SECTION D

49000 PROPELLER SHAFT

CONTENTS

DIVISION I SPECIFICATIONS AND ADJUSTMENTS

41-11 PROPELLER SHAFT SPECIFICATIONS

a. Tightening Specifications

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

Part	Location	Thread Size	Lbs. Ft. Torque
Bolt	Center Bearing Support to Frame	5/16-24	30
Bolt	Rear CV Joint to Pinion Flange	7/16-14	85
*Nut	Upper and Lower Control Arm	1/2-13	80
*Bolt	Upper and Lower Control Arm	1/2-13	110
*Nut and Bolt	Upper Control Arm Vernier Adjustment	7/16-14	48
Nut	Slip Joint Locking	Special	60

*Torquing of Nut or Bolt to be Optional.

b. General Specifications

Item	49000 Series
Propeller Shaft	2 Piece — Open Drive Line
Universal Joints	Nylon Injected Saginaw "Composite"
Constant Velocity Joint (Center and Rear)	Double Cardan Type

DIVISION II

DESCRIPTION AND OPERATION

41-12 DESCRIPTION OF PROPELLER SHAFT

The propeller shaft assembly consists of a front propeller shaft, a rear propeller shaft, a standard universal joint at the front end and a double constant velocity type universal joint in the the center and at the rear. See Figure 40-65. A center support bearing attaches the rear end of the front propeller shaft to a center bearing support assembly which is mounted in the center of the tunnel in the frame. 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 differential assembly. See Figure 40-66.

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. See Figure 40-66. 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 shafts. 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 joint, or vice versa. The end result is, the front and rear propeller shafts always turn at a constant velocity.

New universal joints having improved sealing capacity for longer life are used. Production universal joint bearing caps are retained in the yoke by a nylon injection ring. Service unversal joints however, will still use snap rings for bearing cap retention.

The center support bearing consists of a sealed bearing, the inner race of which is held against a shield at the rear end of the front propeller shaft by a locknut. The center bearing outer race is a press fit into a support which has a rubber support cushion bonded to it. The bearing is retained in the support by two wire snap rings. The locknut 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 locknut.

The propeller shaft assembly requires very little periodic service. The center support bearing is lubricated for life and requires no additional lubrication. All universal joints are 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 are not available separately, but only as a complete propeller shaft assembly; this is because the complete assembly must be given a careful rotating balance and this type of balancing equipment is not available in the field.

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.

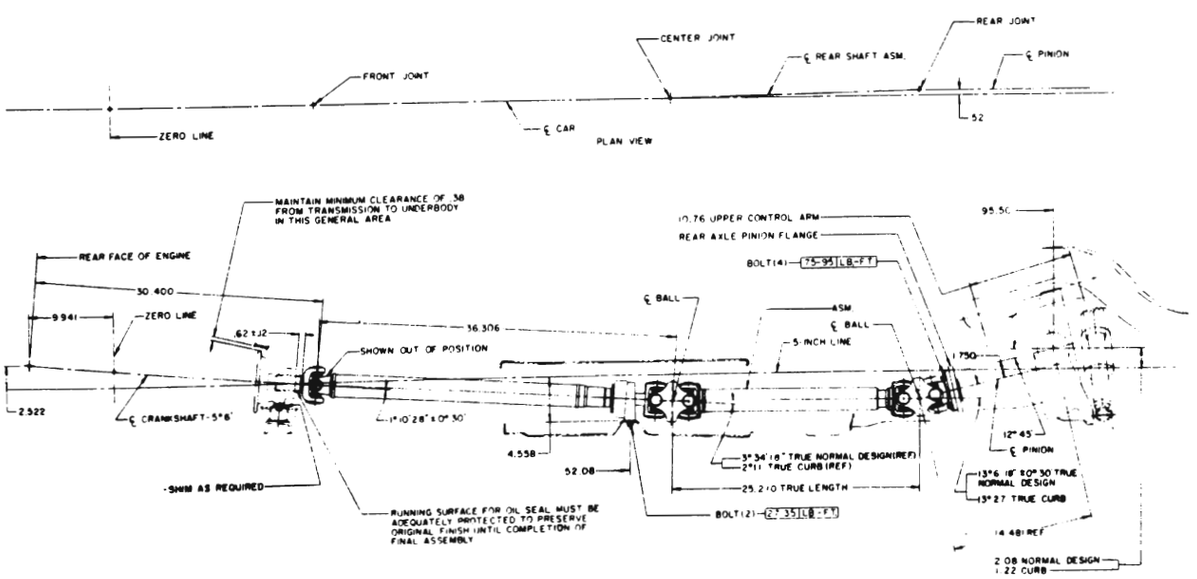

Figure 40-65 - Propeller Shaft Dimensions

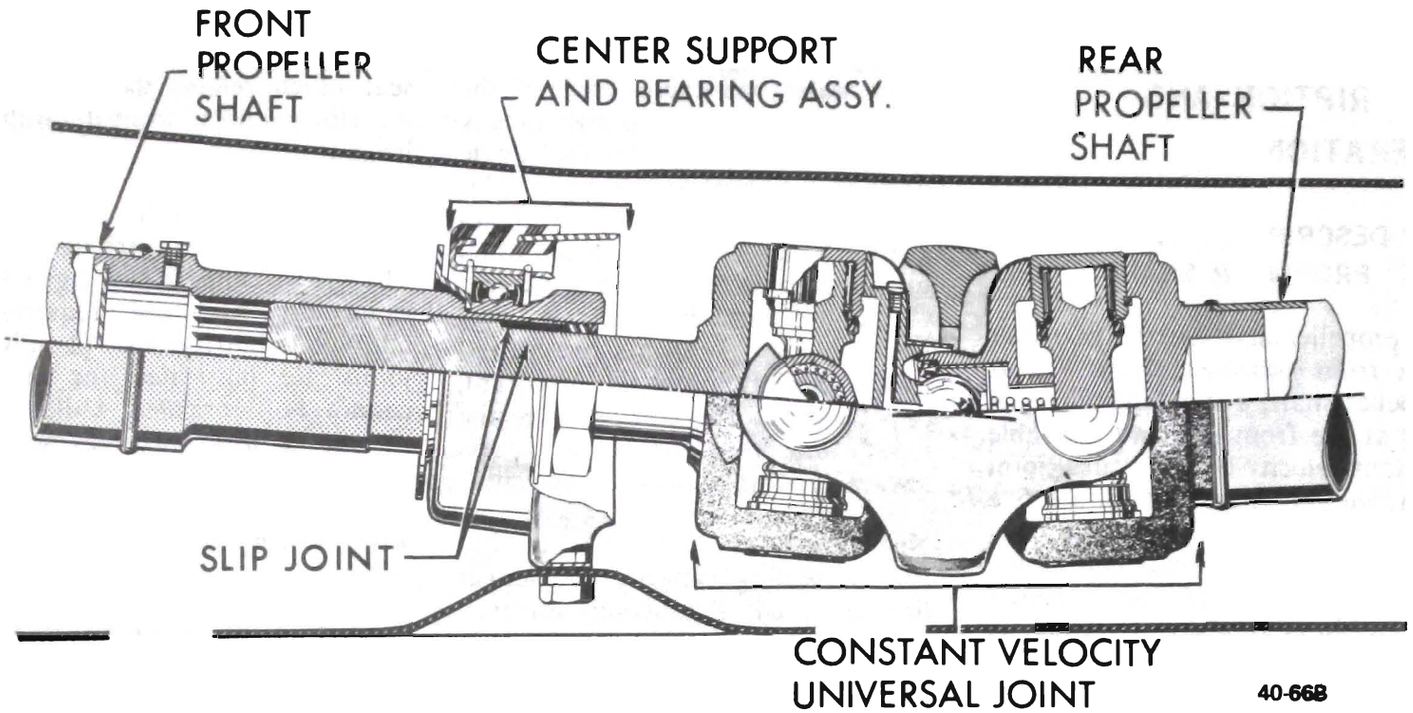

Figure 40-66 · Center Support, Slip Joint and CV Joint

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 and rear ball stud and seat should be lubricated every 6,000 miles with a lubricant meeting specification GM6040M or equivalent. This grease is available in 14 oz. containers through the Parts Department under group 8.800 part number 1050679.

The slip spline should also be lubricated with this lubricant every 6,000 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.

DIVISION III

SERVICE PROCEDURES

41-13 REMOVAL OF PROPELLER SHAFT

Whenever service is required, the propeller shaft must be removed from the car as a complete assembly. During handling out of the car, the assembly must be supported in a straight line as nearly as possible to avoid jamming or bending any of the parts.

1. Mark pinion flange and rear universal joint flange for proper reassembly.

2. Remove the two center bearing support attaching bolts.

3. Remove the four CV joint flange to pinion flange attaching bolts.

4. Support rear end of propeller shaft to avoid damage to constant velocity universal joints and slide complete assembly rearward to disengage the front spline yoke and out of the frame tunnel.

NOTE: *Do not bend constant velocity joint to its extreme angle at any time.*

5. Protect the oil seal surface on the front slip yoke by taping or wiring a cloth over the complete front universal joint.

41-14 DISASSEMBLY OF PROPELLER SHAFT ASSEMBLY

For ease in handling and to help prevent damage to the constant velocity universal joint, the front and rear propeller shafts should be separated at the slip joint before any service operations are attempted.

NOTE: *Never clamp propeller shaft tubing in a vise as the tube is easily dented. Always clamp on one of the yokes. Be careful not to damage the front propeller shaft slip yoke sealing surface. Any nicks can damage the bushing or cut the seal.*

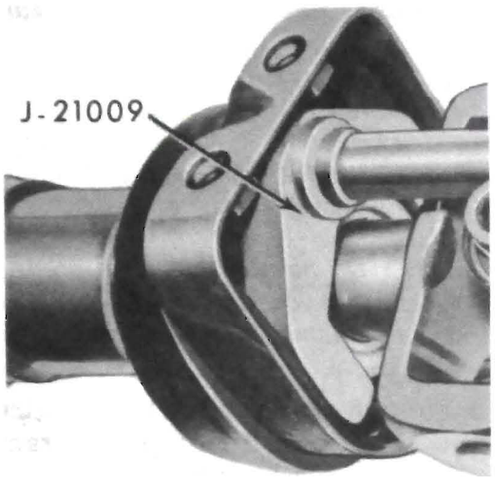

Figure 40-67 - Removing Center Support Lock Nut

a. Disassembly of Slip Joint

1. Loosen locknut until free of threads and slide locknut and seal against the constant velocity joint. See Figure 40-67.

2. Slide the rear propeller shaft from the front propeller shaft.

b. Removal and Disassembly of Center Bearing Assembly

1. Mount propeller shaft assembly in a vise by the yoke to keep it from turning while using the puller.

2. Place the smaller O.D. end of Adapter J-2241-8 (Differential side carrier bearing puller adapter, 1955 and previous) into the splines of the propeller shaft. Position Differential Side Bearing Puller J-2241-2 as shown in Figure 40-68. Pull the center support and bearing assembly from the propeller shaft. Leave the slinger (shield) in position on the shaft.

3. Disassemble center bearing from support by removing snap rings and with the use of a brass drift or other suitable tool drive bearing out of support.

c. Disassembly of Constant Velocity Universal Joints

All yokes must be marked before disassembly for reassembly in their original positions to maintain proper balance. See Figure 40-69.

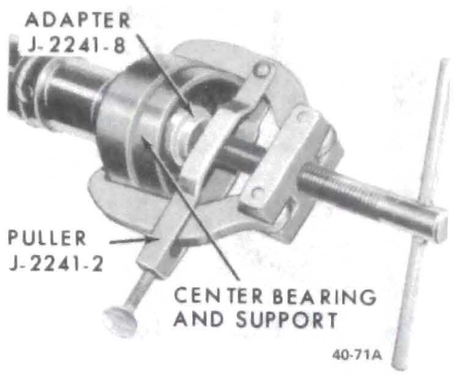

Figure 40-68 - Removing Center Support and Bearing

NOTE: *The following procedure applies to either center or rear constant velocity joints. For ease of disassembly, remove universal joint bearings from link yoke first.*

1. Set up Power Ram and 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.

NOTE: *Remove 1/32" of stock from inside each leg of spider press J-9522-3 which will allow the spider press legs to straddle the CV yokes. See Figure 40-70.*

2. Position propeller shaft constant velocity joint into the fixture as set up in Step 1 with the link yoke bearing over the hole in J-8853

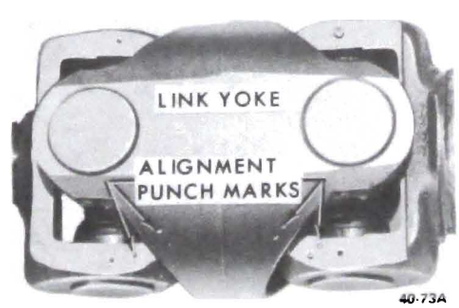

Figure 40-69 - Link Yoke Showing Alignment Punch Marks

Figure 40-70 - Spider Press Leg Rework

Replacer Plate. Install Spider Press J-9522-3 on spider. See Figure 40-71. 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 to shear the nylon injection ring retaining the bearing cap in the yoke and push the bearing as far out of the yoke as possible.

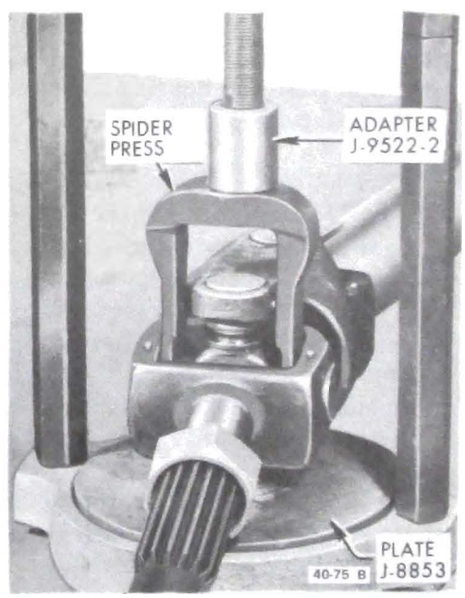

Figure 40-71 - Pressing Out Bearing Cap

3. Release the pump and rotate the propeller shaft to the opposite side. Repeat step 2. Install Spacer J-9522-5 over the spider journal in the space provided with the bearing forced

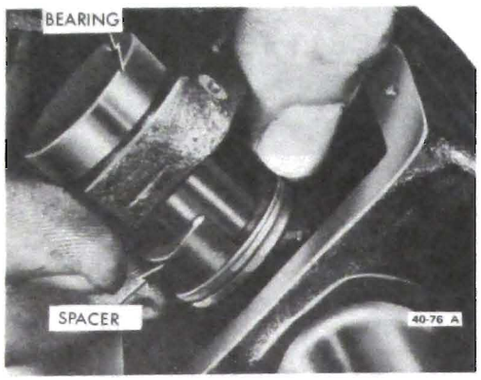

Figure 40-72 - Installing Spacer

partially through the link yoke. See Figure 40-72. Reposition propeller shaft in fixture as before and force the bearing completely out of the yoke with the added assistance of the Spacer.

4. Release the pump and rotate the propeller shaft to the opposite side. Install guide J-9522- 8 in yoke bore of bearing removed and onto spider journal. The guide assures alignment of spider while the opposite bearing is being removed.

5. Position propeller shaft in fixture as before, actuate the pump and force the spider aginst the lower bearing to shear the nylon injection ring retaining the bearing cap in the yoke and push the bearing as far out of the yoke as possible.

6. Release the pump and install Spacer J-9522-5 over the spider journal in the space provided with the bearing forced partially through the link yoke. See Figure 40-72. Reposition propeller shaft in fixture as before and force the bearing completey out of the yoke with the added assistance of the Spacer.

7. Release the pump and propeller shaft. Remove the guide J-9522-8 and carefully work universal joint and ball stud yoke out of link yoke.

8. Repeat steps 2, 3, 4, 5, 6 and 7 to remove other bearings from ball stud yoke so the spider can be removed.

NOTE: *When removing the rear universal joint of the rear CV joint, a tool such as a l-l/8"socket should be used to support the flange yoke which will allow the flange to be clear of the base plate J-8853. See Figure 40-73.*

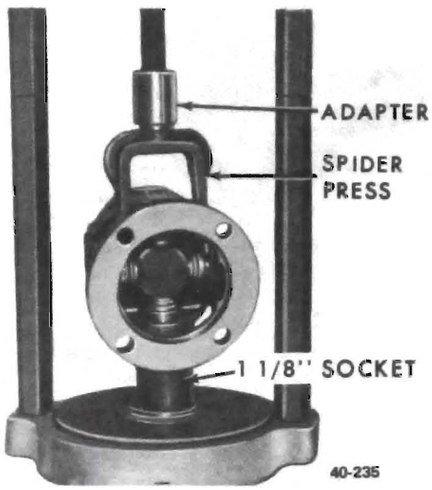

Figure 40-73 - Disassembling Rear CV Rear U-Joint

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, remove .040 spacer, ball seats, washer and spring. See Figure 40-74.

NOTE: *The lip of the ball stud seat may be deformed in the area where previously staked around the seal. This can be corrected by lightly tapping deformed area with a ball peen hammer.*

e. Disassembly of the Front Universal Joint

NOTE: *Do not damage front propeller shaft slip yoke sealing surface. Any nicks can damage bushing or cut seal.*

1. Position propeller shaft and spider press J-9522- 3 in power ram equipped with base plate J-8853 and ram screw adapter J-9522-2.

2. Actuate the pump to force the spider and bearing to shear the nylon retaining ring and remove the bearing.

3. Release pump valve, rotate propeller shaft 1/2 revolution and install spider guide J-9522-7 into yoke bore of removed bearing and onto the journal end of the spider.

4. Position propeller shaft as before and use spider press and power ram hydraulic pump to shear the nylon injection ring and remove the opposite bearing.

NOTE: *Once a production universal joint is disassembled, it cannot be reassembled as there are no snap ring grooves provided in the bearing cap.*

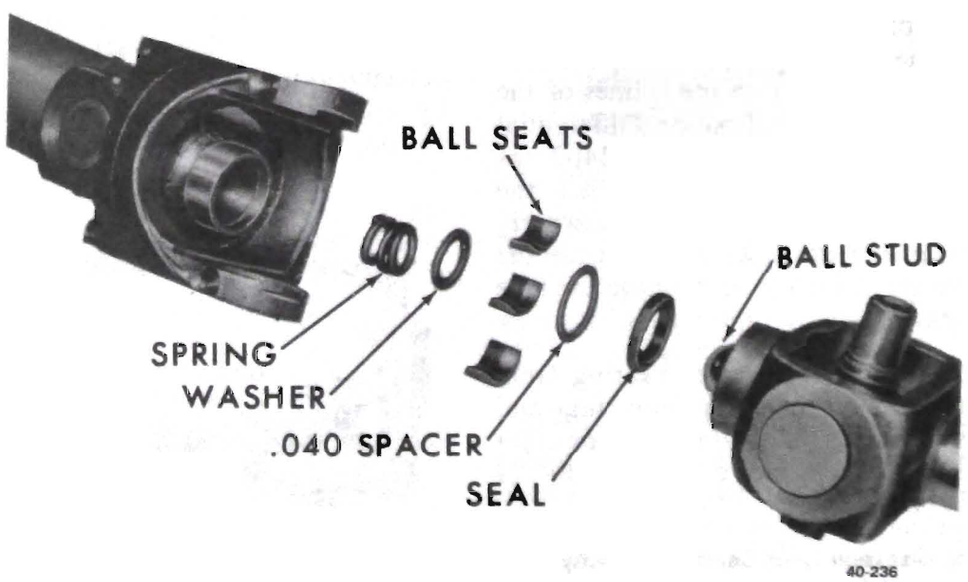

Figure 40-74 - Ball Stud Seat - Exploded View

5. Repeat steps 1, 2, 3 and 4 to remove other bearings until the propeller shaft is disassembled to the point desired.

41-15 ASSEMBLY OF PROPELLER SHAFT

a. Assembly of Front Universal Joint

When reassembling a propeller shaft, install complete universal joint repair kits. Repair kits are listed in the Buick Master Parts Catalog under group 5.442 and include a spider, four bearings, four Delrin spacers, four seals and four shields. The four bearings come equipped with snap rings.

1. Make certain the shields and seals are in firm position and are not damaged on the spider and install the spider in the yoke. The spider may face in either direction.

2. Install spider guide J-9522-7 into one yoke bore and position spider journal into the guide. Push guide in far enough for opposite journal to extend slightly above yoke bore.

NOTE: *Spider journals and bearings must be free of dirt or foreign material.*

3. Place the propeller shaft and yoke assembly in position with the Power Ram and Pump. Inspect bearing cap to see that all needle bearings are in place and lubricated. Make certain the Delrin washer is in place against the needle bearings. Position bearing straight over yoke bore and onto spider journal.

NOTE: *Failure to pilot the spider journal into the bearing could cause the bearing needles to become dislodged during installation of the bearing cap.*

With the pump, force the bearing into the yoke. As the bearing nears the end of its required travel, it will cause the spider to push the guide outward without damage to the seal or shield. The bearing cap is properly positioned in the yoke when the snap ring groove is exposed enough to install the snap ring. Install snap ring.

When the bearing is correctly positioned in the yoke, turn the assembly over, remove the guide J-9522-7 and again place bearing over the bore in the yoke.

Carefully slide the spider partially out of the previously seated bearing and start it carefully into the bearing being installed. This prevents the bearing needles from burring the edge of the spider journal if forced over 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. While observing the previous precautions, 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 40-75.

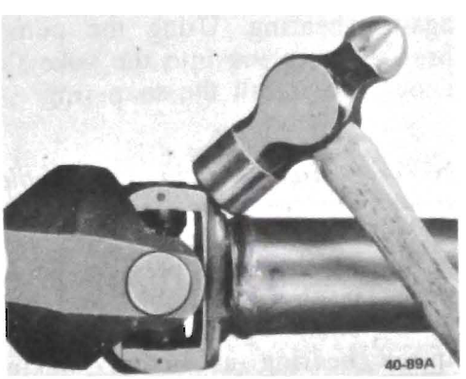

Figure 40-75 - Seating Snap Rings

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, Group 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, Group 5.442.

1. Thoroughly clean ball seat cavity.

The ball seat bore should also be inspected. If this bore is excessively scored, the repair kit should not be used: The propeller shaft should be replaced.

2. Pack spring cavity with grease supplied in repair package which meets GM-6040-M or equivalent This grease is available in 14 oz. containers through the Parts Department Group 8.800 part number 1050679. Install spring, ball seat washer, ball stud seats and .040" spacer. Apply a thin coat of non-hardening sealer such as number 2 Permatex or equivalent to the outer diameter of the seal to insure adequate sealing and install seal with lip toward the seat using Tool J-22271. See Figure 40-76.

3. Stake the seal lightly and evenly in four places, in same area as previously staked. Be careful not to overstake so as to damage or distort the seal.

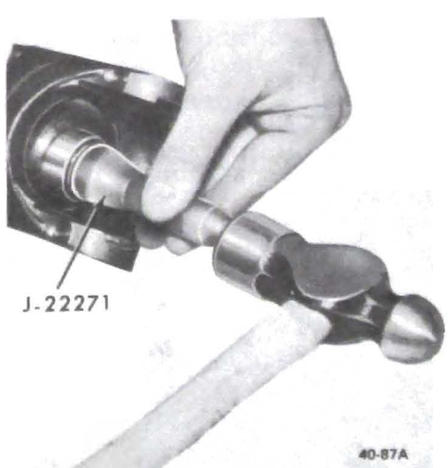

Figure 40-76 Installing Ball Stud Seal

Pack ball seat cavity with sufficient quantity of grease supplied in repair package, to insure that grease is just starting to be forced out of vent in spring seat when ball stud is pushed in by hand.

c. Assembly of Center Constant Velocity Universal Joint

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 Master Parts Catalog under Group 5.442 and include a spider, four bearings and four snap rings.

1. Position the spider inside the ball stud yoke; due to production tolerances, it may fit easier facing one direction than the other. Make certain that the spider dust shields are not damaged during installation.

2. Make certain that the bearings have a full set of rollers, are packed with lubricant and that the seals are in position.

Place the assembly in position with Power Ram and Pump. Position the bearing straight over the hole in the yoke. See Figure 40-77. Carefully pull the spider up 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 is 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 in the bearing from burring the edge of the spider journal if forced over this journal other than straight.

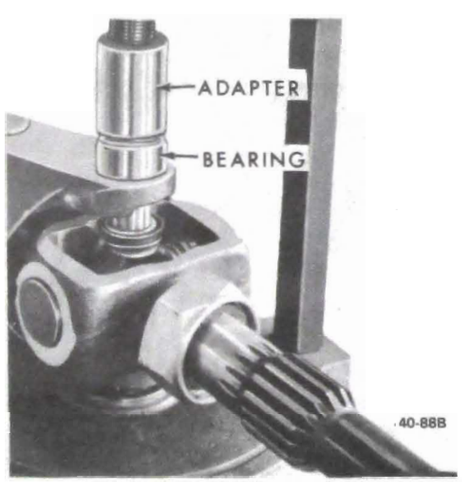

Figure 40-77 - Assembling Center CV Joint

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. Position the ball stud into the ball stud seat while working the spider journals into the bores of the link yoke. Make certain that the spider dust shields and seals are not damaged upon installation.

4. Install guide J-9522-7 into one bore of the yoke link and onto the spider journal. Push the guide in far enough to support the opposite spider journal up into its link yoke bore.

5. With link yoke and shaft assembly properly positioned in press (guide side down) place bearing straight over link yoke bore and onto spider journal and tighten ram screw against bearing. Using the pump, press the bearing into the yoke far enough to install the snap ring.

NOTE: *Make certain the needles remain in place in the bearing caps.*

6. Release the pump pressure, rotate propeller shaft assembly one half turn, remove guide J-9522-7 and install bearing as before making sure the spider journal pilots into the bearing cap. While bearings are being pressed 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 any binding exists, remove the bearings and spider and examine for dislodged rollers or damaged journals.

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

8. Strike the yoke firmly with a hammer to fully seat the snap rings against the yoke. See Figure 40-75.

NOTE: *If a new splined yoke or flange yoke assembly was used, the car should be carefully roadtested for possible vibration caused by out-of-balance propeller shaft. If propeller shaft vibration is encountered see the procedure for balancing this assembly in paragraph 41-18.*

d. Installation of Center Bearing

1. Install rear retainer ring.

2. Using Installer J-9164-1 and Driver Handle J-8592 install bearing into bearing support. See Figure 40-78.

3. Install front retainer ring to secure the bearing.

4. Position slinger on propeller shaft and install the bearing support assembly using installer J-21007.

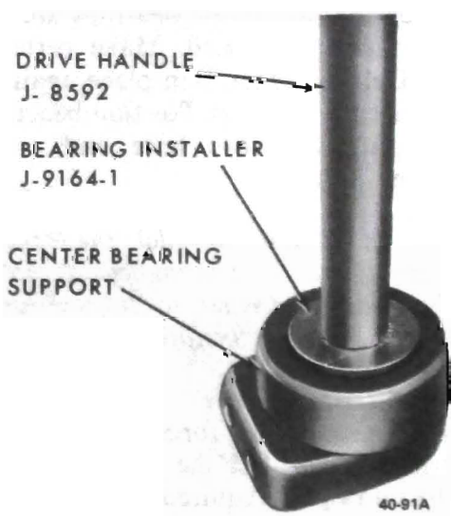

Figure 40-78 - Installing Center Support Bearing

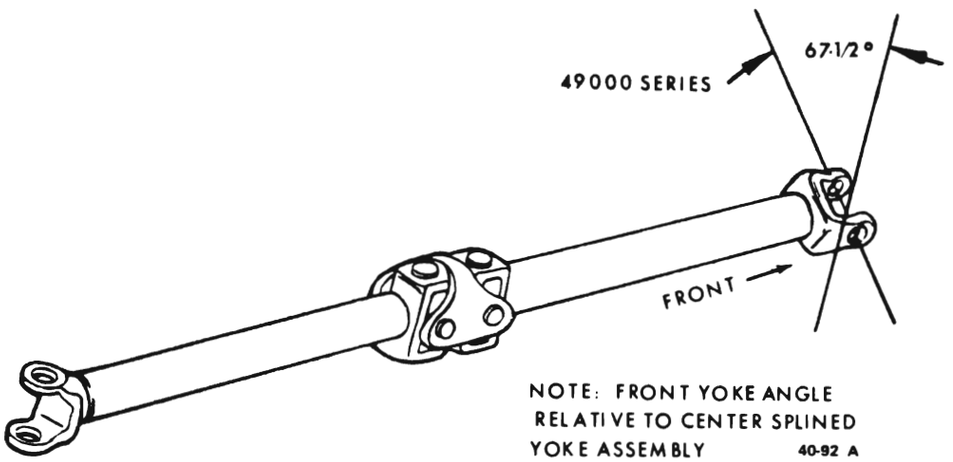

Figure 40-79 · Propeller Shaft Phasing

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.

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 40- 79 for proper phasing of the propeller shaft.

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

41-16 INSTALLATION OF PROPELLER SHAFT

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

1. Protect the oil seal diameter on the front slip yoke by taping or wiring a cloth over the complete front universal joint.

2. Slide complete propeller shaft assembly foward through frame tunnel.

3. Remove protecting cover from front universal joint. Apply transmission oil liberally to the internal splines of the slip yoke. Fill space between lips of transmission seal with wheel bearing grease and apply a thin coat of the same grease to the seal surface of the front universal joint.

4. Slide front universal joint yoke forward over splines of transmission shaft.

CAUTION: *Do not force propeller shaft in place with hammer. Examine for burr on output shaft or for wrong U-joint.*

NOTE: *Fasteners in steps 5 and 6 are important attaching parts in that they could affect the performance of vital components and systems, and/or could result in major repair expense. They must be replaced with one of the same part number or with an equivalent part if replacement becomes necessary.*

Do not use a replacement part or lesser quality or substitute design. Torque values must be used as specified during reassembly to assure proper retention of these parts.

5. Install four pinion flange bolts and torque evenly to 85 lb.ft.

6. Install two bolts in center bearing support. Torque to 20 lb. ft.

NOTE: *Before torquing bolts, position propeller shaft rearward to provide approximately 1/2" space between the end of the transmission case extension and the shoulder of the propeller shaft slip yoke.*

7. Make certain propeller shaft slip spline, center and rear ball stud seats are fully lubricated with lubricant meeting specification GM-6040-M.

41-17 UNIVERSAL JOINT ANGLE ADJUSTMENT

When torque is transmitted through any ordinary universal joint such as the front joint on the Riviera, 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. Therefore, the front joint angle on the Riviera is very small (1° or so).

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.

The actual optimum angles desired must also consider the effects of various passenger loadings and rear axle windup during acceleration so that it is unlikely that the front and rear joints will be found to be the same in actual practice.

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 center-line and the front propeller shaft. This angle is determined by the design of the body assembly and seldom requires alteration after production.

The center and rear constant velocity

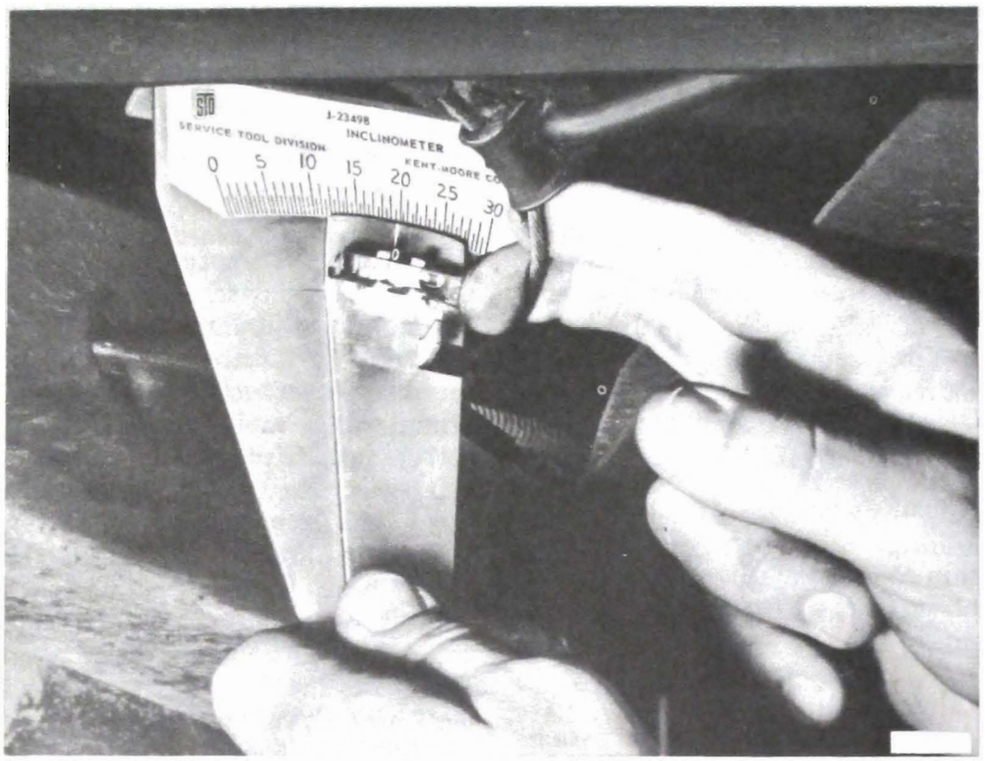

Figure 40-80 Measuring Angle at Front or Propeller Shaft

universal joints, as the name implies, transmit torque at a constant velocity regardless of the angle through which they are operating. Because of the constant velocity joints the car is not sensitive to pinion angle adjustment. Therefore, adjustment seldom becomes necessary. However, if the rear CV joint bottoms on the underbody or if the propeller shaft is rubbing on the frame tunnel, adjustment must be made to provide sufficient clearance.

If drive line shudder, roughness, vibration or rumble is experienced, it may be due to incorrect universal joint angle and this angle should be checked. Also, 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 as necessary.

The inclinometer method will also be used on the 49000 series cars. Readings are to be taken with the car over a pit or on a drive-on hoist as long as the car is at curb weight with a full tank of gasoline.

NOTE: *Jounce car up and down to assure curb height.*

Readings should be taken at the following locations in the following manner.

1. Place inclinometer on front propeller shaft bearing cap. See Figure 40-80. Center bubble in sight glass and record measurement.

2. Rotate propeller shaft 90° and place inclinometer on front slip spline yoke bearing cap. Center bubble in sight glass and record measurement.

3. Subtract smaller figure from larger figure to obtain existing front universal joint angle.

See Figure 40-59 for universal joint angles.

4. Place inclinometer on rear propeller shaft bearing cap. See Figure 40-80A. Center bubble in sight glass and record measurement.

5. Place inclinometer on rear pinion yoke bearing cap. See Figure 40-110F. Center bubble in sight and record measurement.

6. Subtract smaller figure from larger figure to obtain existing rear universal joint angle.

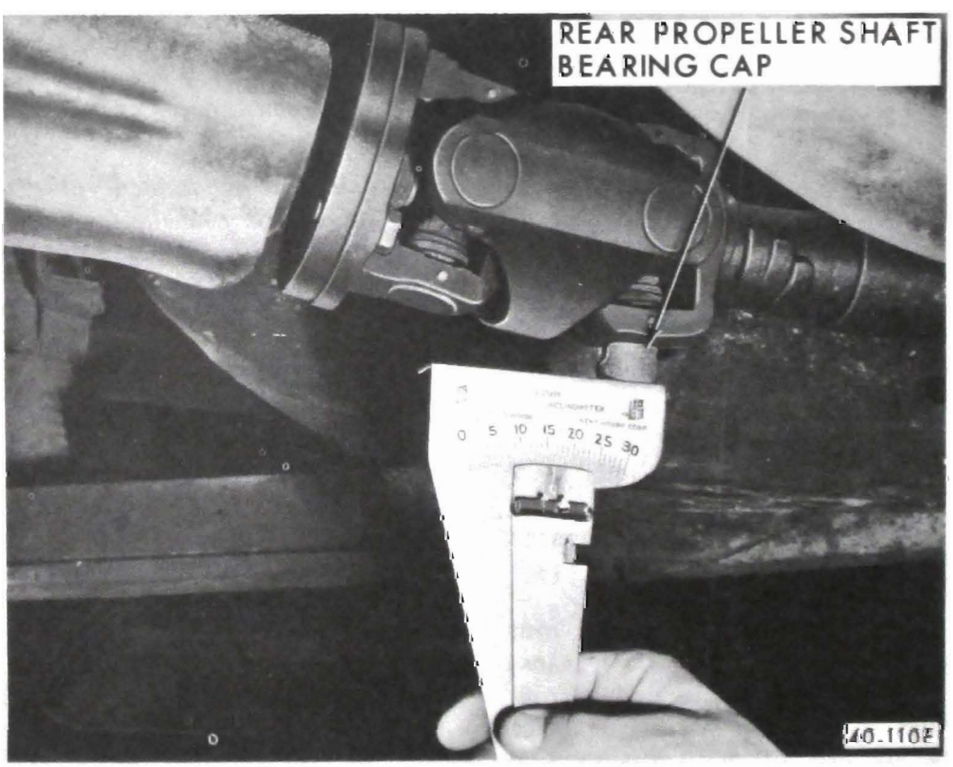

Figure 40-80A Measuring Angle at Rear of Propeller Shaft

Figure 40-80B Measuring Angle at Rear of Propeller Shaft

b. Adjusting Universal Joint Angles

1. To adjust the rear universal joint (pinion nose) angle, position jack under pinion nose and,

(a) Loosen nuts and bolts at the slotted holes in the upper control arm. See Figure 40-81.

(b) Remove middle bolt.

(c) Raise or lower pinion nose as required for correct angle.

(d) Install center bolt in vernier holes that line up and tighten to 48 lb.ft.

(e) Remove jack and recheck measurement on Kent-Moore gauge set-up. If measurement is correct, install bolts and nuts in slotted holes and torque to 48 lb.ft.

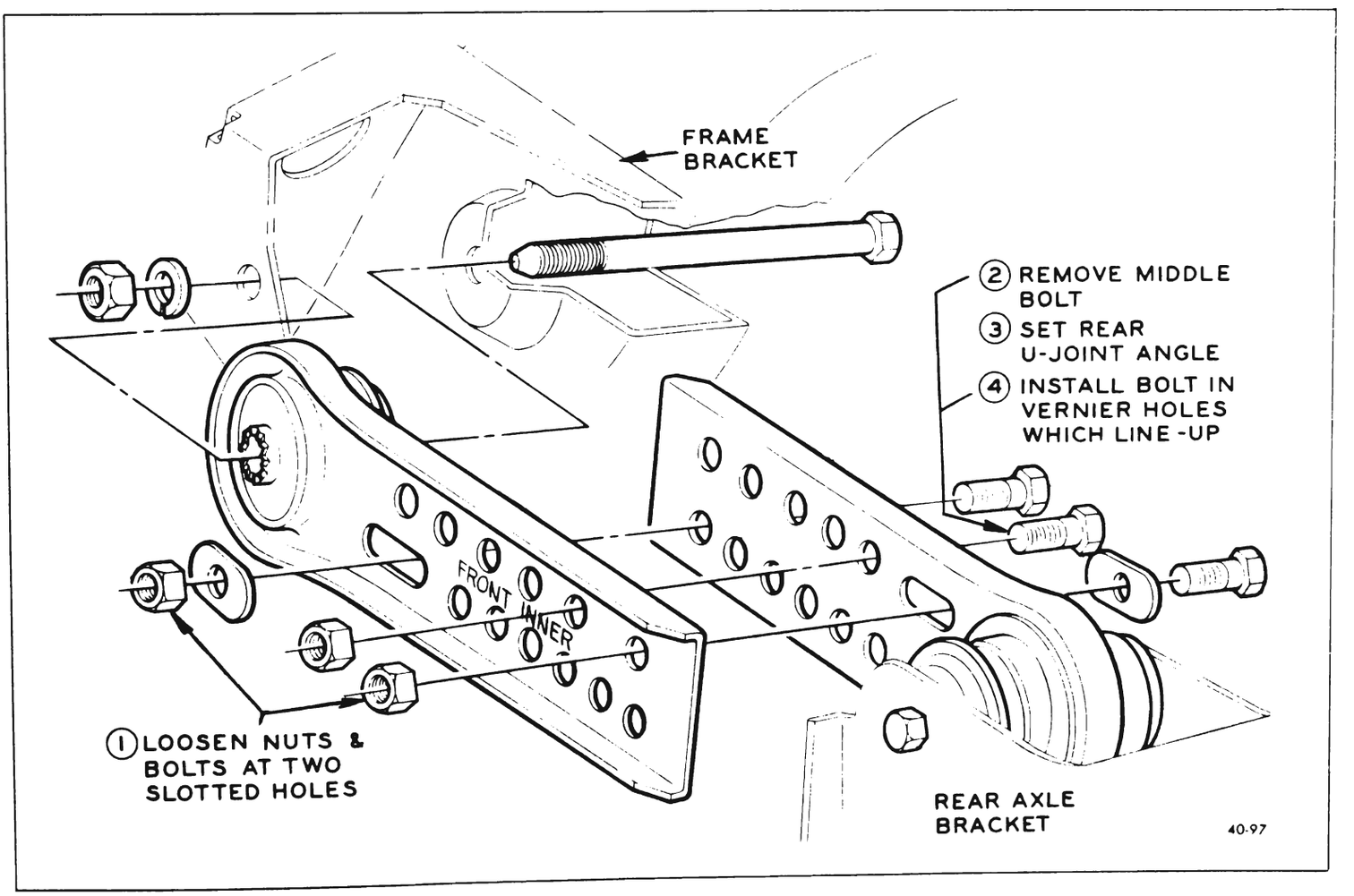

Figure 40-81 - Adjusting Rear Universal Joint Angle

(f) Remove all parts of the alignment set being careful not to kink the cable.

(g) Reinstall differential cover bolts and torque to 30 lb.ft.

2. If ever the occassion should arise to alter the center CV angle,

(a) Loosen the two center bearing support to frame attaching bolts, raise the propeller shaft and install shims between the center bearing support and the frame. Tighten bolts to 30 lb. ft.

3. To adjust the front universal joint angle,

(a) Loosen the two transmission mount to transmission attaching bolts, raise the rear of the transmission to either install or remove necessary shims to obtain the desired angle. Lower rear of transmission and tighten bolts to 53 lb. ft. Recheck dimensions using Kent-Moore gauge set.

41-18 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. Remove both rear tire and wheel assemblies and re- install wheel lug nuts with flat side next to drum.

2. Mark and number propeller shaft at four (4) points 90 degrees apart at rear of shaft just forward of balance weight.

3. Install two (2) Wittek type hose clamps on the rear propeller shaft and slide them rearward until the clamps stop at the nearest balance weight welded to the tube. Align both clamps to any one of the four marks made on shaft in Step 2. Tighten the clamps. See Figure 40-83.

CAUTION: *Be sure sufficient clearance is maintained so that clamp heads do not contact floorpan of car when axle is in contact with rebound bumper in frame. In order to gain sufficient clearance, it may be necessary to position the clamps over the balance weights.*

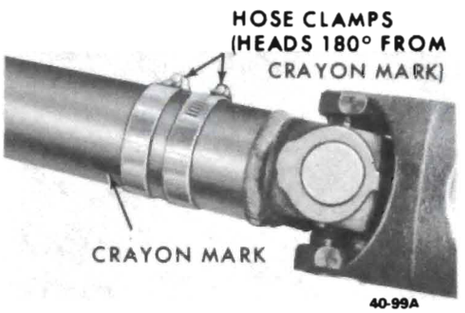

Figure 40-83 - Balance Hose Clamps in Place

4. Run the car through the speed range to 65-70 MPH. Note amount of unbalance.

5. Loosen clamps and rotate clamp heads 90 degrees to the next mark on shaft. Tighten clamps and repeat Step 4.

6. Repeat Step 5 until car has been run with clamp heads located at all four marks on shaft.

7. Position clamps at point of minimum unbalance. Rotate the clamp heads away from each other 45 degrees. (One each way from the point of minimum unbalance.) Run car and note if unbalance has improved. See Figure 40-84.

In some cases it may be necessary to use one clamp or possibly three clamps in order to obtain a good balance.

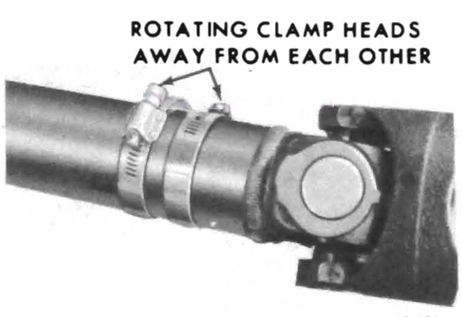

Figure 40-84 - Rotating Balance Hose Clamps

8. 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.*

NOTE: *In some cases it may also be necessary to rebalance propeller shaft at the center, in addition to the rear.*

9. Reinstall tire and wheel assemblies and roadtest the car for final check of balance.

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

If a wheel balancer of the type that is equipped with a strobe light is available, the use of such a unit will facilitate the balancing of the propeller shaft. The balancer pick-up unit should be placed directly under the nose of the rear axle carrier and as far forward as possible.

DIVISION IV

TROUBLE DIAGNOSIS

41-19 PROPELLER SHAFT TROUBLE DIAGNOSIS

a. Body Boom Noise or Vibration

Objectional "body boom" noise or vibration at 55-65 MPH can be caused by an unbalanced propeller shaft. Excessive looseness at the spline can contribute to this unbalance.

Other items that may also contribute to the noise problem are as follows:

1. Undercoating or mud on the shaft causing unbalance.

2. Shaft balance weights missing.

3. Shaft damage such as bending, dents or nicks.

4. Tire-type roughness. Switch tires from a known good car to determine tire fault.

b. Check for Propeller Shaft Vibration

Objectionable vibrations at high speed (65 MPH or higher) may be caused by a propeller shaft that is out of balance. Out of balance may be due to a bent shaft.

To determine whether propeller shaft is causing vibration, drive car through speed range and note speed at which vibration is most pronounced. Shift transmission into lower gear range and drive car at same engine speed as when vibration was most pronounced in direct drive. Note effect on vibration.

To determine engine speed, divide vehicle speed by the transmission gear ratio in which the vibration occurs.

EXAMPLE: *With the THM 400 in low range, divide by 1.50. If vibration is most pronounced in direct drive at 65 MPH, the same engine speed would be produced in low range (THM 400) at 65/1.50 = 43 MPH.*

If the vibration is still present at the same engine speed whether in direct drive or in the lower gear, since the propeller shaft speed varies, this cannot be the fault. If the vibration decreases or is eliminated in the lower gear, then the propeller shaft is out of balance and should be rebalanced.

PROPELLER SHAFT TROUBLE DIAGNOSIS CHART — 49000 SERIES ONLY

Complaint	Possible Cause	Remedy
Shudder on acceleration, low speed.	Loose or missing bolts at center bearing support to frame cross member.	Replace or tighten bolts.
	Incorrectly set front joint angle.	Shim under transmission support mount to decrease front joint angle.
	Incorrect plan view joint angle.	Use Kent-Moore alignment gage cable and weighted strings from engine pulleys and propeller shaft to align shaft in plan view.
	Improper yoke phasing.	Check for correct yoke phasing and correct if necessary.
Roughness or vibration, any speed.	Cut center bearing support rubber.	Replace.
	Improper yoke phasing.	Corect as above.
	Bent shaft.	Replace.
	Dented shaft.	Replace; check to see if sufficient clearance exists between rear frame tunnel and propeller shaft if car is raised on a frame hoist. Grind out frame for sufficient clearance if necessary.
	Improperly aligned support.	Align or check for proper installation of mountings.
	Tight universal joints.	Replace joint if unable to free up or if joint feels rough when rotated by hand.
	Worn universal joints.	Replace.
	Undercoating on shaft.	Clean up shaft.
	Burrs or gouges on companion flange location surfaces.	Attempt to clean up flange. Replace companion flange if necessary.
	Tire unbalance.	Balance wheel and tire assembly or replace with known good tire and wheel assemblies.
	Shaft or companion flange unbalance combination.	1. Check for missing balance weights. 2. Remove and reassemble shaft to companion flange 180° from initial location. 3. Remove and replace companion flange at rear axle pinion 180° from initial location. 4. Rebalance.
	Rubber center bearing mount at frame too tight.	Reduce "squeeze" of bracket to rubber block .010"-.025".

PROPELLER SHAFT TROUBLE DIAGNOSIS CHART (Cont'd)

Complaint	Possible Cause	Remedy
Roughness on heavy acceleration (short duration).	CV joint ball seats worn.	Replace with ball seat repair kit.
	Seat spring bent or broken.	Replace with ball seat repair kit.
Roughness usually at low speeds, light load, 15-35 MPH.	Improperly adjusted front joint angle.	Check and adjust front joint angle by shimming transmission support.
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 kit if lube does not correct. If failure is advanced, shaft must be replaced.
Knock or click.	Joint hitting frame tunnel.	Shim up or replace center bearing mount.
	Worn CV joint centering ball.	Replace with splined yoke or ball seat replacement kit. If failure is advanced, replace shaft.
	Loose upper or lower control arm bushing bolts.	Tighten bolts.
	Broken or cut center bearing support rubber.	Replace center bearing support.
	Stones — gravel in frame tunnel.	Remove stones and gravel.
Scraping noise.	Parking brake cable interference in frame tunnel, 49000 only.	Correctly route cable.
	Slinger on companion flange rubbing on rear axle carrier.	Straighten out slinger to remove interference.
Prop shaft hitting underbody.	Insufficient joint angle.	Increase angle.