Section II

REAR AXLE

CONTENTS

DATA AND SPECIFICATIONS

Rear Axle	LC-1, LC-2	LC-3, LY-1
Type	Semi-Floating	Semi-Floating
Gear Type	Hypoid	Hypoid
Ring Gear Diameter	8.75″	8.75″
Pinion Bearing	2	2
Type	Tapered Roller	Tapered Roller
Adjustment	Shim Pack	Shim Pack
Differential Bearings	2	2
Type	Tapered Roller	Tapered Roller
Adjustment	Threaded Adjuster	Threaded Adjuster

REAR AXLE

DATA AND SPECIFICATIONS (Continued)

Rear Axle	LC-1, LC-2		LC-3, LY-1
Drive Gear Pinion	Matched Sets		Matched Sets
Drive Gear Run-Out	.005″ Maximum		.005″ Maximum
Drive Gear and Pinion Backlash	.006″ to .008″		.006″ to .008″
Differential Side Gear Clearance	.0 to .008″		
Axle Ratio	Std. Model	T & C Wgn.	Standard
Torque Flite	2.93	3.18	2.93
No. Drive Gear Teeth	41	35	41
No. Drive Pinion Teeth	14	14	14
Type Recommended	**Multi-Purpose Gear Lubricant**		
Summer	90		
Winter	90		
Extreme Cold	80		
Capacity	3½ Pints		
Wheel Bearings			
Type	Tapered Roller		
Adjustment	Select Shims		
Axle End Play	.013″ to .018″		
Road Clearance (Full Load)	7.4″		7.6″
T & C Wagon	7.4″		—
Sedan	—		—
Tread (Rear)	59.62″		60.35″
T & C Wagon	59.62″		—
Sedan	—		—

SPECIAL TOOLS

Tool Number	Tool Name
C-637	Puller—Rear Axle Shaft and Inner Oil Seal
C-293	Puller Sets—Roller Bearing
C-406A	Wrench—Differential Bearing Adjusting
C-413	Driver—Axle Shaft Outer Bearing Cup
C-3339 or C-430	Dial—Indicator Set
C-452	Puller—Companion Flange or Yoke
C-499	Puller—Axle Shaft
C-549	Puller—Utility
C-745	Sleeve—Axle Shaft Oil Seal Outer
C-757	Sleeve—Axle Shaft Oil Seal Outer
C-758-D3	Gauge—Pinion Bearing Pre-Load and Cone Angle Setting
C-3281	Wrench—Companion Flange on Yoke Holding
C-839	Driver—Axle Shaft Inner Oil Seal
C-845 or C-319	Puller—Universal Wheel and Hub
C-3565	Driver—Axle Shaft Outer Seal
C-3566	Driver—Axle Shaft Outer Seal—End Brake Support
DD-996 or DD-955	Installing Sleeve—Pinion Bearing
DD-914-8	Ring—Medium Reducer (use with DD-914-89)
DD-921	Wrench—Differential Case Cap Remover and Installer
DD-993	Puller—Pinion Oil Seal
DD-999	Installing Tool—Companion Flange or Yoke
DD-1005	Driver—Differential Case Side and Cross Shaft Roller Bearing

TIGHTENING REFERENCE

	Foot-Pounds
Axle Shaft Nuts	145 (minimum)
Brake Support Plate to Housing Mounting Bolt Nuts	35
Differential Carrier to Axle Housing Bolt Nuts	45
Rear Axle Drive Gear Bolt Nuts	45
Differential Bearing Cap Bolt Nuts	110
Pinion Shaft Companion Flange Nut	240 (minimum)

Section II
REAR AXLE

1. DRIVE GEAR ASSEMBLIES

The rear axles (Figs. 1 and 2) are semi-floating type with two pinion differentials and hypoid drive gear and pinion. The drive gear and pinion on all models are serviced only in matched sets to insure smooth quiet operation.

Cleaning and inspection of parts after disassembly is very important. Metal chips not cleaned from housing and carrier after a failure may cause excessive part wear and future failures.

Bearing cones and cups should be carefully

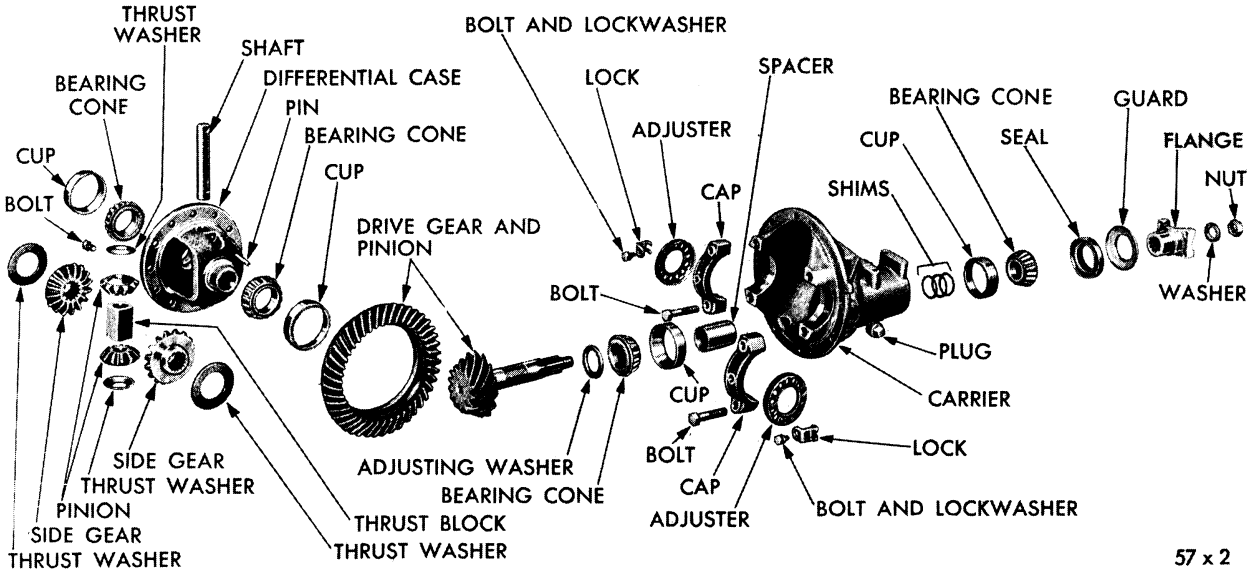


Fig. 1—Rear Axle (Exploded View) LC-1, LC-2

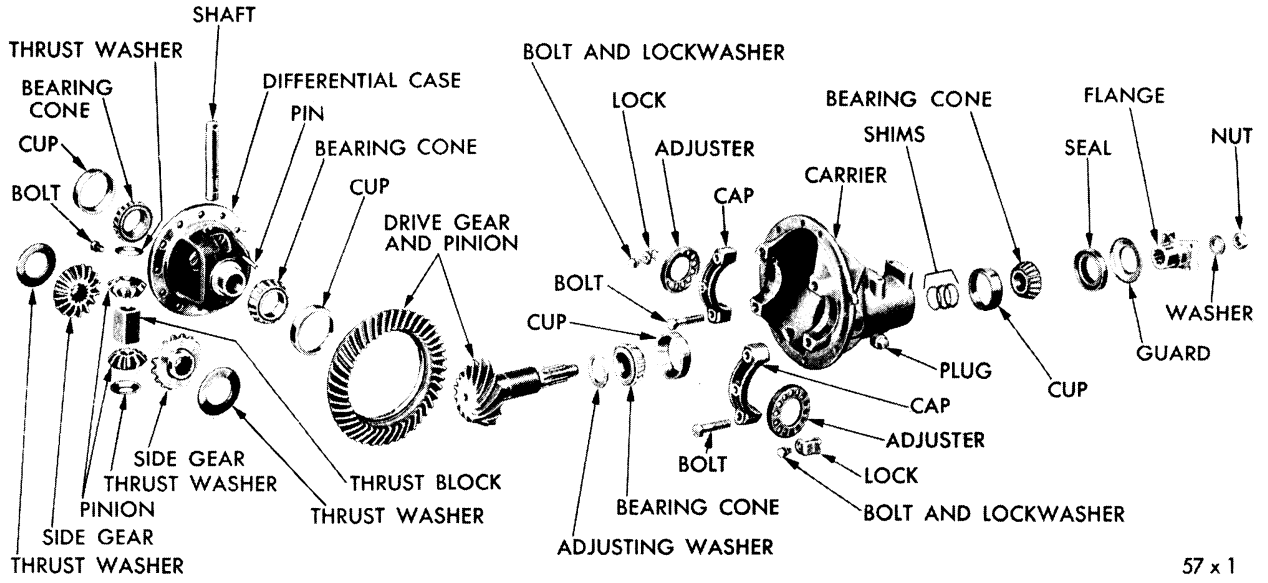


Fig. 2—Rear Axle (Exploded View) LC-3, LY-1

checked for discoloration due to overheating, and for surface wear. Axle housing should also be checked for broken welds or bent sections.

Rear spring seats should be inspected to make sure they are not broken or loose. Axle shafts should be inspected and replaced if there is evidence of damage. The axle shaft should be free of nicks and burrs before assembly.

NOTE: Gaskets and other seals should be replaced whenever they are removed as an insurance against leakage. Bearings, thrust washers and differential pinion shaft should be thoroughly lubricated before final assembly.

SERVICE PROCEDURES

2. REMOVAL OF DIFFERENTIAL CARRIER ASSEMBLY (All models)

Raise car off floor and block the brake pedal so pedal cannot be depressed. Drain lubricant from housing. Back off brake shoes, with Tool C-845. Remove rear wheels, hub and drum assemblies, as shown in Figure 3. Disconnect the brake line at wheel cylinders. Remove rear axle drive shaft keys, install special sleeve Tool C-757 in axle outer oil seal (Fig. 4) and remove the brake backing plate. Remove the shims from each end of axle housing. Each set should be kept separate so that at reassembly, the

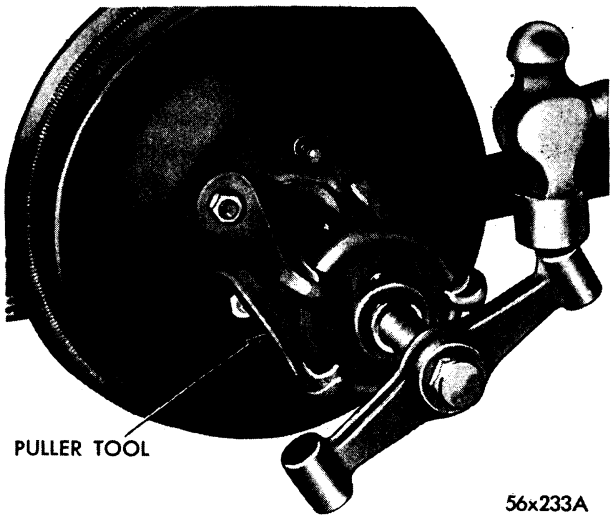


Fig. 3—Removing Hub and Drum Assemblies

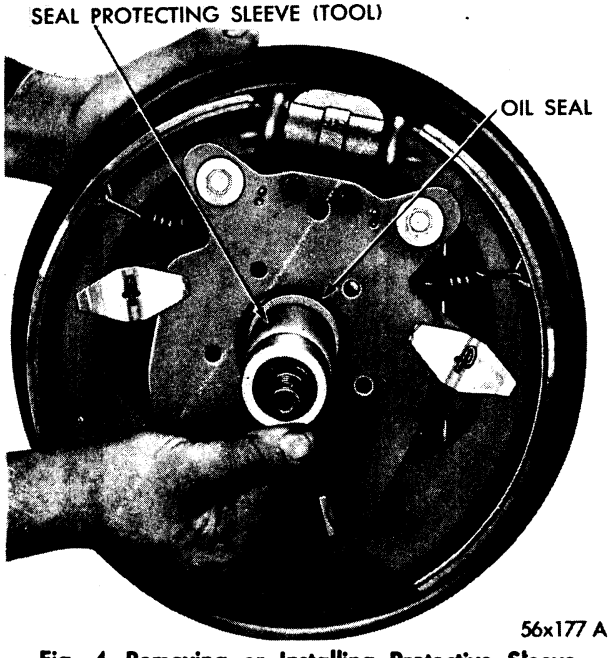


Fig. 4—Removing or Installing Protective Sleeve

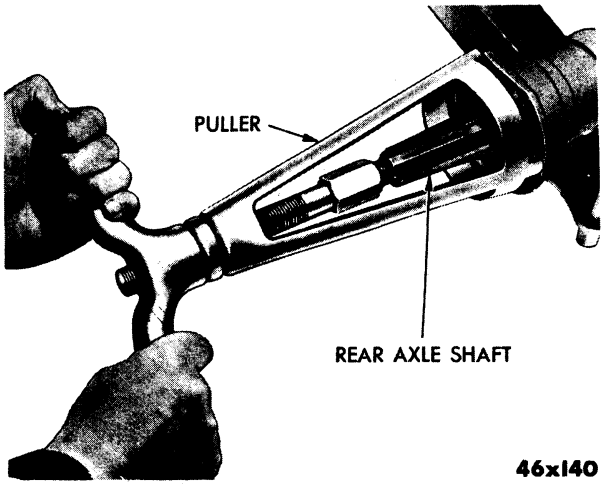


Fig 5—Removing Axle Shaft and Bearing

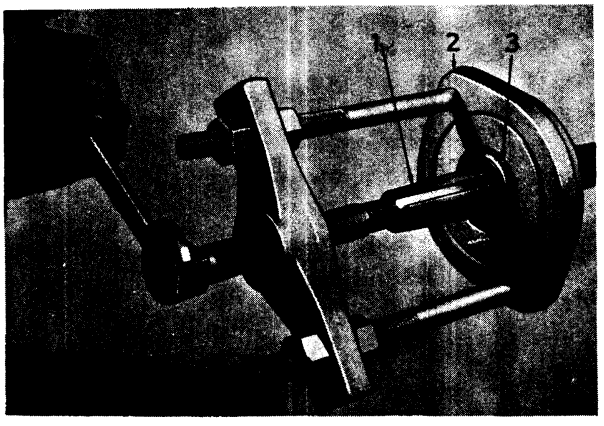


Fig. 6—Removing Bearing from Axle Shaft

central location of the axle, shafts, and thrust block will be maintained. Remove axle shafts and bearings from housing, using puller Tool C-499. (Fig. 5). If necessary, remove bearings from the axle shafts, using bearing puller Tool C-293 with adapter plate No. 13, as shown in Figure 6.

Remove the rear axle shaft inner oil seals, using puller Tool C-637 (Fig. 7) to remove the inner seal and Tool C-839 for the outer, as shown in Figure 8. Disconnect the rear universal joint and drop the prop shaft. Remove bolts attaching the carrier assembly to axle housing, and remove carrier assembly. Clean carrier assembly in suitable solvent.

3. REMOVING DRIVE GEAR AND CASE ASSEMBLY

Check gear tooth pattern on drive gear, drive gear to pinion backlash before disassembly (Fig. 9). With carrier assembly mounted in stand, mark both differential bearing caps and adjusters, if unit is to be checked for a specific noise condition, as shown in Figure 10, before removing caps, adjusters and drive gear assembly from carrier.

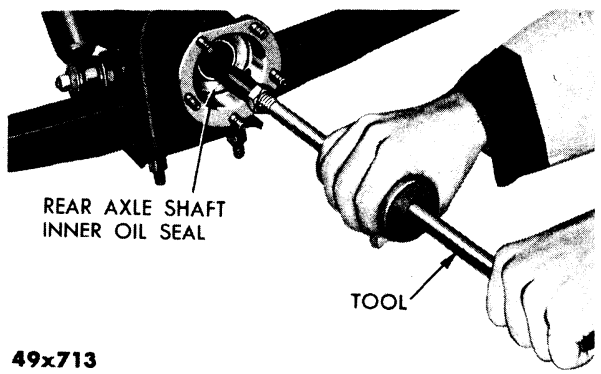


Fig. 7—Removing Inner Oil Seal Using Tool C-637

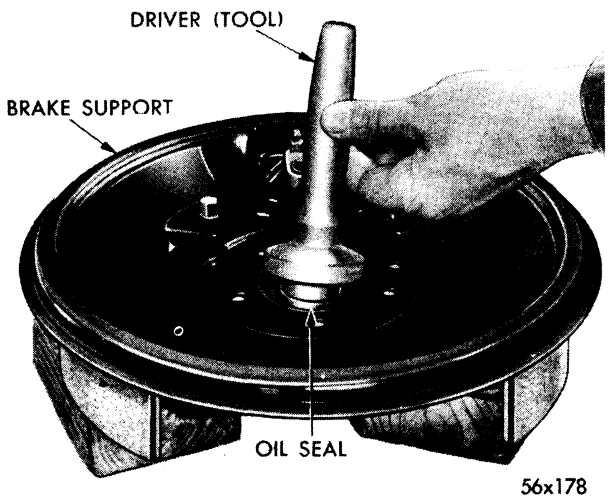


Fig. 8—Removing Outer Axle Shaft Oil Seal with Tool C-839

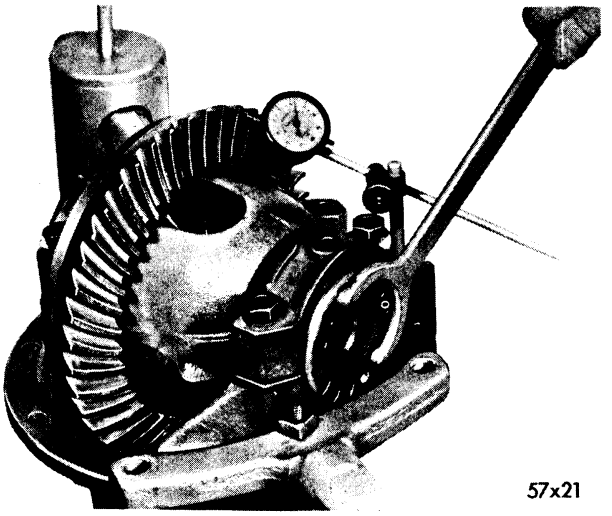


Fig. 9—Checking Drive Gear and Pinion Backlash

NOTE: The caps must NOT be interchanged as they are line bored with the carrier at manufacture.

4. DISASSEMBLY AND INSPECTION OF DIFFERENTIAL DRIVE GEAR AND CASE ASSEMBLY

Place differential case and drive gear assembly in a suitable fixture and remove the drive gear to case attaching cap screws and remove drive gear. **Drive gear to case bolts are left-hand**

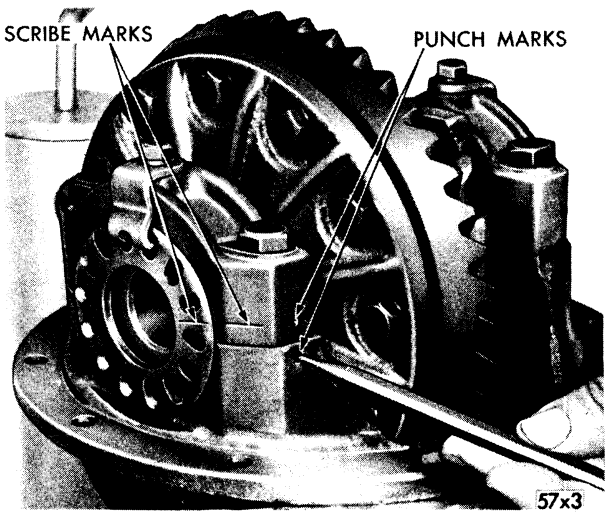


Fig. 10—Marking Caps and Adjusters

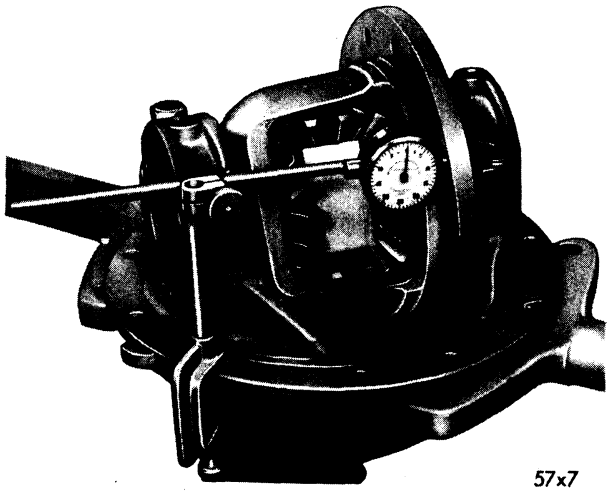


Fig. 11—Checking Drive Gear Mounting Flange

threads, turn clockwise to loosen. Tap drive gear off case, using a fibre hammer. To check differential case runout after removal of drive gear, mount differential case and bearings without drive gear in carrier and adjust. Remove excessive play from the bearings with adjusters. Mount a dial indicator on carrier mounting face and check the drive gear mounting flange runout, as shown in Figure 11. Runout should not exceed .003 inch.

After checking the runout of the assembly, remove the differential case assembly from carrier. Use Tool C-293 in combination with 3 Number 18 adapter plates behind bearings to pull off the differential bearings from case, as shown in Figure 12. If axle is equipped with a Sure Grip differential, refer to Paragraph 23 for service procedure.

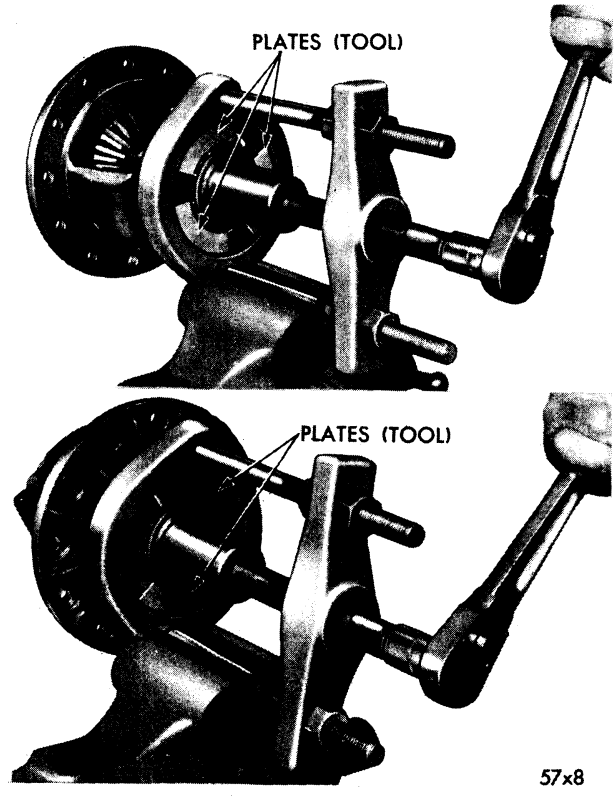


Fig. 12—Removing Differential Case Bearings

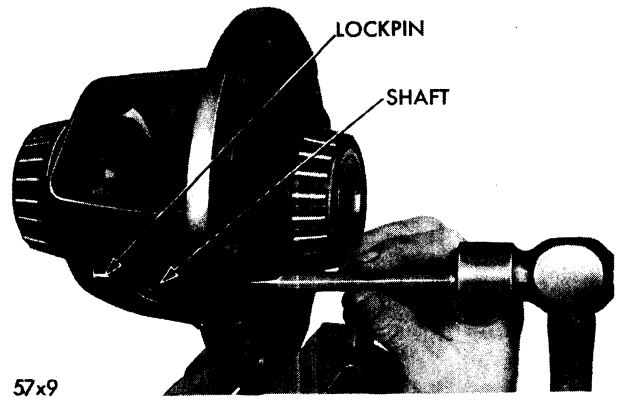


Fig. 13—Removing Differential Pinion Shaft Locl. Pins

Remove differential pinion shaft lock pin by driving pin from case with a hammer and punch, as shown in Figure 13. Drive the differential pinion shaft out of differential case, using a brass drift and hammer. Rotate one differential gear until each pinion appears at the large opening of case. Remove each pinion and thrust washer one at a time, as shown in Figure 14. Lift out rear axle drive shaft thrust block.

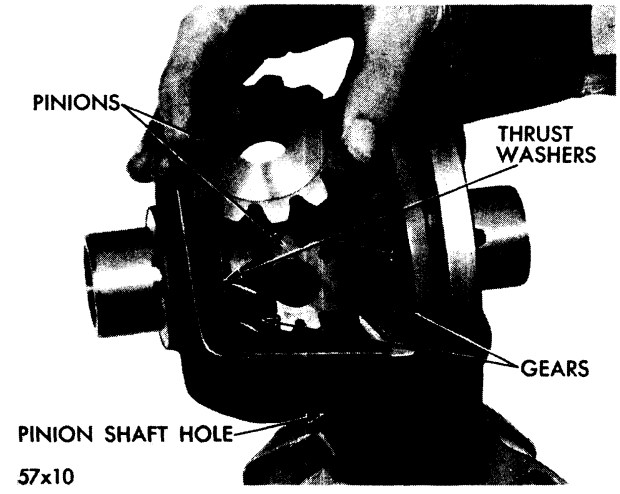


Fig. 14—Removing or Installing Pinion Gear

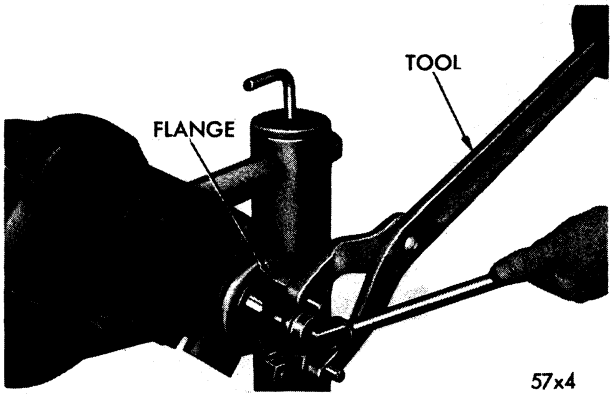


Fig. 15—Removing Companion Flange Nut

5. DISASSEMBLY OF DRIVE PINION AND BEARING ASSEMBLY

Remove the companion flange retaining nut and Belleville washer (Fig. 15) and with puller Tool C-452, and flange holding Tool C-784, remove the companion flange, as shown in Figure 16. Insert pinion oil seal puller Tool C-748 into seal and remove seal from carrier, as shown in Figure 17. Remove pinion bearing washer, bearing cone, and pre-load shims, or spacer (if so equipped). Remove pinion from carrier. If necessary, remove the rear bearing from pinion stem, with puller Tool C-293, and four adapter plates, as shown in Figure 18. Slide the pinion adjusting washer off stem. If necessary, remove both bearing cups from carrier housing, using a suitable drift. Place drift alternately in the two machined slots, in order to drive cups out evenly. Clean carrier, pinion and related parts in suitable solvent, inspect and replace parts as necessary.

6. CLEANING AND INSPECTION

Clean all parts thoroughly in a suitable solvent and blow dry with compressed air. Remove any chips or foreign material from carrier. Inspect all machined surfaces for nicks, burrs or scratches including inner and outer thrust shoulders of differential case. The thrust shoulder on adjusters must be free from burrs so that bearing cups will seat properly. Check differential case for cracks, fractures, distortion or damage. Install a new case if necessary. The bearings should be immersed in clean solvent and rotated by hand until clean. After cleaning, blow dry with compressed air. **Do not spin the bearings with air pressure when blowing them dry, as they are likely to score due to absence of any lubrication.** Check bearings for roughness, or brinelling. The bearings must run free and show no indication of roughness or wear. Examine bearing cups for pitting, scoring or wear. Inspect all gears for chipped or worn gear teeth. Check the fit of differential gears on axle shaft splines and pinions on pinion shaft. Check thrust washers for wear, and replace if necessary. Inspect axle shafts splines for wear, cracks or distortion. Replace necessary parts.

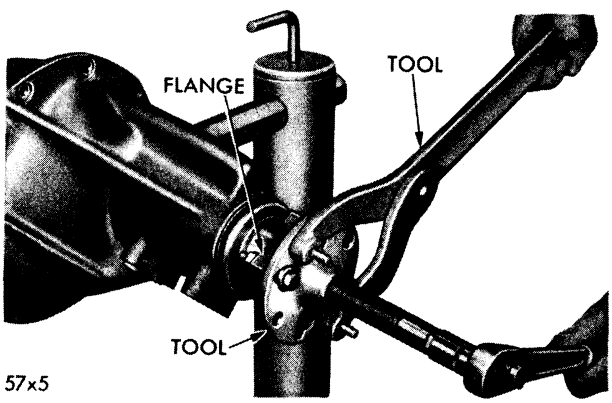


Fig. 16—Removing Companion Flange

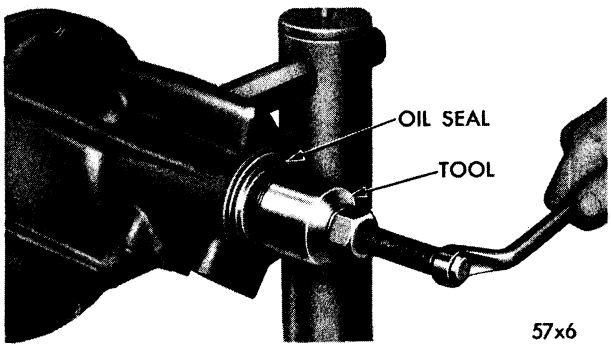


Fig. 17—Removing Drive Pinion Bearing Oil Seal

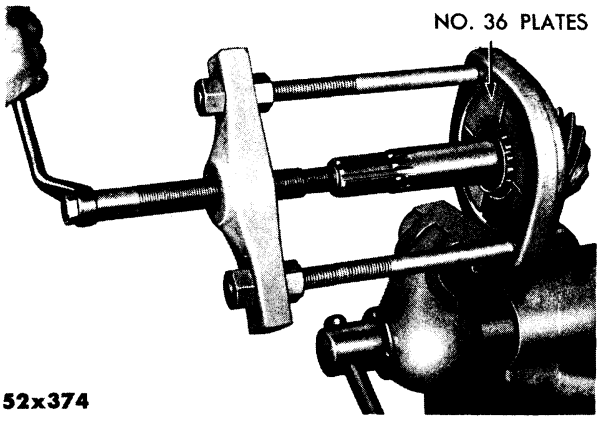


Fig. 18—Removing Pinion Bearing from Shaft (Puller C-293-F2)

7. ASSEMBLING THE DIFFERENTIAL CASE AND PINION GEARS

If new differential gears are to be installed, coat parts with Multi Purpose Gear Lubricant. Install a new thrust washer over hub of each gear and install in position in differential case.

Insert each of two pinions through the large side opening of case (Fig. 18) so that pinion shaft holes of two pinions and their thrust washers are properly aligned. Rotate gears 90 degrees so that pinion shaft holes of case are in exact alignment with holes in the two thrust washers and pinions. From the pinion shaft lock pin hole side of case, insert the slotted portion of pinion shaft through case; the conical thrust washer just through one pinion gear. Install the thrust block between two pinion gears.

IMPORTANT

The thrust block must be installed so that hole in block is aligned with pinion shaft and with the ground sides facing the two differential gears.

While keeping all of these parts in proper alignment, push the pinion shaft on through until locking pin hole in pinion shaft is in exact alignment with its respective hole in case.

NOTE: Before installing pinion shaft lock pin, rotate the differential gears. They must turn freely throughout the 360 degree revolution. The clearance between each gear and case ranges from .001 to .012 inch. This clearance has been established to ascertain free rotation.

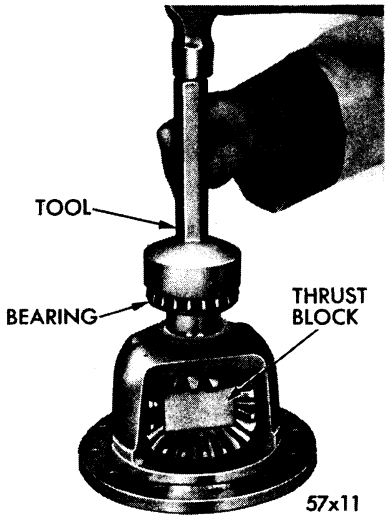


Fig. 19—Installing Differential Bearings

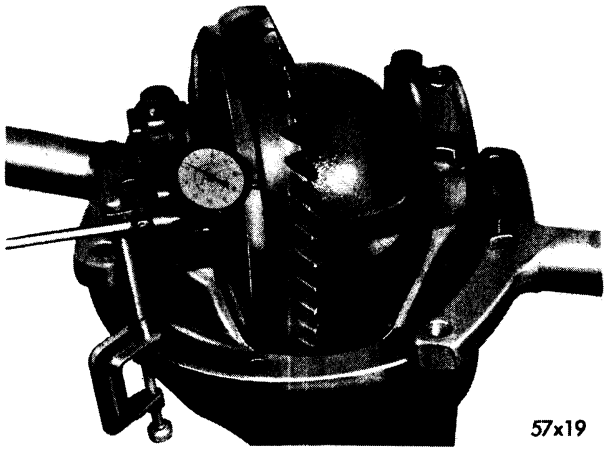


Fig. 20—Checking Drive Gear Runout

Install pinion shaft lock pin through hole in case from the pinion shaft side of the drive gear flange. Position each differential bearing cone on hub of case (Fig. 19) (taper away from drive gear) and with installing Tool DD-1005, install bearing cones. Make certain that contacting surfaces of drive gear and flange are clean and free from burrs. Position drive gear on case aligning the threaded holes of drive gear with those in the case flange. Insert drive gear cap screws through case flange and into drive gear. After it has been ascertained that all cap screws are properly started into their respective threads, tap gear onto case with a fiber mallet until it seats properly on case flange. Position drive gear between brass jaws of vise and alternately tighten each cap screw to 55 foot-pounds torque.

Place differential bearing cups over bearings, and install complete assembly in carrier. Seat the adjusting nuts in the cap pedestals of car-

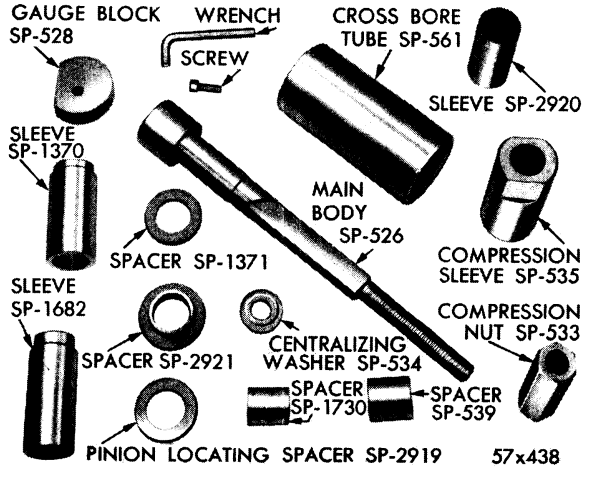


Fig. 21—Special Tool Set C-758-D-3

rier, and install caps and bolts. **Be sure caps are on the same side from which they were removed.** Adjust and remove excessive play from bearings. Check drive gear for runout, as shown in Figure 20.

NOTE: If there is more than .003 inch runout the differential case should be replaced.

8. INSTALLATION OF DRIVE PINION SHAFT, BEARING CONES AND CUPS

Place bearing cups in position in carrier, refer to Tool-set C-758-D-3 (Fig. 21) and proceed as follows: With bearing cups squarely in position in carrier, assemble Tool C-758-D-3 by placing pinion rear bearing over main screw of tool (Fig. 22) and insert tool into carrier from gear side. Place the pinion front bearing over main screw, followed by adaptor SP-535, washer SP-534 and nut SP-533 (Fig. 23). Press bearing cups into place by tightening tool nut, as shown in Figure 24. **Allow tool to rotate slightly in order not to damage bearings or cups during this operation.**

CAUTION

Do not install pinion oil seal during preload and pinion setting operations; otherwise, there will be added drag on pinion giving a false bearing preload on torque wrench.

Pinion Bearing Pre-load Adjustment

The importance of correct pinion bearing preload cannot be over-emphasized. The selection of adjusting washers to give the desired preload should be carefully made. When pinion bearings are installed without pre-loading, the cones are not drawn far enough into their cups to bring the rollers in full contact with thrust ribs on cones. Bearings installed in this manner would allow pinion to "walk" backward and forward under operating loads. This causes a variation in tooth contact pattern, resulting in excessive wear and scoring of gears, and usually is accompanied by noise. On the other hand, where the pinion bearing cones are drawn too far into their cups, the bearings are overloaded even before they have to withstand operating loads imposed upon them by gears. They are apt to "burn up" under a driving load—the rollers might score the cups, causing bearings to gall or flake, resulting in premature axle failure.

Correct cone distance is obtained by use of a spacer and washer combination. **Do not install pinion oil seal during pre-load and pinion setting operations, otherwise, there will be an added drag on pinion shaft which would give a false bearing pre-load on the torque wrench.**

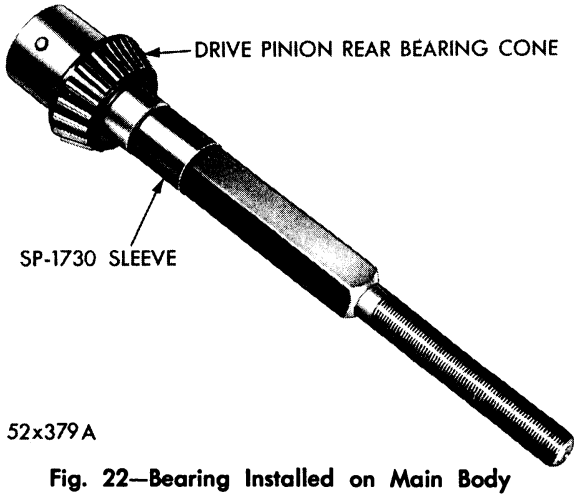


Fig. 22—Bearing Installed on Main Body of Tool C-758-D-3

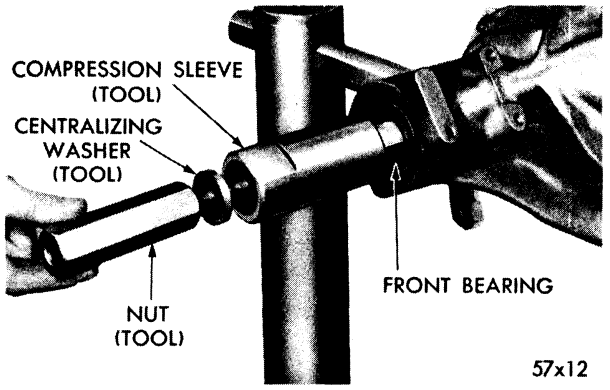


Fig. 23—Compression Sleeve and Centralizing Washer Positioned in Carrier

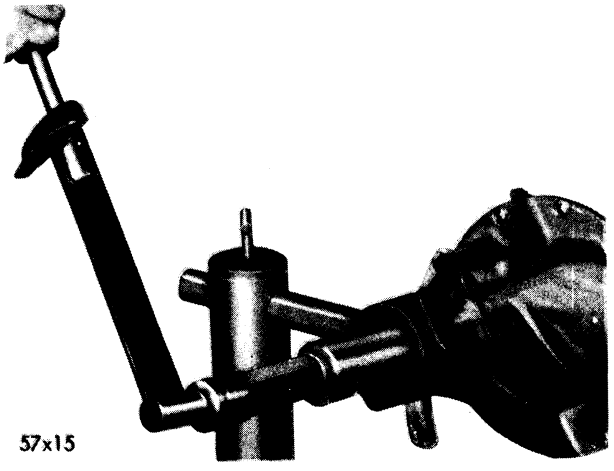


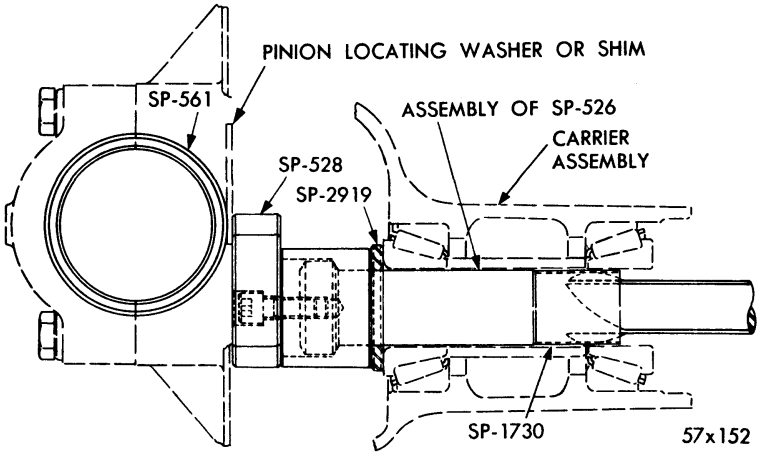
Fig. 24—Seating Bearing Cups and Checking Torque

9. PINION BEARING PRE-LOAD AND PINION SETTING (Without using special Tool C-758-D-3)

Correct drive gear and pinion adjustment consists of following: Pinion Bearing Pre-load, Pinion Setting, Differential Bearing Pre-load, and Backlash between Drive Gear and Pinion. The final inspection of these adjustments is performed by checking the tooth contact patterns, as described in Paragraph 13.

Pre-loading the pinion and differential bearing is important because it holds the drive pinion and differential in place and prevents back and forth movement which would create incorrect gear and pinion tooth contact.

NOTE: If the differential assembly was satisfactory from the standpoint of noise before being disassembled, the drive pinion may be assembled with the original adjusting washers



Used on Windsor

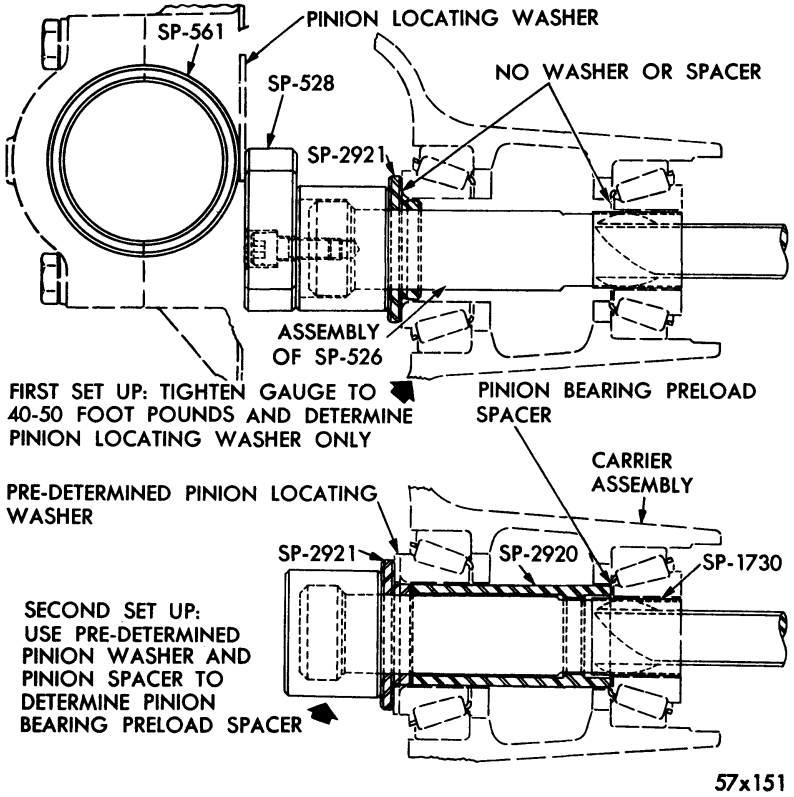


Fig. 25—Used on New Yorker—Imperial Tool C-758-D-3 Installed in Housing

and shims. If replacement parts are installed, or differential adjustment is necessary, the proper thickness washer must be installed between the pinion and rear bearing. The drive gear and pinion are manufactured and lapped in pairs. The position in which the best tooth contact is obtained is etched on end of pinion shaft.

To obtain proper pinion setting in relation to drive gear, the correct thickness thrust washer must be selected before drive pinion is installed in carrier. Pinion bearing adjusting washers are available from .084 inch to .100 inch in .002 inch steps. To select proper thickness thrust washer, proceed as follows: It will be noted that face of the drive pinion is etched with plus (+), or minus (—) sign, followed by a number ranging from 1 to 4, or zero, (0) marking.

If old and new pinion have the same marking and if old bearing is being used, use a thrust washer of same thickness. But if old pinion is marked zero (0) and new pinion is marked + 2, try a .002 **thinner** washer. If new pinion is marked — 2, try a .002 inch **thicker** washer.

If bearing cups are to be replaced, place the bearing cups in position in carrier and drive cups in place with suitable drift. After properly positioning bearing cups in carrier, assemble drive pinion thrust washer (chamfered side down toward gear) on drive pinion stem. Install rear bearing, spacer (if so equipped) and shims on pinion stem. Insert shaft into carrier. Install front pinion bearing and universal joint flange washer and nut. **Do not install oil seal.** Tighten rear axle drive pinion flange nut to 240 foot-pounds torque. Rotate drive pinion shaft after tightening flange nut with wrench to properly seat the bearing rollers in bearing cups. Pre-load torque required to rotate pinion shaft with bearings oiled should be 25 to 35 inch-pounds torque. Add shims to **decrease** torque or remove shims to **increase** torque. After correct pinion setting and bearing preload has been obtained, remove drive pinion flange, install oil seal and tighten drive pinion flange washer and nut to proper torque. Install drive gear with grease marking compound and adjust for correct tooth contact and backlash.

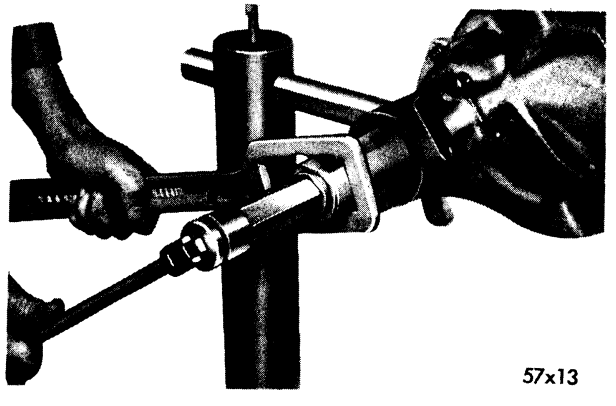

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Fig. 26—Tightening Compression Nut

10. PINION BEARING PRE-LOAD AND PINION SETTING WITH TOOL C-758-D-3 LC-1, LC-2, and Town and Country Wagon)

Lubricate pinion bearing cones. Install locating washer SP-2919 on tool mainshaft. Position rear pinion bearing cone on main screw of Tool C-758-D-3 followed by pinion bearing spacer.

NOTE: Spacer has a larger bore at one end, install large bore end of spacer next to rear bearing.

Install sleeve Tool SP-1730 on tool main screw with sleeve bottoming against the tool main screw shoulder. Install original shims removed from drive pinion over the tool main screw and sleeve and against spacer. Position the carrier in stand so companion flange is facing upwards. Insert tool in carrier. Install pinion front bearing and compression sleeve Tool SP-535. Install tool centralizing washer SP-534 followed by the main screw nut, Tool SP-533. Hold compression sleeve Tool SP-535 with holding Tool C-784 or C-3281, tighten nut to 240 foot-pounds torque. (Fig. 26).

With an inch-pound torque wrench on the nut of tool, rotate wrench several revolutions to seat bearings, (Fig. 24). The correct reading should be 25 to 35 inch-pounds. If bearing pre-load is more than 35 inch-pounds, a thicker shim should be used under front bearings. Shims are available in thickness of .010, .012, .014, .016, .018, .020, .022, .024 and .026 inch. If bearing pre-load is less than 25 inch pounds, a thinner shim should be used.

NOTE: Correct pre-load readings can only be obtained with pinion shaft tool in a vertical position.

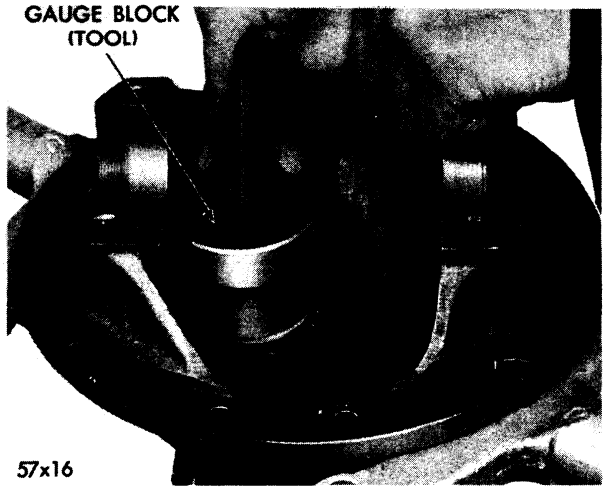


Fig. 27—Installing Gauge Block on Main Body

Assemble gauge block SP-528 (Fig. 27) to main screw. Place SP-561 bearing arbor in carrier bearing supports, as shown in Figure 28.

NOTE: Remove any burrs or upsets in bearing supports before installing bearing arbor, as arbor must be securely seated in bottom of bearing bores.

Center arbor in differential bearing pedestals of carrier. Insert a piece of .002 inch shim stock between arbor and each cap and tighten caps to 10 foot-pounds torque. Select a pinion washer of sufficient thickness so that it will just pass between gauge block end of setting tool and machined surface of arbor, as shown in Figure 29.

For example, if a .090 inch washer can be inserted, but a .092 washer cannot be forced between the two surfaces by hand, the .090 inch washer should be used even though it might feel loose. Check end of drive pinion as it should indicate amount that should be added or subtracted from washer that was selected in above check.

Example: If mark on pinion shaft indicated + 2, a .002 inch thinner washer should be used for final assembly. If spacer selected by the use of tool is .090 inch, it is necessary to deduct .002 inch. The correct washer, therefore, for final assembly would be .088 inch.

When correct washer has been selected for drive pinion, disassemble tool from carrier. Add washer selected to tool, between spacer SP-2921 and pinion rear bearing. Add spacer SP-2920 and the **pinion bearing adjusting spacer** (that was removed from the axle at disassembly). Insert tool assembly in carrier. Slide front bearing on shaft and into position in its cup. Install tool spacer, nut and washer. Tighten tool 240 minimum foot-pounds torque, as shown in Figure 24. Turn the tool with a speed wrench to permit bearings to seat. When bearings are seated, check bearing pre-load by revolving tool, using an inch-pound torque wrench, as shown in Figure 27. The correct bearing pre-load should be 25 to 35 inch-pounds torque.

If the bearing adjustment does not conform to above specifications, it will be necessary to change the adjustment by using a thicker or thinner bearing spacer. A **thicker** spacer should be used if pre-load is too great or a **thinner** spacer if pre-load is not sufficient. When correct spacer has been selected for drive pinion

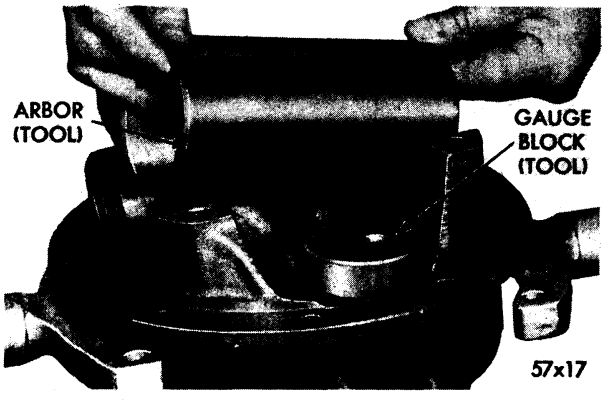


Fig. 28—Installing Arbor

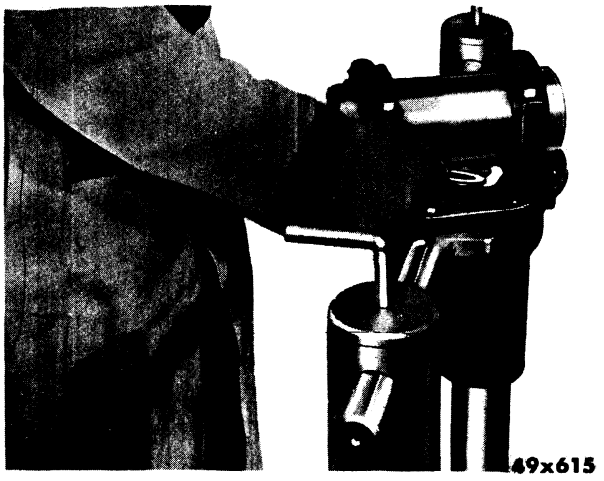


Fig. 29—Determining Spacer Washer Thickness

bearings, remove the carrier cap, shim stock and arbor from carrier housing. Disassemble tool from carrier. Install pinion setting washer over pinion stem with chamfered side against the pinion. Make certain the contacting surfaces of rear bearing cone are perfectly clean. Install cone on stem and press bearing on stem with Tool DD-955. (Fig. 30).

Install the selected shim pack. Lubricate pinion front and rear bearing cones with heavy oil. Apply a light coat of sealer in carrier bore at seal area and install new seal, driving seal with Tool C-3656 until driver bottoms on pinion front bearing. (Fig. 31) (Seal installed). Install companion flange on pinion stem with Tool C-496. Holding companion flange with Tool C-784, tighten nut to 240 foot-pounds torque.

11. PINION BEARING PRE-LOAD AND PINION SETTING (LC-3, LY-1)

Check the bearing cups and carrier for grit and dirt. Assemble washer SP-2921 followed by correct pinion locating washer and spacer SP-2920 along with rear bearing on main shaft of Tool C-758-D-3. Insert tool, bearing and washer assembly in carrier along with original shims previously removed from drive pinion. Install front bearing, compression sleeve SP-535, centralizing washer SP-534 and main nut SP-533. Hold compression sleeve nut with holding Tool C-784 or C-3281 and torque nut to 240 foot-pounds.

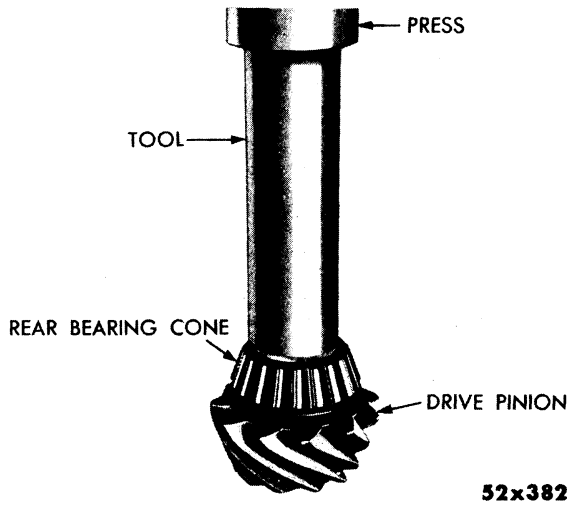


Fig. 30—Installing Pinion Bearing Cone on Pinion Shaft

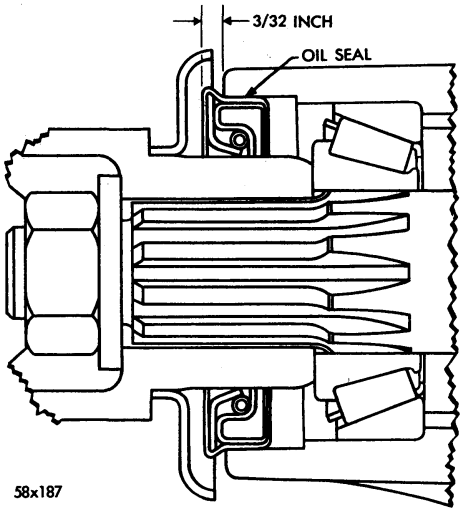


Fig. 31—Pinion Seal Installed

With an inch-pound torque wrench, rotate wrench in a clockwise direction several revolutions to seat bearings. The correct torque reading should be from 25 to 35 inch-pounds. If bearing preload is more than 35 inch-pounds, a thicker shim should be used under front bearing cone. Shims are available in thicknesses of .012, .016, .018, .020, .022, .024 and .026 inch. If bearing preload is less than 25 inch-pounds, a thinner shim should be used.

NOTE: Correct pre-load can only be obtained with tool in a vertical position.

Remove tool with shim pack, bearing cone, pinion locating washer, and spacer from carrier.

Assembly of Pinion in Carrier

With stem end of pinion facing up, install selected washer on pinion stem. Chamfered side of washer facing the drive pinion head. Position rear bearing cone on pinion stem. Make sure contacting surfaces of washer, pinion head and rear bearing cone are perfectly clean and free of dirt or foreign particles. Install rear bearing cone onto pinion stem with Tool DD-955. Install selected shim pack. Lubricate pinion front and rear bearings. Insert pinion stem and bearing assembly in carrier. Apply a light coat of sealer in carrier bore at seal area and install new seal with Tool C-3656 until driver bottoms on pinion front bearing. (Fig. 31) (Seal installed). Support pinion gear in carrier and start companion flange with installing Tool C-496 or DD-999. Install plain washer

(concave side of washer down) and nut. Torque flange nut 240 foot-pounds and remove tool.

12. DIFFERENTIAL BEARING PRE-LOAD AND BACKLASH

NOTE: The differential bearing pre-load and backlash between drive gear and pinion are obtained after the pinion bearing pre-load and pinion are established.

Place differential and drive gear assembly on the bearing support and snug down the caps. Check drive gear for runout on the back face (Fig. 32). Drive gear runout should be true within .005 inch maximum. Make adjustments as follows:

Using two spanner wrenches Tool C-406 (Fig. 33), screw out bearing adjuster at back face of drive gear and screw in the opposite adjuster until considerable backlash is obtained. This helps align bearing cups.

Tighten bearing cap lower bolts 110 foot-pounds torque, leaving top bolts fairly loose. This holds bearing cups in line while moving drive gear. Screw out adjuster on tooth side of gear until it clears bearing cup. Screw in opposite adjuster until only a little backlash remains. This will insure bearing cup alignment for final adjustment.

Turn drive gear a few times by hand to seat bearings. With a dial indicator, find point of least backlash on drive gear at 90 degree intervals. At least point of backlash, screw in adjuster at back face of drive gear until .001 inch appears on indicator.

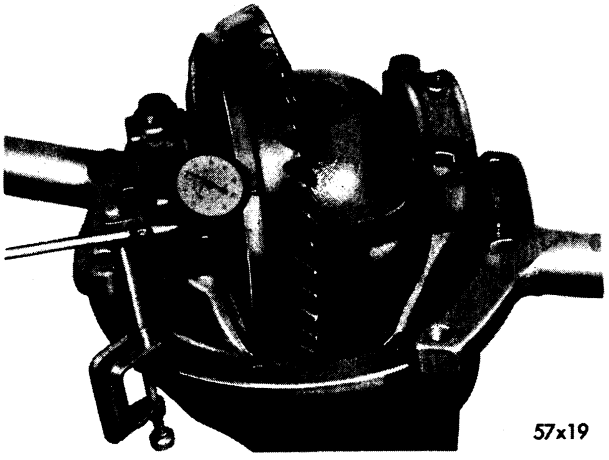


Fig. 32—Checking Ring Gear Runout

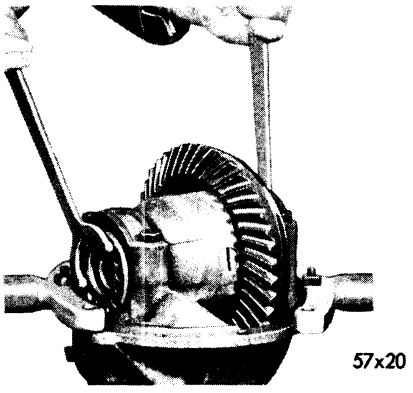


Fig. 33—Adjusting Differential Bearings

Screw in adjuster on tooth side until indicator shows .006 to .008 inch backlash. Lock adjusting nuts in place and tighten both top bolts 110 foot-pounds torque.

Secure the dial indicator to the carrier flange so pointer of indicator is squarely contacting one of the drive gear teeth (thrust side), (Fig. 34). After the first reading is taken, move the dial indicator away from the gear tooth and rotate and check drive gear at 90 degree intervals for specified backlash between drive gear and pinion. If adjustment is followed, the bearing supports will be spread, differential bearings pre-loaded, and backlash between drive gear and pinion established.

CAUTION

Whenever adjustment of differential assembly is changed to obtain correct tooth contact, re-

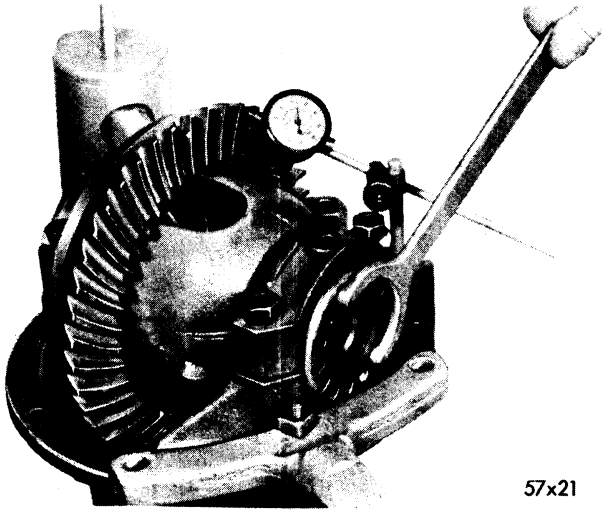


Fig. 34—Checking Back Lash between Drive Gear and Pinion

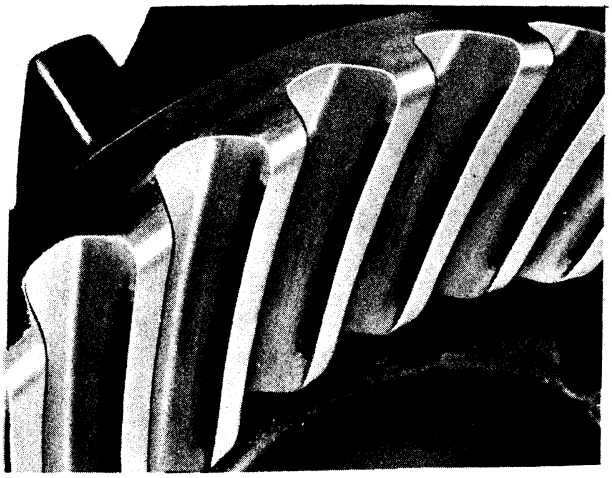


Fig. 35—Heavy Face Contact

adjust differential bearing pre-load and backlash between drive gear and pinion.

If all adjustment have been correctly made, the gears will be properly meshed and quiet operation will result.

13. GEAR ADJUSTING FOR CORRECT TOOTH CONTACT

Check tooth contact by means of gear marking compound applied to drive gear teeth, as shown in Figure 34. Apply load against back face of drive gear with a round bar as drive pinion is rotated. This leaves a bare area the size, shape and location of contact. If improper tooth contact is evident, as indicated by Fig. 35 and 36, the pinion should be adjusted either forward or backward, maintaining the backlash within

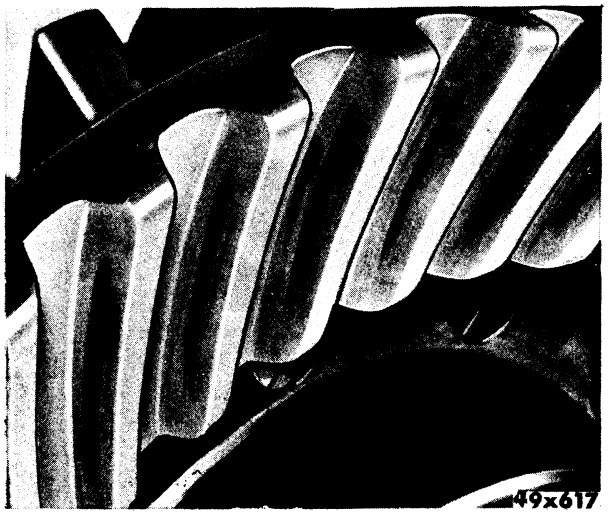


Fig. 36—Heavy Flank Contact

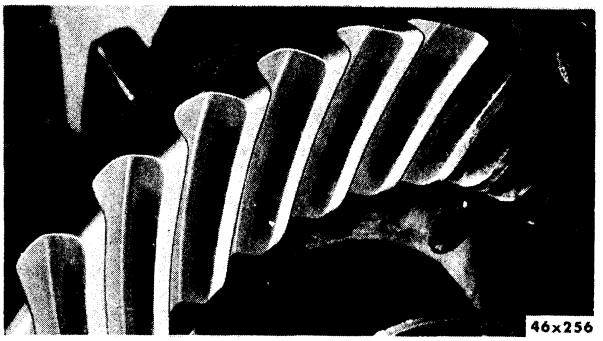


Fig. 37—Correct Gear Tooth Contact

specified limits until correct tooth contact, as shown in Figure 37, is obtained. With adjustments properly made, correct tooth contact, as shown in Figure 37, will result. Notice that contact pattern is well centered on the drive and coast sides about $\frac{1}{16}$ inch from edges of teeth. When tooth marks are obtained by hand, they are apt to be rather small. Under an actual operating load, however, the contact area increases. Figures 35 and 36 show improper or incorrect tooth contact. To correct such conditions, readjust drive gear and pinion as follows:

a. Heavy Face Contact

If tooth marking is across the length of tooth, narrow and high on the tooth face, as shown in Figure 36, the teeth will roll over or gall. This type of contact causes excessive wear and noise.

To correct heavy face contact—move the pinion in **toward center** of drive gear by installing a **thicker** washer behind pinion. Readjust backlash.

b. Heavy Flank Contact

If tooth marking is across the length of tooth, but narrow and low on the flank, as shown in Figure 36, the teeth will gall or score. This type of contact causes excessive wear and noise.

To correct heavy flank contact—move the pinion **away from the center** of the drive gear by using a **thinner** washer behind pinion. Readjust backlash.

14. INSTALLATION OF DIFFERENTIAL CARRIER

Check carrier flange and flange face for nicks and burrs. Mount differential and carrier to axle housing using a new gasket Tighten assembly mounting nuts 35 foot-pounds torque.

15. AXLE DRIVE SHAFT REPLACEMENT AND END PLAY ADJUSTMENT

Loosen the brake shoe cams and remove the rear hub and drum assemblies with puller Tool C-845, (Fig. 3).

NOTE: Do not attempt to remove the brake drums by hammering on end of an axle drive shaft as damage to the bearings and thrust block will result.

Disconnect the brake line at each cylinder and remove the brake support plates and dust shields as assemblies.

NOTE: Remove axle shaft keys and install Tool C-745 for LC1 and LC-2 and C-757 for LC-3 and LY-1 to protect the axle outer seal (Fig. 4).

Remove shims. Remove axle drive shafts and bearing cups (Fig. 5). Remove inner oil seals (Fig. 7).

NOTE: It is advisable to replace inner and outer oil seals when replacing an axle drive shaft.

Clean all parts thoroughly. Inspect bearings and cups for brinnelling and axle shaft for signs of fatigue, or worn bearing and seal surfaces.

Install shims totaling .040 inch at one end of the axle housing. Shims are available in .05, .010, .0125, .015 and .030 inch thickness. Lubricate the bearing and install the axle shaft, bearing and bearing cup (Fig. 38), the bearing cup is driven into the axle housing with Tool C-413 until the face of installing tool bottoms tightly against the shims. Remove tool and install the dust shield, lockwashers and nuts. Tighten 30-35 foot-pounds torque.

Working from the opposite end of the axle housing, install the other axle shaft with bearing until inner end of axle shaft contacts the axle shaft thrust block. Lightly tap end of axle shaft with a fibre mallet to insure shaft is contacting the thrust block: this will force the opposite shaft away from the thrust block to its full travel.

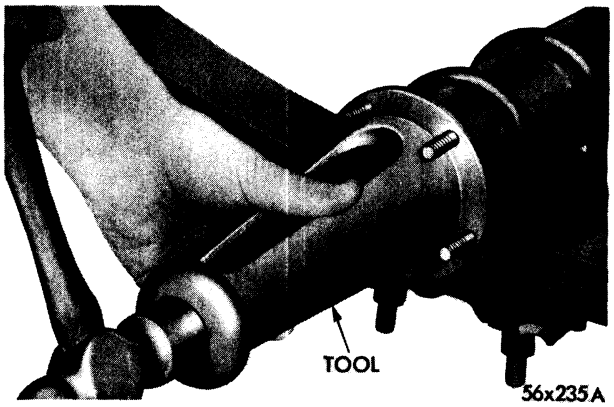


Fig. 38—Installing Axle Drive Shaft Bearing Cup with Tool C-413

Install the bearing cups carefully (Fig. 38), until no axle shaft end play exists without preloading the bearing. Rotate axle shaft during installation of the cup to properly seat bearing.

NOTE: The bearing cup will protrude beyond the face of the axle flange.

Hold the tool firmly against the bearing cup and install a feeler gauge between the axle housing flange and the face of the tool. This measurement will be approximately .040 inch. To obtain .013 to .018 inch axle shaft end play, add a minimum of .013 to whatever the feeler gauge reading indicates.

NOTE: It is recommended that the end play be held to the high limit rather than the low. The end play will decrease during operation due to heat expansion.

CAUTION

When adjusting axle shaft end play, equal thickness of shims should be removed or installed on both sides of axle housing to maintain the centralized position of axle shaft thrust block.

Remove the tool and install the correct shim pack thickness which has been determined.

After axle shaft end play has been checked and corrected, install brake drum and wheel assembly. Tighten axle shaft nuts to a minimum of 145 foot-pounds torque. Install cotter keys and hub caps.

16. INNER OIL SEAL—AXLE SHAFT (REMOVED

a. Removal

Remove inner oil seal with puller Tool C-637 (Fig. 7).

b. Installation

Drive seal into axle counterbore until it is squarely bottomed (Fig. 39). The lip of seal is away from drive flange of tool.

17. BRAKE DUST SHIELD OIL SEAL

a. Removal

With brake dust shield removed, remove outer seal (Fig. 40).

b. Installation

Install seal with outside marking on seal retainer toward brake shoe side of brake dust shield.

18. BEARING—AXLE DRIVE SHAFT

a. Removal

With axle shaft removed, remove bearing with puller Tool C-293 (Fig. 6).

b. Installation

Press bearing on shaft (Fig. 41) and lubricate bearing rollers with Multi-Purpose Gear Lubricant. Install the outer bearing cups with Tool C-413 (Fig. 38).

19. WELDING REAR AXLE HOUSING

The axle housing should be completely disassembled, if it is to be welded with arc welding equipment. It is also possible to weld the assembled housing with gas welding equipment, if precaution is taken to protect gaskets and heat-treated parts.

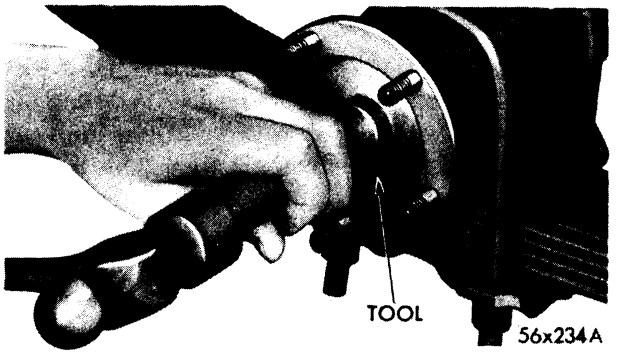


Fig. 39—Installing Axle Shaft Inner Oil Seal with Tool C-839

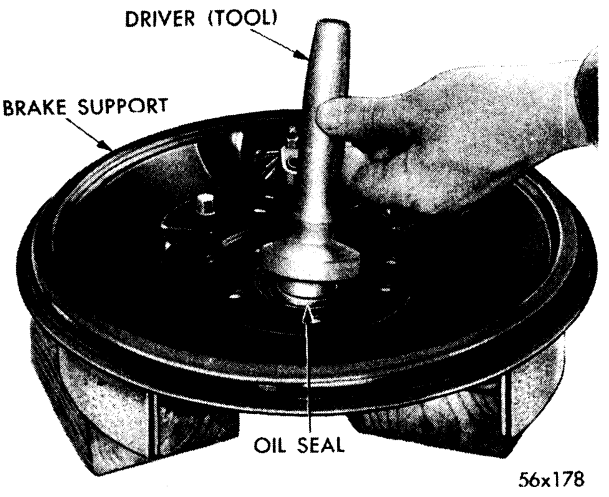


Fig. 40—Removing Rear Axle Shaft Oil Seal from Brake Support with Tool C-839

20. REAR AXLE HOUSING ALIGNMENT

Rear Axle housings may become bent, bowed or warped. If not corrected, such conditions will cause premature axle failure. Disassemble axle assembly and check housing for horizontal and vertical alignment, as follows:

a. Checking Axle Housing for Horizontal Alignment

Place axle housing in "V" blocks—on surface plate. Turn housing until machined surface for carrier mounting is facing UP and perfectly level, as shown in Figure 42. Place square

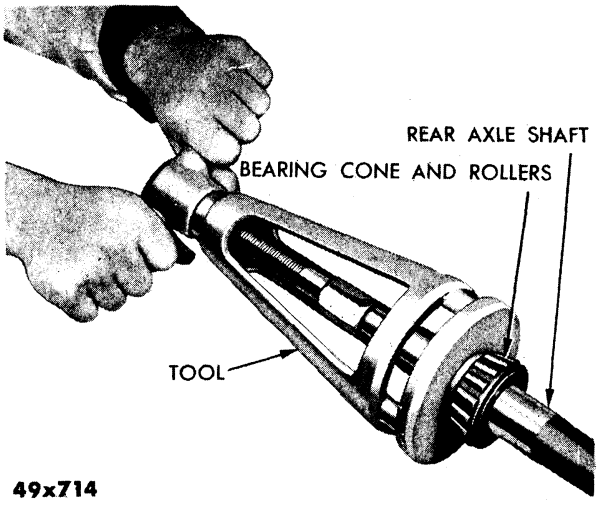


Fig. 41—Installing Axle Shaft Bearing

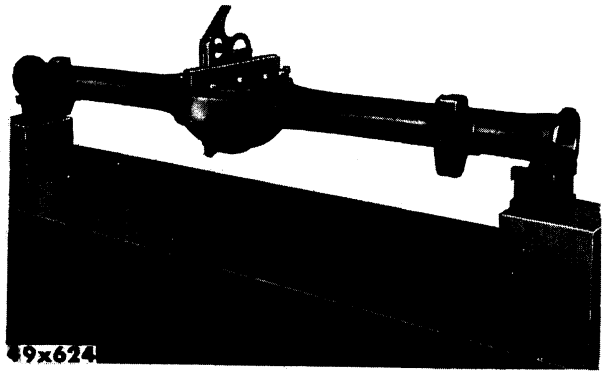


Fig. 42—Leveling Housing for Checking Alignment

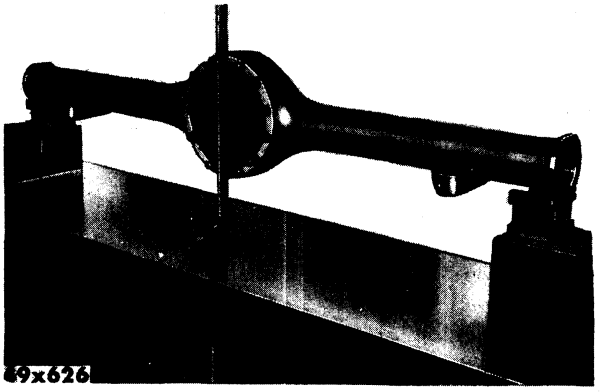


Fig. 44—Squaring Axle for Vertical Alignment

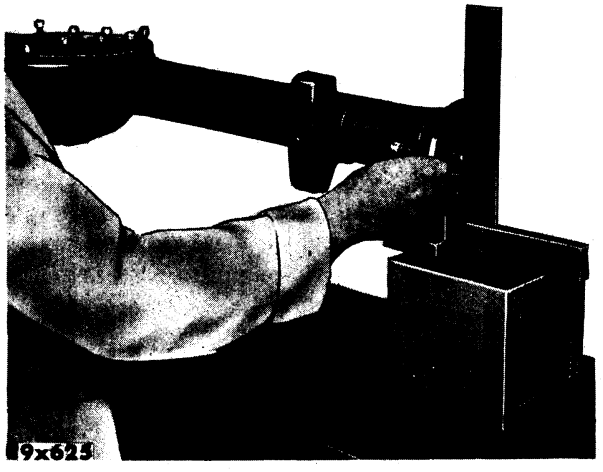


Fig. 43—Checking Horizontal Alignment

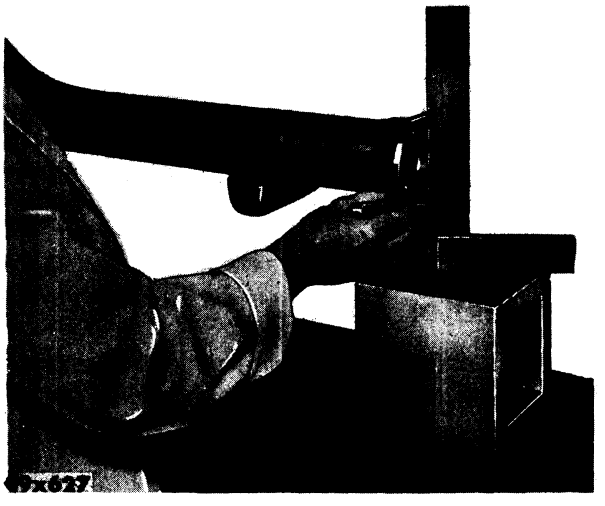


Fig. 45—Checking Vertical Alignment

against machined surface of housing end flange and surface plate, as shown in Figure 43. Amount of housing misalignment will be indicated by thickness of feeler gauge between square and end flange at top or bottom. A housing that checks more than .007 inch should be replaced.

b. Checking Axle Housing for Vertical Alignment

With housing in "V" blocks, turn housing until machined surface for carrier mounting is in a squared, vertical position, as shown in Figure 44. Place a square against machined surface of housing end flange and surface plate, as shown in Figure 45. Amount of housing misalignment will be indicated by thickness of feeler gauge between square and end flange at top or bottom. A housing that checks more than .007 inch should be replaced. To determine amount that axle is misaligned, multiply thickness of feeler stock used by the ratio of 4.7 to 1.

SURE-GRIP DIFFERENTIAL

The conventional rear axle delivers the same amount of torque to both axle shafts. The driving force is therefore, limited by the wheel which has the least amount of traction. If one of the rear wheels gets on an icy patch or into soft mud, its friction against the road lowers suddenly so that the Torque delivered to that wheel is often great enough to overcome friction causing the wheel to spin.

To overcome these characteristics of the con-

ventional differential, the Sure-Grip differential permits the axle shaft whose wheel has the greater traction to develop a considerable amount of torque thus enabling the car to pull out of its difficulty.

21. DESCRIPTION (Fig. 46)

The Sure-Grip differential is similar to the conventional differential except for the addition of friction plates for clutching the differential case to the differential gears and a means for engaging these plates. It has four pinion gears, positioned in the case by two pinion shafts which are at right angles to each other and loose fitting at their intersection. Both ends of each shaft have two flat surfaces, or ramps, which mate with identical ramps in the differential case. There is additional clearance in the case to permit a slight peripheral movement of the ends of the pinion shafts within the case.

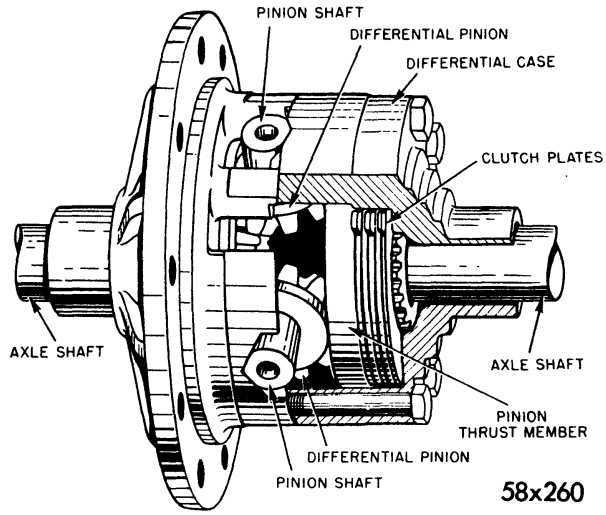


Fig. 46—Sure-Grip Differential (Cut-away)

22. OPERATION (Fig. 47)

Torque delivered by the engine is transmitted to the rear wheels via the axle drive pinion and drive gear to the differential case and to the pinion shafts which are rotated by the case. The pinion shafts carry the pinion gears around, rotating the differential side gears and the axle shafts which are splined to the side gears.

The friction of the wheels against the road, the inertia of the wheels themselves, and the

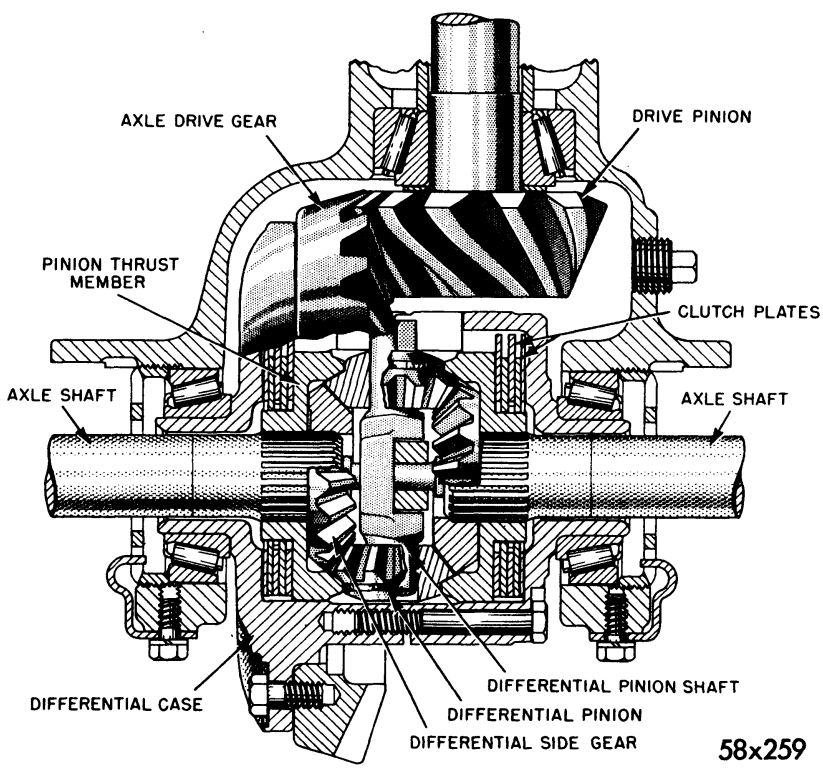


Fig. 47—Sure-Grip Differential Cross-Section

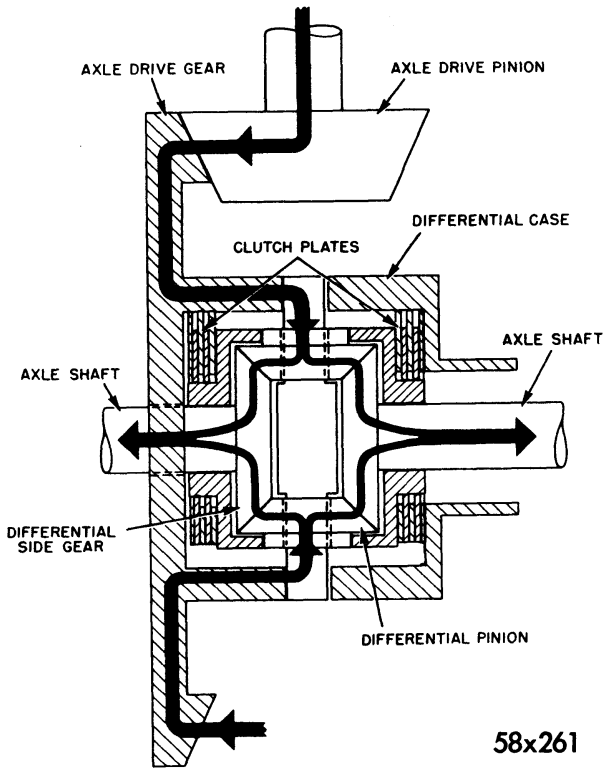


Fig. 48—Power-Flow Axle Shafts Turning at Same Speed

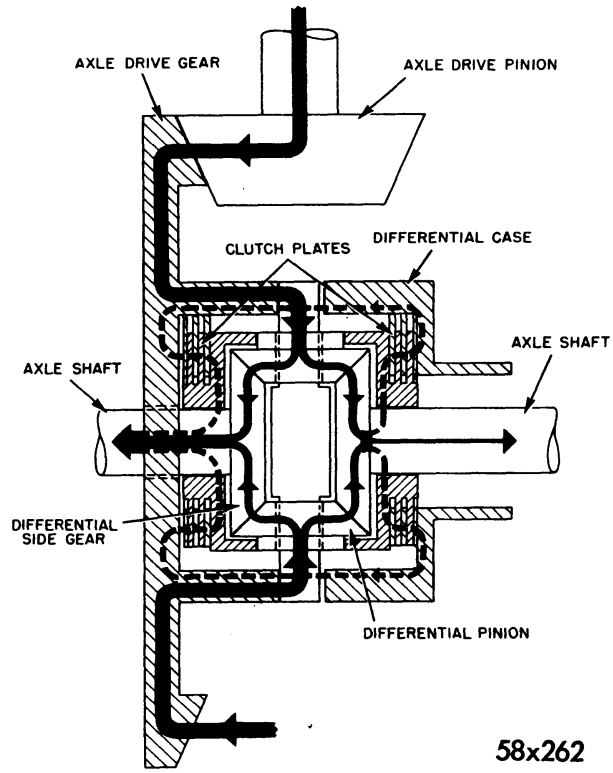


Fig. 49—Power-Flow Axle Shafts Turning at Differential Speeds

friction of the differential gears make the pinion shafts resist turning so that the driving force causes the pinion shaft ramps to slide against the differential case ramps pushing the pinion shafts apart slightly. As the pinion shafts move outward, two of the pinions on one of the pinion shafts bears against one of the pinion thrust members and the two pinions on the other pinion shaft bear against the other thrust member. Each thrust member is splined to one of the axle shafts and drives two friction plates of the clutch. The other two friction plates of each clutch are attached to the differential case so that when they are engaged, both axles shafts become clutched to the case, to a degree that varies with the amount of torque transmitted.

This in effect, locks the axle shafts in normal, straight-ahead driving, thus prevents momentary spinning of the wheels when encountering poor traction. Refer to Figures 48 and 49 for "Power Flow."

SERVICE PROCEDURES

WARNING

Before raising a rear wheel off the ground, shut off engine, set parking brake tightly, carefully block front wheel diagonally opposite the one to be removed against both forward and rearward movement.

23. REMOVAL AND INSTALLATION OF DIFFERENTIAL

Follow the same procedure outlined under removal and installation of the conventional rear axle differential.

24. DISASSEMBLY

Remove axle drive gear. Check runout of drive gear mounting flange. Replace both case halves if runout exceeds .003 inch.

NOTE: Before disassembling case halves, place scribe marks on each half to aid in aligning

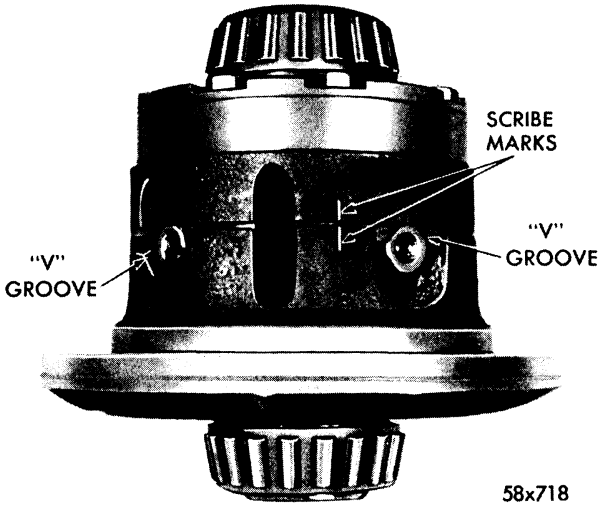


Fig. 50—Case Halves Scribed for Proper Reassembly

case when reassembling (Fig. 50).

Remove case cap attaching bolts and remove case cap (Fig. 51). Remove clutch plates (Fig. 52), (noting relation of clutch plates). Remove side gear retainer (Fig. 53). Remove side gear (Fig. 54). Remove pinion shafts with pinion gears (Fig. 55). Remove remaining side gear (Fig. 56), side gear retainer (Fig. 57) and clutch plates (Fig. 58). Remove axle shaft spacer by pressing out lock pin.

25. ASSEMBLY

Clean all parts thoroughly. Inspect all parts for wear, nicks and burrs. Replace worn, cracked or distorted clutch plates. If case is worn, it will be necessary to replace both halves.

Install clutch plates alternately so that an external tanged plate (approximately $\frac{1}{16}$ inch thick(is installed first, followed by an internal

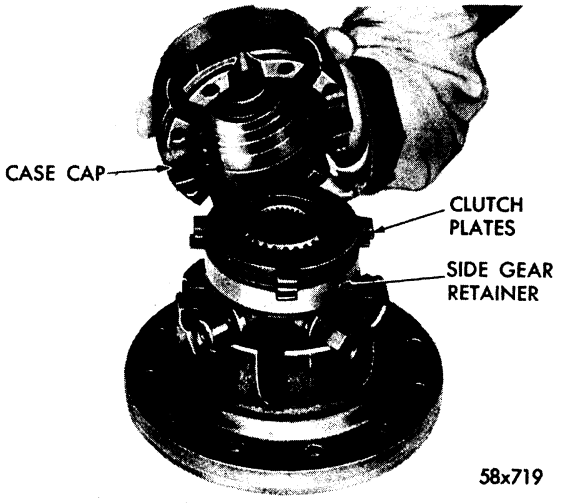


Fig. 51—Removing or Installing Differential Case Cap

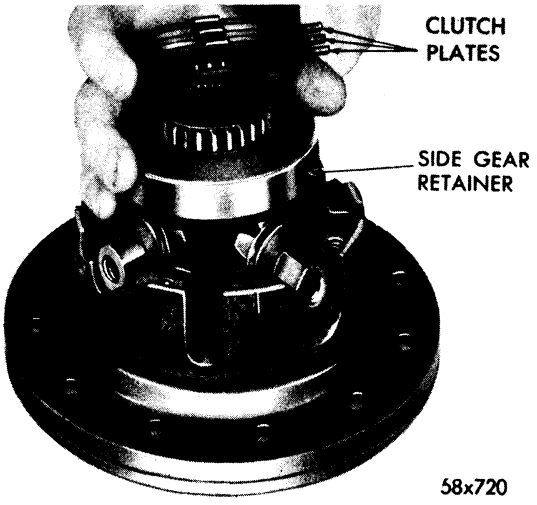


Fig. 52—Removing or Installing Clutch Plates (Cap Side)

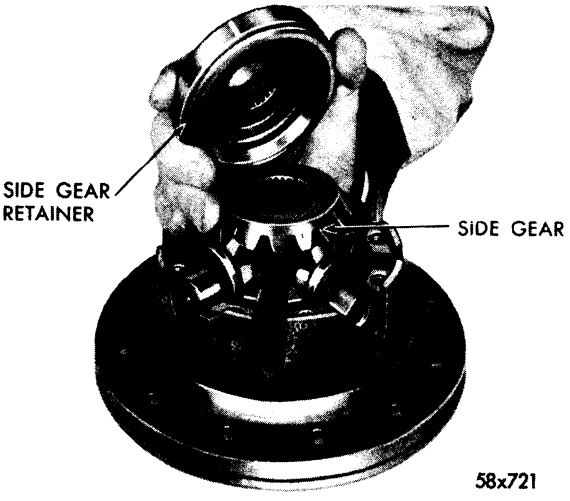


Fig. 53—Removing or Installing Side Gear Retainer (Cap Side)

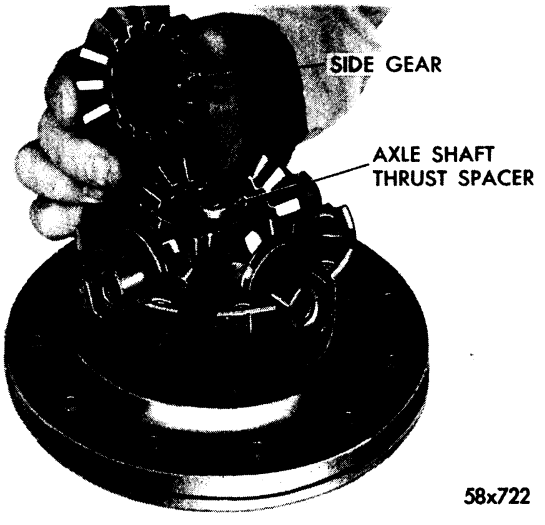


Fig. 54—Removing or Installing Side Gear (Cap Side)

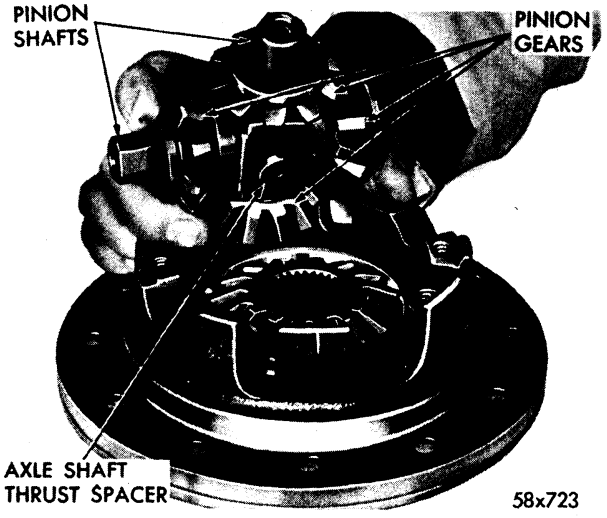


Fig. 55—Removing or Installing Pinion Shafts and Pinion Gears

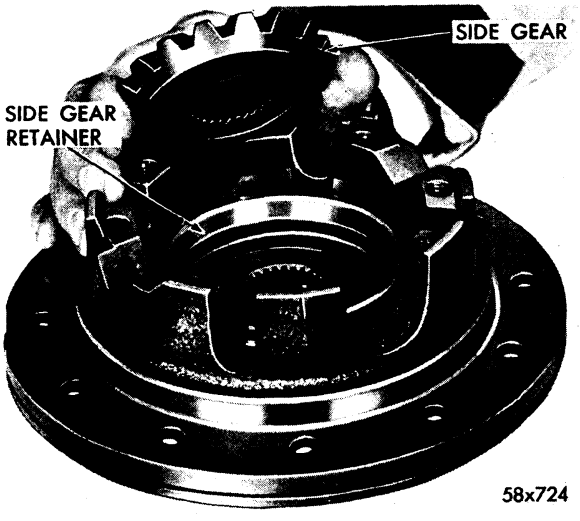
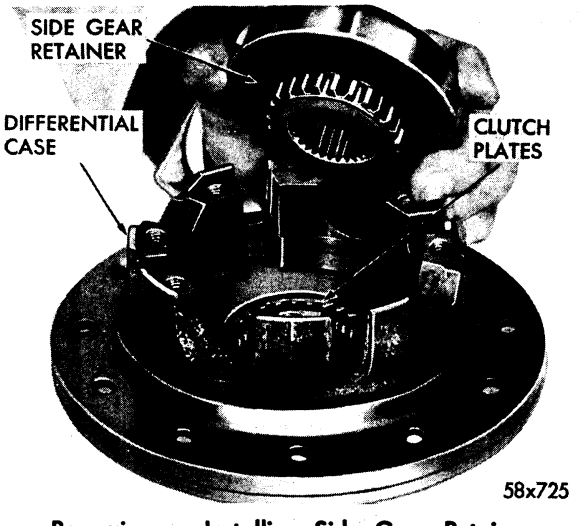


Fig. 56—Removing or Installing Side Gear from Differential Case



Removing or Installing Side Gear Retainer from Differential Case

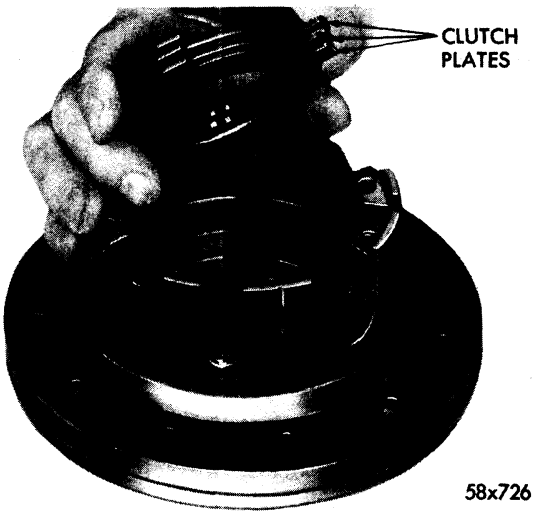


Fig. 58—Removing or Installing Clutch Plates from Differential Case

splined plate until 5 plates are installed. The thin plate (approximately $\frac{1}{16}$ inch) should be installed so that it will be toward the case. Install one side gear retainer, (Fig. 57) engaging splines of retainer with internal splined clutch plates. Install one side gear (Fig. 56).

Install a lock pin in one of the axle thrust spacers, drive pin until pin appears at thrust end of spacer but does not extend beyond thrust face. Align the pinion shafts and install spacer and pin through holes in pinion shafts. Install the other axle shaft thrust spacer, engaging the lock pin, as shown in Figure 59. Press spacer onto the lock pin until the two spacers are in contact. Thrust spacers are a loose fit in pinion shafts.

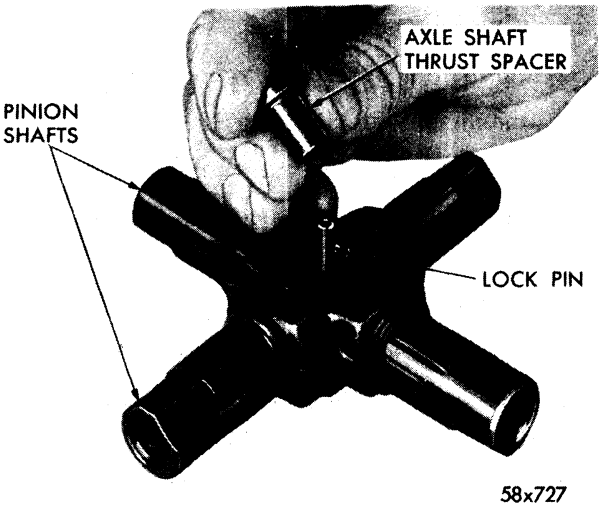


Fig. 59—Installing Axle Shaft Thrust Spacers

Install the four pinion gears on the pinion shafts and install the shafts and pinions assembly in position (Fig. 55). Install side gear (Fig. 54), side gear retainer (Fig. 53), and clutch plates (Fig. 52). Install clutch plates alternately with one thick plate (with tang) facing side gear retainer followed by an internal splined plate until 5 plates are installed.

NOTE: The thin plate (approximately 1/16 inch) should be installed so that it will be towards the case cap.

Install case cap, as shown in Figure 51. Make sure that scribe marks are in alignment, as shown in Figure 50.

Install cap attaching bolts. Tighten evenly to 40 foot-pounds torque. Check the clearance between the pinion mate shaft and the "V" of the case, as shown in Figure 60. Place feeler gauges on both ends of the same shaft and on opposite sides of the "V" so that the total shaft to case clearance can be checked. Do this for both shafts. Clearance should not exceed .020 inch. If clearance exceeds .020 inch with existing clutch plates, install new plates and recheck.

If clearance is still excessive, check shafts and case for wear.

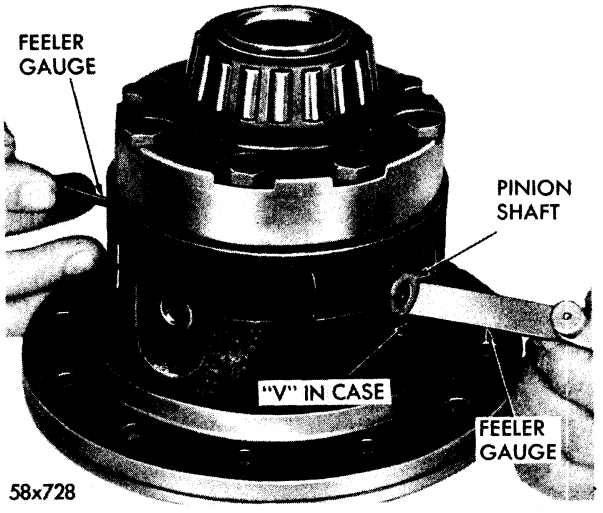


Fig. 60—Checking Clearance between Pinion Mate Shafts and "V" in Case

26. INSTALLATION

Install drive gear and differential assembly in the same manner as outlined under the conventional differential assembly.

LUBRICATION

Fill Sure-Grip Differential with 3½ pints of special differential lubricant MOPAR #1879414. Check level of unit after filling.

SERVICE DIAGNOSIS

27. REAR WHEEL NOISE

a. Wheel loose on axle shaft.

b. Worn drum or axle shaft keyways.

c. Wheel hub bolts loose.

d. Brinnelled or scored wheel bearings.

e. Insufficient lubrication.

f. Improper shimming at axle bearing.

g. Bent or spring axle shaft.

28. REAR AXLE NOISE

a. Lubricant level too low.

b. End play in drive pinion bearings. Also see paragraph 3—Gear noise on coast.

c. Excessive gear lash between ring gear and pinion. Also see paragraph 3. Gear noise on pull.

d. Loose drive pinion companion flange nut.

e. Scuffed gear tooth contact surfaces.

29. REAR AXLE GEAR NOISE

a. Gear noise on pull—a heavy pitch noise and increases as car speed increases, indicates scored gear teeth due to loss of lubricant, excessive gear lash or wrong type of lubricant.

b. Gear noise on coast—noise is heavy and (irregular), indicating excessive end play in pinion bearings.

c. Bearing noise on pull or coast—a rough grating sound that may change slightly in volume as speed changes; indicates that the rear axle pinion bearings are chipped, cracked, scored, badly worn and loose, or no gear lash.

30. CLICKING NOISE IN DRIVE LINE

Noise in drive line when vehicle is backed up

or moved forward.—Clean axle shaft taper, keys and drums. Apply a heavy coating of chalk around entire circumference and length of the tapered section of rear axle shaft. Install drums and tighten axle shaft, nuts 145 foot-pounds torque, minimum. Check universal joints, and flange splines. Tighten companion flange nut 250-280 foot-pounds torque.

31. REAR AXLE DRIVE SHAFT BREAKAGE

a. Improperly adjusted wheel bearings.

b. Abnormal clutch operation.

c. Misaligned axle housing.

d. Vehicle overloaded.

32. DIFFERENTIAL CASE BREAKAGE

a. Improper differential bearing adjustment.

b. Abnormal clutch operation.

c. Excessive drive gear clearance.

d. Vehicle overloaded.

33. DIFFERENTIAL SIDE GEAR BROKEN

a. Worn thrust washers.

b. Misaligned or bent axle shaft.

c. Overloading vehicle.

34. TOOTH BREAKAGE
(Drive Gear and Pinion)

a. Overloading and abnormal clutch operation.

b. Improper gear adjustment.

35. OVERHEATING OF AXLE UNIT

a. Lubricant level too low.

b. Bearings adjusted too light.

c. Bearings adjusted too tight.

d. Excessive wear in gears.

e. Insufficient drive gear to pinion clearance.

36. LOSS OF LUBRICANT

a. Lubricant level too high.

b. Clogged breather.

c. Scored or worn parts.