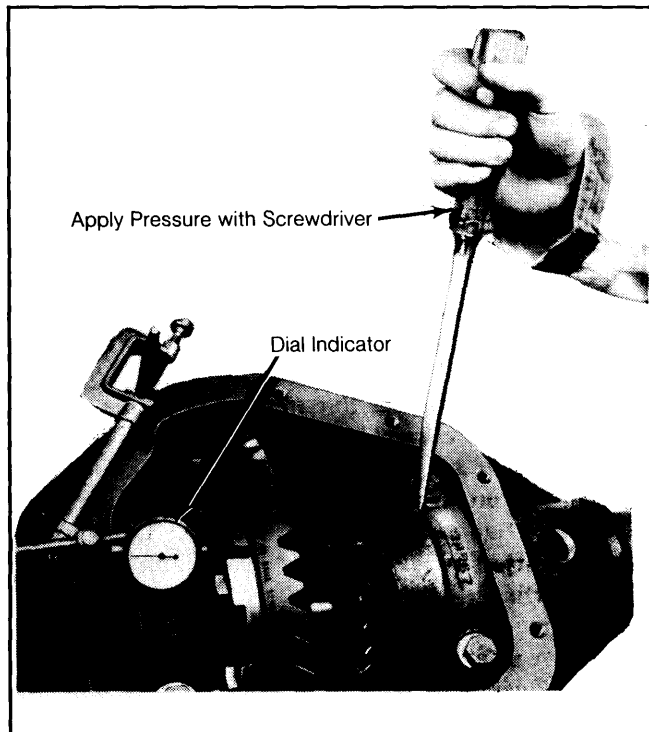
3) Install lock pin, and peen over hole to retain pin. Inspect ring gear and case for burrs and nicks. Install ring gear and tighten bolt evenly. Install differential side bearings. Assemble case in housing without shims.

4) Install bearings caps, and tighten bolts just enough to seat bearing cups. Mount dial indicator to read at back of differential flange.

5) Measure and record amount of side play by moving differential case back and forth with a screwdriver. The measurement will be used later to determine proper shim pack dimension. Remove case from housing. See Fig. 5.

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Fig. 5: Measuring Differential End Play With Dial Indicator



Push back and forth and read dial indicator.

Pinion Depth & Bearing Preload

1) Pinion is adjusted by shims placed between inner bearing cup and housing, and by shims placed between pinion shaft shoulder and outer bearing. Shims behind inner bearing cup adjust position of pinion in relation to ring gear. Shims behind outer bearing adjust pinion inner and outer bearing preload.

2) If old pinion and ring gear assembly are used, proceed as follows:

- Install original shims and inner bearing cup.
- Install outer bearing cup. Press bearing cone onto pinion shaft and install shaft into housing.
- Install outer bearing cone, companion flange, and nut. Do not install outer shims or seal at this time.
- Tighten nut to obtain bearing preload of 10-30 ft. lbs. (14-41 N.m). Use a gauge to measure distance from ring gear center to machined button on end of pinion gear.
- Add or subtract shims from under inner bearing cup to obtain nominal dimension listed in specifications.

3) If new pinion and ring gear assembly are to be installed, proceed as follows:

- Determine pinion depth adjustment figure of old and new pinions and find shim adjustment figure from chart.
- Adjust original shim pack accordingly and proceed as in step 2).

NOTE: An oil slinger between inner bearing cone and pinion, and a baffle, between inner bearing cup and carrier, have been added to front axle assemblies.

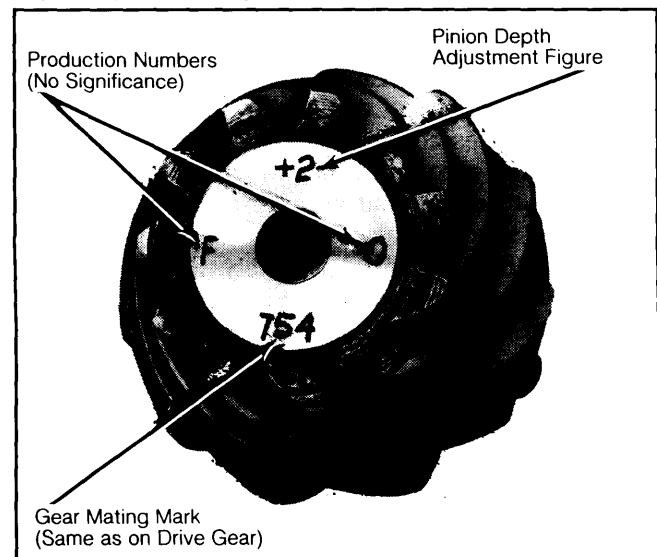
4) Remove pinion gear, rear bearing cup, and starter shim. Install pinion depth shim of correct thickness in housing bearing cup bore. Reinstall rear bearing cup.

5) Install pinion bearing, oil slinger, yoke, washer, and old pinion nut. Tighten nut to specifications, while rotating pinion shaft. Position housing so that pinion shaft is in vertical position (pointing up).

6) With INCH lb. torque wrench, rotate shaft through several revolutions to measure rotating torque. Check measurement against pinion bearing preload in specifications. To decrease preload, add shims; to increase preload, subtract shims.

NOTE: Ignore torque needed to start shaft rotating.

Fig. 6: Pinion Gear Markings Showing Depth Adjustment Figure



Ring gear and pinion numbers must match.

7) After adjustment is made, install oil seal and recheck pinion depth. Check seals in front axle housing bores. If condition is questionable, replace using installer tool.

NOTE: When installing front axle shafts be sure that seals are not dislodged.

Side Bearing Preload

1) With pinion installed in housing and depth and preload adjustment properly made, install differential case into housing. Set dial indicator so that it reads at back of ring gear. Leave bearing cap bolts loose enough to allow movement of case.

2) Insert screwdriver between bearing cap and housing at opposite end from ring gear. Jam case toward ring gear side and, with force still applied to case, set dial indicator to zero.

3) Jam case the other way making sure that ring gear and pinion gears mesh, record reading, repeat several times until readings are the same. This reading is the amount of shims that will go between case and bearing on ring gear side.

4) Remove indicator and differential case from carrier. Remove master bearing from differential case. Install these shims. From the figure originally recorded under Case Assembly, subtract amount of shims just installed on case.

5) Add .015" (.38 mm) for bearing preload and install new shim pack on end of case opposite ring gear.

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Example:

Original recorded side play	+ .070"
Side play with pinion installed	- .032"
Amount left from original side play	= .038"
Additional amount for bearing preload	+ .015"
Amount installed opposite of ring gear	= .053"

6) Install spreader to housing, spread housing and install differential case. Do not spread housing more than .010" (.25 mm). Remove spreader and install bearing caps. Make sure that caps are in original position. Tighten caps evenly to specifications.

Backlash & Final Assembly

1) Mount dial indicator to housing, and measure ring gear to pinion gear backlash in 3 places around ring gear. Variation between readings should not exceed .002" (.05 mm).

2) Adjust to specifications by moving shims from one side of differential case to the other, or by changing depth of pinion gear.

3) Check tooth contact pattern. See *Tooth Pattern* in this section. Install cover and tighten bolts.

TIGHTENING SPECIFICATIONS

Application	Ft. Lbs. (N.m)
Pinion Shaft Flange Nut	210 (286)
Differential Side Bearing Cap Bolt	50 (68)
Ring Gear-to-Differential Case Bolt	55 (75)
Axle Shaft Retainer Bolt	30 (41)
Stub Shaft Retainer Bolts	40 (54)
Splash Shield	60 (81)

AXLE ASSEMBLY SPECIFICATIONS

Application	Specifications
Axle Shaft End Play	Non-Adjustable
Ring Gear Backlash	.005-.009" (.13-.23 mm)
Side Bearings Preload	
New Bearings	20-40 INCH lbs. (2.2-4.5 N.m)
Used Bearings	10-20 INCH lbs. (1.1-2.2 N.m)
Pinion Gear Depth (Nominal Dimension)	
Model 44 (8.50" R.G.)	2.625" (66.68 mm)
Model 50 (9.25" R.G.)	2.810" (71.37 mm)

PINION DEPTH SHIM ADJUSTMENT CHART (INCHES)

Old Pinion Marking	New Pinion Marking								
	-4	-3	-2	-1	0	+1	+2	+3	+4
+4	+0.008	+0.007	+0.006	+0.005	+0.004	+0.003	+0.002	+0.001	0
+3	+0.007	+0.006	+0.005	+0.004	+0.003	+0.002	+0.001	0	-0.001
+2	+0.006	+0.005	+0.004	+0.003	+0.002	+0.001	0	-0.001	-0.002
+1	+0.005	+0.004	+0.003	+0.002	+0.001	0	-0.001	-0.002	-0.003
0	+0.004	+0.003	+0.002	+0.001	0	-0.001	-0.002	-0.003	-0.004
-1	+0.003	+0.002	+0.001	0	-0.001	-0.002	-0.003	-0.004	-0.005
-2	+0.002	+0.001	0	-0.001	-0.002	-0.003	-0.004	-0.005	-0.006
-3	+0.001	0	-0.001	-0.002	-0.003	-0.004	-0.005	-0.006	-0.007
-4	0	-0.001	-0.002	-0.003	-0.004	-0.005	-0.006	-0.007	-0.008