

SECTION E

43-44-45000 STANDARD DIFFERENTIAL

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DIVISION I SPECIFICATIONS AND ADJUSTMENTS

40-20 DIFFERENTIAL SPECIFICATIONS

a. Tightening Specifications

Use a reliable torque wrench to tighten the parts listed, to insure proper tightening without straining or distorting parts. These specifications are for clean and lightly lubricated threads only; dry or dirty threads produce increased friction which prevents accurate measurement of tightness.

Part	Location	Thread Size	Torque Lbs. Ft.
Nut	Rear Universal Joint to Pinion Flange.....	5/16-18	15
Bolt	Rear Axle Housing Cover to Carrier.....	5/16-18	30
Nut	Brake Assembly to Rear Axle Housing.....	3/8-24	35
Bolt	Ring Gear to Differential Case.....	7/16-20 L.H.	85
Bolt	Bearing Cap to Carrier.....	7/16-14	55
Nut	Rear Wheel to Axle Shaft.....	7/16-20	65
*Nut	Upper and Lower Control Arm.....	1/2-13	80
*Bolt	Upper and Lower Control Arm.....	1/2-13	110
Nut	Lower End of Shock Absorber to Lower Control Arm Axle Bracket.....	1/2-20	60

*Torquing of Nut or Bolt to be Optional.

b. General Specifications

Rear Axle Type.....	Semi-Floating Hypoid
Drive and Torque.....	Through 4 Arms
Rear Axle Oil Capacity.....	3 Pints
Ring and Pinion Gear Set Type.....	Hypoid
Differential Lubricant (Standard Axle).....	MPG SAE 80 or 80-90 (MIL-L-2105-B)

c. Limits for Fitting and Adjusting**Pinion Bearings Preload (Measured at pinion flange nut)**

New Bearings	20-25 Lb. inches rotating torque with new seal
Reused Bearings	10-15 Lb. inches rotating torque with new seal

Total Assembly Preload (Measured at pinion flange nut)

New Bearings	35-40 Lb. inches rotating torque with new seal, with ring gear
Reused Bearings	20-25 Lb. inches rotating torque with new seal, with ring gear
Ring Gear Position006"-.008", Backlash

40E-2

d. Differential Gear Ratios

Gear ratios are indicated by letters stamped on the bottom of the left axle tube. The production date is also indicated by a stamped number which represents the day of the year starting with "1" for January 1. See Figure 40-85.

e. Speedometer Gears

Speedometer gears must correspond with axle ratios and tire sizes in order to have correct speedometer and odometer readings.

The drive pinion is mounted in two tapered roller bearings which are preloaded by a collapsible spacer during assembly. The pinion is positioned by a shim located between a shoulder on the drive pinion and the rear bearing. The front bearing is held in place by a large nut. A baffle is located in the carrier ahead of the rear pinion bearing outer race. This baffle insures oil flow through the front pinion bearing.

The differential is supported in the carrier by two tapered roller side bearings. These are preloaded by inserting shims between the bearings and the carrier. The differential assembly is positioned for proper gear and pinion backlash by varying these shims. The ring gear is bolted to the case. The case houses two side gears in mesh with two pinions mounted on a pinion axle. The pinion axle is anchored in the case by a roll pin. The pinions and side gears are backed by thrust washers.

The axle shaft splines engage the differential side gears with a floating fit. The outer ends are supported in the axle housing by thrust type roller bearings. The bearings are lubricated by differential lube. The axle shaft oil seals are located outboard of the bearings on 43-44000. On 45000 the axle shaft oil seals are inboard of the bearing. The bearings are secured against shoulders on the shafts by press fit retainer rings. Retainer plates hold the bearings against shoulders in the housing. Wheel side thrust is taken at the wheel bearings, so an axle shaft may be removed simply by removing the bolts holding the retainer to the brake backing plate and axle housing flange. See Figure 40-88.

The differential carrier is a gray iron casting with tubular axle housings pressed into the sides to form a complete assembly. A removable, heavy steel cover is bolted on the rear of the carrier to permit service of the differential without removing the rear axle from the car. A seal in the front of the carrier runs on the pinion flange. See Figures 40-86 and 40-87.

Brackets welded to the tubular axle housings and upper brackets integral with main carrier casting, form means of attaching the rear axle to the frame. An oil feed passage to the pinion bearings and an oil return hole are provided in the carrier casting to allow lubricant to circulate.

The rear axle filler plug which is magnetic, is located on the right side of the carrier casting just ahead of and below the axle housing.

The rear brake drum is mounted directly against the axle flange on hub studs pressed through the back of the axle flange.

DIVISION II**DESCRIPTION AND OPERATION****40-21 DESCRIPTION AND OPERATION OF STANDARD DIFFERENTIAL**

The rear axle assembly is of the semi-floating type in which the car weight is carried on the axle shafts through bearings enclosed in the outer axle housing tubes. The rear axle is designed for use with an open drive line and coil springs. Drive from the axle housing is transmitted to frame members through two lower and two upper control arms. Large rubber bushings at either end of these control arms are designed to absorb vibration and noise. The upper control arms are angle mounted to also hold the frame in sidewise alignment with the rear axle assembly. The final drive has a hypoid type ring gear and pinion with the centerline of the pinion below the centerline of the ring gear. See Figures 40-86 and 40-87.

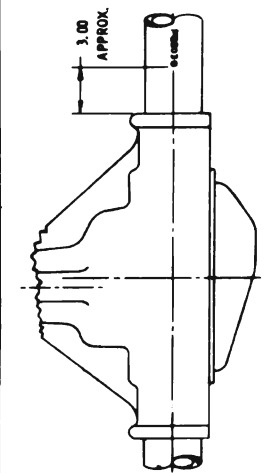
DIVISION III**SERVICE PROCEDURES****40-22 REMOVAL AND INSTALLATION OF DIFFERENTIAL ASSEMBLY**

It is not necessary to remove the rear axle assembly for any normal repairs. However, if the housing is damaged, the rear axle assembly may be removed and installed using the following procedure.

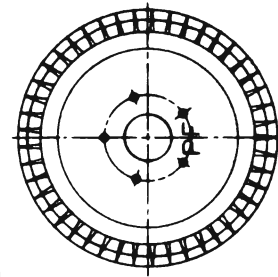
MODELS	ENGINE	TRANSMISSION	AXLE ASSEMBLY RATIO USAGE																
			STANDARD				ECONOMY				PERFORMANCE				SPECIAL CAR ORDER - POSITIVE TRACTION				
			RATIO	REGULAR	CODE	POSITIVE TRACTION	RATIO	REGULAR	CODE	POSITIVE TRACTION	RATIO	REGULAR	CODE	POSITIVE TRACTION	RATIO	NO. "1"	CODE	NO. "2"	CODE
43327-49 43337-49	250 I-4	3-SPEED MANUAL THM 300	3.23	1397284	LC	1397289	LP												
43327-49 43337-49 43371-49 44037-41-39-49	300 V-8	3-SPEED MANUAL THM 350 2 BBL. THM 350 4 BBL.	2.93	1397283	LB	1397288	LW												
43437-36	300 V-8	THM 350	3.23	1397284	LC	1397289	LP												
44037-47	405 V-8	2 & 4 - SPEED MANUAL THM 400	3.42	1397285	OH	1397290	OO												
44037-39-49 44037-49-41-49	300 V-8	3-SPEED MANUAL THM 350	3.23	1397284	LC	1397289	LP												
44037-46	405 V-8	2-SPEED MANUAL THM 400	2.78	1397281	PA	1397412	PT												
44037-39-49 44037-39-41-49	405 V-8	3-SPEED MANUAL THM 400	2.78	1397283	PL	1397287	PO												
44087			2.56	1397302	PB	1397305	PN												
44087-6.5.			2.78	1397402	PH	1397403	PS												
			3.42			1397315	PY												

FOR FIELD IDENTIFICATION, ALL AXLE ASSEMBLIES TO BE STAMPED WITH LETTERS 3/16" HIGH ON BOTTOM OF AXLE TUBE AS INDICATED FROM CHART. SAMPLE MARKING FOR 3.07 RATIO, DATE JULY 22, 1947 IN THE YEAR MFG'D) WOULD BE STANDARD AXLES PG 203, POSITIVE TRACTION AXLES PV 203.

ASSEMBLY PLANT IDENTIFICATION INFO. AXLE CODE LETTERS 1.5 INCHES HIGH STAMPED IN YELLOW INK ON LEFT BRAKE DRUM IN AREA OF WHEEL BOLTS.



GEAR RATIOS	STANDARD AXLES	COLOR CODE	POSITIVE TRACTION AXLES
2.56	SILVER		SILVER
2.78	PINK		PINK & ORANGE
2.93	BLACK		BLACK & ORANGE
3.07	DARK BLUE		DARK BLUE & ORANGE
3.23	WHITE		WHITE & ORANGE
3.42	BROWN		BROWN & ORANGE
3.64	BROWN		BROWN & ORANGE
3.91	PURPLE		PURPLE & ORANGE



40-120D

Figure 40-85 - Differential Identification

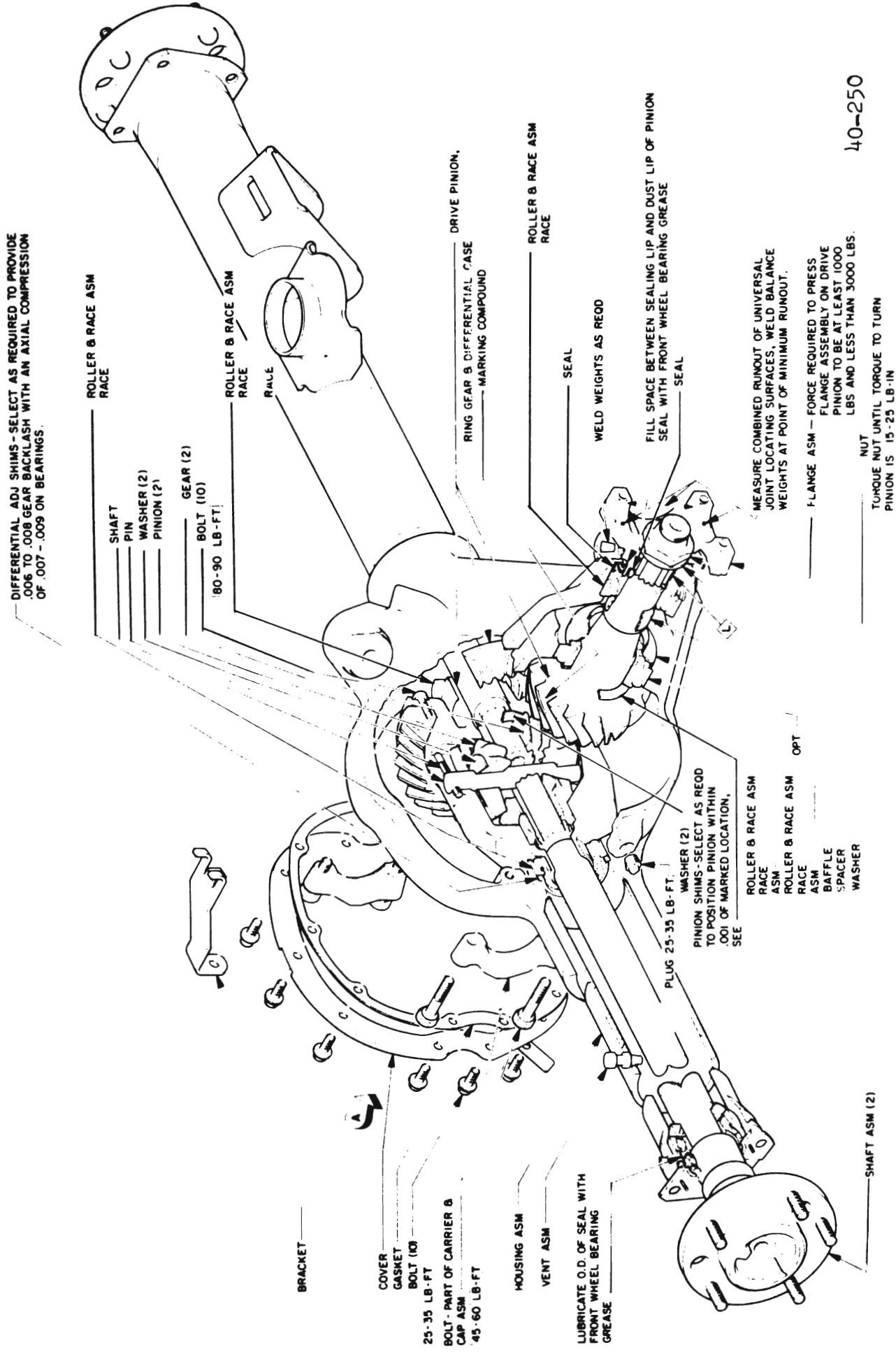


Figure 40-86 · 43-44000 Differential Assembly

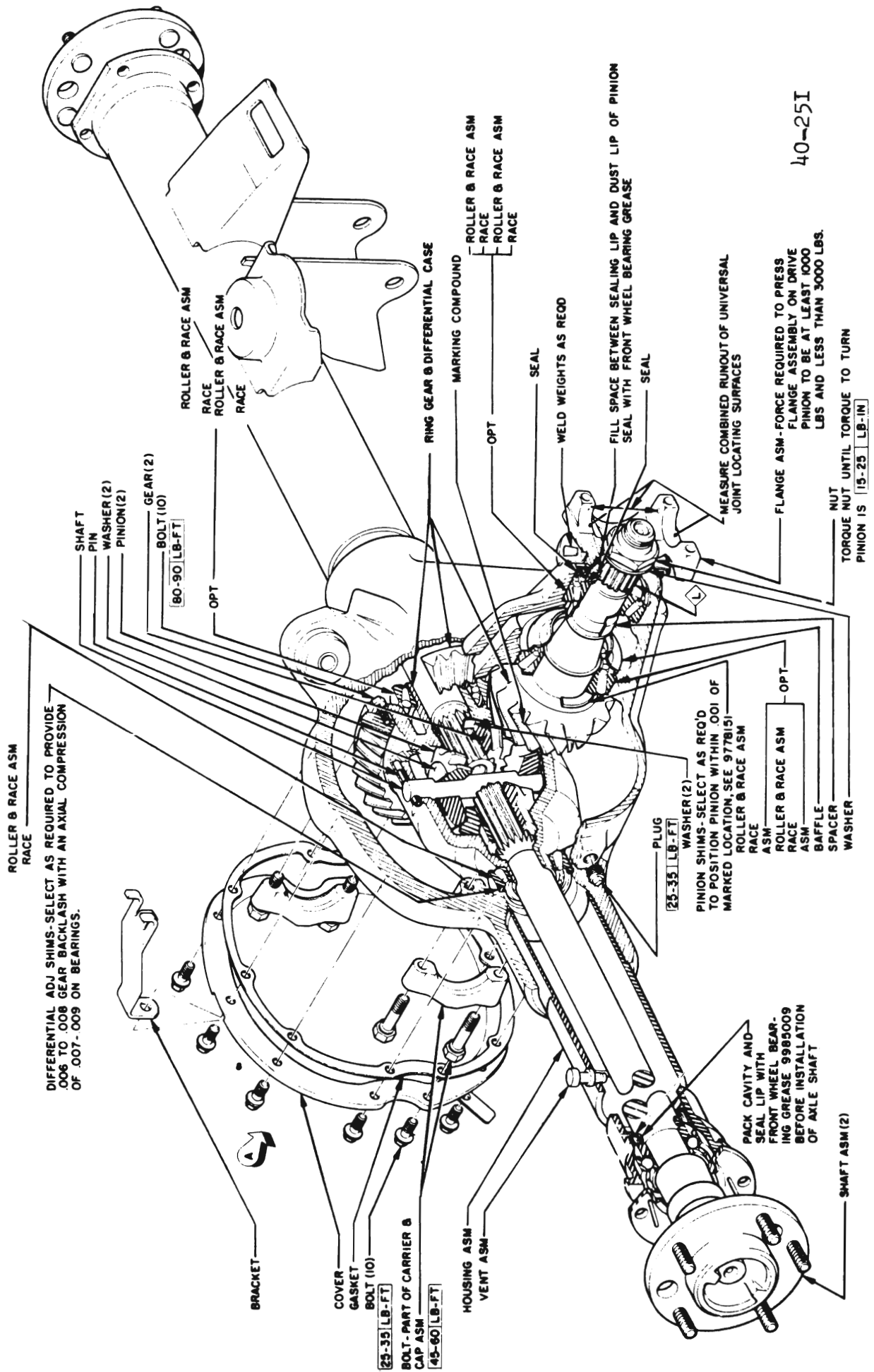


Figure 40-87 - 45000 Differential Assembly

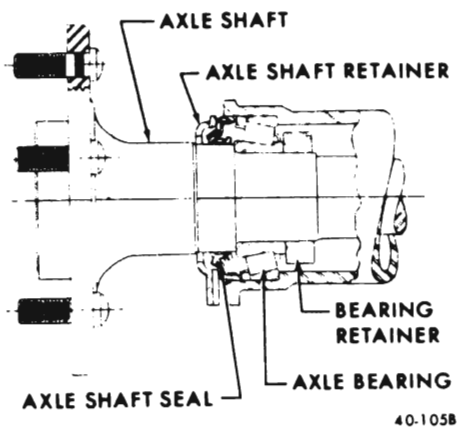


Figure 40-88 - Rear Axle Shaft, Bearing and Seal (43-44000)

a. Removal of Rear Axle Assembly

1. Raise rear of car high enough to permit working underneath. Place a floor jack under center of axle housing so it just starts to raise rear axle assembly. Place jack stands solidly under frame members on both sides.
2. Mark rear universal joint and pinion flange for proper reassembly then disconnect rear universal joint from pinion flange by removing two U-bolts. Remove propeller shaft assembly.
3. Disconnect parking brake cables by removing adjusting nuts at equalizer. Slide center cable rearward and disconnect two rear cables at connectors to free from body.
4. Disconnect rear brake hose at floor pan. Cover brake hose and pipe openings to prevent entrance of dirt.
5. Disconnect shock absorbers at lower end and push shock absorbers up out of the way. Lower jack under housing until rear springs can be removed.
6. Disconnect upper control arms at axle ends.
7. Disconnect lower control arms at axle housing and roll assembly out from under car.

b. Installation of Rear Axle Assembly

NOTE: Fasteners in subparagraph 6 are important attaching parts in that they could affect the performance of vital components and systems, and/or could result in major repair expense. They must be replaced with one of the same part number or with an equivalent part if replacement becomes necessary. Do not use a replacement part or lesser quality or substitute design. Torque values must be used as specified during reassembly to assure proper retention of these parts.

1. Connect lower control arms to housing.

NOTE: Control arm bushing bolts and shock absorbers to be tightened with suspension in normal load position.

2. Connect upper control arms to housing.
3. Place rear springs in position and jack axle housing upward until shock absorbers will reach.
4. Connect shock absorbers, lower control arm bolts and upper control arm bolts. Tighten to specified torque.
5. Connect and adjust parking brake cable.
6. Connect rear universal joint to pinion flange aligning marks previously made. Tighten nuts evenly to 12 lb. ft.
7. Connect rear brake hose at floor pan. Bleed both rear brakes and refill master cylinder.
8. Fill rear axle with specified gear lubricant.

CAUTION: U-bolt nuts must be torqued as specified as over-tightening will distort bearings and cause early failure.

40-23 REMOVAL AND INSTALLATION OF AXLE SHAFT, WHEEL BEARING OR OIL SEAL

Most rear axle service repairs can be made with the rear axle assembly in the car by raising the rear end of the car with the rear axle hanging on the shock absorbers.

Rear axle lubricant may be drained by backing-out all cover bolts and breaking cover loose at the bottom.

a. Remove Axle Shaft Assemblies 43-44000 Series

Design allows for maximum axle shaft end play of .018". This end play can be checked with the wheel and brake drum removed by measuring the difference between the end of the housing and the axle shaft flange while moving the axle shaft in and out by hand.

End play over .018" is excessive. Compensating for all of the end play by inserting a shim inboard of the bearing in the housing is not recommended since it ignores the end play of the bearing itself, and may result in improper seating of the backing plate against the axle tube flange. If the end play is excessive, the axle shaft and bearing assembly should be removed and the cause of the excessive end play determined and corrected.

1. Remove wheels. Both right and left wheels have right hand threads.
2. Remove brake drums.

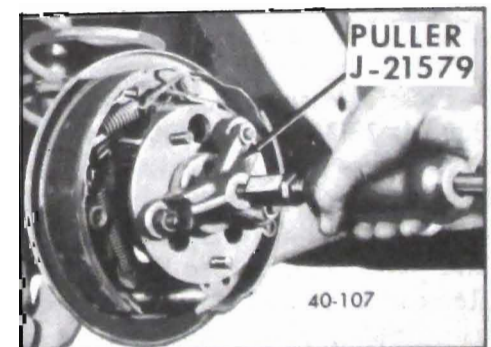


Figure 40-89 - Removing Rear Axle Shaft

3. Remove nuts holding retainer plates to brake backing plates. Pull retainers clear of bolts and reinstall two opposite nuts finger tight to hold brake backing plate in position.

4. Pull out axle shaft assemblies using Puller J- 21579 with a slide hammer. See Figure 40-89.

b. Remove and Install Axle Shaft Bearing (43-44-45000) and/or Seal (43-44000)

The rear wheel bearing and bearing retainer ring both have a heavy press fit on the axle shaft. Because of this fit they should be removed or installed separately. Both the retainer ring and the bearing must be removed to replace the seal.

1. Position and tighten axle shaft in vise so that the retainer ring rests on vise jaws. Use a heavy chisel and hammer to crack ring. See Figure 40-90.

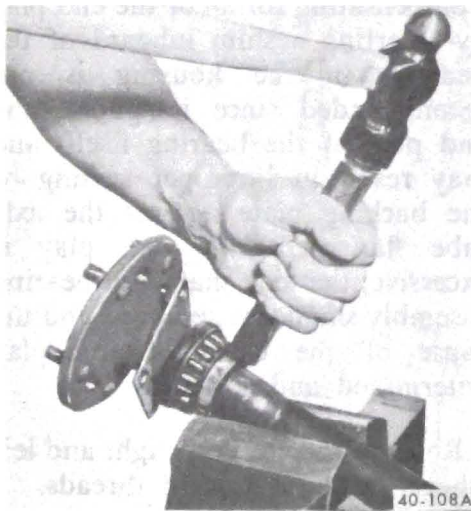


Figure 40-90 - Removing Axle Shaft Bearing Retainer

2. Press axle shaft bearing off using Plate J- 23133 for 43-44000 Cars. An arbor press may be used or a set-up may be made using Ram and Yoke Assembly with Adapter J-6525-01 and puller J-21579. See Figure 40-91. Remove LeSabre axle shaft bearings using puller plate J-8621.

3. Remove axle shaft seal if necessary and install new seal. Insure

against damaging the seal lip.

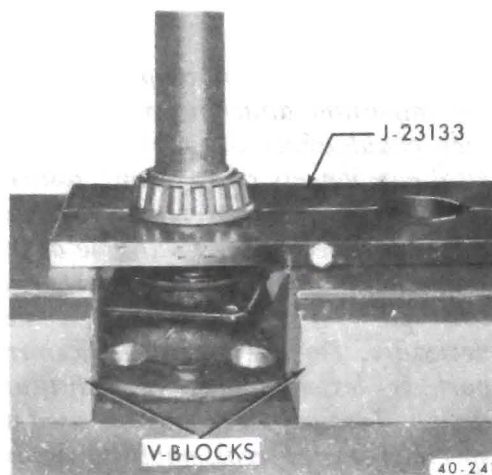


Figure 40-91 Removing Axle Shaft Bearing (43-44000)

NOTE: 1970 43-44000 axle shaft assemblies and axle shaft seals are not interchangeable with previous years cars.

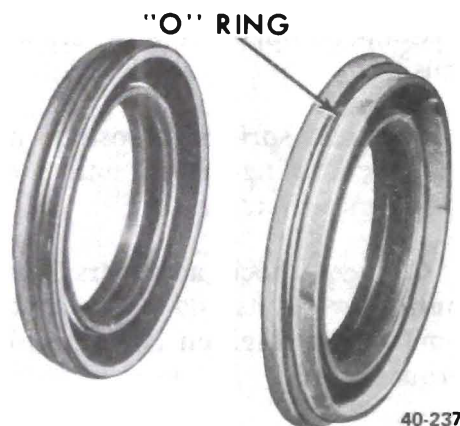


Figure 40-92 - 1970 43-44000 Axle Shaft Seals

NOTE: Retainer plate which retains axle shaft in housing must be installed on axle shaft before seal and bearing are installed.

4. Press new bearing against shoulder on axle shaft using Installer J-21022 for 43-44000.

Use Installer J-8609 for pressing on LeSabre axle shaft bearings.

5. Press new retainer ring against bearing using Installer J-21022 for 43-44000 and Installer J-8609 for LeSabre.

c. Remove and Install Axle Shaft Seal 45000

1. Insert axle shaft so that splined end is just through seal.

2. Using axle shaft as a lever push down on shaft until seal is pried from housing. Remover J-8119 or J-6199 can also be used.

3. Apply sealer to O.D. of new seal.

4. Position seal over Installer J-21129 and drive seal straight into axle housing until fully seated.

5. Pack cavity of seal lip with front wheel bearing grease before installing axle shaft.

d. Remove and Install Rear Wheel Bolt

1. To remove and install a rear wheel bolt, axle shaft assembly must be out of car. Remove rear wheel bolt by pressing from axle flange.

2. Install new rear wheel bolt by pressing through axle flange. Check new bolt for looseness; if bolt is loose, axle shaft must be replaced.

e. Install Axle Shaft Assembly

Rear axle shafts are interchangeable between sides.

1. Apply a light coat of wheel bearing grease in wheel bearing and seal recess of housing. On LeSabres install new outer retainer plate gasket over retainer bolts.

2. Apply gear lubricant to the splines at the inner end of the axle shaft. Apply a coat of wheel bearing grease on the seal surface of the shaft. Install axle shaft. On LeSabres use care to avoid cutting seal lip. Drive shaft into position.

NOTE: If the axle to be installed is a positive traction axle, ONLY POSITIVE TRACTION LUBRICANT SHOULD BE USED.

NOTE: Fasteners in steps 3 and 4 are important attaching parts in that they

could affect the performance of vital components and systems, and/or could result in major repair expense. It must be replaced with one of the same part number or with an equivalent part if replacement becomes necessary. Do not use a replacement part or lesser quality or substitute design. Torque values must be used as specified during reassembly to assure proper retention of this part.

3. Install retainer nuts and torque to 35 lb. ft.

4. Install drum and wheel. Torque lug nuts to 65 lb. ft.

40-24 REMOVAL AND DISASSEMBLY OF DIFFERENTIAL CASE ASSEMBLY

a. Removal of Differential Case Assembly - Differential in Car

1. Raise rear of car and support securely under rear of frame.

2. Loosen parking brake cables so that brake is not applied when axle assembly is lowered.

3. Mark rear universal joint and pinion flange for proper alignment at reassembly. Disconnect rear universal joint by removing two U-bolts. Remove propeller shaft assembly.

4. Lower differential assembly just far enough to clear lower portion of fuel tank.

NOTE: The following steps also apply when making repairs with differential assembly removed from car.

5. Remove bolts securing cover to housing to drain lubricant.

6. While lubricant is draining, remove rear wheels and drums.

7. Remove rear axle shafts as described in paragraph 40-23.

NOTE: Before proceeding with following steps, it is advisable to check the

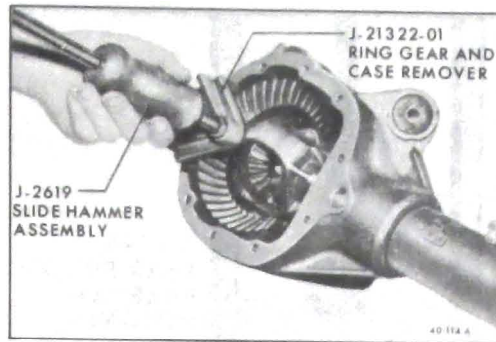


Figure 40-93 Removing Differential Case Assembly

existing ring gear to pinion backlash as described in paragraph 40-25, subparagraph f. This will indicate gear or bearing wear or an error in backlash or preload setting which will help in determining cause of axle noise. Backlash should be recorded so that if same gears are reused, they may be reinstalled at original lash to avoid changing gear tooth contact.

8. Mark side bearing caps for proper installation at reassembly. Remove bolts holding differential side bearing caps to housing.

9. Remove two ring gear retaining bolts from differential case and install Ring Gear and Case Remover J-21322 with slide hammer as shown in Figure 40-93. Remove case assembly and place right and left bearing outer races and shims in sets with marked bearing caps so that they can be reinstalled in their original positions.

CAUTION: Do not allow case assembly to drop as this may cause injury or damage parts.

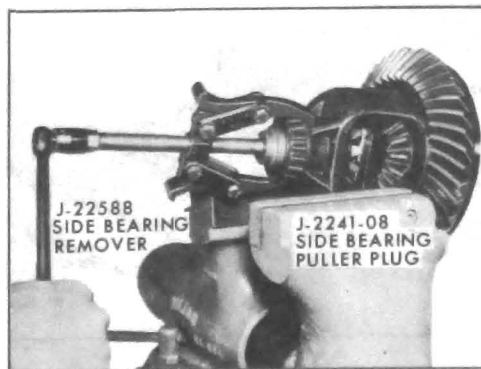


Figure 40-94 - Removing Differential Side Bearings

b. Disassemble Differential Case Assembly

1. If differential side bearings are to be replaced, insert Remover Adapter J-2214-8 in center hole and pull bearing using Puller J-22588. See Figure 40-94.

2. Remove roll pin that retains differential pinion shaft. See Figure 40-95. Remove differential pinions, side gears and thrust washers from case.

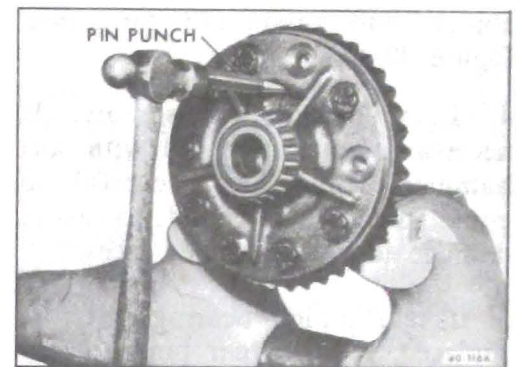


Figure 40-95 - Removing Pinion Shaft Roll Pin

3. If ring gear is to be replaced and it is tight on case after removing bolts, tap it off using a soft hammer; do not pry between ring gear and case.

c. Removal of Pinion and Bearings

1. Check pinion bearing preload as described in paragraph 40-25, subparagraph c.

If there is no preload reading, check for looseness of pinion assembly by shaking. Looseness indicates need for bearing replacement. If assembly is run long with very loose bearings, ring and pinion will also require replacement.

2. Install Holder J-8614-01 on flange by using two 5/16-18x2" bolts with flat washers. Remove pinion nut and washer. See Figure 40-96.

3. Pull pinion flange from pinion using Puller J-8614-02 in Holder J-8614-01. To install puller, back out puller screw, insert puller through

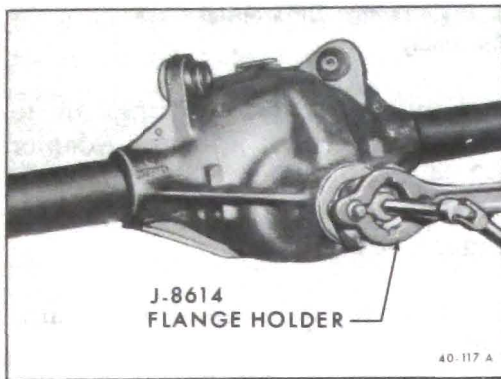


Figure 40-96 - Removing Pinion Nut

holder, and rotate 1/8 turn. See Figure 40-97.

4. Remove pinion assembly. If necessary, tap pinion out with soft hammer, while being careful to guide pinion with hand to avoid damage to bearing outer races.

5. If rear pinion bearing is to be replaced, remove rear pinion bearing from pinion shaft using Remover J-9746 with Holder J-6407. See Figure 40-98.

6. Pry pinion oil seal from carrier and remove front pinion bearing. If this bearing is to be replaced, drive outer race from carrier using a brass drift.

7. If rear pinion bearing is to be replaced, drive outer race from carrier using a brass drift in slots provided for this purpose.

NOTE: As the rear pinion bearing

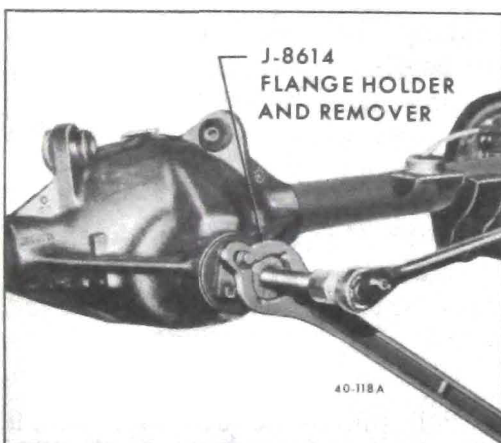


Figure 40-97 - Removing Pinion Flange

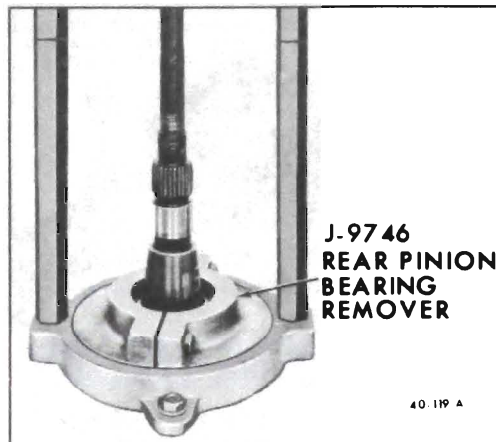


Figure 40-98 - Removing Rear Pinion Bearing

outer race is being removed, the baffle will become damaged and require replacement during assembly.

40-25 ASSEMBLY AND INSTALLATION OF DIFFERENTIAL CASE ASSEMBLY

Before installation of any parts, examine the wearing surfaces of all parts for scoring or unusual wear. Make certain that the interior of the carrier housing is absolutely clean and dry. Also make certain that the parts to be assembled are absolutely clean and that there are no burred edges. Lubricate all parts with the specified rear axle lubricant just before assembly.

NOTE: If the Buick is equipped with a Positive Traction Differential, only Positive Traction Lube should be used.

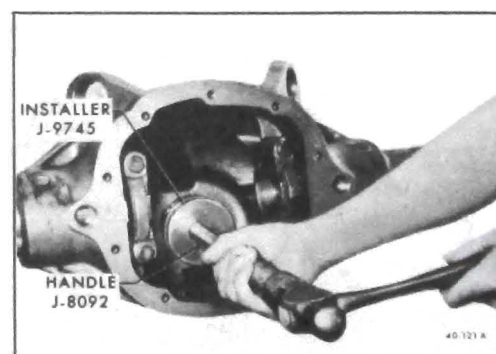


Figure 40-99 - Installing Rear Pinion Bearing Outer Race

NOTE: If the ring gear and pinion are changed, only factory hypoid lubricant should be used for filling because of its special anti-scoring properties. For this reason the proper lubricant is included in the carton with the replacement gears as received.

a. Install Pinion Bearing Outer Races in Carrier

1. If rear pinion bearing is to be replaced, install a new baffle and new outer race using Installer J-9745 with Driver Handle J-8092. See Figure 40-99.

2. If front pinion bearing is to be replaced, install new outer race using Installer J-7817 with Driver Handle J-8092. See Figure 40-100.

b. Set Pinion Depth

Ring and pinion gear sets are matched in a special test machine which permits adjustment of pinion depth in ring gear until a point is reached where best operation and proper tooth contact under load is obtained. At this point, the setting of the pinion with reference to the centerline of the ring gear is indicated by the machine. This setting may vary slightly from the design or "nominal" setting due to allowable variation in machining the parts. However, most production pinions and all pinions used for service replacement are zero or nominal pinions.

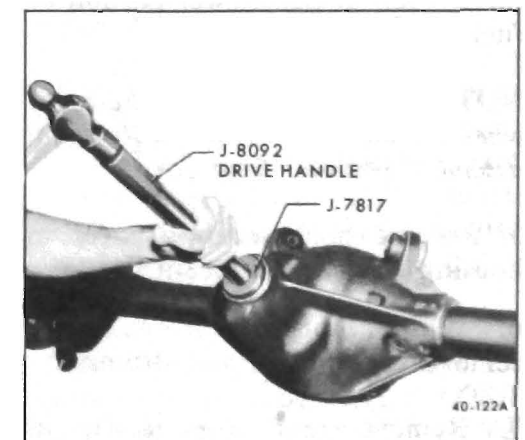


Figure 40-100 - Installing Front Pinion Bearing Outer Race

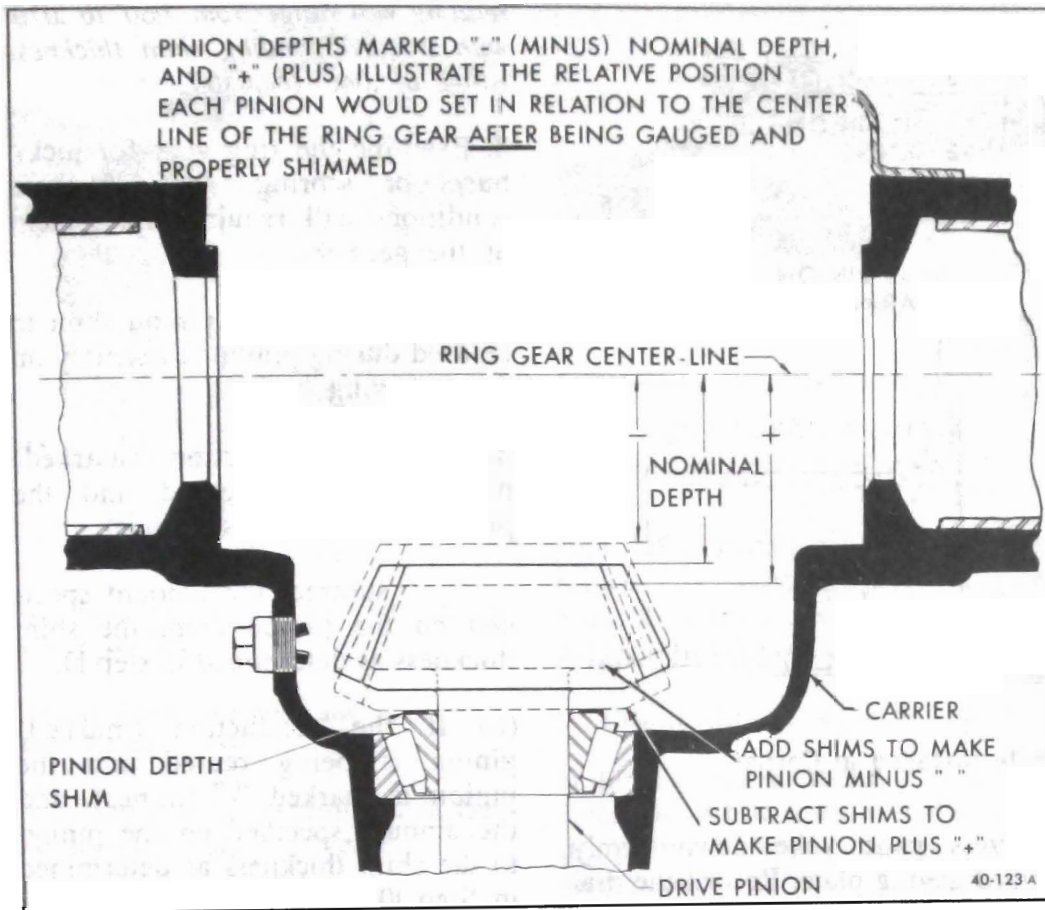


Figure 40-101 - Nominal Pinion Setting Depth

If during repair, a pinion is found having a plus or minus reading recorded in thousandths on the rear face of the pinion, this indicates that the pinion during testing was found to have best tooth contact as a position varying from design or nominal depth.

In order to compensate for all of the allowable machining variables, a procedure of gaging the carrier and shimming the pinion has been developed. After gaging a carrier, the assembler is able to install a shim between the front face of the pinion and its bearing so that pinion depth can be adjusted to an exact required specification for best tooth contact in each axle assembly.

Pinion depth is set with Pinion Setting Gauge J-5647 which consists of the following: (1) master gage, (1) indicator gage with dial indicator (1) J-5647-41 Disc (L), (1) J-8619-10 Disc (R), (1) J-5647-44 Gage Plate, J-8619-12 Pilot and Nut with J-8619-13 Stud. See Figure 40-102. Although production pinions are marked, neither

production nor service pinions have a gaging tooth. The pinion setting gage provides in effect a nominal or zero pinion as a reference.

Set up pinion setting gage as follows:

1. Be certain that all parts of pinion setting gage are clean.

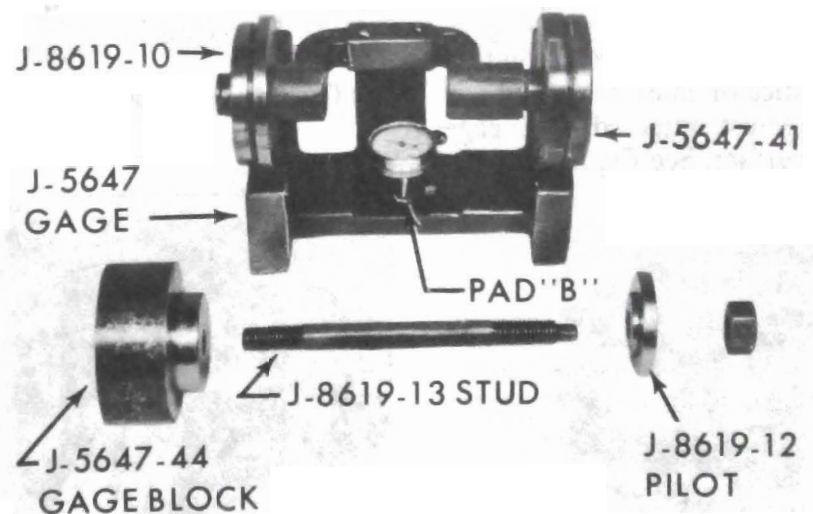
2. Lubricate front and rear pinion bearings which will be used in final reassembly and position them in their respective races in the carrier. Thread Stud J-8619-13 into Gage Plate J-5647-44. With bearings held in place in races, install gage plate and stud assembly on rear pinion bearing inner race. Install Pilot J-8619-12 on front pinion bearing with small diameter on raised portion of bearing race. See Figure 40-103.

3. Install nut on Stud J-8619-13. Hold stud stationary with wrench positioned on flats on end of stud; tighten nut until a reading of 20 pound inches is obtained when rotating gage plate assembly with a pound inch torque wrench.

4. Install Discs J-5647-41 (L) and J-8619-10 (R) on the indicator gage. Install the small ball-tipped contact button on the stem of the dial indicator and mount the dial indicator on the indicator gage. See Figure 40-102.

5. Place the indicator gage on the master gage, as shown in Figure 40-104 so that its spring loaded center is engaged in the centering hole for Pad "B" on the Master Gage.

6. Center the dial indicator contact button on the contact pad and lock



40-124B

Figure 40-102 - Pinion Setting Gauge

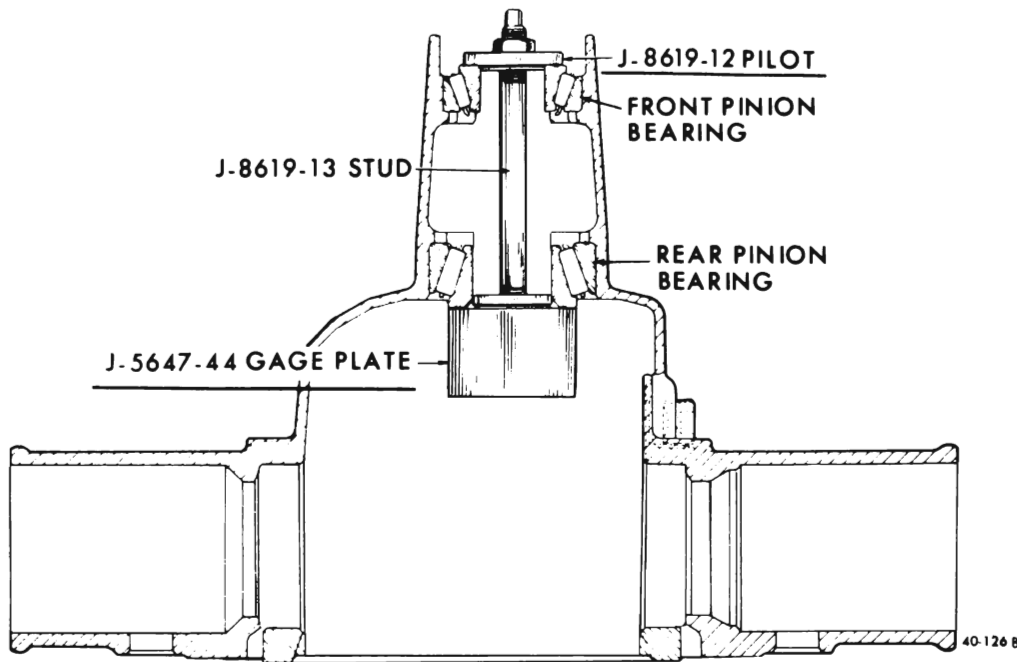


Figure 40-103 - Pinion Gage Plate Installed in Carrier

the dial indicator by tightening the thumb screw.

7. Hold gage yoke down firmly, with large diameter portion of each disc contacting both the horizontal and vertical pads on master gage; set dial indicator at zero.

8. Be certain differential bearing support bores are free of dirt and burrs. Install indicator gage in carrier so that small diameter portion of discs rest in differential bearing pedestal support bores. Spring-loaded center of gage must be located in centering hole of gage plate, and ball-tipped contact button of dial indicator must be positioned to bear against outer edge of gage plate top surface. See Figure 40-105.

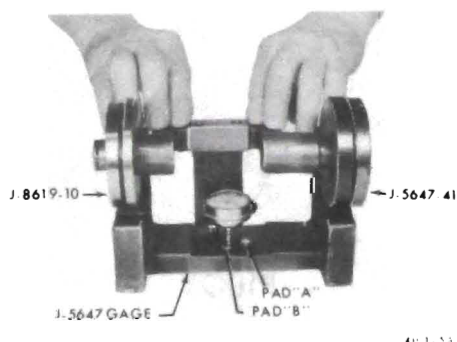


Figure 40-104 - Zeroing Pinion Setting Gage

9. Press gage yoke down firmly toward gaging plate. Record the dial indicator reading. Remove indicator gage and recheck "zero setting" on master gage to make sure this setting was not disturbed by handling.

10. If zero setting is still correct, remove gaging set-up and both bearings from the carrier. Then subtract reading recorded in previous step from .100. For example, a typical reading of .070" should be subtracted from .100 this answer (.30) indicates the thickness of the shims to be selected as further qualified in Step 12 following.

NOTE: An average dial indicator

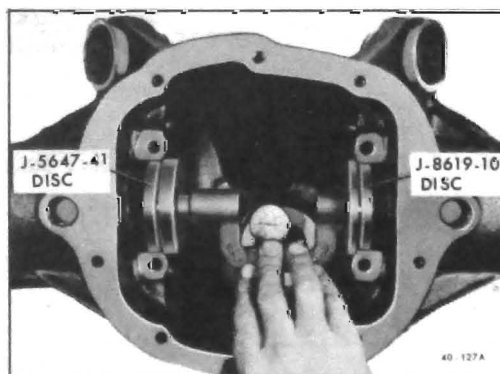


Figure 40-105 - Checking Pinion Depth

reading will range from .060" to .070" with a corresponding shim thickness range of .040" to .030".

11. Examine the ring gear for nicks, burrs or scoring. Any of these conditions will require replacement of the gear set.

12. Select the correct pinion shim to be used during pinion reassembly on the following basis:

(a) If the production (marked) pinion is being reused and the pinion is marked "+" (plus),

subtract the amount specified on the pinion from the shim thickness as determined in step 10.

(b) If the production (marked) pinion is being reused and the pinion is marked "-" (minus), add the amount specified on the pinion to the shim thickness as determined in Step 10.

(c) If a service pinion is being used (no marking), shim pinion using shim thickness directly as determined in Step 10.

NOTE: Frequently production pinions are nominal or zero pinions (no marking). When reusing a nominal production pinion, shim as with service pinion using shim thickness directly as determined in Step 10.

13. Position correct shim on pinion shaft and install rear pinion bearing.

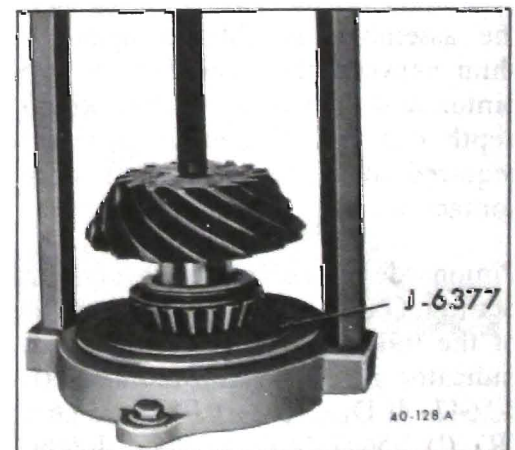


Figure 40-106 - Installing Rear Pinion Bearing

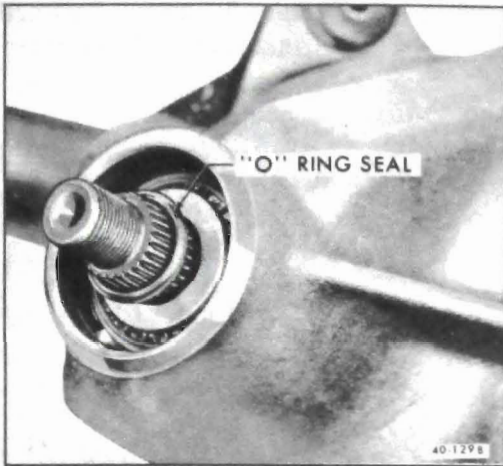


Figure 40-107 - Installing Pinion 'O' Ring

Use Installer J-6377 as shown in Figure 40-106.

c. Install Pinion Assembly and Adjust Pinion Preload

1. Position pinion assembly in carrier and install collapsible spacer.
2. Place front pinion bearing in position on pinion. Hold pinion fully forward and drive bearing over pinion until seated. Use Installer J-21128.
3. Install "O" ring on pinion in spline undercut. See Figure 40-107.
4. Install pinion oil seal in carrier. Coat O.D. of seal with sealing compound. Install seal by using Installer J-21128. See Figure 40-108.
5. Coat lips of pinion oil seal and seal surface of pinion flange with



Figure 40-108 - Installing Pinion Oil Seal

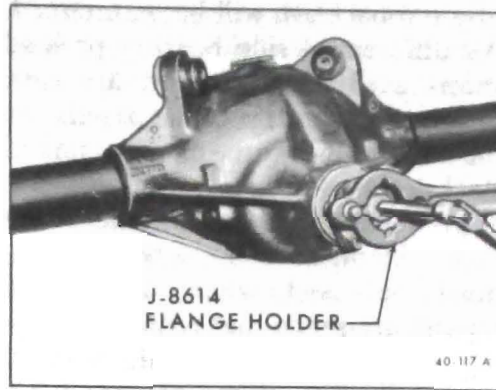


Figure 40-109 - Installing Pinion Nut

gear lube. Install pinion flange on pinion by tapping with a soft hammer until a few pinion threads project through flange.

6. Install pinion washer and nut.

Hold companion flange with Holder J-8614-01. While intermittently rotating pinion to seat bearings, tighten pinion nut until end play begins to be taken up. See Figure 40-109.

NOTE: When no further end play is detectable, and when Holder J-8614 will no longer pivot freely as pinion is rotated preload specifications are being neared. Further tightening should be done only after preload has been checked.

7. Check preload by using a pound inch torque wrench as shown in Figure 40-110.

NOTE: After preload has been checked, final tightening should be



Figure 40-110 - Checking Pinion Preload

done very cautiously. For example, if when checking, preload was found to be 5 pound inches, additional tightening of the pinion nut as little as 1/8 turn can add 5 additional pound inches drag. Therefore, the pinion nut should be further tightened only a little at a time and preload should be checked after each slight amount of tightening. Exceeding preload specifications will compress the collapsible spacer too far and requires its replacement.

8. While observing the preceding caution, carefully set preload drag at 20-25 lb. in. on new bearings or 10-15 lb. in. on reused bearings.

9. Rotate pinion several times to assure that bearings have been seated. Check preload again. If drag has been reduced by rotating pinion, re-set preload to specification.

d. Assemble Differential Case Assembly

Before assembling the differential, examine the wearing surfaces of all parts for scoring or unusual wear. Also make certain that all parts are absolutely clean. Lubricate parts with rear axle lubricant just before assembly.

1. Place side gear thrust washers over side gear hubs and install side gears in case. If same parts are reused, replace in original sides.

2. Install the two pinion gears and

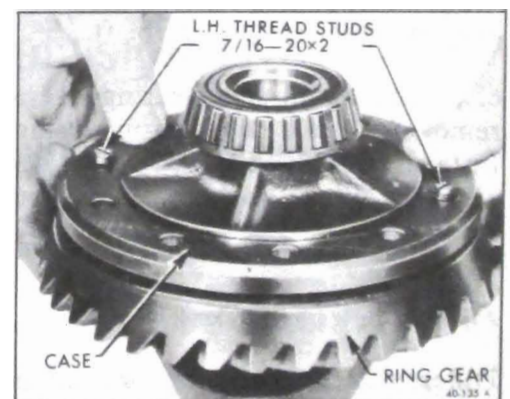


Figure 40-111 - Installing Ring Gear On Differential Case



Figure 40-112 - Installing Differential Side Bearings

washers, through the two big windows in the case, into mesh with the side gears making sure the pinion gear bores are 180° apart.

3. Rotate the side and pinion gears as on assembly until the pinion gear bores are in alignment with the pinion shaft bores in the case.

4. Install pinion shaft and roll pin.

5. After making certain that mating surfaces of case and ring gear are clean and free of burrs, thread two 7/16x20x2 (LH) studs into opposite sides of ring gear, then install ring gear on case. See Figure 40-111. Install ring gear attaching bolts just snug. Torque bolts alternately in progressive stages to 85 lb. ft.

6. If differential side bearings were removed, install new bearings using Installer J-22771 (L) and J-22761 (R) with Driver Handle J-8092. See Figure 40-112.

e. Install Differential Case and Adjust Side Bearing Preload

Differential side bearing preload is adjusted by changing the thickness of both the right and left shims by an equal amount. By changing the thickness of both shims equally, the

original backlash will be maintained. All differential side bearing preload shims used in production are cast. Shims used during service repairs of the differential are of a stamped steel design and are used along with a production type, .140" thick, cast shim. Stamped steel service shims must be used when differential repairs are made that require changing side bearing preload. Service, steel, adjusting shims are available in thicknesses ranging from .040" to .082" in increments of .002".

1. Before installation of case assembly, make sure that side bearing surfaces in carrier are clean and free of burrs. Side bearings must be oiled with gear lube and if same bearings are being reused, they must have original outer races in place.

2. Place differential case and bearing assembly in position in carrier. Use service type adjusting shim totaling same thickness as original production type adjusting shims if either new or reused bearings are to be used. Slip left shims in position at left bearing with steel shim next to bearing, then place .140" shim for right side in position and drive steel shim carefully into position between bearing and cast shim using a soft hammer. See Figure 40-113.

Install side bearing caps, as previously marked and tighten bolts to 55 lb. ft. before checking side bearing preload or backlash.

3. Rotate differential case assembly

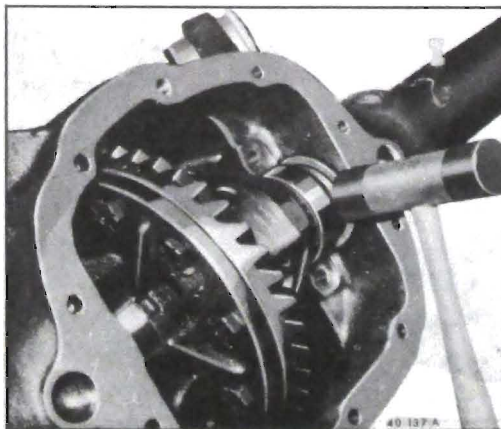


Figure 40-113 - Installing Differential Adjusting Shims

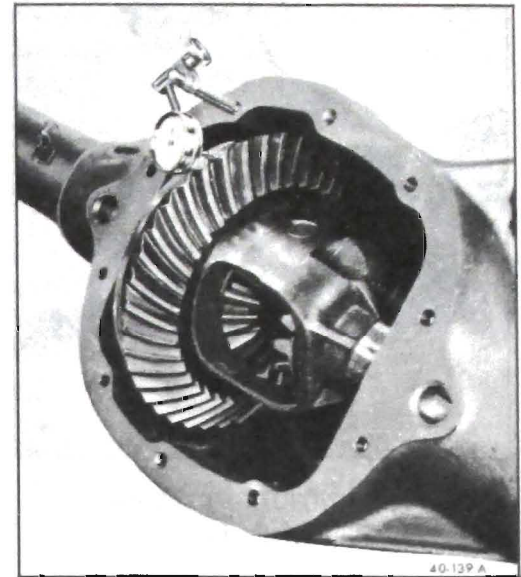


Figure 40-114 - Checking Ring Gear to Pinion Backlash

several complete turns to seat bearings. Check bearing preload using an inch pound torque wrench connected at pinion nut.

Bearing preload should read 35-40 lb. in. of rotating torque with new bearings or 20-25 lb. in. of rotating torque with reused bearings. See Figure 40-104. If preload is not according to these specifications, increase shim thickness on each side .002" for each additional 10 lb. in. preload desired, or decrease shim thickness .002" on each side for each 10 lb. in. preload to be subtracted.

f. Adjust Differential Backlash

1. Rotate differential case several times to seat bearings, then mount dial indicator as shown in Figure 40-114. Use a small button on indicator stem so that contact can be made near heel end of tooth. Set dial indicator so that stem is as nearly as possible in line with gear rotation and perpendicular to tooth angle for accurate backlash reading.

2. With pinion locked to carrier, check gear lash at 3 or 4 points around ring gear. Lash must not vary over .001" around ring gear. If variation is over .001" check for burrs, uneven bolting conditions or

distorted case flange and make corrections as necessary.

3. Gear lash at the point of minimum lash should be .006" to .008" for all new gears. If adjustment is necessary, adjust to .007".

If original gear set having a wear pattern is being reinstalled, original gear lash should be maintained within + or - .001".

4. If gear backlash is not within specifications, correct by increasing thickness of one differential shim and decreasing thickness of other shim the same amount. In this way, correct differential bearing preload will be maintained.

Shift .002" in shim thickness for each .001" change in backlash desired. If backlash is .002" too much, decrease thickness of right shim .004" and increase thickness of left shim .004". If backlash is .002" too little, increase thickness of right shim .004" and decrease thickness of left shim .004".

5. Install new cover gasket and cover torquing bolts to 30 lb. ft.

After waiting 20 minutes retorque bolts to 30 lb. ft.

g. Install Axle Shaft Assemblies

1. Apply a coat of wheel bearing grease in bearing recesses of housing. Install new outer retainer gaskets. Apply a thin coating of 2 Permatex or equivalent to outer diameter of seal if replaced. To help prevent damage to the lip of the wheel seal when installing axle shaft and to insure lubricant on the seal lip during the first few miles of operation, the wheel seal lip should be lubricated with wheel bearing grease. Insert axle shaft assemblies carefully until shaft splines engage in differential to avoid damage to seals.

2. Drive axle shaft assemblies into position.

NOTE: *Fasteners in steps 3 and 5 are important attaching parts in that they could affect the performance of vital components and systems, and/or could result in major repair expense. These must be replaced with one of the same part number or with an equivalent part if replacement becomes necessary. Do not use a replacement part or lesser quality or substitute design. Torque values must be used as specified during reassembly to assure proper retention of these parts.*

3. Place retainer over studs and install nuts. Torque nuts to 35 lb. ft.

4. Install brake drums over wheel bolts.

5. Install wheels and tighten wheel nuts to 65 lb. ft.

6. Install 3 pints of MPG SAE 80 or 80-90 (MIL-L- 2105-B) LUBRICANT or equivalent.

h. Install Pinion Oil Seal with Differential Installed in Car

In case of pinion oil seal failure, remove old oil seal and install new one (with differential remaining in car) as follows:

1. Mark propeller shaft and companion flange to permit proper alignment at reinstallation. Disconnect propeller shaft from companion flange and support shaft out of way. If U-joint bearings are not held by a retainer strap, use a piece of wire or tape to retain bearings in their journals.

2. Remove wheels and brake drums. Install an inch pound torque wrench on pinion nut, and record torque required to rotate pinion freely.

3. Mark position of companion flange, pinion shaft, and pinion nut so that they can be reinstalled in the same position.

4. Remove companion flange nut and washer using Holder J-6814-01 to hold flange.

5. Pry oil seal out of carrier.

6. Examine oil seal surface of companion flange for grooves, nicks or damaged surface. If damaged, replace flange.

7. Examine carrier bore and remove any burrs that might cause leaks around O.D. of seal.

8. Apply thin coating of 2 Permatex or equivalent on O.D. of new pinion oil seal and install seal using Installer J-21128.

9. Apply seal lubricant to O.D. of companion flange.

10. Install companion flange, with Holder J-8614-01 attached, onto pinion noting that the splines are mated as when removed.

11. Remove holding tool J-8614-01.

12. Check pinion preload using a pound inch torque wrench; the torque reading should be equal to or five pound inches above that recorded in Step 2 above.

13. Connect propeller shaft to companion flange using alignment marks. Torque the four (4) nuts to 12 lb. ft.

DIVISION IV

TROUBLE DIAGNOSIS

40-26 PRE-REPAIR

INVESTIGATION AND TROUBLE DIAGNOSIS

See paragraph 40-39 for all models.