Section II

REAR AXLE

CONTENTS

REAR AXLE
DATA AND SPECIFICATIONS

Rear Axle	C-71	C-72	C-73	C-70
Type	Semi-Floating	Semi-Floating	Semi-Floating	Semi-Floating
Gear Type	Hypoid	Hypoid	Hypoid	Hypoid
*Ring Gear Diameter	8.25″	8.75″	8.75″	9.62″
Pinion Bearings	2	2	2	2
Type	Tapered Roller	Tapered Roller	Tapered Roller	Tapered Roller
Adjustment	Shim Pack	Solid Washer	Solid Washer	Solid Washer
Differential Bearings	2	2	2	2
Type	Tapered Roller	Tapered Roller	Tapered Roller	Tapered Roller
Adjustment	Threaded Adjuster	Threaded Adjuster	Threaded Adjuster	Threaded Adjuster

REAR AXLE

DATA AND SPECIFICATIONS (Continued)

Rear Axle	C-71	C-72	C-73	C-70
Drive Gear Pinion	Matched Sets	Matched Sets	Matched Sets	Matched Sets
Drive Gear Run-Out	.005" Maximum	.005" Maximum	.005" Maximum	.005" Maximum
Drive Gear and Pinion Backlash	.006" to .008"	.006" to .008"	.006" to .008"	.006" to .008"
Differential Side Gear Clearance	.004" to .012"	.004" to .012"	.004" to .012"	.004" to .012"
Axle Ratio	Std. / T&C Wgn.	Std. / T&C Wgn.	Standard	Standard
With Standard 3-Speed Trans.	3.73 / 3.91	— / —	—	—
No. Drive Gear Teeth	41 / 43	— / —	—	—
No. Drive Pinion Teeth	11 / 11	— / —	—	—
With PowerFlite	3.54 / 3.73	3.36 / 3.54	3.54	3.54
No. Drive Gear Teeth	39 / 41	37 / 39	39	39
No. Drive Pinion Teeth	11 / 11	11 / 11	11	11
Type Recommended	Ex. Press. Hypoid	Extreme Pressure Hypoid		Ex. Press. Hypoid
Lubrication — Summer	90	90		90
Lubrication — Winter	90	90		90
Lubrication — Extreme Cold	80	80		80
Lubrication — Capacity	3 ¼ Pints (Including T & C Wagon)	3 ½ Pints (T & C Wagon)		5 Pints (Limousine)
Wheel Bearings — Type	Tapered Roller	Tapered Roller		Tapered Roller
Wheel Bearings — Adjustment	Select Shims	Select Shims		Select Shims
Wheel Bearings — Axle End Play	.003" to .008"	.003" to .008"		.003" to .008"
Road Clearance (full load)	8.4"	8.4"	8.6"	9 3/8"
T&C Wagon	8.4"	8.4"	—	9 3/8"
Sedan	—	—	—	9 3/8"
Tread (Rear)	59.62"	59.62"	60.35"	60.75"
T&C Wagon	59.62"	59.62"	—	—
Sedan	—	—	—	60.75"

*Windsor Town and Country Wagon Models use an 8.75 diameter ring gear.

SPECIAL TOOLS

Tool Number	Tool Name
C-158	Puller—Rear Axle Shaft and Inner Bearing Cup
C-293	Puller Sets—Roller Bearing
C-406A	Wrench—Differential Bearing Adjusting
C-413	Driver—Axle Shaft Outer Bearing Cup
C-430	Dial—Indicator Set
C-452	Puller—Companion Flange or Yoke
C-499	Puller—Axle Shaft
C-549	Puller—Utility
C-637	Puller—Axle Shaft and Oil Seal
C-757	Installing Sleeve—Axle Shaft Oil Seal
C-758-D2	Gauge—Pinion Bearing Pre-Load and Cone Angle Setting
C-784	Wrench—Companion Flange on Yoke Holding
C-839	Driver—Axle Shaft Inner Oil Seal
C-845	Puller—Universal Wheel and Hub
C-3095	Installing Sleeve—Pinion Bearing
DD-807	Driver—Pinion Oil Seal Installing
DD-914-8	Ring—Medium Reducer (use with DD-914-89)
DD-914-89	Plate Set—Pinion Bearing Puller Adapter
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	40
DIFFERENTIAL BEARING CAP BOLTS	90
PINION SHAFT COMPANION FLANGE NUT C-71	240 (minimum)
C-72, C-73, C-70 300-B	250 (minimum)

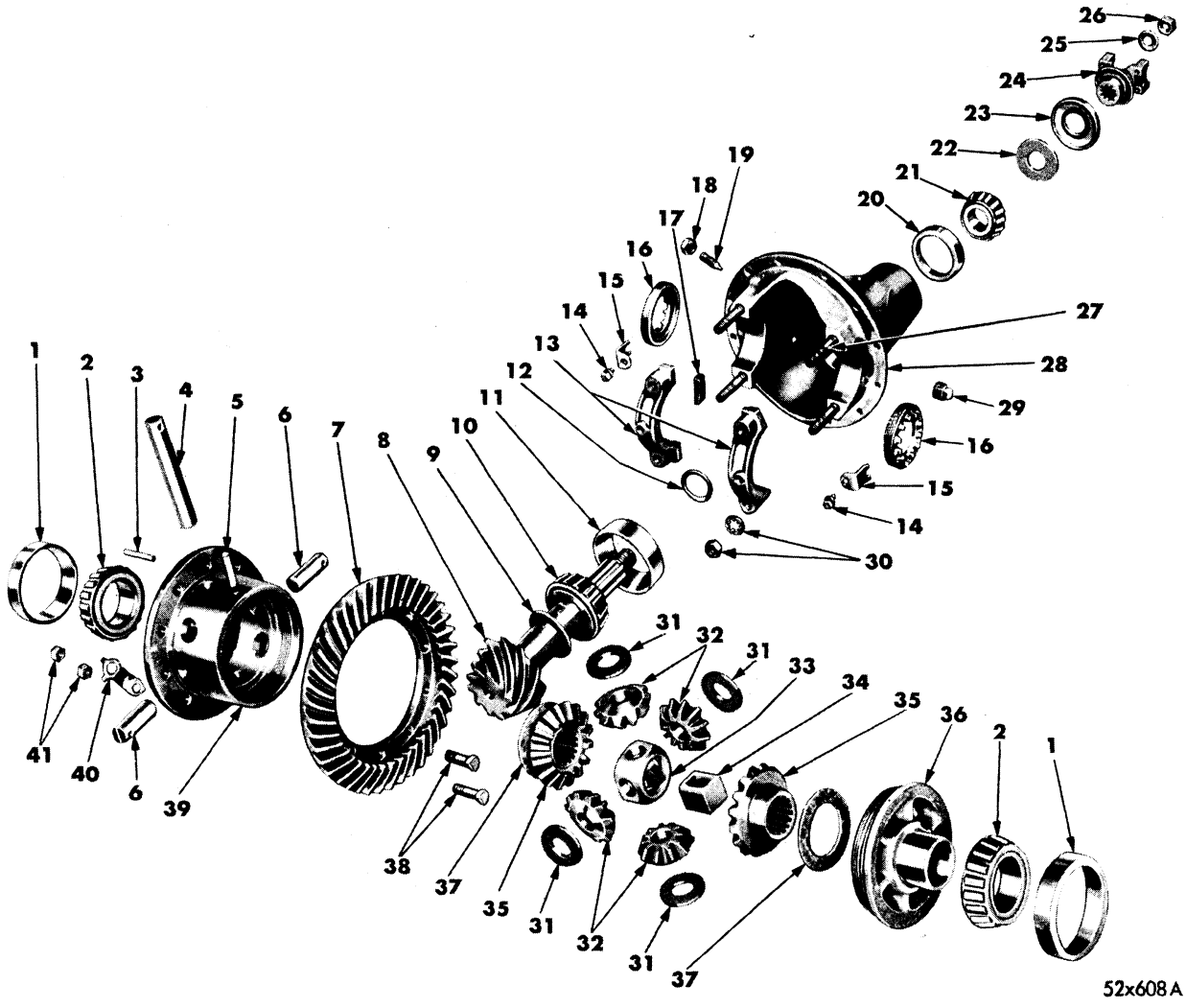

Fig. 1—Rear Axle (Disassembled View) C-70

1—Differential bearing cup
2—Differential bearing cone
3—Differential pinion shaft lock pin
4—Differential pinion shaft—long
5—Differential case cap lock pin
6—Differential pinion shaft—short
7—Axle drive gear
8—Axle drive pinion
9—Axle drive pinion inner bearing washer
10—Axle drive pinion bearing cone—rear
11—Axle drive pinion bearing cup—rear
12—Axle drive pinion bearing spacer
13—Carrier caps
14—Differential bearing adjuster lock screw
15—Differential bearing adjuster lock
16—Differential bearing adjuster
17—Axle drive gear thrust screw pad
18—Axle drive gear thrust screw check-nut
19—Axle drive gear thrust screw
20—Axle drive pinion bearing cup—front
21—Axle drive pinion bearing cone—front
22—Axle drive pinion bearing oil slinger
23—Axle drive pinion bearing oil seal
24—Companion flange and oil seal guard
25—Companion flange nut washer
26—Companion flange nut
27—Carrier cap stud
28—Carrier
29—Filler plug
30—Differential bearing cap stud nut and lockwasher
31—Differential pinion thrust washer
32—Differential pinions
33—Differential pinion shaft block
34—Rear axle drive shaft thrust block
35—Differential side gear
36—Differential case cap
37—Differential gear thrust washer
38—Axle drive gear bolts
39—Differential case
40—Axle drive gear bolt nut lock
41—Axle drive gear bolt nuts

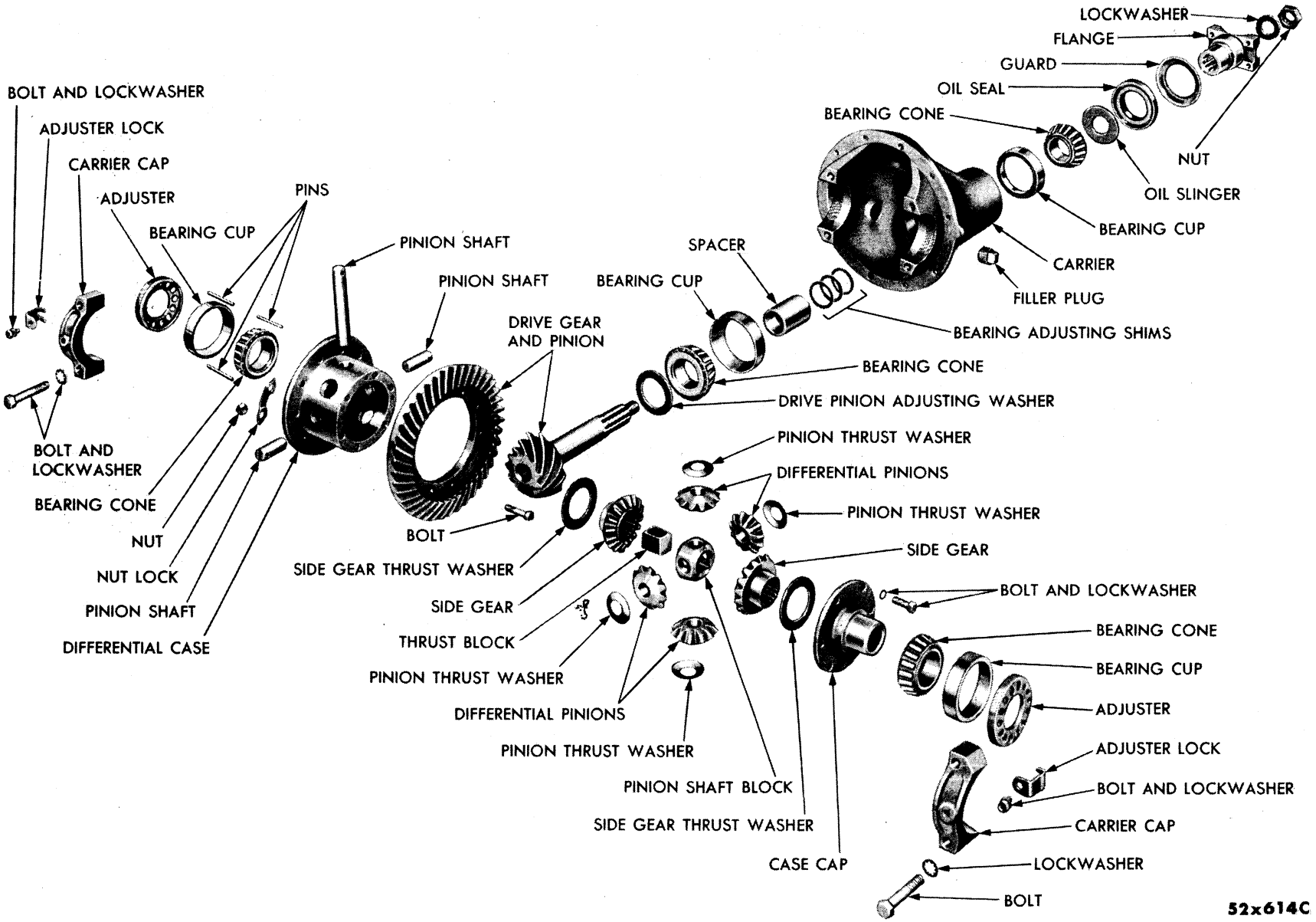

Fig. 2—Rear Axle (Disassembled View) Standard Models, C 71
(Except Town and Country Wagon)

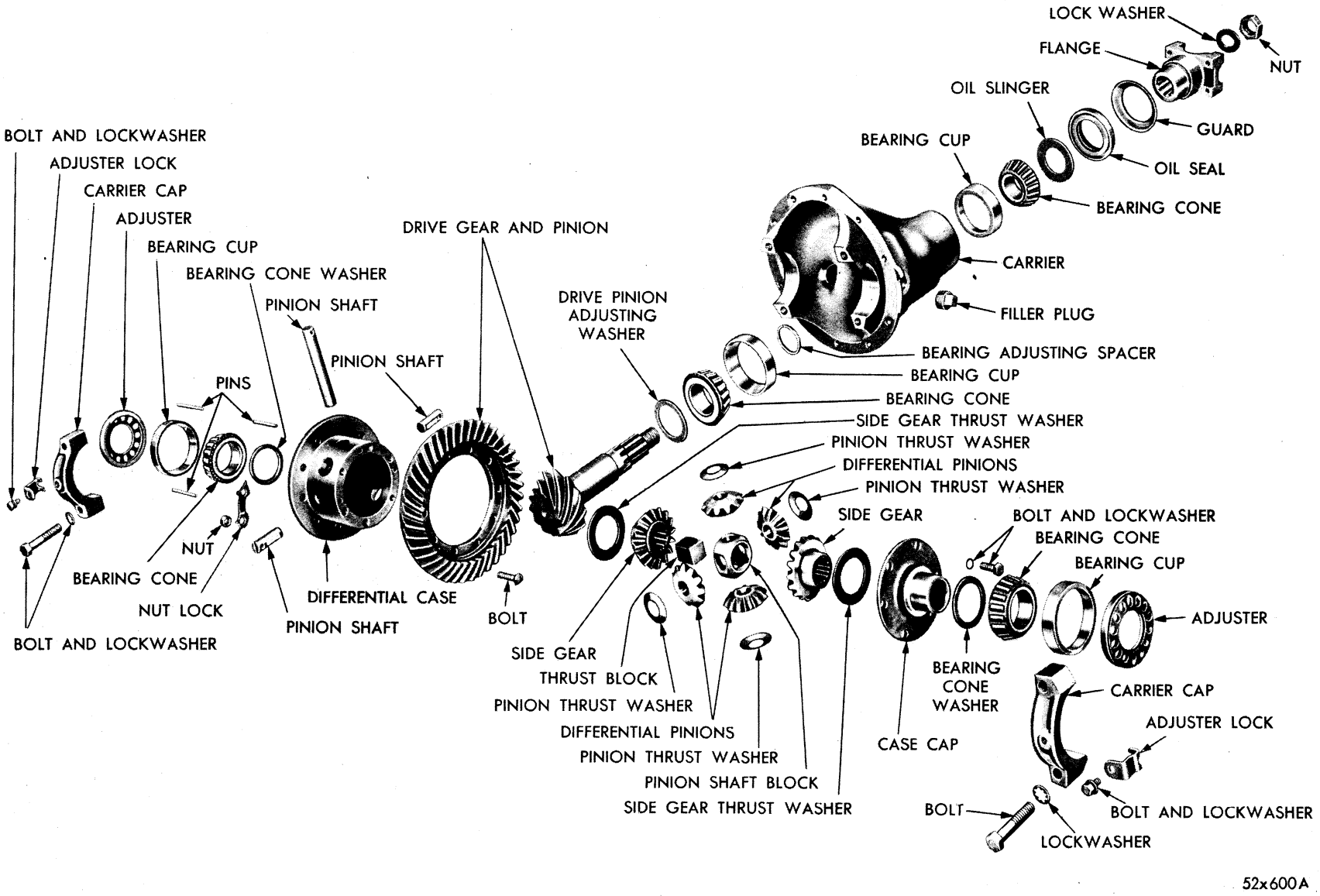

Fig. 3—Rear Axle (Disassembled View) C 72, C 73, including C 71, C 72 Town and Country Wagon and Power Package Equipped Cars

Section II
REAR AXLE

1. DRIVE GEAR ASSEMBLIES

The rear axles used on 1956 Chrysler Models Figure 1, 2 and 3, are semi-floating type with four pinion side gear assembly and hypoid drive gear and pinion. The standard C-71 Models are equipped with 8¼ inch drive gear, Models C-72, C-73, C-70 including Town and Country Wagon and power package equipped cars use an 8¾ drive gear assembly while the C-70 Imperials use a 9⅝ drive gear assembly. The drive gear and pinion on all models are serviced only in matched sets to insure smooth quiet operation.

2. CLEANING AND INSPECTION

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

Bearings and bearing cups should be carefully checked for discoloration due to overheating, and for surface wear. Axle housing should also be checked for broken welds or for being bent.

Rear spring seats should be inspected to make sure they are not broken or loose. Axle shaft splines should be inspected and replaced if there is evidence of torsional or spline damage. Wheel hub boss and seal surface of 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, thrust blocks, and pinion shaft should be thoroughly lubricated before final assembly.

SERVICE PROCEDURES

3. REMOVAL AND INSTALLATION OF AXLE DRIVE SHAFT AND AXLE SHAFT OIL SEAL

a. Removal

Block brake pedal so pedal cannot be depressed while working on rear axle. Raise car off floor.

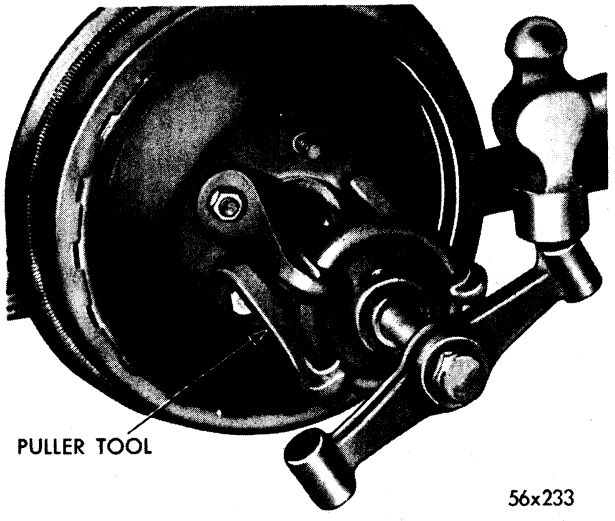

Fig. 4—Removing Rear Hub and Drum Assembly with Tool C-845

Drain lubricant from differential housing. Remove wheel hub and drum assembly with puller set Tool C-845, as shown in Figure 4.

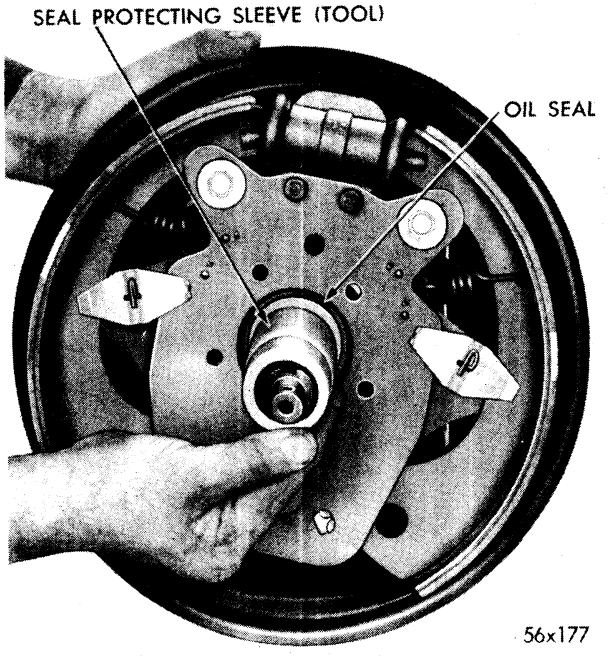

Fig. 5—Removing or Installing Brake Support Tool C-757

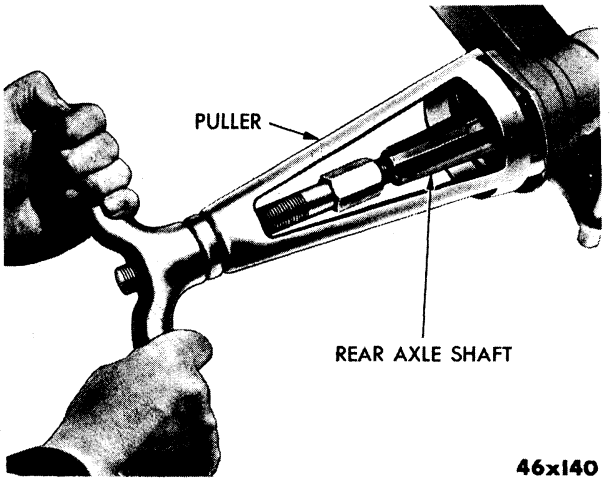

Fig. 6—Removing Axle Drive Shaft and Bearing Using Tool C-499

CAUTION

Do not strike end of axle shaft to loosen hub, because of possible damage to axle shaft and roller bearings.

Disconnect brake line at wheel cylinder. Remove rear axle drive shaft key and install special sleeve Tool C-757 in axle bearing outer oil seal before removing brake support from axle housing, as shown in Figure 5.

Remove shims from each end of axle housing. Shims should be kept separate so they can be reinstalled in same position as they came off axle housing, so as to keep the axle shaft thrust block centralized in differential assembly. Remove axle shaft and bearings from housing, using Tool C-499, as shown in Figure 6.

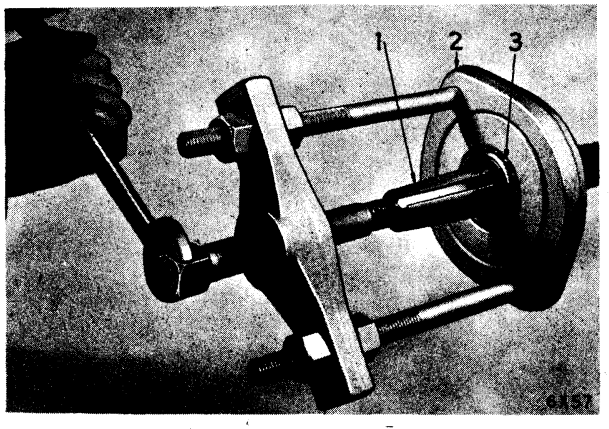

Fig. 7—Removing Bearing from Axle Drive Shaft (Puller C-293C-1)

1—Axle drive shaft 2—Tool C-293-C-1 3—Bearing

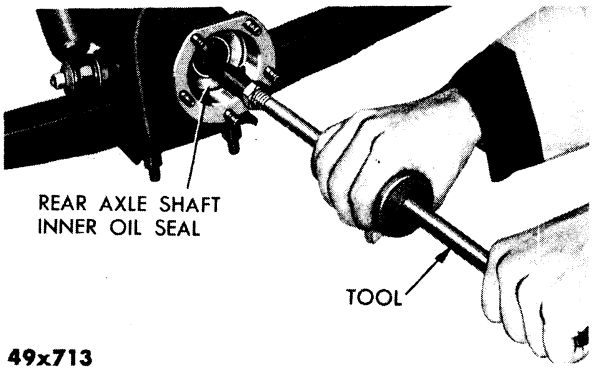

Fig. 8—Removing Axle Shaft Inner Oil Seal Using Tool C-637

CAUTION

Do not allow axle shaft to drag on inner oil seal when removing axle from housing. The inner diameter of oil seal is designed with a feather edge to hug the shaft snugly to prevent oil leak. If edge is enlarged or damaged in any way, efficiency of the seal will be impaired.

If axle shaft bearings are replaced, perform operation as follows:

Remove bearings from axle shafts, using bearing puller Tool C-293-C-1, as shown in Figure 7. Remove axle shaft inner oil seal from housing, using Tool C-637, as shown in Figure 8. Remove outer oil seal from support plate by driving seal out of plate with driver, Tool C-839, as shown in Figure 9.

Cleanliness and inspection are vital when overhauling or repairing a rear axle assembly.

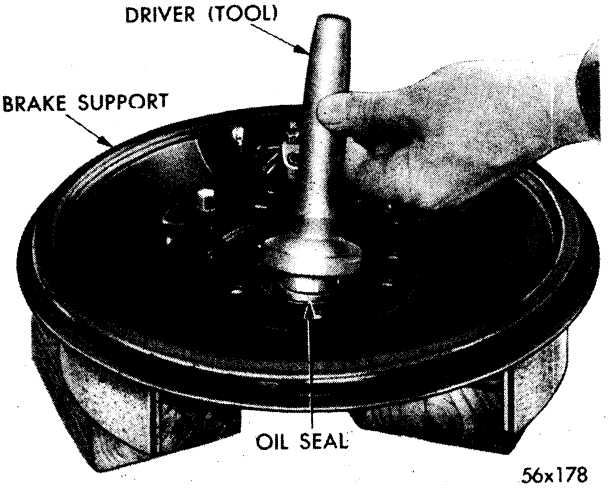

Fig. 9—Removing or Installing Outer Rear Axle Shaft Oil Seal with Tool C-839

b. Installation

NOTE

New oil seals should be installed whenever seals are removed from axle housing and brake support plate.

Install rear axle drive shaft inner oil seal in housing, using special drift Tool C-839, as shown in Figure 10. Install outer oil seal in brake support plate, as shown in Figure 9. Leather seals should be prepared for installation by soaking them in light engine oil for 30 minutes. Before installing axle shaft in housing, examine the bearing surface of the bearing cups for wear and pits, also the surface of axle shaft on which the oil seal wipes to make sure the machine is smooth and free from tool marks and burrs. If necessary, dress down surface of shaft with a stone or fine emery cloth to make sure a smooth bearing surface is maintained for the oil seal.

NOTE

Stone or emery polish lines should run around and not along shaft.

To install axle shaft, replace bearing on axle shaft with special Tool C-158 (Fig. 11) and moderately lubricate axle bearings with hypoid lubricant. Carefully insert axle shaft in housing, making sure shaft and differential side gear splines align.

Install axle drive shaft outer bearing cup with special driver Tool C-413, as shown in Figure 12.

Install axle shaft shims in same manner as removed to maintain central position of axle shaft thrust block. Install special sleeve Tool C-757 in axle bearing outer oil seal, before

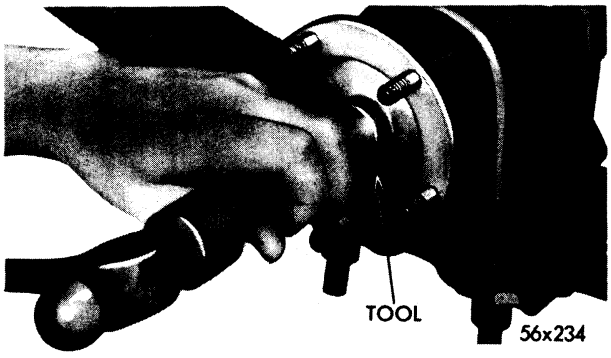

Fig. 10—Installing Axle Shaft Inner Oil Seal with Tool 839

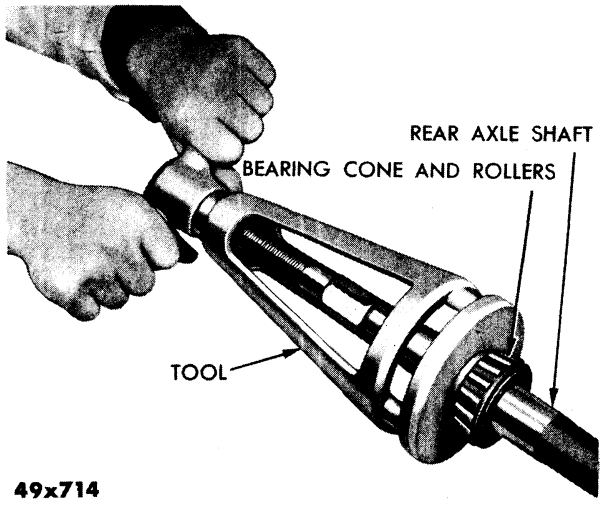

Fig. 11—Installing Axle Shaft Bearing

mounting brake support to axle housing (Fig. 5), to protect seal from being damaged by axle shaft keyway during installation. Clean mating surfaces of axle housing flange and brake support. Install new gaskets. Install brake support plates and tighten attaching nuts to 35 foot-pounds torque. Install axle shaft keys. Connect brake lines to brake cylinder, unblock brake pedal and bleed brake lines. Check the axle shaft end play with dial indicator to make sure it comes within .003 to .008 inch limits, as outlined in Paragraph 5 (Fig. 13).

Install wheel hub and drum assembly. Tighten axle shaft nuts to a minimum of 145 foot-pounds torque. Install new cotter keys and hub caps.

Refill axle housing and carrier assembly with Extreme Pressure Hypoid Lubricant, as outlined in Lubrication Section. Check and refill master cylinder. Check and adjust brake shoes. Lower car and remove brake pedal block.

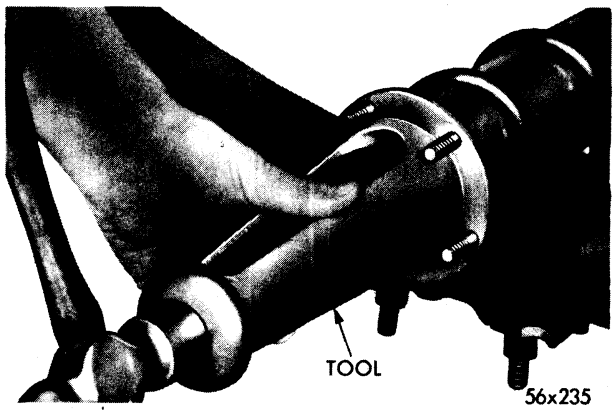

Fig. 12—Installing Axle Drive Shaft Bearing Cup with Tool 413

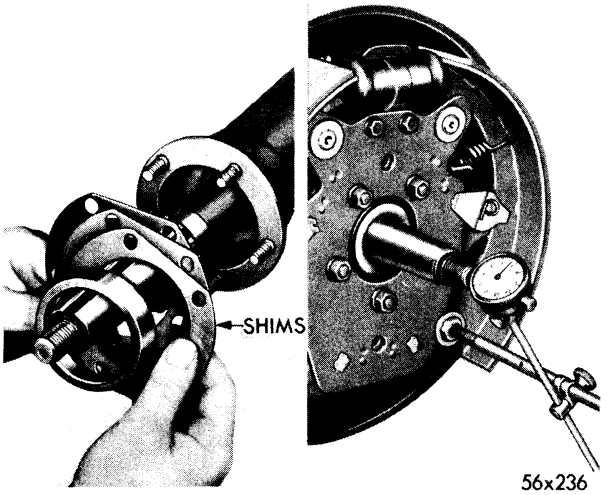

Fig. 13—Checking Axle Shaft End Play

4. REMOVING BROKEN END OF AXLE DRIVE SHAFT

Raise car, back off brake shoes, remove wheel, drum and axle drive shaft as outlined in Paragraph 3. If break is less than eight inches from splined end of shaft, it will be necessary to remove differential and carrier assembly. If break is more than eight inches from splined end of shaft, it will be necessary to remove inner oil seal and snare inner end of axle drive shaft out through housing with a hoop.

CAUTION

To avoid damage to rear axle carrier assembly, oil must be drained from differential housing and cleaned to remove chips and grit before installing new axle shaft.

Replace axle shaft and check rear axle end play, as outlined in Paragraph 5. Replace wheel hub and drum assembly and tighten axle shaft nuts to a minimum of 145 foot-pounds torque. Refill differential, and adjust brake shoes.

5. SETTING AXLE SHAFT END PLAY

Rear axle shaft end play is adjusted by use of adjusting shims that are bolted between the axle housing ends and brake support plates. The shims are available in thicknesses of .005, .010, .0125, .015, and .030 inch. The correct axle end play is .003 to .008 inch. One or more shims may be required to obtain correct end play.

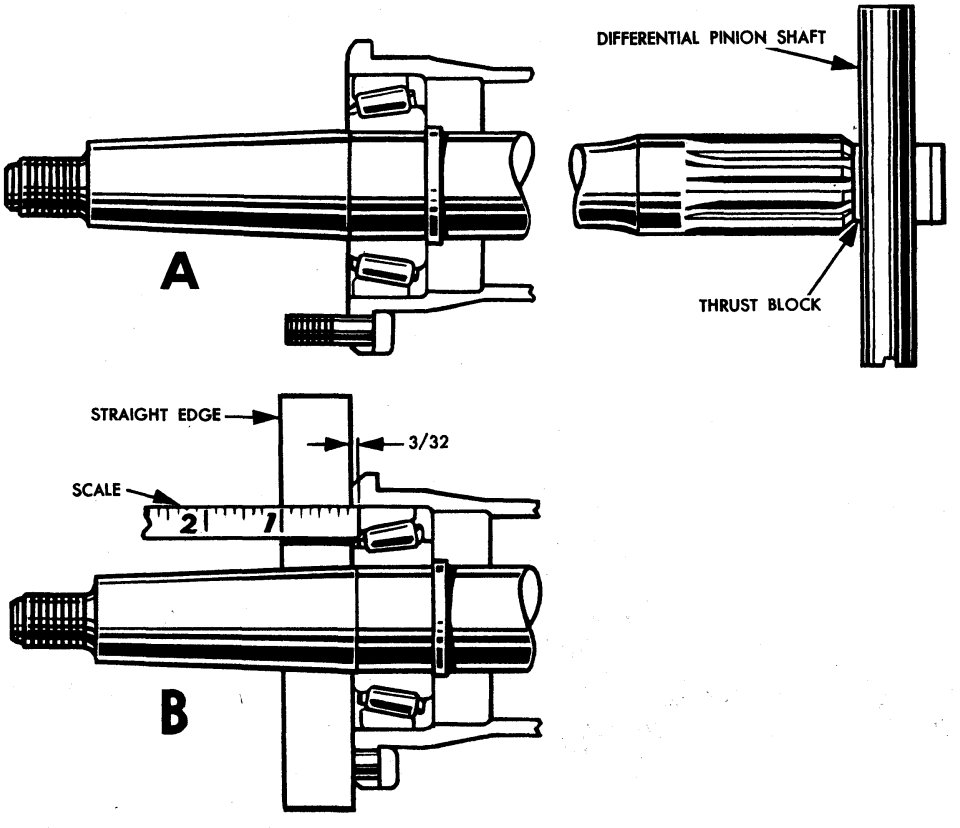

Fig. 14—Adjusting Axle Shaft End Play

Preparation for setting axle shaft end play consists of removal of axle drive shafts. It is not necessary to remove bearing cones from axle drive shafts unless they are to be replaced. Clean parts after disassembly, and inspect bearing cups, cones, and rollers for signs of surface failure.

The axle drive shaft thrust block has an elongated hole to allow the block approximately ¼ inch total lateral motion in assembly. The thrust block must be located so that elongated hole is approximately centered on the long differential pinion shaft.

To adjust axle end play, the operation can be started from either side of axle housing. These instructions will be confined to the case of starting at the left side.

Install left axle drive shaft and bearing cone assembly (without lubricant). Drive bearing cup as far as it will go, using Tool C-413, in order to prevent damage to axle housing. This will thrust the block as far to the right as it can go, as shown in Figure 14 "A".

If the left bearing cup is now withdrawn about ⅛ inch, the thrust block will be approximately centered on the differential pinion shaft. Axle operation is not affected by mislocation of the thrust block unless the block bears against the differential pinion shaft, in which case end play of the left and right axle shaft may be different, and wheel thrust will be imposed upon differential bearings, a condition that should be avoided.

With the left bearing cup in its innermost position, as shown in Figure 14, lay a straightedge across end of axle housing. Measure distance from the straightedge to bearing cup face, to nearest 1/64 inch. The example shown in Figure 14 "B" shows a measurement of 3/32 inch.

One eighth inch minus the above measurement gives the thickness of shims required at the left end of housing to center of thrust block. For the above example, a shim 1/32 inch thick would center the thrust block. A .030 inch shim is close to this thickness, but a good practice is to use a .020 inch shim which is less shim than the thickness required for centering the thrust block.

Remove left axle shaft, grease bearing, reinstall shaft and bearing. Using correct thickness of shims or shim, install the left brake support plate. The bearing cup should not be driven all the way in during this operation. As the brake support plate is drawn up tight, it will push the bearing cup in to the correct position. This completes the work on left axle.

CAUTION

Use clean shims. Clean mating surfaces. Presence of rust or grit will result in incorrect measurement.

Install right axle drive shaft and bearing without lubricant. Bearing should be clean and dry. Using Tool C-413, drive bearing cup in as far as it will go, while rotating axle shaft to seat both bearings properly. If proper procedure has been followed, left bearing cup will be up firmly against left brake support plate, and right bearing cup, bearing cone, right axle shaft, thrust block, left axle shaft and bearing cone, will move as a unit, until left bearing is seated. It is important that axle shafts be rotated during this operation. Now, end play in the bearings will be zero, and rotation of axle shafts will require more effort. The right bearing cup should then protrude beyond the housing end.

Leaving .010 inch out of the left shim will help to assure that the right bearing cup will protrude beyond the housing end face. Hold a straightedge firmly against the outer face of the right bearing cup. Using set of feeler gauges, measure accurately distance between housing face and straightedge. This measurement gives thickness of shim that would give zero end play if it were used in assembly. The shim thickness to be used is obtained by adding .003 inch to above measurement. If this gives a thickness that cannot be built up from existing shims, use the next larger shim combination. This insures that end play will be greater than .003 inch.

For example of end play setting, assume right bearing cup face protrudes .038 inch beyond end face of housing. Shim thickness required for .003 inch end play is .038 inch + .003 inch equals .041 inch. This cannot be obtained with existing shims, so .0425 inch is used, which is obtained with one .030 inch and one

.0125 inch shim. The end play is then .0425 inch minus .038 inch, equals .0045 inch.

Remove right axle shaft and lubricate bearing. Install axle shaft, bearing and shim and complete the assembly. If dial indicator shows less than .003 inch, or more than .008 inch end play, remove brake support plate and oil seal, and add or remove shims, as required, to obtain desired axle shaft end play.

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.

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

6. REMOVAL AND INSPECTION OF DIFFERENTIAL AND CARRIER ASSEMBLY

a. Removal

Raise car off floor and back off the brake shoes. Remove wheel hub and drum assembly and rear axle shaft and proceed as follows:

Disconnect rear universal joint and drop propeller shaft. Drain lubricant from differential housing.

NOTE

All accumulation of grit, dirt and other foreign matter, deposited on the differential and carrier assembly around attaching bolt nuts should be cleaned off before assembly is removed from housing to prevent dirt falling into the housing, gears, or bearings, when assembly is removed. Remove carrier assembly and clean thoroughly.

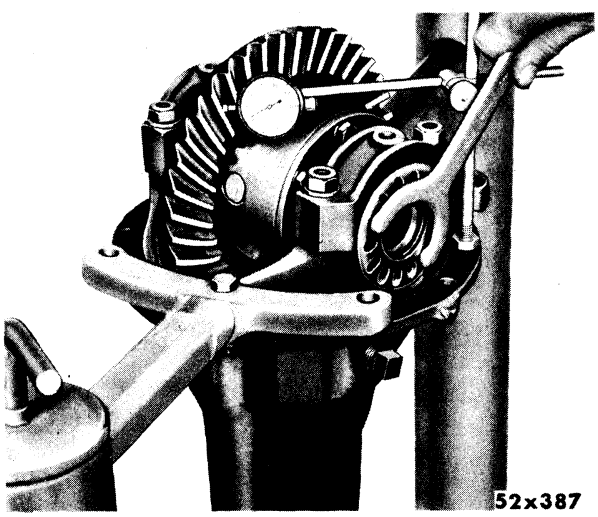

Fig. 15—Checking Backlash between Ring Gear and Pinion

b. Inspection

Make sure companion flange or yoke nut is tight and has not moved from its original position. Check the backlash between the drive gear and pinion gear, as shown in Figure 15. (Backlash should not be less than .006 inch or more than .008 inch.)

Inspect surfaces of the drive gear and pinion teeth for nicks, burrs, scoring or other damage. (Drive gear and pinion are replaceable in sets only.) Check tightness of drive gear to differential case bolts. Tighten if necessary. Check drive gear runout with gauge C-430. Runout should not be more than .005 inch. Check differential bearing pre-load and backlash, as outlined in Paragraph 19.

NOTE

Careful inspection of pinion bearing pre-load will assist in determining cause of noisy axle. Improper drive pinion position will cause a noisy axle.

7. REMOVING DIFFERENTIAL CASE AND DRIVE GEAR ASSEMBLY FROM CARRIER (All Models) (Figs. 1, 2 and 3)

Disassemble the differential case assembly as follows:

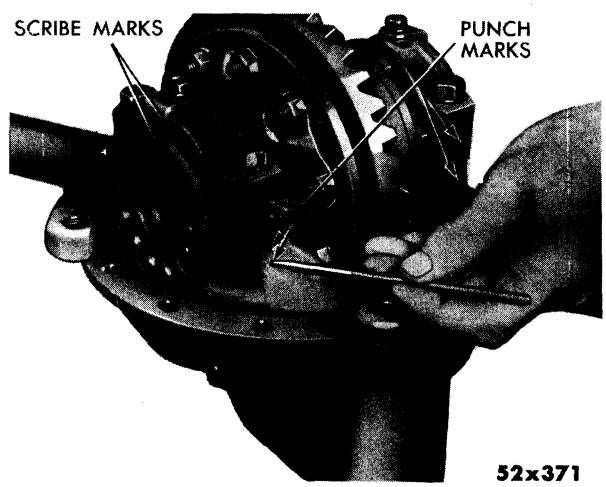

Fig. 16—Marking Bearing Caps and Adjusting Nuts

Mount carrier assembly in stand. Mark both differential bearing adjusters and caps, so they may be reinstalled in approximately the same position at assembly, as shown in Figure 16.

NOTE

Bearing caps must NOT be interchanged. They are lined-bored with carrier housing when manufactured.

Remove bearing cap bolts, caps, adjusting nuts and bearing cups and lift differential case and drive gear assembly out of carrier.

NOTE

Clean drive gear, bearings, bearing cap, drive pinion and inside of carrier assembly, as outlined in "Cleanliness", Paragraph 2.

Check differential side gear and pinion teeth, bores and spherical back of pinions, pinion (cross) shaft, thrust washers and thrust surfaces inside differential case for wear or damage. If any of above mentioned parts are worn they should be replaced.

Inspect fit of differential side gears in hub of differential case. If they are excessively loose, the gears or case should be replaced. Examine surfaces of differential case cone and roller bearings, and bearing cups, for pitting and wear. Assemble cups in bearings and rotate. If bearings are rough or drag on rotation, the bearing rollers may have a flat spot. If so, the bearing should be replaced.

Make sure oil passages in differential carrier are clear, clean and unobstructed.

NOTE

Whenever a differential carrier assembly is removed for rebuilding, due to bearing or other failure, care must be taken to see that all foreign matter, such as grit, dirt, metal particles, etc., are removed from carrier.

8. DISASSEMBLY AND INSPECTION OF BARREL-TYPE DIFFERENTIAL WITH BOLTED-ON CASE CAP

a. Disassembly

Place differential case and drive gear assembly on bench, bend down locking tab and remove

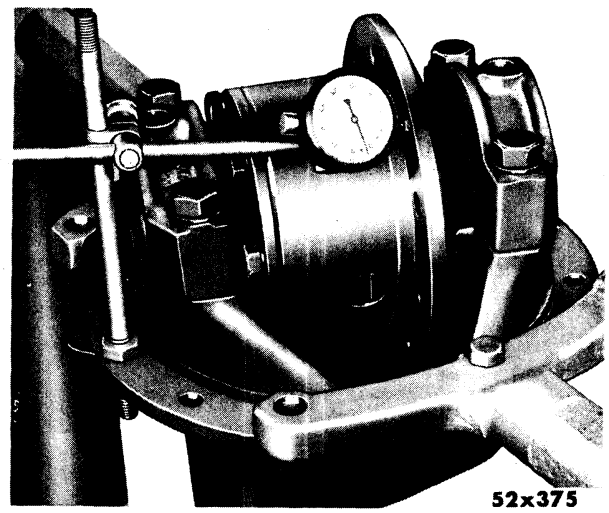

Fig. 17—Checking Drive Gear Mounting Flange Run-Out

drive gear to case attaching nuts and bolts.

Use fiber hammer to tap drive gear off differential case. Clean around differential case flange to allow for checking face runout. Mount differential case in carrier. Assemble bearings, adjusting nuts and bearing caps on carrier. Adjust and remove excessive play from bearings. Mount a dial indicator on carrier mounting face and check ring gear mounting flange for runout, as shown in Figure 17.

NOTE

If there is more than .005 inch runout during above check, the differential case must be replaced.

Inspect bolt holes in ring gear mounting flange for wear or out-of-round. If bolt holes

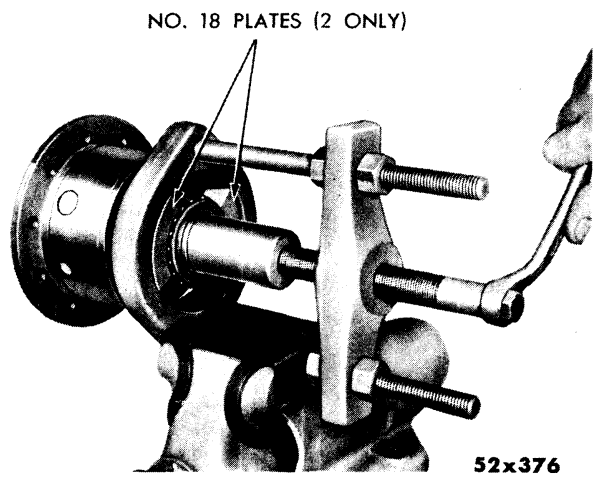

Fig. 18—Removing Differential Bearings

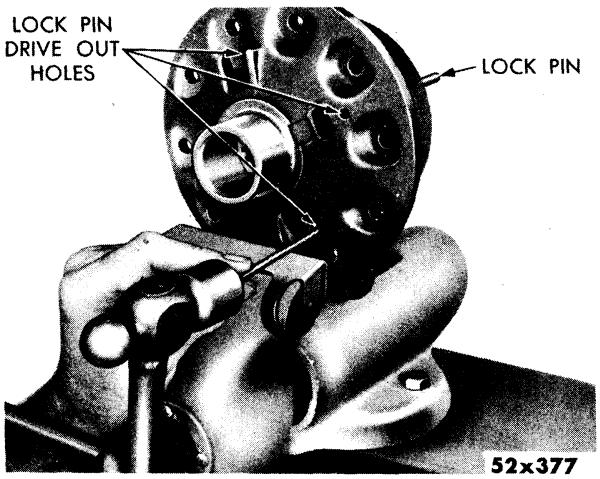

Fig. 19—Removing the Differential Pinion Shaft Lock Pins

are out-of-round, the ring gear will creep on the case.

Remove differential case from carrier. Fit Number 18 plates behind bearings and pull off differential bearings, using Tool C-293, as shown in Figure 18. Remove differential bearing spacers. Remove differential cap to case bolts, and tap cap lightly with a soft hammer to remove. Remove three differential pinion shaft lock pins by driving them out of case with a hammer and punch, as shown in Figure 19.

Drive the long pinion shaft out of differential case, using a brass drift and hammer.

NOTE

This shaft can be identified as having only one retaining pin.

Lift out rear axle drive shaft thrust block. Drive the short pinion shafts out of case, and lift out the pinion shaft block.

NOTE

The short pinion shaft sides of the block are punch marked for identification.

Lift out differential pinion gears, side gears and thrust washers.

b. 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 housing. Inspect all machined surfaces for nicks, burrs or scratches. Inspect thrust shoulders in carrier housing (bearing cups) to make sure there are no burrs on them. The thrust shoulder must be flat, so bearing cups will seat properly. Check the 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.

CAUTION

Do not spin bearings with air pressure when blowing them dry, as damage to bearings may result from this practice.

Check bearings for roughness, or brinelling. The bearings must run free and show no indication of roughness of wear. Examine bearing cups for pitting, scoring or wear. Inspect all gears for chipped or worn gear teeth. Check fit of differential side gears on axle shaft splines and differential gears on pinion shafts. Check thrust washers for wear and replace, if necessary.

NOTE

Whenever a differential carrier assembly is removed for rebuilding due to bearing or other failure, care must be taken to see that all foreign matter, such as grit, dirt, metal particles, etc., are removed from carrier.

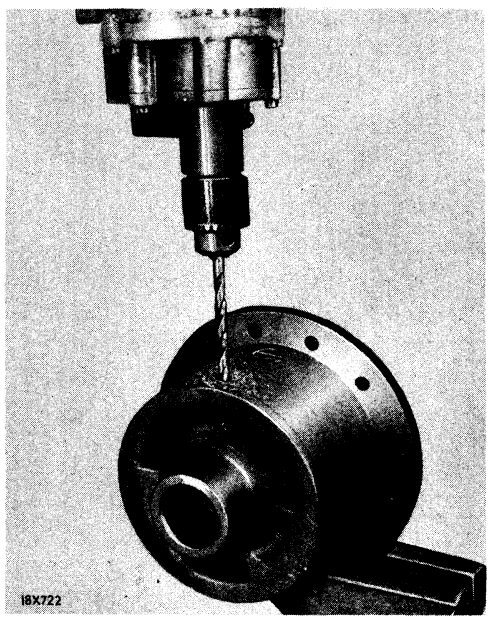

Fig. 20—Removing Differential Case Cap Lock Pin

9. DISASSEMBLY AND INSPECTION OF BARREL-TYPE DIFFERENTIAL WITH SCREWED-ON CASE CAP

Remove drive gear from differential case as outlined in Paragraph 8 and proceed as follows:

Mount the flange of differential case in a vise equipped with copper jaws.

Remove differential bearings with puller. On Model C-70 use Number 83 adapter and Number 41 plug, puller set Tool DD-914.

Remove the differential case cap locking pins by center punching and drilling, as shown in Figure 20. Remove shell of pin left in hole with a punch. The differential case cap is .001 to .002 inch larger than differential case body in which it fits. The case **must** be expanded by heating for easy removal of case cap. The case will be damaged, if any attempt is made to remove cap without heating.

Heat outside of the case (not cap) with torch. Keep the flame moving around the case to assure even heating. Try a piece of ordinary soft solder on case, from time to time. When the solder starts to melt at approximately 360 to 400 degrees F., the case will be hot as it can get without damaging the thrust washers.

When case is just hot enough to melt soft solder, loosen cap with a blunt drift and a heavy hammer and quickly unscrew the cap from case, with Tool DD-921, as shown in Figure 21. The parts can now be immersed in oil to cool for subsequent handling.

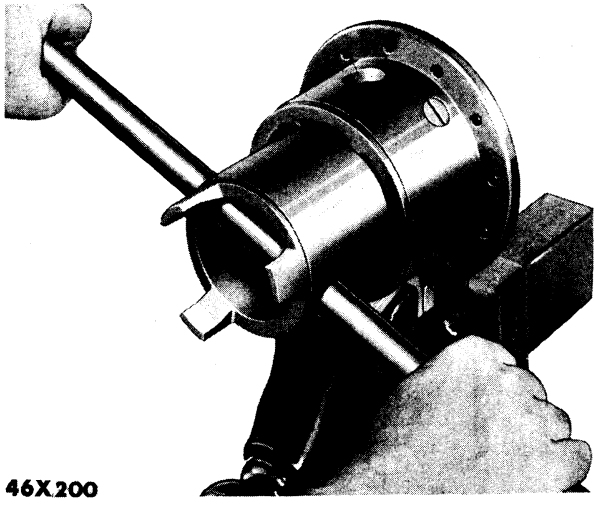

Fig. 21—Removing Differential Case Cap, Using Tool DD-921

Fig. 22—Removing Differential Pinion Shaft Lock Pins

Remove three different pinion shaft lock pins by driving them out of case with a hammer and punch, as shown in Figure 22.

With drift and hammer, drive the long pinion shaft out of case, and remove the thrust block. Drive the short pinion shaft out of the case and lift out pinion shaft block. Remove differential pinions, side gears and thrust washers from case.

10. ASSEMBLY OF BARREL-TYPE DIFFERENTIAL WITH BOLTED-ON CASE CAP

If new differential side gears are installed, place a new thrust washer over hub of differential side gear and lay in position in differential case.

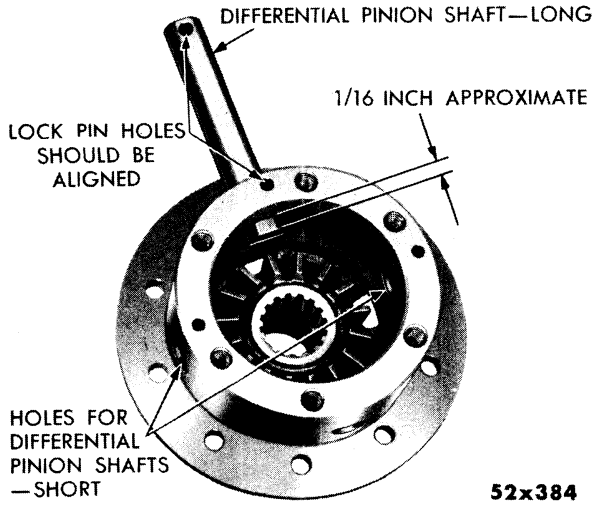

Fig. 23—Positioning the Long Pinion Shaft in Case

Line up the locking pin hole in the long pinion shaft with hole in the differential case pinion boss (opposite boss has no pin hole). Drive pinion shaft in case until it protrudes about 1/16 inch on inside of case, as shown in Figure 23.

Place a pinion thrust washer on pinion so that the concave side faces pinion. Install pinion and thrust washer on end of shaft that protrudes through case. Tap shaft in case, while holding pinion up against case, until end of shaft is even with edge of pinion.

Insert the pinion shaft block with punch marked sides facing the short shaft holes. Install axle drive shaft thrust block and continue to drive shaft through pinion shaft block and rear axle drive shaft thrust block.

Install opposite pinion and thrust washer. Drive shaft into final position in case, making sure locking pin holes are lined up.

Drive one of the short pinion shafts into either of the remaining holes until shaft protrudes about 1/16 inch on inside of case. (Be sure lock pin holes line up.) Install pinion and thrust washer and continue to drive shaft until shaft enters hole in pinion shaft block. Install the other short shaft, washer and gear in the same manner.

Lock three pinion shafts into case by installing three new locking pins in holes, driving pin ends approximately 1/16 inch below machined surface of case.

Assemble thrust washer and differential side gear in cap. Using attaching cap screws as guides, position cap on differential case, and tap into position with fiber hammer.

Tighten cap screws 35 foot-pounds torque as shown in Figure 24.

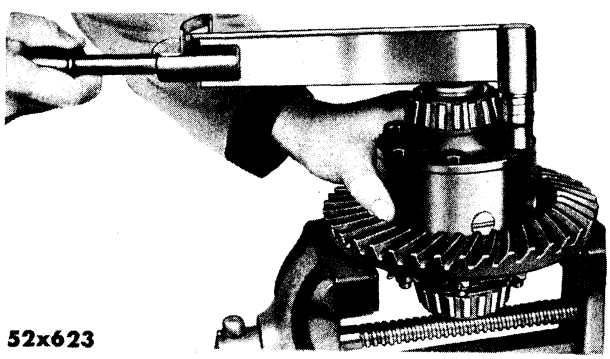

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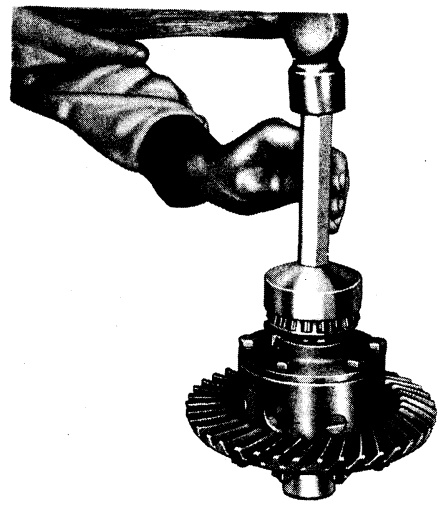
Fig. 24—Tightening Differential Case Cap Screws



52x385

Fig. 25—Installing Differential Bearings

Install ring gear and tighten mounting bolt nuts to 40 foot-pounds torque. Lock nuts by bending locking tabs. Slide differential bearing spacers over hubs (if so equipped). Install bearings on the case, using Tool DD-1005, as shown in Figure 25. Place differential bearing cups over the bearings. Install complete assembly in carrier housing. Seat adjusting nuts in pedestals of the carrier housing and install caps and bolts.

NOTE

Be sure the caps are on the same side from which they were removed.

Mount a dial indicator, with pointer resting against back face of ring gear and check runout. Runout should be true within .005 inch, as shown in Figure 17.

11. ASSEMBLY OF BARREL-TYPE DIFFERENTIAL WITH SCREWED-ON CASE CAP

If new differential side gears are to be installed, place a new thrust washer over hub of gear and lay in position in differential case.

Line up locking pin hole in the long pinion shaft with hole in the differential case pinion boss (opposite boss has no locking pin hole). Drive pinion shaft in until it protrudes about 1/16 inch on inside of case.

Place a pinion gear thrust washer on pinion so that concave side faces pinion. Install pinion gear and washer on end of shaft that pro-

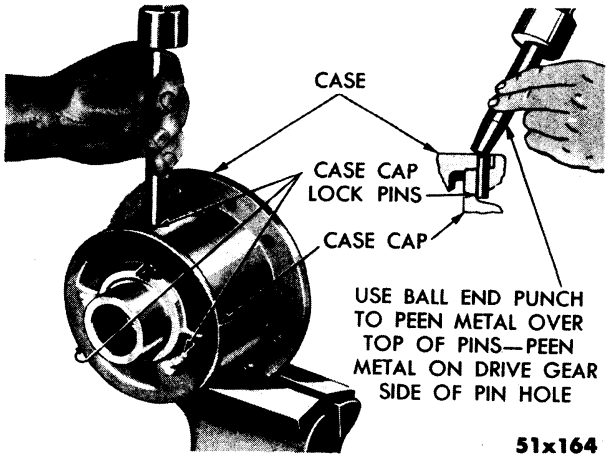


Fig. 26—Staking Differential Case Cap Lock Pins

trudes. Tap shaft and hold pinion, until end of shaft is even with edge of pinion.

Insert pinion shaft block (with punch marked sides facing the short shaft holes and the side marked 1 facing up). Install thrust block and continue to drive shaft through pinion shaft thrust block and pinion shaft block. Install opposite pinion gear and thrust washer. Drive shaft into final position. Drive one of short pinion shafts into either of remaining holes, until shaft protrudes about $\frac{1}{16}$ inch on inside of case. Be sure lock pin holes line up. Install pinion gear and thrust washer and continue to drive until shaft enters hole in pinion shaft block. Install the other short shaft, washer and gear in the same manner.

Lock the three pinion shafts in case (by in-

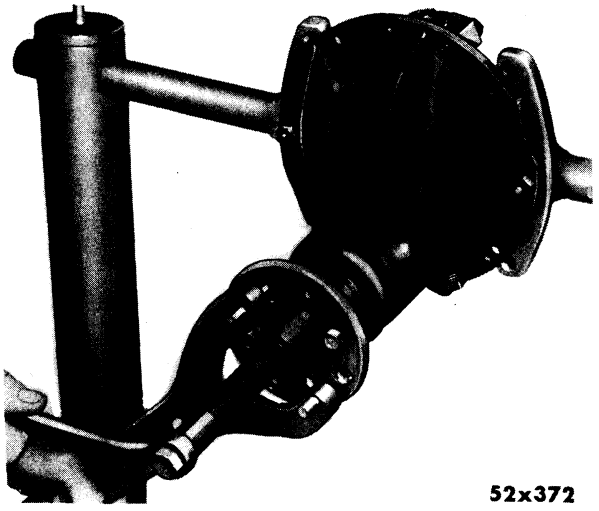


Fig. 27—Removing Companion Flange (Puller C-452)

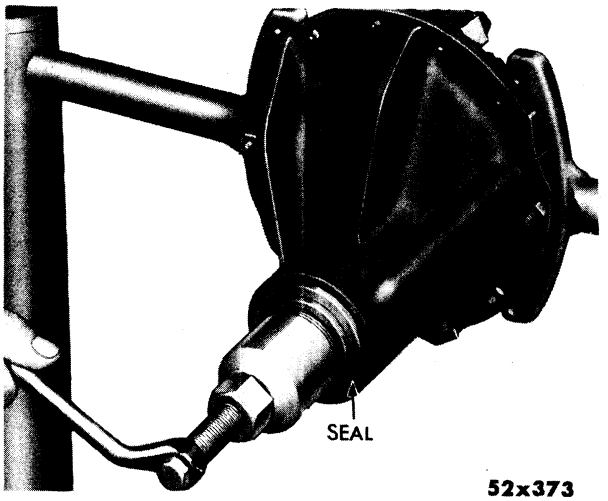


Fig. 28—Removing Pinion Bearing Oil Seal (Puller C-748)

stalling three new locking pins in holes) and peen over. Clamp completed assembly in vise and heat outside surface of threaded portion of case with a torch flame, as in the disassembly procedure. Dip threaded portion of cap in gear oil. Assemble thrust washer and differential side gear in cap, and screw into the differential case with wrench Tool DD-921, as shown in Figure 21. Tighten securely in position with a blunt drift and hammer.

Drive three new differential case cap lock pins $\frac{1}{16}$ inch below surface of case. Peen the metal of the case over the pins with a ball end punch, as shown in Figure 26. Install the differential bearing cones on case, using Tool DD-1004. Check the case runout, as shown in Figure 17.

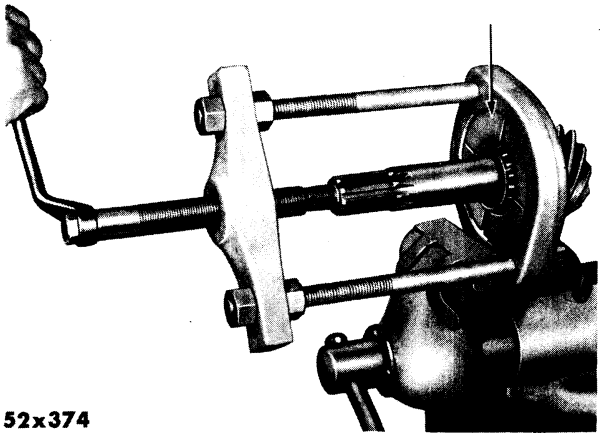


Fig. 29—Removing Bearing From Pinion Puller (C-293-C-1)

12. REMOVAL OF AXLE DRIVE PINION FROM CARRIER (ALL MODELS)

a. Removal

With carrier assembly mounted in stand, remove companion flange retaining nut and washer. On all models, remove drive pinion flange with utility puller Tool C-549, as shown in Figure 27.

Remove pinion shaft oil seal. Use Tool DD-993 to remove drive pinion oil seal from differential carrier assembly. (Refer to Fig. 28). Remove the oil slinger, bearing cone, spacer and shims (if so equipped), pinion adjusting washer, bearing cone and pinion from carrier housing. To remove or install the rear bearing from (or on) drive pinion, use special Tool DD-914 (for Model C-70) and Tool C-293-C for all other models (Fig. 29).

NOTE

When using Tool C-293-C, use Number 36 plates also.

Remove both bearing cups from carrier assembly with a suitable drift. Be sure to drive both cups out evenly.

b. 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 housing. Inspect all machined surfaces for nicks, burrs or scratches. Inspect thrust shoulders in carrier housing (bearing cups) to make sure there are no burrs on them. The thrust shoulder must be flat so the bearing cups will seat properly.

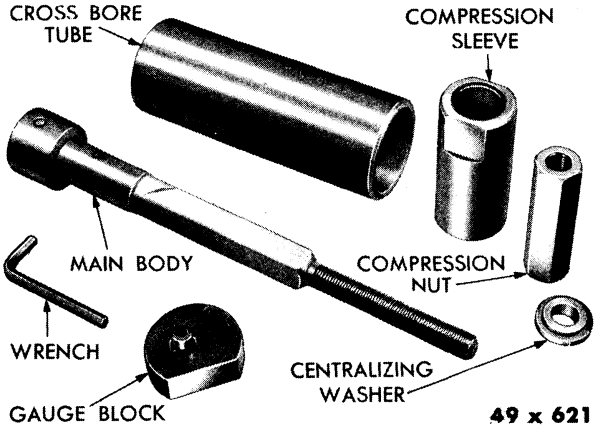


Fig. 30—Special Tool Set C-758-D2

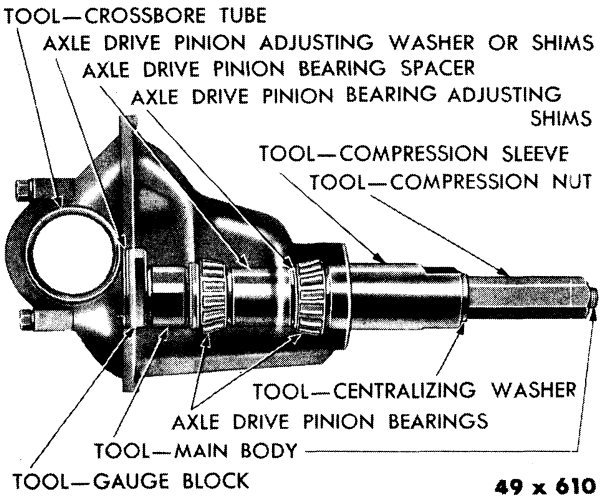


Fig. 31—Main Body, Bearings, Spacer and Shims Installed (Tool C-758-D2)

CAUTION

Do not rotate bearings with air pressure when blowing them dry, as damage to bearings may result from this practice.

Check bearings for roughness, or brinelling. The bearings must run free and show no indication of roughness or wear. Clean carrier housing thoroughly, inspect oil passages and inside of housing for burrs, grit or dirt.

13. INSTALLATION OF DRIVE PINION BEARING CUPS

Place bearing cups in position in carrier. Refer to Figs. 30 and 31 and proceed as follows:

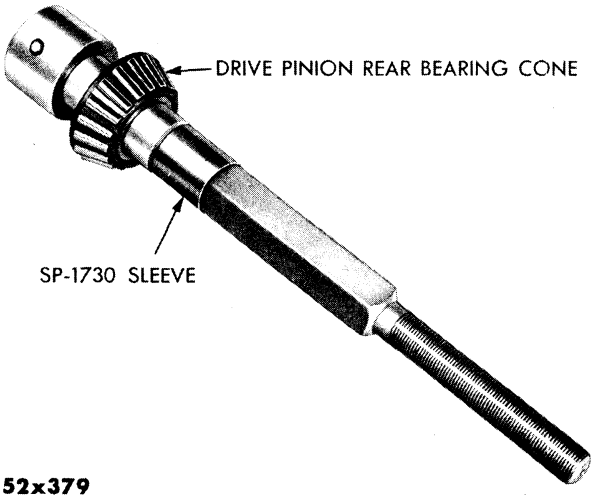


Fig. 32—Bearing Installed on Tool

With bearing cups squarely in position in carrier, assemble Tool C-758-D2 by placing rear pinion bearing over main screw of Tool as shown in Figure 32 and inserting into carrier from gear side, as shown in Figure 33.

Place front pinion bearing over main screw, followed by adapter SP-535, washer SP-534 and nut SP-533. Press bearing cups into place by tightening tool nut, as shown in Figure 34.

NOTE

Allow tool to rotate slightly in order to avoid damaging 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 shaft which would give a false bearing preload on torque wrench.

14. REAR AXLE ADJUSTMENT

To set drive gear and pinion for quiet operation and long life, the following adjustments must be made in the order indicated:

Pinion bearing pre-load

Pinion setting

Differential bearing pre-load

Backlash between drive gear and pinion

Each adjustment is important, because, each one has a significant effect on final goal—**good tooth contact.**

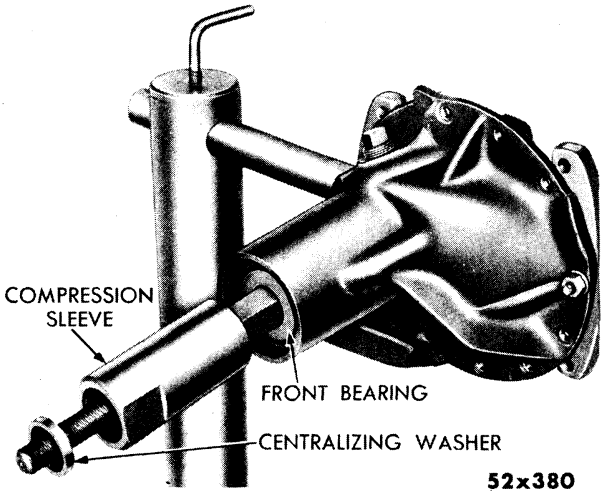


Fig. 33—Compression Sleeve and Centralizing Washer in Position in Carrier

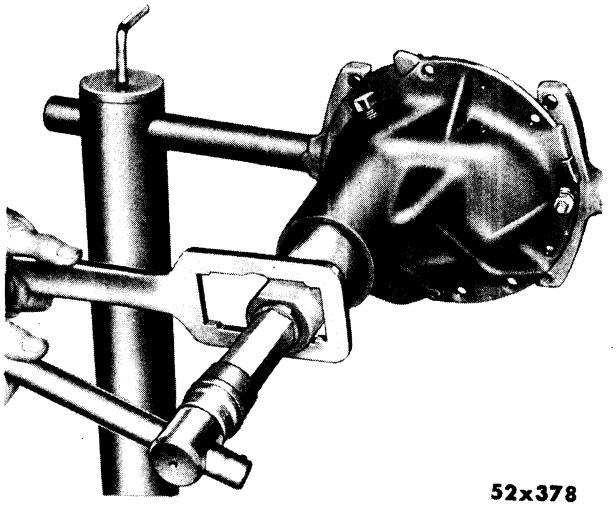


Fig. 34—Seating Bearing Cups in Carrier Housing

Pinion Bearing Pre-Load

The importance of correct pinion bearing pre-load cannot be over-emphasized.

The selection of washers to give the desired pre-load should be carefully made.

Where pinion bearings are installed without pre-loading, the cones are not drawn far enough into their cups to bring rollers in full contact with the thrust ribs on cones. Bearings installed in this manner would allow pinion to "walk" backward and forward under operating loads. This causes variation in tooth contact pattern, resulting in excessive wear and scoring of gears which usually is accompanied by noise.

On the other hand, where pinion bearing cones are drawn too far into their cups, the bearings are overloaded before they have to withstand operating loads imposed upon them by the gears. They are apt to "burn up" under a driving load—the rollers might score the cups, causing bearings to spall or flake, resulting in premature axle failure.

15. SETTING DRIVE PINION PRE-LOAD C-71 AND POWER PACKAGE EQUIPPED CARS (EXCEPT TOWN AND COUNTRY WAGON)

With use of special Tool C-788-D2 (Fig. 30), items 1 and 2, pinion bearing pre-load and pinion setting can be predetermined, thus saving considerable time and labor incurred in the old trial and error method. Also, pinion bearing cups can be installed with this tool.

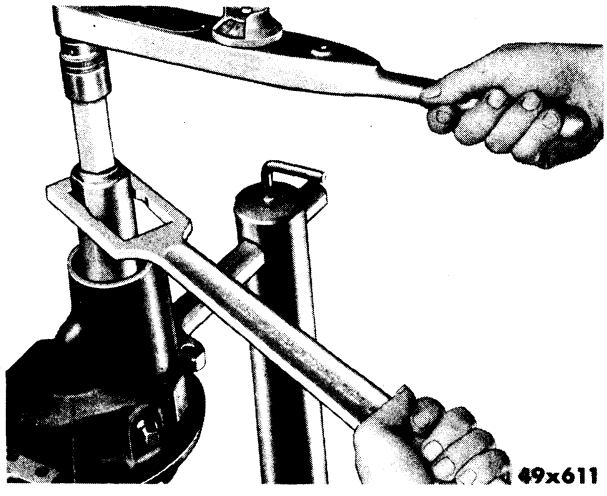


Fig. 35—Tightening Compression Nut with Foot-Pound Torque Wrench

Install cups in housing. Assemble bearing cones and tool in carrier without bearing spacer. Tighten main nut, drawing cups into their proper position.

NOTE

Turn tool and bearings at intervals to help line up bearing cups and avoid possible damage to bearings.

With bearing cups in carrier, slide rear bearing cone and spacer over **main body** of tool and insert in carrier. Slide adjusting shims and front bearing cone over **main body,** as shown in Figure 32. Place **compression sleeve, centralizing washer** and **compression nut** over **main body,** and tighten to 240 minimum foot-pounds torque, as shown in Figure 35. Remove torque wrench and, with a speed wrench, rotate **main body** of tool to seat bearings properly.

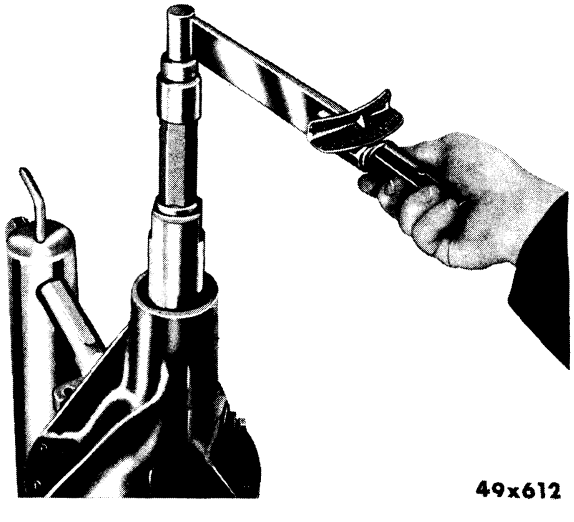


Fig. 36—Checking Torque Required to Turn Main Body

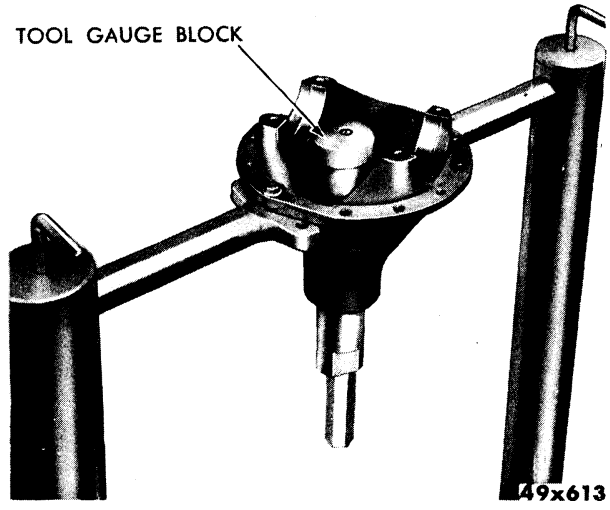


Fig. 37—Installing Gauge Block on Main Body

Use an inch-pound wrench to read the torque required to turn **main body,** as shown in Figure 36. Desired torque should be 20 to 30 inch-pounds. Loosen up assembly and add or remove shims as required.

16. SETTING DRIVE PINION C-71 AND POWER PACKAGE EQUIPPED CARS (EXCEPT TOWN AND COUNTRY WAGON)

Place **gauge block** on top of body and tighten in place, as shown in Figure 37 (gauge block takes place of drive pinion). Assemble **cross bore gauge bar** to carrier bearings supports, as shown in Figure 38. Tighten cap screws to hold bar in place.

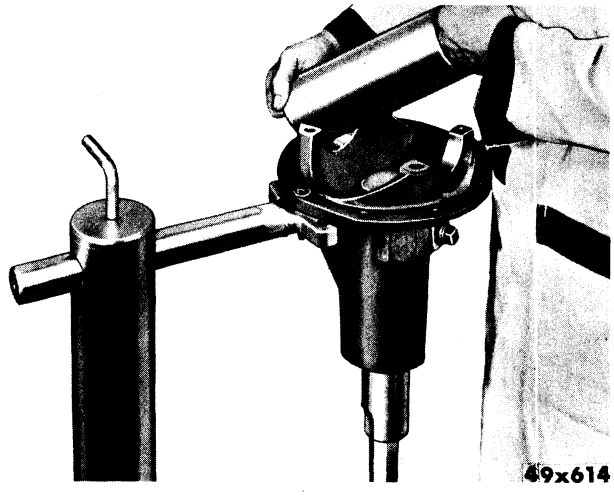


Fig. 38—Installing Arbor S.P. 561

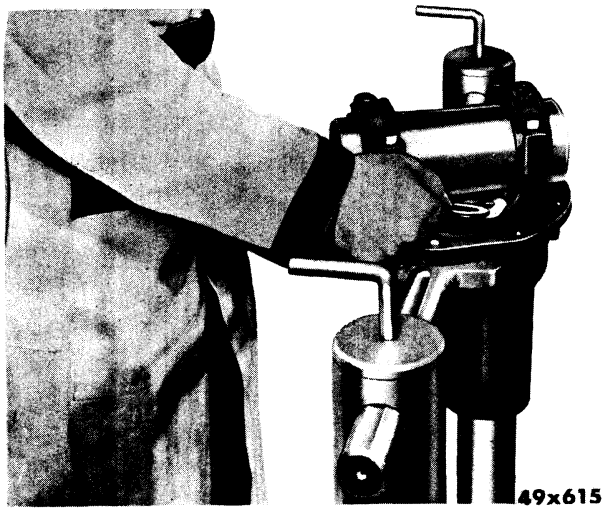


Fig 39—Spacer Washer Thickness

The distance between **gauge block** and **cross bore gauge bar** determines thickness of spacer washer to be used, as shown in Figure 39. The pinion washer to be used is obtained by finding thickness of the washer that slides between the cross bore gauge bar and gauge block with a slight drag. This washer will be the correct size for assembly, provided the pinion has no correction indicated on the small end of pinion head. In Manufacture, after pinion is lapped in with gear, the position of pinion for best tooth contact is etched on the small end of the pinion head as a + or — number. This is the number of thousandths of an inch between the "best bearing" position and standard position. A + 2 would indicate that the pinion should be located .002 inch farther than the standard setting away from the drive gear. This amount (.002 inch) should be subtracted from the washer thickness of washer that slides between the cross bore and gauge block. For example, if gauge indicated that a carrier and rear pinion bearing combination required a pinion washer .090 inch thick, the washer used in assembly is not known until the pinion is inspected for its position mark. If it is marked 0, the spacer used in this example is .090 inch. If the pinion is marked + 2, the spacer should be .088 inch thick. If the pinion is marked — 2, the spacer used is .092 inch thick.

When correct washer has been selected for drive pinion, disassemble the tool from differential carrier housing. Slide pinion washer over piston shaft with chamfered side against the pinion. Install rear pinion bearing, using Tool C-3095 and a suitable arbor press. Install the pinion in differential carrier. Slide bearing spacer, bearing pre-load shim pack, bearing cone and oil slinger over shaft and down into position. Install a new oil seal, using driver Tool DD-807, as shown in Figure 40. Install companion flange, washer and nut. Tighten to 240 minimum foot-pounds torque.

17. PINION PRE-LOAD AND PINION SETTING (C-72, C-73, C-70 AND C-71 TOWN AND COUNTRY WAGON AND POWER PACKAGE EQUIPPED CARS

The above models use a large bearing at rear of drive pinion. The shoulder is close to front bearing, so enlarged section of pinion shaft performs the function of spacing the pinion bearings.

Adjustment of bearing pre-load is left to a thick spacer (approximately 3/16 inch), available in various thicknesses, and selected to give pre-load within limits specified. Pinion bearing spacers are available in fifteen different sizes as follows:

Spacer Thickness

.175 in.	.191 in.
.177 in.	.193 in.
.179 in.	.195 in.
.181 in.	.197 in.
.183 in.	.199 in.
.185 in.	.201 in.
.187 in.	.203 in.
.189 in.	

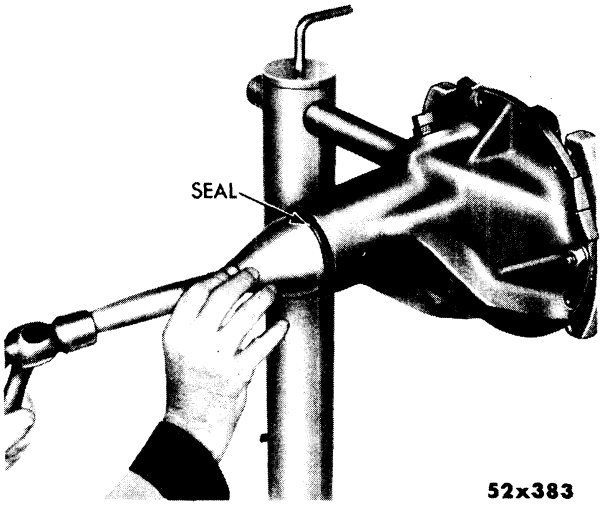


Fig. 40—Installing the Drive Pinion Oil Seal

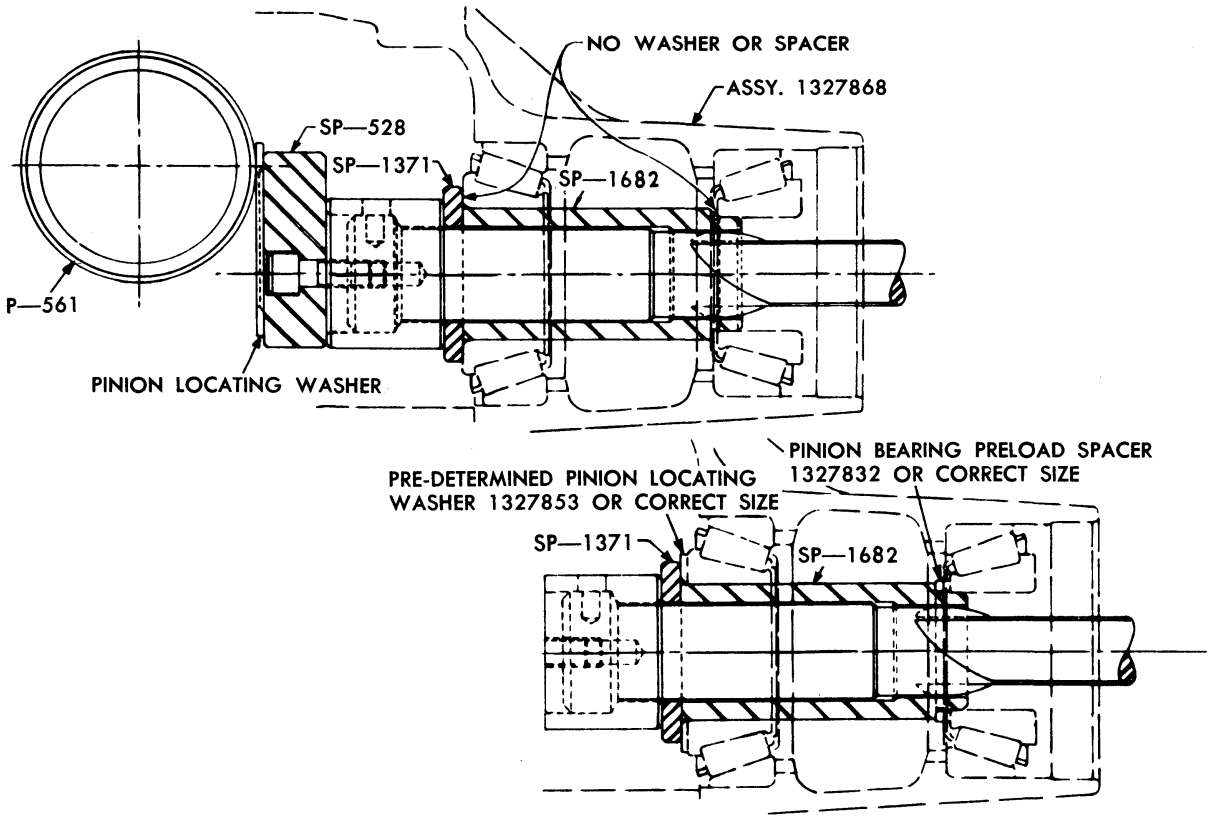


Fig. 41—Setting Pinion Bearing Pre-Load with Tool C-758-D2

To check and adjust pinion bearing pre-load, refer to Figure 41, and proceed as follows:

Assemble spacer SP-1371 to main section of tool and install spacer SP-1370. Correct pinion bearing pre-load should have a drag torque of not more than 25 to 35 inch-pounds with pinion seal removed. Slide pinion rear bearing over spacer SP-1370 and up against spacer SP-1371. Insert tool, as assembled, into carrier housing. Slide front bearing over tool shaft and into its proper position in bearing cup.

Tighten tool compression nut so the torque required to rotate the tool assembly on bearings is 25 to 35 inch-pounds, with the bearing lubricated with hypoid gear oil. Assemble gauge block SP-528 to main screw. Place SP-561 bearing arbor in differential carrier bearing supports, as shown in Figure 41.

NOTE

Remove any burrs or upsets in bearing supports before installing bearing arbor, as arbor must be securely seated in bottom of bearing bores. Carefully tighten retaining bolts 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 39.

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 the 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. Therefore, the correct washer for final assembly would be .088 inch.

When correct washer has been selected for drive pinion, disassemble the tool from differ-

ential carrier housing. Add washer selected to the tool, between spacer SP-1371 and pinion rear bearing. Add spacer SP-1370 and the **pinion bearing adjusting spacer** (that was removed from the axle at disassembly). Insert tool assembly in carrier housing. Slide front bearing on the shaft and into position in its cup. Install the tool spacer, nut and washer. Tighten tool 250 minimum foot-pounds torque as shown in Figure 35. 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 36.

The correct bearing pre-load should be 25-35 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 the pre-load is too great or a thinner spacer if the pre-load is not sufficient.

When the correct spacer has been selected for drive pinion bearings, disassemble tool from the differential carrier housing.

Slide the pinion washer over the pinion shaft with the chamfered side against the pinion. Install the rear pinion bearing, using Tool C-3095 and a suitable arbor press (See Fig. 42). Install pinion in the differential carrier. Slide the bearing adjusting spacer, bearing and oil slinger over shaft and down into position. Install a new oil seal, using driver Tool DD-807, as shown in Figure 43. Install the companion flange, washer and nut. Tighten to 250 minimum foot-pounds torque.

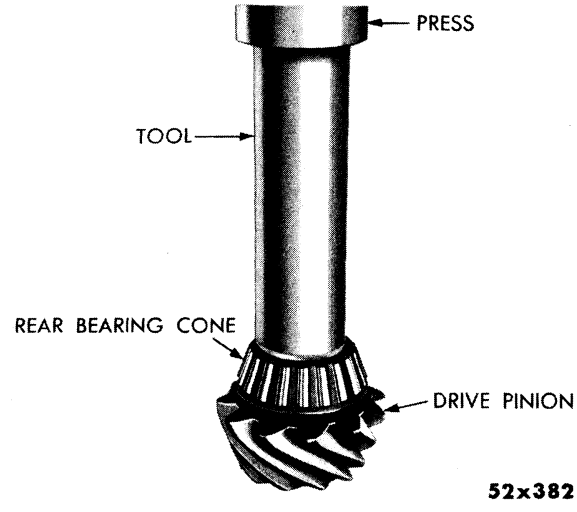


Fig. 42—Installing Bearing on Pinion Shaft

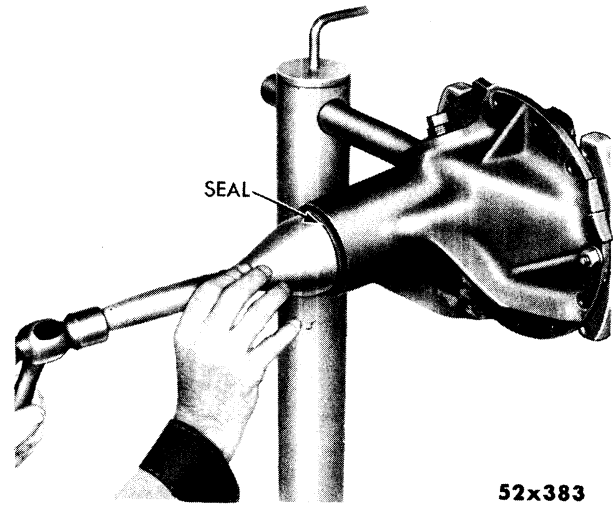


Fig. 43—Installing the Drive Pinion Oil Seal

18. SETTING DIFFERENTIAL BEARING PRE-LOAD AND BACKLASH (ALL MODELS)

Differential bearing pre-load and backlash between the drive gear and pinion are obtained after pinion bearing pre-load and pinion settings, as described in Paragraph 17.

Place the differential bearing cups over bearings and install complete assembly in carrier housing. Seat the adjusters in the pedestals of carrier housing and install caps and bolts.

NOTE

Be sure the caps are on the same side from which they were removed.

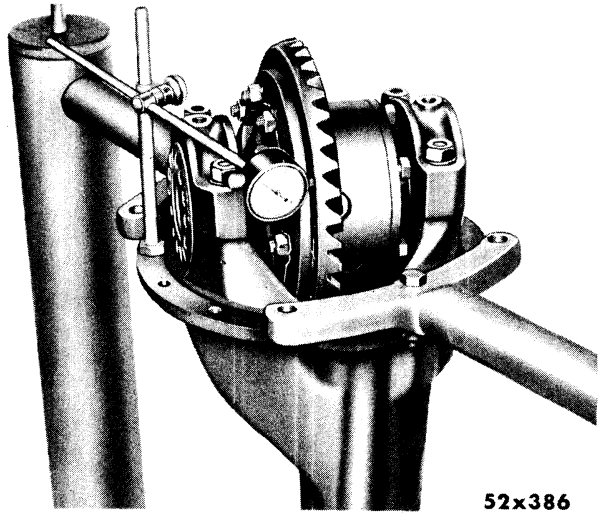


Fig. 44—Checking Ring Gear Run-Out

Mount a dial indicator with pointer resting against the back face of ring gear and check runout. Runout should be true within .005 inch, as shown in Figure 44.

In order to make certain that differential bearings and caps are properly seated, proceed as follows:

Using spanner wrench Tool C-406, as shown in Figure 45, turn the right hand bearing adjuster clockwise until considerable backlash exists between the ring gear and pinion. Back off the adjuster several turns.

Tighten lower pedestal bolts 90 foot-pounds torque, leaving top bolts slightly loose. This holds bearing cups in line while moving the ring gear. Mount dial indicator on the carrier so the plunger rests against one of the ring gear teeth, as shown in Figure 46. (Make certain that the indicator is properly positioned so the plunger will accurately indicate the exact amount of backlash.) Check the backlash between ring gear and pinion at 90 degree intervals as ring gear is rotated. Stop at point of least backlash. Turn the left hand bearing adjuster clockwise until only .001 inch backlash exists between ring gear and pinion. Be sure that the right hand adjuster is kept screwed out so that the bearing cup can move without interference. Make certain the left hand bearing adjuster is in position where the nut lock and attaching bolt can be installed. Tighten the upper left hand bearing cap bolt 90 foot-pounds torque.

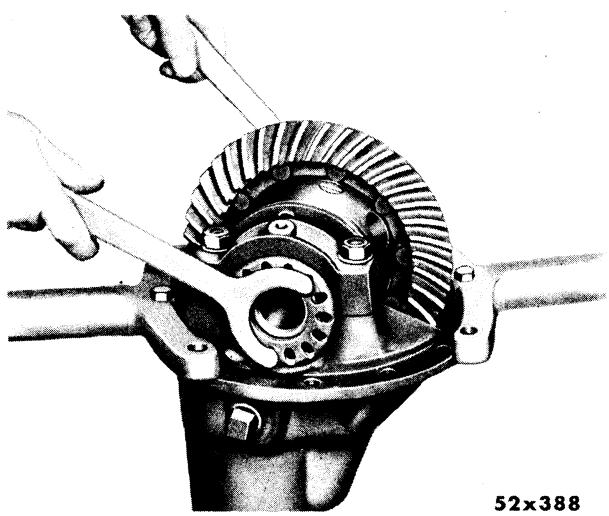


Fig. 45—Adjusting Differential Bearings

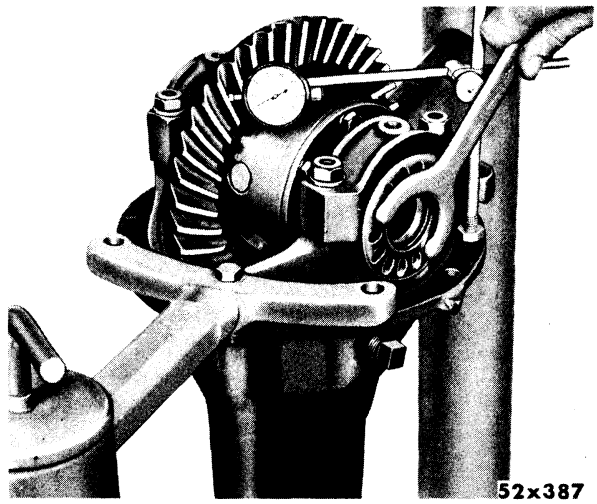


Fig. 46—Checking Backlash between Ring Gear and Pinion

NOTE

In order to properly pre-load the bearings, the entire procedure must be very carefully performed. It is important therefore to complete operation with .001 inch clearance between ring gear and pinion before upper bolt is tightened.

Turn the right hand adjuster clockwise until dial indicator shows a backlash of .006 inch between ring gear and pinion, as shown in Figure 46.

Considerable effort will be required to turn adjusting nut to the last notch or two. This is necessary, however, to insure adequate preload. The adjustment should be performed so that the adjuster lock and attaching bolt can be installed. Tighten the right hand bearing cap attaching bolt 90 foot-pounds torque, and recheck the other three. After final tightening of all pedestal bolts, recheck the backlash. As a result of this method of adjustment, the carrier pedestals have been spread, the differential bearings have been pre-loaded, and backlash between ring gear and pinion has been correctly set.

CAUTION

Whenever adjustment of differential assembly is changed to obtain correct tooth contact, readjust differential bearing pre-load and backlash between ring gear and pinion.

If all adjustments have been correctly made, the gears will be properly meshed and quiet in operation. Proper tooth contact is essential for

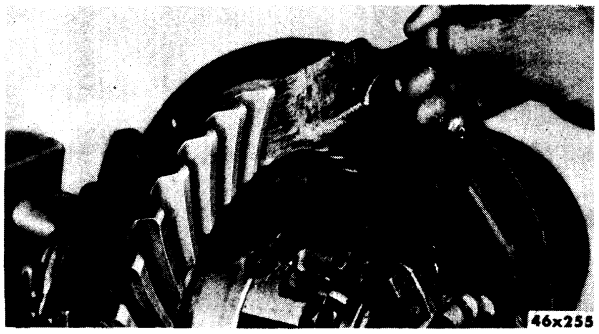


Fig. 47—Applying Red Lead to Gear Teeth

quiet gear operation and long life. It is necessary, therefore, that the tooth contact be checked with gear marking compound before differential carrier assembly is installed in axle housing.

19. GEAR ADJUSTMENT FOR CORRECT TOOTH CONTACT

Check tooth contact by means of gear marking compound applied to drive gear teeth, as shown in Figure 47. Apply load against back face of the drive gear with a round bar as the 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 Figures 48 and 49, the pinion should be adjusted either forward or backward, maintaining the backlash within specified limits until correct tooth contact, as shown in Figure 47, is obtained.

With adjustments properly made, correct tooth contact, as shown in Figure 50, will result. Notice that the contact pattern is well centered on the drive and coast sides about $\frac{1}{16}$ inch from edges of the teeth. When tooth marks are obtained by hand, they are apt to be rather small. Under an actual operating load, however, the contact area will spread out—the higher the load, the greater becomes the contact area.

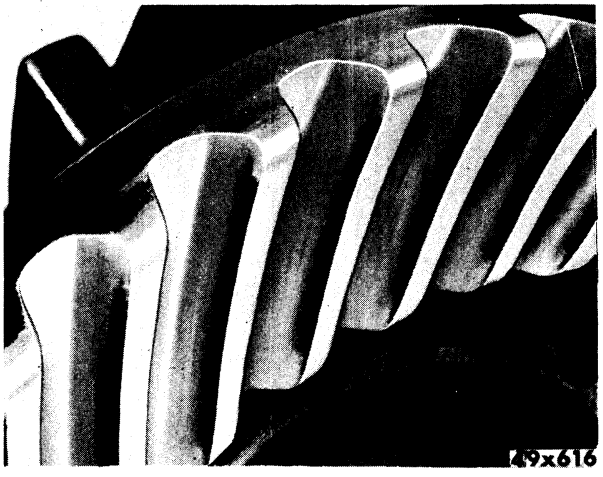


Fig. 48—Heavy Face Contact

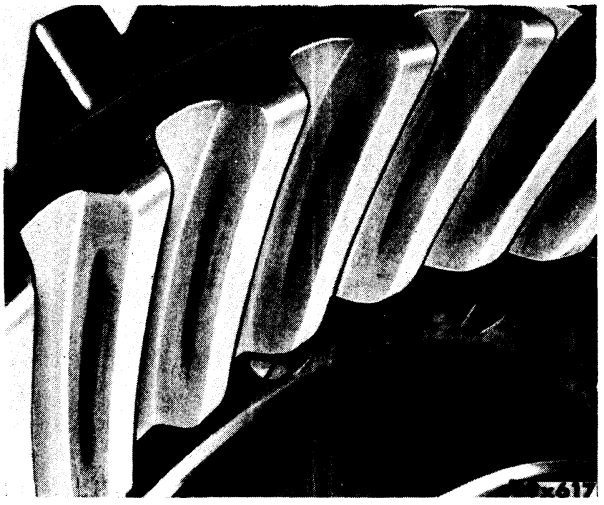


Fig. 49—Heavy Flank Contact

Figures 48 and 49 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 the tooth, narrow and high on the tooth face, as shown in Figure 49, 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 the center** of drive gear by installing a thicker washer behind pinion. Readjust backlash.

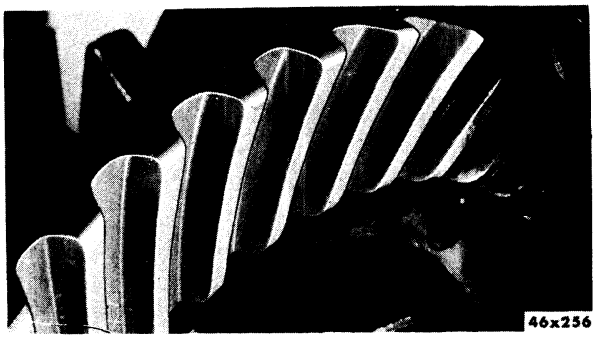


Fig. 50—Correct Gear Tooth Contact

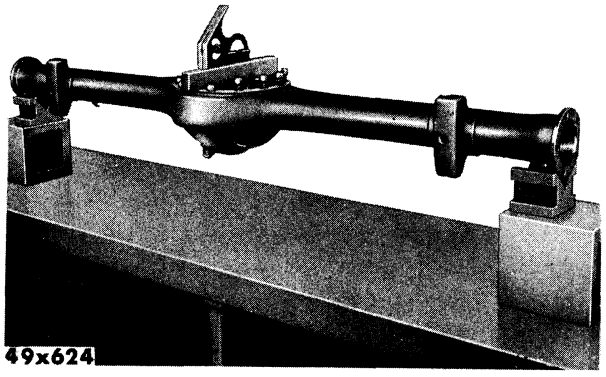


Fig. 51—Leveling Housing for Checking Alignment

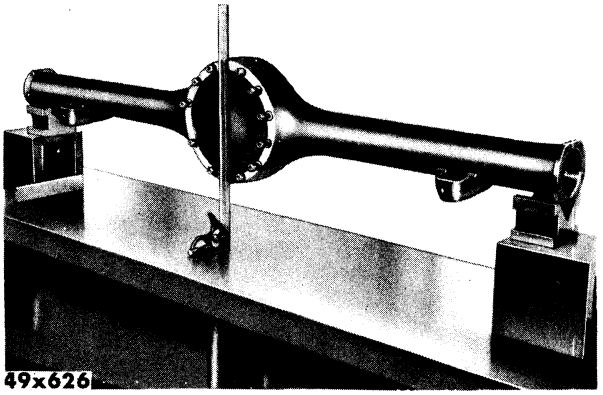


Fig. 53—Squaring Axle for Vertical Alignment

b. Heavy Flank Contact

If tooth marking is across the length of tooth, but narrow and low on the flank, as shown in Figure 49, 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.

20. INSTALLATION OF AXLE ASSEMBLY

Check carrier housing flange and flange face on differential housing for nicks and burrs.

Mount differential carrier to the axle housing, using a new gasket. Tighten the mounting nuts to 45 foot-pounds torque. Reinstall rear axle shaft, brake supports and check axle end play, as outlined in Paragraph 3. Connect brake tubes, bleed brakes, install rear wheels, and tighten rear axle shaft nuts to a minimum of 145 foot-pounds torque. Install new cotter key.

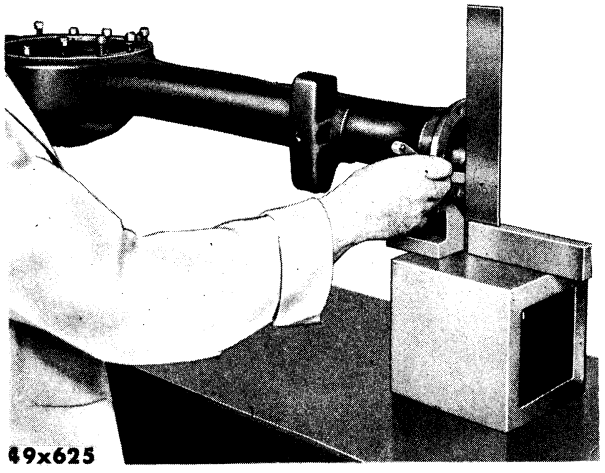


Fig. 52—Checking Horizontal Alignment

Reinstall propeller shaft and fill rear axle differential with correct viscosity Hypoid oil. Refer to Lubrication Section, of this manual.

21. 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 51. Place square against machined surface of housing end flange and surface plate, as shown in Figure 52. Amount of housing misalignment will be indicated by thickness of feeler gauge between

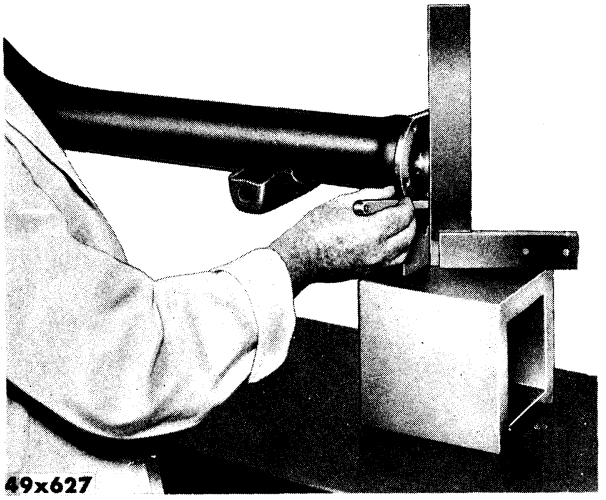


Fig. 54—Checking Vertical Alignment

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 53. Place a square against machined surface of housing end flange and surface plate, as shown in Figure 54. 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.

22. WELDING REAR AXLE HOUSING

Arc welding of complete rear axle assemblies to repair leaking housings, covers, loose or broken spring seats and brake line clips, has been common shop practice for some time. Recent investigations, however, have proven that arc welding should definitely NOT be used for repairing the rear axle housing, unless axle is completely disassembled.

It is possible for arcing electric current to jump the gap and damage roller bearings when there is end play. The damage is similar to brinelled bearing marks. It is further possible for damage to be done to the faces of the drive gear and pinion, as well as differential side gears and pinions, if conditions are just right for the existence of sufficient backlash gap on these parts to cause arcing.

Grounding of arc welding equipment is not effective in prevent damage. Instead of arc welding equipment, gas welding equipment should always be used on rear axle housing, unless the unit is completely disassembled.

SERVICE DIAGNOSIS

23. REAR WHEEL NOISE

a. Check keyways for possible damage. Reset drum and tighten nut to 145 foot-pounds minimum torque.

b. If keyways in hub and axle shaft show excessive wear, replace hub and axle shaft to correct this condition.

c. Tighten loose wheel hub bolts.

d. Check bearings for possible damage and replace if necessary. Refer to Lubrication Section for proper lubrication.

e. Check rear wheel bearings. If scored or show signs of wear, they should be replaced.

f. Defective or brinelled bearings must be replaced. Check rear axle shaft end play.

g. Readjust axle shaft end play to bring desired clearance of .003 to .008 inch.

24. NOISE IN REAR AXLE ASSEMBLY

a. Refer to Rear Axle Housing Alignment, Paragraph 21, in this section.

b. Replace bent or sprung axle shaft.

c. Refer to Pinion Bearing Pre-Load, Paragraph 14, in this section.

d. Refer to Backlash Adjustment, Paragraph 14, in this section.

e. Adjust pinion bearings, as outlined in Rear Axle Adjustment, Paragraph 14, in this section.

f. Tighten drive pinion flange nut.

g. Check axle shaft end play. Readjust to bring desired end play clearance of .003 to .008 inch.

h. Check lubricant. Replace scuffed gears. For correct tooth contact, refer to Paragraph 19, in this section.

25. REAR AXLE DRIVE SHAFT BREAKAGE

a. Replace broken shaft and readjust end play to desired clearance of .003 to .008 inch.

b. Replace broken shaft, after correcting Rear Axle Housing Alignment, as outlined in Paragraph 21, in this section.

c. Replace broken shaft. Avoid excessive weight in or on car.

d. Replace broken shaft after checking for other possible causes. Avoid erratic use of clutch.

e. Replace broken shaft. Refer to Clutch, Section IV, to correct this condition.

26. DIFFERENTIAL CASE BREAKAGE

a. Replace broken case and examine gears and bearings for possible damage. At reassembly, adjust differential bearings, as outlined in Rear Axle Adjustment, Paragraph 14, in this section.

b. Replace broken case and examine gears and bearings for possible damage. At reassembly, adjust drive gear and pinion backlash to required specification of .006 to .008 inch, as outlined in Rear Axle Adjustment, Paragraph 14, in this section.

c. Replace broken case and examine gears and bearings for possible damage. Avoid excessive weight in or on car.

Replace broken case. After checking for other possible causes, examine gears and bearings for possible damage. Avoid erratic use of clutch.

27. DIFFERENTIAL SIDE GEAR BROKEN AT HUB

a. Replace damaged gears. Examine other gears and bearings for possible damage. Check Rear Axle Housing Alignment, as outlined in Paragraph 21, in this section.

b. Replace damaged gears. Check axle shafts for alignment, and examine other gears for possible damage.

c. Replace damaged gears. Examine other gears and bearings for possible damage. Replace thrust washers that are badly worn. Side gear to thrust washer clearance should be from .004 to .012 inch.

28. SCORING OF DIFFERENT GEARS

a. Replace scored gears. Scoring marks on the pressure face of gear teeth, or in the bore are caused by instantaneous fusing of the mating surfaces. **Scored gears should be replaced.** Fill rear axle to required capacity with Extreme Pressure Hypoid Lubricant SAE 90 (winter and summer), or with SAE 80 below —10 degrees F.

b. Replace scored gears. Inspect all gears and bearings for possible damage. Clean out and refill axle with Extreme Pressure Hypoid Lubricant SAE 90 (winter and summer), or with SAE 80 below —10 degrees F.

c. Replace scored gears. Inspect all gears, pinion bores and shaft for scoring or bearings for possible damage.

d. Replace scored gears. Inspect all gears, bearings, pinion bores and shaft for scoring or possible damage. Avoid excessive weight in or on car.

29. TOOTH BREAKAGE (DRIVE GEAR AND PINION)

a. Replace gears. Examine other gears and bearings for possible damage. Replace parts as needed. Avoid excessive weight in car.

b. Replace gears, being careful to examine remaining parts for possible damage. Avoid erratic clutch operation.

c. Replace gears. Examine remaining parts for possible damage. Replace parts as required.

d. Replace gears. Examine other parts for possible damage. Drive gear and pinion backlash should be .006 to .008 inch. Refer to Gear Adjustment for Correct Tooth Contact, Paragraph 19, in this section.

30. REAR AXLE NOISE

Rear axle noises are generally divided into three groups:

(1) **Gear Noise on Pull** — If the noise is of a heavy pitch and increases as the car speed is increased, it is an indication of scored teeth due to loss of lubricant, incorrect mesh of teeth or wrong type of lubricant.

(2) **Gear Noise on Coast** — If the noise is heavy and irregular, it is an indication of scored teeth as a result of excessive end play in pinion bearings or by incorrect adjustments.

(3) **Bearing Noise on Pull or Coast** — This indicates bearings are chipped, cracked, scored, badly worn or loose, or the pinion is improperly positioned. Bearings, that are badly worn or broken, will make a gravelly, rough grating sound that may change slightly in volume as speed changes.

a. If an axle is noisy because of insufficient lubricant, it is too late to obtain any benefit by adding lubricant. The gears or bearings, or both, are likely to be damaged. Inspect all parts, replace damaged parts, and check axle and housing assembly for leaks.

b. Check drive gear and pinion tooth contact, as outlined in Gear Adjustment for Correct Tooth Contact, Paragraph 19, in this section.

c. Remove unmatched drive gear and pinion. Replace with a new matched gear and pinion set. Refer to Removal and Inspection of Differential Carrier Assembly, Paragraph 6, in this section.

d. Check teeth on drive gear and pinion for contact, as outlined in Gear Adjustment for Correct Tooth Contact, Paragraph 19, in this section. If necessary, replace with new matched set.

e. Adjust drive pinion bearings, as outlined in Rear Axle Adjustment, Paragraph 14, in this section.

f. Adjust differential bearings, as outlined in Rear Axle Adjustment, Paragraph 14, in this section.

g. Check drive gear for runout.

h. Tighten carrier housing nuts to required torque. Check for oil leaks.

31. LOSS OF LUBRICANT

a. Drain excess lubricant by removing filler plug, allowing lubricant to level at lower edge of filler plug hole.

b. Replace worn oil seals. Prepare new seals before installation.

c. Refer to Welding Rear Axle Housing, Paragraph 22, in this section.

d. Replace worn drive pinion oil seal. Prepare new oil seal before installation. See Paragraph 17.

e. Replace worn or scored companion flange and oil seal. Prepare new oil seal before installation.

32. OVER-HEATING OF UNIT

a. Refill rear axle, allowing lubricant to level at lower edge of filler plug hole.

b. Drain, flush and refill rear axle with Extreme Pressure Hypoid Lubricant SAE 90 (winter or summer), or with SAE 80 below —10 degrees F.

c. Readjust differential bearings to required pre-load.

d. Check gears for excessive wear or scoring. Replace as necessary.

e. Readjust drive gear and pinion backlash from .006 to .008 inch. Check gear for possible scoring.

NOTE

Oil seals may be destroyed by excessive heat. Replace cracked or hardened seals.