

MC-9 MAINTENANCE MANUAL

SECTION 14

PROPELLER SHAFT

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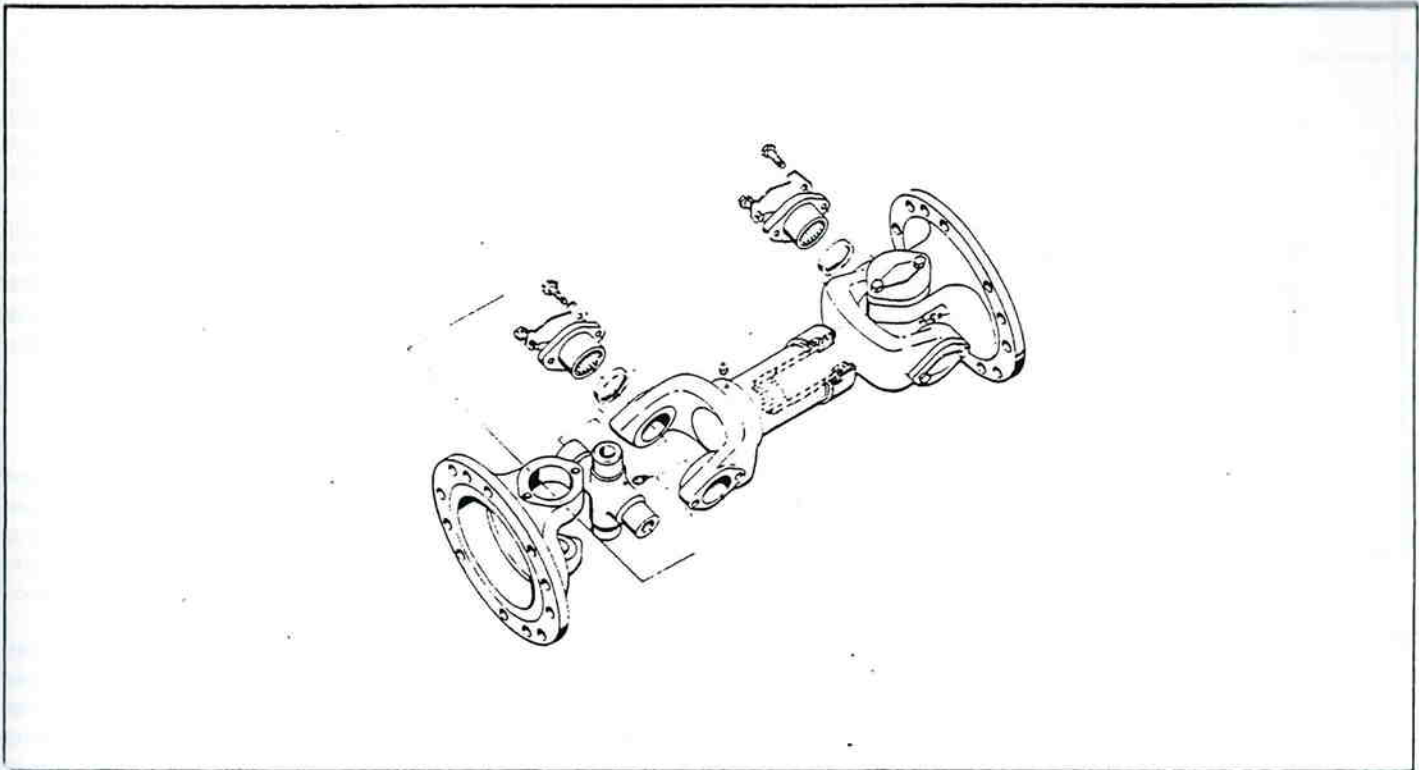


Figure 14-1. Coach Propeller Shaft

PROPELLER SHAFT

The propeller shaft transmits power from the transmission to the differential. In the two-axle coach, this is done through the use of an intermediate drive adapter (drop box). The propeller shaft is of the tubular type and uses two heavy duty needle bearing universal joints.

The slip joint compensates for variations in distance between the transmission and differential or drop box brought about by the rise and fall of the rear axle as the coach passes over uneven surfaces. The slip joint also facilitates removal of the transmission or rear axle.

The propeller shaft is flanged at each end for attachment to the transmission and differential (Fig. 14-1).

CAUTION: When assembling the propeller shaft to the sleeve yoke, the arrows must align at the joining areas. This will align the trunnions.

MAINTENANCE

Both universal joints are provided with lubrication fittings. A third lubrication fitting is provided at the slip joint.

The propeller shaft lubrication fittings should be serviced according to the recommendations contained in Section 10 of this manual.

Shaft flanges should be checked at regular inspection intervals for loose or broken bolts, lockwashers and nuts. When installing bolts, use only new $\frac{3}{8}$ " (9.52 mm) spring lockwashers to provide a proper lock.

CAUTION: Do not re-use lockwashers in this location. On coaches with standard transmission, only 14B-1-28 bolts are to be installed as they are Grade 8 bolts with a longer than normal unthreaded section as shown in Figure 14-2.

It is important that only (19-3-162) grade 8 hex nuts are installed on these bolts. The recommended torque value for the hex nuts is 35-39 ft. lbs. (47-53 Nm).

REMOVAL

The propeller shaft may be removed from the vehicle by removing the bolts which attach the universal joint flange and flange or end yoke to the differential and transmission shafts.

To remove the propeller shaft, remove the nuts and lockwashers which attach the propeller shaft flange and flange or yoke to transmission and differential shafts. Unscrew the slip joint dust cap. Telescope the propeller together at the slip joint. The shaft can then be removed. Replacement is the reverse of removal.

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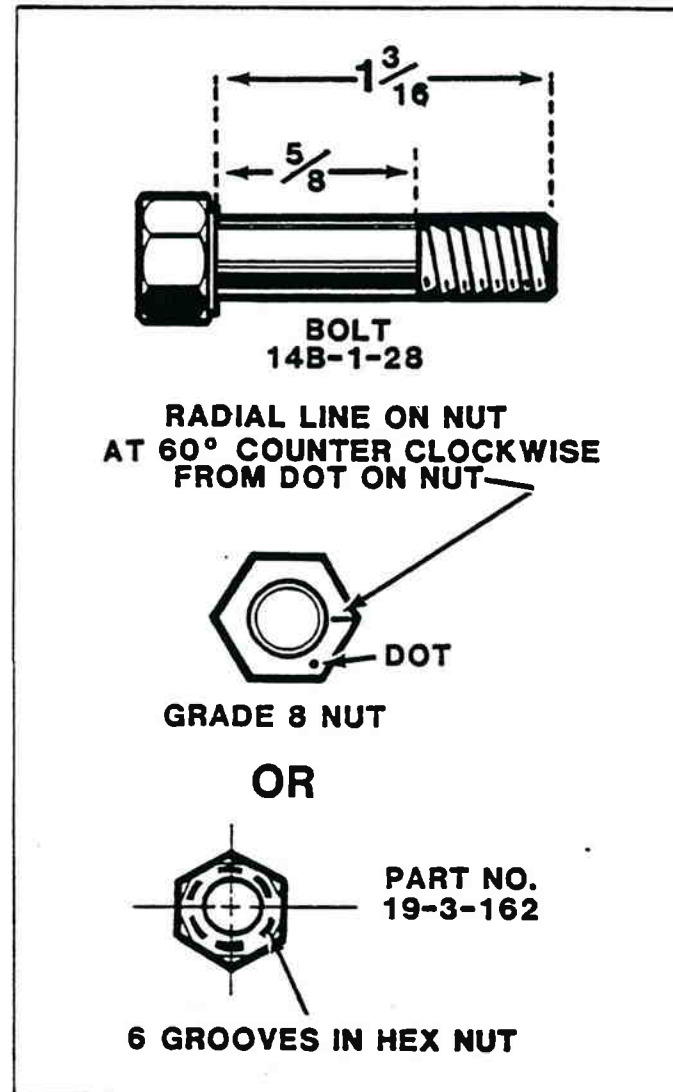


Figure 14-2. Propeller Shaft Flange Bolts and Nuts.

DISASSEMBLY OF UNIVERSAL JOINTS

Bend tangs of lock plate. Unscrew capscrews and remove lock plate. To remove the needle bearings and retaining cap subassembly use a large pair of channel lock pliers on retaining cap edges, turn retaining cap and bearing subassembly at the same time lifting upward to remove the subassembly from the journal trunnion diameter and out of the yoke hole. Turn the joint over and tap the exposed end of the journal cross until the opposite needle bearing is free. Use a soft round drift with flat face about 1/32" (.79 mm) smaller in diameter than the hole in the yoke.

Remove the journal cross by sliding it to one side of the yoke and tilting it over the top of the yoke lug.

CLEANING AND INSPECTION

Thoroughly clean grease from bearings, journals, and other parts. Clean all lubricant passages in the journal, and the lubri-

cation fittings. Needle bearing assemblies may be soaked in cleaning solution to soften particles of hard grease. It is extremely important that bearing assemblies be absolutely clean, since even very small particles of dirt or grit can cause rapid bearing wear. Do not attempt to disassemble needle bearings.

Bearing journal areas should be inspected for roughness or grooving. If light honing does not remove roughness, the entire bearing assembly should be replaced. Excessive wear of the needle bearings is indicated if the needles drop out of the retainer, or if marks are present on the journal bearing surface. Inspect yokes for cracks, wear or distortion.

REASSEMBLY

Pack needle bearing assemblies with clean grease. Insert one trunnion of the journal into the yoke as far as possible from the inside, and tilt until opposite trunnion clears the yoke and drops into position. Install lubrication fittings and lubricate bearings approximately 1/3 full with the lubricant specified in Section 10.

Insert bearing assemblies from outside of yoke and tap into place with plastic hammer. Do not use a steel hammer for this purpose. The joints should move freely in the bearings and not bind. Also, if new needle bearing assemblies are not being installed, care should be taken to replace bearing assemblies in the same locations from which they were removed. Install bearing caps, new lock straps, and capscrews. Tighten capscrews firmly then lock screws by bending lock straps against screw heads.

LUBRICATION UNIVERSAL JOINTS

To insure proper lubrication of all four bearing assemblies on universal joints, it is essential to add lubricant until it appears at all journal cross bearing seals. See figures 14-3 thru 14-6. This assures removal of dirt particles and other contaminants that may find their way into the bearings and indicates that the bearings are fully lubricated.

Do not assume that bearing cavities have been filled with new lubricant unless flow is noticed around all four bearing seals.

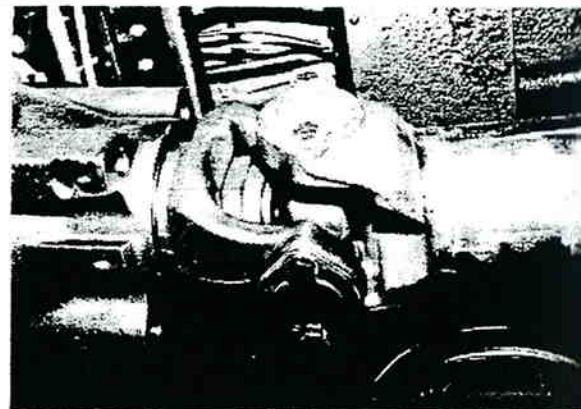


Figure 14-3. Propeller Shaft Grease Nipples and Mounting Bolts.

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Journal cross seals are designed to relieve. However, if all the seals do not "pop" when being lubed, move the driveshaft laterally in all four directions and pull or push on the driveshaft in the direction opposite to the journal cross seal not relieving while lube gun pressure is being applied to the alemite fitting. An increase in line pressure may also be necessary.

If seals fail to purge, cup removal may be necessary to remove the obstruction and promote lubrication.

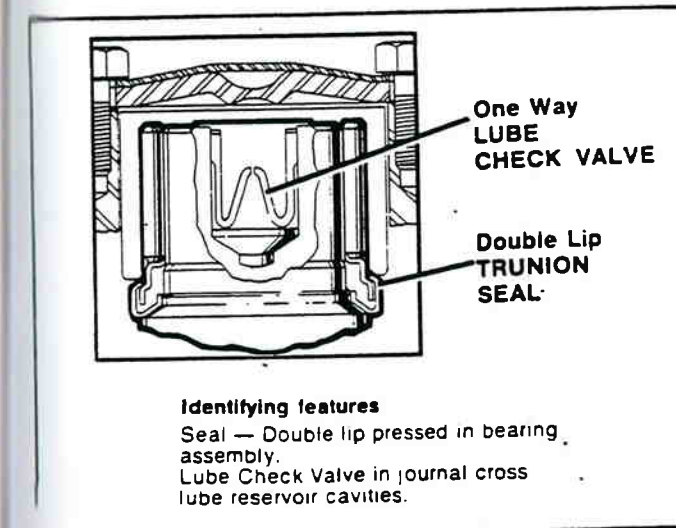


Figure 14-4. Seal Cross Sectional View.

DRIVE SHAFT ASSEMBLY

Factory assembled drive shafts are lubricated at the plant prior to shipment. When installing spare parts replacement assemblies, it is recommended that all universal joints be lubricated after installation of the drive shaft prior to putting vehicle in service. High quality extreme pressure (EP) grease is recommended for universal joints. Lithium soap base greases meeting NLGI Grade 1 and Grade 2 specifications are preferred. The use of greases that tend to separate and cake should be avoided. Refer to Section 10 for lubrication intervals.

RELUBE CYCLES

Relubrication cycles for drive shaft universal joints and slip splines vary with operating conditions. The following relubrication schedule has been used successfully.

| | Miles | Kilometers | Hours |
|----------|-------------|--------------|---------|
| Normal | 6,000-8,000 | 9,700-13,000 | 150-200 |
| * Severe | 2,000-3,000 | 3,200- 4,800 | 50- 75 |

* Such as high ambient temperatures or extremely rough road conditions.

TROUBLESHOOTING

Noise and vibration in the drive line often originate in the propeller shaft. Noise and vibration originating in the universal

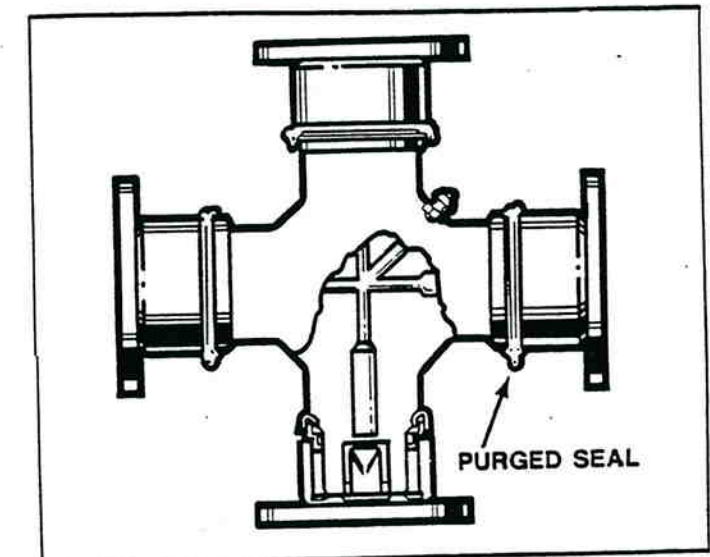


Figure 14-5. Journal Cross Assembly.

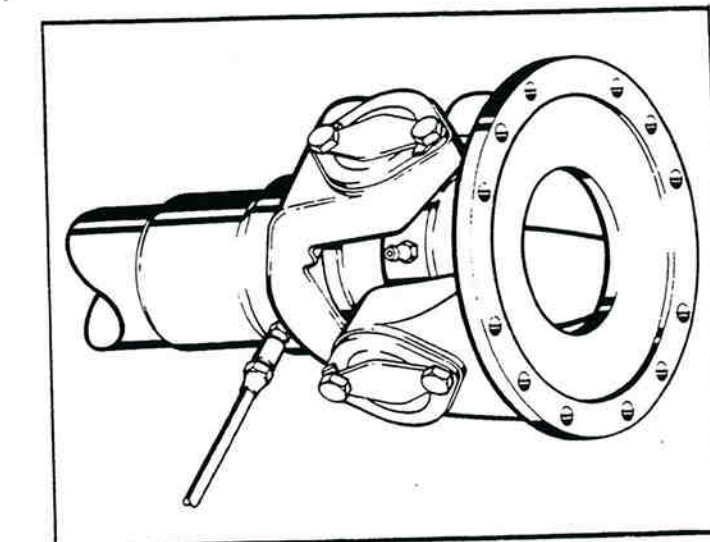


Figure 14-6. Sleeve Yoke End of Spline.

joint and propeller shaft assembly appear only at certain speeds, and usually come and go as the vehicle speed is increased or decreased. Noises produced by the rear axle, on the other hand, are generally present throughout the vehicle's speed range.

When propeller shaft assembly noise and vibration becomes excessive, the cause should be determined and corrected immediately, since rear axle pinion failure is often a direct result. Propeller shaft noise and vibration often appear to originate in the rear axle.

Common causes of propeller shaft and universal joint vibration are (a) propeller shaft assembly out of balance; (b) excessive flange runout or distorted yokes; (c) loose yoke nuts; (d) universal joint yoke misalignment.

