SECTION 5

REAR AXLE

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REAR AXLE

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GENERAL DESCRIPTION

The 1961 Chevrolet passenger car rear axle (fig. 1), is a semi-floating, hypoid gear, Hotchkiss drive type, with an overhung drive pinion supported by two tapered roller bearing assemblies which absorb the axial and radial loads. Two differential assemblies are used in 1961: a standard two-pinion differential, and an optional four-pinion, limited-slip Positraction differential.

MAINTENANCE AND ADJUSTMENTS

LUBRICANT

Built-in oil baffle ledges, above the point of contact between the ring and pinion gears, insure adequate lubrication and reduced gear wear at this vital point. The ring and pinion gear sets are manganese phosphate coated to insure a more efficient break-in. This necessitates draining the rear axle after the first 1000 miles of operation and refilling with a High Grade Multi-Purpose Lubricant as recommended in the lubrication section. A drain plug is located in the bottom of the axle housing to facilitate this draining procedure. Thereafter, the lubricant level should be periodically checked and maintained at the level of the filler plug with a warm axle. It is also recommended that the rear axle be drained and refilled seasonally or at a maximum of every 10,000 miles.

Lubricant Leaks

Lubricant leaks should be checked for at the companion flange or rear universal joint rear yoke oil seal, differential carrier to axle housing gasket, lubricant filler and drain plugs, and at axle shaft bearings. Cor-

rection of these leaks consists of replacing the defective seals or gaskets involved as described in this section.

HUB NUTS

For continued safe operation, wheel hub nuts should be periodically inspected for secure installation.

REAR AXLE NOISE DIAGNOSIS

Mechanical failures of the rear axle are relatively simple to locate and correct. Noise in a rear axle is a little more difficult to diagnose and repair. One of the most essential parts of rear axle service is proper diagnosis.

One of the cardinal points of axle noise diagnosis is the fact that all rear axles are noisy to a certain degree. The action of transmitting the high engine torque through a 90° turn and reducing propeller shaft speed produces noise in rear axles. This point establishes the need for a line between normal and abnormal or unacceptable axle noises.

Slight axle noise heard only at a certain speed or under remote conditions must be considered normal. Axle noise tends to "peak" at varying speeds and the noise is in no way indicative of trouble in the axle.

If noise is present in an objectionable form, loud or at all speeds, an effort should be made to isolate the noise as being in one particular unit of the vehicle. Axle noise is often confused with other noises such as tire noise, transmission noise, propeller shaft vibration and universal joint noise. Isolation of the noise as in any one unit requires skill and experience. An attempt to eliminate a slight noise may baffle even the best of diagnosticians. Such practices as raising tire pressure to eliminate tire noise, listening for the noise at varying speeds and on drive, float and coast, and under proper highway conditions, turning the steering wheel from left to right to detect wheel bearing noise, will aid even the beginner in detecting alleged axle noises. Axle noises fall into two categories, gear noise and bearing noise.

Gear Noise

Abnormal gear noise can be recognized since it produces a cycling pitch and will be very pronounced in the speed range at which it occurs, appearing under either "drive," "float" or "coast" conditions. Gear noise tends to peak in a narrow speed range or ranges, while bearing noise will tend to remain constant in pitch. Abnormal gear noise is rare and usually originates from the scoring of the ring gear and pinion teeth as a result of insufficient or improper lubricant in new assemblies. Side gears rarely give trouble as they are used only when the rear wheels travel at different speeds.

Bearing Noise

Defective bearings will always produce a rough whine that is constant in pitch and usually most noticeable under "drive" conditions. This fact will allow you to distinguish between bearing noise and gear noise.

1. Pinion bearing noise resulting from a bearing failure can be identified by a constant rough sound. Pinion bearings are rotating at a higher speed than differential side bearings or axle shaft bearings. This particular noise can be picked up best by testing the car on a smooth road (black top). However, care should be taken not to confuse tire noise with bearing or gear noise. If any doubt exists, tire treads should be examined for irregularities that would produce such noise.
2. Wheel bearing noise may be confused with rear axle noise. To differentiate between wheel bearings and rear axle, drive the vehicle on a smooth road at medium-low speed. With traffic permitting, turn the vehicle sharply right and left. If noise is caused by wheel bearings, it will increase in the turns because of the side loading. If noise cannot be isolated to front or rear wheel bearings, inspection will be necessary.
3. Side bearings will produce a constant rough noise of a slower nature than pinion bearings. Side bearing noise will not fluctuate in the above wheel bearing test.

SERVICE OPERATIONS

NOTE: Refer to following sub-section on Propeller Shafts for instances when propeller shaft angles must be rechecked.

AXLE SHAFT AND BEARING ASSEMBLY

Removal

1. Raise rear of vehicle and place stand jacks under rear axle housing.
2. Remove hub nuts and remove tire and wheel assembly.
3. Remove brake drum and gasket.
4. Remove four nuts and lock washers from bearing retaining bolts (on inside of axle flange).
5. Attach Tool J-5748 with slide hammer to hub bolts with three hub nuts and remove axle shaft and bearing assembly and outer gasket (fig. 2). Be careful not to disturb brake backing plate and inner gasket.

   NOTE: If bearing retainer and parking brake strut interfere, raise strut slightly with screw driver to obtain clearance.
6. Install bolt and nut to hold brake backing plate and inner gasket on axle housing.

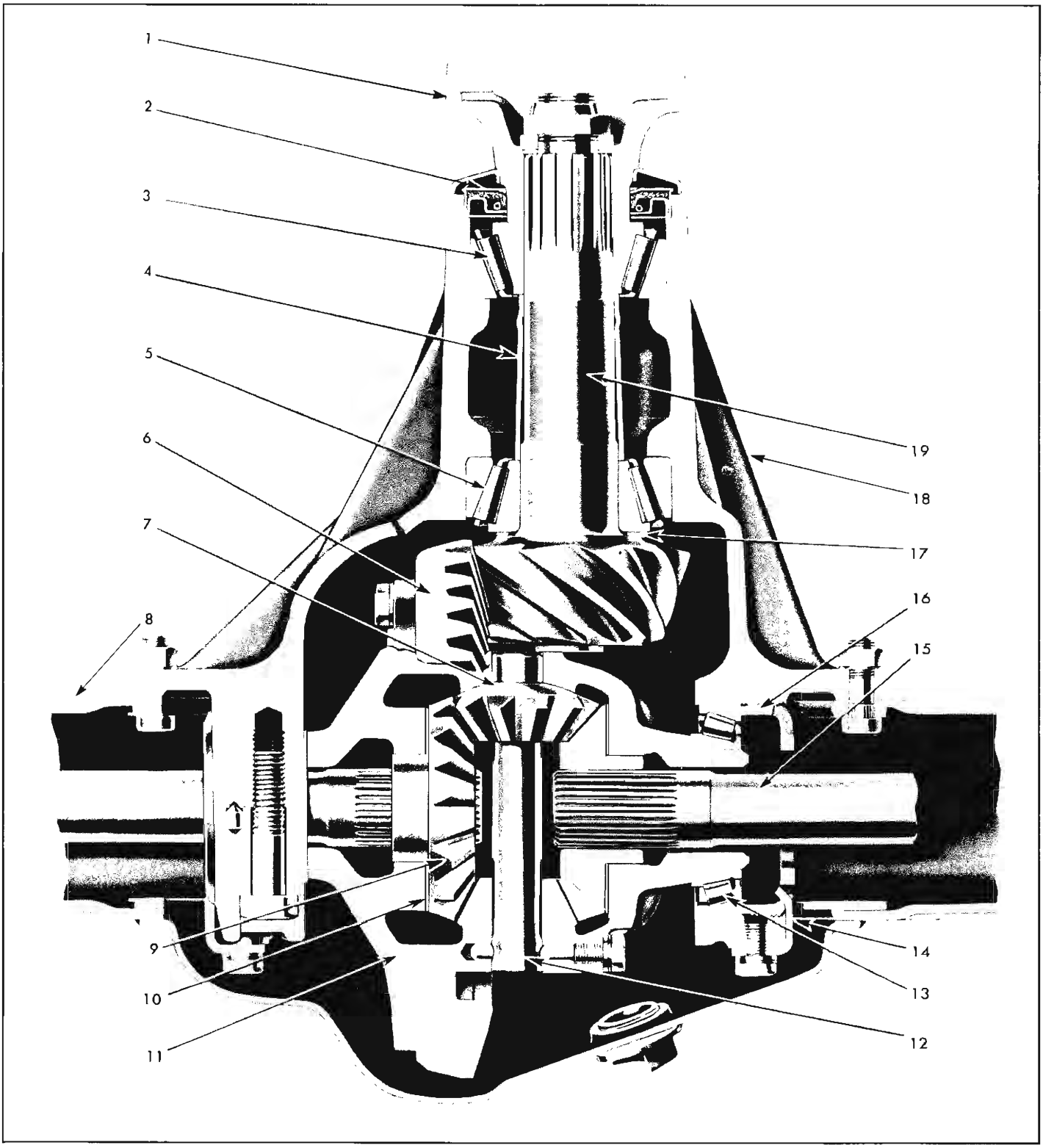

Fig. 1—Cross-Section Passenger Rear Axle

1. Pinion Drive Flange
2. Oil Seal
3. Front Pinion Bearing
4. Pinion Bearing Spacer
5. Rear Pinion Bearing
6. Ring Gear
7. Differential Pinion
8. Axle Housing
9. Differential Side Gear
10. Differential Side Gear Thrust Washer
11. Differential Case
12. Differential Pinion
13. Differential Side Bearing
14. Adjusting Sleeve Lock
15. Axle Shaft
16. Adjusting Sleeve
17. Pinion Shim
18. Carrier
19. Drive Pinion

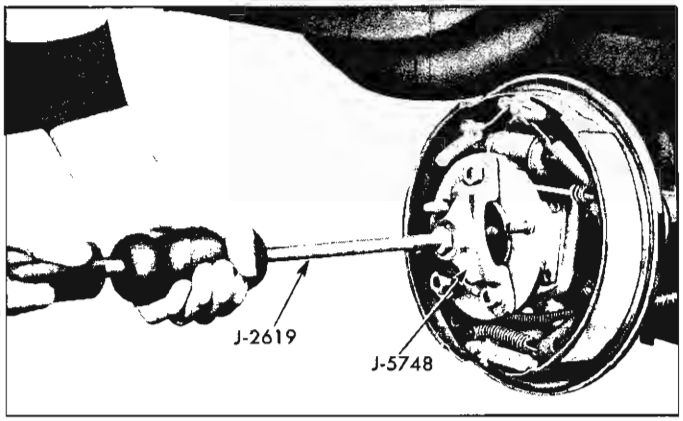

Fig. 2—Removing Axle Shaft

Inspection

Inspect bearing for looseness, roughness or evidence of leakage at seal.

NOTE: When inspecting rear axle shaft bearings apply all of the load possible by hand as load is all important in bringing out bearing noise.

Inspect axle shafts for cracks, loose bolts or worn splines.

Repairs

Axle Shaft Bearing and/or Oil Seal—Replace

1. Install Tool J-5741 between axle flange and bearing with the land of the plates against the bearing and inside the retainer. Install bolts in plates.

   NOTE: It will be necessary to remove retainer plate attaching bolts to allow installation of tool between retainer and bearing.

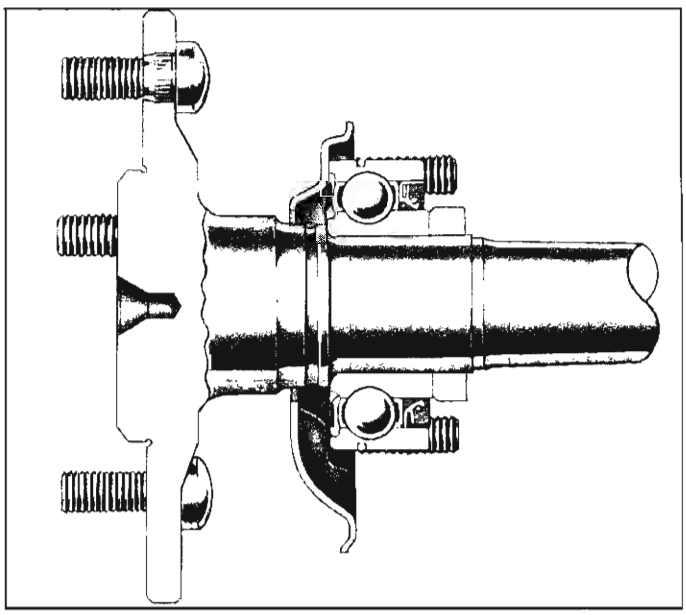

Fig. 3—Rear Axle Shaft and Bearing

2. Press bearing from shaft with press plate parting line (fig. 4) resting on press bed. This operation may damage the bearing retainer so that it may have to be replaced.

   CAUTION: Press plates must be supported at break as shown.

3. To replace oil seal, pry old seal out with screwdriver. Be careful not to damage bearing races. Repack bearings with a high grade wheel bearing grease. **Do not pack full.** Use only a sufficient quantity to fill 40% of the cavity around the balls and ball cage between the inner and outer seals. This is a quantity of grease approximately equivalent to 1½ teaspoonsful of grease. Install new seal.

   NOTE: Use caution to avoid damage to rubber portion of seal on outer metal shell.

4. Install new bearing or re-sealed old bearing, using Tool J-6661 (fig. 5). Bearing bottoms on shaft against shoulder.

   NOTE: New bearing retainer must be on axle shaft before bearing is installed.

5. Install new axle shaft bearing retaining ring on shaft, using Tool J-6661 as above to seat the ring against the bearing.

   NOTE: Chamfered side of ring must go against bearing.

6. On all units equipped with heavy duty roller bearings:

   a. Place inner race of roller bearing on shaft and press in place using "flat" side of Tool J-6661.

   b. Make certain seal is in place on bearing. Place roller bearing and cage assembly over inner race.

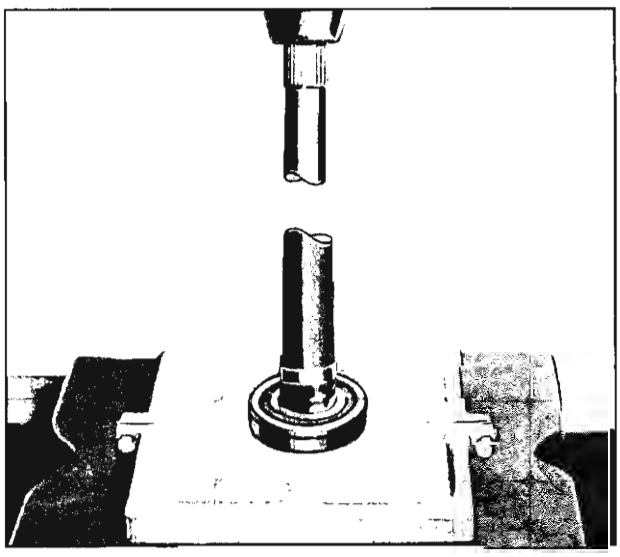

Fig. 4—Removing Axle Shaft Bearing

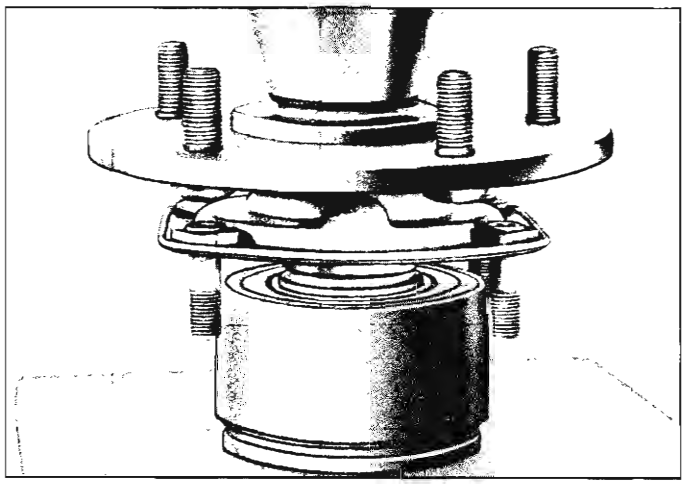

Fig. 5—Installing Axle Shaft Bearing

c. Using "flat" side of tool J-6661 install roller bearing retaining ring.

NOTE: If new bearing is being installed it will be a one piece assembly.

Axle Shaft Replacement

In case of damage to the axle shaft flange bolts, remove old bolts and replace as outlined below.

1. Insert special serrated bolt into hole, making sure it is square with wheel flange.

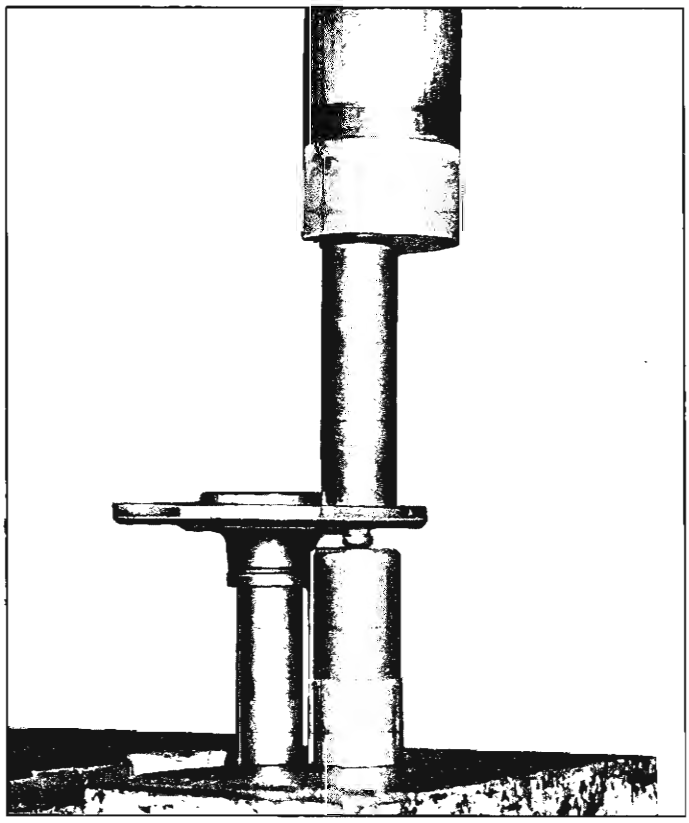

Fig. 6—Installing Flange Bolts

2. Using suitable hollow tool, press bolt into flange hole until bolt head is seated against flange (fig. 6).
3. Install new bearing as outined above.

Axle Shaft Installation

1. Replace bearing "O" ring seal. Remove temporary nut and bolt holding brake backing plate in place.

   NOTE: When installing axle shaft with heavy duty bearings, spacer ring must be installed between rear wheel bearing assembly and axle housing bearing bore. Be certain chamfer on ring is toward center of vehicle.

2. Install new retainer gasket. Install axle shaft in housing using Tool J-5748 and slide hammer. Rotate shaft to align splines of shaft and differential side gear. Outer race of bearing must seat against shoulder in axle housing.

   NOTE: Parking brake strut may have to be raised slightly with a screwdriver to obtain clearance for bearing retainer.

3. Install nuts and lockwashers on bearing retainer bolts and tighten securely.
4. Install brake drum gasket, drum, wheel and hub nuts.
5. Lower vehicle to floor, and road test for leaks and noise.

COMPANION FLANGE, OIL DEFLECTOR AND/OR OIL SEAL REPLACEMENT

1. Raise one rear corner of vehicle off floor and place jack stand under frame side rail.

   NOTE: This is to lock one rear wheel and obtain differential to body clearance. If operation is to be performed on a hoist, support frame on stand jacks, allow axle to drop for clearance and expand brake shoes on one wheel to lock wheel.

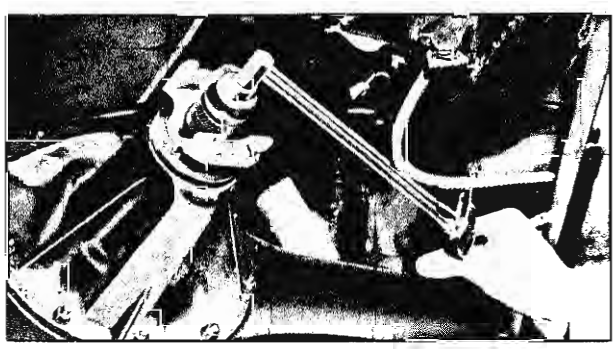

Fig. 7- Measuring Bearing Preload

Fig. 8—Removing Companion Flange Nut

2. Check free wheel for freedom of rotation.
3. Separate rear universal joint, tape trunnion bearings to joint and support rear of propeller shaft.
4. Using Tool J-5853, on the companion flange nut, rotate the pinion through several complete revolutions and record the torque required to keep the pinion turning (fig. 7). If old flange is to be installed, mark pinion and flange for reassembly in same relative position.
5. Holding drive flange with Tool J-2637, remove companion flange nut and special washer (fig. 8). Discard nut.
6. Remove drive flange using Tool J-0820 bolted over holding Tool J-2637 (fig. 9). Pry old oil seal out, using a screwdriver or hammer and chisel.
7. Inspect drive flange for smooth oil seal surface or worn drive splines. Replace if necessary.
8. On new flanges or old flanges with damaged deflectors, install new deflector, using Tool J-5749 (fig. 10).
9. Soak new seal in light engine oil for 10 minutes

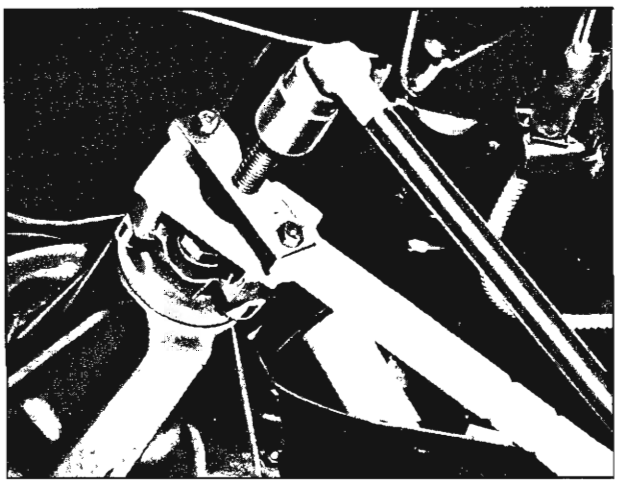

Fig. 9—Removing Companion Flange

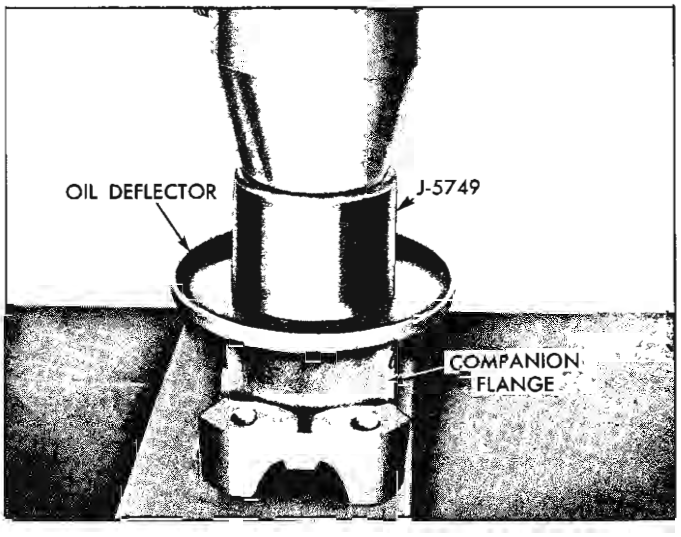

Fig. 10—Installing New Oil Deflector

before installation, wipe O.D. of seal and coat O.D. of seal with a sealer, such as G. M. Sealing Compound (Pat. No. 987266). Install new oil seal using Tool J-5154.

10. Install drive flange aligning marks on pinion and flange if old flange is being used. If flange does not go on shaft easily, pull flange on shaft, using Tool J-5780 (fig. 11). The tool is threaded onto pinion shaft and large nut tightened to pull flange on shaft. Remove tool and install special washer and a new self-locking nut.

CAUTION: Do not hammer flange on pinion shaft. To do so will damage ring gear and pinion.

Tighten nut to remove end play and continue alternately tightening in small increments and checking preload torque with inch pound torque wrench until it is the same as recorded in step 4.

NOTE: The position of the pinion and flange was previously marked so that reinstallation may be made with flange and pinion in same relative position.

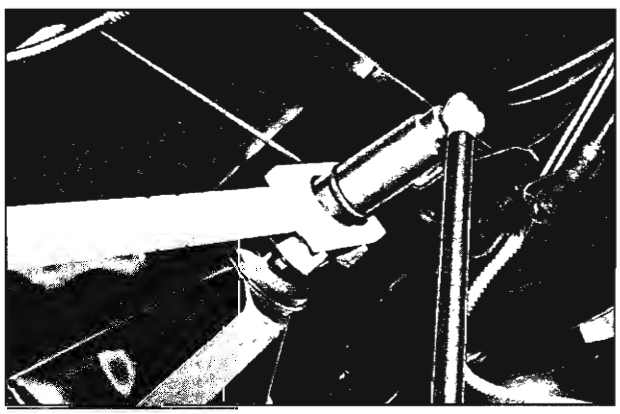

Fig. 11—Installing Companion Flange

11. Readjust brake if expanded above.
12. Lower vehicle to floor and road test for leaks and noise.

REAR AXLE ASSEMBLY

Removal

Major operations on this axle assembly may be performed without removing complete axle assembly from the vehicle. There may be occasions, however, when it will be necessary to remove the complete assembly as result of collision which may cause distortion of axle housing or axle shaft tubes. The following axle housing assembly removal, therefore, is to be used only when replacement of axle housing is necessary.

1. Raise vehicle from floor and support with stand jacks under frame side rails.
2. Remove rear wheels.
3. Remove two trunnion bearing "U" bolts from the rear yoke and split rear universal joint.

   NOTE: Tape the bearings to the trunnion.

4. Disconnect hand brake cable at rear quick disconnect and remove cables from cable clamps on frame.
5. Disconnect hydraulic brake line connection at rear axle housing.
6. Disconnect shock absorber eyes from anchor pins as outlined in Section 3.
7. While supporting axle assembly with hydraulic jacks, remove rear suspension upper and lower control arms and tie rod as outlined in Section 3. Lower rear axle assembly and remove from under car.

Installation

1. Slide axle assembly under vehicle, raise into position and install upper and lower control arms, tie rod, and rear coil springs as outlined in Section 3.
2. Replace shock absorber eyes to anchor pins.
3. Connect hydraulic brake line to connector at rear axle housing.
4. Connect hand brake cable and adjust. See "Brake Section."
5. Reassemble the rear universal joint, making sure "U" bolts are tightened securely.
6. Replace rear wheels.
7. Bleed brake lines at all four wheels. See "Brake Section."
8. Check "Driveline Angles" as outlined later in this section.
9. Lower vehicle to floor.

The operations to follow are major service operations, but may be, as a result of axle construction, performed without removing axle assembly from the vehicle.

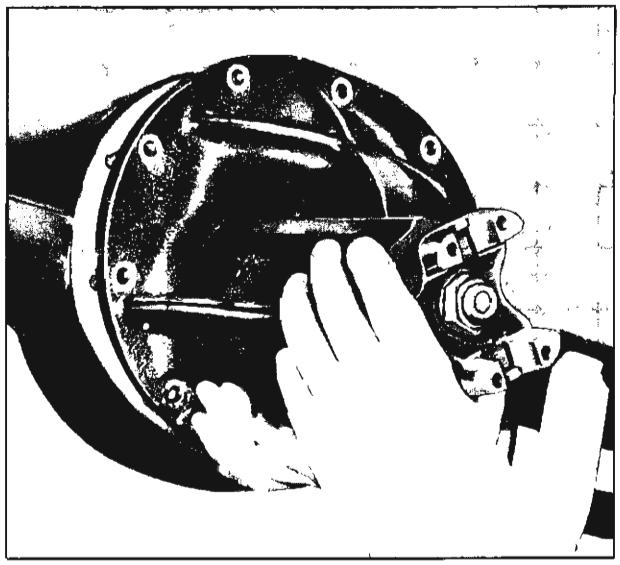

Fig. 12—Removing Differential Carrier

DIFFERENTIAL CARRIER

NOTE: Service operations on "Positraction" are covered later in this section.

Removal

1. Clean all dirt from area of differential carrier to axle housing joint.
2. Remove axle shafts as previously outlined.

   NOTE: Axle shafts need be pulled out only to clear differential side gears.

3. Remove two trunnion bearing "U" bolts from the rear universal point and split joint. Lower propel-

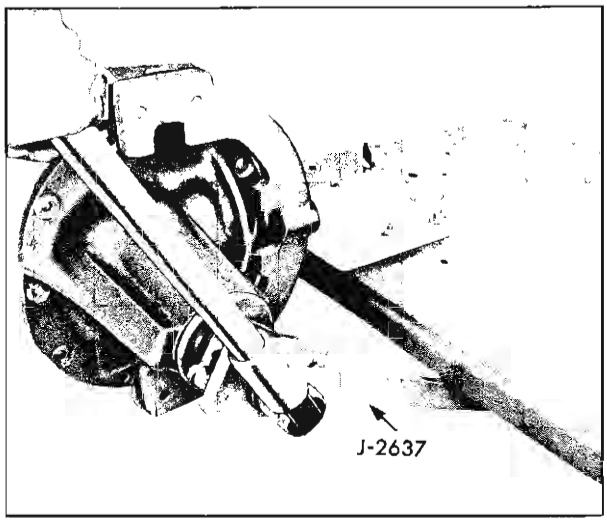

Fig. 13—Removing Companion Flange Nut

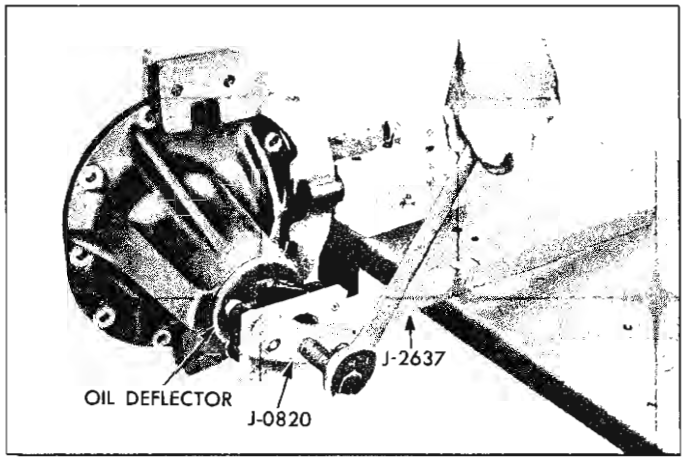

Fig. 14—Removing Companion Flange

ler shaft to floor.

NOTE: Tape the bearings to the trunnion.

4. Remove drain plug and allow rear axle lubricant to drain into a drip pan. Remove sealing lock nuts which attach differential carrier to the axle housing. Remove differential carrier assembly (fig. 12).

Disassembly

1. Mount carrier assembly in a bench vise or in Tool J-3289.
2. Mark bearing caps and carrier for reassembly in same position. Remove differential adjusting nut locks and bearing cap bolts.
3. Remove bearing caps and adjusting nuts by tapping on bosses of caps until free from dowels.

   CAUTION: Do not use screwdriver to pry cap off as this may damage machined face of cap.

4. Remove differential and ring gear assembly from the carrier housing.

   CAUTION: Exercise care that differential side bearing outer races are not dropped in removing assembly from carrier housing.

5. Remove differential pinion shaft screw and lockwasher and differential pinion shaft from differential case.
6. Remove differential pinion, side gears and thrust washers.
7. Hold companion flange from turning by installing

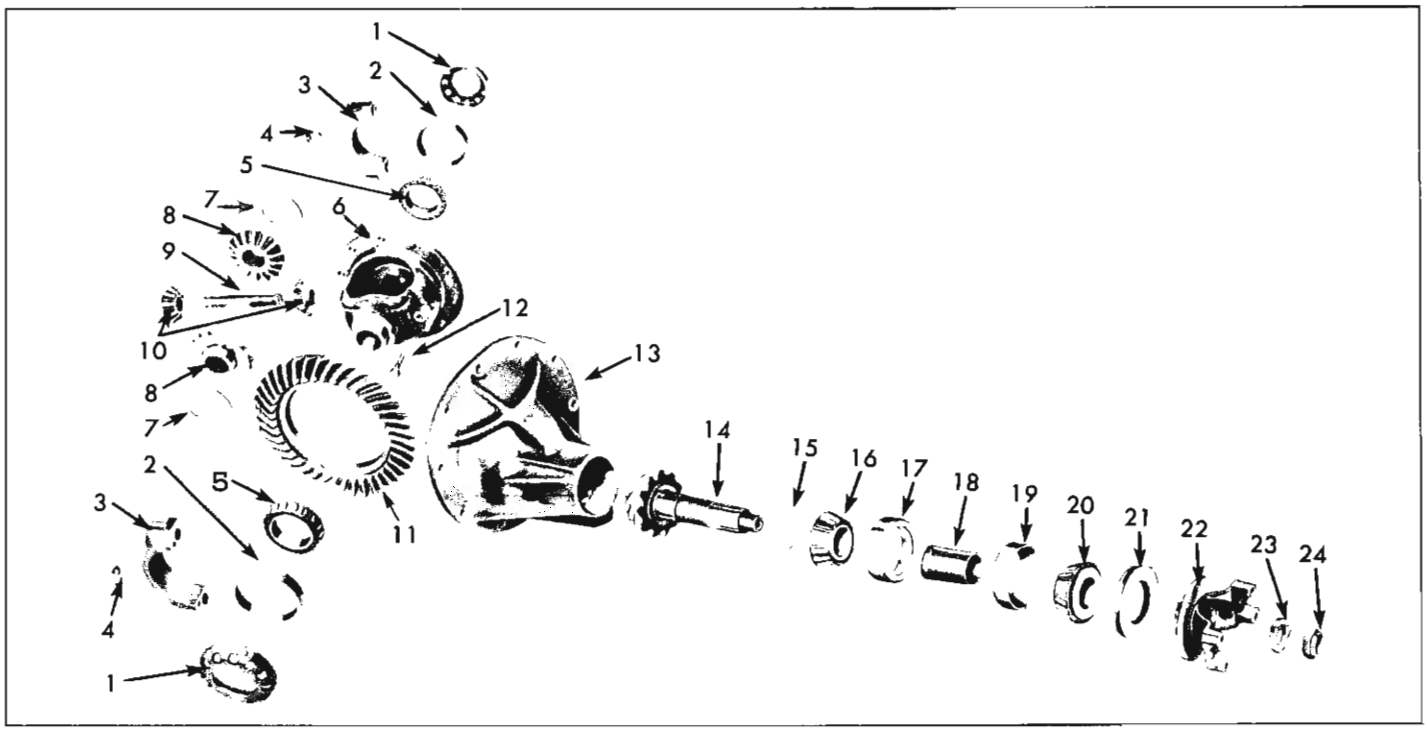

Fig. 15—Axle Exploded

1. Differential Bearing Adjusting Nut
2. Differential Bearing Outer Race
3. Differential Bearing Caps
4. Differential Bearing Adjusting Nut Lock
5. Differential Bearing Cone and Roller Assembly
6. Differential Case
7. Differential Side Gear Thrust Washer
8. Differential Side Gear
9. Differential Pinion Gear Shaft
10. Differential Pinion Gear
11. Ring Gear
12. Differential Pinion Gear Shaft Lock
13. Differential Carrier
14. Drive Pinion Gear
15. Pinion Depth Adjusting Shim
16. Rear Pinion Bearing Cone and Roller Assembly
17. Rear Pinion Bearing Outer Race
18. Pinion Bearing Spacer
19. Front Pinion Bearing Outer Race
20. Front Pinion Bearing Cone and Roller Assembly
21. Companion Flange Oil Seal
22. Companion Flange
23. Special Washer
24. Self Locking Nut

Tool J-2637 and remove propeller shaft pinion flange nut and washer (fig. 13). Remove flange by using Tool J-0820, bolted to flange with holding tool in place (fig. 14).

8. Remove pinion from carrier by tapping on front end with a soft faced hammer.
9. Remove pinion shaft oil seal, pinion front bearing and bearing spacer from carrier.

NOTE: Some axles may have a 1/16" shim behind the spacer. This is a production item only and should be discarded along with the bearing spacer.

10. Wash all parts in cleaning solvent. Thoroughly clean axle housing. Figure 15 shows the parts layout.

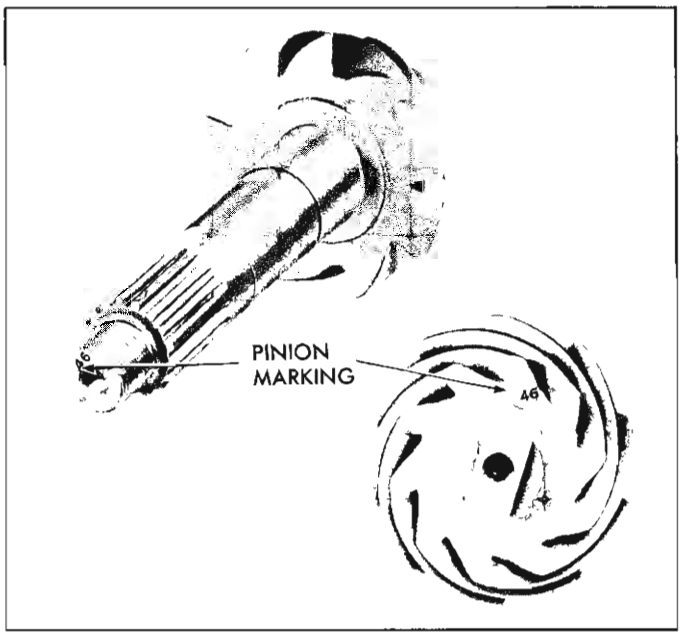

Fig. 16—Pinion Marking

Inspection

1. Inspect all bearing cups, races and rollers for scoring, chipping or evidence of excessive wear. Inspect large end of rollers for wear. This is where wear is most evident on taper roller bearings.

NOTE: The rear axle pinion bearings are of the pre-loaded type, and the natural wear pattern is a frosted condition with occasional slight scratches on races or rollers. This does not indicate a defective bearing.

2. Inspect oil seal for evidence of wear or damage.
3. Inspect pinion splines and flange for evidence of excessive wear.
4. Inpect ring gear and pinion teeth for scoring, cracking or chipping.

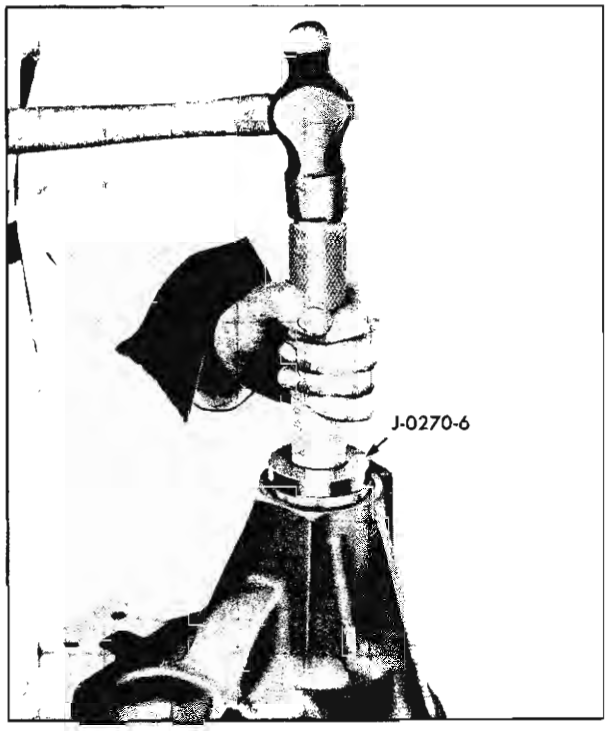

Fig. 17—Installing Front Pinion Bearing Cup

5. Inspect differential case for cracks or scores on side gear and pinion gear thrust faces.
6. Inspect the differential side gear thrust washers for evidence of wear, scoring, cracks or any other damage.
7. Check fit of differential side gears in case.
8. Check fit of side gear and axle shaft splines.
9. Inspect differential pinion shaft for scoring or evidence of excessive wear.
10. Inspect differential carrier for cracks or crossed threads on differential bearings caps and bosses.

Repairs

Pinion and/or Bearing Replacement

A number marked on the shank of the pinion will indicate, in thousandths, the pinion mounting distance. These numbers will range from 40 to 50 (fig. 16) and will not include the period and zero, i.e. .0, prefixing a thousandths decimal type figure. In the procedure following, an example is given on usage of this number.

1. Remove front and rear bearing cups with brass drift.
2. Install new bearing cups in carrier, using Tool J-0270-6 (fig. 17) on front cup and Tool J-0270-14 (fig. 18) on rear cup. Bearing cups should seat against shoulders in differential carrier.
3. Remove pinion rear bearing assembly using Tool

J-7028 (fig. 19). Note size of shim removed from between bearing and gear.

4. If the original ring gear and pinion, pinion rear bearing assembly and differential carrier will all be reinstalled, the original shim or one of the same thickness may be used. If the ring gear and pinion, pinion rear bearing assembly or differential carrier are replaced, the correct thickness of the pinion depth shim may be determined as follows:

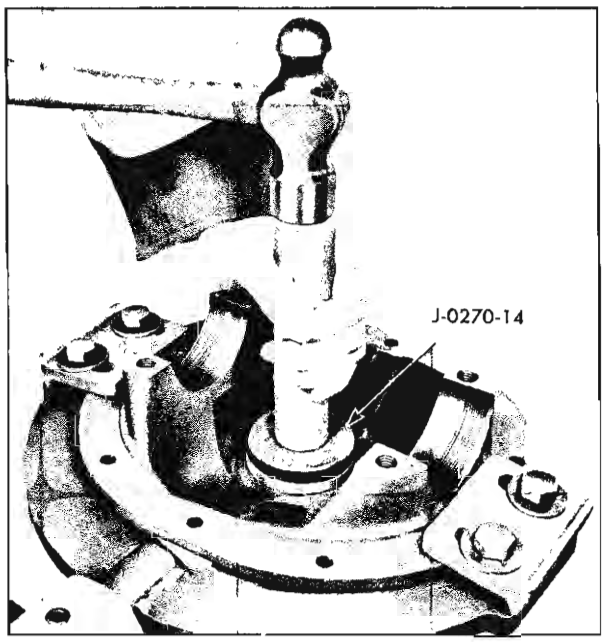

Fig. 18—Installing Rear Pinion Bearing Cup

5. Lubricate pinion bearing cone and roller assemblies with gear lubricant. Position rear bearing in its cup carrier. Rotate bearing several times to make sure it is seated.

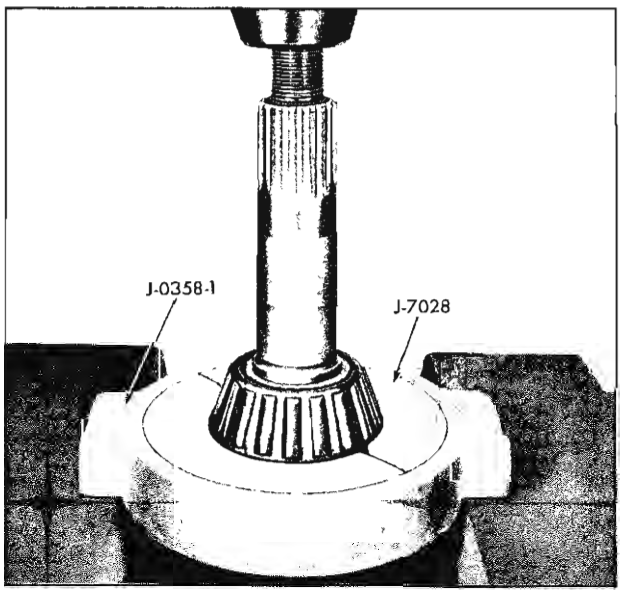

Fig. 19—Removing Rear Pinion Bearing Cone and Roller

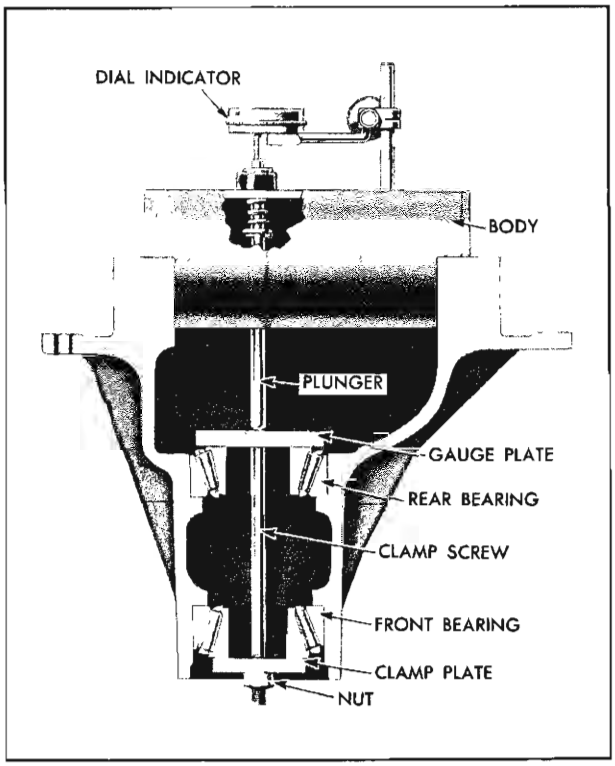

Fig. 20—Cross Section of Differential Carrier and Pinion Setting Gauge

6. Position gauge plate on rear bearing so that the chamfered corner is towards pinion side and top of differential as installed in the car. See Figure 22.
7. While holding front cone and roller assembly in its cup with the clamp late, insert the clamp screw through the gauge plate, both bearings and clamp plate. Secure with hex nut provided. Tighten sufficient amount to center bearings in cups only. Check to see that neither the gauge plate nor clamp plate touch the housing.

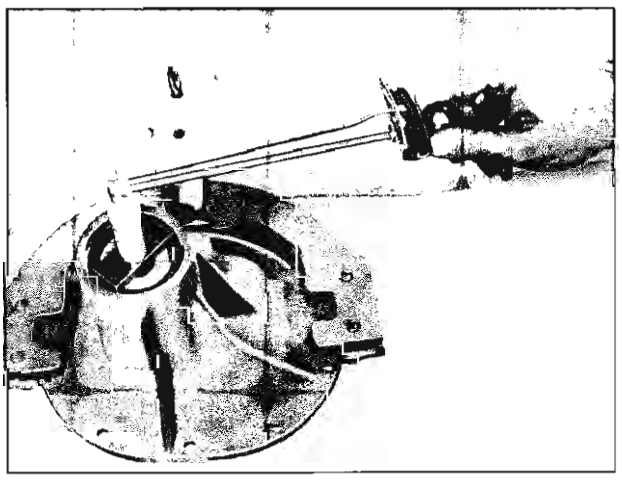

Fig. 21—Measuring Pinion Bearing Simulated Preload

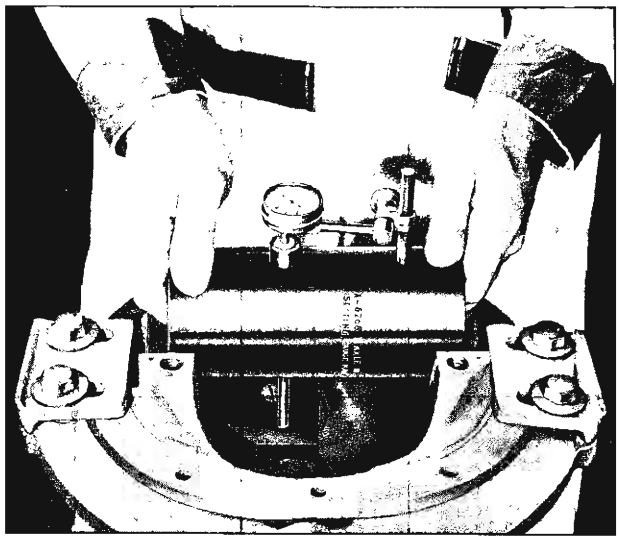

Fig. 22—Checking Pinion Setting Gauge Dial Reading

8. Oscillate gauge plate and bearings several times to be sure bearings are seated and then draw up hex nut until 20 inch-pounds of torque are required to oscillate plate and bearings. See Figure 21.

NOTE: A torque of 60 ft. lbs. may be required to tighten nut on clamp bolt in order to achieve simulated preload of pinion bearings after assembly. After tightening the clamp bolt nut, the 20 in. lb. torque is measured as shown in Figure 21.

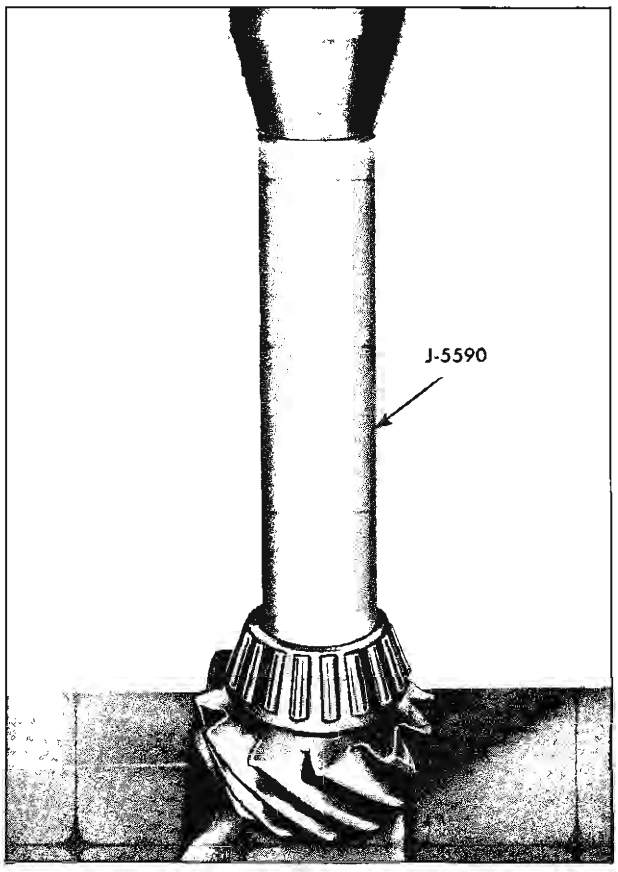

Fig. 23—Installing Rear Pinion Bearing Cone and Roller Assembly

9. Install Tool J-6266 body assembly across differential bores (fig. 22). Plunger on body must point inward toward center of pinion rear bearing.
10. Mount a dial indicator J-8001 on the tool body post with the indicator button on top of the tool plunger (see Figure 22). Swing body so that plunger **does not** touch gauge plate, and set indicator dial at zero.
11. Slowly swing plunger back across gauge plate until highest indicator reading is obtained. Record this measurement and recheck to see that it is correct.
12. Record factory marking on pinion. **Subtract** from the marking on the pinion. The difference between these two figures determines the thickness of the pinion depth shim to be installed with the particular pinion and ring gear, and rear bearing and carrier being checked. Shims are available in six different thicknesses: .021", .024", .027", .030", .033", and .036". Use shim which is closest to the difference in measurements.

	Example #1	Example #2	Example #3
Pinion Marking	42	45	51
Tool Marking	15	22	22
Difference	27	23	29
Proper Shim Thickness	.027	.024	.030

13. Remove indicator, complete tool and pinion rear bearing cone assembly from carrier.
14. Position shim selected on pinion head.
15. Install new cone and roller assembly (fig. 23), using Tool J-5590. Press cone against shim and rear face of pinion.

Differential Bearing Replacement

1. Install Tool J-8107 (Use Tool J-7112 on "Positraction" units), making sure puller legs are fitted securely in case and retaining yoke is tight.
2. Tighten puller screw to remove bearings (fig. 24).
3. Place new bearing on hub with thick side of inner race toward case and drive in place with Tool J-5768 (fig. 25).

NOTE: This tool is counterbored and has pilot to assure proper installation and seating of bearing.

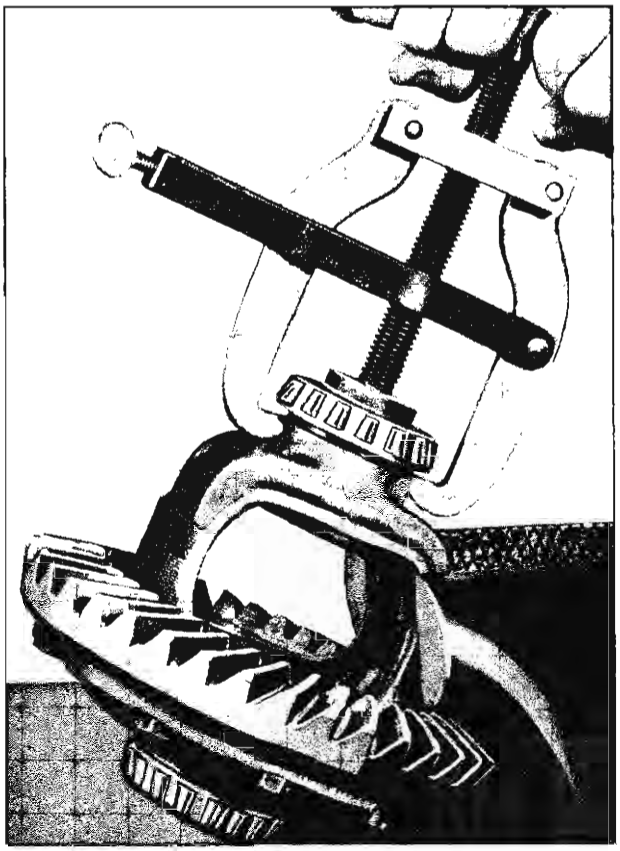

Fig. 24—Removing Differential Side Bearings

Ring Gear or Differential Case Replacement

1. Remove ring gear bolts and lockwashers.
2. With soft hammer tap ring gear off the case.
3. Install guide pins made from 3/8"-24 x 1½" long cap-screws with heads cut off and ends slotted to ring gear (fig. 26).
4. Make sure back face of ring gear and face of case are free of dirt and burrs. Mount case on V blocks placed at side bearings and check face runout with a dial indicator. This should not exceed .003". Drop ring gear over pilot diameter of the case.
5. Install every other ring gear bolt and lockwasher, then draw them up evenly and snugly so that gear face is flush with face of case.
6. Remove guide pins and install remaining bolts.

NOTE: All bolts should be tightened to 40-60 ft. lbs.

Assembly

1. Mount carrier in a bench vise or holding fixture.
2. Lubricate pinion bearings with hypoid lubricant and install pinion in carrier.
3. Install pinion bearing spacer large end toward gear. A new spacer must be used.
4. Install front pinion bearing cone and roller assembly on pinion shaft.
5. Soak new oil seal for 10 minutes in light engine oil. Wipe O.D. at seal and coat with a sealer such as G.M. Perfect Seal Sealing Compound (Pt. No. 987266). Using Tool J-5154 (fig. 27), install new pinion shaft oil seal so that the top of the seal is located 3/16" "plus 1/32"" or minus "0" from the front of the differential carrier. See inset Figure 27.

CAUTION: Seal must not bottom.

6. Install pinion flange and deflector assembly using Tools J-5780 and J-2637 (fig. 28). Install special washer and new special self-locking nut.
7. Tighten pinion flange nut, holding companion flange with Tool J-2637, until torque required to turn pinion is 15 to 25 inch pounds with new bearings and 5 to 15 inch pounds with old parts. This may require a nut torque of as high as 350 ft. lbs. Tool J-5853, fig. 29, or a scale may be used to determine the preload. Tool J-0544, Figure 30, should read 1⅞ to 3⅛ pounds new and ⅝ to 1⅞ pounds with old parts when applied to an eight inch radius, at notches in Companion Flange Holding Tool.

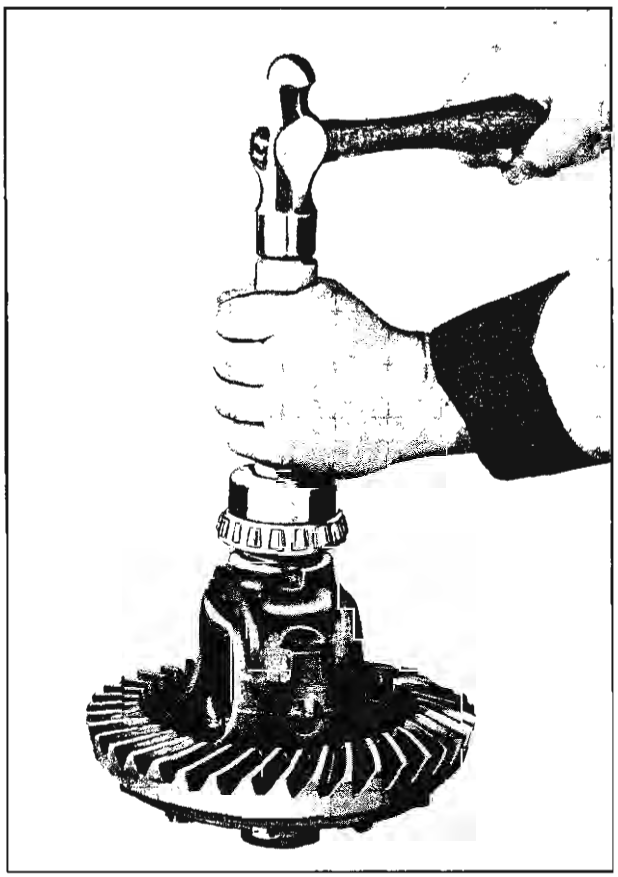

Fig. 25—Installing Differential Side Bearing

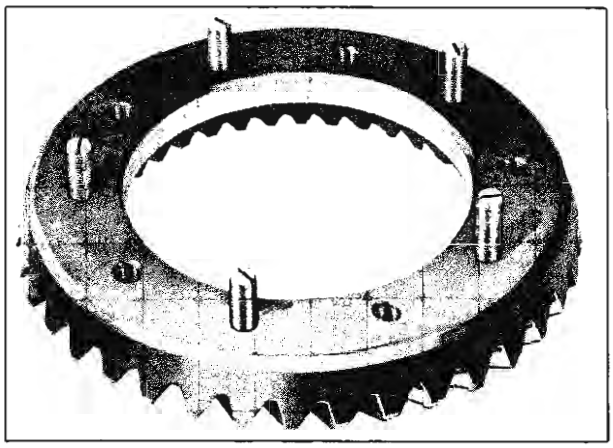

Fig. 26—Guide Pins in Ring Gear

CAUTION: Be certain there is no contact between oil deflector and carrier.

8. Install differential assembly in the carrier and install outer races and adjusting nuts.

   CAUTION: Carefully slide adjusting nuts alongside the bearing so that threads on nuts fit into threads in carrier.

9. Install bearing caps, aligning marks on cap with marks on carrier.

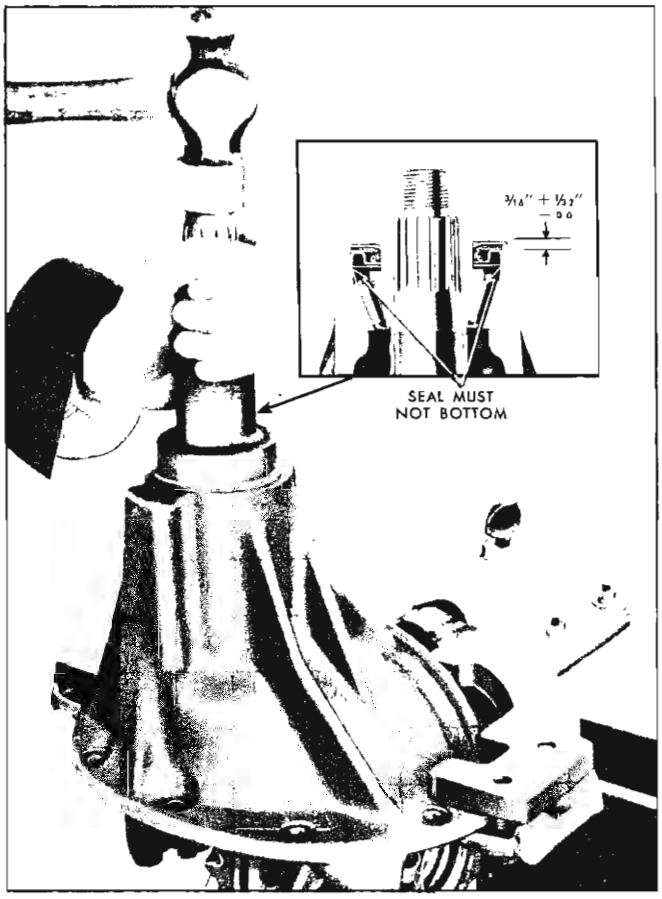

Fig. 27—Installing Oil Seal

10. Install and tighten cap screws snugly.
11. Lubricate hubs of differential side gears and thrust washers with hypoid lubricant and install them into differential case.
12. Roll the two differential pinions into position and install pinion gear shaft and pinion gear shaft lock screw.

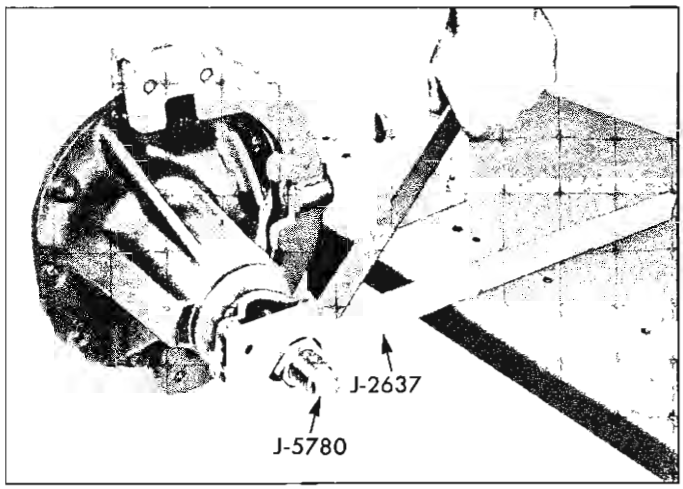

Fig. 28—Installing Companion Flange

Ring Gear and Pinion Adjustment

1. Back off right hand adjusting nut and tighten left hand adjusting nut using Tool J-0972 while turning ring gear (fig. 31). Continue tightening left hand nut until all lash is removed, then lock left hand adjusting nut in place by tightening left hand bearing cap bolts to 70-75 ft. lbs.

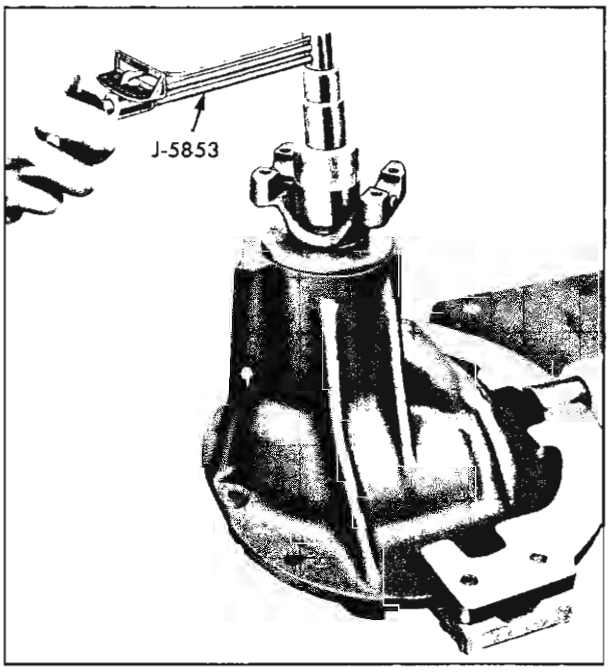

Fig. 29—Checking Preload, Torque Wrench

2. Tighten right hand nut to force left bearing firmly into contact with left adjusting nut. Then loosen the right nut and again tighten snugly against bearing.

   NOTE: This position may be easily determined as the bearing rollers begin to move when contact is made.

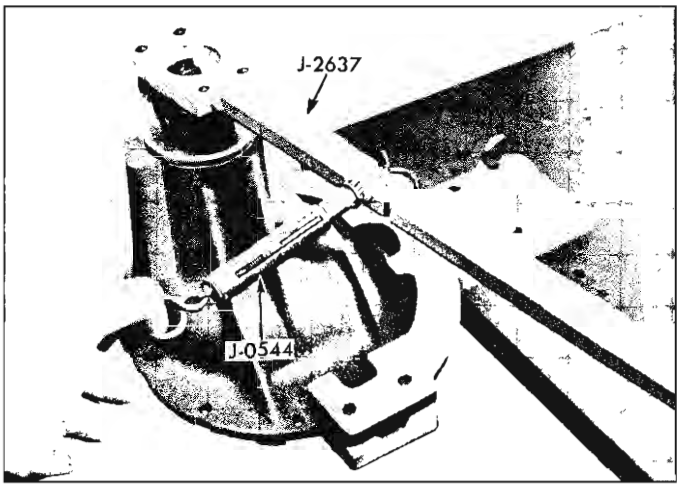

Fig. 30—Checking Preload, Scale

3. Tighten right hand nut to a minimum of two additional notches to maximum of three notches to a locking position. This operation preloads the differential bearings.

4. Mount a dial indicator on the carrier and check the back lash, (fig. 32) between the ring gear and pinion. The back lash should be from .003"-.010" (.005-.008 preferred).

5. Tighten right hand bearing cap bolts to 70-75 ft. lbs. Recheck back lash and install both adjusting nut locks.

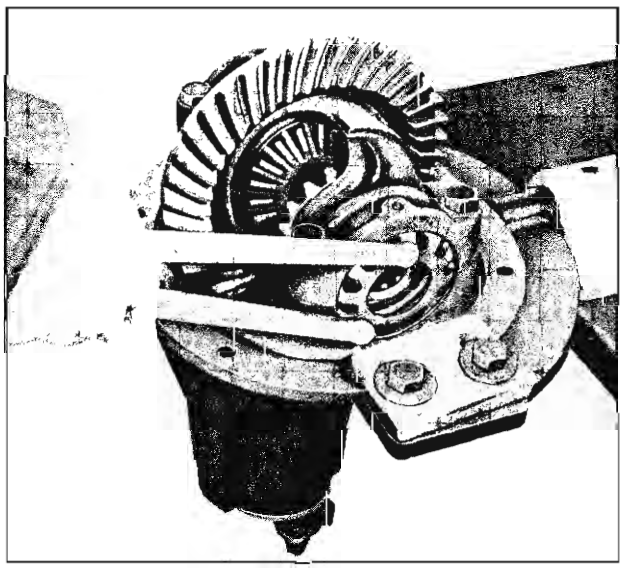

Fig. 31—Adjusting Differential Bearings

Ring Gear and Pinion Contact Pattern

It is very important that tooth contact be tested before differential carrier assembly is installed. Allowable variations in the carrier or rear pinion may cause pinion to be too far in or out even when shimmed according to the shim chart. Thus, tooth contact must be tested and corrected as necessary or the gears may be noisy. This test may be performed as follows with the carrier assembly mounted in the holding fixture.

1. Thoroughly clean the ring gear and pinion teeth.

2. Paint ring gear teeth lightly and evenly with red lead and oil of a suitable consistency to produce a contact pattern.

3. Place a 1⅛" deep socket on the companion flange nut and grasp firmly with a cloth to form a friction brake.

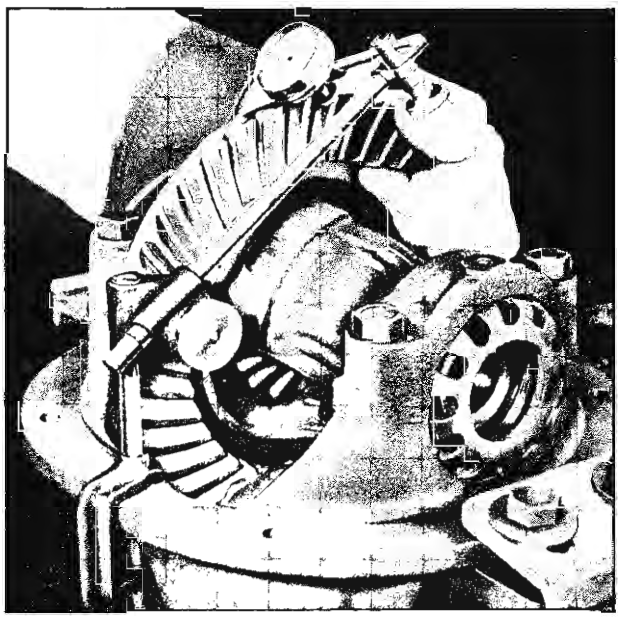

Fig. 32—Checking Back Lash

4. Using a 9/16" box wrench on the ring gear bolts, rock the ring gear back and forth, shifting bolt heads to develop a contact pattern on the teeth of the ring gear (fig. 33).

Inspect the contact pattern produced by the above procedure. Figure 34 shows the terminology used in analyzing contact patterns.

The large end of the tooth is called the "heel" and the small end the "toe." Also, the top of the tooth, which is the part above the pitch line, is called the "face," while the part below the pitch line is called the "flank." The space between the meshed teeth is referred to as "backlash."

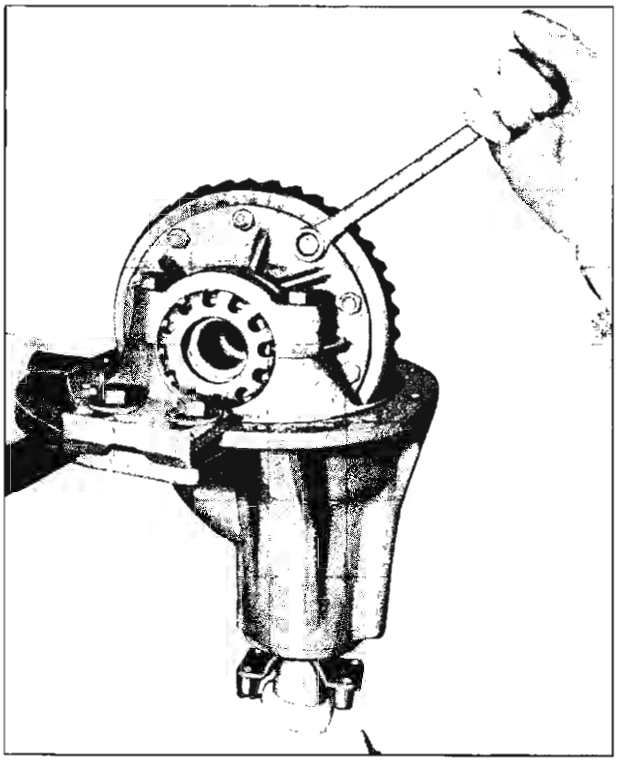

Fig. 33—Developing Tooth Pattern

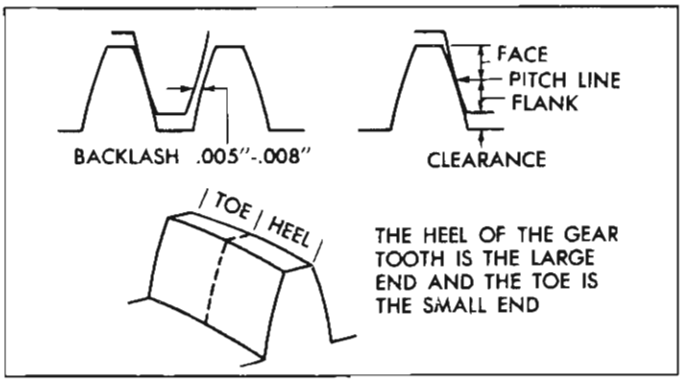

Fig. 34—Gear Tooth Nomenclature

Figure 35 shows correct and incorrect contact patterns. For illustrative purposes, "coast" side of gear contact is shown. Drive and coast side of gear teeth will have similar contact patterns.

Tooth pattern "A" provides the ideal bearing for quietness and long life. If the pattern shows a toe contact "B," it indicates not enough backlash. To correct, move the ring gear away from the pinion by loosening left-hand differential adjusting nut and tightening right-hand adjusting nut.

NOTE: Make adjustment one notch at a time, repeat check with red lead and continue adjustment until tooth contact appears as in "A." Backlash must remain within limits.

If the pattern shows a heel contact "C," it indicates too much backlash. Make correction as for "B," however, loosen right hand differential adjusting nut and tighten left hand adjusting nut to move ring gear toward pinion. Backlash must remain within limits.

If the pattern shows a high face contact "D," it indicates that the pinion is too far out, that is too far toward the front of the car.

To correct a pattern such as in "D," it will be necessary to install a thicker pinion shim as described under "Pinion and/or Bearing Replacement." A .003" thicker shim is recommended as a starting point. Continued changes may be necessary to obtain the correct setting.

If the pattern shows a flank contact "E," it indicates that the pinion is in too far. To correct, replace the

Fig. 35—Gear Teeth Contact Pattern

pinion shim with one .003" thinner and recheck contact pattern. Other changes may be necessary to obtain the correct pattern.

In making pinion adjustments, be sure backlash is correct before retesting with red lead for tooth pattern. Moving the pinion in reduces backlash and moving it out increases it.

NOTE: When proper tooth contact is obtained, wipe red lead from gears and carrier with cloth moistened with clean gasoline or kerosene.

Pour a liberal quantity of rear axle lubricant on gear and bearing and turn gears to work lubricant into all surfaces.

Installation

1. Clean out axle thoroughly and place new gasket over carrier mounting bolts.
2. Assemble differential carrier assembly to axle housing, install new sealing lock nuts and tighten to 35-45 ft. lbs.
3. Connect rear universal joint.
4. Road test for noise and leaks.

POSITRACTION

The Positraction differential unit for 1961 is a four-pinion, multi-plate unit which provides five friction surfaces.

COMPLAINT DIAGNOSIS

Improper operation of the Positraction differential is generally indicated in one of the following ways:

1. Improper drive with one wheel having less traction.
2. Differential chatter.

(1) Improper Drive with One Wheel Having Less Traction

Under some operating conditions where one rear wheel is on excessively slippery surface and the opposite wheel is on a good traction surface, it may be necessary to lightly apply the parking brake to produce enough resistance to the spinning wheel to cause axle lock-up.

Lock-up is independent of acceleration; therefore, light throttle application on starting is recommended to provide maximum traction by preventing "break away" of the non-slipping wheel.

The Positraction unit can be effectively tested for correct operation by placing one rear wheel on good dry pavement and the other on ice, mud, grease, etc.

It can easily be determined whether or not the non-slipping wheel is providing pulling power. The procedure can then be repeated with the opposite wheels on dry and slippery surface.

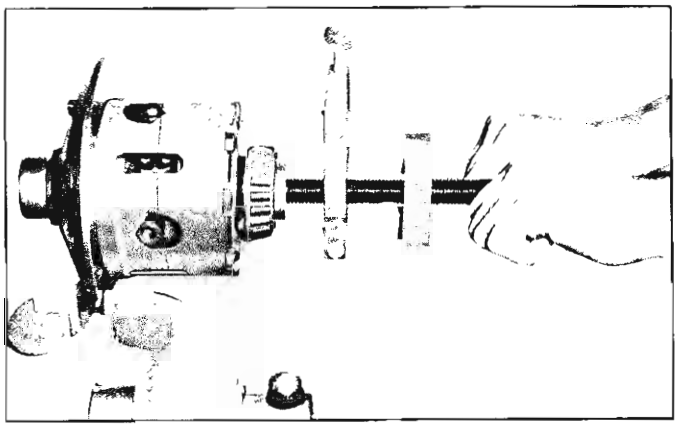

Fig. 36—Removing Differential Side Bearings

CAUTION: The warning posted in the luggage compartment regarding operation of the unit while on a jack should not be interpreted as a means of testing. Its only intention is to point out that a possibility does exist that the axle could lock up under certain conditions and force the vehicle off the jack.

(2) Differential Chatter

Differential chatter is due to the wrong lubricant being used in the axle. The lubricant specified by us in our parts catalog must always be used for this unit. In some cases, the slightest bit of contamination of the lubricant by any foreign lubricant is enough to cause considerable chatter.

Removal

1. Remove carrier as outlined earlier in this section.
2. Remove the differential bearing caps. Mark each cap for reassembly. Mark the bearing adjustment

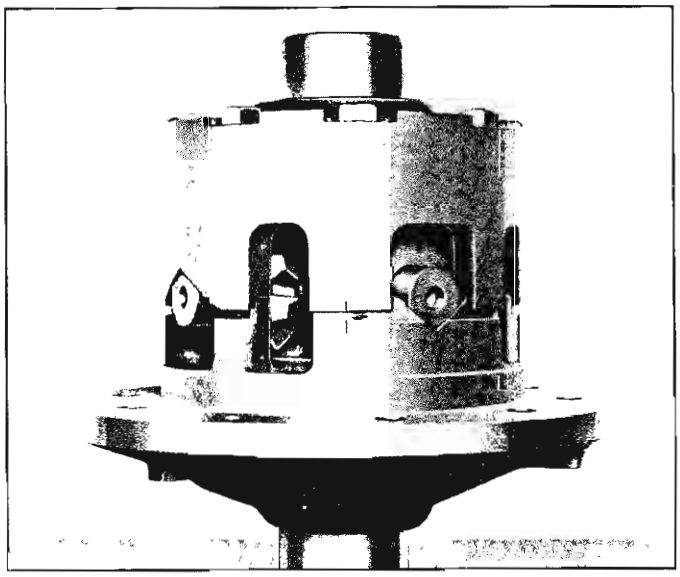

Fig. 37—Alignment Marks

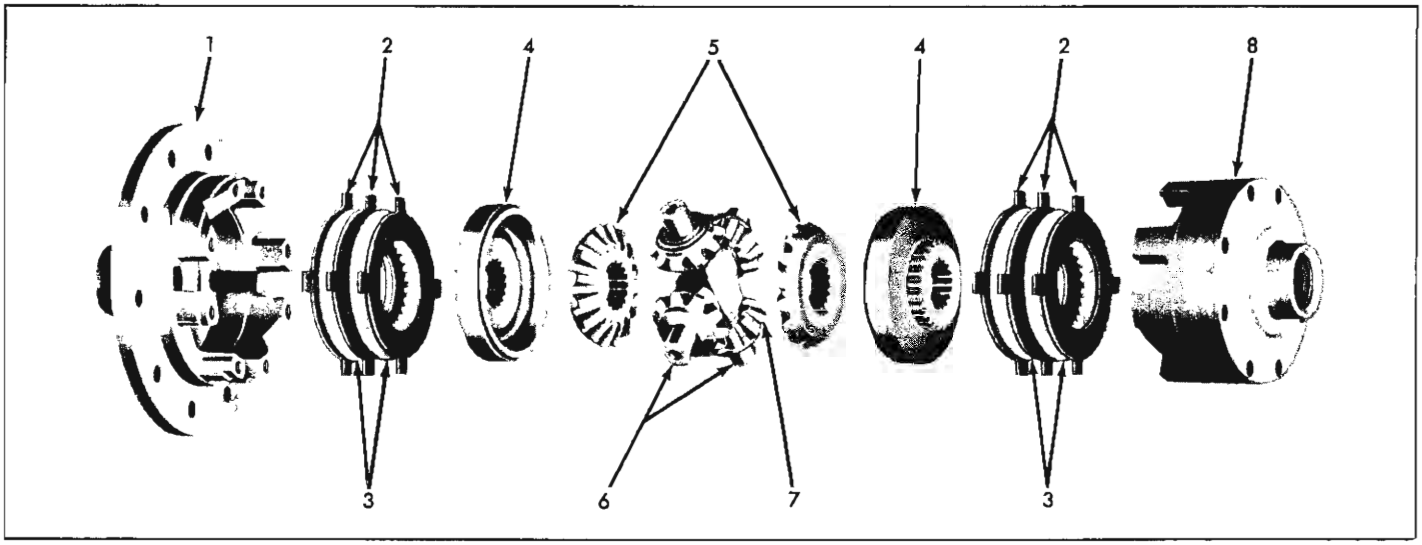

Fig. 38—Differential Case Details and Relative Location of Parts

1. Differential Case—Ring Gear Flange
2. Clutch Plate
3. Clutch Disc
4. Side Gear Retainer Ring
5. Side Gear
6. Cross Shaft
7. Pinion Gear
8. Differential Case—End Housing

nut for reassembly.

3. Remove ring gear bolts and ring gear as outlined in this section.
4. Remove the side bearings using Tool J-7112 (fig. 36). Keep bearing cups with the bearings if they are reusable; replace bearings if worn or damaged.

Disassembly

1. Check to be certain that the differential case halves are marked with a number or letter to aid aligning the case when reassembling. If not, scribe an alignment mark as shown in Figure 37.
2. With unit on bench, remove eight attaching bolts.

   NOTE: These bolts have left-hand thread.

3. Remove end housing.
4. Remove clutch plates from side gear retainer.
5. Remove side gear retainer and side gear.
6. Remove pinion mate shafts and gears.
7. Remove remaining side gear, side gear retainer and clutch plates.

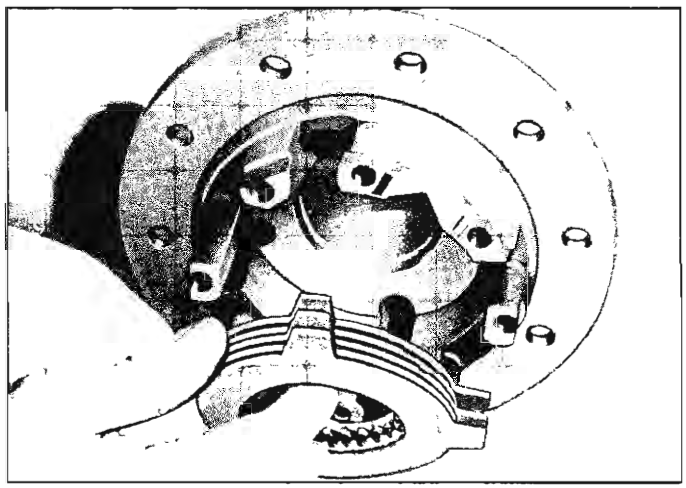

Fig. 39—Installing Clutch Plates

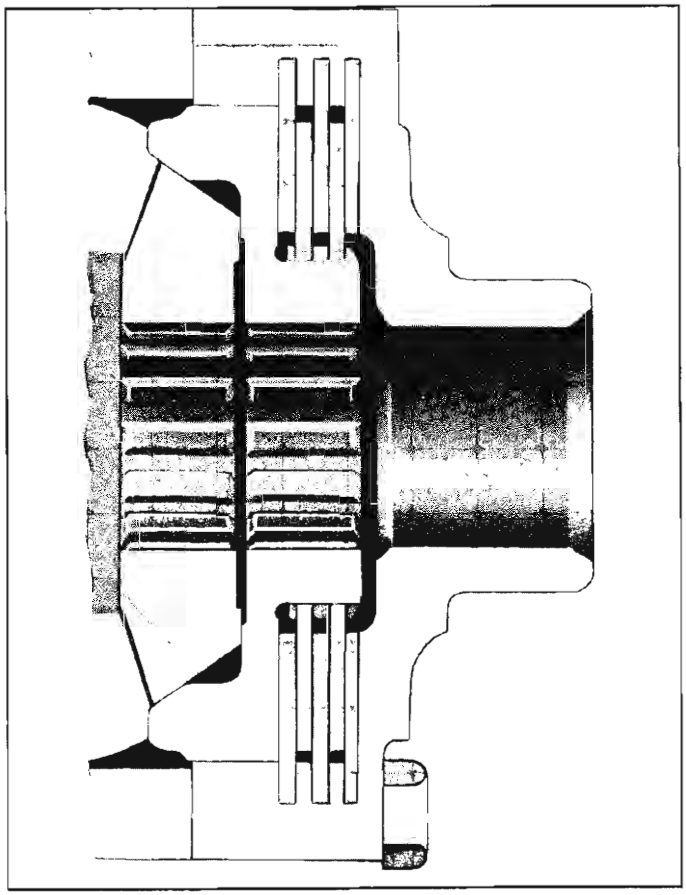

Fig. 40—Clutch Plate Arrangement

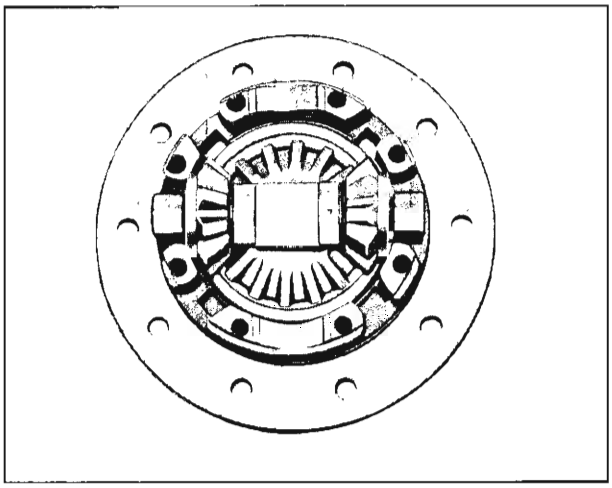

Fig. 41—Shaft and Gear Installation

Cleaning and Inspection

Clean and inspect all parts before reassembly. Inspect clutch plates for heat discoloration, excessive wear, cracks or distortion. Inspect thrust surfaces on side gear retainer and on differential case to see that they are free from nicks, burrs or imperfections. It is important that these parts be free from imperfections as defective parts will reduce the efficiency of this unit.

Assembly

(Refer to Figure 38 for details and relative location of parts.)

1. Lubricate each clutch disc and plate and install in ring gear flange half of case, stacking in the following manner (fig. 39):
   a. .060″ plate next to case.
   b. Splined clutch disc.
   c. .090″ Belleville type plate. Assemble this plate with I. D. in contact with disc nearest case.
   d. Splined clutch disc.
   e. 090″ flat plate.

   NOTE: This arrangement provides five friction surfaces. Any arrangement which provides fewer friction surfaces will reduce the clutch capacity and tend to allow clutch slippage under lesser torque loads. Refer to Figure 40 for clutch plate arrangement.

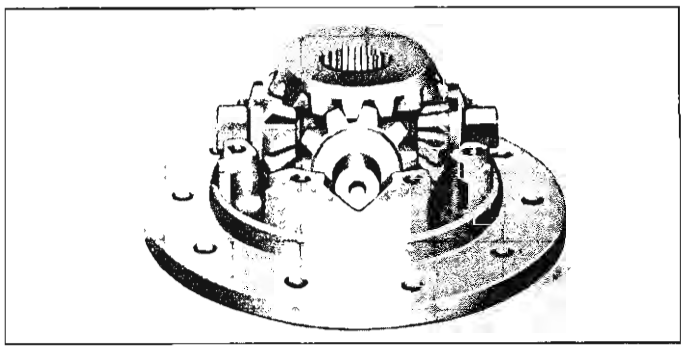

Fig. 42—Remaining Shaft and Gear Installation

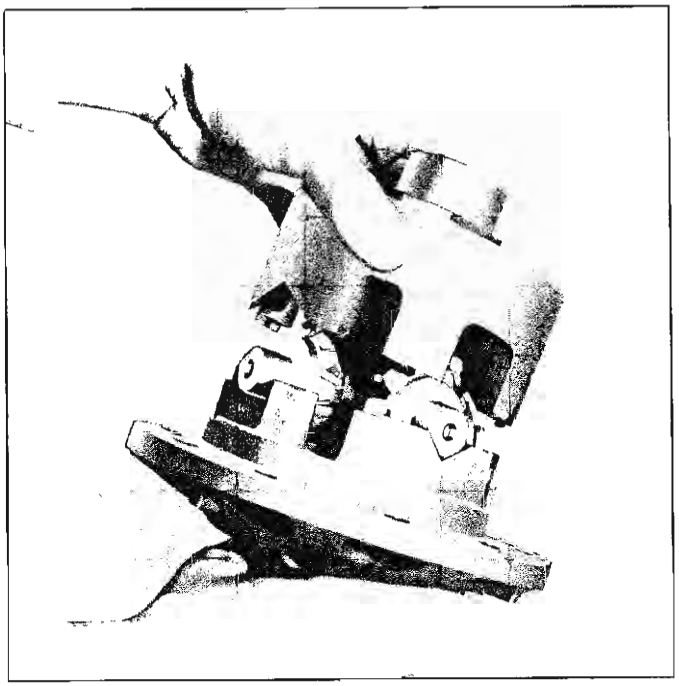

Fig. 43—Case Assembly

2. Install side gear retainer ring making sure splines engage both clutch disc internal splines.
3. Install side gear in retainer ring and position one cross shaft and pinions on side gear with ramp in shaft facing up (fig. 41).
4. Install remaining shaft and gears as shown in Figure 42.
5. Install remaining clutch discs, plates and side gear retainer in other half of housing in same order as in ring gear flange half.

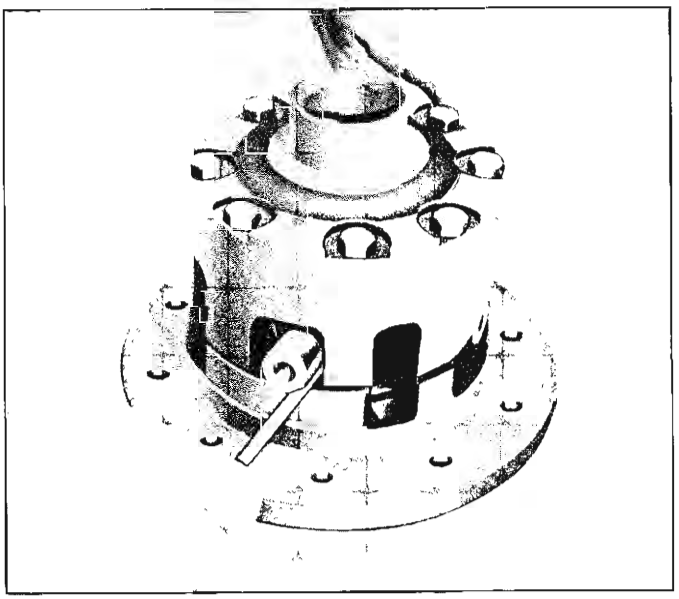

Fig. 44—Checking Pinion Mate Shaft Clearances

6. Hold end case half of housing with finger through the bearing trunnion to hold side gear in place and, with scribe marks aligned, place the assembly on the ring gear flange half (fig. 43).
7. Install eight case attaching bolts, finger tight, and check to see that side gears rotate freely.
8. Tighten eight attaching bolts evenly to 35-45 ft. lbs.

   NOTE: These bolts have left-hand thread.
9. Check for metal to metal contact between surfaces of pinion mate shaft "V" and the cam ramps in the case to make sure there is no clearance (fig. 44). If clearance exists, check for worn parts.
10. Install ring gear on case as outlined in Section 5-11.

Installation

1. Install the Positraction differential with ring gear and bearings assembled as outlined earlier in this Section.
2. Use the same instructions and specifications for ring gear bolts, bearing cap bolts, backlash and bearing pre-load as used for the standard differential.
3. Fill unit with recommended lubricant, check for leaks and road test vehicle.

TROUBLES AND REMEDIES

REAR AXLE

Symptom and Probable Cause	Probable Remedy
Excessive Backlash	
a. Loose wheel bolts.	a. Tighten nuts securely. Make sure the tapered end of nut is toward wheel.
b. Worn universal joint.	b. Replace or overhaul joint.
c. Loose propeller shaft to pinion splines.	c. Replace worn parts.
d. Loose ring gear and pinion adjustment.	d. Adjust ring gear and pinion.
e. Worn differential gears or case.	e. Replace worn parts.
f. Worn axle shaft or differential gear splines.	f. Replace worn parts.
Klunking Noise in Axle or Vehicle Weight Shifts From Side to Side on Turns	
a. Excessive end play in axle shafts.	a. Replace axle shaft bearings and or retainer.
Axle Noise on Drive	
a. Ring gear and pinion adjustment too tight.	a. Readjust ring gear and pinion.
b. Pinion bearings rough.	b. Replace bearing and readjust ring gear and pinion.
Axle Noisy on Coast	
a. Ring gear and pinion adjustment too loose.	a. Readjust ring gear and pinion.
b. Pinion bearings rough.	b. Replace bearing and readjust ring gear and pinion.
c. Excessive end play in pinion.	c. Adjust pinion bearings or replace bearings.
Axle Noisy on Both Drive and Coast	
a. Pinion bearings rough.	a. Replace bearings and adjust ring gear and pinion.
b. Loose or damaged differential side bearings.	b. Replace or adjust differential side bearings.
c. Damaged axle shaft bearing.	c. Replace bearing.
d. Worn universal joint.	d. Replace worn parts.
e. Badly worn ring gear or pinion teeth.	e. Replace ring gear and pinion.
f. Pinion too deep in ring gear.	f. Adjust by shimming.
g. Loose or worn wheel bearings.	g. Replace wheel bearings.
Axle Lubricant Leaks	
a. Axle shaft bearing seals leaking.	a. Replace axle shaft bearing seals and "O" rings.
b. Pinion shaft oil seal leaking.	b. Replace pinion shaft oil seal.
c. Differential carrier to housing gasket leaking.	c. Replace gasket.

PROPELLER SHAFTS AND UNIVERSAL JOINTS

INDEX

GENERAL DESCRIPTION

The Chevrolet passenger vehicles utilize a double tubular propeller shaft in a hotchkiss type drive system. The three exposed universal joints are of the sealed roller bearing type, lubricated at assembly.

MAINTENANCE AND ADJUSTMENTS

UNIVERSAL JOINTS

The universal joints are lubricated at the factory and sealed. It is recommended that they be disassembled and lubricated every 25,000 miles.

DRIVELINE ANGLES

Due to the design of the driveline, the relative angles formed by the propeller shaft(s), and transmission output shaft and pinion gear are very critical. Conse-

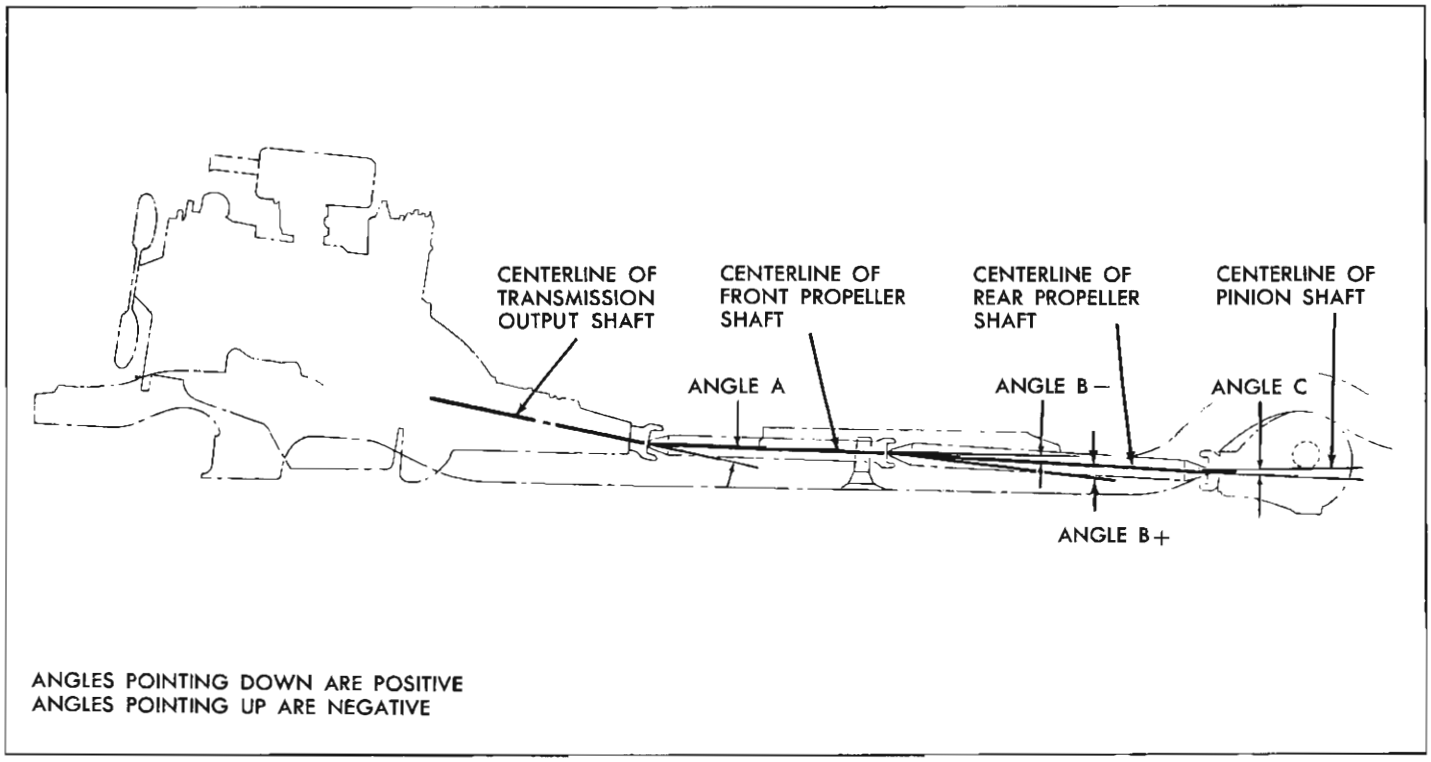

Fig. 45—Schematic Diagram of Driveline Angles

quently these angles must be checked whenever the following operations are performed or when the following conditions exist.

Angle Check Requirements

OPERATION OR CONDITION	ANGLE CHECK REQUIREMENT		
	Front Joint Angle (A)	Rear Joint Angle (B)	Pinion Joint Angle (C)
Propeller Shaft Vibration	Yes	Yes	Yes
Collision	Yes	Yes	Yes
Rear Axle Housing Removal or Replacement	No	Yes	Yes
Differential Housing Removal or Replacement	No	No	No
Control Arm Replacement	No	Yes	Yes
Control Arm Bushing Replacement	No	No	No
Rear Spring Removal or Replacement	No	No	No
Unversal Joint Removal or Replacement	No	No	No
Driveshaft Center Bearing Replacement	No	No	No
Engine Mount Removal or Replacement	Yes	No	No
Engine Removal and Replacement	Yes	No	No

TROUBLE DIAGNOSIS

In many cases it has been found to be more practical to shim at the center bearing support instead of trying to compensate for adjustment at joint angle (A) and joint angle (C). The center bearing support (which controls joint angle B)) is shimmed by loosening or removing the two attaching bolts under the frame center section and placing shims (use transmission shims) between the frame section and the support (inside the driveshaft tunnel). However, if this is done, joint angles (A) and (C) must be rechecked to see if they are still within specifications.

A. If the complaint is driveline shudder at 20 to 30 mph with four or more passengers, it is probably due to the center angle being too large under the heavier load conditions.

1. Check the axle to frame height dimension. This should be at least 6¼″. If less than 6¼″, corrective steps should be taken to raise rear vehicle height before attempting any propeller shaft shudder correction.
2. Install two No. 3750050 shims under the center bearing mounting and add one No. 3758116 spacer to the existing shim pack at the rear suspension upper control arm attachment (see fig. 46). Road test the vehicle with five or six passengers and one or two passengers.
3. The above action may bring in a lower frequency shudder at approximately 10 mph with only one or two passengers. If this occurs, it can usually be corrected by installing one No. 3750050 shim at the transmission support. Road test the vehicle with one or two passenger load and again with five or six passenger load.
4. If the 20 to 30 mph shudder with five to six passenger load has returned, add one more No. 3750050 shim at the center bearing and road test.

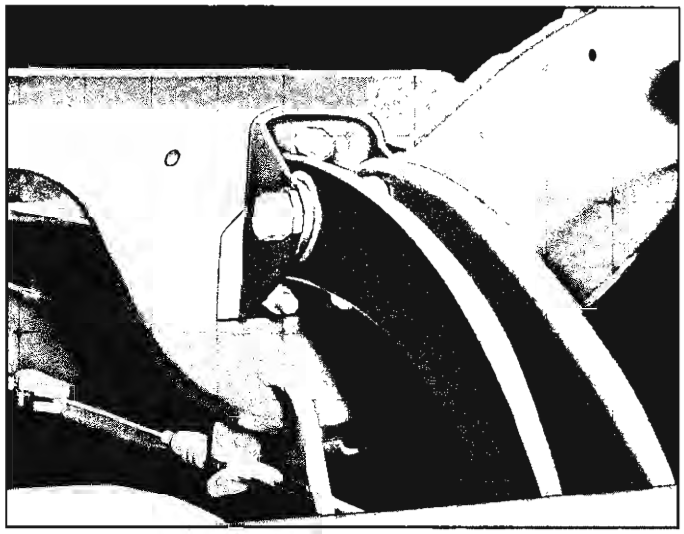

Fig. 46—Rear Shim Location

B. If the complaint is drive line vibration starting at higher vehicle speeds, either the front or rear propeller shaft may be bent or out of balance. Check for undercoat material on the shafts or evidence of a missing balance weight that may have been knocked off the ends of either shaft. Check for a bent shaft by using a dial indicator at the ends and middle of each shaft. Runout limits are .010″ at the ends of the shafts, and .015″ at the center of either shaft. Propeller shaft assembly may have to be removed from vehicle and placed in vee blocks for this check.

C. If the complaint is a shudder or heavy vibration over 30 mph, stop vehicle and run engine at approximately 2400 rpm. If the vibration comes in under this condition, the trouble is engine vibration.

These procedures are a general approach to correcting heavy load propeller shaft shudder and will be effective in a high percentage of the cases. However, if the shudder continues the only solution is to use a double protractor and correct the angle settings as necessary, using the specifications listed below.

Angle Check and Measurement

Front Joint Angle A	Center Joint Angle B*	Rear Joint Angle C	Height D
2½° to 3° 2¾° preferred	−1° to −1½° −1¼° preferred	2¾° to 3¼° 3° desired	6¼″ ± ⅜″

*For all vehicles which are normally and continuously driven at maximum load conditions, angle B may be increased approximately ¼° to ½° in negative direction for more satisfactory results.

NOTE: All angles are measured in relation to a horizontal or level plane as indicated by the bubble in the protractor. A positive or negative angle is determined when the imaginary centerline of a propeller shaft section is above or below the centerline of the following section. Refer to Figure 45.

a. Angle A is normally positive, that is, the engine-transmission centerline is down at the rear in relation to the front propeller shaft centerline.

b. Angle B is normally negative, that is, the centerline of the front propeller shaft is up at the rear in relation to the centerline of the second propeller shaft.

c. Angle C is normally positive, that is, the centerline of the second propeller shaft is down at the rear in relation to the centerline of the pinion shaft.

1. The rear of the car should be supported by the tires or a twin post hoist so that the weight of the car is on the springs. A frame hoist cannot be used.
2. Measure the distance from the top of the axle housing to the frame kickup (dimension D). The measurement should be the same on both sides. The front suspension is critical in this operation since it controls the side to side leveling of the vehicle.
3. Before checking the driveline angles, make a visual check of the transmission support crossmember. For correct assembly, two conditions must exist: (1) the top (upper) surface of this crossmember is tapered, i.e., not parallel to bottom plane of crossmember. This taper must be toward the rear of the vehicle. (2) The crossmember to frame attaching bolts must be in the proper holes. At the point on the frame bracket where the crossmember attaches, there are two holes, one above the other. On all Three-speed and Turboglide equipped vehicles, the upper holes must be used, and for the Powerglide and Overdrive equipped vehicles, the lower holes must be utilized.
4. By the use of a bubble protractor, measure and record the following angles: The angle of the engine crankshaft (equivalent to transmission output shaft) by laying the protractor on the bottom of the oil filter on V-8's or on the oil pan side rail on L-6's (for greatest accuracy, measure this angle on the engine valve rocker cover (fig. 47); the front propeller shaft (fig. 48); the rear propeller shaft (fig. 49); and the axle pinion shaft (fig. 50).

CAUTION: The car must be in properly raised position on a suitable hoist or ramp to measure all angles. When measuring the engine angle, the front fender must not be leaned on or the car in any way be disturbed as this will affect the engine angle and give a false reading.

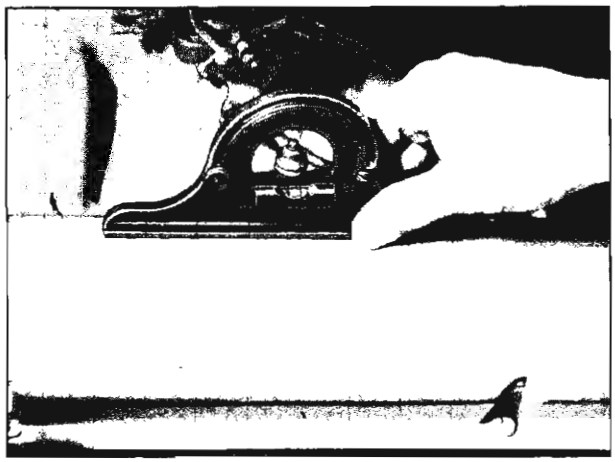

Fig. 47—Measuring Engine Angle

NOTE: To measure the pinion shaft angle, lay the protractor on the bottom machined surface of the "U" joint. The propeller shaft must be rotated until one of four surfaces is parallel to the floor under the hoist.

5. When figuring angles (A), (B), or (C), subtract the rearmost angle from the preceding one (i.e.,

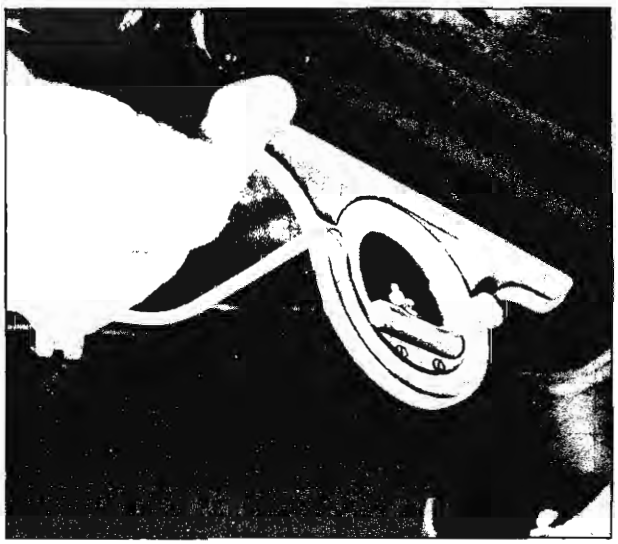

Fig. 48—Measuring Front Propeller Shaft Angle

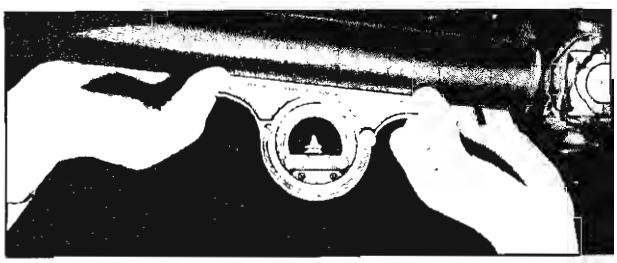

Fig. 49—Measuring Rear Propeller Shaft Angle

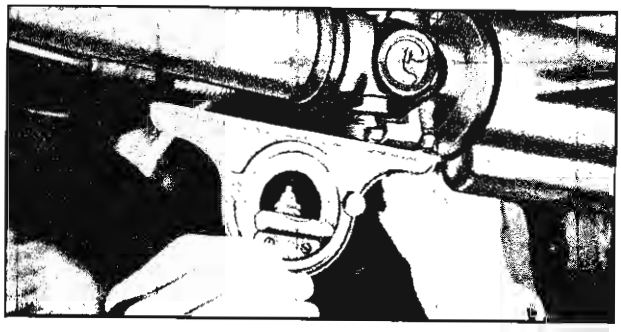

Fig. 50—Measuring Pinion Shaft Angle

engine angle minus front propeller shaft angle for angle (A); front propeller shaft angle minus rear propeller shaft angle for angle (B); rear propeller shaft angle minus pinion shaft angle for angle (C). However, there will be one exception to this rule. That is, when the second angle is "up at rear" higher at rear of protractor than at front) the second angle must be added to the first one. See angle (C)—FIRST EXAMPLE.

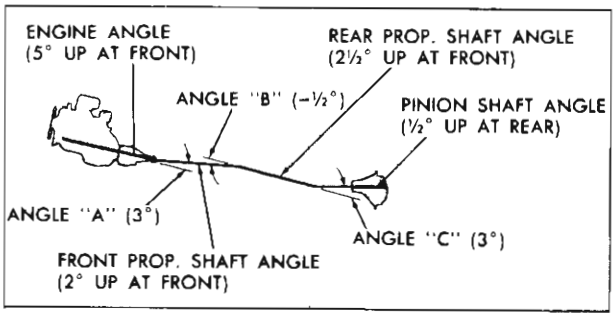

Fig. 51—First Example—Driveline Joint Angles

First Example

Refer to Figure 51.

Engine Angle .....5° up at front
Front Propeller Shaft Angle.....2° up at front
Therefore Front Joint Angle (A) = 3°
Front Propeller Shaft Angle.....2° up at front
Rear Propeller Shaft Angle.....2½° up at front
Therefore—Center Joint Angle (B) = —½°
(minus denotes inverted angle)
Rear Propeller Shaft Angle.....2½° up at front
Pinion Shaft Angle.....½° up at rear
Therefore—Rear Point Angle (C) = 3°

If any of the joint angles are not within the limits of the specified angles, suitable shims should be added or removed at the transmission support and/or the front end of the rear suspension upper control arm until the joint angles are within specified limits.

EXAMPLE: If the front angle is too large, a shim should be inserted under the transmission support. If the rear angle is too small, a shim should be removed from the rear suspension upper control arm front attachment. For shim removal, see Section 3, 12, and 13 of this manual.

NOTE: Always remove or install shims alternately at each location. For example, never add or subtract two shims from one side and none from the other.

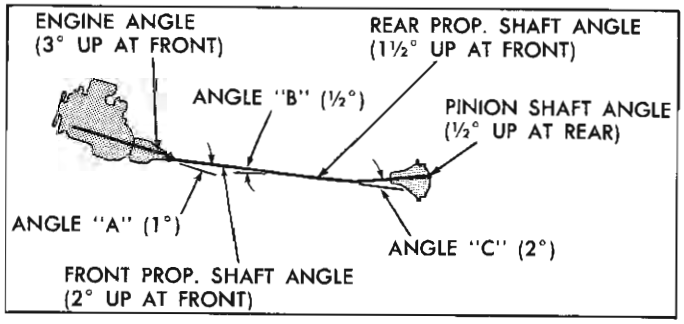

Fig. 52—Second Example—Driveline Joint Angles

Second Example

Refer to Figure 52.

Engine Angle .....3° up at front
Front Propeller Shaft Angle.....2° up at front
Therefore Front Joint Angle (A) = 1°
Front Propeller Shaft Angle.....2° up at front
Rear Propeller Shaft Angle.....1½° up at front
Therefore Center Joint Angle (B) = ½°
Rear Propeller Shaft Angle.....1½° up at front
Pinion Shaft Angle.....½° up at rear
Therefore Rear Joint Angle (C) = 2°

Following the specifications given previously, the proper shimming can be determined. If the front joint angle (A) is too large, shim(s) should be inserted under the transmission support. If the front joint angle (A) is too small shim(s) will have to be removed from under transmission support. If the rear joint angle is too large, shim(s) must be added to the rear suspension, upper arm attachment. If the rear angle is too small, shim(s) must be removed from the rear suspension, upper arm, front attachment.

NOTE: Always remove or install shims alternately at each location. For example, never add or subtract two shims from one side and none from the other.

If corrective measures are made at angles (A) or (C), angle (B) should automatically be corrected. However, if angle "B" is not within the specified limits and vibration is objectionable it may be necessary to insert a shim under the center bearing mounting inside the frame. If it is still impossible to obtain the specified angles, remeasure the height from the top of the axle housing to the bottom of the frame at the

kick-up. If this dimension is not within ± ½" of specified height (gasoline tank full) the rear coil springs may have to be changed. (See Section 3 for "Rear Coil Spring Sag.") If after corrective measures have been made and there is still excessive driveline vibration, the center bearing should be checked for excessive wear, failure of rubber boot or improper assembly.

NOTE: If objectionable vibration occurs and the joint angles are within specified limits (which can exist if one angle is near the high limit and adjacent angle is near low limit) make shim adjustments as outlined above adjusting the angle toward the opposite limit.

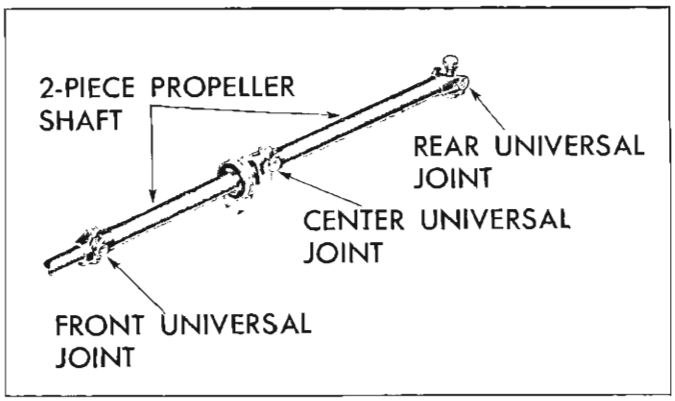

Fig. 53—Propeller Shaft Components

SERVICE OPERATIONS

PROPELLER SHAFTS

Removal

1. Remove two bolts attaching center bearing support to frame X member (fig. 54).

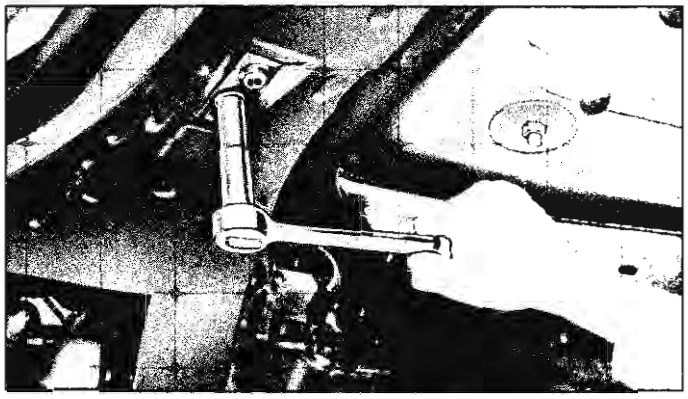

Fig. 54—Removing Center Bearing Support Attaching Bolts

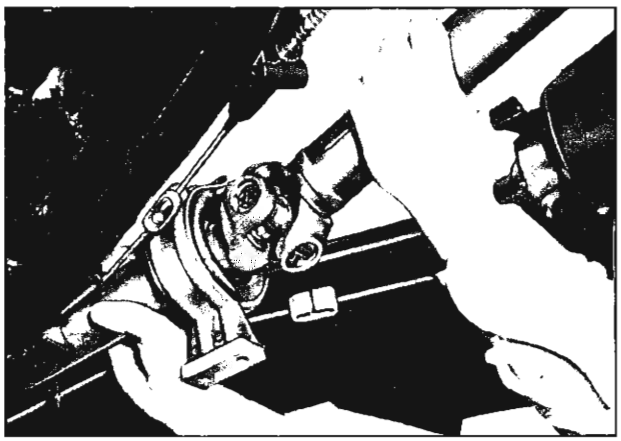

Fig. 55—Removing Propeller Shaft

2. Split the rear universal joint by removing trunnion bearing "U" clamps. Tape bearings to keep them from becoming damaged.
3. Withdraw the propeller shaft and bearing assembly by moving it rearward and to the left passing **under** the axle housing assembly (fig. 55).

Repairs

Universal Joints

1. Remove bearing lock ring from yoke.
2. Support shaft yoke in a bench vise or on a short length of 1¼" pipe.
3. Using soft drift and hammer, drive on one end of trunnion bearing just far enough to drive opposite bearing from yoke (fig. 56).

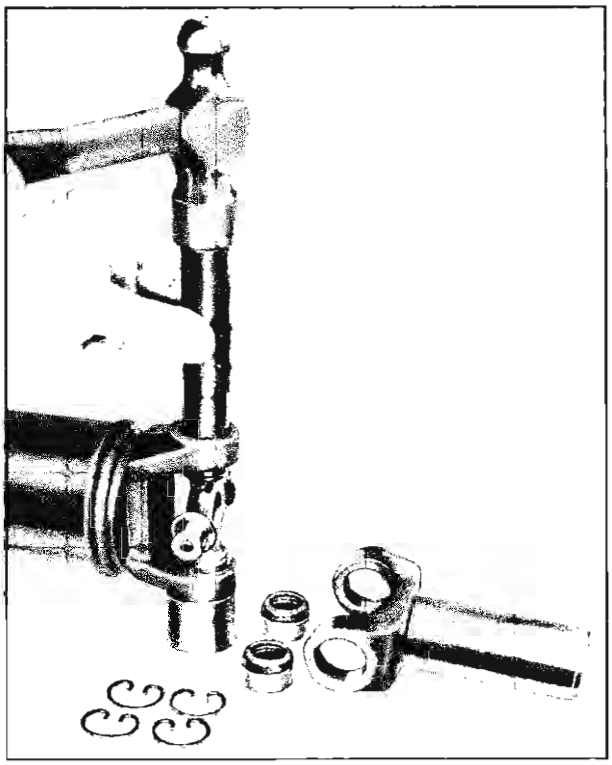

Fig. 56—Disassembling Universal Joint

4. Support the other side of yoke in bench vise and drive other bearing out using brass drift on end of trunnion hub.
5. On other joints, remove trunnions from yokes in a similar manner.
6. Remove trunnion.
7. Clean and inspect bearings. Re-lubricate with a high-melting point wheel bearing type grease.
8. Replace trunnion and press new or relubricated bearings into yokes and over trunnion hubs far enough to install lock rings.
9. Hold trunnion in one hand and tap yoke lightly to seat bearings against lock rings.

NOTE: Replacement of rear axle drive flange is covered in this section.

Center Bearing and Support Assembly

1. Remove bolt attaching center universal joint yoke to front propeller shaft.
2. Remove flat washer from front propeller shaft. Using a suitable tool such as Tool J-2229 and Holder J-358-1 or Tool J-5741 to press outer race of bearing, press off bearing and support assembly from front propeller shaft. Remove remaining flat washer from propeller shaft.

NOTE: The above pressing operation may damage the center bearing. If possible, do not remove bearing unless it is to be replaced.

3. Inspect condition of flat washers and bearing and support, replacing if necessary.
4. Install flat washer on rear end of front propeller shaft.
5. Set center bearing and support assembly on end of shaft, and by pressing on inner race of bearing, (with tool such as J-5813) press on until bearing bottoms on machined step of propeller shaft.
6. Install remaining flat washer. Install front yoke of center universal joint with one attaching bolt.

NOTE: Care must be exercised so that the phasing of the yokes of the front shaft is 90°.

7. Install center universal joint as outlined above.

Installation

1. Ascertain the condition of the slip joint seal in the transmission. Replace if necessary as described in the transmission section of this manual.
2. Insert the propeller shaft and bearing assembly through the frame X member.
3. Slip the front joint front yoke over the transmission output shaft.
4. Connect the rear universal joint by installing the two U bolts. Be sure the trunnions are properly seated in the rear axle drive flange. Torque should be 14-18 ft. lbs.
5. With the car setting at curb height (Axle Height [D] as shown on previous chart) the center bearing mounting should be allowed to fall freely into place over the slotted holes in frame X member and should then be tightened at this position. Tighten center bearing support bolts 15-20 ft. lbs.

TROUBLES AND REMEDIES

PROPELLER SHAFTS AND UNIVERSAL JOINTS

Symptom and Probable Cause	Probable Remedy
Excessive Vibration	
a. Improper driveline angles	a. Adjust driveline angles
b. Worn universal joint	b. Replace worn parts
c. Bent propeller shaft	c. Replace bent shaft
d. Universal joint yoke bearings worn	d. Replace worn parts
e. Runout of pinion flange	e. Relocate or replace
f. Out of balance propeller shaft	f. Replace propeller shaft
Excessive Backlash	
a. Worn universal joints	a. Replace worn parts
b. Worn drive shaft or joint splines	b. Replace worn parts

NOTE: Excessive back lash is usually a fault of the rear axle assembly and very seldom a result of "U" joint or splines.

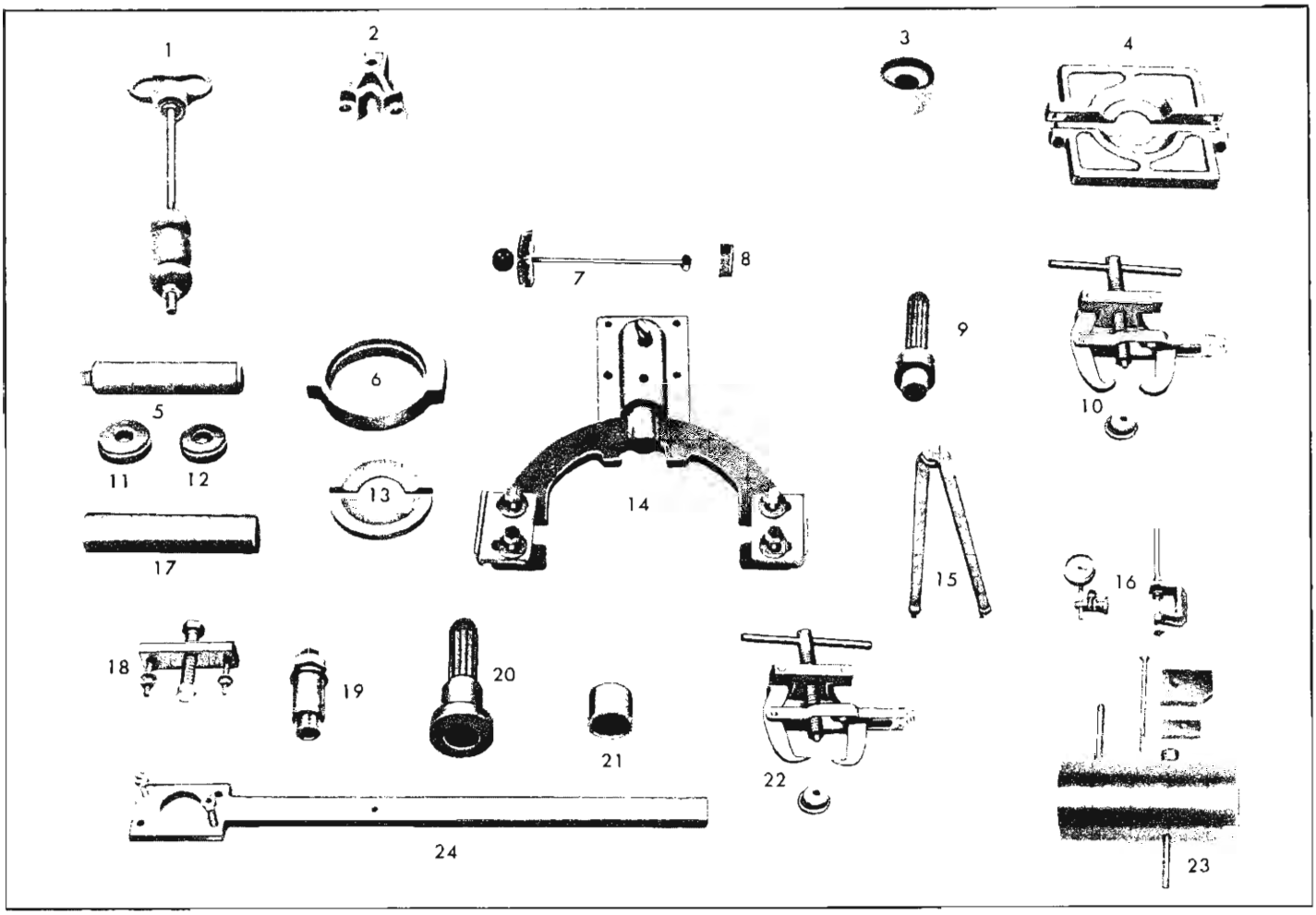

Fig. 57—Rear Axle Special Tools

1.	J-2619-B (J-2654-A)	Slide Hammer
2.	J-5748	Axle Shaft Remover
3.	J-6661	Axle Shaft Bearing Installer
4.	J-5741	Axle Shaft Bearing Remover
5.	J-8092	Driver Handle
6.	J-0358	Press Plate Holder
7.	J-5853	Torque Wrench (0-100 in. lbs.)
8.	J-5810	Torque Wrench Adaptor
9.	J-5768	Differential Side Bearing Installer
10.	J-8107 (TR-278-R)	Differential Side Bearing Puller (All ex. Positraction)
11.	J-8850	Front Wheel Bearing Inner Race Installer
12.	J-8849	Front Wheel Bearing Outer Race Installer
13.	J-7028*	Rear Pinion Bearing Remover
14.	J-3289	Differential Carrier Holding Fixture
15.	J-0972	Differential Side Bearing Adjusting Wrench
16.	J-8001 (KMO-30)	Dial Indicator
17.	J-5590	Transmission Front Bearing Installer
18.	J-0820	Companion Flange Remover
19.	J-5780	Companion Flange Installer
20.	J-5154	Output Shaft Oil Seal Installer
21.	J-5749	Companion Flange Oil Deflector Installer
22.	J-7112	Differential Side Bearing Puller (Positraction)
23.	J-6266-A	Pinion Depth Setting Gauge
24.	J-2637-A	Companion Flange Holding Tool