DANA/SPICER SEMI-FLOATING AXLES

Chevrolet (1965-74)
Dodge (1965-74)
Ford (1965-74)
GMC (1965-74)
International Harvester (1965-74)
Jeep (1965-74)
Plymouth (1974)

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

DESCRIPTION

Axle is banjo-type housing, "over-hung" mounted hypoid drive pinion, integral differential carrier type axle assembly used in front and rear locations, and with open-type or closed-type steering knuckles. Whether used in front or rear, axles are similar except for steering knuckles and locking hubs used on front wheel drive units. *See Steering Knuckles and Locking Hubs in this Section.*

AXLE RATIO & IDENTIFICATION

Dana/Spicer Model Identification — Model Series can be determined two ways. It is cast on differential housing in one of three locations: Right rear, on rib below axle housing; on top, to right of centerline; on bottom, on rib between axle bore and pinion bore. Model Series can also be determined by diameter of ring gear.

Model Series Identification

Ring Gear Diameter	Model Series Number
7.125"	27-XX, 30-XX
8.5"	44-XX
9.25"	53-XX
9.75"	60-XX
10.5"	70-XX

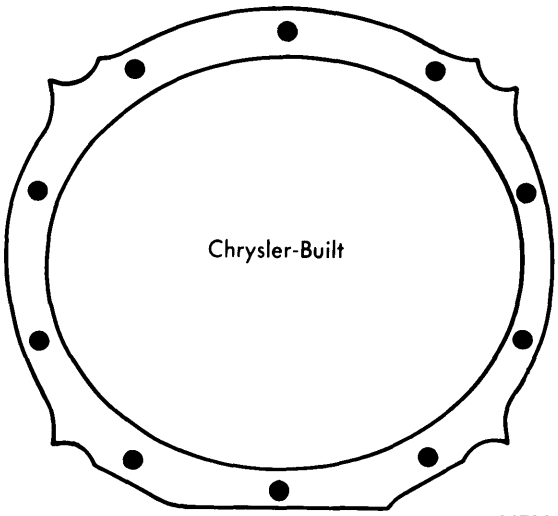
1970-74 Chevrolet & 1973-74 GMC — Ratio code or number is stamped on forward side of axle housing tube. This identification is usually found on right tube but may be found on left tube. It is adjacent to differential housing.

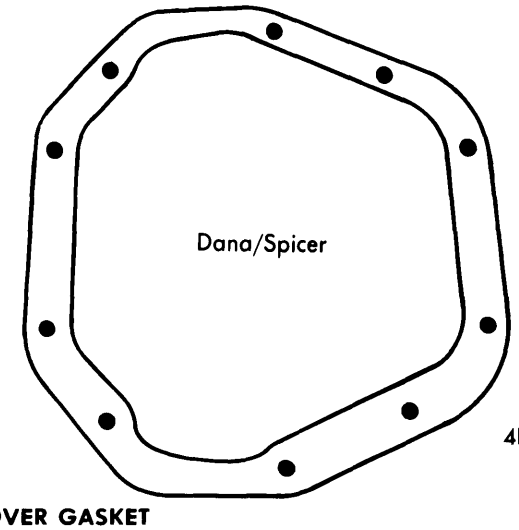
Axle Ratio Codes

Ratio	Conventional	Positive Traction
1970 (Chev. Only)		
3.73-1	TDF	TDK
4.56-1	TYS	
1971 (Chev. Only)		
3.54-1	TKD, TKH, TKP	TKG, TKJ, TKR
3.73-1		THL
4.10-1	TAJ,TJS,TKK,TKS	TJJ,TKL
	TJP,TJS,TKK,TKS	TJJ,TKL
4.56-1	TKW, TRA, TRC	
	TRD, TRG	

Axle Ratio Codes

Ratio	Conventional	Positive Traction
1972 (Chev. Only)		
3.54-1	RKD, RKH	RKG, RKJ
	RKP, RKR	
3.73-1	RAW	RAX
4.10-1	RAJ, RJB, RJH, RJP	RAH, RJA, RJJ
	RJS, RKB, RKK, RKS	RKC, RKL, RKT
4.56-1	RKW, RKX, RRA	RRB, RRD
	RRC, RRG	RRH
1973 (Chev. & GMC)		
3.07-1	TAH	TAJ
3.73-1	TBH, TLM	TBJ, TLT
	TLS, TLW	TLX
4.10-1	TFR, TKB	TFM, TKA
	TKD, TKM	TKC, TKL
4.56-1	TFZ, TKS, TKU	THB, TKR
	TLA, TLC	TKT, TLB
4.88-1	MLT	
1974 (Chev. & GMC)		
3.07-1	TAH, KAH	KAJ, TAJ
3.73-1	TBH, KBH, KKC	TBJ, KBJ, KKD
	KKF, KKM	KKH, KKN
4.10-1	KJS, KJU, KMF	KJT, KJW, KMH
	KMM, KMR, KMZ	KMN, KMU, KMB
	KMA, KMC, KMJ	KMD, KMK
4.56-1	KFA, KFB, KFD, KRF	KFC, KFF, KRJ
	KRN, KRZ, KRT, KRA	KRR,KSA, KRU,
	KRC, KRK, KRS	KRW, KRB,
		KRD, KRM
4.88-1	KTA	



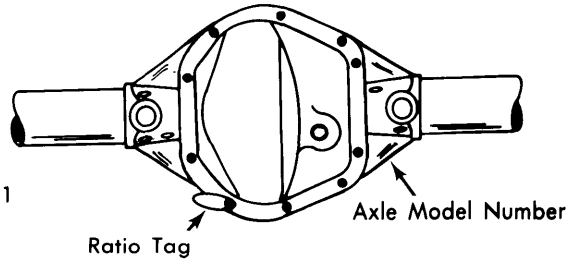


4DO02

DIFFERENTIAL HOUSING COVER GASKET

DANA/SPICER SEMI-FLOATING AXLES (Cont.)

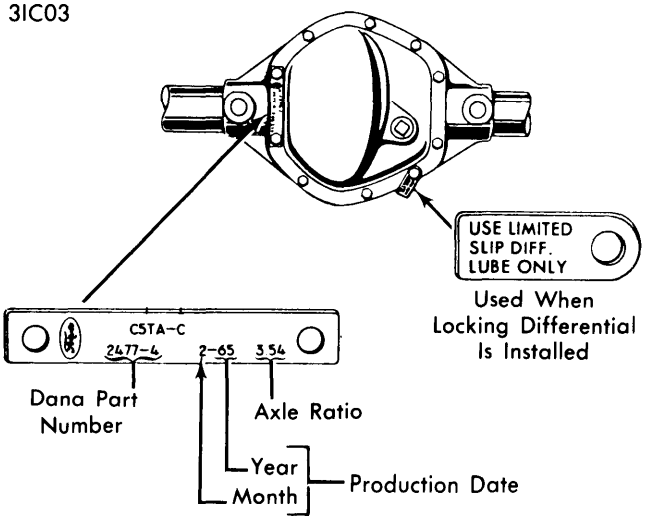
1965-69 Chevrolet & 1965-72 GMC – Axle Model Number is stamped on right rear of differential housing. Axle ratio is stamped on metal tag attached to bolt on left side of differential housing cover.



AXLE MODEL & RATIO TAG LOCATION

Dodge – Some Chrysler built drive axles also used an integral housing. Dana/Spicer drive axles can be distinguished from these by the shape of the differential housing cover gasket (see illustration).

Ford – All axles with integral housing are Dana/Spicer. The axle ratio is stamped on a metal tag attached to two differential housing cover screws.



FORD RATIO TAG LOCATION

International Harvester – Axle can be identified by code number on Part Code Sheet found in glove compartment and mounted on sun visor, or by corresponding model number found on metal tag on differential housing cover bolt. Metal tag also identifies axle ratio. All front drive axles are Dana/Spicer.

IHC Dana/Spicer Axle Identification

Model Number	Code Number
RA-1	14001
RA-3	14003
RA-4	14004
RA-14	14014
RA-15	14015
RA-16	14016
RA-17	14017
RA-18	14018
RA-23	14023
RA-28	14028
RA-53	14053
RA-54	14054
RA-63	14063
RA-83	14083
RA-84	14084

Jeep – All drive axles are Dana/Spicer. Ratio is stamped on tag attached to cover plate bolt.

REMOVAL & INSTALLATION

FRONT AXLE SHAFTS & BEARINGS

Removal – 1) Support vehicle with front wheel off ground. If equipped with adjustable hubs, see Locking Hubs in this section for removal procedure. Remove adjustable hub or grease cup from wheel. Remove drive flange from shaft and hub.

Drum Brakes Only: Remove lock nut and adjusting nut from shaft and remove wheel, hub, and drum as an assembly. Disc Brakes Only: Remove bolts holding disc brake caliper assembly and place assembly out of way. Remove rotor and hub assembly. All: Remove backing plate or disc brake shield and tap spindle loose with soft-faced hammer. Remove spindle and pull axle shaft assembly out of opening.

2) Remove seals from hub and drive bearing cups out with drift pin. Inspect bearings and cups for wear and replace as required. Install bearings and 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 axle shaft is installed. Tighten bearing adjusting nut to 50 ft. lbs. while rotating wheel; then back off nut 1/6 turn. Be sure that lock nut does not change adjusting nut setting.

REAR AXLE SHAFTS & BEARINGS

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

Removal (Tapered Shaft End) – 1) Raise vehicle and support with floor stands. Remove wheels. Remove cotter pin, nut, and washer securing hub to axle shaft. Using a suitable hub puller, remove hub and drum assembly (back off brake shoes if necessary). Disconnect hydraulic brake lines. Remove bolts and lift off seal retainer, bearing retainer, backing plate and shims. *NOTE – Do not damage shims; retain them for reassembly.*

DANA/SPICER SEMI-FLOATING AXLES (Cont.)

2) Using a slide hammer, remove axle shaft and bearing assembly. *NOTE – Do not apply sharp blows to shaft; bearing damage could result.* Use a suitable press to remove bearing and seal from shaft.

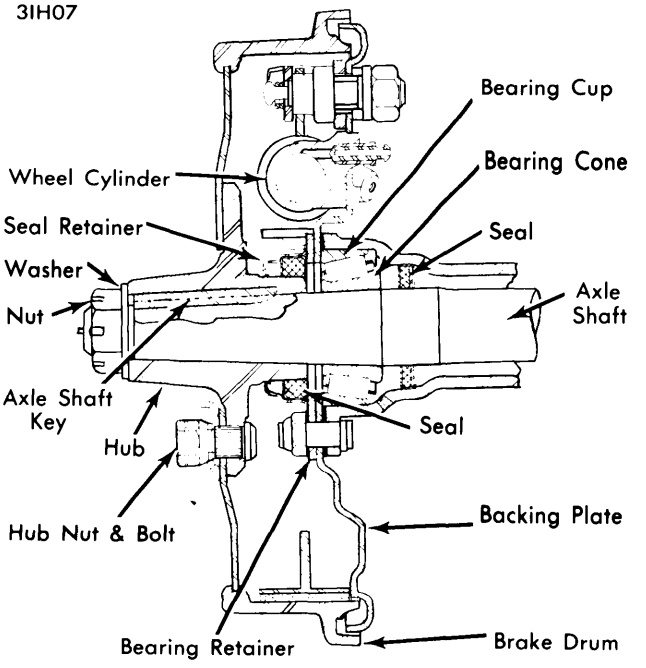
Installation – 1) Lightly lubricate seal surface of seal with grease, and press onto shaft so that seal lip will be toward differential when axle is installed. After thoroughly cleaning inside diameter of bearing cone and axle taper, snap cone onto axle taper by hand. Be sure that large end of cone will face differential when axle is installed.

2) Install new seal in seal retainer. Install axle shaft assembly and lightly tap bearing cup into place. Install original shim pack or new shims of equivalent thickness on end of axle housing flange. Insert backing plate bolts to retain shims. Install brake backing plate, wheel bearing retainer, and seal retainer. Install bolts and tighten evenly.

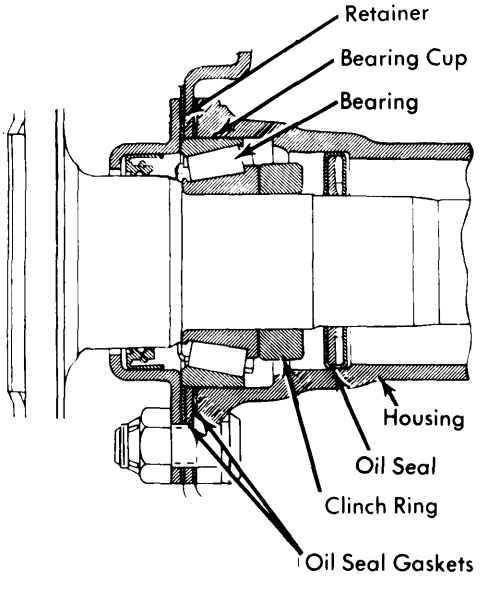
3) Grasp opposite wheel and pull outward. Using light strokes of slide hammer on serviced axle, tap it outward to be sure that bearing cone is seated in cup. Measure axle shaft end play and shim as required. *NOTE – Some models have bearing adjusting shims on right side, some on both sides.*

4) Place key in axle shaft. Install hub on shaft and secure with washer and nut. Tighten nut and insert cotter pin. Do not back off nut to align holes for cotter pin; tighten nut more instead. *NOTE – Jeep Only: Install hub on shaft before installing key.* Recheck end play.

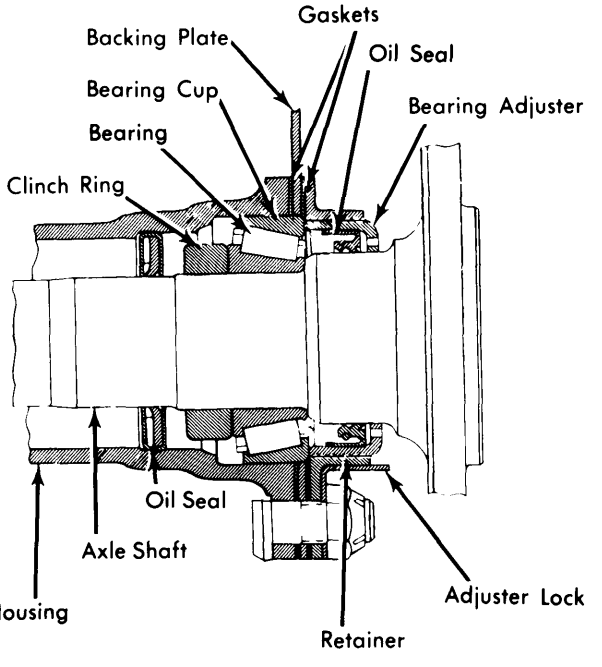
3IH07



TAPERED SHAFT END



Left Axle (W/O Adjusting Ring)



Right Axle (W/Adjusting Ring)

3IH08

FLANGED SHAFT END W/BEARING ADJUSTING RING

DANA/SPICER SEMI-FLOATING AXLES (Cont.)

Removal (Flanged Shaft End W/Bearing Adjusting Ring) – 1) Raise vehicle and support with floor stands. Remove wheels. Remove clips from wheel bolts and pull off brake drum. Remove brake backing plate bolts. If axle housing has not been removed from vehicle, be sure that no strain is put on hydraulic line during remaining procedure. Pull axle out of housing. If it seems stuck, install wheel with two lug nuts and use wheel for leverage. Do not strike shaft to free it.

2) Cut clinch ring which retains bearing with a chisel and remove. *CAUTION – Do not damage shaft with chisel.* Press bearing off shaft. Slide bearing adjuster ring (right side) or bearing retainer (left side) off shaft. Remove seals from retainer or adjusting ring. *CAUTION – Use care to avoid distorting components.* Remove seal from end of axle housing.

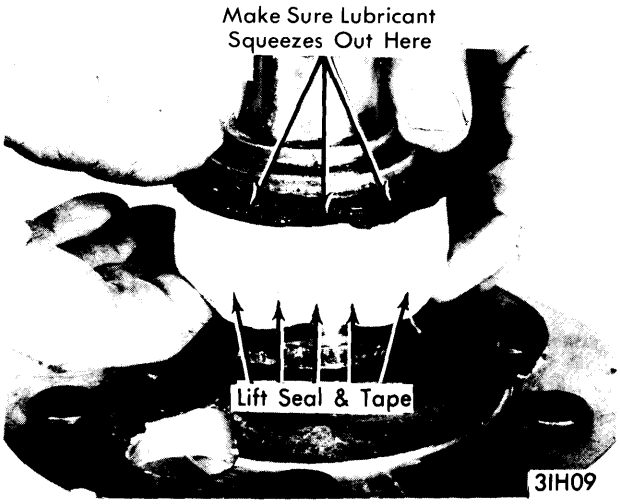
Installation – 1) Install new seals in axle housing. Install double-lipped seal in retainer or adjusting ring with short lip of seal toward flanged end of shaft. Lubricate all seal lips with light coating of grease. Install on axle shaft, bearing adjuster ring and seal assembly (right side) or bearing retainer (left side), press on bearing cup and cone, then press on clinch ring. Do not attempt to press on bearing and clinch ring in one operation.

2) Adjust adjuster ring so that only two threads engage seal assembly. Install shaft into housing, tighten bolts evenly, and coat threads of adjuster ring with waterproof sealer. Adjust axle shaft end play by mounting a dial gauge to read at axle shaft flange. While an assistant rotates left wheel, turn adjuster ring in until no end play exists. Ring is adjusted with screwdriver through axle flange access hole. When no end play exists, back off adjuster ring two castellations and check for correct end play (see specifications). Bend tang of locking ring into a castellation of adjuster ring. Install brake drum, retaining clip, and wheel.

Removal (Flanged Shaft End W/Non-Adjustable Bearing) – 1) Raise vehicle and support with floor stands. Remove wheels. Remove retaining clips and brake drum. It may be necessary to back off brake shoes. *CAUTION – Be sure to release automatic brake shoe adjuster lever before backing off brake shoes.* Remove brake backing plate bolts and pull axle shaft assembly out of housing. If it seems stuck, install wheel with two lug nuts and use wheel for leverage. Do not strike shaft to free it.

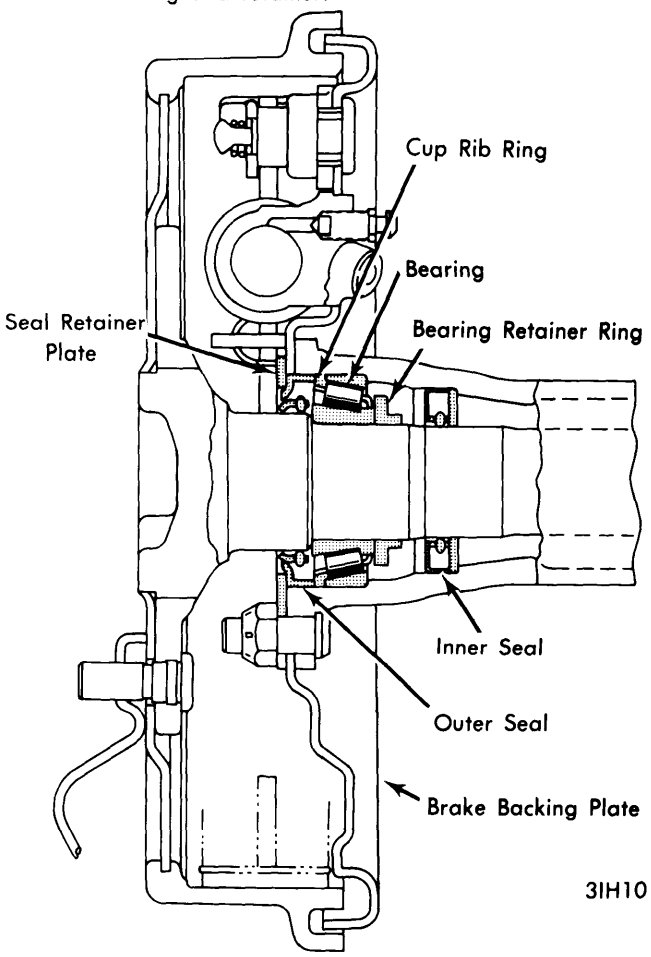
2) Using a suitable puller, remove bearing cup and oil seal from axle housing. If bearing cone on axle is not serviceable, remove it by first cutting retainer ring with a chisel, then pressing bearing off shaft. Remove seal and retainer plate. If bearing cone is serviceable it can be cleaned on shaft if seal is not damaged.

Installation – 1) If old bearing is to be reused, lubricate it as follows: Push retainer and seal towards flanged end of shaft. *NOTE – Be careful not to push seal lip off machined seat on shaft.* Fill cavity between seal and cone with grease. Wrap masking tape around seal and cone to contain grease. With masking tape in place, pull seal towards bearing cone, forcing lubricant between rollers and through cone assembly. If grease does not appear at small end of rollers, repeat procedure. *CAUTION – Be sure that no grease is on flange side of seal.*



LUBRICATING BEARING CONE

2) On disassembled axle, install retainer and carefully position seal on machined seat on axle. Press bearing onto shaft making sure that cup rib ring is towards flange end of shaft (see illustration). Press new bearing retainer ring on axle shaft with narrow end toward splined end of shaft. (Bearing and retainer can be pressed on at same time). Bearing and retainer must be pressed into seat on shaft so that a .0015" feeler gauge cannot be inserted between seat and bearing or between bearing and retainer.



FLANGED SHAFT END W/NON-ADJUSTABLE BEARING

DANA/SPICER SEMI-FLOATING AXLES (Cont.)

3) Install seal and bearing cup into axle housing if old bearing is being reused. Install seal only into housing if new bearing is used (cup was installed on shaft with cone). Install shaft in housing making sure that splines do not damage seal lip. Install backing plate mounting bolts and finger tighten. Tighten nuts evenly and alternately to specifications in 15 ft. lbs. increments. Install drum, retainer clips, and wheels. There is no axle shaft end play adjustment.

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.

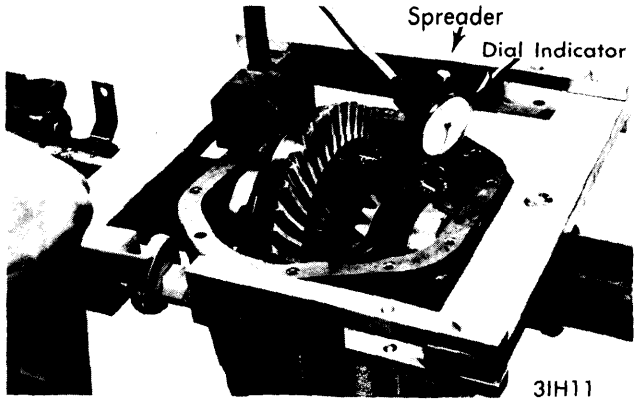
OVERHAUL

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) Remove bolts holding ring gear to differential case. With a small punch drive out lock pin. Remove differential shaft and thrust block. Remove differential pinion gears and thrust washers.



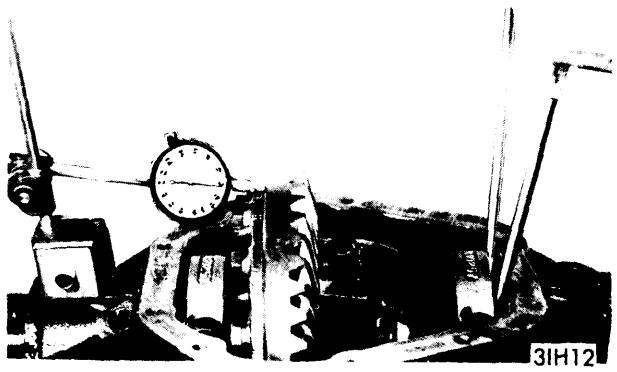
SPREADING DIFFERENTIAL HOUSING (TYPICAL)

3) 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.

4) 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.



MEASURING DIFFERENTIAL ENDPLAY

DANA/SPICER SEMI-FLOATING AXLES (Cont.)

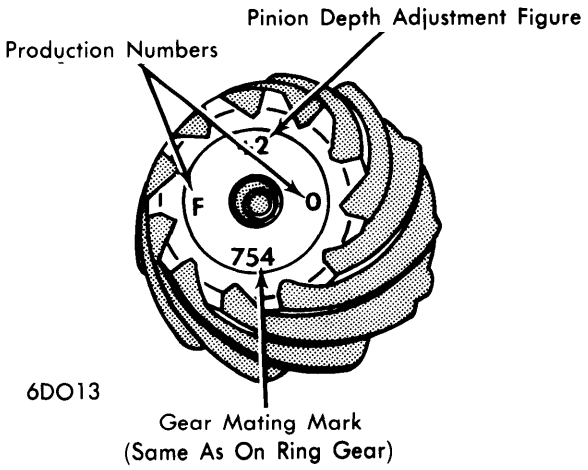
2) Install differential side bearings. Assemble case in housing WITHOUT shims. Install bearing caps and tighten bolts just enough to seat bearing cups. Mount dial indicator to read at back of differential flange. Measure and record amount of side play of differential case by moving back and forth with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

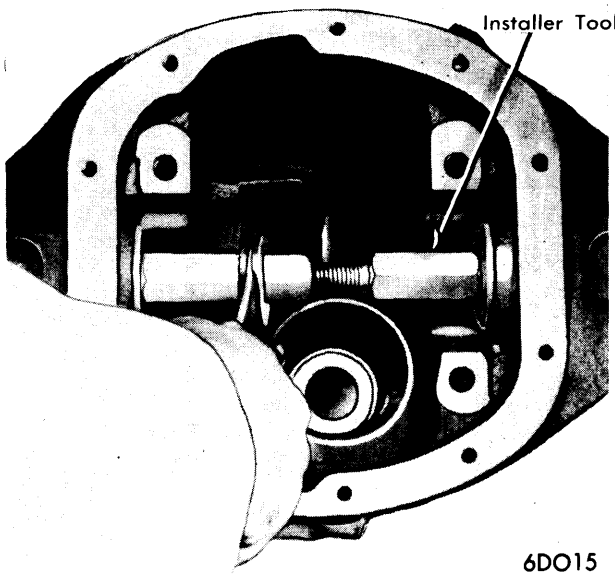
5) Front axles only: Check seals in axle housing bores. If condition is questionable, replace using suitable installer tool (see illustration). *NOTE – When installing front axle shafts be sure that these seals are not dislodged.*

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

8FO14

PINION DEPTH SHIM ADJUSTMENT CHART

DANA/SPICER SEMI-FLOATING AXLES (Cont.)



INSTALLING INNER OIL SEALS

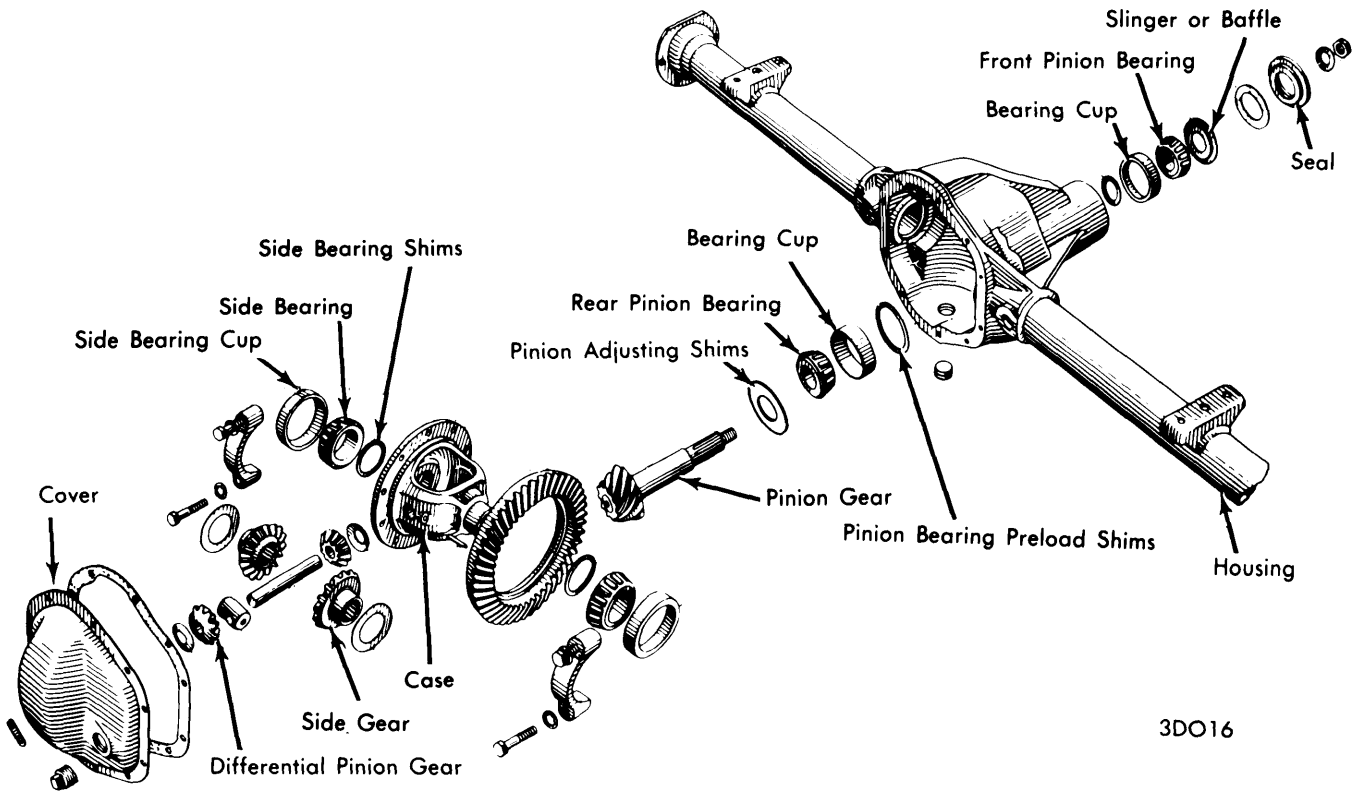
Side Bearing Preload – 1) With pinion installed in housing and depth and preload adjustments properly made, install differential case into housing and set dial indicator so that it reads at back of ring gear. Leave bearing cap bolts loose enough to allow movement of case. Insert screwdriver between bearing 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)

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 INTEGRAL HOUSING AXLE ASSEMBLY

DANA/SPICER SEMI-FLOATING AXLES (Cont.)

AXLE ASSEMBLY SPECIFICATIONS

Axle Shaft End Play	
Tapered Shaft	.001-.006"
Flanged Shaft W/Adjusting Ring	.001-.010"
Flanged Shaft, Nonadjustable	① .001-.015"
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)	
Models 2558, 2559, 2682	2.625"
Model Series 23 & 30	2.250"
Model Series 25	②
Model Series 27	2.094"
Model Series 44	2.625"
Model Series 53	③
Model Series 60	3.125"
Model Series 70	3.500"

① — End play is nonadjustable but can be measured to check proper bearing installation.
② — Use Jeep Gauge Block (W-101-A-22), side "G".
③ — Use Jeep Gauge Block (W-101-A-22), side "F".

TIGHTENING SPECIFICATIONS

Application	Ft. Lbs.
Models 2558, 2559, & 2682 and Model Series 23, 25, 27, 30, 44, & 53	
Pinion Shaft Flange Nut	210
Side Bearing Cap Bolt	
All (Exc. 44 & 53)	45
44 & 53	80
Ring Gear-To-Case Bolt	55
Axle Shaft Or Bearing Retainer Bolt	65
Cover-To-Housing Bolt	35
Model Series 60-70	
Pinion Shaft Flange Nut	260
Side Bearing Cap Bolt	80
Ring Gear-To-Case Bolt	110
Axle Shaft Or Bearing Retainer Bolt	75
Cover-To-Housing Bolt	40