

# PROPELLER SHAFT

## CONTENTS OF THIS SECTION

SUBJECT	PAGE	SUBJECT	PAGE
General Description . . . . .	4A-1	Disassemble Propeller Shaft Universal Joints	4A-2
Inspection . . . . .	4A-1	Cleaning and Inspection . . . . .	4A-3
Minor Services and Repairs . . . . .	4A-1	Assemble Propeller Shaft . . . . .	4A-3
Alignment of Engine and Propeller Shaft . . . . .	4A-1	Install Propeller Shaft Assembly . . . . .	4A-4
Major Repairs . . . . .	4A-1	Trouble Diagnosis and Testing . . . . .	4A-5
Remove Propeller Shaft Assembly . . . . .	4A-1	Torque Specifications . . . . .	4A-5

### GENERAL DESCRIPTION

The propeller shaft is the connecting link between and transmits power from the transmission to the differential. Two shafts are used; a solid tubular steel shaft on cars equipped with a synchromesh transmission, and one incorporating rubber torsional dampeners on cars equipped with an automatic transmission Fig. 4A-1.

Each shaft has a universal joint and a splined yoke on the transmission end and are held in alignment by a bushing in the transmission rear bearing retainer (or rear extension housing), and a universal joint at the differential end (Fig. 4A-2).

A U-bolt type clamp and locking plate is used to attach the universal joint to the companion flange at the differential. The front joint attaches to the output shaft of the transmission by means of a splined yoke which permits fore and aft movement of the propeller shaft when the rear axle assembly moves up and down. This splined connection is lubricated from the transmission. An oil seal pressed into the transmission rear bearing retainer protects the transmission yoke from dust as well as loss of transmission lubricant.

### INSPECTION

No periodic inspection of the propeller shaft assembly is required. Since the propeller shaft assembly is a balanced unit, it should be kept free of undercoating and other foreign material which could upset shaft balance.

### MINOR SERVICES AND REPAIRS

#### ALIGNMENT OF ENGINE AND PROPELLER SHAFT

Adjustment of the propeller shaft angle, such as shimming cannot be made at the rear axle and is not required at the front (engine and transmission).

All necessary differential pinion angle requirements are designed and built into the rear upper and lower control arm geometry. Slots in the engine front motor mounts provide for fore and aft movement of the engine and transmission assembly to give allowance for variation of the positioning of the transmission rear cross member. The relationship of engine crankshaft angle to propeller shaft angle is maintained within specification by design.

### MAJOR REPAIRS

#### REMOVE PROPELLER SHAFT DRIVE LINE ASSEMBLY

1. Remove U-bolt nuts, lock plates and U-bolts from rear axle drive pinion flange.

2. Use a suitable rubber band to hold bearing onto journals if tie wire has been removed to prevent loss of needle bearings when rear joint is disconnected (Fig. 4A-3).

3. Remove complete drive line assembly by sliding rearward to disengage from splines on transmission main shaft.

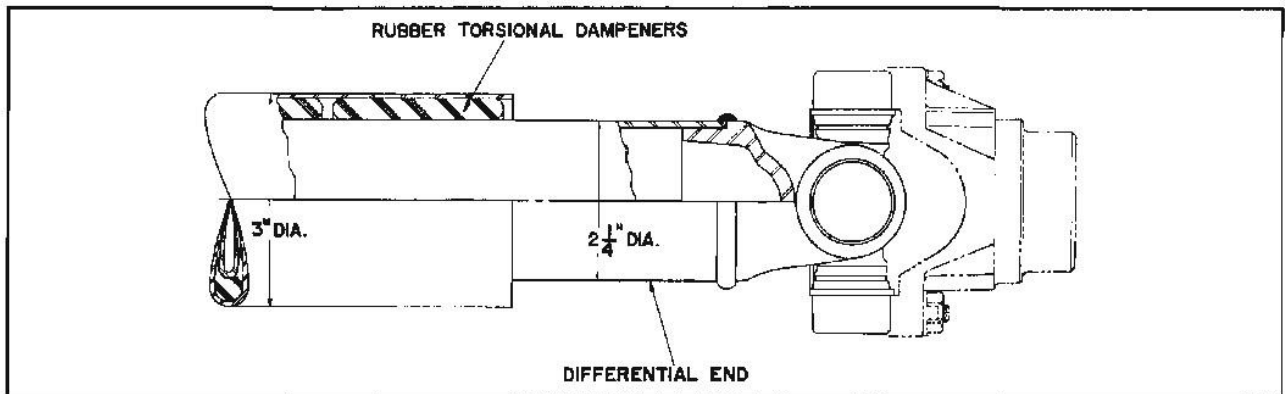


Fig. 4A-1 Insulated Propeller Shaft

### DISASSEMBLE PROPELLER SHAFT UNIVERSAL JOINTS

*NOTE: When removing bearings from universal joint yokes, use extreme care so as not to lose needle rollers from bearings.*

1. Remove snap ring from yoke members by using screwdriver or similar tool.

2. Remove bearings from splined yoke member as follows:

a. Lay or clamp end of shaft in vise so fixed yoke member welded to tube bears against vise. (Do not lay or clamp tubular member in vise.) Shaft should be horizontal and splined yoke member must be free to move vertically between jaws of vise.

b. Using a piece of pipe or similar tool with diameter sufficiently large to encircle bearing (slightly larger than 1-1/8 inch), apply force on yoke around bearing (Fig. 4A-4). This will drive

yoke down causing journal assembly (spider) to force bearing partially out of yoke.

c. Rotate shaft 180° and repeat above step to partially remove opposite bearing.

d. With yoke down as far as possible, place one or more flat washers (9/16" O.D.) inside lower bearing (Fig. 4A-5).

*NOTE: Total thickness of washers should be 1/8"-3/16".*

e. Rotate shaft 180° and again apply force around bearing in which washers were installed. This will completely remove bearing from yoke.

f. Remove splined yoke member from journal.

g. Remove remaining bearing from splined yoke member using brass drift.

3. Remove bearings and journal (spider) from fixed yoke member, which is welded to tubular shaft, as follows:

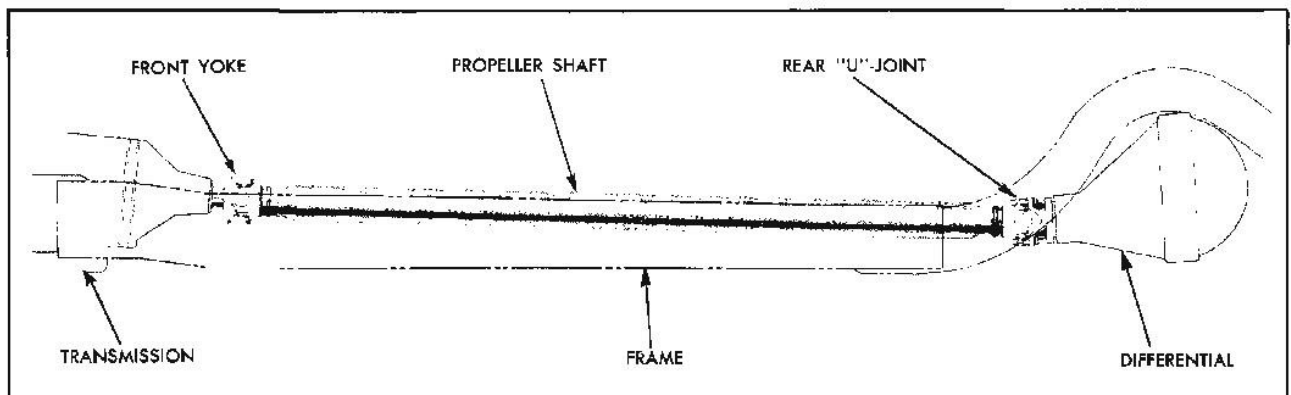


Fig. 4A-2 Relationship of Propeller Shaft to Transmission, Differential and Frame

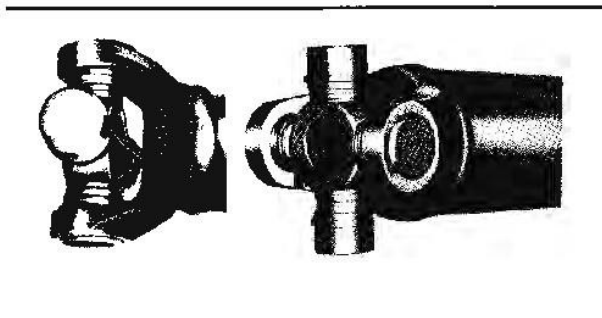


Fig. 4A-3 Bearings Held in Place by Tie Wire

a. With yoke member clamped or supported in vise, drive bearing out as far as possible using drift applied to center part of journal (Fig. 4A-6).

b. Rotate shaft 180° and drive opposite bearing out as far as possible using drift in same manner as in above step.

c. Hold journal up and install three or four small flat washers (Fig. 4A-7). Lower journal onto washers and drive bearing out using drift applied to journal.

d. Remove journal from yoke.

e. Remove remaining bearing using brass drift.

#### CLEANING AND INSPECTION

1. Wash all parts thoroughly in a cleaning fluid. Probe holes in journals to remove any hardened grease.

2. Inspect roller bearing surfaces of journals, inner bearing surfaces of outer races, and rollers for wear, scores, flat spot or other damage.

3. Inspect packings (cork washers) and journal dust shields for wear and injury. Replace if necessary. Packing should be flexible, if brittle or hard replace with new packing.

4. Inspect outer surface of propeller shaft splined yoke to ensure that it is not burred since burrs will damage seal. Also inspect splines for freedom from dirt.

#### ASSEMBLE PROPELLER SHAFT

1. Repack roller bearings and fill holes in ends of journal with high melting point wheel bearing lubricant (18 rollers are used for each bearing).

2. Install bearing journal and bearings in fixed yoke member as follows:

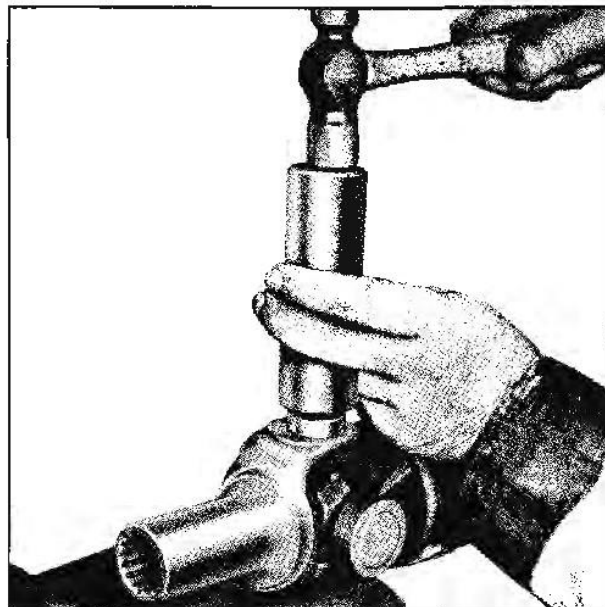


Fig. 4A-4 Removing Bearing From Splined Yoke Member

a. Press cork washer into position in recess of bearing and install bearing about one quarter way in on one side of fixed yoke using soft faced hammer.

b. Position journal, with dust shields installed, between arms of yoke and place journal in partially installed bearing.

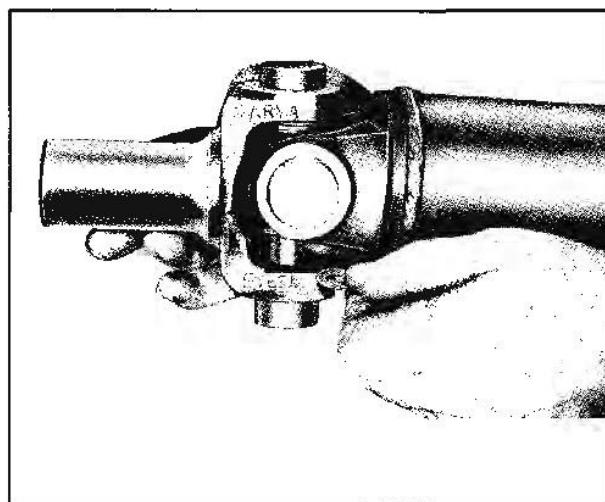


Fig. 4A-5 Placing Washers Inside Bearing of Splined Yoke Member

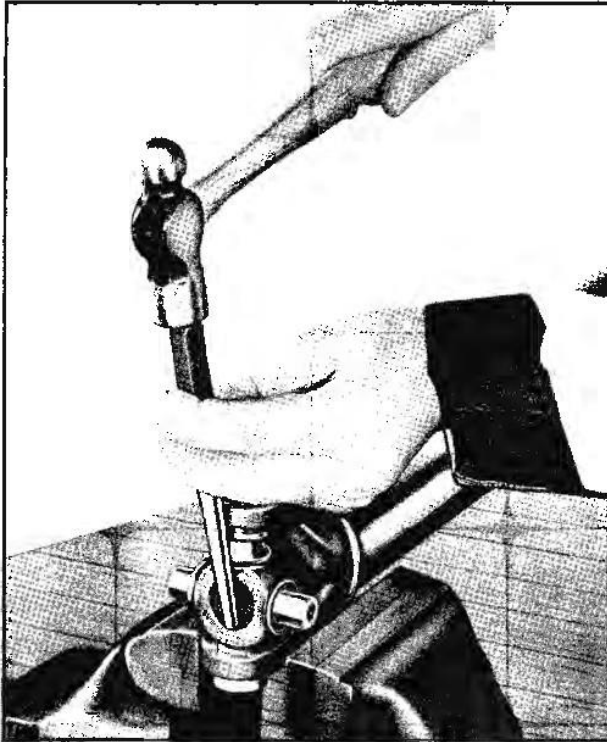


Fig. 4A-6 Removing Bearing From Fixed Yoke Member

c. Hold journal in place and complete installing bearing.

d. Install opposite bearing, with cork washer in place, ensuring that bearing rollers do not bind on journal. Check movement of journal in bearings for smoothness.

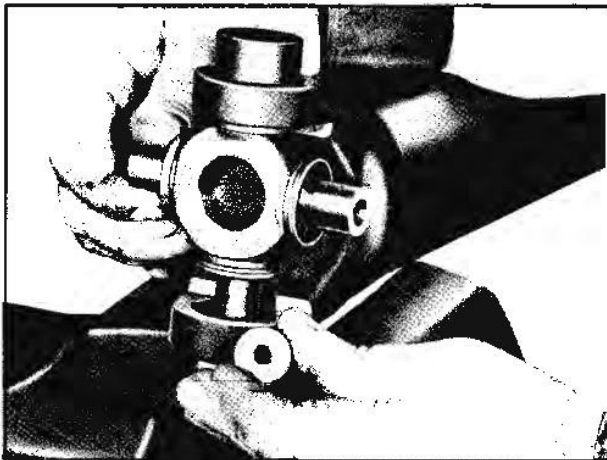


Fig. 4A-7 Placing Washers Inside Bearing of Fixed Yoke Member

*NOTE: It may be necessary to tap fixed yoke with hammer to free joints of bind.*

3. Install bearings in splined yoke member as follows:

a. Press cork washer into bearing and start bearing into place in splined yoke member with a soft faced hammer.

b. Position yoke over journal so arm of journal seats in bearing. Support yoke on opposite side and complete installation of bearing.

c. Press cork washer in place in remaining bearing and install bearing, ensuring that bearing rollers do not jam on journal. Check for free movement of universal joint.

4. Install snap rings in yoke members with gap toward yoke.

#### **INSTALL PROPELLER SHAFT DRIVE LINE ASSEMBLY**

1. Inspect outer diameter of splined yoke to ensure that it is not burred so as to damage transmission seal.

2. Apply engine oil to spline and outside diameter of yoke and slide propeller shaft front joints onto transmission output shaft.

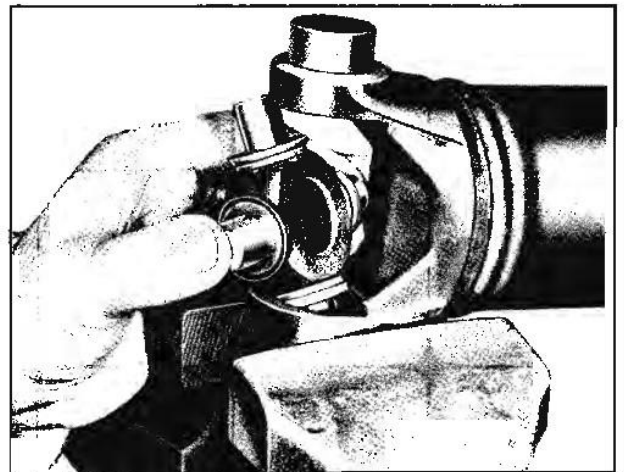


Fig. 4A-8 Correct Installation of Journal to Yoke

3. Position rear universal joint to rear axle companion flange making sure trunion bearings are properly aligned in companion flange yoke.

4. Install U-bolts, lock plates and nuts and tighten U-bolt nuts to 14-20 lb. ft. torque. Ensure that ears of lock plates are bent up against flat side of nuts.

## TROUBLE DIAGNOSIS AND TESTING

### OIL LEAK AT FRONT YOKE

#### CAUSE

Rough outside surface on splined yoke or defective transmission rear oil seal. An occasional drop of oil dripping from the spline yoke is normal and requires no correction.

#### REMEDY

Replace seal if cut by burrs on yoke. Replace yoke if outside surface is rough and burred badly. Minor burrs can be smoothed by careful use of crocus cloth or honing with a fine stone.

### KNOCK IN DRIVE LINE

#### CAUSE

Worn universal joints.

*NOTE: "Clunking" noise when car is operated under "floating" condition at approximately 10 mph in high gear or neutral.*

#### REMEDY

Disassemble universal joints, inspect and replace worn parts.

### PROPELLER SHAFT VIBRATION

If vibration comes in at definite speed while car is moving, check by driving car at speed above which vibration came in, shutting off engine and coasting in neutral down through speed where vibration came in. If vibration comes in at same speed when coasting, it is probably caused by propeller shaft or tires.

Tires may give a vibration at certain high speeds which could be mistaken for propeller shaft vibration. By inflating tires above normal pressure and retesting, it may be possible to distinguish tire noise from propeller shaft vibration. When it has been established that the tires are not the cause of vibration, then check propeller shaft assembly for balance and replace shaft.

## WRENCH TORQUE SPECIFICATIONS

(Torque in lb. ft.)

TORQUE	SIZE	APPLICATION
14-20	5/16-24	Nut, Rear Universal Joint Companion Flange Clamp