

SPICER (DANA) SEMI-FLOATING AXLES

Chrysler Corp.
 Ford
 General Motors
 Jeep

NOTE — FRONT AXLE USAGE — The Spicer (Dana) models 30 & 50 are used as front drive axles. The models 44 & 60 are used as both front and rear drive axles, with semi-floating axles. The model 60 is also available with full-floating axles. See Spicer (Dana) Full-Floating Axles in this section.

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

DESCRIPTION

The axle assembly is the hypoid gear type with integral carrier housing and an over-hung mounted drive pinion. The drive pinion depth, pinion bearing preload and side bearing preload are all set or adjusted by shims. Other than the components required for front wheel drive units, service and overhaul procedures for all axle models are the same except for drive pinion depth and some torque specifications.

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. The axle model is often cast into the differential housing, or it can be determined by measuring the diameter off the ring gear. See the following chart. To determine the drive axle ratio, refer to Drive Axle Ratio Identification in this section.

AXLE RATIO & IDENTIFICATION

Model I.D. By Ring Gear Diameter

Model I.D.	Ring Gear Diameter
Model 30	7.25"
Model 44	8.50"
Model 50	9.25"
Model 60	9.75"

REMOVAL & INSTALLATION

NOTE — For front axle shaft and bearing removal, see Spicer (Dana) Full-Floating Axles or 4-Wheel Drive Steering Knuckles in this section.

AXLE SHAFTS & BEARINGS

NOTE — Spicer (Dana) semi-floating axles do not require an end play adjustment.

Removal — 1) Raise vehicle and support with safety stands. Remove wheel, brake drum retaining clips, and brake drum.

NOTE — If it is necessary to back off brake shoes to remove drum, be sure that automatic adjuster lever is held away from starwheel before rotating starwheel.

2) Remove bearing retainer bolts and pull axle shaft out of housing. If axle seems stuck, install wheel to flange and use wheel for leverage.

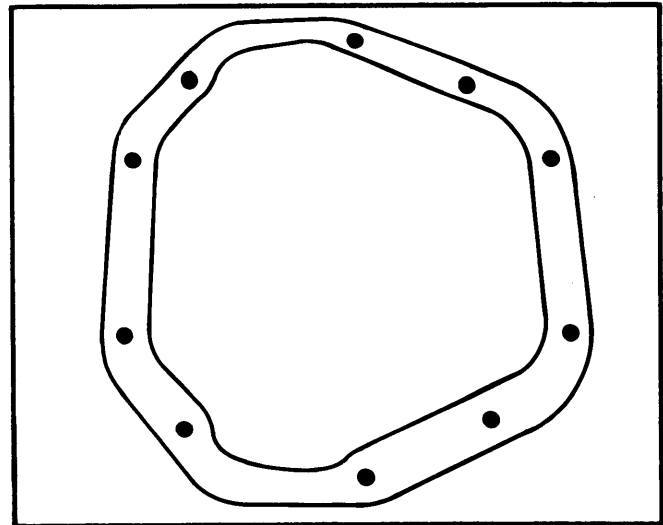


Fig. 1 Spicer (Dana) Housing Cover Gasket for Identification Purposes

CAUTION — Do not strike axle shaft to free it.

3) Using a suitable puller, remove bearing cup and oil seal from bore of axle housing. To remove bearing from axle, cut through bearing retaining ring with a cold chisel without nicking axle shaft. With retainer removed, press bearing off shaft. Remove outer oil seal and retainer plate from axle shaft.

CAUTION — Do not use heat from any source to remove retaining ring.

NOTE — If old bearing is to be reused and is still installed on axle shaft, it can be lubricated as follows: Push bearing retainer and seal towards 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 towards bearing, forcing grease into bearing. If grease does not appear at small end of rollers, repeat procedures.

CAUTION — Be sure that no grease is on flange side of seal.



Fig. 2 Lubricating Bearing Installed on Axle Shaft

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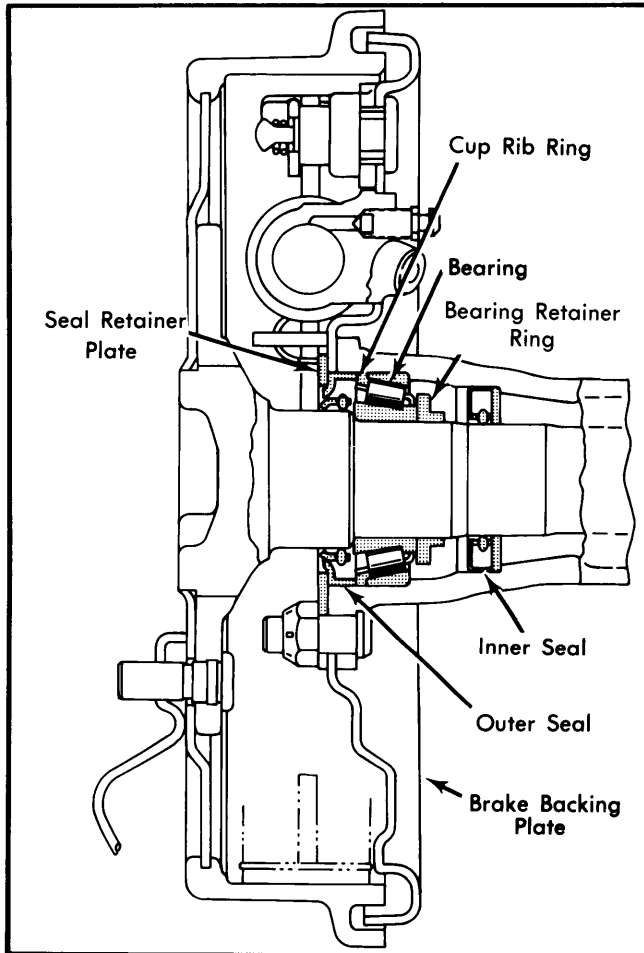


Fig. 3 Sectional View of Flanged Shaft End With Non-Adjustable Bearing

Removal — 1) Raise vehicle and support with safety stands. Remove wheel and tire assembly, and brake caliper.

2) Remove brake backing plate and bearing retaining plate nuts through access hole in axle shaft flange.

3) Bolt a suitable adapter (J-21579) to lug bolts on axle shaft flange. Attach a slide hammer to adapter and remove axle shaft from housing.

4) Pry out axle shaft oil seal from axle housing.

5) Mount axle shaft in a vise. Drill a $\frac{1}{4}$ " hole in bearing retainer ring. Drill hole to a depth $\frac{3}{4}$ of ring thickness. Do not allow drill to contact axle shaft.

6) Place a chisel over drilled hole in ring. Using chisel, cut a deep groove in ring. This will enlarge ring and allow it to be removed from axle shaft.

NOTE — Do not heat retaining ring. Heat will transfer to bearing journal and weaken it.

7) Position a suitable support plate (J-23674) under bearing. Place bearing and support plate in a hydraulic press and remove bearing from axle shaft.

8) Cut through oil seal using a hacksaw. Remove seal and retainer plate. Inspect seal surface on axle shaft for damage. Repair any scratches with crocus cloth.

Installation — 1) Position retainer plate on axle shaft. Pack a suitable wheel bearing grease between oil seal lips.

2) Install oil seal on axle shaft. Make sure outer face of seal faces axle flange.

3) Position bearing on axle shaft. Make sure cup rib ring is facing axle flange. Install a new bearing retainer ring on axle shaft.

4) Using support plate used during bearing removal, press bearing and retainer ring on axle shaft at same time. Make sure bearing and ring are seated against axle shaft shoulder.

5) Install a new oil seal in axle housing tube. Slide axle shaft assembly into position in tube. Care must be taken not to damage seal lip.

6) Apply wheel bearing grease around outside of bearing before sliding into place. Tap flange with a rubber mallet to drive axle into place.

7) Install brake backing plate and retainer plate nuts and lockwashers. Install brake drum. Install wheel and tire and lower vehicle.

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 using tool (J-8614-01) and yoke using tool (J-8614).

CAUTION — 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 — Lubricate cavity between seal lips with a high melting point lubricant. Install seal into bore making sure that it bottoms against shoulder. Place flange on shaft and draw it down with pinion nut. Tighten pinion nut to specifications.

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

AXLE ASSEMBLY

Removal — Raise vehicle on hoist and support axle assembly to take weight off springs. Disconnect drive shaft at pinion flange and tie out of way. Remove hub and drum assembly. Disconnect vent tube (if equipped), and disconnect parking brake cable(s) and service brake hydraulic lines. Disconnect shock absorbers at axle brackets. Disconnect springs and remove axle.

Installation — Reverse removal procedure. Do not fully tighten shock absorbers nut until assembly is completed. Bleed hydraulic lines and adjust parking brake before moving vehicle.

SPICER (DANA) SEMI-FLOATING AXLES (Cont.)

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 the 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. Mount dial indicator on axle housing to measure amount of spread.

CAUTION — Do not spread housing more than .020". Permanent damage to housing could result.

2) Remove dial indicator after housing has been spread. Remove bearing cap bolts. Carefully pry differential assembly out of housing. Remove spreader tool immediately so that housing does not take set. Mount differential in vise and using brass drift and hammer, remove ring gear. Remove pinion mate lockpin with small punch. Remove pinion mate shaft and thrust block. Rotate pinion gears until gears are aligned with case opening. Remove gears and thrust washers.

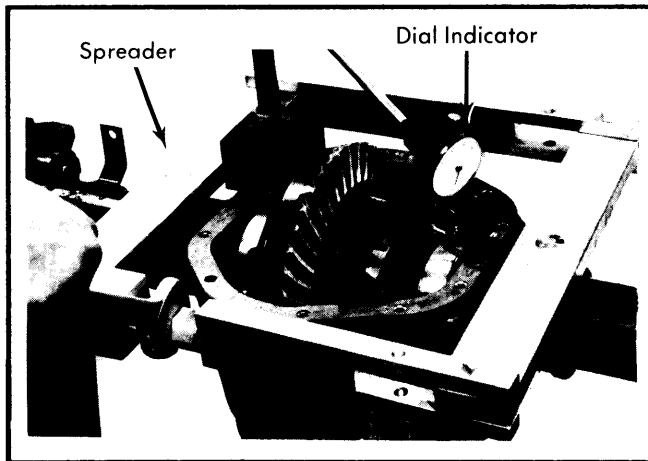


Fig. 4 Correct Procedure to Spread Carrier Housing

3) Remove pinion nut. With suitable puller, remove pinion yoke. Using soft-faced hammer, 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.

4) From pinion shaft bore, remove oil seal and 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. Discard seal. Remove inner bearing cone and press pinion bearing off shaft.

5) Using a suitable puller, remove side bearings from differential case. Often during removal of side bearings, shims between bearings and differential case are mutilated. If so, shims must be individually measured and their thicknesses recorded, so that new shim packs can be secured.

REASSEMBLY & ADJUSTMENT

Case Assembly — 1) Place differential case in holding fixture or vise. Lubricate side and pinion gears and all thrust washers and install in case. Rotate side gears until holes in pinion gears and washers line up with holes in case. 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"; if not, shims can be installed (at least one on each side) or new thrust washers used. Install lock pin and peen over hole to retain pin. Inspect ring gear and case for burrs and nicks. Install ring gear and tighten bolts evenly.

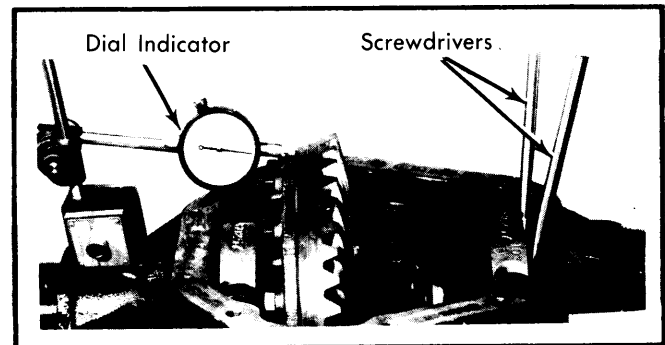


Fig. 5 Measuring Differential End Play With a Dial Indicator

2) Install differential side bearings. Assemble case in housing WITHOUT shims. Install bearing caps and tighten bolts just enough to seat bearing cups. Mount dial indicator to read at back of differential flange. Measure and record amount of side play of differential case by moving back and forth with a screwdriver (see illustration). The measurement will be used later to determine proper shim pack dimension. Remove case from housing.

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. Use a suitable 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 (see illustration) of old and new pinions and find shim adjustment figure from chart. Adjust original shim pack accordingly and proceed as in step 2).

NOTE — The previous procedures also apply to pinion adjustment on the FRONT AXLE, which includes the oil slinger between the inner bearing cup and carrier.

SPICER (DANA) SEMI-FLOATING AXLES (Cont.)

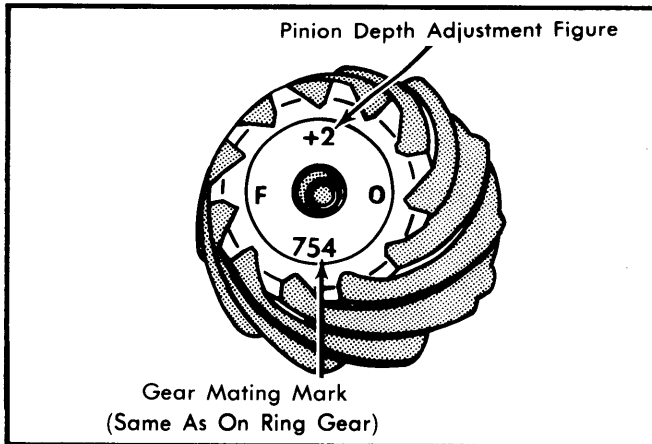


Fig. 6 Pinion Gear Markings Showing Depth Adjustment Figure

4) Remove pinion gear, rear bearing cup, and starter shim. Install pinion depth shim of correct thickness in housing bearing cup core and reinstall rear bearing cup. Install pinion bearing preload shims. Install pinion gear, front bearing, oil slinger (if equipped), yoke, washer, and old pinion nut. Tighten nut to specified torque, while rotating pinion shaft. Position housing so that pinion shaft is in vertical position, pointing up. With INCH lb. torque wrench, rotate shaft through several revolutions to measure rotating torque.

NOTE — Ignore torque needed to start shaft rotating.

5) Check measurement against pinion bearing preload in specifications. To decrease preload, add shims; to increase preload, subtract shims. After adjustment is made, install oil seal and recheck pinion depth.

6) All FRONT AXLES have axle shaft oil seals, which are pressed into the tube ends of the carrier. There are two dif-

ferent designs. Check seals in axle housing bores. If condition is questionable, replace, using suitable installer tool.

NOTE — When installing front axle shaft be sure that these seals are not dislodged.

Side Bearing Preload — 1) With pinion installed in housing and depth and preload adjustments properly made, install differential case into housing and set dial indicator so that it reads at back of ring gear. Leave bearing cap bolts loose enough to allow movement of case. 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. Jam case the other way (making sure that ring and pinion gears mesh) and record reading. Repeat several times until readings are the same. This reading is amount of shims that will go between case and bearing on ring gear side. Remove indicator and differential case from the carrier. Remove master bearing from differential case. Install these shims.

2) From the figure originally recorded under Case Assembly, subtract amount of shims just installed on case. Add .015" for bearing preload and install new shim pack on end of case opposite ring gear.

Example: +.070" (Original Recorded Sideplay)
 −.032" (Sideplay With Pinion Installed)
 =.038" (Amount Left From Original Sideplay)
 +.015" (Additional Amount For Bearing Preload)
 =.053" (Amount Installed Opposite of Ring Gear)

3) Install spreader to housing, spread housing and install differential case.

NOTE — Do not spread housing more than .020". Permanent damage to housing could result.

4) Install differential assembly. Remove spreader and install bearing caps. Make sure that caps are in original position, then tighten caps evenly.

PINION DEPTH SHIM ADJUSTMENT CHART (INCHES)									
Old Pinion	New Pinion								
	−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

Drive Axles

SPICER (DANA) SEMI-FLOATING AXLES (Cont.)

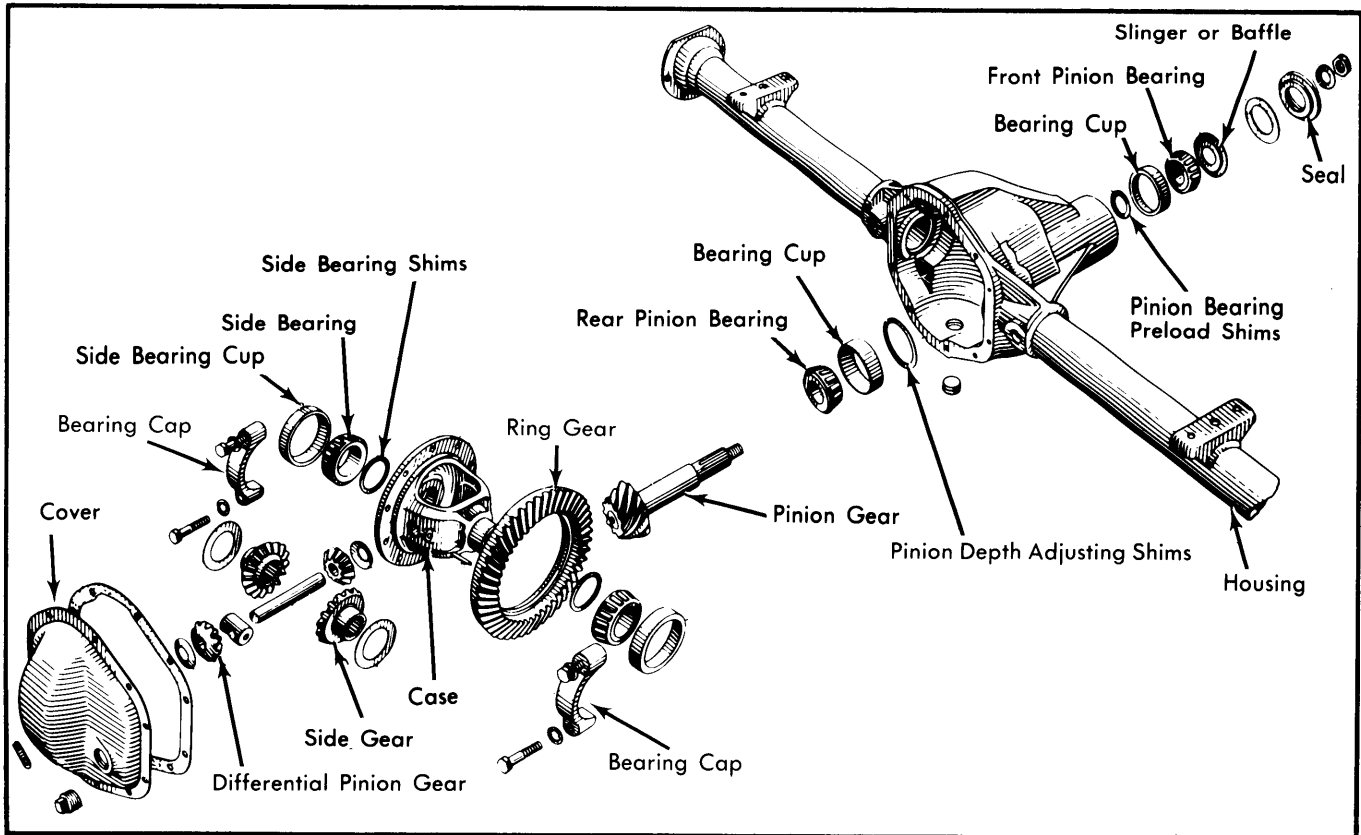


Fig. 7 Exploded View of Spicer (Dana) Model 44 Semi-Floating Axle Assembly

Backlash & Final Assembly – Mount dial indicator to housing and measure ring gear to pinion gear backlash in three places around ring gear (see specifications). Variation between readings should not exceed .002". Adjust to

specifications by moving shims from one side of differential case to other, or by changing depth of pinion gear. Check tooth contact pattern (see Tooth Contact Pattern in this section). Install cover and tighten bolts to specifications.

AXLE ASSEMBLY SPECIFICATIONS

Application	Specification
Axle Shaft End Play	Non-Adjustable
Ring Gear Backlash005-.010"
Side Bearing Preload015"
Pinion Bearing Preload	
New Bearings	20-40 INCH Lbs.
Used Bearings	10-20 INCH Lbs.
Pinion Gear Depth (Nominal Dimension)	
Model 44 (8.500" Ring Gear)	2.625"
Model 30 (7.125" Ring Gear)	2.250"

TIGHTENING SPECIFICATIONS

Application	Ft. Lbs.
Pinion Shaft Flange Nut	210
Differential Side Bearing Cap Bolt	50
Ring Gear-to-Differential Case Bolt	55
Axle Shaft Retainer Bolt	30
Differential Housing Cover Bolt	20