DANA/SPICER FULL FLOATING AXLES

Chrysler Corp.
Ford Motor Co.
General Motors
International Harvester
Jeep

NOTE — Some models use other units, see appropriate vehicle manufacturer on Contents Page.

DESCRIPTION

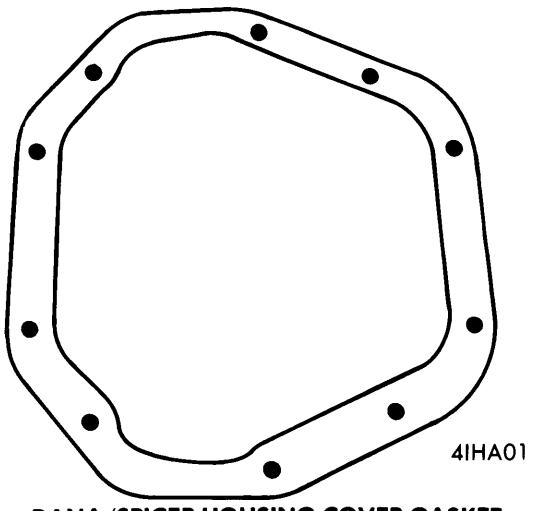
Dana/Spicer axles come in different models for application in vehicles with a wide range of GVW ratings. Service and overhaul procedures for all full floating axle models are the same except for drive pinion depth and some torque specifications. The axle assembly has an integral differential carrier and an over-hung mounted drive pinion. The drive pinion depth, pinion bearing preload, and differential side bearing preload are all set by shims. Dana/Spicer axle assemblies are also available with semi-floating axles. See *Dana/Spicer Semi-Floating Axles in this Section.* Other than the unique parts required for front-wheel drive, driven front and rear axles are identical.

AXLE RATIO & IDENTIFICATION

All Dana/Spicer axles have an integral carrier with a removeable rear cover plate. The cover plate has a unique shape that allows positive identitication of Dana/Spicer axles on any model vehicle. See *illustration.* The axle ratio can be determined by dividing the number of teeth on the ring gear by the number of teeth on the pinion gear. The axle model is often cast on the differential housing, or it can be determined by measuring the diameter of the ring gear. See *following chart.*

Model Identification By Ring Gear Size

Ring Gear Diameter	Model Number
7.125"	30-XX
8.500"	44-XX
9.750"	60-XX
10.500"	70-XX



DANA/SPICER HOUSING COVER GASKET

REMOVAL & INSTALLATION

FRONT AXLE SHAFTS & BEARINGS

Removal — 1) Support vehicle with front wheel off ground. Remove grease cup or adjustable hub (see Locking Hubs in this Section.) Remove snap ring, if equipped, then remove drive flange to expose adjusting and lock nuts.

2) On vehicles with drum brakes, proceed as follows: Remove lock nut and adjusting nut from axle shaft, then remove wheel hub and drum as an assembly. Remove brake backing plate, then tap spindle loose with soft-faced hammer. Remove spindle and pull axle shaft out of opening. Proceed to step **4).**

3) On vehicles with disc brakes, proceed as follows: Remove bolts holding disc brake caliper assembly. Remove caliper and suspend from frame with wire hook. It is not necessary to disconnect brake line. Remove rotor and hub assembly. Remove disc brake splash shield, then tap spindle loose with soft-faced hammer. Remove spindle and pull axle shaft out of opening.

4) On all models, remove seals from hub and drive bearing cups out with drift. Inspect bearings and cups for wear and replace as required. Install bearings and new seals in hub.

Installation — To install, reverse removal procedure noting the following: Be sure that inner oil seal (next to differential side bearing in axle housing bore) is not damaged when installing axle shaft. Bearing adjustment is made in one or two steps (see following chart for application). One step method: with wheel turning, tighten adjusting nut to specified torque, then back off nut specified fraction of a turn. Two step method: with wheel turning, tighten adjusting to specified torque to seat bearings, then back off nut until fully released. Retorque nut while turning wheel to second specified setting, then back of specified fraction of a turn.

Front Wheel Bearing Adjustment

Application	Torque (Ft. Lbs.)	Back Off
Chrysler Corp.		
W100-200, AW100, PW100	100	None
W300		
1st Step	50	Release
2nd Step	30-40	135°-150°
Ford Motor Co.	50	1/4
General Motors		
1st Step	50	Release
2nd Step	35	3/8 Max.
International Harvester	50	1/6
Jeep		
CJ Models	Binding①	1/6
All Others	50	1/4

① — With wheel turning, tighten adjusting nut until wheel binds slightly.

REAR AXLE SHAFTS & BEARINGS

NOTE — Close inspection of hub and axle type is necessary to determine which procedure below applies.

Removal — 1) Remove flange nuts from hub studs. Using a heavy hammer, rap sharply on center of axle flange to loosen tapered dowels (if equipped). Remove dowels. Rap center of flange again to cause flange and axle assembly to spring

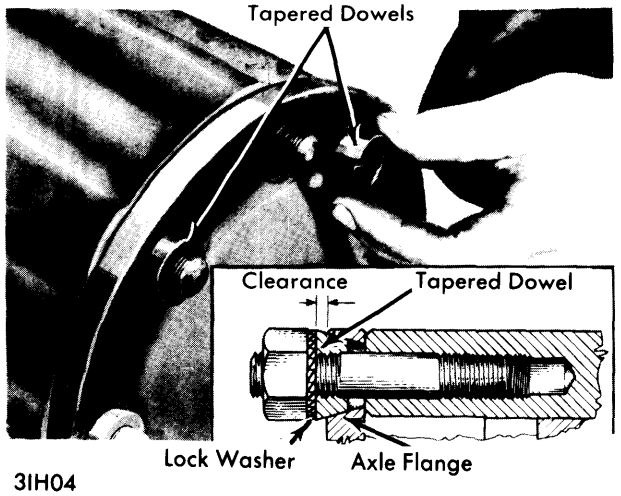
DANA/SPICER FULL FLOATING AXLES (Cont.)

away from hub. Remove axle without using prying devices which might damage axle flange and hub mating surfaces. To service bearings, remove locking devices and bearing adjusting nut. Pull wheel straight off axle housing using care to avoid dropping bearing cones. Remove and discard seal(s). Remove bearing cones from hub or axle housing.

2) Two methods are used to position outer bearing cup in hub: Seating cup against a machined shoulder, and seating cup against a removable snap ring set into a machined groove. To remove machined shoulder type, drive each bearing cup out of hub using a long drift or suitable tool. To remove snap ring type, remove inner cup with long drift. Remove snap ring with pliers. Using a suitable tool, drive outer bearing and cup out of hub.

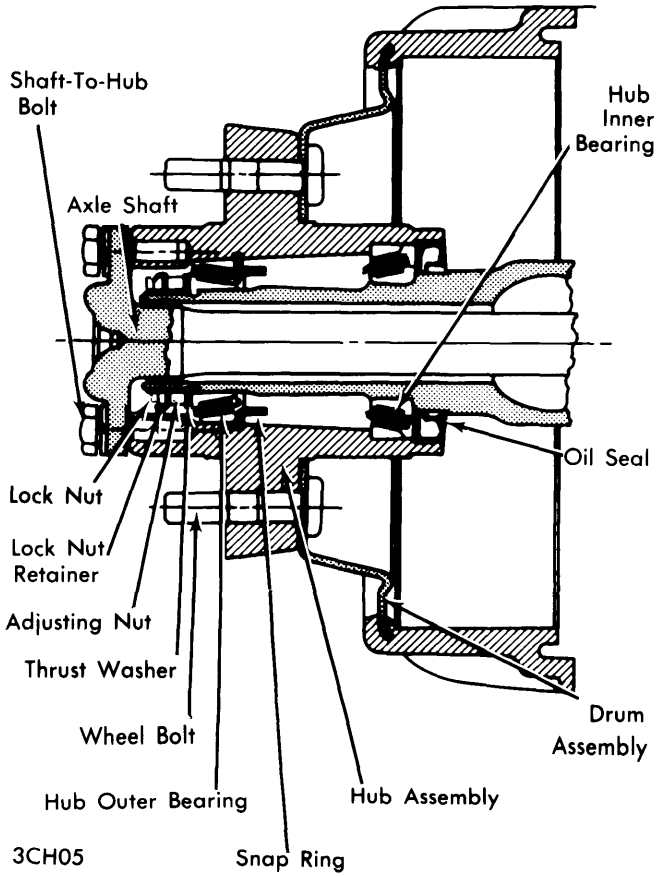
Installation – 1) To install machined shoulder type, drive or press inner and outer bearing cups into place using a suitable tool. Make sure that cups are firmly seated against shoulders in hub. To install snap ring type, insert outer bearing cone into hub. Insert bearing cup into hub and drive beyond snap ring groove. Install snap ring. Drive cone and cup assembly back against snap ring making sure that it is fully seated. Install inner bearing cup and cone. Install seal(s).

2) Install hub onto axle housing. Install thrust washer and adjusting nut. Tighten nut to specifications while rotating wheel in both directions. On all vehicles except Chevrolet and GMC, back off adjusting nut specified fraction of a turn. On Chevrolet and GMC, fully release nut, then retighten to torque specified in 2nd Step and back off required fraction of a turn.

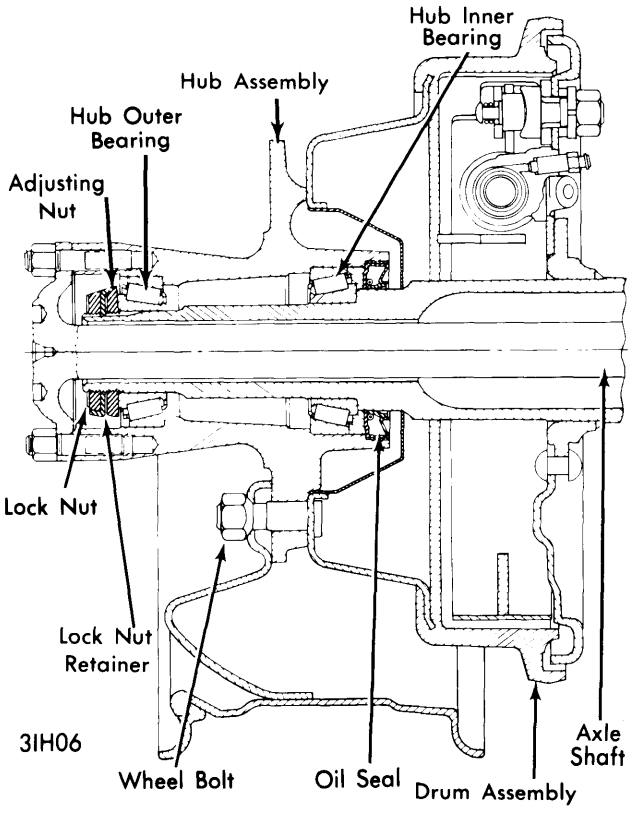


DETAILS OF TAPERED DOWELS

3) Install lock nut retainer and lock nut. On Ford E-250 and E-350, adjusting nut is locked into position with locking wedge. This wedge must be pressed into a previously uncut portion of the nylon inner ring in the adjusting nut. If this cannot be done with adjusting nut in proper position, adjusting nut must be replaced. Be sure that installation of locking device, lock nut or wedge, does not change adjusting nut setting.



FULL FLOATING AXLE SHAFT & BEARINGS W/SNAP RING BEARING RETAINER (TYPICAL)



FULL FLOATING AXLE SHAFT & BEARINGS W/MACHINED SHOULDER BEARING RETAINER (TYPICAL)

DANA/SPICER FULL FLOATING AXLES (Cont.)

Rear Wheel Bearing Adjustment

Application	Torque (Ft. Lbs.)	Back Off
Chrysler Corp.	Binding①	1/6
Ford Motor Co.		
E-250 & E-350	130	1/8-1/4
All Others	65	3/8
General Motors		
1st Step	50	Release
2nd Step	35	1/4
International Harvester	50	1/6
Jeep	50	1/6

① – With wheel turning, tighten adjusting nut until wheel binds slightly.

WHEEL & HUB

See Axle Shafts & Bearings for procedure.

PINION FLANGE & SEAL

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

Removal – Disconnect drive shaft and scribe a line down pinion shaft, flange, and nut. Remove nut and, using a suitable tool, remove flange. *CAUTION – Do not hammer flange off. Damage to pinion gear, ring gear, and bearing could result.* 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.

OVERHAUL

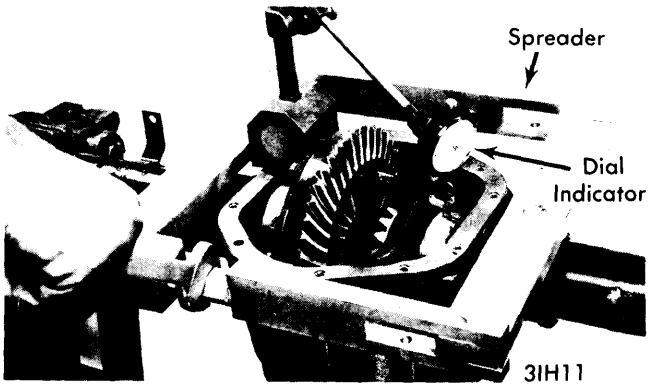
DISASSEMBLY

NOTE – Remove axle housing assembly before beginning overhaul.

1) Remove axles and housing cover. Be sure that side bearing caps are marked so that they can later be installed in their original positions. Remove bolts and side bearing caps. Use a housing spreader to spread differential housing .015-.020". Use a dial indicator to measure spread. *CAUTION – Do not spread housing more than .020". Permanent damage to housing could result.* Carefully pry differential case out of housing. Be careful not to damage machined surface of housing. Remove spreader immediately to prevent possibility of carrier taking a set.

2) If differential case is one piece, proceed as follows: Remove bolts holding ring gear to differential case, then tap ring gear off with soft-faced hammer. With a small punch, drive out lock pin. Remove differential shaft and thrust block. Remove differential pinion gears and thrust washers.

3) If differential case is two piece, proceed as follows: Remove bolts holding ring gear to differential case, then tap ring gear off with soft-faced hammer. Mark differentail case halves to aid reassembly. Remove bolts and separate case halves. Remove pinion gear spider, pinion gears, side gears, and all thrust washers.



SPREADING DIFFERENTIAL HOUSING

4) Remove pinion nut. With suitable puller, remove pinion flange. 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 them for reassembly.* From pinion shaft bore, remove oil seal and bearing cone. A baffle or an 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 pinion shaft.

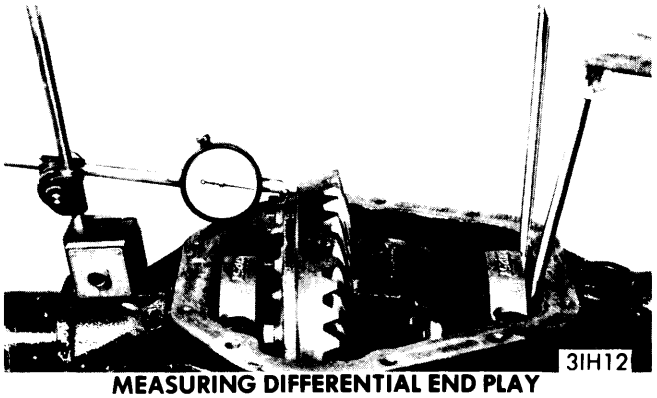
5) Using a suitable puller, remove side bearings from differential case. Often during removal of side bearings, shims between bearings and differential case are mutilated. If so, shims must be individually measured and their thicknesses recorded, so that new shim packs can be secured.

REASSEMBLY & ADJUSTMENT

Case Assembly – 1) If differential case is one piece, proceed as follows: 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 by measuring clearance between side gears and case. Clearance should be .000-.006"; if not, shims can be installed (in equal amounts on each side), or new thrust washers installed. Install lock pin and peen over hole to retain pin. Install ring gear and tighten bolts to specifications.

DANA/SPICER FULL FLOATING AXLES (Cont.)

2) If differential case is two piece, proceed as follows: Lubricate all parts with differential lubricant. Install differential side gears and thrust washers, pinion gear spider, pinion gears, and thrust washers in differential case. Check for preload of side gears by measuring clearance between side gears and case. Clearance should be .000-.006"; if not, shims can be installed (in equal amounts on each side), or new thrust washers installed. Rejoin case halves using aligning marks made during reassembly. Tighten bolts to specifications. Install ring gear and tighten bolts to specifications.



MEASURING DIFFERENTIAL END PLAY

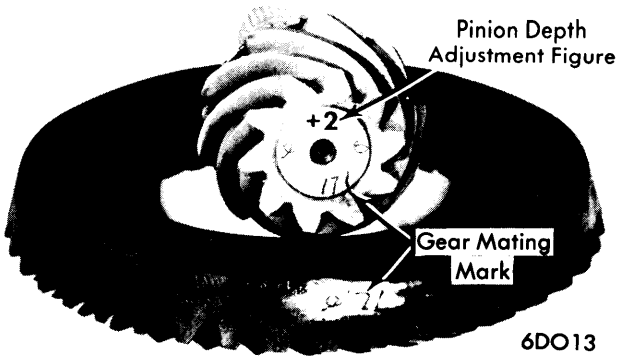
2) Install differential side bearings. Assemble case in housing WITHOUT shims. Install bearing caps and tighten bolts just enough to seat bearing cups. Mount dial indicator to read at back of differential flange. Measure and record amount of side play of differential case by moving back and forth with 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.

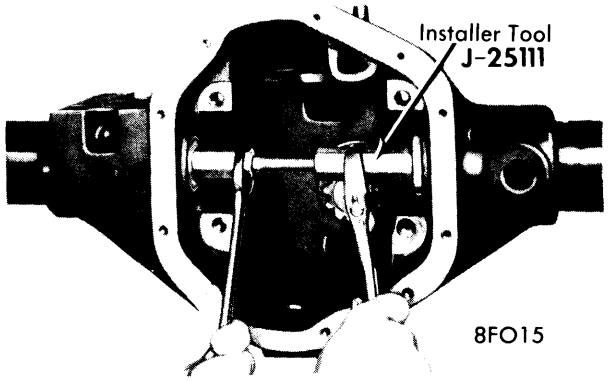
3) If new pinion and ring gear assembly are to be installed, proceed as follows: Determine pinion depth adjustment figure (see illustration) of old and new pinions and find shim adjustment figure from chart. Adjust original shim pack accordingly and proceed as in step **2)**.

4) Remove pinion flange and nut, and remove front pinion bearing cone. Install original preload shim pack. Lubricate and install bearing cone. Install pinion flange and nut and tighten to specifications while rotating pinion shaft. Place housing in position so that pinion shaft is vertical, pointing up. With INCH lb. wrench rotate shaft through several revolutions to measure rotating torque. *NOTE – Ignore torque needed to start shaft rotating.* 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.



PINION DEPTH ADJUSTMENT FIGURE

5) Front axles only: Check seals in axle housing bores. If condition is questionable, replace using suitable installer tool (see illustration). *NOTE – When installing front axle shafts be sure that these seals are not dislodged.*



INSTALLING INNER OIL SEALS

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. 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)

DANA/SPICER FULL FLOATING AXLES (Cont.)

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

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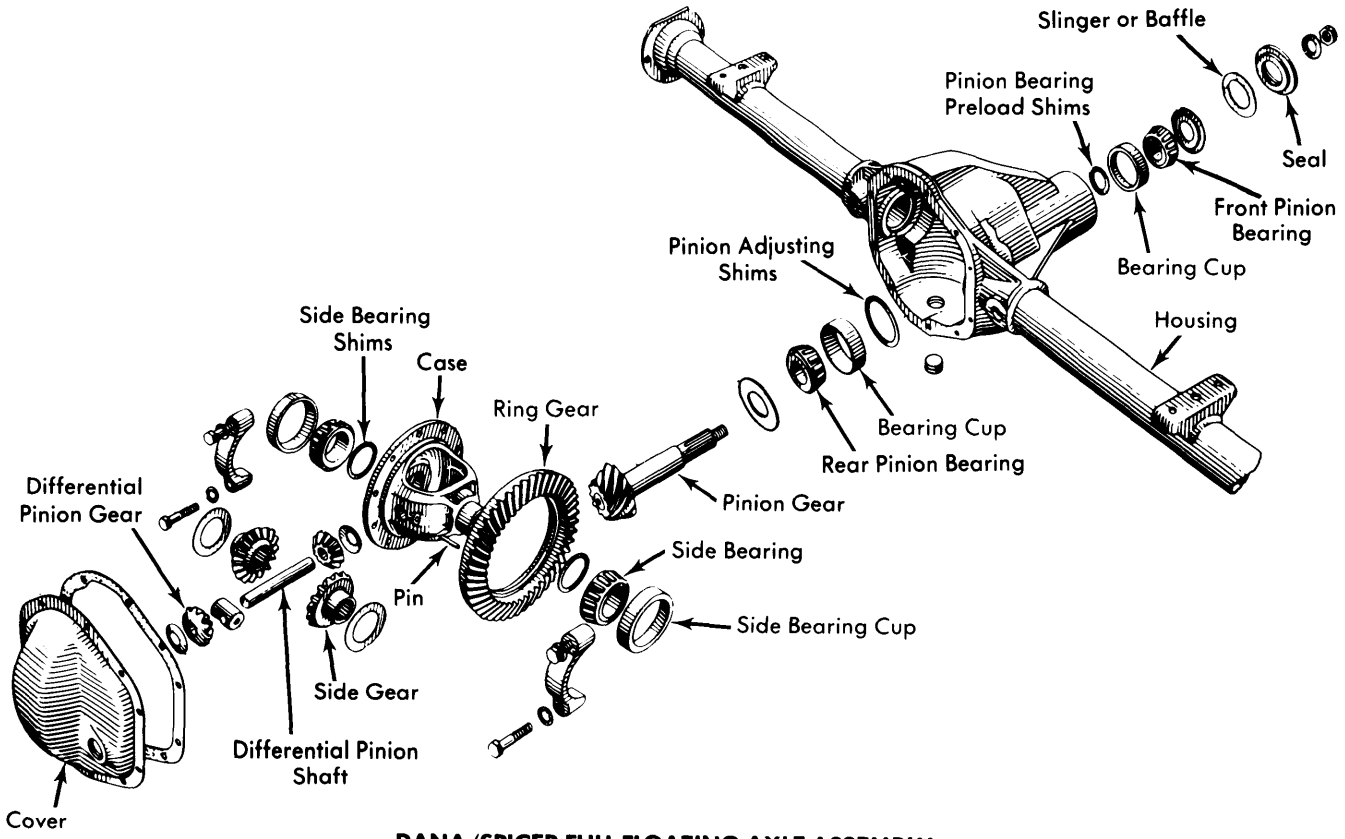
PINION DEPTH SHIM ADJUSTMENT CHART

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

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.



DANA/SPICER FULL FLOATING AXLE ASSEMBLY (ONE-PIECE DIFFERENTIAL SHOWN)

DANA/SPICER FULL FLOATING AXLES (Cont.)

AXLE ASSEMBLY SPECIFICATIONS

Application	Specification
Ring Gear Backlash	.005-.009"
Side Bearing Preload	.015"
Pinion Bearing Preload	
New Bearings	20-40 INCH Lbs.
Used Bearings	10-20 INCH Lbs.
Pinion Gear Depth (Nominal Dimension)	
Model 30	2.250"
Model 44	2.625"
Model 60	3.125"
Model 70	3.500"

TIGHTENING SPECIFICATIONS

Applications	Ft. Lbs. Models 30 & 44	Ft. Lbs. Models 60 & 70
Pinion Shaft Flange Nut	210	260
Side Bearing Cap		
All (Exc. Model 30)	80	80
Model 30	45	
Ring Gear-to-Case	55	110
Axle Flange-to-Hub		
All (Exc. Model 70)	35	55
Model 70		85
Cover-to-Housing	35	40