

## DRIVE SHAFTS AND PROPELLER SHAFT

### Sliding joint and gaiter

To remove the gaiter from the sliding joint or the front propeller shaft, clean the gaiter and the area of the shaft adjacent to it. Ensure that the arrows are visible on the sleeve yoke and shaft (1, Fig. 4). Cut the metal and rubber rings (2, Fig. 4) securing the gaiter to the yoke and shaft, withdraw the gaiter (5, Fig. 5) along the shaft.

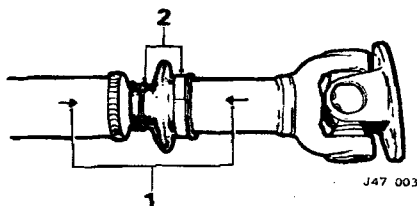


Fig. 4

Partially withdraw the sleeve yoke (4, Fig. 5) from the splined shaft and examine the splines for wear. If there is more than 0.1 mm (0.004 in) circumferential movement measured on the outside diameter of the spline, then the complete propeller shaft assembly must be renewed.

Withdraw the sleeve yoke (4, Fig. 5) from the splines shaft and remove the gaiter (5, Fig. 5).

### Inspection

Carefully inspect the internal and external splines of the sliding joint. Ensure that the welch washer in the female spline is secure and leakproof.

Wash all the other components of the propeller shaft assembly in petrol, examine bearing races and spider journals for signs of looseness, load markings, scoring or distortion. Spiders or bearings should not be renewed separately, as this will cause premature failure of the replacement.

It is essential that the bearing cups (3, Fig. 5) are a light drive fit in the yoke trunnions.

### Reassembling

#### Universal joints

Using new universal joint assemblies if necessary, insert the journal cross into the flange, tilting it to engage in the yoke bores.

Ensure that all the needle rollers are in position; fill each bearing cup one-third full of grease of the recommended type.

Fit one of the bearing cups (3, Fig. 5) in the yoke bore, and using a suitable soft metal drift, tap the bearing cup fully home.

Fit a new snap-ring (2, Fig. 5) ensuring it is correctly located in the groove.

Assemble the other spiders and bearing cups, and fit new snap-rings, to retain the bearing cups.

#### Sliding joint and gaiter

Lubricate the internal and external splines generously with Blended Spline Grease (ref. MNR (A) supplied by Oilene Ltd.), align the arrows and engage the male and female splines.

Ensure that a dimension of less than 185 mm (7.3 in) can be obtained between the yoke joint centre-line and the weld centre-line on the propeller shaft.

Withdraw the shaft and check for complete coverage of the splines by the lubricant.

To prevent damage to the rubber rings and gaiter wrap thin metal or plastic film over the male splines. Pass the two rubber rings over the splines, followed by the smaller end of the gaiter, place the rings over the gaiter.

Remove the protective film from the splines.

Position the metal ring clip on the gaiter, realign the splines and ease the gaiter over the sliding joint. Check that the arrows align (1, Fig. 4) and fit the sleeve yoke to the shaft.

Secure the gaiter clip.

### Rear propeller shaft

Coat the splines of the rear propeller shaft with Loctite grade AVV and fit to the centre joint yoke, align the marks previously made.

Fit and tighten the bolt (1, Fig. 5) secure using a new tab washer.

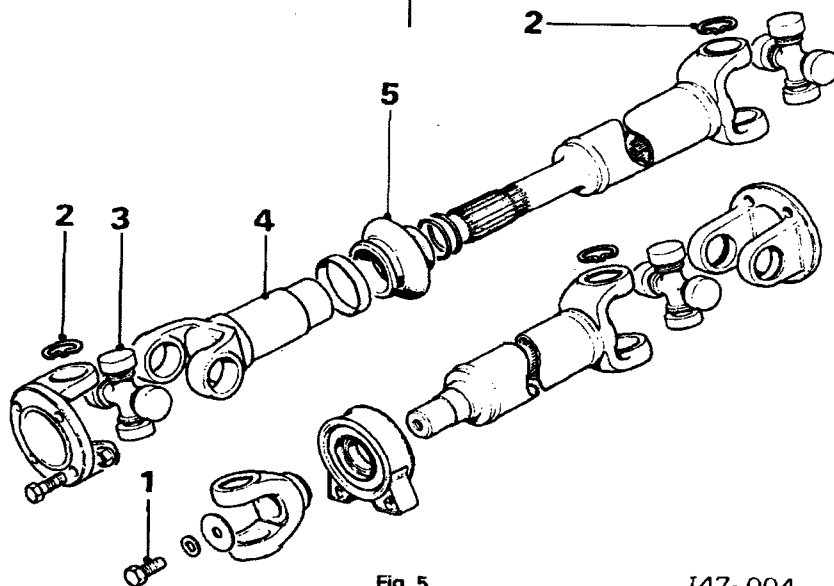


Fig. 5

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**Reassembling**

Remove bearing assemblies from one replacement spider; if necessary, retain rollers in housings with petroleum jelly. Leave grease shields in position.  
 Fit spider to one end section of shaft.  
 Fit two bearings and circlips in end section trunnions. Use a soft round drift against bearing housings.  
 Insert spider in trunnions of centre section of shaft.  
 Fit two bearings and circlips in centre section trunnions.  
 Fit grease nipple to spider.  
 Repeat above operations on opposite end of drive shaft.  
 Grease joints with hand grease gun.  
 Refit drive shaft.

**PROPELLER SHAFT**

**Remove and refit 47.15.01**

Service tools: Engine support tool MS 53A or extension jack.

**Removing**

To provide access, remove the exhaust heat shield where fitted.  
 Mark the relationship between the propeller shaft and final drive flanges, and remove the bolts securing the flanges.  
 Remove the bolts securing the centre bearing support plate, to the centre bearing and body.  
 Remove the support plate. Collect two spacers with the front bolts.  
 Using service tool MS 53A or, alternatively, place an extension jack under the gearbox, nut under the oil pan, take the weight off the rear engine mounting.  
 Separate the exhaust system at the down-pipe and intermediate pipe joints.  
 On cars equipped with a catalyst, slacken the nut and move the exhaust support stay to one side.  
 Remove the exhaust strengthening plate from the transmission case; collect two spacers and one washer.  
 Raise the rear of the engine/gearbox unit to reduce the loading on the mounting spring.  
 Remove the bolts securing the engine mounting to the tunnel closing plate, and detach the mounting plate. Collect spring, two spacers, two special washers and bump stop rubber.  
 Mark the relationship between the propeller shaft front flange and gearbox flange. Remove the bolts, turning the shaft to give access to each nut.  
 Separate the flanges and withdraw the complete propeller shaft rearwards through the transmission tunnel.

**Refitting**

**NOTE:** Before refitting the shaft, ensure that all the universal joints operate freely; a tight joint will cause vibration.

Insert the propeller shaft through the rear of the tunnel and line up the front flanges as marked. Fit the bolts through the flanges, fit and tighten the nuts. Refer to torque wrench settings. Replace the rear engine mounting and strengthening plate and detach the engine support tool or jack.  
 Replace the rear flange to final drive flange as marked, fit four bolts, fit and tighten the nuts to the correct torque.  
 Offer up the centre bearing support plate to the centre bearing and body structure. Insert bolts and spacers but do not fully tighten. Move the centre bearing as far as possible to the right-hand side of the tunnel and tighten the bolts.  
**NOTE:** If propeller shaft vibration is experienced, move the centre bearing to the left in small steps until the vibration is eliminated. It is most important that the spacers which control the vertical location of the bearing are replaced as originally installed.  
 Replace the exhaust stay (catalyst equipped cars) and re-make exhaust flange joint using 'Firegum'.

**PROPELLER SHAFT**

**Overhaul 47.15.10**

- including:**
- Propeller shaft — rear — remove and refit 47.15.03**
- Sliding joint and gaiter — remove and refit 47.15.08**
- Centre bearing — remove and refit 47.15.33**

**NOTE:** The propeller shaft is supplied as a balanced unit and it is not possible to replace the front or rear shafts separately. Only the sliding joint gaiter, centre bearing, end flanges and spiders of the universal joints can be renewed.

**Dismantling**

Remove the propeller shaft assembly from the vehicle and place on a workbench.  
 Clean the assembly and mark the relationship between the centre yoke and the rear shaft.

**Rear propeller shaft**

To remove the rear propeller shaft, insert a suitable distance piece (e.g. a scrap nut), between the head of the bolt (1, Fig. 3) securing the centre joint yoke to the rear shaft, and the spider of the centre universal joint. Using an open-ended spanner, unscrew the bolt (1, Fig. 3) from the rear shaft; to separate the shafts, break the Loctite adhesion between the splines and withdraw the rear shaft from the centre yoke.

**Centre bearing**

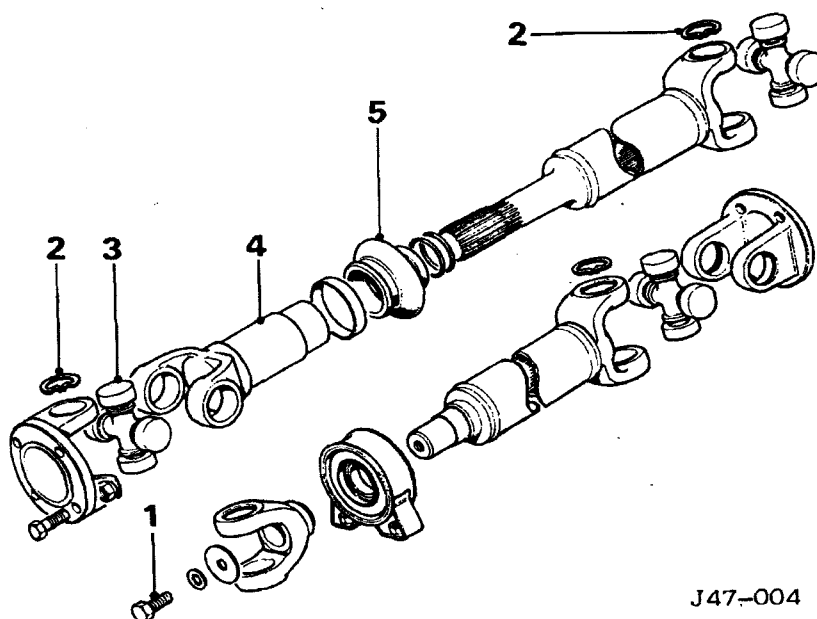
Using a suitable puller, remove the centre bearing from the rear propeller shaft. Engage the legs of the puller in the inner reinforcing ring of the rubber mounting.

**Universal joints**

To overhaul the propeller shaft universal joints, remove the snap-rings from the grooves (2, Fig. 3).

**NOTE:** If difficulty is encountered, tap the bearing cup (3, Fig. 3) inwards to relieve the pressure on the snap-ring.

Hold the flange yoke and tap the yoke with a soft-faced hammer. The bearing cup should gradually emerge and can be finally removed. Alternatively, secure the propeller shaft in a vice. Using a suitable soft metal drift, drift down on a bearing cup to displace the opposite cup. Remove the propeller shaft from the vice, hold the displaced cup in the vice and separate from the propeller shaft by pulling and twisting. Repeat the above operations for the opposite bearing cup, and the remaining bearing cups at each end of the shaft.



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Fig. 3

## PROPELLER SHAFT

Remove the two self-locking nuts and bolts securing the body mounting bracket to the propeller shaft bearing plate. Remove four bolts and lockwashers securing the mounting rubbers to the body mounting bracket.

### Checking the Alignment in the Horizontal Plane

To check the alignment, it is advisable to make up a simple checking jig as shown in Fig. 2.

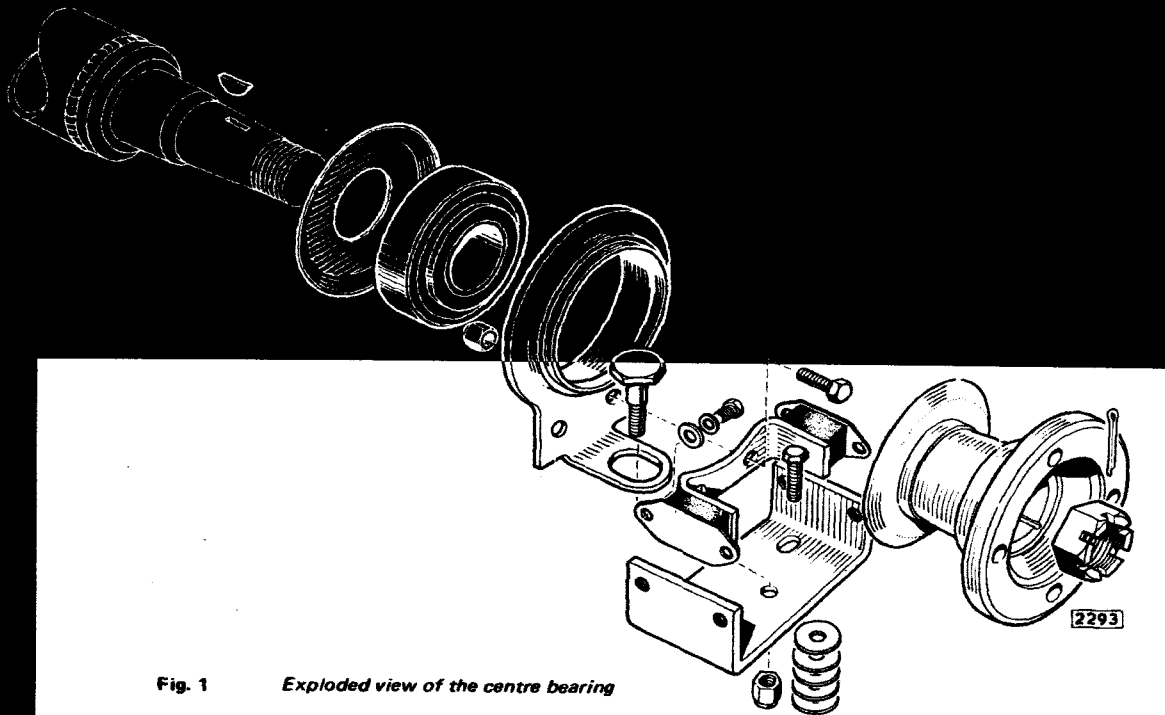


Fig. 1 Exploded view of the centre bearing

### Reassembling

Renew the bearing if worn.  
Renew the mounting rubbers if worn or damaged.  
Reassembly is the reverse of the dismantling procedure.

### DIVIDED PROPELLER SHAFT ALIGNMENT

The alignment of the divided propeller shaft is MOST IMPORTANT, and if the removal of the engine or the rear shaft has taken place the following checks should be made on replacement. Failure to carry out this check may result in transmission judder when taking up the drive from a standing start.

Offer up the jig to the front and rear propeller shafts as illustrated in Fig. 3. All three legs should contact the propeller shafts simultaneously.

### Adjustment

If any adjustment is necessary, add or subtract shim washers between the centre bearing bracket and the propeller shaft tunnel (See Fig. 1). Add shims to raise and lower the centre bearing.

### Checking the Alignment in the Vertical Plane

Using the jig (Fig. 2) place in position as shown in Fig. 4.

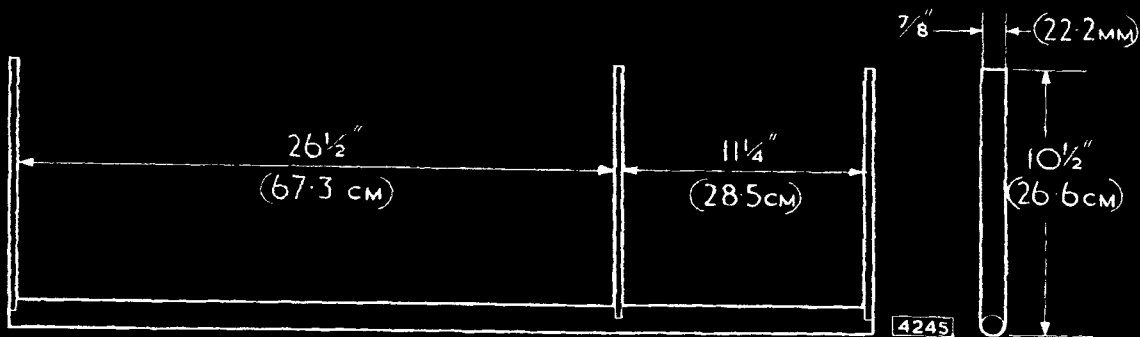


Fig. 2 Propeller shaft alignment jig

## PROPELLER SHAFT

### DESCRIPTION

A divided propeller shaft of the open type is fitted, the front end of the rear shaft being supported in a rubber mounted ball race.

The front shaft has a universal joint at each end and a sliding spline encased in a rubber gaiter.

## ROUTINE MAINTENANCE

The propeller shaft universal joints, sliding spline and the centre bearing are pre-packed with grease, therefore no periodic maintenance is required. Replenishment with grease is only necessary when the shafts are overhauled.

## RECOMMENDED LUBRICANTS

Mobil	Castrol	Shell	Esso	B.P.	Duckham	Regent Caltex/ Texaco
Mobilgrease	Castrolase L.M.	Retinax A	Esso-Multi- Purpose Grease H	Energrease L.2	L.B. 10	Marfak All-Purpose

### FRONT PROPELLER SHAFT

#### Removal

Remove four self-locking nuts and bolts from the front and rear attachment flanges, compress the shaft at the sliding spline and withdraw rearwards.

#### Refitting

Reverse the removal procedure to refit. Check that all flanges are clean.

### REAR PROPELLER SHAFT

#### Removal

Remove four self-locking nuts and bolts from the front and rear attachment flanges.

Mark the location of the centre bearing support bracket in relation to the underside of the body. Remove the four securing setscrews and lockwashers and detach the support bracket. Note the number and location of any washers between the bracket and the body.

Withdraw the shaft rearwards.

#### Refitting

Reverse the removal procedure to refit. Check that all flanges are clean.  
Check the propeller shaft alignment as detailed on page G.4 after refitting.

### CENTRE BEARING

The centre bearing consists of a ball bearing pressed in to a housing to which a plate is attached.

The assembly is mounted on the front of the rear propeller shaft, with a dust shield interposed between the housing and the shaft tubing. The bearing is retained on the shaft by a flange coupling which is bolted to the companion flange on the front propeller shaft.

#### Removal

Remove the rear propeller shaft complete with centre bearing, as detailed previously.

#### Refitting

Reverse the removal procedure to refit. Note the procedure detailed under the heading "Divided propeller shaft alignment."

#### Dismantling

The flange coupling is retained on the rear propeller shaft by two Woodruff keys, and is secured by a slotted nut and split pin.

Extract the split pin, remove the nut and withdraw the flange coupling.

Remove the keys and outer dust cover.

Drive the shaft through the bearing and housing, and press out the bearing.

## PROPELLER SHAFT

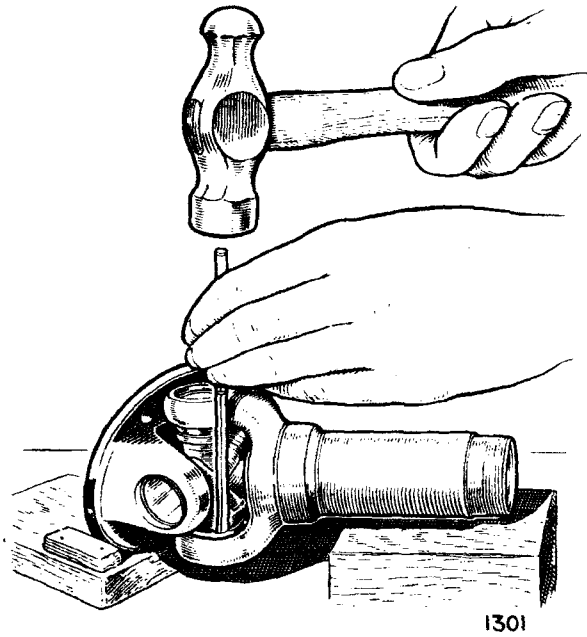


Fig. 6 *Tapping out the bearing with a small diameter rod*

Fit the rubber seals to the inner end of each bearing. Insert the journal into the flange yoke. Fit one of the bearings in the bore of the yoke and, using a drift approximately  $1/32$ in. (.08mm) smaller than the bearing diameter, tap the bearing into position. Locate the retaining circlip securely in its groove. Repeat this operation for the remaining three bearings and wipe off any superfluous grease.

Finally recheck that all circlips are seated correctly and that the journals are free in movement.

### IMPORTANT

When replacing the sliding joint, it must be refitted with its yoke in line with the fixed yoke at the other end of the shaft. Arrows are stamped on the two parts to facilitate alignment.

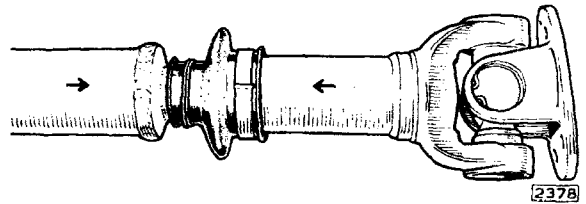


Fig. 7 *Showing the arrows on the sliding joint*

All three legs should contact the propeller shafts simultaneously.

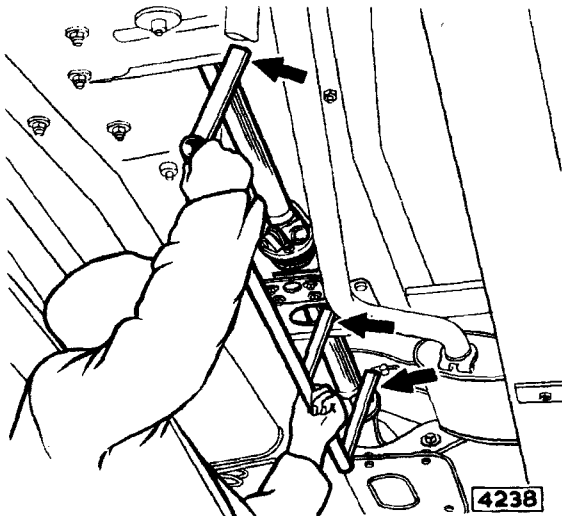


Fig. 3 Checking the horizontal alignment

**Adjustment**

If any adjustment is necessary, release the setscrews securing the centre bearing bracket to the body floor. Adjust by use of the slotted holes to allow the shafts to be aligned.

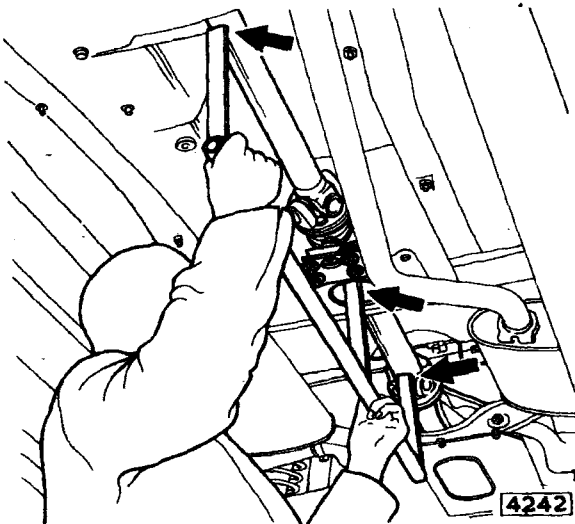


Fig. 4 Checking the vertical alignment

**UNIVERSAL JOINTS**

**Check for Wear**

The parts most likely to show signs of wear after long usage are the bearings and the journals. Should looseness, load markings or distortion be observed, renew the complete journal assembly.

In the rare event of wear in the cross holes of either the yokes or flange yokes, the units must be replaced. In the case of wear in the cross holes of the fixed yoke (which is part of the shaft) the shaft must be replaced. Check for excessive movement of the splined shaft in the splined sleeve yoke. If circumferential movement, measured on the outside diameter of the spline exceeds .004in. (.1mm), replace the complete propeller shaft.

**Dismantling**

Release the rubber gaiter retaining ring and remove the sliding joint from the splined shaft. Clean thoroughly. Remove the snap rings from their grooves in the yokes. If a ring does not snap out of its groove readily, tap the bearing to relieve the pressure against the ring. Tap the yoke lug as shown in Fig. 5 with a soft nosed hammer and the top bearing will gradually emerge. It can be finally removed by hand.

If great difficulty is encountered in tapping out the bearing, it may be driven out from inside using a small diameter drift. See Fig. 6.

Repeat the operation for the opposite bearing and withdraw the yoke.

Rest the two exposed trunnions on a block of wood and tap the yoke with a soft nosed hammer to remove the two remaining bearings.

Wash all parts thoroughly in petrol.

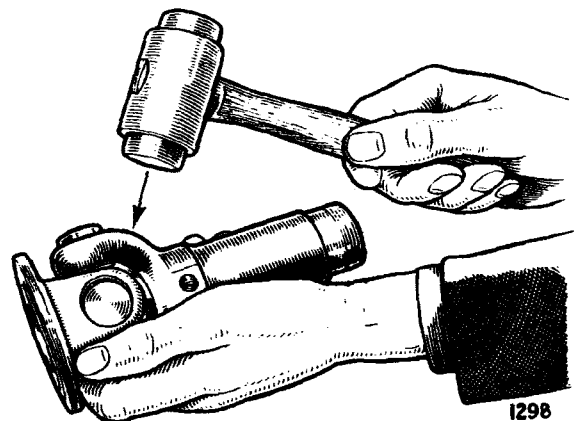


Fig. 5 Tapping the yoke to remove the bearing

**Assembling**

Prior to assembling, fill each journal trunnion reservoir with the recommended grease and half fill each bearing with similar lubricant.

# PROPELLER SHAFT

## PROPELLER SHAFTS 2.8 / 4.2 litre cars

With the introduction of the larger diameter front propeller shaft on manual and overdrive cars, the alignment procedure differs from that previously used as follows:-

On all cars, irrespective of the type of transmission (including automatic) as shown in the following illustration, the front and rear shafts should be in line in elevation and offset by 3.175mm. (1/8") to the left-hand at the centre bearing in plan view.

The basic checking fixture previously used to align propeller shafts should be modified to incorporate the additional 3.175mm. (1/8") offset on the centre bearing and also the increased diameter front shaft manual and overdrive transmission.

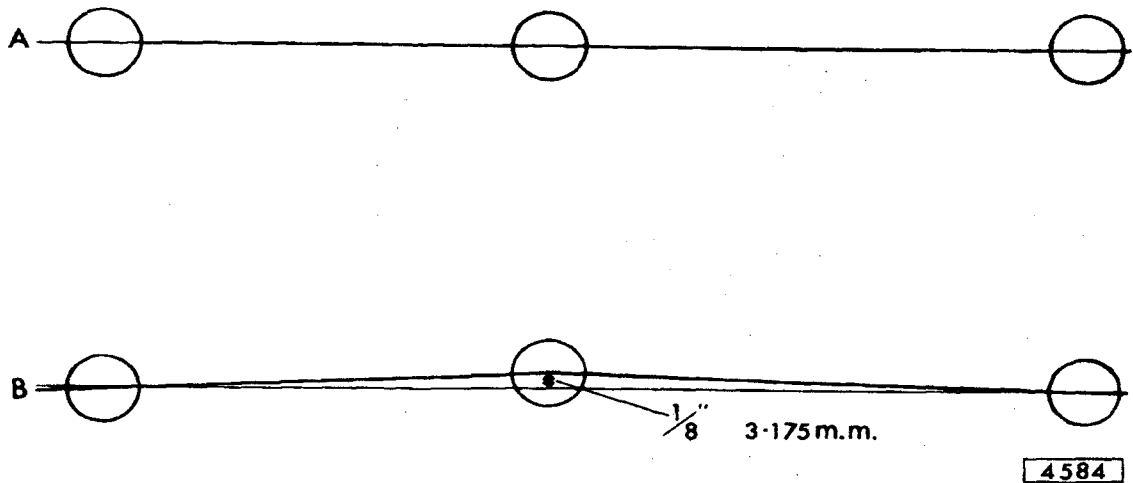
### Diameter of Shafts

<b>Automatic Transmission</b> 50.8 mm. (2") 50.8 mm. (2")	Front Rear	<b>Manual/Overdrive Transmission</b> 76.2 mm. (3") 50.8 mm. (2")
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If propeller shaft vibration is evident upon testing the car, new centre mounting rubber assemblies should be fitted, obtainable under Part Numbers:-

C.19509/1	4.2 litre only
C.19509/1 or C.19509/2	2.8 litre only

**IMPORTANT:** The two mounting rubbers, C.19509/1 and C.19509/2, vary only in the hardness of the rubber and in all other respects are identical. It is therefore **ESSENTIAL** that correct parts are obtained.



**Fig. 8** Schematic propeller shaft alignment in plan and elevation  
 A - Elevation  
 B - Plan view

## SUPPLEMENTARY INFORMATION

### **Flange Coupling – Later Cars**

Flange couplings on later cars are splined on to propeller shaft and it is essential that relative position of flange to shaft is noted before dismantling.