

SECTION 6-D PROPELLER SHAFT

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6-11 DESCRIPTION OF PROPELLER SHAFT

The propeller shaft assembly consists of a front propeller shaft, a rear propeller shaft, a standard universal joint at each end, and a double-type constant velocity universal joint in the center. See Figure 6-45. A center support bearing attaches the rear end of the front propeller shaft to a drive line support assembly which is in turn attached to the

underside of the body. A splined front yoke on the front end of the rear propeller shaft extends into a splined coupling in the rear end of the front propeller shaft. This slip spline permits the slight lengthening and shortening of the propeller shaft required by the up and down movement of the rear axle assembly.

The constant velocity universal joint is composed of two single joints connected with a special

link yoke. A center ball and socket between the joints maintains the relative position of the two units. This center ball causes each of the two joints to operate through exactly one half of the complete angle between the front and rear propeller shaft. Because the two joint angles are the same, even though the usual universal joint fluctuation is present within the unit, the acceleration of the front joint is always neutralized by the deceleration of the rear

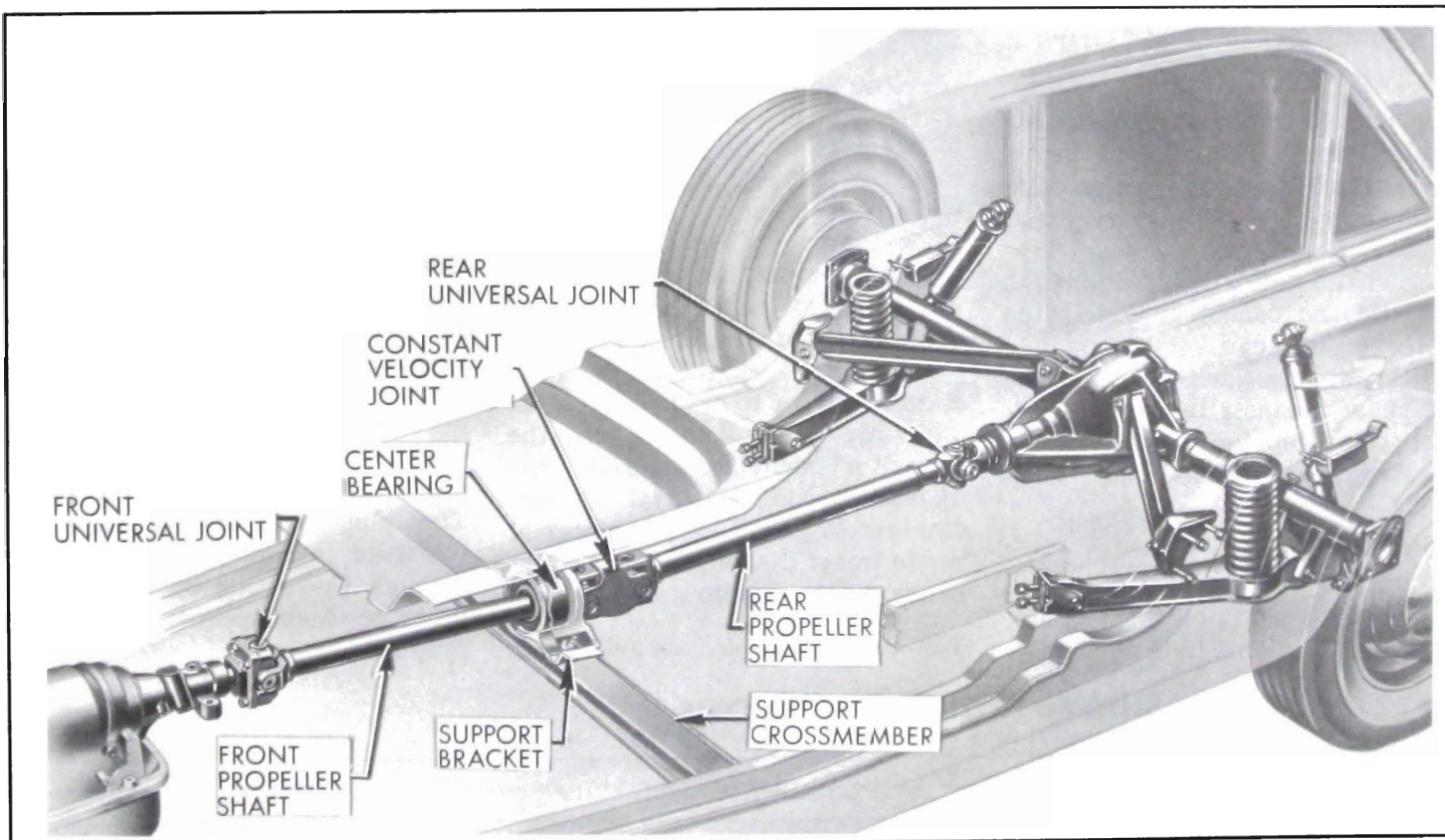


Figure 6-45—Propeller Shaft Assembly

joint, or vice versa. The end result is, the front and rear propeller shafts always turn at a constant velocity.

The center support bearing consists of a sealed bearing, the inner race of which is held against a shoulder at the rear end of the front propeller shaft by a lock nut. The center bearing outer race sets in a metal retainer which has a rubber support cushion bonded to it. The rubber cushion in turn rests in a support bracket which is bolted to a center support cross member which is attached through rubber mounts to the car underbody. A slinger is pressed against the shoulder of the shaft ahead of the center bearing to prevent moisture and dirt from getting into the bearing. The lock nut which retains the center bearing in place also prevents the slip joint from separating. The seal which retains the lubricant in the slip spline is located inside the lock nut. See Figure 6-46.

The propeller shaft assembly requires very little periodic service. The center bearing is lubricated for life and requires no additional lubrication. The universal joints are all lubricated for life and cannot be lubricated while in the car. If a joint becomes worn or noisy, a service kit must be installed which consists of a spider complete with bearing assemblies and snap rings.

Front and rear propeller shafts will not be available separately, but only as a complete assembly.

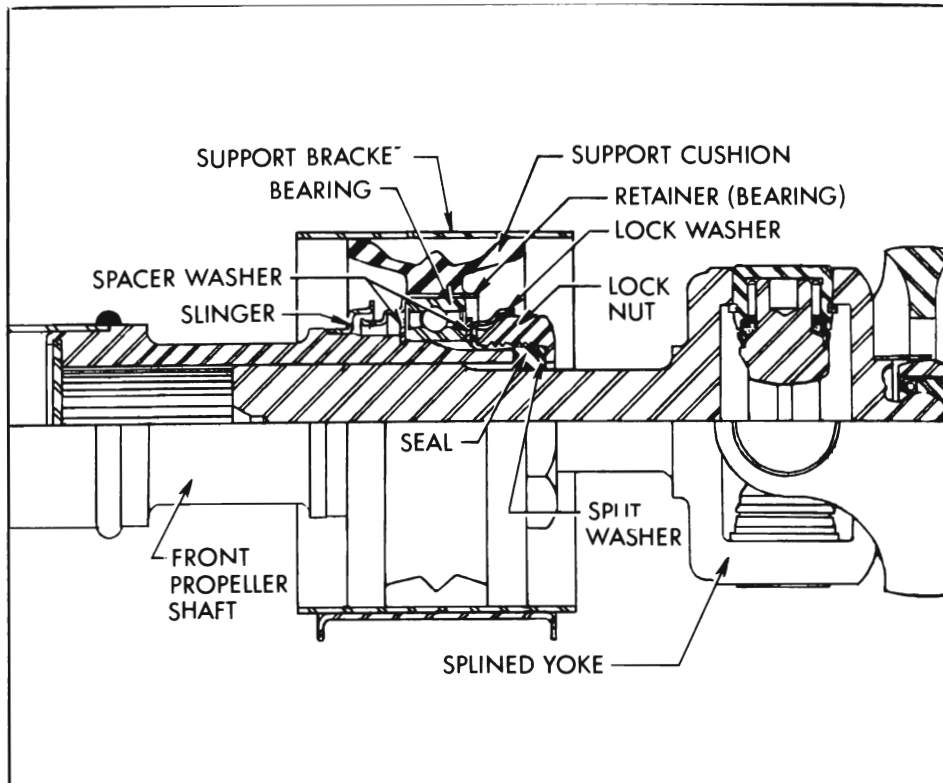


Figure 6-46—Center Support Bearing and Slip Spline

The reason for this is that propeller shafts are balanced in production as complete assemblies. The splined yoke assembly is serviced separately, however.

If any part of the propeller shaft requires repair, it is necessary to remove the complete propeller shaft assembly from the car. The assembly must be handled very carefully to avoid jamming or bending any of the parts.

If the car is to be undercoated, care must be taken to keep the propeller shaft completely free of undercoating material. Undercoating or any other material would upset the balance and might cause a serious vibration.

The center ball and socket cannot

be lubricated in the car. Whenever the constant velocity universal joint is disassembled, however, the ball and socket must be lubricated with Multi-Purpose Grease EP No. 1 Grade.

The slip spline must also be lubricated with Multi-Purpose Grease EP No. 1 Grade every 12,000 miles, or after disconnecting the slip joint for any reason. To lubricate the spline, remove the plug and install a grease fitting. When grease appears at the slip joint nut, remove the fitting and reinstall the plug. The plug must be in place as lubricant would be thrown out through the fitting by centrifugal force at high speeds. See paragraph 1-4.

6-12 PROPELLER SHAFT TROUBLE DIAGNOSIS

COMPLAINT	POSSIBLE CAUSE	REMEDY
Shudder on acceleration low speed	Improperly adjusted rear joint angle	Check and adjust using Kent-Moore alignment gauge.

6-12 PROPELLER SHAFT TROUBLE DIAGNOSIS (Cont'd.)

COMPLAINT	POSSIBLE CAUSE	REMEDY
Shudder on acceleration low speed (Cont'd.)	Incorrect plan view joint angles Improper yoke phasing	Use Kent-Moore alignment gauge cable and weighted strings from engine pulleys and propeller shaft to align shaft in plan view. Check for correct yoke phasing and correct if necessary (See Figure 6-76)
Roughness or vibration any speed	Improper yoke phasing Bent or dented shaft Tight universal joints Worn universal joints U-Joint retainer bent against bearing cup Undercoating on shaft Incorrect U-bolt torque Burrs or gauges on companion flange snap ring location surfaces Incorrect rear joint angle (usually too large an angle) Tire unbalance Shaft or companion flange unbalance combination	Correct as above Replace Impact yokes with hammer to free up. Replace joint if unable to free up or if joint feels rough when rotated by hand. See Figures 6-67 and 6-72. Replace Replace Clean up shaft Check and correct - (12-15 ft. lbs.) Replace companion flange if it can't be reworked Check and adjust using Kent-Moore alignment gauge. Balance wheel and tire assembly or replace from known good car. 1. Check for missing balance weights. 2. Remove and reassemble shaft to companion flange 180° from initial location. 3. Remove and replace companion flange on transmission output shaft or rear axle pinion 180° from initial location. 4. Rebalance.
Roughness on heavy acceleration (short duration)	CV joint ball seats worn Seat spring set or broken	Replace with ball seat repair kit.

6-12 PROPELLER SHAFT TROUBLE DIAGNOSIS (Cont'd.)

COMPLAINT	POSSIBLE CAUSE	CORRECTION
Roughness usually at low speeds, light load, 15-35 MPH	Improperly adjusted joint angles usually rear joint angle is too large.	Check and adjust rear joint angle using Kent-Moore alignment gauge.
Whine or whistle	Center support bearing	Place car on hoist with rear wheels free to rotate and diagnose for source of noise. Replace center support bearing if found to be noisy.
Squeak	Lack of lubricant or worn CV joint centering ball	1. Lube 2. Replace with ball seat or splined yoke kit if lube does not correct.
Knock or click	Worn CV joint centering ball	Replace with splined yoke or ball seat replacement kit
	Loose upper or lower control arm bushing bolts	Tighten bolts
Scrapping noise	Slinger on companion flange rubbing on rear axle carrier	Straighten out slinger to remove interference.
	Slinger at center bearing loose and rubbing	Replace slinger.

6-13 REMOVAL OF PROPELLER SHAFT

Before removing the propeller shaft, the complete drive train, including the front companion flange and the rear pinion flange, must be marked for reassembly in the same relative position. Unless correctly assembled, out-of-balance vibration may result. The propeller shaft must be removed as a complete assembly. The assembly must be supported during handling out of the car to avoid jamming or bending any of the parts. See Figures 6-47, 6-48, 6-49 on correct method of handling.

1. At front companion flange, bend up lock plate tabs and re-

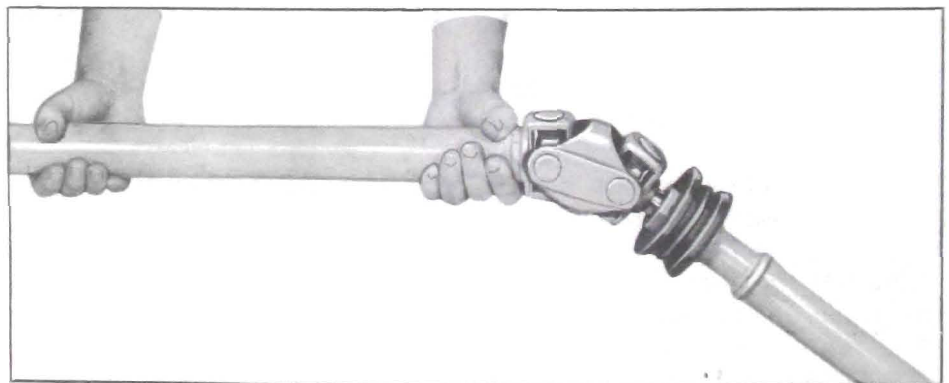


Figure 6-47—Do Not Carry Propeller Shaft in This Manner

move U-bolt clamps from front universal joint. NOTE: If universal joint bearings are not retained on spider with a connecting strap, use tape or wire to secure bearings.

2. At rear pinion flange, bend up lock plate tabs and remove U-bolt clamps from rear universal joint. Support rear end of propeller shaft to avoid damage to constant velocity universal joint.

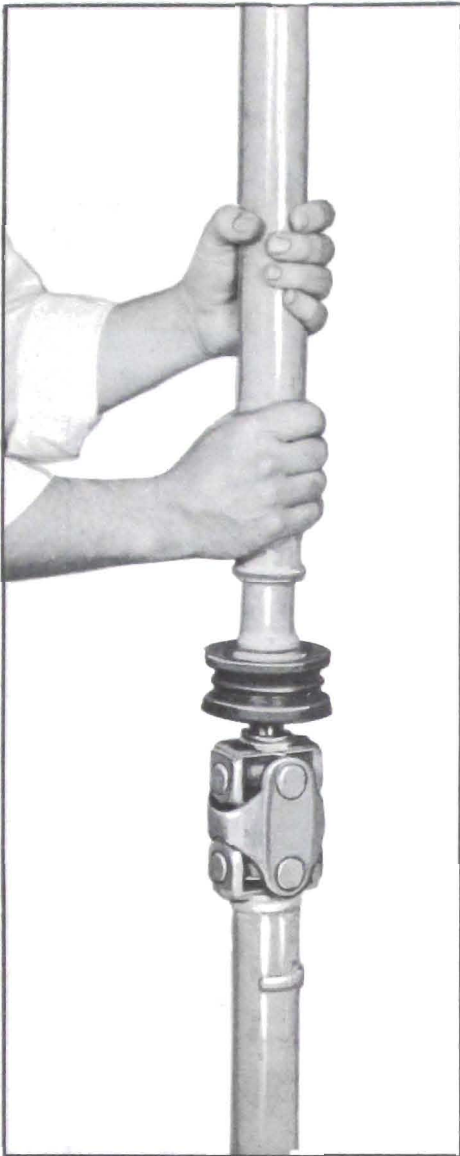


Figure 6-48—Shaft May Be Carried in This Position

3. Remove four center support cross member bolts and lower complete propeller shaft and center support cross member assemblies. Remove assembly to bench. The cross member can now be disconnected.

6-14 DISASSEMBLY OF PROPELLER SHAFT

For ease in handling, and to help prevent damage to the constant velocity universal joint, the front and rear propeller shafts should

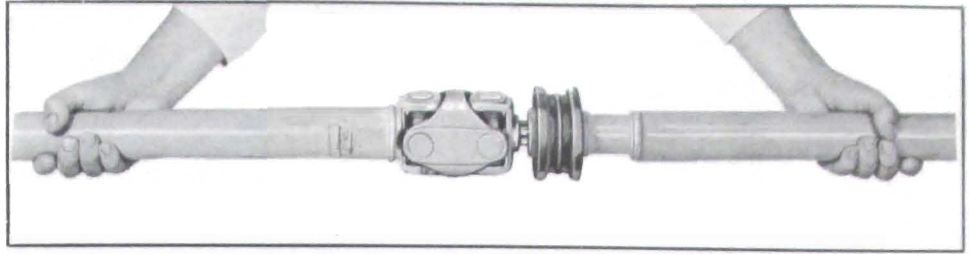


Figure 6-49—Good Method of Handling Propeller Shaft

be separated at the slip joint before any service operations are attempted. **CAUTION:** Never clamp propeller shaft tubing in a vise as the tube is easily dented. Always clamp on one of the yokes.

a. Disassembly of Slip Joint

1. Pry up rim of lock washer to disengage flats on bearing locknut. Loosen locknut using Tool J-21009 until free of threads and slide locknut and seal against constant velocity joint. See Figures 6-51 and 6-52.

2. Slide rear propeller shaft from front propeller shaft, making certain that index spring wire in splines is not lost.

b. Removal of Center Bearing

1. Position the center bearing assembly in the jaws of a vise supported around the slinger, but not on, as this slinger is a press fit on the shaft and must remain so. Drive off the propeller shaft with a soft hammer. See Figure 6-53.

2. Place the center bearing assembly on a bench and bend back the 3 lock tabs securing the center bearing.

3. Use Tool J-6269-3 (Differential Side Bearing Cup Remover) to bear against the center bearing and drive the bearing out of the assembly. See Figure 6-54.

. Disassembly of Constant Velocity Universal Joint

All yokes must be marked before disassembly for reassembly in their original positions to maintain proper balance. For ease of disassembly remove the bearings from the link yoke and the spider from the splined yoke first. See Figure 6-55.

1. Remove snap rings from the bearings. The snap rings are on the inside of the link yoke and can be removed with the assistance of Tool J-9522-1. See Figure 6-56.

2. Set up J-6180-01 Power Ram and J-6207 Hydraulic Pump in preparation for removing the propeller shaft bearings. With this use Axle Bearing and Retainer Replacer J-8853 as a base plate. Attach Adapter J-9522-2 onto the ram screw. See Figure 6-57.

3. Position propeller shaft constant velocity joint into the fixture as set up in Step 2 with the link yoke bearing over the hole in J-8853 Replacer. Install spider press J-9522-4 on spider. See Figure 6-57. The notches in the spider press are offset so that this press can be positioned on the spider without interference from the link yoke casting.

With tools in position, actuate the pump and force the spider against the lower bearing, pushing the bearing as far out of the yoke and through the hole in Tool J-8853 as possible.

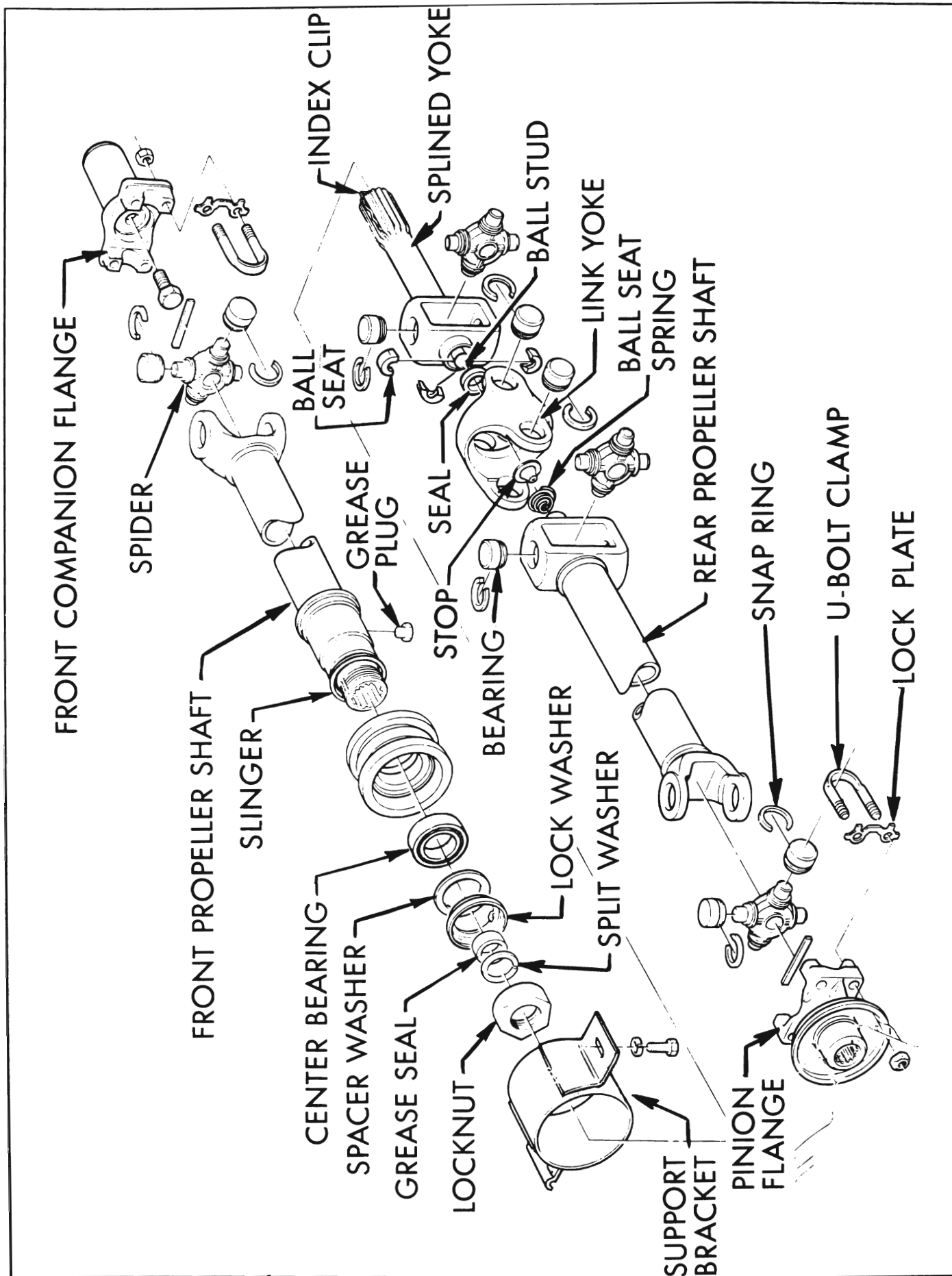


Figure 6-50—Exploded View—Buick Propeller Shaft (4-Speed Synchronmesh Shown)

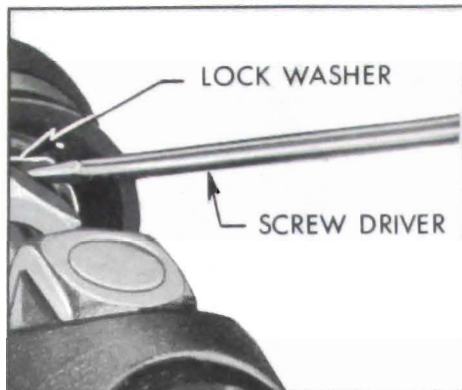


Figure 6-51—Disengaging Lock Washer

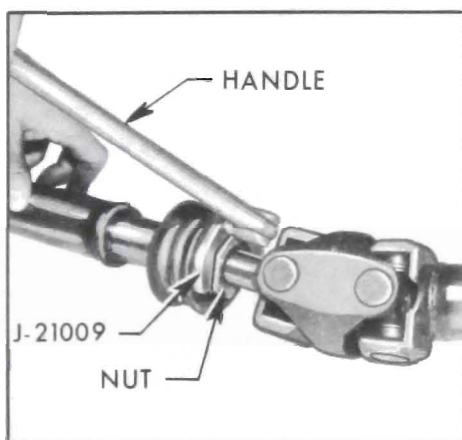


Figure 6-52—Removing Slip Spline Nut

4. Release the pump and remove the propeller shaft. Install Spacer J-9522-6 over the spider journal at the space provided with the bearing forced partially through the link yoke. See Figure 6-58. Reposition propeller shaft in fixture as before and force the bearing completely out of the yoke with the added assistance of the spacer.

5. Release the pump and the propeller shaft. Install Guide J-9522-9 through the bearing hole in the link yoke and over the journal end of the spider. See Figure 6-59. This guide assures alignment of the spider while removing the opposite bearing.

6. Install Spacer J-9522-6 adjacent to the bearing as in Step 4

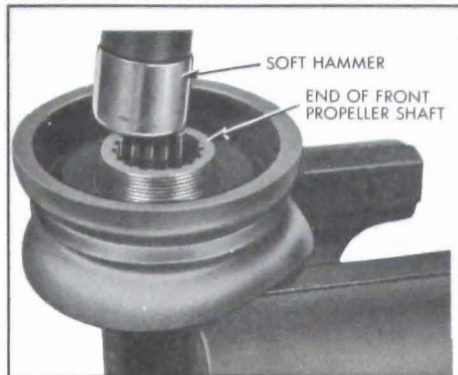


Figure 6-53—Removing Center Bearing From Propeller Shaft



Figure 6-54—Removing Center Bearing

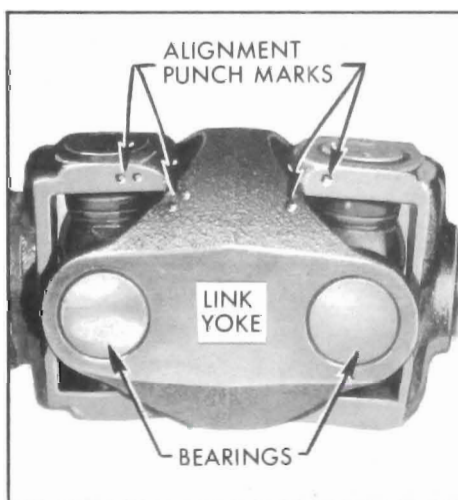


Figure 6-55—Link Yoke Showing Alignment Punch Marks

and remove the bearing. See Figure 6-60.

7. Repeat Steps 3, 4, 5 and 6 to remove other bearings until the propeller shaft is disassembled

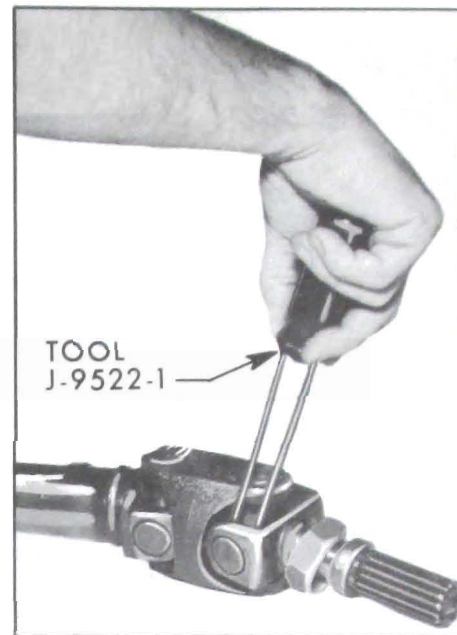


Figure 6-56—Removing Snap Rings From Propeller Shaft

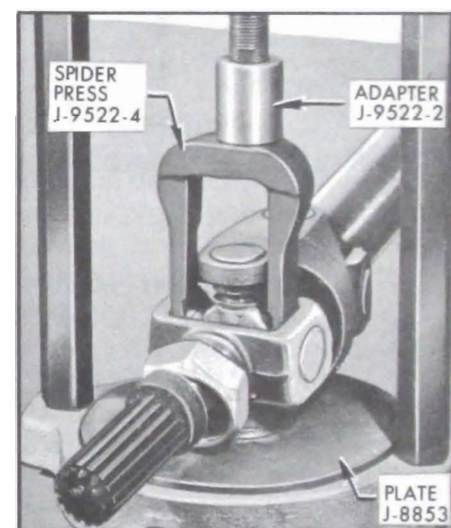


Figure 6-57—Pressing Out Bearing

to a point desired or until the spider can be slipped out of the link yoke.

d. Disassembly of Ball Stud Seat

1. Position the propeller shaft yoke in a vise so that the ball stud seat is accessible for removal.

2. With a screwdriver pry out the seal and remove the ball

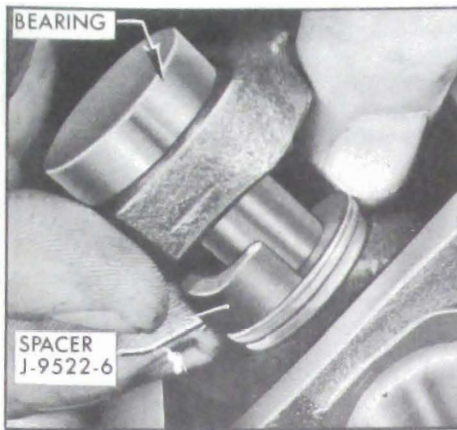


Figure 6-58—Installing Spacer

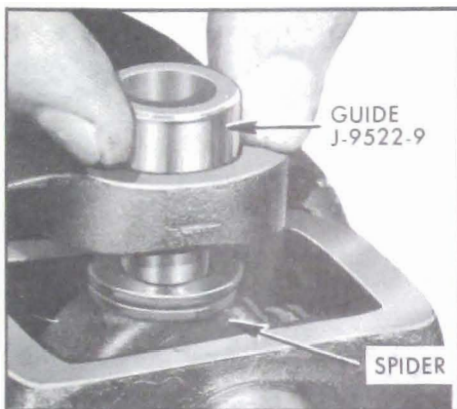


Figure 6-59—Installing Guide

seats. If the propeller shaft is for a 4-speed synchromesh-equipped Buick, next remove the ball seat stop and ball seat spring. On all other shafts remove the ball seat stop, spring, ball stud spring seat, and gasket.

e. Disassembly of the Front and Rear Universal Joints

1. Remove snap rings from the bearings. The snap rings are on the inside of the yoke and can be removed with the aid of Tool J-9522-1. See Figure 6-61.

2. Set up J-6180-01 Power Ram and J-6207 Hydraulic Pump in preparation for removing the propeller shaft bearings. With this use Axle Bearing and Retainer Replacer J-8853 as a base plate. Attach Adapter J-9522-2 onto the ram screw. See Figure 6-62.

3. Position the propeller shaft

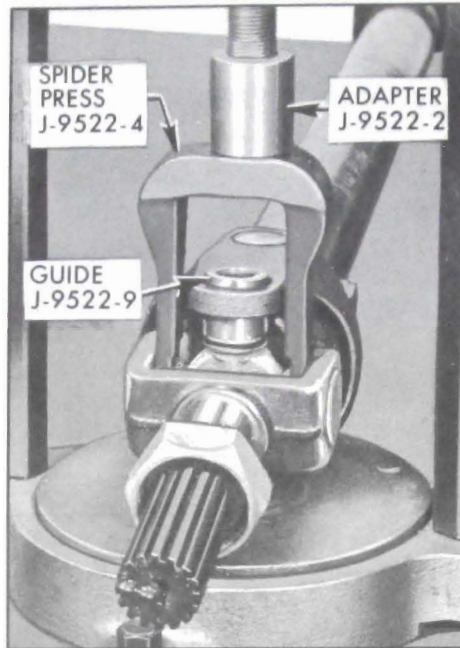


Figure 6-60—Removing Bearing With Guide and Spacer in Place

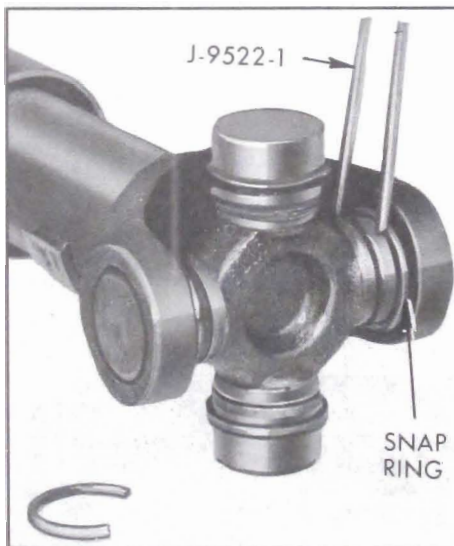


Figure 6-61—Removing Snap Rings From Propeller Shaft

universal joint into the fixture as set up in Step 2 with a bearing over the hole in Replacer J-8853. Install Spider Press J-9522-4 on spider. See Figure 6-62.

With tools in position actuate the pump and force the spider against the lower bearing, pushing the bearing as far out of the universal joint and through the hole in Tool J-8853 as possible.

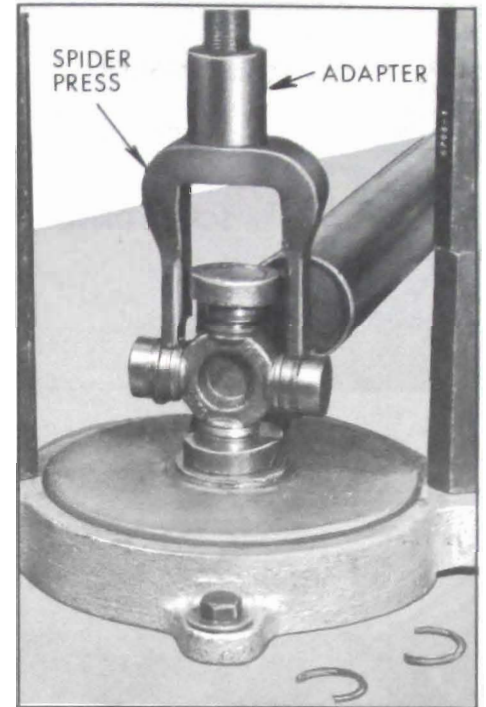


Figure 6-62—Pressing Out U-Joint Bearing

4. Release the pump and remove the propeller shaft. Install Spacer J-9522-6 over the spider journal at the space provided with bearing forced partially through the yoke. See Figure 6-63. Reposition the propeller shaft in the fixture as before and force the bearing completely out of the yoke with the added assistance of the spacer.

5. Release pump and propeller shaft. Install Guide J-9522-9 through the bearing hole in the

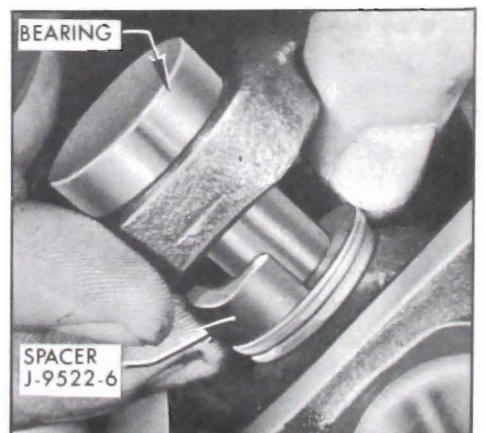


Figure 6-63—Installing Spacer

yoke and over the journal end of the spider. See Figure 6-64. This guide assures alignment of the spider while removing the opposite bearing.

6. Install Spacer J-9522-6 adjacent to the bearing as in Step 4 and remove the bearing. See Figure 6-65.

7. Repeat Steps 3, 4, 5 and 6 to remove other bearings until the

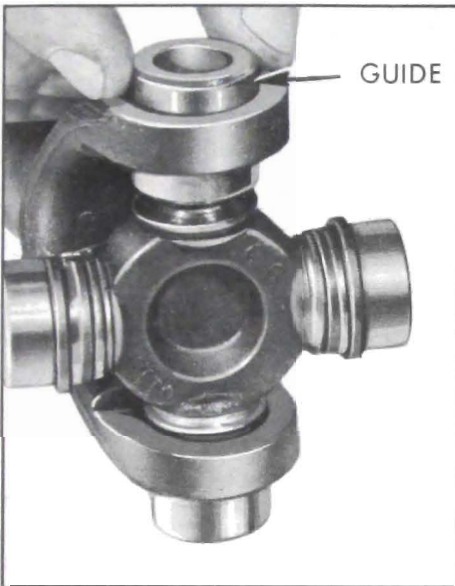


Figure 6-64—Installing Guide on U-Joint

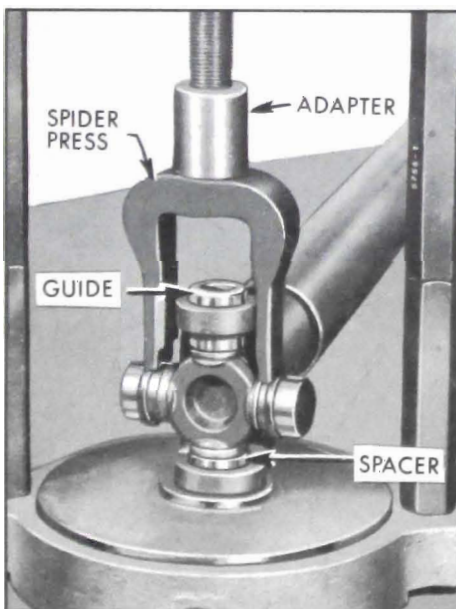


Figure 6-65—Removing Bearing With Guide and Spacer in Place

propeller shaft is disassembled to a point desired.

6-15 ASSEMBLY OF PROPELLER SHAFT

a. Assembly of Front and Rear Universal Joints

When inspection indicates any worn or damaged universal joint parts, always install a complete universal joint repair kit. Repair kits are listed in the Buick Parts Book under Gr. 5.442 and include a spider, four bearings, and four snap rings.

1. Position the new spider inside the yoke; it may face either direction. Make certain that the spider dust shields are not damaged upon installation.

2. Make certain that the bearings have a full set of rollers, are packed with lubricant, and that the seals are in position. Multi-purpose Universal Joint bearing grease #2 grade should be added to bearings if they might be dry, although new bearings are normally pre-lubricated as received from the source.

Place the assembly in position with Power Ram J-6180 and Pump J-6207 as shown in Figure 6-66. Position the bearing straight over the hole in the yoke. Carefully pull up the spider so that the spider journal enters the loose bearing. With the pump force the bearing into the yoke continuing to hold the spider up in this bearing. Failure to do this could cause the bearing needles to become dislodged if the journal was engaged incorrectly.

When the bearing is correctly positioned in the yoke turn the assembly over. Again place the bearing over the hole in the yoke. Carefully slide the spider partially out of the previously seated

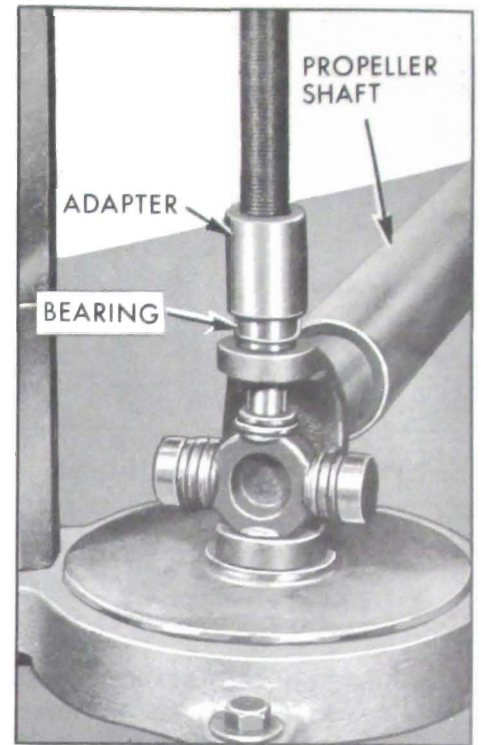


Figure 6-66—Pressing Bearing Into Place

bearing and start it carefully into the bearing being installed. This is to prevent the needles from the bearing from burring the edge of the spider journal if forced over this journal other than straight. Even slight burring of the journal can cause premature failure.

While pressing bearings into position, move the spider back and forth to make certain that the spider journals engage the bearings squarely to avoid damage and binding. If binding exists, remove the bearings and spider and examine for dislodged rollers or damaged journals.

3. Install the balance of the bearings necessary to complete the assembly, observing the previous precautions, and install snap rings.

4. Strike the yoke with a hammer to fully seat the snap rings against the yoke. Turn the spider to make certain that it is free. See Figure 6-67.

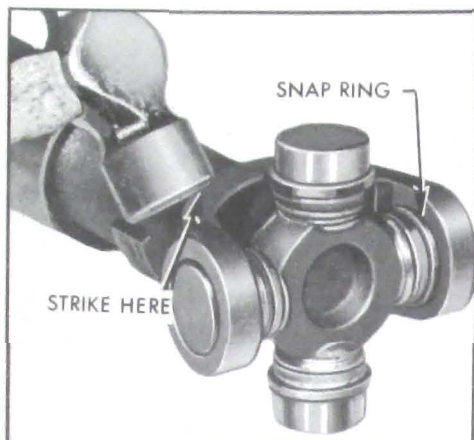


Figure 6-67—Seating U-Joint Snap Rings

b. Assembly of the Ball Stud Seat

Examine the ball stud and ball stud seats for scores or wear. Worn seats can be replaced by using a replacement kit, Gr. 5.442. Since the ball stud is an integral part of the splined yoke, any scoring of this part requires the replacement of this splined yoke. This assembly is also available in kit form, Gr. 5.442.

4-Speed Synchronesh Propeller Shaft

1. Clean out the seat cavity thoroughly.
2. Make certain that the spring peg is in position in the hole in the bottom of the seat cavity.
3. Install spring, small end first.
4. Pack cavity with EP #1 Grease.
5. Install spring stop so that small end enters the large opening in the spring. See Figure 6-68.
6. Install ball stud seats.
7. Apply Permatex or similar sealer on the outer diameter of the seal to insure adequate sealing and install seal with its lip towards the seat using Tool J-9738. Seat until flush.
8. Lightly coat surface of ball seats with EP #1 Grease.

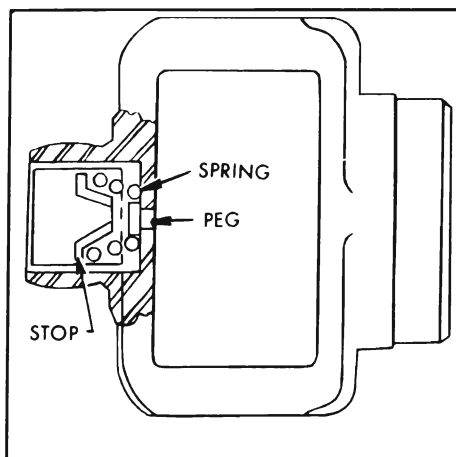


Figure 6-68—Stop, Spring, and Peg Position in 4-Speed Propeller Shaft

Other Propeller Shafts

1. Clean out the seat cavity thoroughly.
2. Install spring seat gasket. See Figure 6-69.
3. Install ball stud spring seat.
4. Install spring.
5. Pack cavity with EP #1 grease.
6. Install ball seat stop over spring.
7. Install ball seats.

8. Apply Permatex on the outer diameter of the seal to insure adequate sealing and install seal with its lip towards the seat using Tool J-9738. Seat seal until flush. See Figure 6-70.

9. Lightly coat surface of ball seats with EP #1 grease.

c. Assembly of Constant Velocity Universal Joints

All yokes must be carefully assembled using the marks made before disassembly to assure balance maintenance of the complete propeller shaft assembly.

When inspection indicates any worn or damaged CV Universal Joint parts, always install a complete repair kit. Repair kits are listed in the Buick Parts Book under Gr. 5.442 and include a spider, 4 bearings and 4 snap rings.

1. Make certain that the bearings have a full set of rollers, are packed with lubricant, and that the seals are in position. Multi-Purpose universal joint bearing

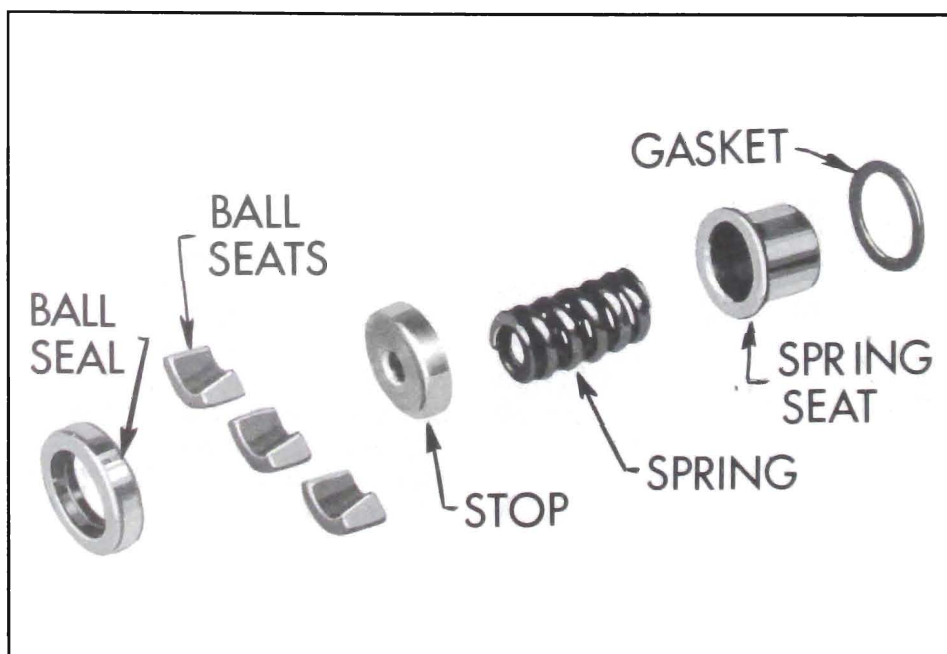


Figure 6-69—Ball Seat Stop - Exploded View

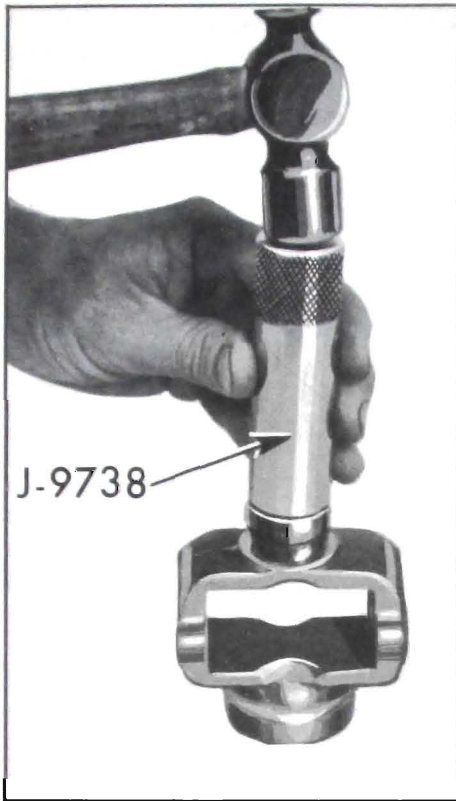


Figure 6-70—Installing Ball Seat Seal

grease, #2 grade should be added to bearings if they might be dry, although new bearings are normally pre-lubricated as received from the source.

2. For ease of assembly use the following sequence to assemble the Constant Velocity Universal Joint:

a. Connect the link yoke to the rear propeller shaft as outlined in Step 3 below.

b. Insert a new spider without bearings into the splined shaft yoke.

c. Position the ball stud into the ball stud seat while working the spider journals into the holes in the link yoke. Make certain that the spider dust shields are not damaged upon installation.

3. Place the assembly in position with Power Ram J-6180 and Pump J-6207 as shown in Figure 6-71. Position the bearing straight over the hole in the yoke. Carefully

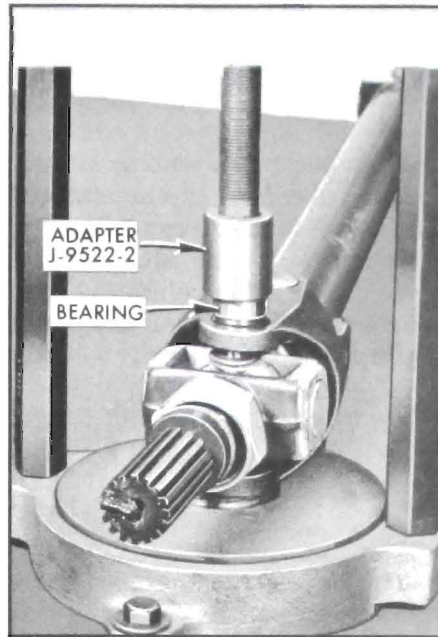


Figure 6-71—Pressing Bearing Into Position

pull up the spider so that the spider journal enters the loose bearing. With the pump force the bearing into the yoke, continuing to hold the spider up in this bearing. Failure to do this could cause the bearing needles to become dislodged if engaged incorrectly.

When the bearing is correctly positioned in the yoke, turn the assembly over. Again place the bearing over the hole in the yoke. Carefully slide the spider partially out of the previously seated bearing and start it carefully into the bearing being installed. This is to prevent the needles from the bearing from burring the edge of the spider journal if forced over this journal other than straight. Even slight burring of the journal can cause premature failure.

While pressing bearings into position, move the spider back and forth to make certain that the spider journals engage the bearings squarely to avoid damage and binding. If binding exists, remove the bearings and spider and examine for dislodged rollers or damaged journals.

4. Install the balance of the bearings necessary to complete the assembly and install snap rings.

5. Strike the yoke with a hammer to fully seat the snap rings against the yoke. Turn the spider to make certain that it is free. See Figure 6-72.

NOTE: If a new splined yoke assembly was used, the car should be carefully roadtested for possible vibration caused by an out of balanced propeller shaft. If propeller shaft vibration is encountered see the procedure for balancing this assembly in paragraph 6-18.

d. Installation of Center Bearing

1. Install washer and new bearing into the center bearing retainer and drive bearing into place in this assembly with Installer J-7013-24 and J-7013-1 handle (Flight Pitch tools). Bend lock tabs to secure bearing. See Figure 6-73.

2. Pack both sides of the bearing with waterproof #5 grade grease to keep out water and dirt. Position the bearing assembly on the propeller shaft. With center bearing Installer J-21007 drive the

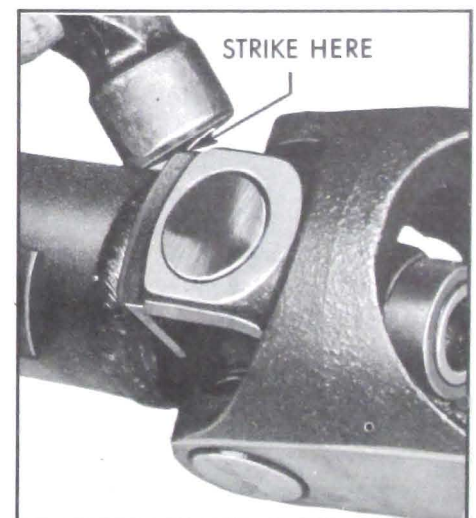


Figure 6-72—Seating Snap Rings

bearing assembly against its seat on the propeller shaft. See Figure 6-74.

e. Assembly of Slip Joint

1. Make certain that the locknut, split washer and seal are in place on the smooth part of the spline shaft. Make certain that the index spring wire is in place in the splines. Also make certain that the large lock washer is in place

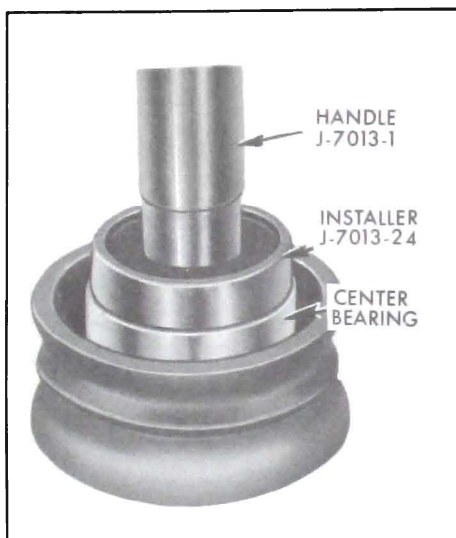


Figure 6-73—Installing Center Bearing on Lower Series

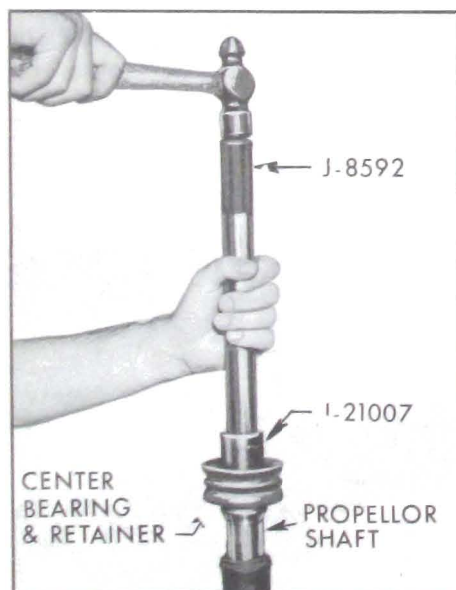


Figure 6-74—Installing Center Bearing on Propeller Shaft

on the rear end of the front propeller shaft. Apply ample Multi-Purpose E.P. #1 Grease to splines and cavity.

2. Align the index spring with the missing internal spline in the rear end of the front propeller shaft, and slide the slip joint together. See Figure 6-75. See Figure 6-76 for proper phasing of the propeller shaft.

3. Install the locknut and tighten securely to 65 ft. lbs. using Wrench J-21009.

4. Bend in the rim of the lock washer to engage the flat of the locknut firmly.

6-16 INSTALLATION OF PROPELLER SHAFT

The propeller shaft must be supported carefully during handling to avoid jamming or bending any of the parts.

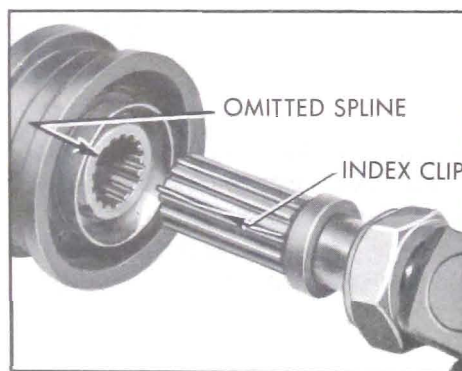


Figure 6-75—Assembling Slip Joint

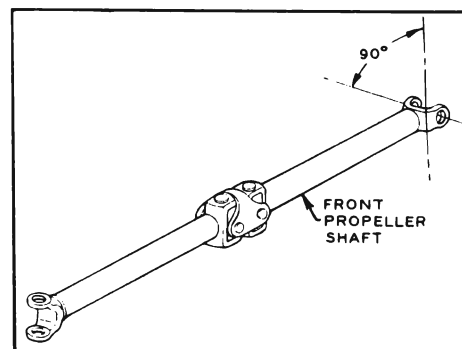


Figure 6-76—Propeller Shaft Phasing

1. Attach center support cross member to center bearing support bracket, support complete assembly adequately to prevent excessive bending of the propeller shaft and install to car underbody with four bolts attaching cross member to body.

2. Make certain rear universal joint mark is aligned with the pinion flange mark, then install U-bolts, lock plates and nuts. The bearing and spider assembly must be started straight and seated in the companion flange so that no burr is formed by the snap rings gouging the locating surfaces of the companion flange when entering. Use 4 in. C-clamp if necessary to compress bearings so that snap rings do not contact companion flange bearing surface. See Figure 6-77. Replace the flange if it has been gouged or burred. Torque nuts evenly to 15 ft. lbs., using an extension such as J-9113-01 torque wrench. Bend lock tabs against nuts. See Figure 6-78.

3. Make certain front universal joint mark is aligned with the front companion flange mark, then install U-bolts, lock plates and nuts. Follow the same precautions

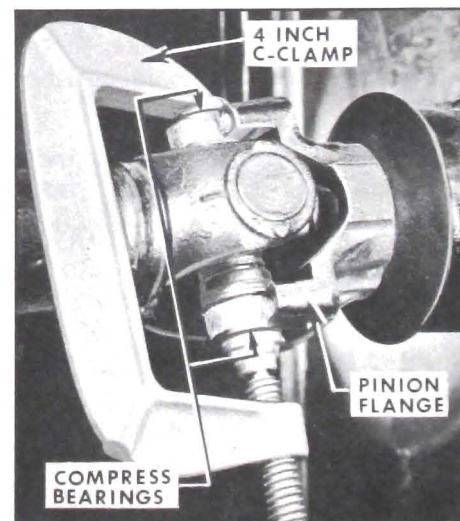


Figure 6-77—Using C-Clamp to Install a U-Joint

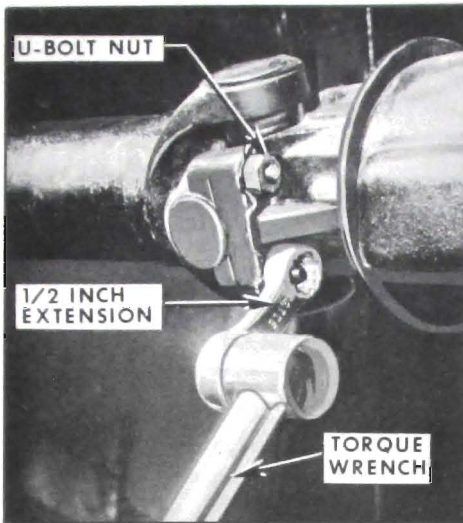


Figure 6-78—Using Extension to Torque U-Bolt Clamps

as in Step 2 and torque nuts evenly to 15 ft. lbs. and bend lock plate tabs against nuts.

4. Lubricate slip spline by removing plug and installing a grease fitting. Fill with Multi-Purpose Grease EP #1 Grade, then remove fitting and reinstall plug. See paragraph 1-4.

6-17 ADJUSTMENT OF REAR UNIVERSAL JOINT ANGLE

When torque is transmitted through any ordinary universal joint, the driven yoke fluctuates slightly in speed. In other words, although the driving yoke rotates at a constant speed, the driven yoke speeds-up and slows-down twice per revolution. This fluctuation of the driven yoke is in direct proportion to the angle through which the universal joint is operating; the greater the angle, the greater the fluctuation.

Whenever two universal joints are used, this fluctuation effect can be eliminated by staggering the joints so that the two driving yokes are 90° apart provided the two joints are transmitting torque through the same angle.

Therefore, when two universal joints are used, the angles through which they operate must be very nearly the same. This allows the alternate acceleration and deceleration of one joint to be offset by the alternate deceleration and acceleration of the second joint. When the two joints do not run at approximately the same angle, operation is rough and an objectionable vibration is produced.

In addition, universal joints are designed to operate safely and efficiently within certain angles. If the designed angle is exceeded, the joint may be broken or otherwise damaged.

The front universal joint angle is actually the angle between the engine-transmission centerline and the front propeller shaft. This angle is determined by the design of the body assembly. Since this angle is not liable to change with use, no method has been established for adjusting this front joint angle.

The center constant velocity universal joint, just as the name implies, transmits at a constant velocity regardless of the angle through which it is operating. Therefore, no means is provided or needed for adjusting the constant velocity joint.

The rear universal joint angle, however, is carefully adjusted at the factory, using shims between the forward ends of the lower control arms and the body. These shims cause the rear axle housing to rotate, thereby changing the angle of the drive pinion in relation to the angle of the rear propeller shaft. If, for any reason, this original factory setting is changed, roughness and objectionable vibration could result. Therefore, if there is a severe rear end collision, or if the axle housing or any control arms are replaced, the rear universal joint angle should be checked and corrected if necessary.

Since it is very difficult to measure rear universal joint angle using a bubble protractor, a simple method has been developed using a spring-loaded steel cable stretched between the front of the chassis and the rear axle carrier. When the rear universal joint angle is adjusted correctly, this steel cable will clear the underside of the pinion flange by a definite amount. Therefore, if this single direct measurement is within specified limits, the rear universal joint angle is correct; if this measurement is out of limits, the joint angle is not correct.

Rear universal joint angle is checked using Alignment Set J-8973. This set also contains two pieces, J-8973-22 and J-8973-23 which are used for front end alignment only.

The spacer blocks in the set are designed to raise the rear of the car above normal trim height. Use of these blocks makes certain that the rear universal joint angle will be checked at a predetermined trim height. These blocks must be used since rear universal joint reading varies at different trim heights and the only reference dimension given is for the particular height block supplied.

The front end of the cable is equipped with two attaching brackets so that the cable may be used on all series 1963 Buicks. The rear end of the cable has stops attached at various points to allow the cable to be placed in tension on all wheelbase Buicks.

Check and adjust rear universal joint angle using the following procedure:

If the work is to be done with the aid of a hoist, a drive-on hoist is preferable. A frame contact lift hoist cannot be used because alignment spacers must be inserted between the axle tubes and

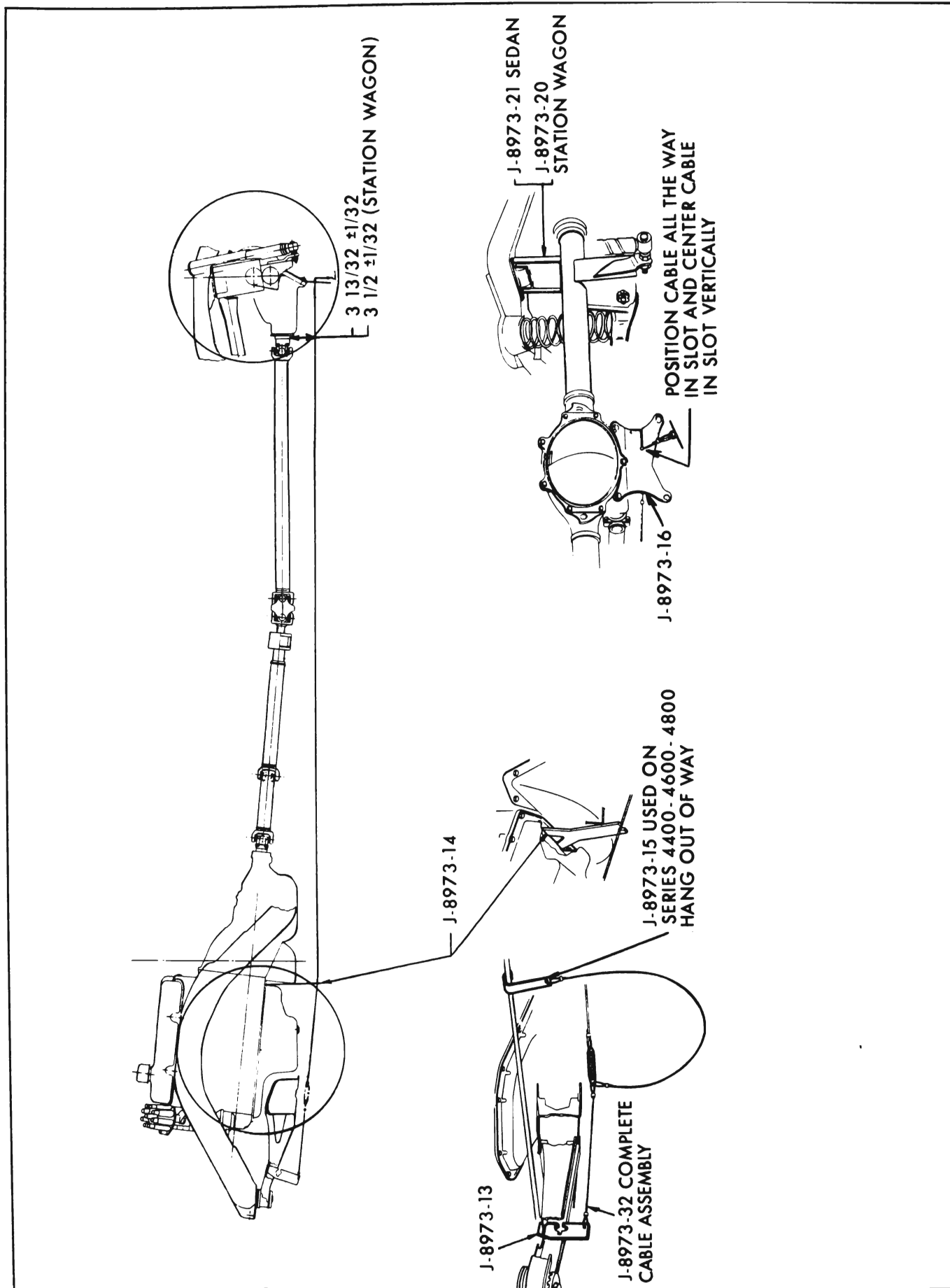


Figure 6-79—Checking Rear Universal Joint Angle

the frame. A twin post hoist will not give accurate rear U-joint angle settings, due to friction between the hoist and the axle tubes, unless the car is lowered to the floor to allow the axle assembly to go to a neutral position each time the number of shims is changed.

1. Raise rear of car and insert blocks so slot straddles rubber bumper. Hold the blocks up against the bumper mounting straps and allow car to settle until axle housing contacts blocks. **NOTE: Two different height blocks are used on 4000-4100 Series: J-8973-20 for Estate Wagons, and J-8973-21 for Sedans.**

2. Remove differential cover bolt on each side of lowest cover bolt. Using these two cover bolts, attach rear bracket J-8973-16 so lower slotted portion of bracket is vertical. Tighten bolts to hold bracket securely in place.

3. Engage front attaching bracket J-8973-13 in front cross member assembly using hole immediately to rear of front mount. Hook slot of bracket into rear of hole. See Figure 6-79.

4. Place Engine Height Plate J-8973-14 so that the upper end bears against the engine oil pan between the two rear oil pan bolts. See Figure 6-79. Place the cable in notch of height plate, pull cable tight and hook into rear bracket so one of the stops on the cable is to the rear of the bracket slot. It is important that the cable is fully in the slot and is taut and free of kinks.

5. Measure perpendicular distance from cable to machined surface immediately in front of slinger, on rear pinion flange. This distance should be $3\text{-}3/16'' \pm 1/32''$.

6. If distance measured in Step 5 is not within specifications, shims must be added or subtracted between lower control arm forward

mounting brackets and underbody side rail. See Figure 7-30. Shims **must** be removed or added in equal amounts on both sides.

7. Remove height rod, cable, bracket and spacer blocks. Reinstall differential cover bolts.

6-18 PROPELLER SHAFT BALANCING PROCEDURE

1. Place the car on a twin post hoist so that the rear of the car is supported on the rear axle housing and the rear wheels are free to rotate.

2. Balancing at the center of the propeller shaft just rearward of the CV Joint is all that is normally required. It is often possible to locate the heavy side of the shaft by holding a crayon or colored pencil close to the shaft while the shaft is rotating (speedometer indicating 40-50 MPH) and carefully bringing the crayon upwards until it just contacts this rotating shaft. If carefully done, the heavy side (point of maximum

runout) only will be marked by the crayon. This normally gives a good indication of which side of the shaft is heavy for unbalance, and serves as a starting point for initial location of the hose clamps.

3. Install two (2) Wittek #28 hose clamps (Gr. 1.166, Part #1351813) on the rear propeller shaft and slide them forward until the clamps stop at the nearest balance weight welded to the tube. Place the two clamps side by side with the heads together and 180° from the crayon marking. See Figure 6-80. Tighten the clamps.

4. Run the car through the speed range to 65 - 70 MPH. If no unbalance is felt, nothing further need be done on the hoist. However, if unbalance still exists, rotate both clamps to the opposite side of the shaft and retighten. Run car again and notice if the unbalance feel is better or worse; if worse, return the clamps to the original position. Apparently the combined weight of the two hose clamp heads was excessive, so to reduce this excess rotate the clamp heads away from each

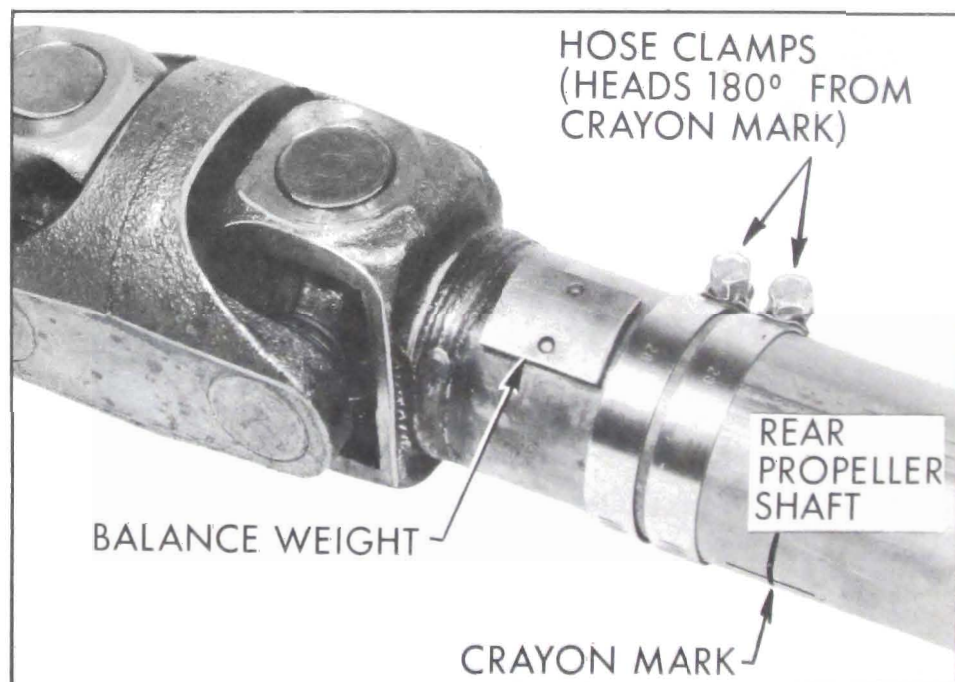


Figure 6-80—Hose Clamps in Place Opposite Crayon Mark

other 45° (one each way from the original position). See Figure 6-81. Run car and note if unbalance has improved.

5. Continue to rotate the clamps apart in smaller angular increments until the car feel for unbalance is best.

CAUTION: Do not run car on hoist for extended periods due to danger of overheating the transmission or engine.

6. Roadtest the car again for final check of balance.

NOTE: Slight vibration felt in the car on the hoist may not show up in a roadtest which is after all the final determining factor.

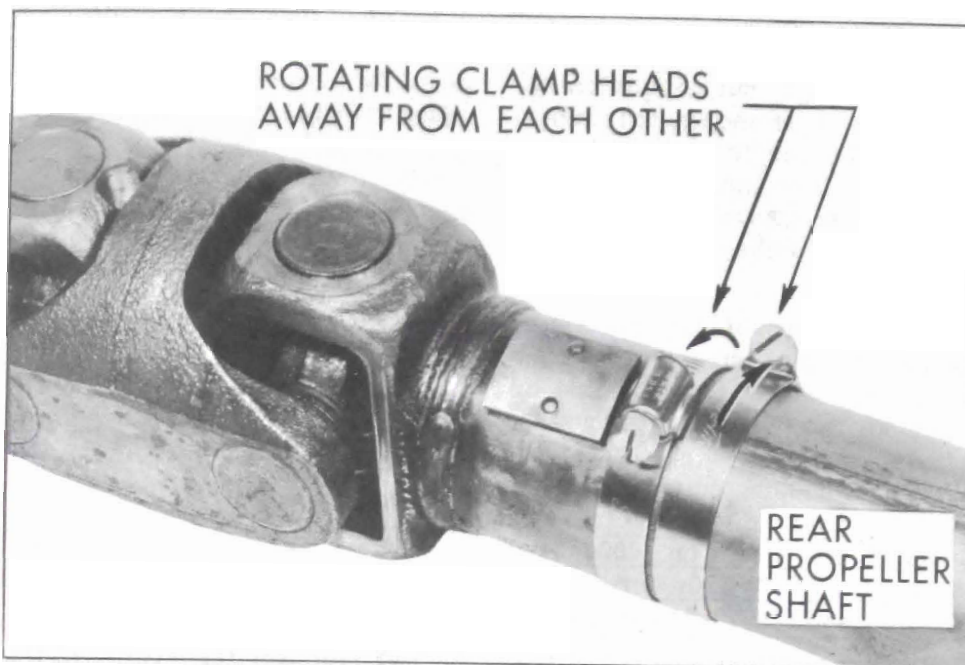
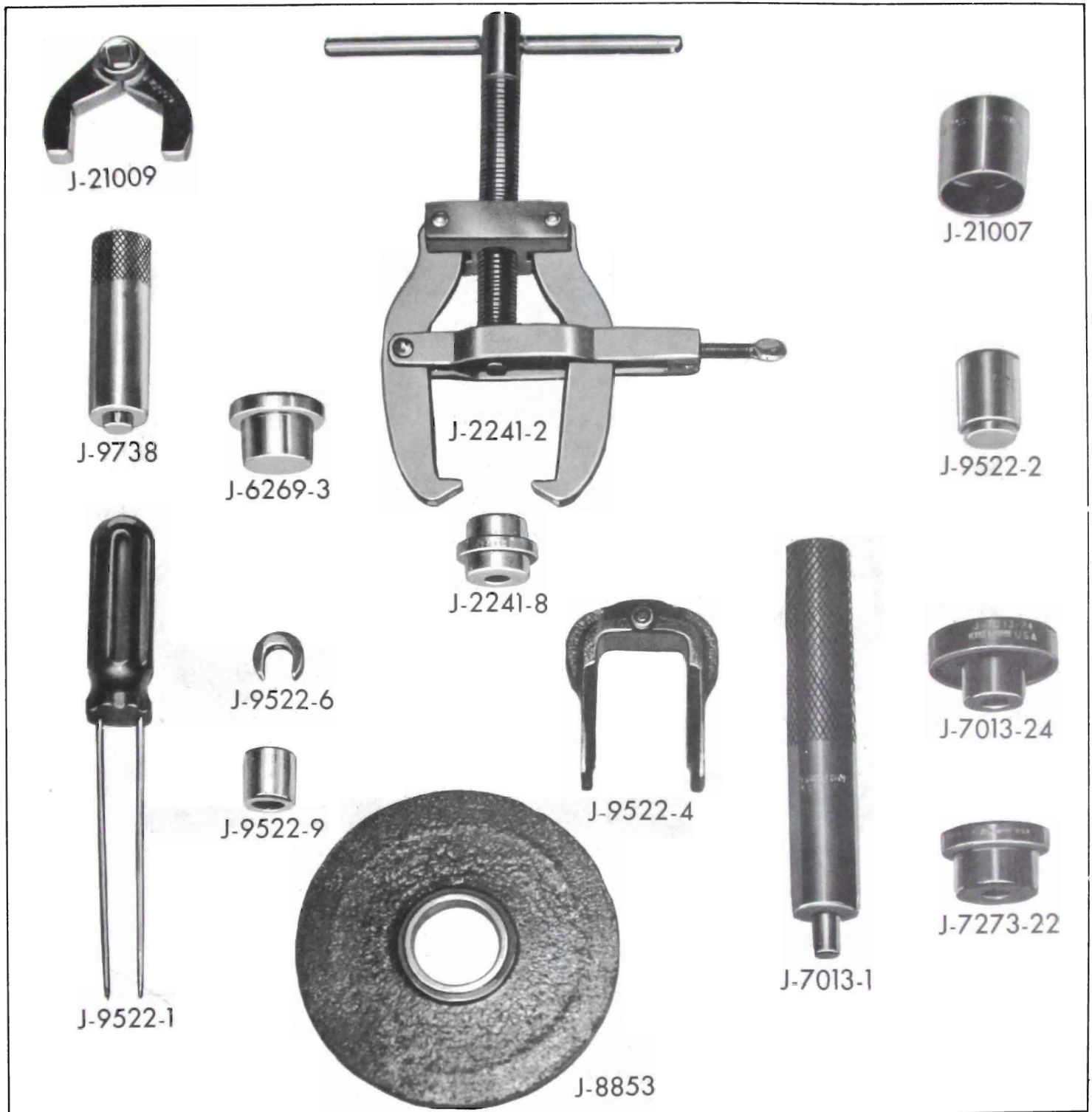


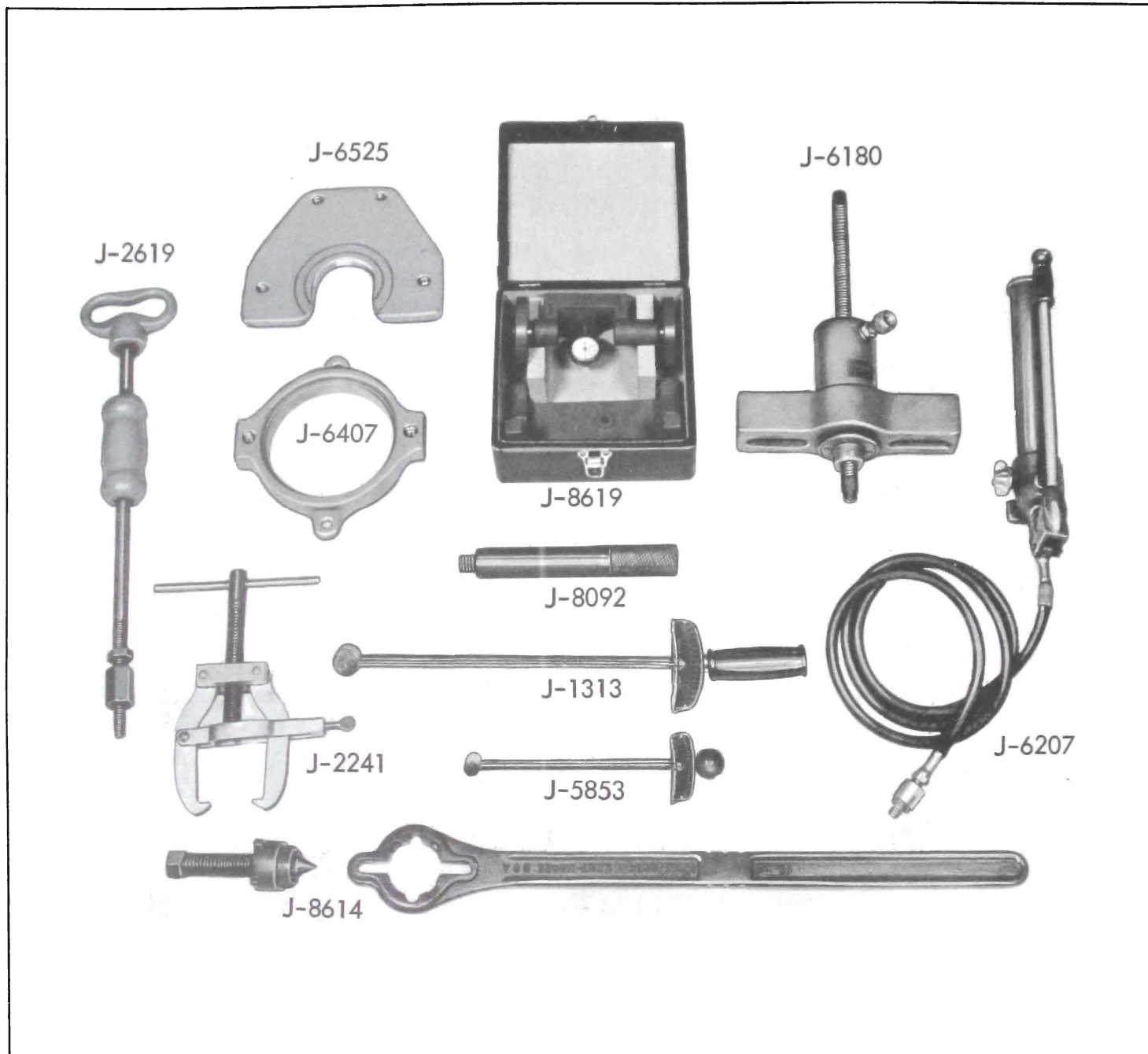
Figure 6-81—Rotating Hose Clamp Heads From Each Other



PROPELLER SHAFT TOOLS

21007	Center Bearing Installer	8853	Axle Bearing & Bearing Retainer Replacer
21009	Center Bearing Lock Nut Wrench	9522-1	Snap Ring Remover
2241-2	Differential Side Bearing Puller	9522-2	Power Ram Adapter
2241-8	Differential Side Bearing Puller Adapter	9522-4	Spider Press
6269-3	Differential Side Bearing Cup Remover	9522-6	Bearing Spacer
7013-1	Flight Pitch Bearing Driver Handle	9522-9	Bearing Guide
7013-24	Flight Pitch Bearing Driver	9738	Seal Installer
7273-22	Flight Pitch Bushing Remover		

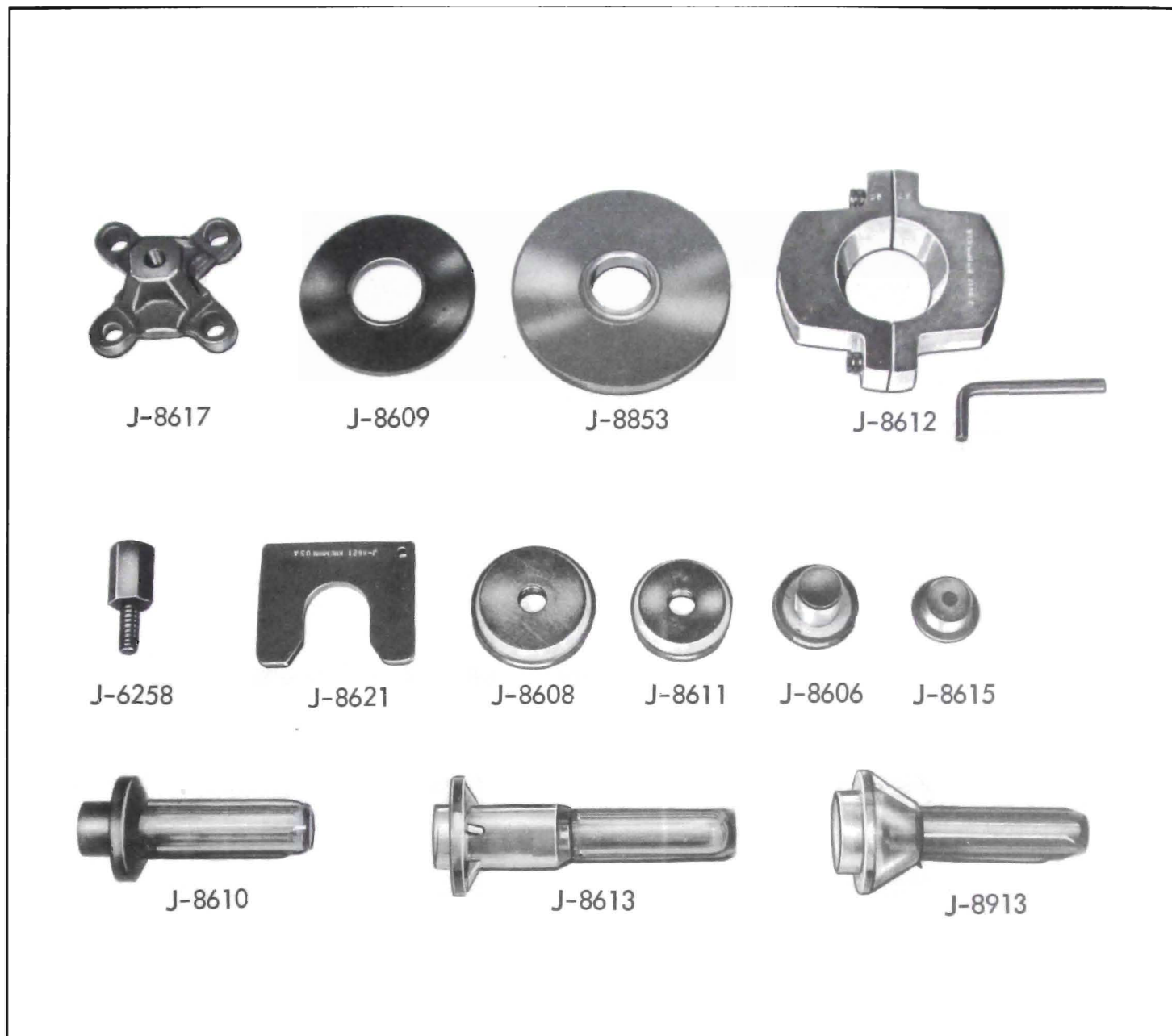
Figure 6-82—Propeller Shaft Tools



REAR AXLE TOOLS

- J-1313 Torque Wrench (0 - 150 ft. lb.)
- J-2241 Side Carrier Bearing Puller
- J-2619 Slide Hammer
- J-5853 Torque Wrench (0 - 100 in. lb.)
- J-6180 12 Ton Power Ram
- J-6207 Hydraulic Pump
- J-6407 Press Plate Holder
- J-6525 Axle Shaft Bearing Remover
- J-8092 Driver Handle
- J-8614 Companion Flange Holder and Puller
- J-8619 Pinion Setting Gauge

Figure 6-83—Rear Axle Special Tools (Group 1)



REAR AXLE TOOLS (GROUP 2)

- J-6258 Ram Screw Adapter
- J-8606 Differential Side Bearing Installer
- J-8608 Rear Pinion Bearing and Race Installer
- J-8609 Rear Pinion Bearing Installer
- J-8610 Axle Shaft Seal Installer
- J-8611 Front Pinion Bearing Outer Race Installer
- J-8612 Rear Pinion Bearing Remover
- J-8613 Pinion Oil Seal Installer
- J-8615 Side Bearing Puller Support
- J-8617 Axle Shaft Remover
- J-8621 Axle Shaft Bearing Puller Plate
- J-8853 Axle Shaft Retainer and Ring Installer
- J-8913 Pinion Oil Seal Installer

Figure 6-84—Rear Axle Special Tools (Group 2)