

## SPICER (DANA) SEMI-FLOATING AXLES

Chrysler Corp.; Front & Rear Axles  
Ford, General Motors, and Jeep; Rear Axles

**NOTE:** **FRONT AXLE USAGE** - The Spicer (Dana) models 44 & 60 are used as both front and rear drive axles, with semi-floating axles. The models 61 & 70 are used as rear drive axles, with semi-floating axles. 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 of 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.

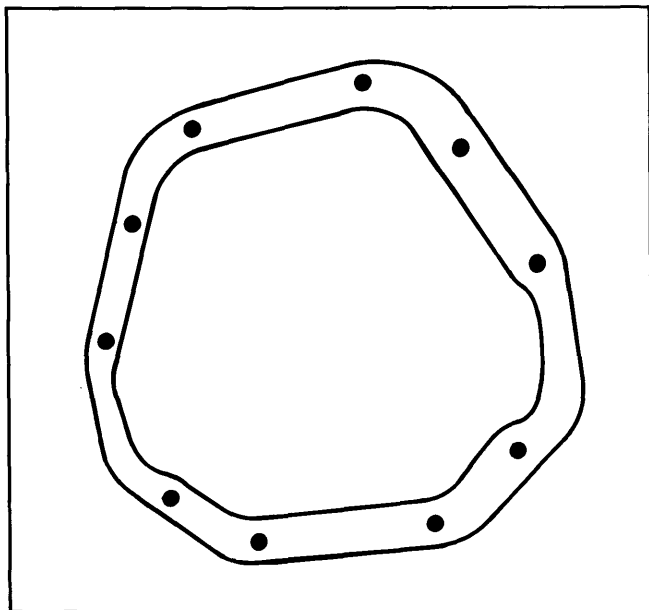
Other than the components required for front wheel drive units, service and overhaul procedures for all axle models are the same, except for drive pinion depth and some torque specifications.

### AXLE RATIO & IDENTIFICATION

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 of the ring gear. To determine the drive axle ratio, refer to Drive Axle Ratio Identification in this section.

Fig. 1: Spicer (Dana) Housing Cover Gasket.



Gasket shape aids in identification.

### MODEL I.D. BY RING GEAR DIAMETER

Model	Ring Gear Diameter
44	8.50"
60	9.75"
61	9.75"
70	10.50"

### 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 (With Axle Bearing Installed)

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

**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.

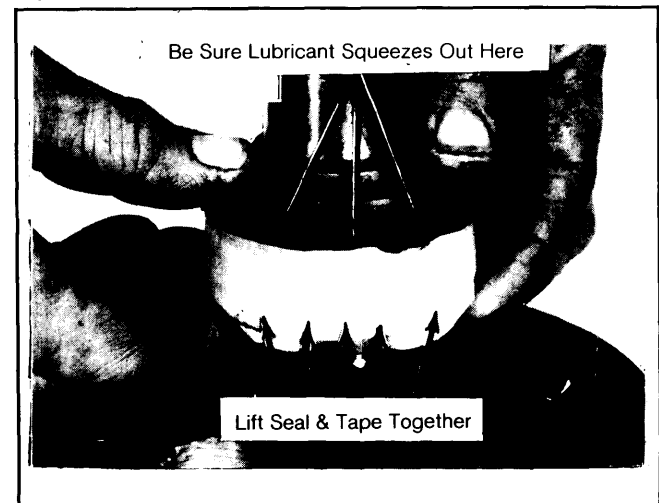
2) Remove bearing retainer bolts, and pull axle shaft out of housing. If axle seems stuck, install wheel to flange, and use wheel for leverage. Do not strike axle shaft to free it.

3) Using a puller, remove bearing cup and oil seal from bore of axle housing. To remove bearing from axle, cut through bearing retaining ring with a chisel, using care not to nick axle shaft.

4) 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.

Fig. 2: Lubricating Bearing Installed on Axle Shaft



If grease does not appear at small end of rollers, repeat procedures.

# Drive Axles

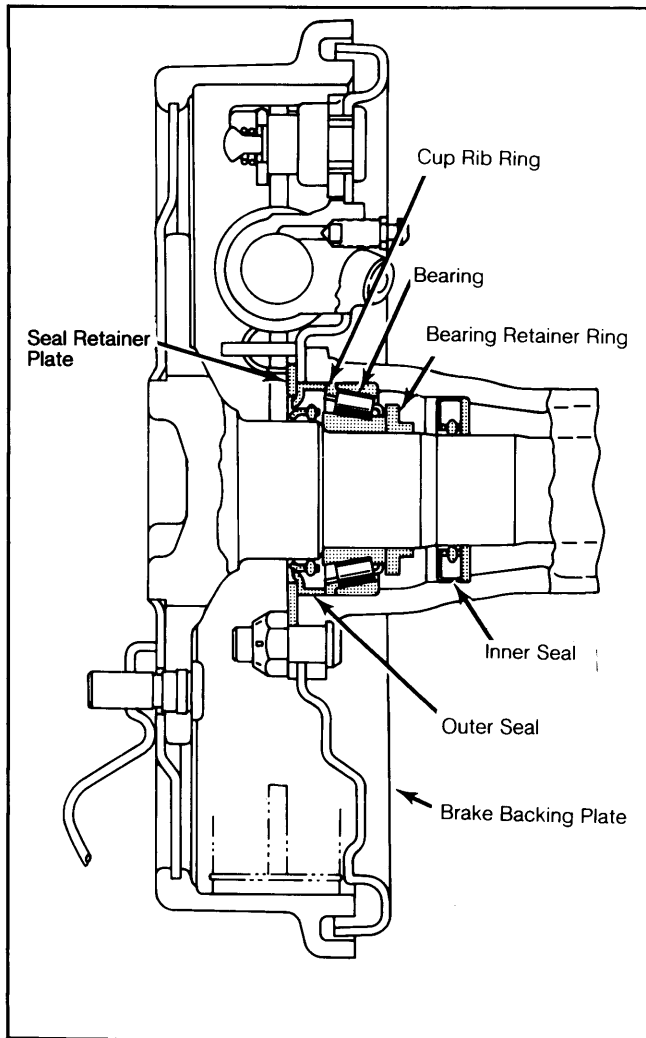
## SPICER (DANA) SEMI-FLOATING AXLES (Cont.)

5) 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. Be careful that seal does not come off machined part of shaft.
- Fill the cavity between seal and bearing with grease. Wrap masking tape around the 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.

**NOTE:** Be sure that no grease is on flange side of seal.

**Fig. 3: Sectional View of Flanged Shaft End**



Note non-adjustable bearing is used.

### Removal With Axle Bearing Installed

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 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. Mount axle shaft in a vise.

5) Drill a  $\frac{1}{4}$ " (6.35 mm) hole in bearing retainer ring. Drill hole to a depth  $\frac{1}{4}$  of ring thickness. Do not allow drill to contact axle shaft.

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

**CAUTION:** Do not heat retaining ring. Heat will transfer to bearing journal and weaken it.

7) Position 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 axle shaft seal surface for damage. Repair any scratches with crocus cloth.

### Installation

1) Position retainer plate on axle shaft. Pack 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 soft 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 yoke holder (J-8614-01) and yoke remover (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

1) 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.

2) Tighten pinion nut to specifications. Failure to tighten pinion nut to full specifications will result in flange or pinion shaft failure. Install drive shaft.

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

### AXLE ASSEMBLY

#### Removal

1) Raise vehicle on hoist. Support axle assembly to take weight off spring. Disconnect drive shaft at pinion flange, and tie out of the way. Remove hub and drum assembly.

2) Disconnect vent tube (if equipped). 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.

### OVERHAUL

#### DISASSEMBLY

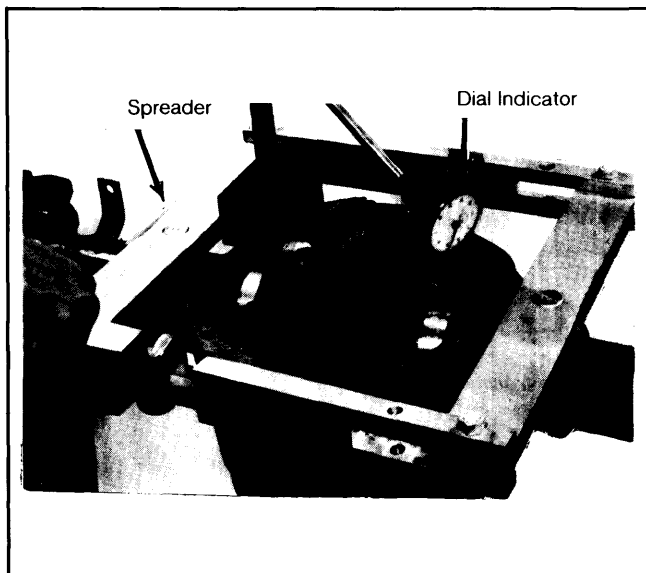
**NOTE:** Axle housing does not need to be removed to overhaul assembly. However, it is suggested that the entire axle unit be removed from the vehicle and held tight in a stand or rack.

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 .010" (.25 mm). 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.

**Fig. 4: Correct Procedure to Spread Spicer (Dana) Carrier Housing**



Do not leave spreader tension on housing or damage could result.

3) Mount differential in vise. Using brass drift and hammer, remove ring gear. Remove pinion mate lock pin with small punch. Remove pinion mate shaft thrust block. Rotate pinion gears until gears are aligned with case opening.

4) Remove gears and thrust washers. Remove pinion nut. Using puller, remove pinion yoke. Using soft-faced hammer, drive pinion shaft out of housing. From pinion hammer bore, remove oil seal and bearing cone.

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

5) A baffle or oil slinger may also be present. Record the order in which they were removed, so they may be installed correctly. Discard seal. Remove inner bearing cone and press pinion bearing off shaft.

6) Using a puller, remove side bearings from differential case. Often during removal of side bearings, shim 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

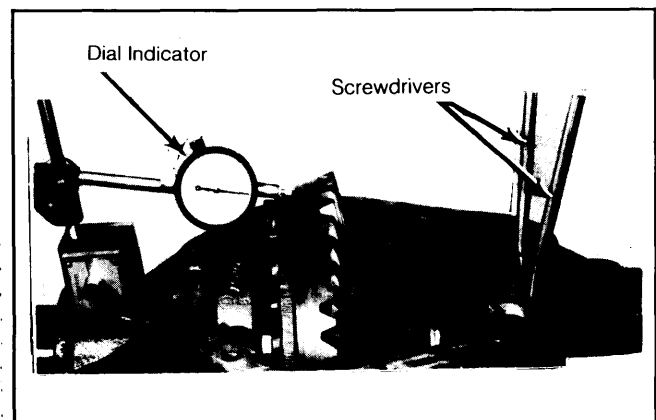
#### Case Assembly

1) Place differential case in holding fixture or vise. Lubricate side and pinion gears and all thrust washers. 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" (0-.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 bolts evenly. Install differential side bearings. Assemble case in housing without shims.

**Fig. 5: Measuring Differential Case End Play With a Dial Indicator**



Check end play without shims installed in case.

4) 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 it back and forth with a screwdriver. See Fig. 5.

# Drive Axles

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

5) 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, or between pinion shaft shoulder and outer bearing. Shims behind inner bearing cup adjust position of pinion in relation to ring gear.

2) Shims behind outer bearing adjust pinion inner and outer bearing preload. If old pinion and ring gear assembly are used, proceed as follows:

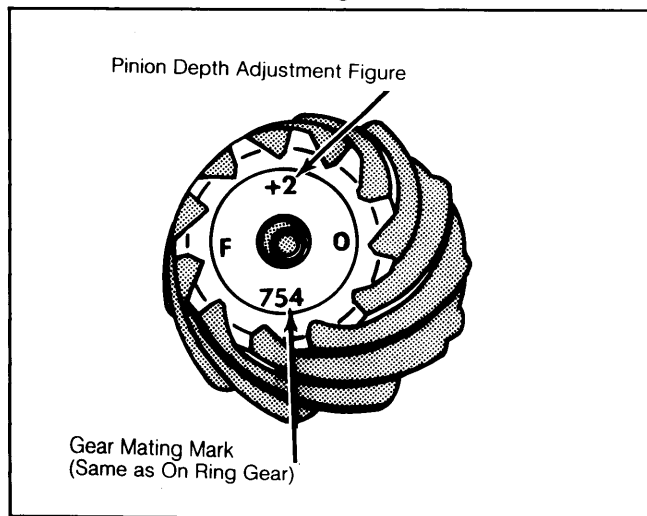
- Install original shims and inner bearing cup. Install outer bearing cup.
- Press bearing cone onto pinion shaft and install shaft into housing.
- Install outer bearing cone, companion flange, and nut.
- Do not install outer shims or seal at this time.
- Tighten nut to obtain bearing preload of 10-30 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. See Fig. 6. 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.

**Fig. 6: Location of Pinion Gear Markings Showing Depth Adjustment Figure**



Number on pinion and on ring gear must match.

4) Remove pinion gear, rear bearing cup, and starting shim. Install pinion depth shim of correct thickness in housing bearing cup core, and reinstall rear bearing cup. Install pinion bearing preload shims.

5) Install pinion gear, front bearing, oil slinger (if equipped), yoke, washer, and old pinion nut. Tighten nut to specified torque, while rotating pinion shaft.

6) Position housing, so that pinion shaft is in vertical position, pointing upward. With INCH lb. torque wrench, rotate shaft through several revolutions to measure rotating torque. Ignore torque needed to start shaft rotating.

7) 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.

8) Front axles have axle shaft oil seals, which are pressed into the tube ends of the carrier. There are 2 different designs. Check seals in axle housing bores. If condition is questionable, replace seals using installer of proper size.

**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. Set dial indicator so that it reads at back of ring gear.

2) 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. See Fig. 5.

3) 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 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.

Example:

+ .070" (1.78 mm) Original Recorded Side Play  
 - .032" (.81 mm) Side Play With Pinion Installed  
 = .038" (.97 mm) Amount Left From Original Side Play  
 + .015" (.38 mm) Additional Amount for Bearing Preload  
 = .053" (1.35 mm) Amount Installed Opposite of Ring Gear

6) Install spreader to housing, spread housing, and install differential case. Do not spread housing more than .010" (.25 mm). Install differential assembly.

7) Remove spreader, and install bearing caps. Make sure that caps are in original position. Tighten caps evenly to specifications.

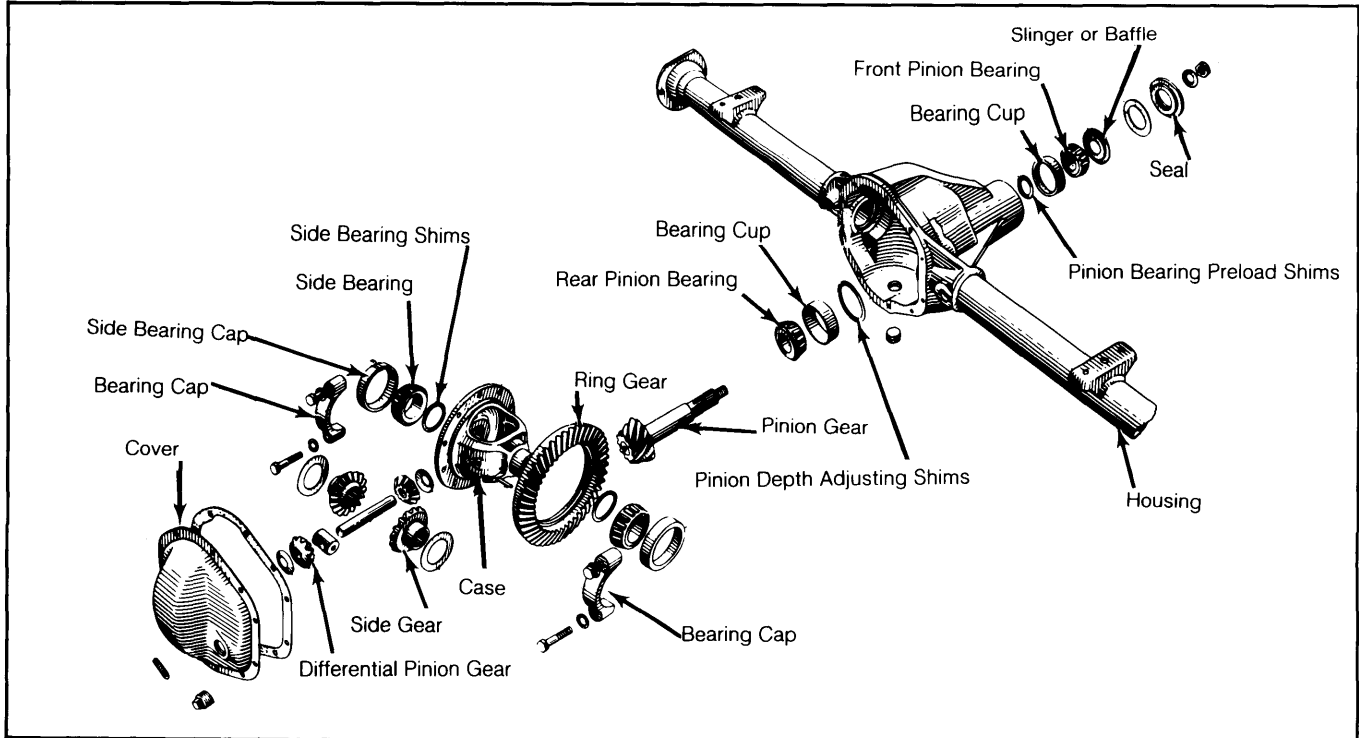
### Backlash & Final Assembly

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" (.051 mm).

2) Adjust to specifications by moving shims from one side of differential case to the 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.

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

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



### AXLE ASSEMBLY SPECIFICATIONS

Application	Specification In. (mm)
Axle Shaft End Play .....	Non-Adjustable
Ring Gear Backlash .....	.005-.009 (.12-.15)
Differential Bearing Preload .....	.015 (.38)
	<b>INCH Lbs. (N.m)</b>
Pinion Bearing Preload	
New Bearings .....	20-40 (2-5)
Used Bearings .....	10-20 (1-2)

### TIGHTENING SPECIFICATIONS

Application	Ft. Lbs. (N.m)
Pinion Shaft Flange Nut	
44 .....	210 (287)
60, 61 & 70 .....	260 (354)
Differential Side Bearing Cap Bolt	
44 .....	50 (68)
60, 61 & 70 .....	80 (109)
Ring Gear-to-Differential Case Bolt .....	105 (143)

### 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