

**GROUP 3**  
**REAR AXLE**

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**SPECIFICATIONS**

**MODELS**

**VC-1, VC-2, VC-3, VY-1**

Type .....	Semi-Floating
Gear Type .....	Hypoid
Ring Gear Diameter .....	8.75 inch
Pinion Bearing .....	Tapered Roller (2)
Drive Pinion Bearing Pre-Load .....	20-30 in. lbs. without oil seal
Adjustment .....	Shim Pack
Differential Bearings .....	Tapered Roller (2)
Differential Bearing Adjustment .....	Threaded Adjuster
Drive Gear and Pinion .....	Serviced in Matched Sets Only
Drive Gear Runout .....	.005 inch (Maximum)
Drive Gear and Pinion Adjustment .....	Select Washer
Drive Gear and Pinion Backlash .....	.006 to .008 inch
Differential Side Gear Clearance .....	.001 to .012 inch
Differential Lubricant Capacity .....	4 pints
Type .....	Multi-purpose Gear Lubricant as defined by MIL-L-2105B is used in all rear axles. MoPar Hypoid Lubricant Part No. 1879414 is also recommended.
Anticipated Temperature Range	Viscosity Grade
Above — 10°F .....	SAE 90
As low as — 30°F .....	SAE 80
Below — 30°F .....	SAE 75
Axle Ratio	
Manual Transmission VC-1, VC-2 .....	3.23 to 1
*TorqueFlite Transmission VC-1 (Optional Ratio) .....	2.76 to 1
TorqueFlite Transmission VC-3 .....	2.76 to 1
TorqueFlite Transmission VY-1 .....	2.93 to 1
Sure Grip Differential .....	2.93 to 1
Wheel Bearing Axle Shaft End Play .....	.013 to .023 inch
VC-1 Models with 383 cubic inch engines are equipped with the large stem 8¾ inch drive gear.	

## SPECIAL TOOLS

C-293-E2 or F2	Puller Sets—Roller Bearing
C-406-A	Differential Bearing Adjusting Wrench
C-413	Rear Axle Shaft Outer Bearing Cup Driver
C-452	Universal Joint Flange Puller
C-485	Torque Wrench (Foot-Pounds)
C-496	Pinion and Transmission Companion Flange or Yoke Puller
C-499	Axle Shaft Puller
C-637	Axle Shaft and Inner Oil Seal Puller
C-685	Torque Wrench (Inch-Pounds)
C-745	Rear Axle Shaft Oil Seal Installing Sleeve
C-748	Pinion Oil Seal Puller
C-758-D3	Pinion Setting Gauge Set
C-839	Rear Axle Shaft Inner Oil Seal Driver
C-845	Universal Wheel and Hub Puller
C-3281	Companion Flange Holding Wrench
C-3339	Dial Indicator (Replaces C-430)
C-3565	Axle Shaft Outer Seal Driver
C-3656	Pinion Oil Seal Driver
DD-996	Pinion Bearing Installer
DD-999	Flange or Yoke Installer
DD-1005	Differential Case Side and Cross Shaft Roller Bearing Driver
DD-1014	Repair Stand—Differential Carrier
SP-2919	Pinion Setting Adapter—Part of Tool C-758-D3
SP-2921	Pinion Setting Adapter—Part of Tool C-758-D3

## TORQUE REFERENCE

	(Foot-Pound)
Axle Shaft Nuts	145 (min.)
Brake Support Plate to Housing Mounting Bolts Nuts	30 to 35
Differential Bearing Cap Bolts	90
Differential Carrier to Axle Housing Bolt Nuts	45
Rear Axle Drive Gear to Case Bolts	60
Rear Axle Drive Pinion Companion Flange Nut	240 (min.)
Spring Clip (U-Bolts) Nuts	50

## REAR AXLE

The rear axle assembly (Figs. 1 and 2) may be divided into four subassemblies; axle drive shafts with related parts, differential with drive gear, drive pinion with carrier, and the axle housing. It is not

necessary to remove the entire assembly to service any of the above parts with the exception of the axle housing itself.

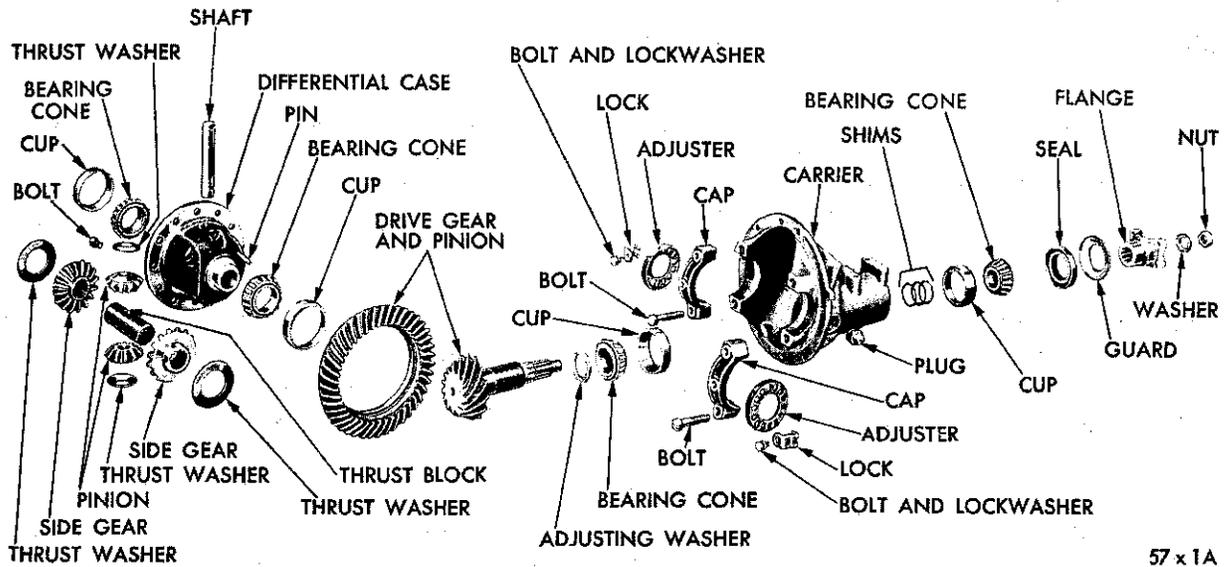
### SERVICE PROCEDURES

#### 1. AXLE DRIVE SHAFTS

The axle drive shafts are the same length for the conventional and Sure Grip differentials.

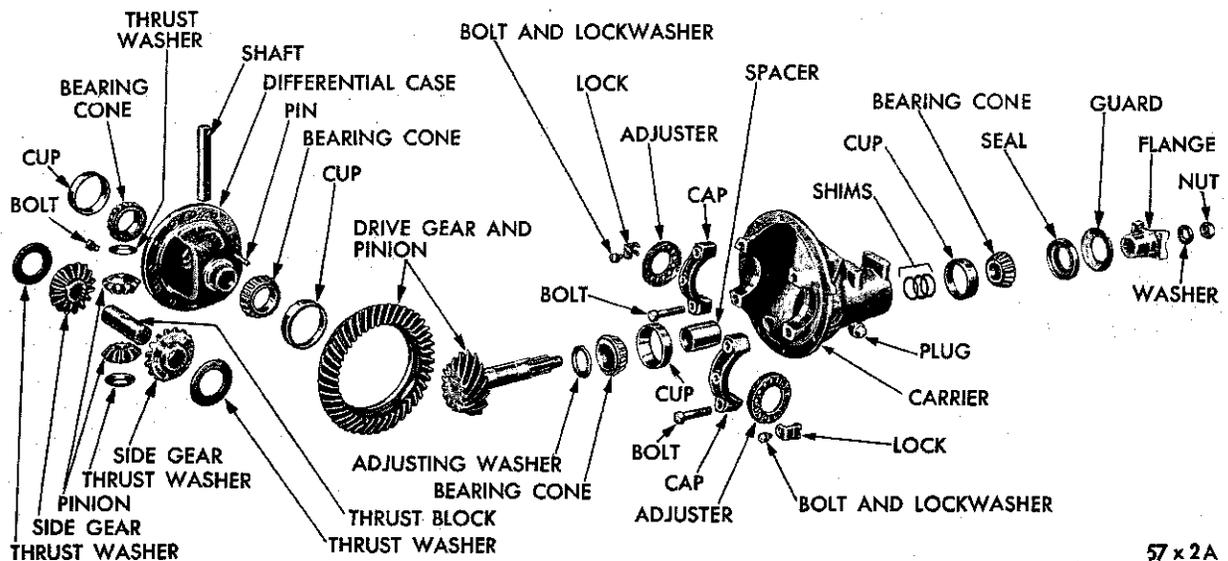
#### Removal

(1) Raise the vehicle and remove the rear wheels, hub and drum assembly using puller Tool C-845 or Tool C-319.



57 x 1A

Fig. 1—Rear Axle (Disassembled View) Models VC-2, VC-3, VY-1



57 x 2A

Fig. 2—Rear Axle (Disassembled View) Model VC-1

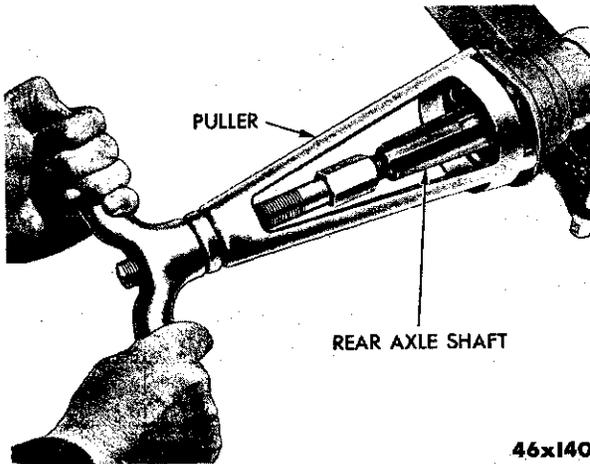


Fig. 3—Removing Axle Drive Shaft and Bearing

(2) Block the brake pedal to prevent its being depressed and disconnect the brake lines at the wheel cylinders.

(3) Remove the axle drive shaft key and remove the brake support plate assembly using Tool C-745 to protect the outer seal.

(4) Carefully remove the shim pack from each end of the axle housing. Identify each shim pack as to location to aid in reassembly.

(5) Remove the axle shaft and bearing assembly with Tool C-499 (Fig. 3). If necessary, the bearings may be removed from the axle shafts with bearing puller Tool C-293 and number 13 adaptors (Fig. 4).

(6) Remove the axle shaft inner oil seals with puller Tool C-637. Remove the brake support plate outer seal with Tool C-3565.

**Cleaning and Inspection**

(1) Using mineral spirits or dry cleaning solvent,

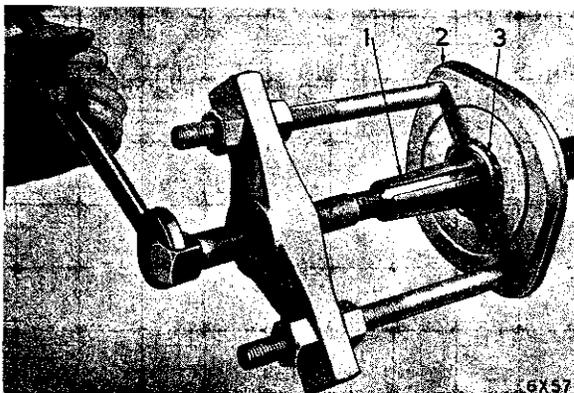


Fig. 4—Removing Bearing from Axle Drive Shaft

clean the axle shafts, bearings, cups, shims and shim contacting surfaces as well as the counterbores of the axle housing. With the exception of the bearings, dry all parts with compressed air.

(2) Inspect the bearing cones and cups for pitting or other visible damage. If either the bearing cone or cup is unfit for further service, always replace both.

(3) Inspect each axle shaft for signs of fatigue, worn or scored oil seal contacting surfaces, wear or accumulated metal deposits on the thrust block end of shaft, damaged threads, or excessively worn splines. Machine surfaces can usually be satisfactorily cleaned. If abnormal conditions are noted, the shafts should be replaced.

(4) Inspect the shims for distortion or other visible damage. Discard any shims unfit for further service.

(5) Inspect the shim contacting surfaces of both the brake support and axle housing for burrs. Remove burrs with crocus cloth if possible.

(6) If inspection above reveals that replacement of either the axle shafts or bearings are necessary, install new bearings on either the original shaft or the new shaft. Make certain the bearing and axle shaft contacting surfaces are thoroughly cleaned so the bearing when installed, bottoms against the shoulder of the axle shaft (**tapered portion of bearing must face the axle shaft threads**).

**Axle Drive Shaft End Play**

Where the original axle shafts and/or bearings are used, start the adjustment of the axle end play with the original shim pack. Use new styrofoam gaskets on each side of the shim packs.

(1) Install a new axle inner oil seal (Fig. 5) using Tool C-839.

(2) Lubricate both axle shaft bearings and install axles and bearing cups using Tool C-413 (Figure 6).

(3) With the axle assembled and the brake support

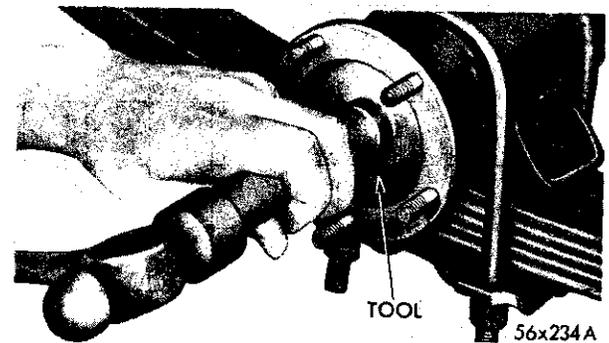


Fig. 5—Installing Axle Shaft Inner Oil Seal

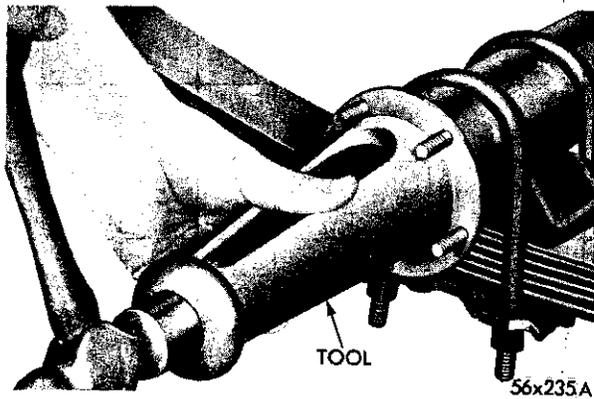


Fig. 6—Installing Axle Drive Shaft Bearing Cup

plates removed, proceed as follows.

(4) Push both axle shafts and bearing cups in toward the center of the housing as far as they will go.

**NOTE:** Rotate axles to insure seating of both bearings and cups.

(5) After pushing the left axle in as far as it will go, measure the amount the right axle shaft bearing cup protrudes out of the axle housing (using feeler gauge stock).

(6) If the protrusion of the right bearing cup is less than .052 inch (Standard Differential) or .081 inch (Sure-Grip Differential), no shims are needed on the right side. If the protrusion is beyond the above specifications, that is the amount of shims to add to the right side.

(7) Install the gasket, shims and brake support plate to the right side of the axle housing. Tighten the attaching nut 30 to 35 foot-pounds torque.

(8) Push the left axle shaft and bearing cup in as far as possible while rotating the axle shaft to insure seating of the axle bearing and cup.

(9) Measure the distance the bearing cup protrudes beyond the housing face.

(10) Add .016 inch to this measurement in order to insure the proper end play.

(11) Install the gasket, shims and brake support plate. Tighten the brake plate attaching nuts 30 to 35 foot-pounds torque.

(12) Measure the total end play of both axle shafts after assembly. Preferred end play (.013 to .023 inch). If necessary to correct, change shims on the left side.

(13) Position the shim packs and gaskets on the flange studs and drive the cups in until the tool bottoms on the shim pack.

(14) Install a new outer oil seal in the brake support plate with Tool C-3565 with the lip of the seal toward the center of the vehicle.

(15) Insert the sleeve Tool C-745 in the outer seal to protect the seal when the brake support plate is installed.

(16) Install the support plate assembly. Tighten the attaching nuts 30 to 35 foot-pounds. Install the wheels, hub and drum. The axle shaft key should be flush with the outer end of the hub.

## 2. DIFFERENTIAL CARRIER REMOVAL

(1) Remove the axle drive shafts, Paragraph 1.

(2) Disconnect the rear universal joint and support the propeller shaft up and out of the way.

(3) Remove the lubricant from the axle housing using a suction gun.

(4) Remove the attaching nuts and lift the rear axle carrier assembly from under the vehicle.

## 3. DIFFERENTIAL CARRIER DISASSEMBLY

### Differential Assembly Removal

(1) Mount the carrier in Stand DD-1014 and attach the dial indicator Tool C-430 or Tool C-3339 to the differential carrier flange so the pointer of the indicator squarely contacts the back face of the ring gear (Fig. 7). Make certain there is no end play in the differential side bearings. If end play is evident, remove the adjuster lock and slightly loosen the bearing cap on the gear tooth side. Tighten the adjuster sufficiently to eliminate the end play.

(2) Rotate the drive gear several complete revolutions while noting the total indicator reading. This reading must not exceed .005 inch runout. If the indicator reading exceeds the .005 inch runout, it will be necessary to take a second reading after the drive gear has been removed. This operation is covered during "Differential Disassembly". Remove the dial indicator.

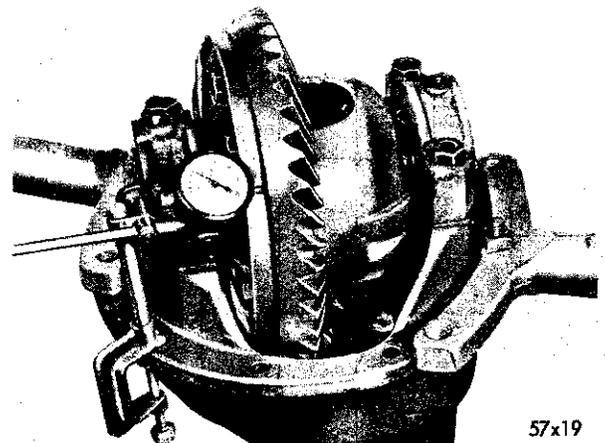


Fig. 7—Measuring the Drive Gear Runout

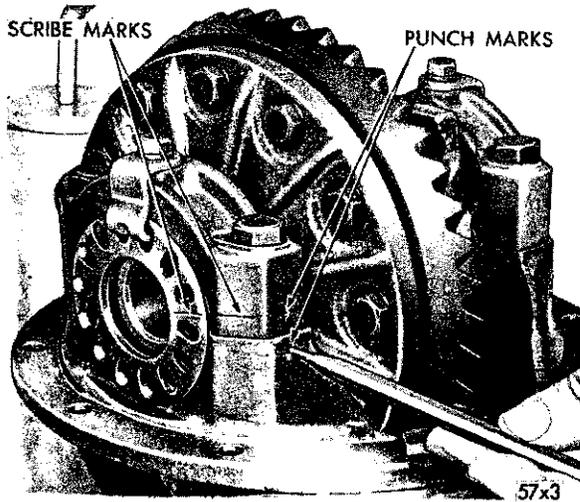


Fig. 8—Marking Bearing Caps and Adjusting Nuts

(3) Apply identifying punch marks on the bearing supports of the differential carrier, differential bearing caps, and bearing adjusters for reassembly purposes (Fig. 8).

(4) Remove each of the differential bearing adjuster lock screws and locks.

(5) With a 3/4 inch socket wrench, loosen the bearing cap bolts (one on each side) and back off the bearing adjusters slightly with spanner wrench Tool C-406, to remove the differential case bearing preload. Remove the bearing cap bolts, caps and bearing adjusters.

(6) Remove the differential assembly with the bearing cups. Make certain that each bearing cup remains with its respective bearing.

**Pinion Removal**

(1) With the companion flange up, hold the flange with holding Tool C-3281 and remove the pinion shaft nut and Belleville washer.

(2) Install the companion flange puller Tool C-452

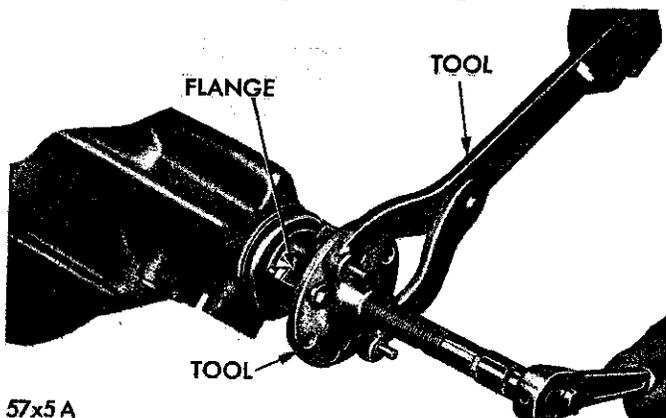


Fig. 9—Removing Companion Flange

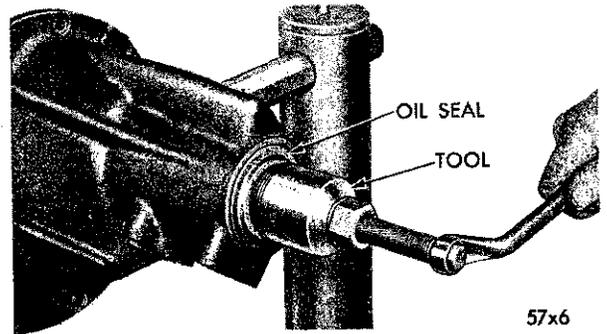


Fig. 10—Removing Pinion Bearing Oil Seal

and remove the flange (Fig. 9).

(3) Install the oil seal puller Tool C-748 by screwing it securely into the pinion oil seal (Fig. 10) and tighten the puller screw to remove the seal.

(4) While holding one hand over the companion flange end of the carrier, invert the carrier in the stand. The oil slinger, front bearing cone shim pack and bearing spacer (where used) will drop from the carrier.

(5) Withdraw the pinion and rear bearing cone from the carrier.

**Pinion Rear Bearing Removal**

(1) When removing the pinion rear bearing (Fig. 11) on a Chrysler Newport carrier use Tool C-293 and four (4) No. 36 adaptors. On all other Chrysler and Imperial models, use Tool C-293 and four (4) No. 37 adaptors.

(2) The pinion bearing cups can be removed from the carrier with a blunt brass drift and hammer.

**Differential Case Disassembly**

(1) Hold the drive gear in an upright position using

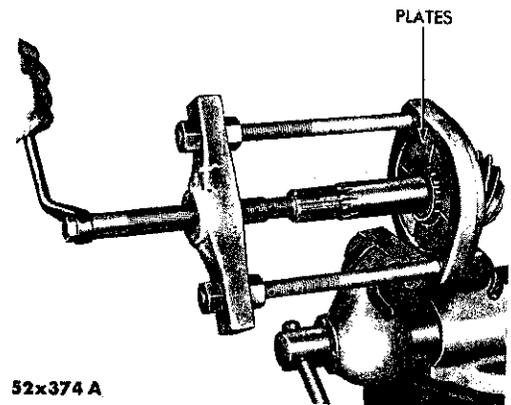


Fig. 11—Removing Bearing from Pinion Shaft

brass jaws in a vise. With a  $\frac{5}{8}$  inch socket wrench, remove the drive gear to differential attaching cap screws. The drive gear, attaching screws have left hand threads.

(2) Remove the assembly from the vise and with a fiber mallet, tap the drive gear off the case.

(3) If the drive gear runout was found to be more than .005 inch (Paragraph 3 "Carrier Disassembly") test the case as follows: Install the differential with bearing cups in the carrier.

(4) Install the bearing caps, attaching bolts and bearing adjusters. Snug the bearing cap bolts down lightly and screw in both adjusters with spanner wrench Tool C-406A.

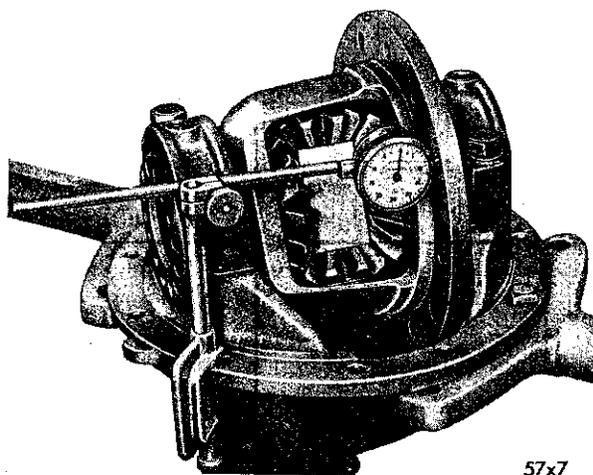
(5) Tighten the support cap bolts and adjusters sufficiently to prevent any end play in the bearings.

(6) Attach a dial indicator Tool C-430 or Tool C-3339 to the differential carrier flange so the pointer of the indicator squarely contacts the drive gear surface of the differential case flange between the outer edge of the flange and the drive gear bolt holes (Fig. 12).

(7) Rotate the differential several complete revolutions while noting the total indicator reading. This reading must not exceed .003 inch runout. If the runout is in excess of .003 inch, the differential case must be replaced.

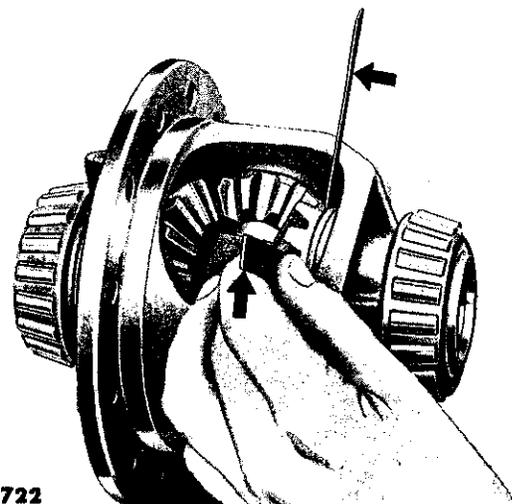
(8) Measure the side gear clearances between the gear and case (Fig. 13). Clearances should be from .001 to .012 inch. If the clearance exceeds .012 inch, install new thrust washers.

(9) From the back side of the drive gear flange, drive the differential pinion shaft lock pin out of the case with a flat nose drift and hammer. The lock pin



57x7

Fig. 12—Checking Drive Gear Mounting Flange Run-out



49x722

Fig. 13—Checking Differential Gear Clearance

is a  $\frac{1}{4}$  inch hollow split type. (The hole is reamed only part way through, making it necessary to remove the lock pin from one direction.)

(10) Drive the pinion shaft out with a brass drift and hammer and remove the axle drive shaft thrust block.

(11) Rotate on differential side gear until each pinion appears at the large opening of the case. Remove each pinion and thrust washer at that time.

(12) Remove the two differential side gears and thrust washers.

#### 4. DIFFERENTIAL—CLEANING AND INSPECTION

(1) Clean all parts in fast evaporating mineral spirits or a dry cleaning solvent and with the exception of the bearings, dry with compressed air.

(2) Inspect the differential bearing cones and cups for pitting, spalling or other visible damage. If replacement is necessary, remove the bearings from the differential case with puller Tool C-293 and four adaptor plates No. 18 (Fig. 14).

(3) Inspect the differential case for elongated or enlarged pinion shaft holes, the side gear counterbores and the four thrust washer contacting surfaces for galling, metal deposits or raised portions of metal. If any of the above conditions exist, satisfactory correction must be made or the case replaced. Inspect the case for cracks or other visible damage which might render it unfit for further service.

(4) Inspect the differential pinion shaft for excessive wear. Replace as necessary.

(5) Inspect the differential pinion gears for excessive wear, cracks, chipped teeth or other visible

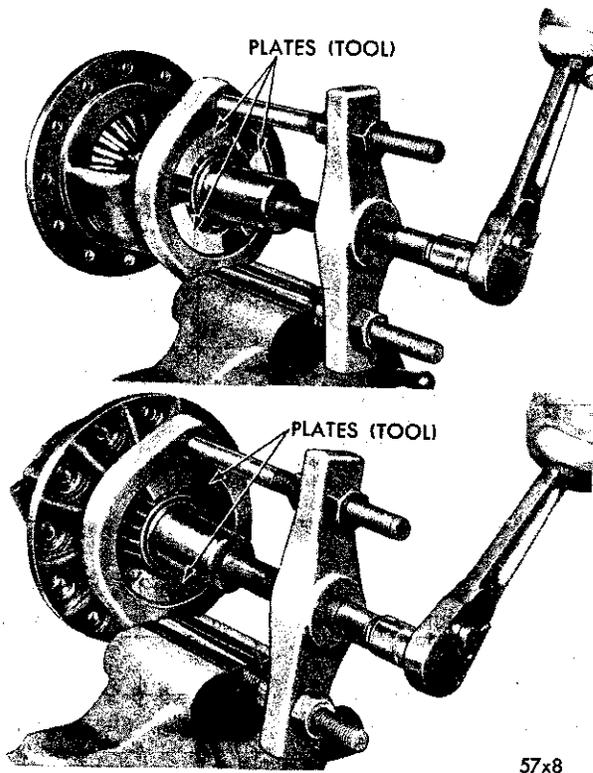


Fig. 14—Removing Differential Bearings

damage. Replace pinion gears or thrust washers as necessary.

(6) Inspect the differential side gears for cracks, chipped teeth or other visible damage. Replace differential side gears or thrust washers as necessary.

(7) Inspect the axle shaft thrust block for excessive wear or visible damage. The wear surface, on the opposite sides of the block, must be smooth. If inspection reveals that replacement of the thrust block is necessary, the axle shaft end play must be reset.

(8) Inspect the differential pinion shaft lock pin for damage or looseness in the case. Replace the pin or case as necessary.

(9) Inspect the drive gear for worn or chipped teeth or damaged attaching bolt threads. If replacement of the drive gear is necessary, replace both the drive gear and drive pinion as they are furnished in matched sets only.

(10) Inspect the drive pinion bearing cones and the cups (which may have been left in the carrier) for pitting, galling, excessive wear, or other visible damage. If inspection reveals that either are unfit for further service, replace the cup and cone.

(11) Inspect the differential carrier for cracks or other visible damage which would render it unfit for further service. Raised metal on the shoulder incurred

in removing the pinion cups should be flattened by use of a flat nose punch.

(12) Inspect the drive pinion for damaged or excessively worn teeth, damaged bearings, journals or splines. If replacement of the pinion is necessary, a new drive gear must also be used as they are furnished in matched sets only, also inspect the pinion bearing spacer for distortion and damage.

(13) Inspect the companion flange for cracks, worn splines, pitted, rough or corroded oil seal contacting surface. Repair or replace the companion flange as necessary.

(14) Inspect the pinion bearing shim pack for damaged or distorted shims. Replace the shims with a correct one during establishment of pinion bearing preload.

## 5. DIFFERENTIAL CASE ASSEMBLY

(1) Install a thrust washer on each of the differential side gears and position the gears in the case.

(2) Through the large side opening of the case, insert each of the two pinion and thrust washers exactly 180 degrees opposite each other, so the pinion shaft holes of the two gears and thrust washers are properly aligned.

(3) Rotate the gears 90 degrees so that the pinion shaft holes of the case are in exact alignment with the holes in the two thrust washers and pinions.

(4) From the pinion shaft lock pin hole side of the case, insert the slotted portion of the pinion shaft through the case, and the conical thrust washer, and just through one of the pinion gears.

(5) Install the thrust block between the two pinion gears. The thrust block must be installed so the hole in the block is aligned with the pinion shaft and with the ground sides of the block facing the two side gears.

(6) While keeping all of these parts in proper alignment push the pinion shaft into the case until the locking pin hole in the pinion shaft is in exact alignment with its respective hole in the case. Install the pinion shaft lock pin through the hole in the case from the pinion shaft side of the drive gear flange.

**NOTE:** The contacting surfaces of the drive gear and the case flange must be clean and free of all burrs.

(7) Position the drive gear on the case, aligning the threaded holes of the drive gear with those in the case flange.

(8) Insert the drive gear cap screws through the case flange and into the drive gear. After all cap screws are properly started, tap the drive gear onto the flange.

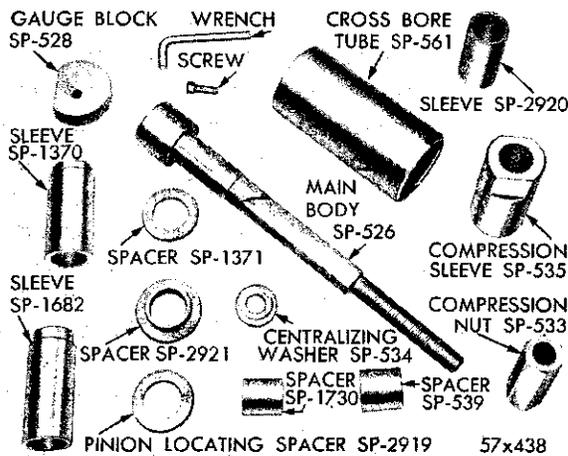


Fig. 15—Tool Set C-758

(9) Position the unit between the brass jaws of the vise and alternately torque tighten each cap screw to 60 foot-pounds torque.

(10) Position each differential bearing cone on the hub of the case (taper away from the drive gear) and with installing Tool DD-1005, install the bearing cones. An arbor press may be used in conjunction with the installing tool.

**CAUTION:** Never exert pressure against the bearing cage, since this would damage the bearing.

### 6. PINION BEARING CUP—INSTALLATION

(1) Place the bearing cups squarely in position. Assemble Tool C-758 (Fig. 15) by placing spacer SP-2919 (on Chrysler Newport C-1) followed by the rear pinion bearing cone over the main screw of the tool and inserting it into the carrier from the gear side (Fig. 16).

(2) Place the front pinion bearing over the main screw followed by compression sleeve SP-535, centralizing washer SP-534, and main screw nut SP-533. Hold the compression sleeve with the companion

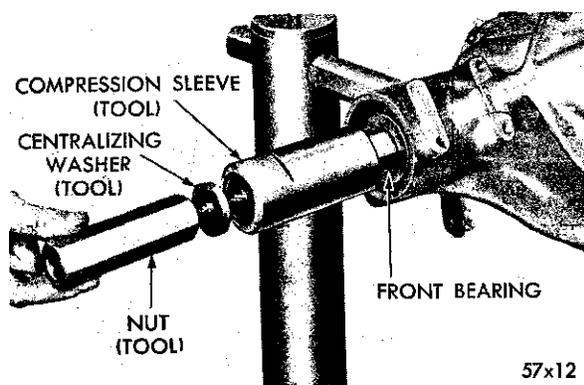


Fig. 16—Compression Sleeve and Centralizing Washer

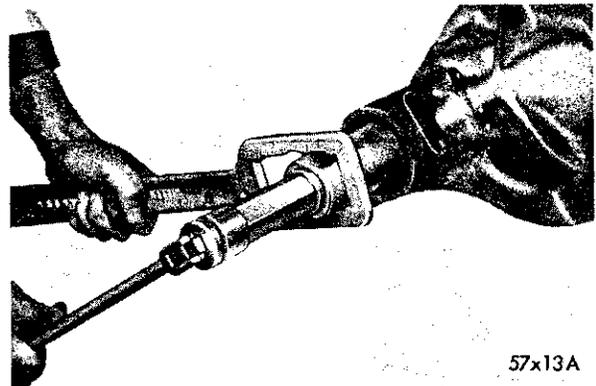


Fig. 17—Sealing Bearing Cups in Carrier

flange holding Tool C-3281 and tighten the nut (Fig. 17), allowing the tool to rotate as the nut is being tightened in order not to damage the bearings or cups. Do not remove the tool after installing the cups.

### 7. PINION BEARING PRELOAD-DEPTH OF MESH-INSTALLATION MODEL VC-1, USING TOOL C-758

#### Bearing Preload

Two types of drive pinions are used. The method of determining pinion depth of mesh and bearing preload are the same for both pinions, however, the sequence of making the two adjustments changes. Pinions used on Models VC-2, VC-3 and Models VY-1, require the depth of mesh adjustment first, while pinions used on Model VC-1 requires the bearing preload adjustment first.

(1) With the tool installed in the carrier, remove the main screw nut, centralizing washer, compression sleeve and the front pinion bearing.

(2) Install the pinion bearing spacer, the larger bore of spacer next to the rear bearing.

(3) Position the sleeve (SP-1730) in the front bear-

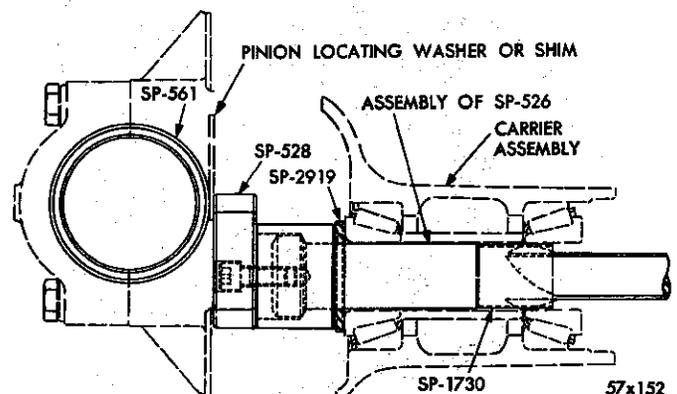


Fig. 18—Tool C-758 Installed in Housing—Model VC-1

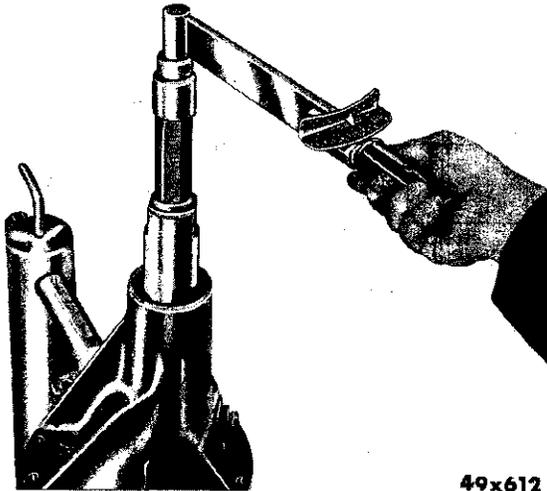


Fig. 19—Checking Preload Torque (inch-pounds)

ing, making sure the sleeve is flush with the rear of the bearing.

(4) Position the original shims, previously removed from the drive pinion shaft, over the sleeve and slide the sleeve, bearing and shims over the tool main screw until the shims rest against the spacer (Fig. 18).

(5) Install the tool compression sleeve (SP-535) (square end out), centralizing washer (SP-534) and main screw nut (SP-533). Turn the carrier in the stand to bring the nut on top (Fig. 19).

(6) Tighten the toolnut to 240 foot-pounds Torque, using holding Tool C-3281 on the compression sleeve to hold the assembly in several positions to make a complete revolution while tightening. Remove the holding tool and rotate the assembly several turns in both directions to align the bearing rollers. Recheck the torque to 240 foot-pounds (torque may have diminished as the bearing rollers were aligned by rotating).

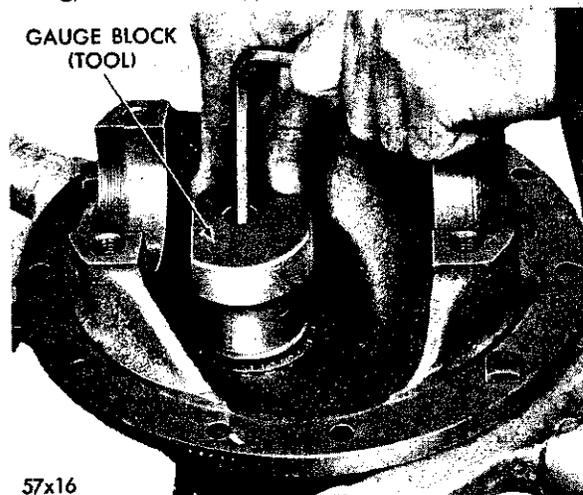


Fig. 20—Installing Gauge Block

(7) Correct bearing preload reading can only be obtained with the nose of the carrier up. Using an inch pound torque wrench Tool C-685, and with the handle of the wrench floating, read the torque when the wrench is moving through at least one full rotation. The correct reading is 20 to 30 inch-pounds for a new bearing, and zero to 15 inch-pounds for bearing in use and should be uniform during the full rotations. If the bearing preload is more than 30 inch-pounds, a thicker shim should be used under the front bearing. If the bearing preload is less than 20 inch-pounds, a thinner shim should be used. Shims are available in thicknesses of .010, .012, .014, .016 and .018 inch. After proper pinion bearing preload is established, do not remove the tool.

### Depth of Mesh

The position of the drive pinion with respect to the drive gear (depth of mesh) is determined by the location of the bearing cup shoulders in the carrier and by the portion of the pinion in back of the rear bearing. The thickness of a pinion spacer washer suitable for the carrier can be determined by using Tool C-758.

(1) Invert the carrier in the stand and install gauge block SP-528 or SP-3250 on the end of the tool (Fig. 20), attaching it to the tool with the Allen screw. The flat portion of the spacer should be facing the differential bearing pedestals and the offset of the spacer (or the large portion) toward the center of the carrier. Tighten the screw with an Allen wrench.

(2) Position arbor SP-561 (part of Tool C-758) in the differential bearing pedestals of the carrier (Fig. 21). Center the arbor so that an approximate equal distance is maintained at both ends. Position the differential bearing caps and attaching bolts on the carrier pedestals. Insert a piece of .002 inch feeler stock between the arbor and each cap, and tighten the cap bolts securely.

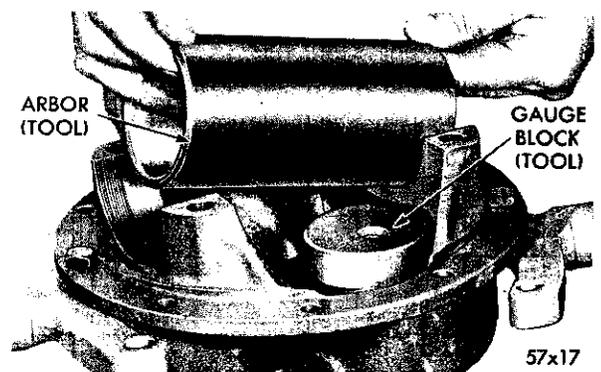


Fig. 21—Installing Arbor

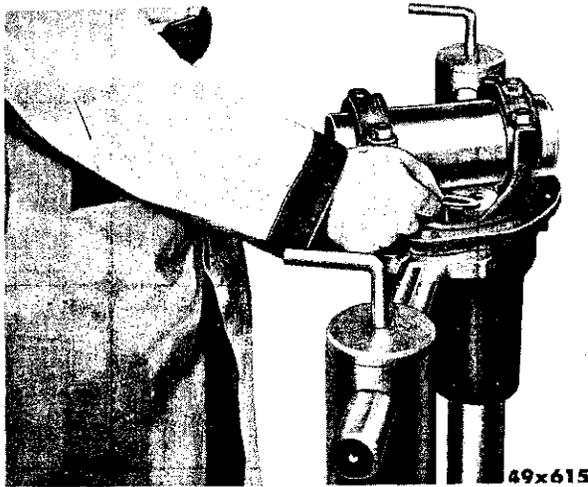


Fig. 22—Determining Spacer Washer Thickness

(3) Select the “gauge washer” that will fit between the tool gauge block and arbor (Fig. 22). The fit must be snug but not too tight (similar to the pull of a feeler gauge). This washer is used only for determining the correct thickness washer to be used for installation.

(4) To select the proper washer for installation, read the marking on the end of the pinion (—0, —1, —2, +1, +2, etc.) When the marking is —(minus), add that amount to the thickness of the “gauge washer” selected in step 3. When the Marking is + (plus), subtract that amount. Example: With a “gauge washer” .086 inch thick and a pinion marked —2, install spacer washer .088 inch thick (.086 + .002 = .088). Example: With a “gauge washer” .086 inch thick and a pinion marked +2, install a spacer washer .084 inch thick, (.086 — .002 = .084) or when a “gauge washer” .086 inch thick is too loose and the .088 inch is too tight, use a .086 inch spacer washer.

- (5) Remove the tool arbor from the carrier.
- (6) Remove the tool and bearings out of the carrier.
- (7) Remove the shims, spacer, tool sleeve, and rear bearing cone from the tool main screw.

**Bearing Installation**

(1) With the shaft end of pinion facing up, install the selected correct pinion spacer washer on the pinion gear shaft. These washers have a chamfer on one side. The chamfer must face the pinion head.

(2) Position the rear bearing cone on the pinion shaft (small end away from the pinion gear). Make certain that the contacting surfaces of the correct washer, pinion gear, and rear bearing cone are perfectly clean and free of any foreign particles.

(3) Install the rear bearing cone onto the pinion

shaft with Tool DD-996. An arbor press may be used in conjunction with the tool.

(4) Install the bearing tubular spacer on the pinion shaft (large bore facing the rear bearing).

(5) Install the selected shim pack.

(6) Lubricate the front and rear pinion shaft bearing cones with Multipurpose Gear Lubricant.

(7) Install the front bearing in its cup in the carrier.

(8) Install the oil seal to the carrier with driver Tool C-3656, lip of seal must face the front bearing. The seal must be driven into the carrier until the tool bottoms against the front pinion bearing cone (Fig. 23).

(9) Insert the pinion shaft up through the carrier. While supporting the pinion in the carrier, install the companion flange with installing Tool C-496 or DD-999.

(10) Remove the tool and install the plain washer and nut (convex side of washer up).

(11) Hold the companion flange with holding Tool C-3281. Torque the companion flange nut to 240 foot-pounds. Rotate the assembly several turns in both directions to align the bearing rollers. Recheck the torque to 240 foot-pounds (torque may have diminished as bearing rollers were aligned by rotating).

**8. PINION BEARING PRELOAD AND PINION SETTING—MODELS VC-2, VC-3, VY-1 USING TOOL C-758-D-3**

Inspect the bearing cups and carrier for grit and dirt. Assemble spacer SP-2921 to the main section of the tool followed by spacer SP-1730. Install the pinion rear bearing over spacer SP-1730 and against spacer SP-2921 (Fig. 24). Insert the assembly into the carrier

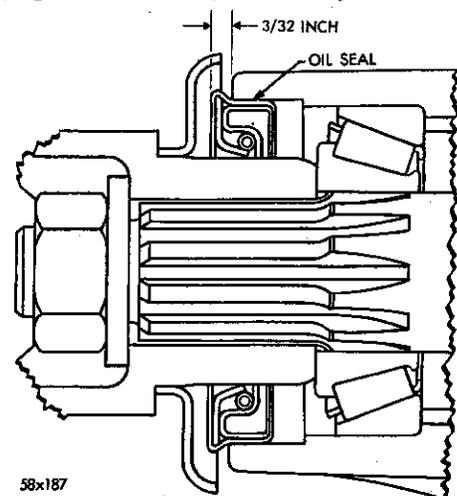
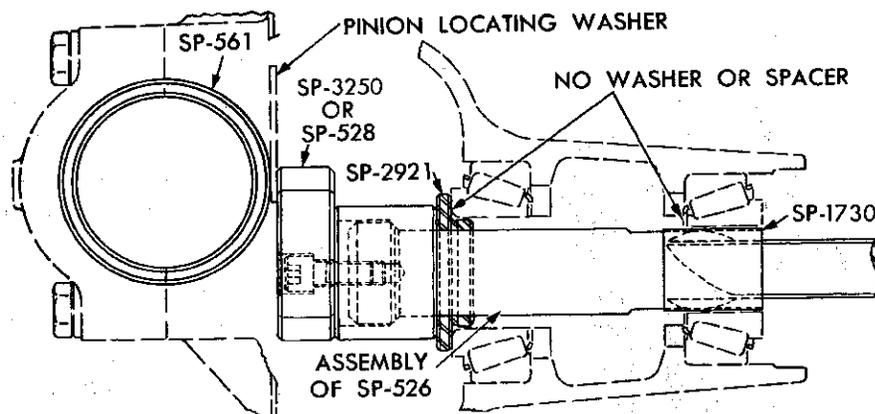


Fig. 23—Pinion Oil Seal Installation



60x168A

60x168A

Fig. 24—Tool C-758 Installed in Housing Models VC-2, VC-3, VY-1

housing and install the front bearing over the tool shaft and in its proper position in the bearing cup. Install the tool spacer; tool thrust washer and the tool nut on the shaft. Tighten the tool setting nut to not more than 25 to 50 foot-pounds torque.

Turn the tool several revolutions to permit the bearing rollers to seat. After the bearing rollers have been properly seated, check the bearing preload by rotating the tool with an inch-pound torque wrench. With the bearings lubricated with hypoid gear oil the correct preload should be from 25 to 50 inch-pounds torque.

Assemble gauge block SP-528 or SP-3250 to the main screw attaching it with the allen screw securely. Position tool arbor SP-561 in the differential carrier bearing supports. Insert a piece of .002 inch feeler stock between the arbor and each cap. Install the caps and tighten the bolts to 10 foot-pounds torque.

Select a gauge washer that will just pass between the gauge block end of the tool and the machined surface of the bearing arbor. As an example, if a .090 inch spacer can be inserted but a .092 inch spacer cannot be forced between the two surfaces by hand, the .090 inch spacer should be used even though it might feel loose.

Note the end of the drive pinion as it will indicate the amount that should be added or subtracted from the spacer that was selected. As an example, if the pinion shaft indicated plus two a .002 inch thinner spacer should be used for final assembly. As an example, if a spacer selected by the use of the tool is .090 inch it is necessary to deduct .002 inch, therefore, the correct spacer for final assembly would be .088 inch.

To correctly read the markings on the end of the drive pinion, always remember that the plus (+) symbol indicates a deduction of the required spacer

thickness, whereas the minus (—) symbol indicates the necessity for a thicker spacer.

When the correct spacer is selected for the drive pinion, disassemble the setting tool from the differential carrier housing and add the pinion positioning spacer just selected to the tool, between spacer SP-2921 and the pinion rear bearing. Install spacer SP-1730 and the pinion bearing adjusting spacer from the previous bearings. Insert the tool assembly in the carrier housing. Place the forward roller bearing over the shaft and in position in the carrier bearing cup. Install the tool spacer, tool nut washer and tool nut on the shaft. Hold the compression sleeve nut with holding Tool C-3281 and tighten the nut to 240 foot-pounds torque. Turn the tool several revolutions to permit the bearing rollers to seat. After the bearing rollers have been properly seated measure the bearing preload by rotating the tool with an inch-pound torque wrench. With the bearing lubricated with Multipurpose Gear Lubricant, the correct preload specifications are from 45 to 50 inch-pounds torque.

If the bearing adjustment does not conform to specifications it will be necessary to change the adjustment by either a thicker or thinner pinion bearing spacer. If the preload is too great it will be necessary to install a thicker spacer and if the pre-load is not sufficient a thinner spacer will be necessary.

When the correct spacer is selected for the drive pinion bearing, disassemble the tool from the differential carrier housing and install the bearings, pinion positioning spacer and bearing spacer to the pinion and install the assembly in the housing. Measure the turning torque, it should be 20 to 30 inch pounds before installing the seal. If not within specifications, correct as necessary.

#### Assembly of Pinion Carrier

With the shaft end of pinion facing up, install the

selected washer on the pinion stem, with the chamfered side of the washer facing the drive pinion gear. Position the rear bearing on the pinion shaft. Make sure the contacting surfaces of the washer, pinion gear and rear bearing are perfectly clean and free from dirt or foreign particles. Install the rear bearing cone onto the pinion shaft with Tool DD-955. Install the selected shim pack. Lubricate the front and rear bearing. Insert the pinion and bearing assembly in the carrier. Apply a light coat of sealer in the carrier bore at the seal area. Install a new seal with Tool C-3656 until the driver bottoms on the pinion front bearing. Install and support the pinion gear assembly in the carrier, and install the universal joint flange with installing Tool C-496 or DD-999. Install the plain washer (concave side of washer down) and nut. Tighten the flange nut to 240 foot-pounds torque and remove the flange holding tool.

**9. PINION BEARING PRELOAD AND PINION SETTING**  
*(Without Using Special Tool C-758)*

If the differential assembly was satisfactorily quiet before being disassembled, the drive pinion may be assembled with the original adjusting washers 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 matching sets. The adjustment position in which the best tooth contact is obtained is etched on the end of the pinion shaft.

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

**Depth of Mesh**

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

**Pinion Bearing Preload**

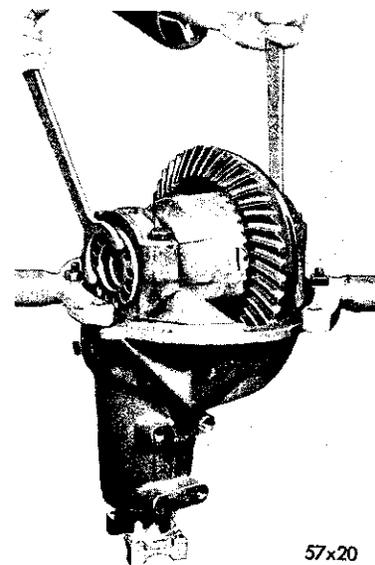
If the bearing cups are to be replaced, place the

bearing cups in position in the carrier and drive the cups in place with a suitable drift. After properly positioning of the bearing cups in the carrier, assemble the drive pinion thrust washer (chamfered side down toward gear) on the drive pinion stem. Install the rear bearing, spacer (if so equipped) and shims on the pinion stem. Insert the pinion shaft into the carrier. Install the front pinion bearing, universal joint flange, washer and nut. **Do not install the oil seal.** Tighten the drive pinion flange nut to 240 foot-pounds torque. Rotate the drive pinion shaft after tightening the flange nut, to properly seat the bearing rollers in the bearing cups. The pre-load torque required to rotate the pinion shaft with the bearings oiled should be 20 to 30 inch-pounds torque for new bearings and 0 to 15 inch-pounds for bearings in use. Add shims to decrease torque or remove shims to increase torque. After the correct pinion setting and bearing preload has been obtained, remove the drive pinion flange. Install the oil seal. Install the pinion flange, washer and nut. Tighten the pinion nut to the proper torque.

**10. DIFFERENTIAL CASE ASSEMBLY—INSTALLATION**

**Installation in Carrier**

- (1) Install the differential bearing cup on its respective bearing, and position the assembly in the carrier.
- (2) Install the differential bearing caps, making certain that the identification marks on the cap correspond with those on the carrier. Install the attaching bolts and tighten the bolts of each cap by hand.



57x20

Fig. 25—Adjusting Differential Bearings

(3) Note the identification marks on the differential bearing adjusters and reinstall each in its respective side.

(4) Screw the adjuster in by hand. No attempt should be made at this time to apply an excessive pressure. To square the bearing cups with the bearing, turn the adjusters "in" with spanner wrenches Tool C-406A (Fig. 25), until cups are properly squared with the bearings and end play is eliminated with some backlash existing between the drive gear and pinion.

(5) While facing each bearing support cap, tighten the left hand bolt 85 to 90 foot-pounds torque on each side.

### 11. DRIVE GEAR AND PINION BACKLASH

The drive and pinion backlash should be .006 to .008 inch at the point of minimum backlash.

(1) Attach a dial indicator Tool C-340 or C-3339 to the carrier flange so pointer or indicator is squarely contacting one of the drive gear teeth (drive side) (Fig. 26).

(2) Measure the backlash between the drive gear and pinion. After the first reading is taken, move the dial indicator away from the tooth sufficiently to rotate the drive gear approximately 90 degrees and again measure the backlash. The backlash should be measured in four different positions to determine the least clearance between the drive gear and pinion. After the point of least clearance has been established, mark the drive gear. Do not rotate the drive gear from the point of least clearance until all adjustments have been completed.

(3) Turn both bearing adjusters equally (in the same direction) until the backlash between the drive

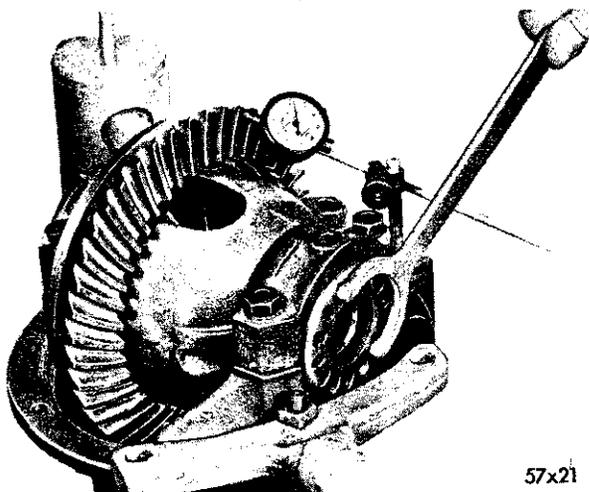
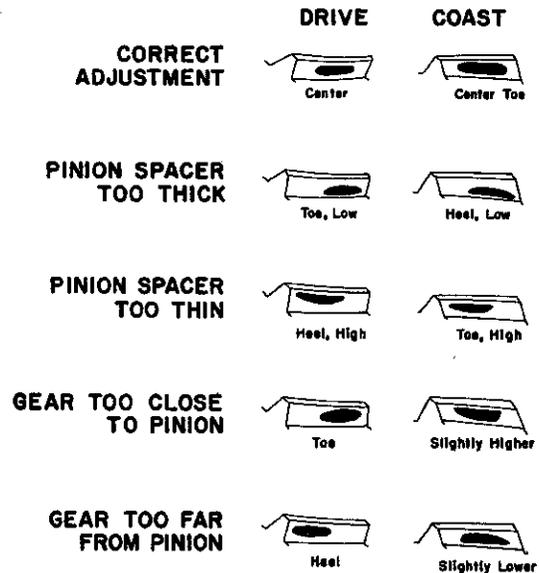


Fig. 26—Measuring the Drive Gear and Pinion Back Lash

57x21



1. PINION SPACER CHANGES AFFECT THE COAST SIDE CONTACT FASTER THAN THE DRIVE SIDE
2. BACKLASH ADJUSTMENTS AFFECT THE DRIVE SIDE CONTACT MUCH FASTER THAN THE COAST SIDE
3. ALL BACKLASH MEASUREMENTS SHOULD BE MADE AT THE POINT OF MINIMUM BACKLASH

60x1022A

Fig. 27—Gear Tooth Contact Pattern

gear and the pinion is .0005 to .0015 inch. This backlash variation is given to permit alignment and installation of the bearing adjuster lock, lockwasher and attaching bolt. The adjuster must only be turned in a clockwise direction and under no circumstances should be backed off.

(4) Install the adjuster lock on the back-face side of the drive gear.

### Side Bearing Preload

(1) Turn the bearing adjuster (tooth side of drive gear) (Fig. 26) in a notch at a time (notch referred to is the adjuster lock holes) until the backlash between the drive gear and pinion is a minimum of .006 inch to .008 inch. This will preload the bearings and establish the correct backlash.

(2) Tighten the remaining two bearing support cap bolts 85 to 90 foot-pounds torque.

(3) Install the remaining adjuster lock, lockwasher and attaching bolts. Tighten the lock retaining cap screws 15 to 20 foot-pounds torque.

### 12. GEAR TOOTH CONTACT PATTERN

The gear tooth contact pattern (Fig. 27) will disclose whether the correct washer has been installed behind the pinion rear bearing and the drive gear has been positioned properly. Refer to Figure 27 for various gear tooth contact patterns.

### **Obtaining Tooth Contact Pattern**

Apply red lead to the drive gear teeth and apply a load against the back of the drive gear with a round bar. As this pressure is being applied to the drive gear, rotate the pinion. This action will leave a distinct contact pattern on the gear teeth. The series of illustrations shows the correct pattern as well as a series of incorrect patterns.

### **Correct Adjustment—Proper Tooth Contact**

With the adjustments properly made, correct tooth contact, as shown in Figure 27, will result. Notice that contact pattern is well centered on the drive and coast sides. When tooth contact patterns are obtained by hand, they are apt to be rather small. Under an actual operating load, however, the contact area increases.

If improper tooth contact is evident, as shown in Figure 27, the pinion should be adjusted either forward or backward, maintaining the backlash within specified limits until the correct tooth contact, as shown in Figure 27 is obtained.

### **Heavy Face Contact**

If the tooth pattern is across the length of the tooth face, narrow and near the top, the teeth will wear thin and roll over or score, resulting in excessive gear lash and noise. This condition is corrected by installing a thicker washer behind the pinion rear bearing.

### **Heavy Flank Contact**

If the tooth pattern is across the length of the tooth and is narrow and low on the flank, the pinion teeth will score and also result in noise. This condition is corrected by installing a thinner washer behind the pinion rear bearing.

### **Heavy Heel Contact**

If the tooth pattern is heavy on the toe of the tooth, the edges of the teeth may chip resulting in excessive damage of the entire assembly. This condition is corrected by moving the drive gear away from the pinion. This will increase the backlash making it necessary to insert a thinner washer behind the pinion rear bearing.

### **Heavy Toe Contact**

If the tooth pattern is heavy on the heel of the teeth, the edges of the teeth may chip resulting in

excessive damage to the entire assembly. This condition is corrected by moving the drive gear toward the pinion. This would result in decreasing the backlash making it necessary to insert a thinner washer behind the pinion rear bearing.

## **13. REAR AXLE HOUSING—WELDING**

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.

## **14. DIFFERENTIAL CARRIER ASSEMBLY INSTALLATION**

(1) Using a new gasket, install the carrier assembly to the axle housing. Tighten the mounting nuts to 45 foot-pounds torque.

(2) Press the bearings on the axle shafts. Lubricate the bearing rollers with grease, align axle splines, and insert the axle shafts in the housing. Install the axle drive shaft outer bearing cups with Tool C-413.

(3) Install new gaskets and shims in same manner in which they were removed to maintain central position of the axle shaft thrust block. Install a new seal in the brake support plate with Tool C-3565 with the lip of the seal facing toward the center of the vehicle.

(4) Install the brake support plate and tighten the nuts 30 to 35 foot-pounds torque.

(5) Measure the axle shaft end play, as outlined in Paragraph 1.

(6) Install the hub and drum assemblies.

(7) Tighten the axle shaft nuts 145 foot-pounds torque minimum, and install new cotter pins.

(8) Connect the rear universal joint.

(9) Remove the block from the brake pedal and bleed the brake lines.

(10) Refill the axle housing and carrier assembly with the specified lubricant. Refer to the "Lubrication" Group 0.

(11) Install the wheels and tires and tighten in the sequence outlined in "Wheels, Bearings and Tires," Group 22.

### SURE-GRIP DIFFERENTIAL

The sure-grip differential (Figs. 28, 29, 30, and 31) is similar to the conventional differential except for the addition of friction plates and belleville plates and discs for clutching the differential case to the differential gears and a means for engaging these plates. The belleville plates and discs accomplish a

positive engagement of the clutch discs and plates at all times by placing a preload on the plates and discs. 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 inter-section. 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.

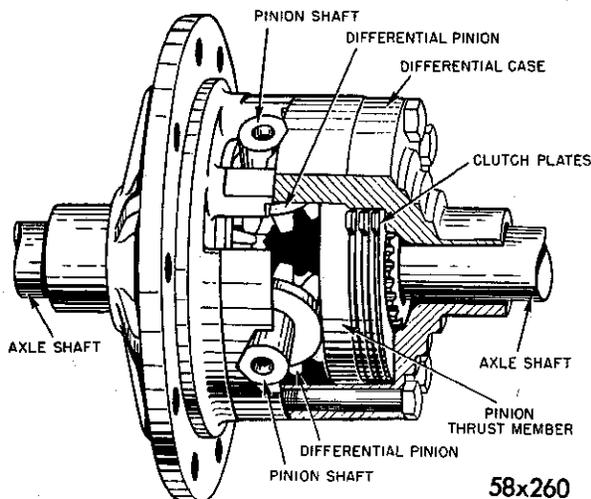


Fig. 28—Sure-Grip Differential (Schematic)

#### 15. SURE-GRIP DIFFERENTIAL—IDENTIFICATION

Identification of sure-grip type differential assembly can be made by the letter "S" stamped on the identification pad on the right side of carrier housing, or by a metal tag reading, "Use Sure-Grip Lube" attached by means of the rear axle housing-to-carrier bolt, below the carrier filler plug. If the letter "S" or tag is not apparent, remove the filler plug and use a flashlight to look up through the filler plug hole to identify the type of differential case. The sure-grip type differential case (two-piece construction) has at-

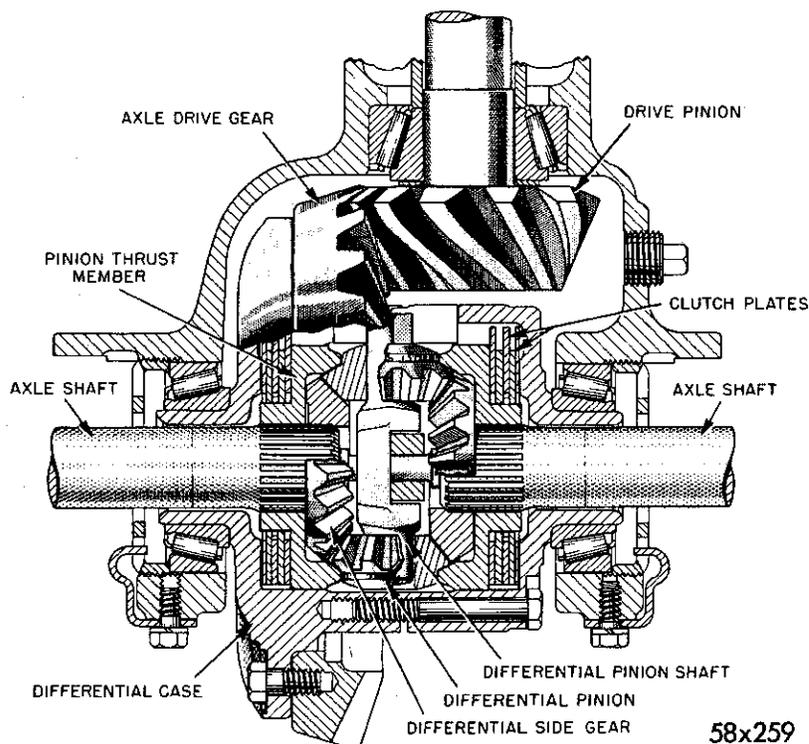
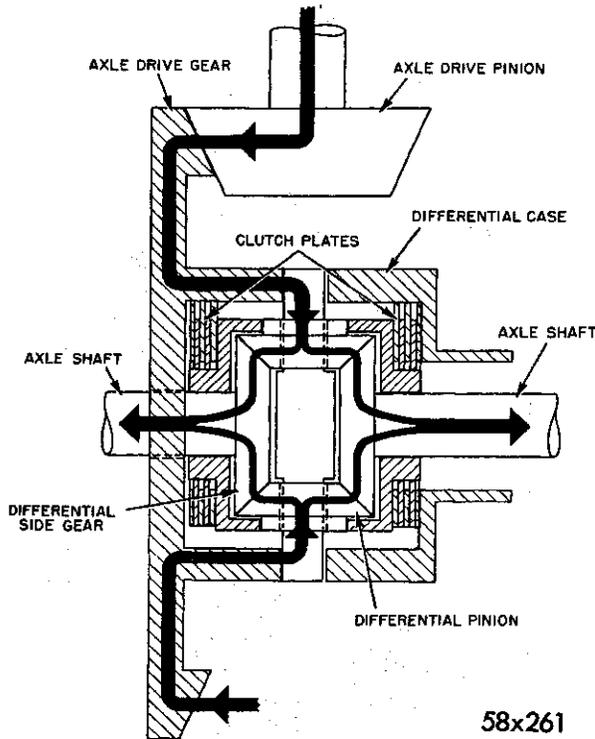
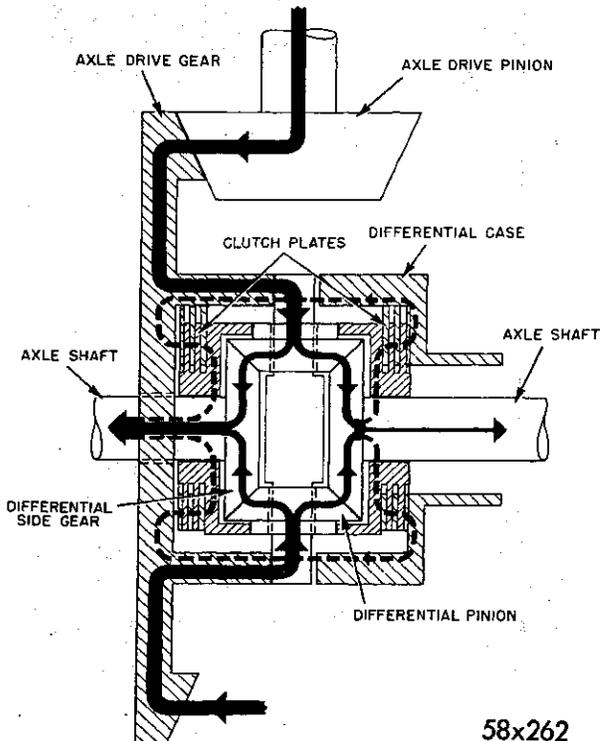


Fig. 29—Sure-Grip Differential (Cross-Section)



58x261

Fig. 30—Power-Flow—Axles Turning at Same Speeds



58x262

Fig. 31—Power-Flow—Axles Turning at Different Speeds

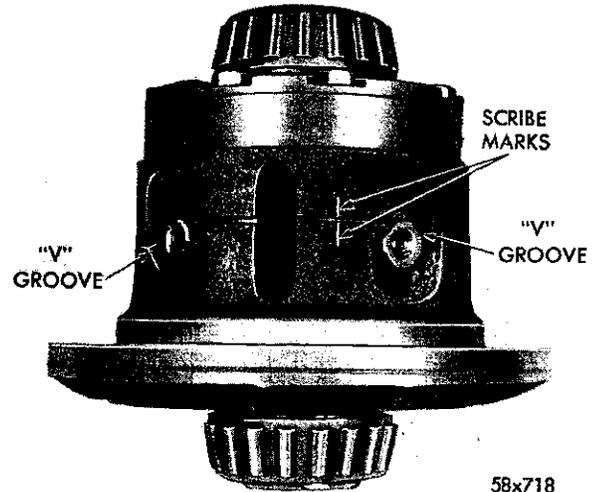


Fig. 32—Case Halves Scribed for Reassembly

taching bolts. The conventional type differential case (one-piece construction) has a dome-like shape with no case cap attaching bolts.

**16. LUBRICATION**

Use MoPar Hypoid Lubricant Part Number 1879414 for Sure-Grip Differential. Fill until the fluid level comes between the bottom of the filler hole and 1/2 inch below.

**17. SURE-GRIP DIFFERENTIAL REMOVAL AND INSTALLATION**

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

Follow the same procedure outlined under removal

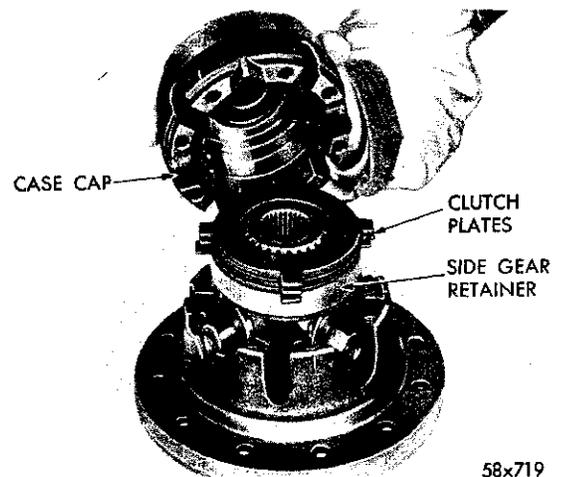


Fig. 33—Removing or Installing Differential Case Cap

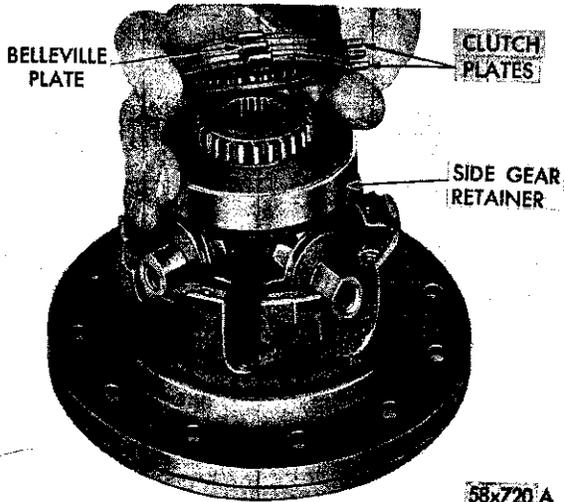


Fig. 34—Removing or Installing Clutch Plates (Cap Side)

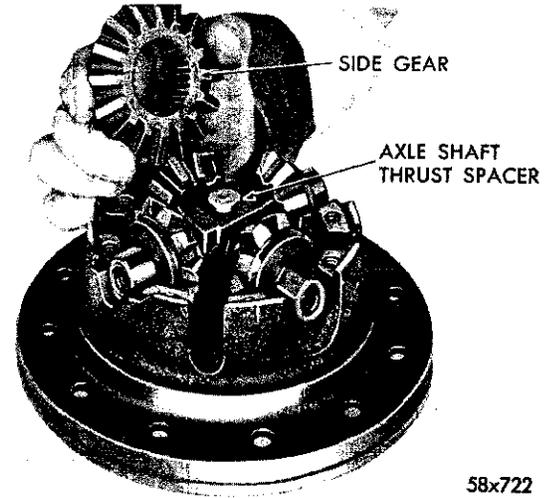


Fig. 36—Removing or Installing Side Gear (Cap Side)

and installation of the conventional rear axle differential.

**18. DISASSEMBLY**

(1) Remove the axle drive gear. Measure the run-out of the drive gear mounting flange. Replace both case halves if the runout exceeds .003 inch.

(2) Before disassembling the case halves, place scribe marks on each half to aid in aligning the case when reassembling (Fig. 32). Remove the case cap attaching bolts and remove the case cap (Fig. 33). Remove the clutch plates (Fig. 34).

(3) Remove the side gear retainer (Fig. 35), and the side gear (Fig. 36).

(4) Remove the pinion shafts with the pinion gears (Fig. 37).

(5) Remove the remaining side gear (Fig. 38), the

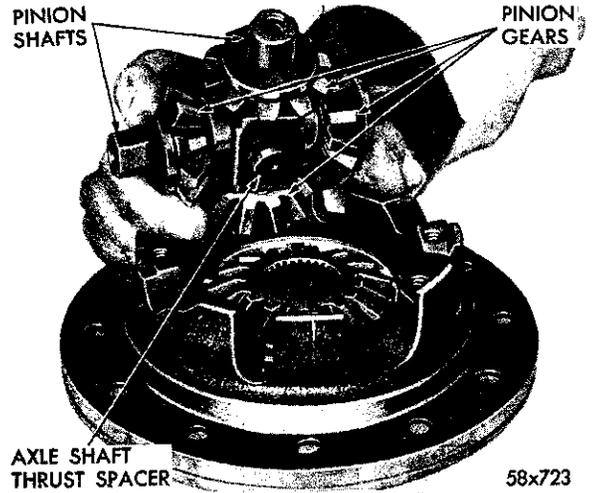


Fig. 37—Removing or Installing Pinion Shafts and Gears

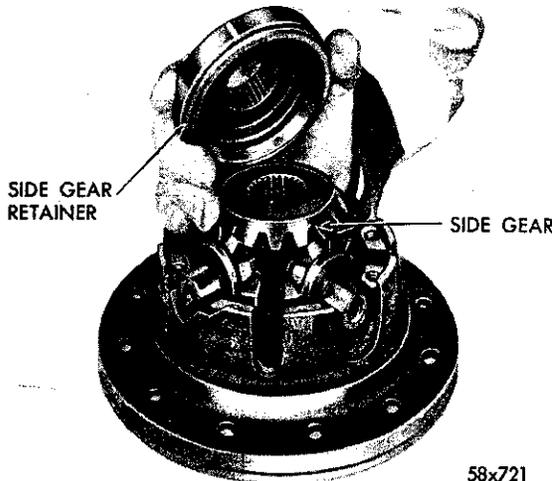


Fig. 35—Removing or Installing Side Gear Retainer (Cap Side)

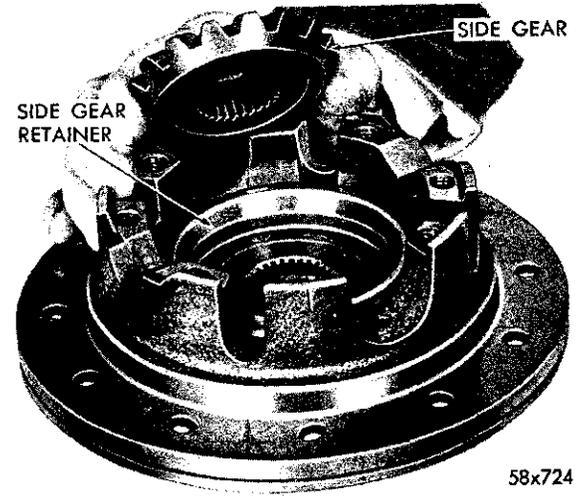


Fig. 38—Removing or Installing Side Gear from Differential Case

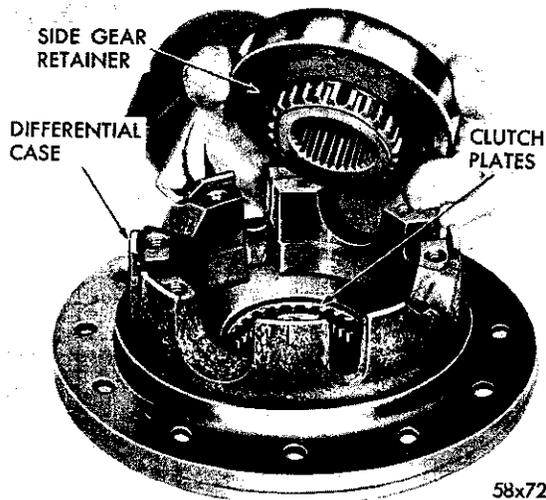


Fig. 39—Removing or Installing Side Gear Retainer

side gear retainer (Fig. 39) and the clutch plates (Fig. 40).

(6) Remove the axle shaft thrust spacer by pressing out the lock pin.

## 19. CLEANING AND INSPECTION

Clean all the parts thoroughly. Inspect all the parts for wear, nicks and burrs. The inner and outer flat clutch plates and outer flat clutch disc should be replaced if they are worn or distorted. If the case is worn, it will be necessary to replace both halves.

## 20. ASSEMBLY

(1) Position the clutch plates and discs in their proper location in each half of the case, as shown in Figure 41.

(2) Place the side gears in their retainers. Insert

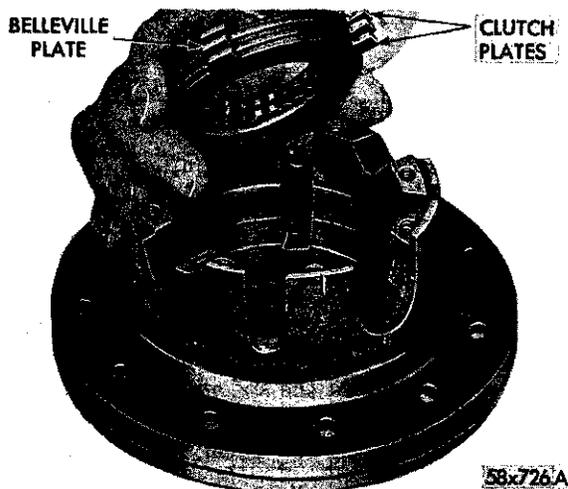


Fig. 40—Removing or Installing Clutch Plates

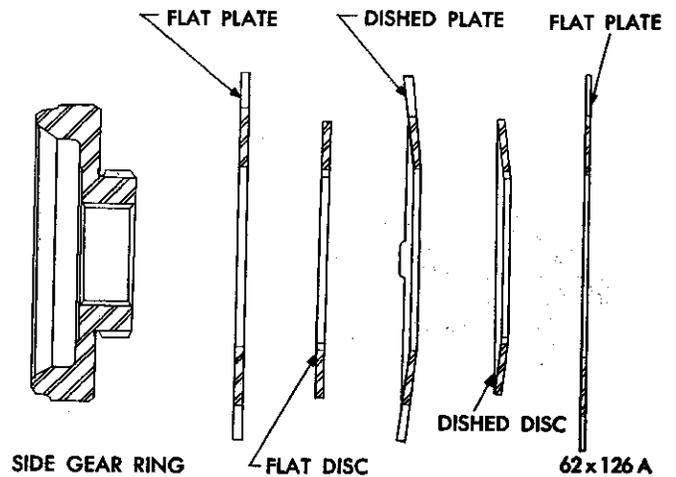


Fig. 41—Arrangement of Clutch Plates, Discs and Washers

splines of the retainers through the splines of the clutch discs.

(3) Place the aligning pin through one axle shaft thrust spacer. Assemble the pinion shafts on aligning pin.

(4) Place the pinion gears on shafts and install the assembly on the drive gear half of the case. Insert the thrust spacer in the pinion shaft (Fig. 42).

(5) Slide the cap half of case over the edge of bench far enough to insert one finger up through the assembly to hold it together. Place the assembly on the drive gear half, matching the scribe marks.

(6) Make sure the markings on each differential case half coincide. Install the differential case bolts and turn them in a few threads.

(7) Insert the axle shafts from the vehicle to align the splines. Make sure the axle shafts engage the

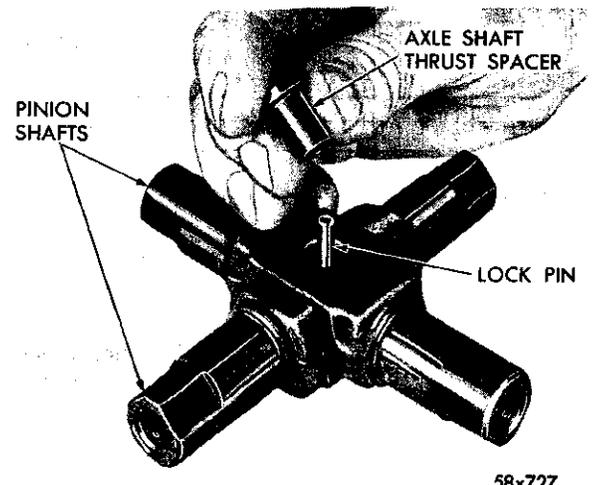


Fig. 42—Installing Axle Shaft Thrust Spacers

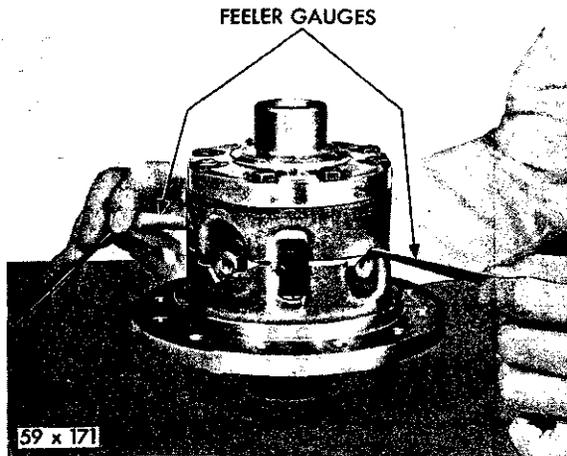


Fig. 43—Measuring the Clearance Between Pinion Shaft and Case

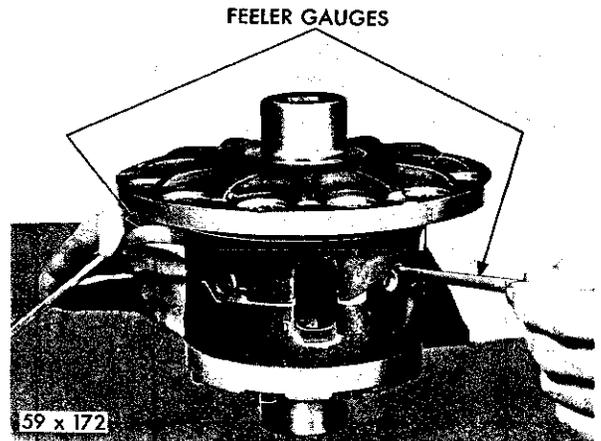


Fig. 44—Measuring the Clearance of Pinion Shaft and Cap

side gear splines as well as the clutch ring splines.

(8) With the shafts installed, center the cross shafts between the two ramp surfaces in the differential case. Tighten the differential case bolts evenly by alternately turning opposite bolts until all are tightened to 45 foot-pound torque. To keep the splines of the side gear and the clutch plates in exact alignment during the tightening procedure, move the axle shafts back and forth as the bolts are being tightened. After assembly, slight misalignments of the splines can be corrected by moving the axle shafts back and forth until free. Remove the axle shafts.

(9) With the differential resting on one hub, insert two feeler blades, one over each end of the pinion shaft having ramps above it (Fig. 43). The clearance should not exceed .010 inch at each end of the shaft.

(10) Invert the differential to rest on the opposite hub. Measure the opposite pinion shaft in like manner to the same specifications (Fig. 44).

The measurements over .010 inch indicate that the clutch discs are worn and should be replaced. New discs and plates may produce a clearance of as little as .002 inch. With either new or used discs, the measurement of the two shafts should be within .005 of each other.

When installing the rear axle shaft outer oil seal, use Tool C-3565 and seal protector Tool C-745 when installing the brake support over the rear axle shaft.

Before lowering the rear wheels of the vehicle to the floor, adjust the rear brakes.

**CAUTION: Both rear wheels must be raised off the floor.**

### SERVICE DIAGNOSIS

Condition	Possible Cause	Correction
<b>Rear Axle Noise</b>	(a) Wheel loose on axle drum.	(a) Tighten wheel in sequence outline in "Wheels and Tires".
	(b) Worn drum or worn axle shaft keyways.	(b) Replace drum or axle shaft as necessary.
	(c) Wheel hub bolts loose.	(c) Tighten bolts to correct torque.
	(d) Brinelled or scored wheel bearings.	(d) Replace wheel bearings.
	(e) Insufficient lubrication.	(e) Add the specified lubricant as required.
	(f) Bent axle shaft or wheel and hub.	(f) Replace wheel, hub or drum as necessary.
	(g) Lubricant level low.	(g) Add lubricant as required.

**SERVICE DIAGNOSIS— (Continued)**

Condition	Possible Cause	Correction
<b>Rear Axle Noise Cont.</b>	<ul style="list-style-type: none"> <li>(h) End play in drive pinion bearing.</li> <li>(i) Excessive gear lash between drive gear and pinion</li> <li>(j) Loose drive pinion companion flange nut.</li> <li>(k) Damaged gears.</li> </ul>	<ul style="list-style-type: none"> <li>(h) Measure and adjust end play.</li> <li>(i) Measure and adjust gear lash.</li> <li>(j) Tighten flange nut to 240 (min.) foot-pounds torque.</li> <li>(k) Replace gears as required.</li> </ul>
<b>Over-Heating of the Axle Unit</b>	<ul style="list-style-type: none"> <li>(a) Lubricant level too low.</li> <li>(b) Bearing adjusted too tightly.</li> <li>(c) Excessive wear in gears.</li> </ul>	<ul style="list-style-type: none"> <li>(a) Add the specified lubricant as required.</li> <li>(b) Adjust bearings correctly.</li> <li>(c) Replace excessively worn gears.</li> </ul>
<b>Loss of Lubricant</b>	<ul style="list-style-type: none"> <li>(a) Lubricant level too high.</li> <li>(b) Improper type lubricant.</li> <li>(c) Clogged breather.</li> <li>(d) Oil seals worn.</li> </ul>	<ul style="list-style-type: none"> <li>(a) Remove excessive lubricant.</li> <li>(b) Remove lubricant and replace with the specified type</li> <li>(c) Clean breather thoroughly.</li> <li>(d) Replace seals as required.</li> </ul>

