Issue record sheet 1

November 1984

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Final drive

Contents

Final drive

Introduction

The final drive assembly comprises a central differential gearcase which houses the hypoid crown wheel, pinion, and differential housing gears.

The final drive case is attached to a crossmember, which is mounted to the body by the use of rubber mounts.

Final drive torque reaction is controlled by a torque arm bolted to the final drive case and rear suspension crossmember.

Two types of drive-shaft assemblies are fitted to the final drive.

On cars other than those conforming to a North American specification and those cars prior to vehicle identification number (VIN)*SCAZS0009BCH02573* (with the exception of cars listed below), the drive-shafts utilize a ball and trunnion joint, together with a universal joint.

On cars conforming to a North American specification and cars from vehicle identification number (VIN)*SCAZS0009BCH02573*(including cars listed), the drive-shafts utilize constant velocity joints (see figs. J1-4 and J2-1).

Important

Never disconnect the torque arm or the frame tubes connecting the final drive crossmember to the rear suspension crossmember without removing all suspension load from the rear sub-frame assembly.

For details refer to Torque arm - To remove.

A fully adjusted final drive casing assembly is available as a service exchange item. This is supplied without the drive-shaft assemblies but is fitted with both side bearing housings.

When fitting either type of drive-shaft assembly, it is essential that the side bearing housings supplied with the final drive unit, are fitted to the drive-shafts. The fitting of any other bearing housing will result in an incorrectly adjusted final drive assembly.

Vehicle identification numbers of cars fitted with drive-shafts incorporating constant velocity joints

SCAZS0008BCX01864
SCAZS0001BCH02177
SCAZS0008BCH02225
SCAZN0008BCX02259
SCAZN0006BCH02263
SCAZN0007BCX02267
SCAZS0009BCH02296
SCAZS0004BCX02297
SCAZS0004BCH02304
SCAZS0007BCX02309
SCAZS000XBCH02310
SCAZS0004BCH02318
SCAZN0009BCH02337
SCAZS0003BCH02391
SCAZS0003BCX02405
SCAZS0007BCH02457
SCAZS0005BCH02473
SCAZS0001BCH02518
SCAZS0007BCX02522
SCAZS0009BCH02539
SCAZS0000BCH02543
SCAZS0008BCH02547
SCAZS0008BCH02550
SCAZS0001BCH02552
SCAZS0003BCH02553
SCAZS0007BCH02555
SCAZS0000BCH02557
SCAZS0000BCH02560
SCBZS0008BCH02561
SCAZS0006BCH02563
SCAZS0007BCH02572
and onwards.

Final drive - To remove (cars fitted with ball and trunnion joints - see Introduction)

1. Position the car on a ramp. Securely chock the front road wheels.
2. Switch on the ignition. Select the Neutral position on the gear range selector, remove the gearbox isolator. Switch off the ignition.
3. Insert the spring retainer tool RH 9299 into each rear suspension spring (see Chapter H). Compress the springs to remove all spring load from the trailing arms.
4. Depressurize the hydraulic systems as described in Chapter G.

Note

Under no circumstances should operations to remove the final drive be carried out while spring or strut loads are applied to the rear sub-frame.

5. Locate a hydraulic jack under the final drive case and raise the rear of the car. Position sill blocks beneath the rear end of the car sills. Lower the hydraulic jack from beneath the final drive allowing the sill blocks to support the car.
6. Remove the rear wheels.
7. Remove the rear hub and brake caliper assemblies as described in Section J4.
8. Disconnect the propeller shaft from the final drive flange. Slide the shaft as far forward as possible.

Additional clearance between the propeller shaft and the pinion flange can be obtained by slackening

the bolts on the front engine mount stop plate. This will allow the engine to be moved forward. Place a wooden wedge between the front sub-frame and engine sump to retain the engine in this forward position.

9. Remove the six retaining nuts from the right-hand drive-shaft bearing housing. Carefully withdraw the drive-shaft from the final drive. Collect the belleville washer assembly and adjusting washer from behind the housing.

10. Remove the six retaining nuts from the left-hand drive-shaft bearing housing. Carefully withdraw the drive-shaft from the final drive. Collect the large adjusting washer fitted between the bearing housing and the crown wheel bearing.

Note

When handling a drive-shaft assembly, both ends should be supported. Do not carry the shaft holding one end only. Do not place the shaft in an unsupported position or allow the trunnion body to hang downwards, otherwise oil may be lost through the small breather hole in the centre of the splined shaft.

11. Support the final drive unit with a hydraulic jack positioned beneath the centre casing.

12. Remove the two securing bolts from the front end of the torque arm.

13. From the rear face of the final drive crossmember remove the setscrews securing the final drive assembly.

14. Slide the propeller shaft as far forward as possible to obtain maximum clearance between the shaft and final drive pinion flange.

15. Carefully lower the torque arm and ease the propeller shaft upwards and over the pinion flange. Carefully ease the final drive assembly forwards, then lower the assembly from the car.

Note

During this operation, care must be taken to ensure that the final drive is adequately supported.

Final drive - To remove (cars fitted with constant velocity joints - see Introduction).

1. Carry out Operations 1 to 5 inclusive of Final drive - To remove (cars fitted with ball and trunnion joints).

2. Remove the bolts from the constant velocity joint on each side of the final drive (capscrews on Bentley Mulsanne Turbo). When removing the capscrews, care must be taken not to damage the grease retaining caps.

3. Carefully ease the constant velocity joint away from its output-shaft and support the drive-shaft beneath the body using strong string or wire.

4. Disconnect the propeller shaft from the final drive flange and slide the shaft as far forward as possible to

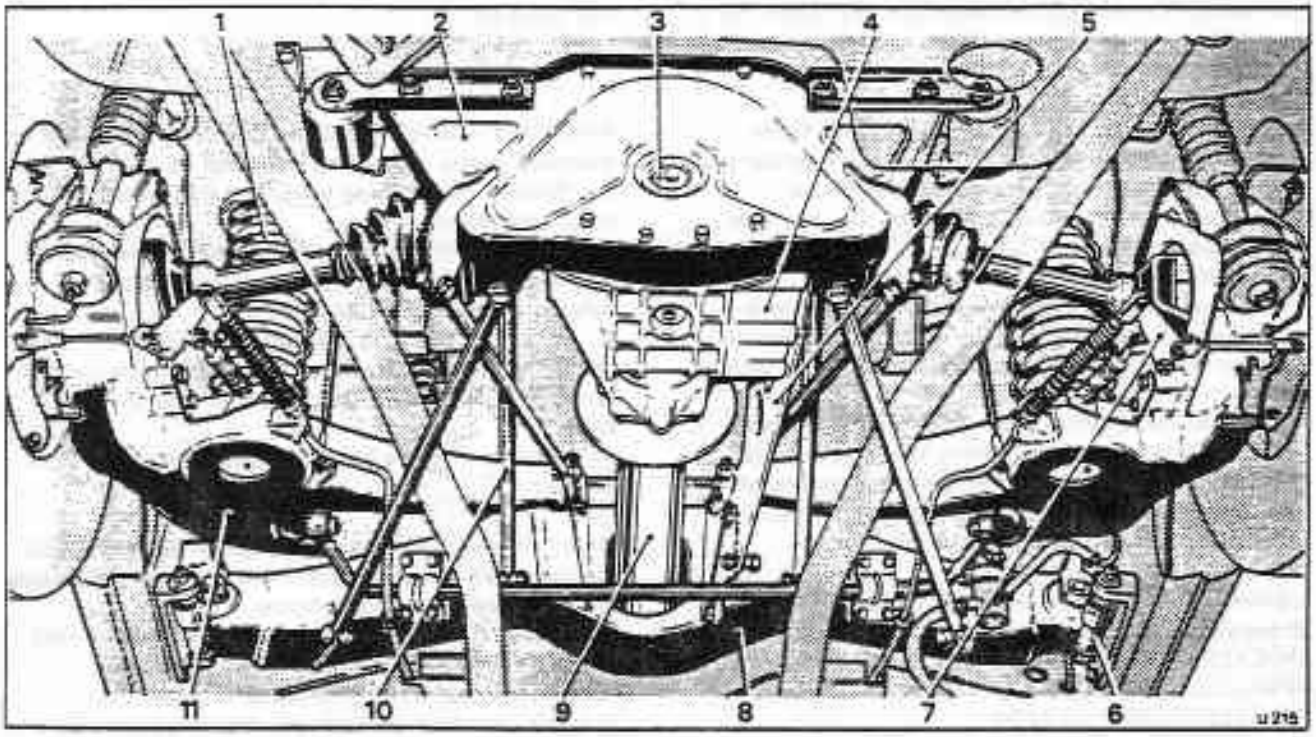


Fig. J1-1 Final drive in position (cars fitted with ball and trunnion joints)

1 Suspension spring
2 Final drive crossmember
3 Oil filler and level plug
4 Final drive unit
5 Torque arm
6 Crossmember damper
7 Parking brake actuation lever
8 Rear suspension crossmember
9 Propeller shaft
10 Frame tubes (6)
11 Trailing arm

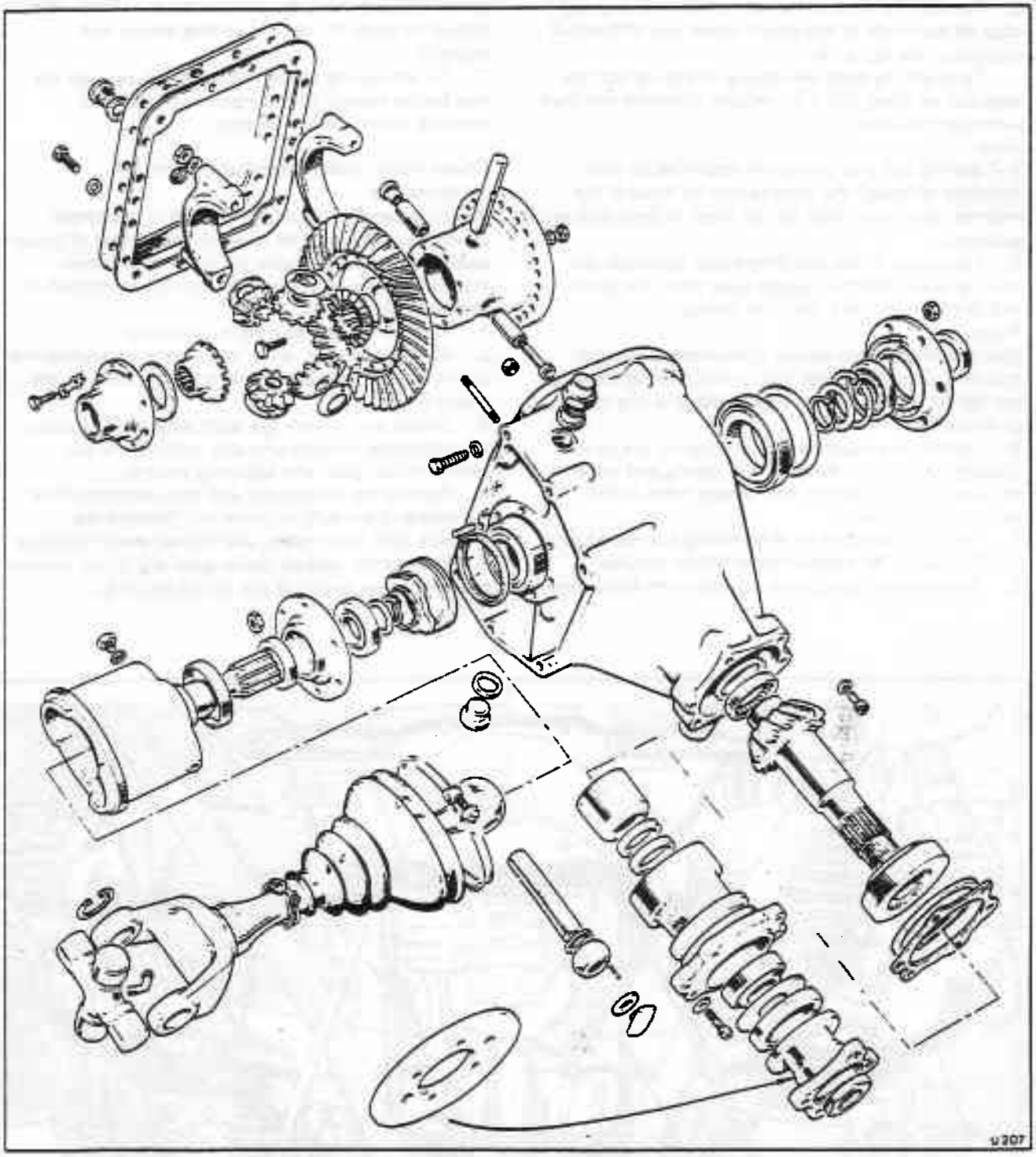


Fig. J1-2 **Final drive (cars fitted with ball and trunnion joints)**

obtain maximum clearance between the shaft and the final drive pinion flange.

5. Remove the two securing bolts from the front end of the torque arm.

6. From the rear face of the final drive crossmember remove the setscrews securing the final drive assembly.

7. Carefully lower the torque arm and ease the propeller shaft upwards and over the pinion flange. Carefully ease the final drive assembly forwards, then lower the assembly from the car.

Note

During this operation, care must be taken to ensure that the final drive unit is adequately supported.

Final drive unit - To dismantle

1. Unscrew the setscrews retaining the final drive casing rear cover. Remove the cover.

2. Remove the nuts and washers from the bearing caps on each side of the crown wheel and differential assembly (see fig. J1-5).

Correlate the caps and casing to ensure that the caps can be fitted into their original positions and then withdraw the caps.

Note

The bearing cap and casing are machined as pairs, therefore, although the caps cannot be fitted to the incorrect side, they must not be fitted in their reversed positions.

3. The crown wheel and differential assembly can now be raised slightly, moved away from the pinion and carefully removed from the casing.

Note

Care should be taken during Operations 2 and 3 to ensure that the two large taper roller bearing tracks do not fall off, as this could cause damage to the rollers or tracks.

4. Remove the capscrews which secure the pinion housing to the front flange of the casing and insert extractor screws into the two tapped holes in the pinion housing flange.
5. Place the casing in an oven having a temperature of 110°C (230°F) for approximately fifteen minutes.
6. Remove the casing from the oven and extract the pinion housing using the two extractor screws; care should be taken to turn the screws evenly and together.
7. To remove the pinion nose bearing, remove the two socket headed screws, retaining nuts, and washers. Withdraw the bearing.

Crown wheel and differential assembly - To dismantle

When dismantling the crown wheel and differential assembly, care should be taken to ensure that all thrust washers and bearing tracks are retained with their appropriate parts to ensure that they are assembled in their original positions.

1. Remove the two bearing outer tracks.
2. Remove the nuts, bolts, and washers securing the crown wheel to the differential housing. Remove the crown wheel.
3. Unlock and remove the eight setscrews securing the differential housing end cap, remove the cap, splined pinion gear, and adjusting washer.
4. Remove the locking-nut and long setscrew from the centre of the split trunnion pin. Remove the trunnion pins, bevel gears, and dished thrust washers.
5. Remove the splined pinion gear and thrust washer from the opposite end of the pinion housing.

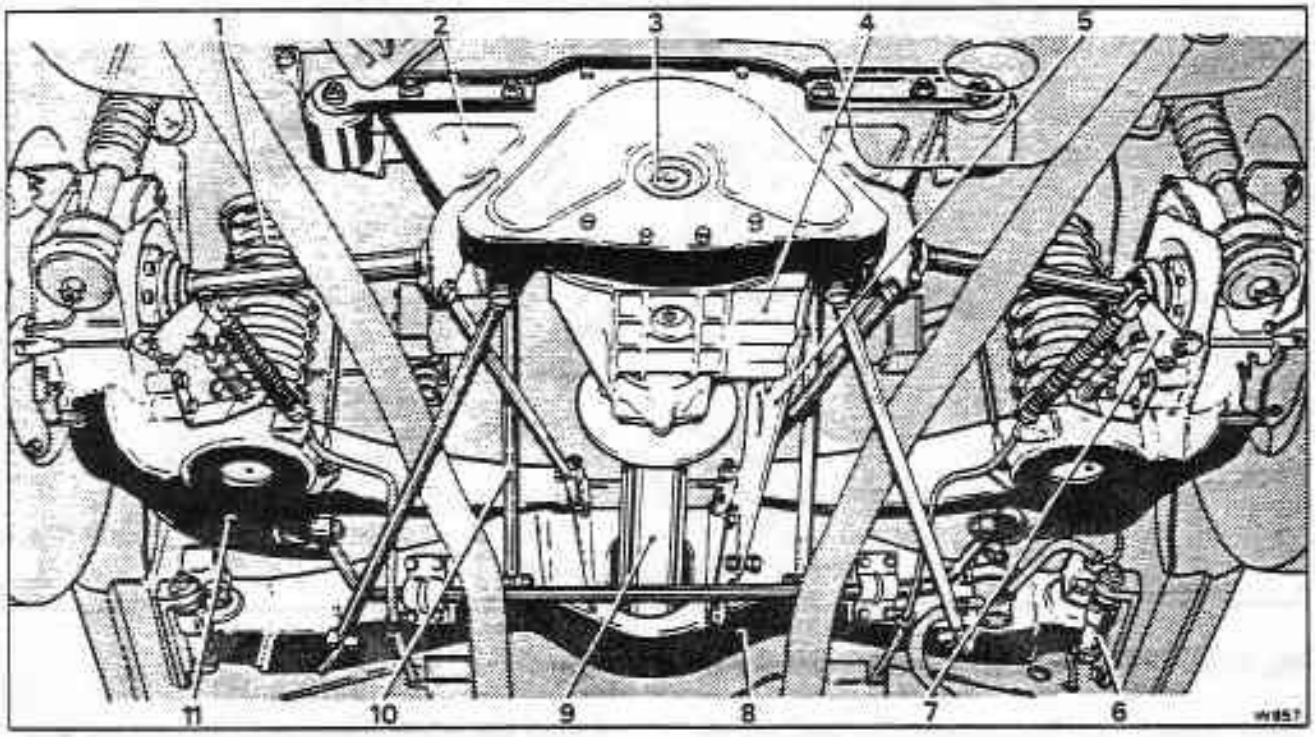


Fig. J1-3 Final drive (cars fitted with constant velocity joints)

1 Suspension spring
2 Final drive crossmember
3 Oil filler and level plug
4 Final drive unit
5 Torque arm
6 Crossmember damper
7 Parking brake actuation lever
8 Rear suspension crossmember
9 Propeller shaft (damper fitted)
10 Frame tubes
11 Trailing arm

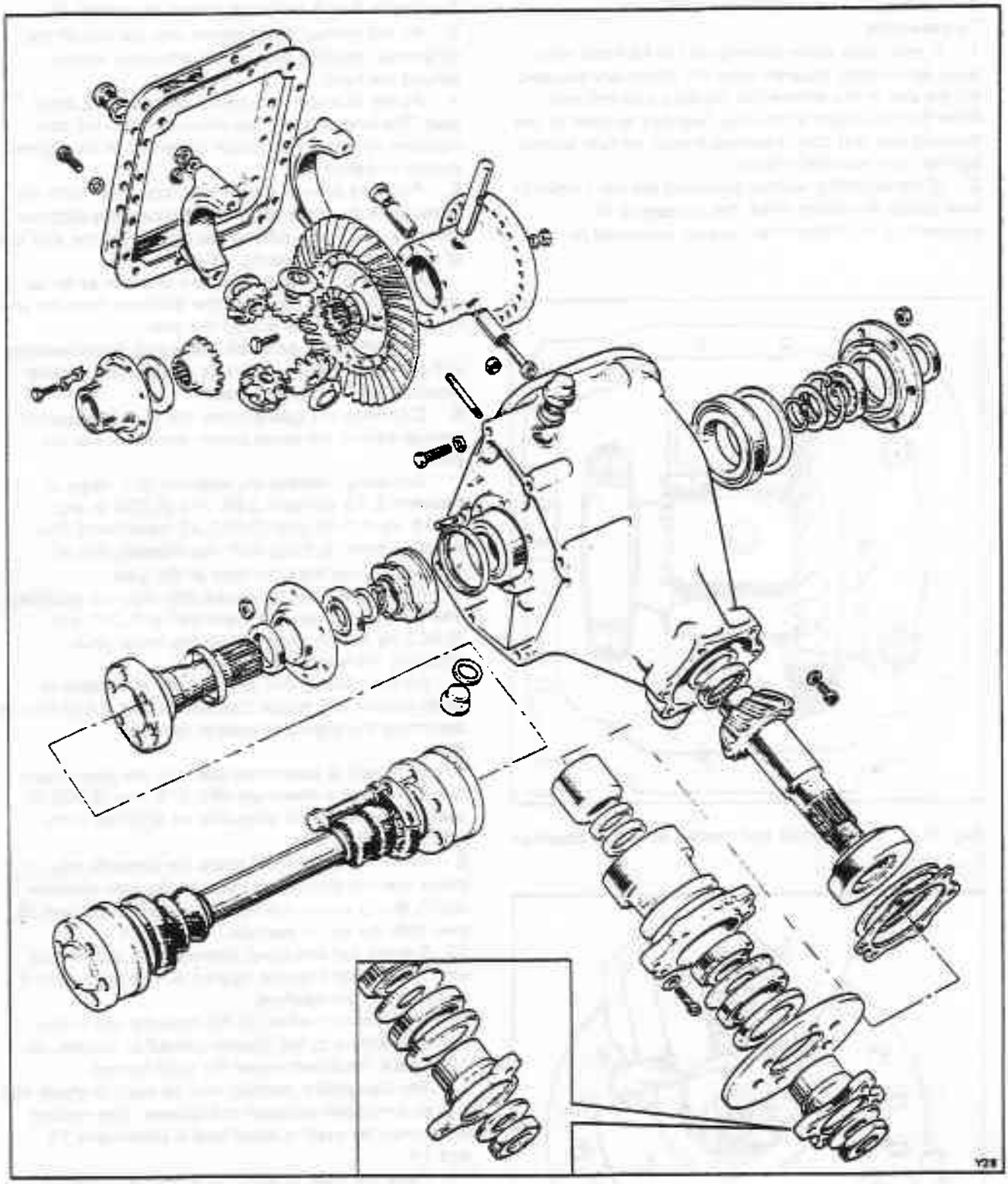


Fig. J1-4 Final drive (cars fitted with constant velocity joints)

6. Wash all parts thoroughly and dry with compressed air. If it is necessary to renew the large taper roller bearings, press them off the differential housing and end cap.

7. All components should be thoroughly inspected for wear and damage and any defective items renewed.

Thrust washers should be flat and parallel, excluding the four dished thrust washers fitted behind the bevel gears. Ensure that gears and all bearing surfaces are free from damage, pitting, score marks, burrs, and excessive wear.

Crown wheel and differential assembly - To assemble

1. If new taper roller bearings are to be fitted they must be pressed squarely onto the diameters situated on the end of the differential housing and end cap. Note that the larger of the two bearings is fitted to the housing and that both bearings should be fully seated against their abutment faces.
2. If the adjusting washer positions are not known or new pieces are being fitted, the procedure for assembling the differential housing described in Operations 3 to 6 inclusive should be carried out.
3. Fit the splined bevel pinion into the end of the differential housing without an adjusting washer behind the head.
4. Fit the trunnion pin, dished washers, and bevel gear. The long bolt and nut which connect the split trunnion pin should be torque tightened to the figures quoted in Section J6.
5. Push the splined pinion gear into mesh with the bevel gears as far as possible. Measure the distance from the end of the differential housing to the end face of the pinion gear (see fig. J1-6).

Pull the pinion gear back out of mesh as far as possible and again measure the distance from the end of the housing to the end of the gear.

The difference between these two measurements will give the nominal thickness of adjusting washer required behind the gear head.

6. Dismantle the gears, place the correct adjusting washer behind the bevel pinion and assemble the gears.

Adjusting washers are available in a range of between 2,13 mm and 2,94 mm (0.084 in and 0.116 in) in 0,05 mm (0.002 in) increments. The washers must be fitted with the chamfer and oil grooves against the back face of the gear.

7. Rotate the gears to ensure that they are perfectly free but with a maximum backlash of 0,076 mm (0.003 in) and no end-float on the bevel gear; adjusting the washer as necessary.
8. Fit the housing end cap and the other splined bevel pinions and repeat Operations 3 to 7 inclusive to determine the adjusting washer required.

Note

When the unit is assembled correctly the gear should turn freely with a maximum of 0,076 mm (0.003 in) backlash between the gears and no end-float in the splined bevel pinions.

9. When the differential gears are correctly set, check that the torque tightness of the split trunnion centre bolt is within the figures quoted in Section J6, then lock the nut in position.
10. Tighten the end cover setscrews in accordance with the standard torque figures quoted in Chapter P and lock the tab-washers.
11. Fit the crown wheel to the housing and torque tighten the nuts to the figures quoted in Section J6.
12. Check the crown wheel for axial run-out.

Any convenient method may be used to check this e.g. on a mandrel between the centres. One method which may be used is described in Operations 13 and 14.

13. Place the roller bearing outer tracks in position and stand the assembly on one end. Position the assembly in a press with one adjusting washer fitted to each bearing (see fig. J1-7).
14. Apply light pressure and using a dial indicator, check the run-out of the crown wheel; the run-out should not exceed 0,05 mm (0.002 in).

If the run-out exceeds this figure vary the crown wheel position relative to the differential housing until the run-out is within the 0,05 mm (0.002 in) limit.

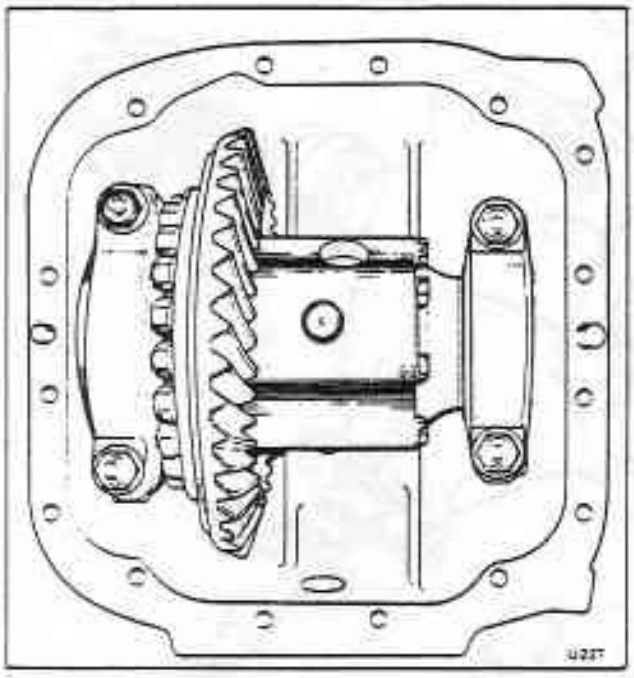


Fig. J1-5 Differential and crown wheel in position

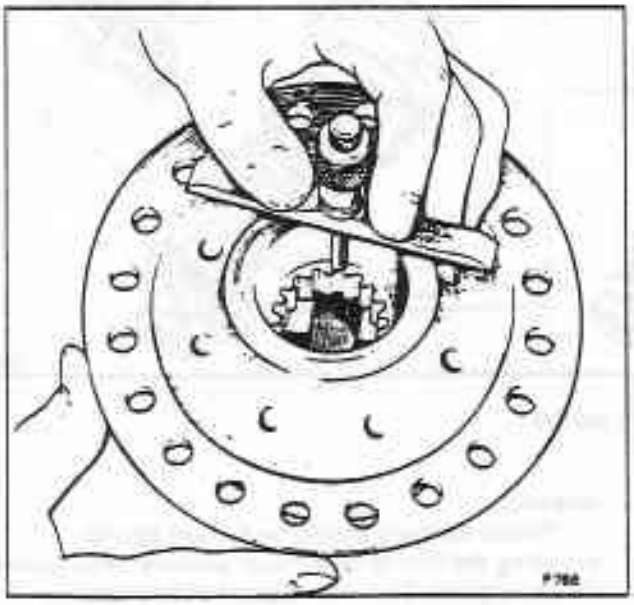


Fig. J1-6 Splined bevel pinion measurement

Pinion housing - To dismantle (see fig. J1-8)

1. Remove and discard the 'O' ring fitted to the pinion housing.
2. Unscrew and remove the nut securing the pinion flange and damper. Remove the flange using the special hydraulic ram RH 8017 and special extractor beam RH 8470.
3. Remove the pinion oil seal and the oil flinger fitted behind it.
4. Position the housing in a press with the pinion gear downwards. With the housing lower end firmly supported, carefully press the pinion out of the housing.
5. Collect the spacer and adjusting washers from the pinion shank and the taper roller bearing from the housing.
6. If new taper roller bearings are to be fitted, the outer tracks must be removed from the housing using a soft drift and a hammer, taking care to avoid damaging the bearing locating bores.
7. The large taper roller bearing should be removed from beneath the pinion head using a press and the special extraction tool RH 8016.
8. Wash all parts thoroughly in paraffin and dry with compressed air.
9. Inspect parts for serviceability; any showing damage, pitting, or excessive wear should be renewed.

Pinion housing - To assemble (see fig. J1-8)

It should be noted that there are two types of pinion flange, dependent upon the type of propeller shaft fitted.

On propeller shafts incorporating universal couplings a four point coupling flange is fitted. On propeller shafts having flexible couplings a three point coupling is fitted.

Important

If the axle is again assembled using the original bearings, then the original pre-load adjusting washers should be used. Under no circumstances should the assembly be set to the pre-load figures quoted when new pinion bearings, pinion housing, and adjusting washers are fitted.

1. Lightly lubricate all components paying particular attention to the roller bearing faces.
2. If new bearings are to be fitted press the outer tracks into the pinion housing and the large roller bearing onto the pinion, ensuring that the bearings are square and seated on their abutment faces.
3. Enter the pinion into the housing then fit the spacer and two adjusting washers onto the pinion shank.

The two washers determine the pre-load on the pinion bearings.

It is important that the washers are free from defects and are flat and parallel to within 0,012 mm (0.0005 in).

If the pinion bearings have not been renewed, the original washers may be used (see above note). If new bearings have been fitted, washers whose combined thickness amounts to between 6,85 mm and 7,10 mm (0.270 in and 0.279 in) should give the best initial setting.

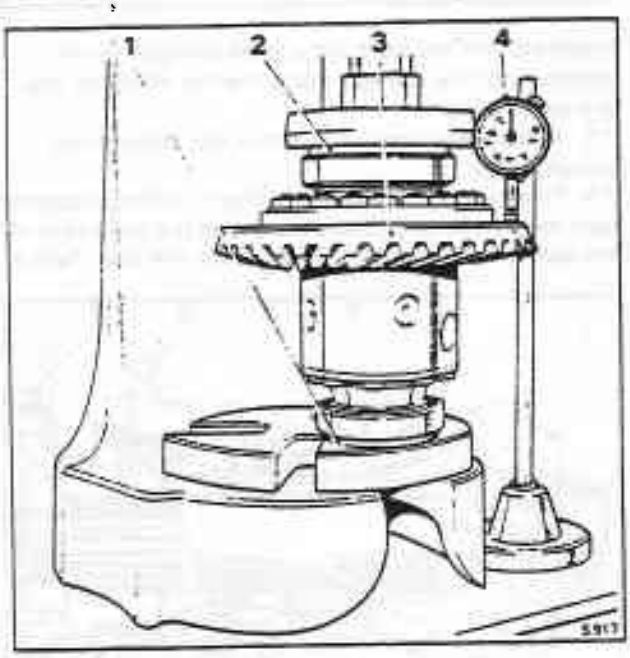


Fig. J1-7 Checking the crown wheel

1 Adjusting washer
2 Adjusting washer
3 Crown wheel and differential assembly
4 Dial test indicator

4. Support the pinion and housing. Press the upper bearing onto the pinion shank until it abuts the adjusting washers.
5. Fit the oil flinger.
6. On cars fitted with a propeller shaft incorporating universal couplings,fit the transmission damper to the pinion flange.
7. Apply a thin coating of anti-scuffing paste (ASP) to the pinion flange. Enter the pinion flange onto the pinion shank taking care not to damage the pinion threads.
8. Press the coupling flange onto the pinion shank using assembly tool RH 8457. Fit the nut.
9. Tighten the nut to the torque figures quoted in Section J6. Rotate the pinion housing during tightening to check free movement of the bearings.
10. Rotate the pinion in the housing several times in both directions, then check the pre-load.

The pre-load on the pinion bearings when the housing is out of the final drive casing should be between 0,73 Nm and 1,02 Nm (6.4 lbf in and 9.0 lbf in). This can be checked using a suitable torque meter.

11. If the pre-load is not correct the pinion must be extracted from the housing and the adjusting washers changed as necessary to obtain the correct reading.

Adjusting washers are available in a range of between 6.86 mm and 7.24 mm (0.270 in and 0.285 in) in increments of 0,0254 mm (0.001 in) and also between 7,37 mm and 7,62 mm (0.290 in and 0.300 in) in increments of 0,127 mm (0.005 in).

Reducing the combined thickness of the washers will increase the pre-load and by increasing the

thickness will reduce it. Very small changes to the thickness of the washers has a marked effect on the pre-load figure.

12. Remove the pinion flange nut and remove the pinion flange.

13. Fit a new oil seal, ensuring that it is fitted squarely with the lip pointing inwards and that the front face of the seal is 3.20 mm (0.125 in) below the front face of the housing. If a P.T.F.E. oil seal is being fitted **do not** lubricate, as this type of oil seal is coated with a sealing element that is more efficient when fitted dry. It should be noted that it is **only** P.T.F.E. seals that do not require lubrication when fitting.

14. Clean and fit the pinion flange and damper (if fitted) ensuring that the correlation marks are in line. Failure to do this will result in pinion imbalance.

15. Fit and torque tighten the nut to the figures quoted in Section J6. Rotate the pinion housing during tightening to check free movement of the bearings.

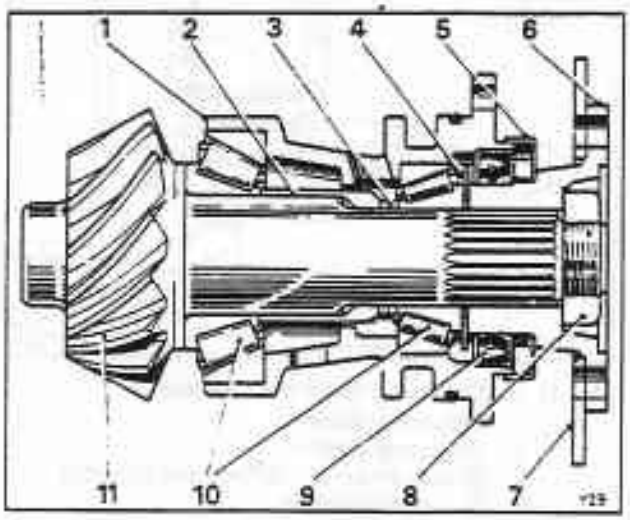


Fig. J1-8 Pinion assembly

1 Pinion housing
2 Spacer
3 Pre-load adjusting washers
4 Oil flinger
5 Shield
6 Pinion flange
7 Damper (if fitted)
8 Pinion flange nut
9 Oil seal
10 Taper roller bearings
11 Pinion

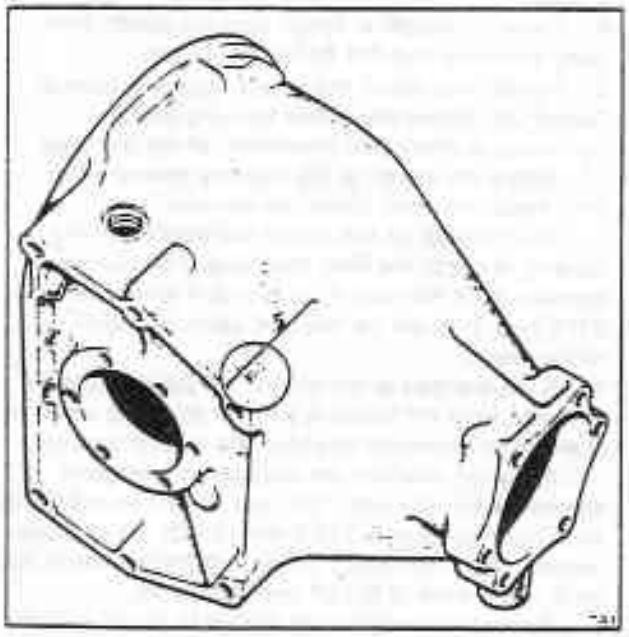


Fig. J1-9 Stamped dimension on final drive casing

Final drive unit - To assemble

To assemble the final drive unit reverse the procedure given for dismantling ensuring that the crown wheel and pinion are in their correct relative positions and that the amount of backlash between the two gears is correct.

All parts must be cleaned thoroughly prior to assembly and all bearings lubricated.

1. Before assembling the final drive unit the stiffening bar RH 8032 should be fitted to the final drive casing.

2. Partially screw four ⅜ in UNF studs into the threaded holes in the front of the final drive casing. It is sufficient to fit these by hand as they serve only as location pegs for the pinion housing.

3. If the pinion nose bearing has been removed from the casing, fit the bearing, snap ring, and the two socket headed retaining screws, nuts, and washers. Tighten the screws in accordance with the standard torque figures quoted in Chapter P and centre punch the nuts in three places to lock them into position.

4. Note the dimension stamped on the final drive casing (see fig. J1-9) then place the casing in an oven having a temperature of 110°C (230°F) for approximately thirty minutes.

5. Carefully measure from the back face of the pinion housing front flange to the face of the pinion gear adjacent to the nose bearing diameter (see fig. J1-10 dimension X).

Add this figure to the dimension etched on the rear face of the pinion (dimension Y).

The dimension A stamped on the final drive casing which was noted previously must now be subtracted from the total of dimensions X and Y.

The final dimension gives the thickness of the split adjusting washer which must be used between the pinion housing flange and the casing, to place the pinion in the correct position.

Thickness of washer = X + Y - A.

The above measurements must be taken carefully and accurately.

Split adjusting washers are available in the following sizes 3.05 mm (0.120 in), 3.17 mm (0.125 in), 3.33 mm (0.130 in), 3.48 mm (0.137 in), and 3.78 mm (0.140 in).

6. Remove the casing from the oven and fit the split adjusting washers over the studs.

7. Fit a new 'O' ring to the pinion housing and insert the housing into the casing as far as possible.

Note
The pinion housing has one offset hole and can therefore only be fitted in one position. It is adviseable to establish this position before entering the housing into the casing.

8. Remove the locating studs, fit the four capscrews and tighten them progressively and evenly to the torque figures quoted in Section J6.
9. Examine the crown wheel and note the backlash figure etched on the back face.
10. Carefully place the crown wheel and the differential assembly in position. Fit the bearing caps but do not tighten the nuts.
11. If the two final drive side housings are still connected to the splined shafts, remove the retaining circlips. Then, remove the housings from the shafts.
12. Fit the adjusting washer with the chamfered face outwards, three belleville washers with the convex side outwards, distance piece, and housing on the right-hand side of the final drive casing and progressively tighten the housing securing nuts (see fig. J2-3).
13. Fit the adjusting washer behind the crown wheel bearing. Fit the left-hand side housing. Progressively tighten the housing nuts whilst rocking the crown wheel back and forth to ensure that there is backlash between the gears.
14. Mount a dial test indicator on the final drive casing with the indicator pad on the flank of a crown wheel tooth.
15. Zero the indicator and 'rock' the crown wheel back and forth noting the backlash.
16. The backlash should be checked at four positions around the crown wheel and an average reading taken. This figure should be marginally less than the backlash figure etched on the crown wheel.

If it does not conform, the thickness of the washer behind the bearing must be varied to obtain the correct reading.

Washers are available in a range of between 5,66 mm and 6,60 mm (0.223 in and 0.260 in) in increments of 0,10 mm (0.004 in).

17. In order to obtain the required result equal amounts may be ground from each side of the washer, taking care to ensure that, after grinding, the washer is still flat and parrallel to within 0.02 mm (0.001 in).
18. When the backlash is correct, remove the side housings from the centre casing.
19. Accurately measure the distance from the casing flange to the taper roller bearing outer track on the right-hand side of the final drive casing (see fig. J1-11).
20. Place the right-hand housing, distance piece, and belleville washers in the checking jig RH 9578 and tighten the jig end pieces until the belleville washers are flat (see fig. J1-12).
21. Using feeler gauges, measure the distances between the housing flange face and the top of the two pins on the gauge. The result added to the nominal pin height marked on the gauge gives the distance from the side housing to the belleville washers.

Subtract this dimension from the dimension

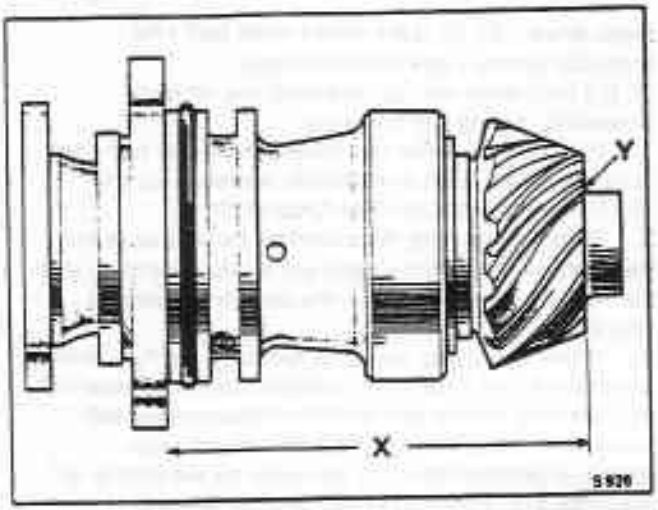


Fig. J1-10 Pinion housing measurement
X Dimension between housing and pinion gear
Y Dimension etched on pinion gear face

previously taken between the casing flange and the taper bearing. The result gives the thickness of the adjusting washer which must be fitted between the belleville washers and the taper bearing, to give the correct pre-load.

Adjustment washers are available in a range of between 5,08 mm and 6,60 mm (0.200 in and 0.260 in) in increments of 0,25 mm (0.010 in). Washers may be lightly ground to obtain the correct dimensions but if this is done equal amounts must be removed from each side and the washer must be kept flat and parallel.

22. Fit the right-hand side housing to the splined shafts.
23. Fit the correct size washer with the chamfered side outwards; also the assembly comprising of a distance piece and three belleville washers convex side outwards. Fit the housing and splined shaft assembly.
24. Fit the left-hand side housing to the splined shaft. Fit the housing and splined shaft assembly.
25. Tighten the housing securing nuts progressively and evenly, and finally tighten them to the standard torque figures quoted in Chapter P.
26. Tighten the nuts securing the two large bearing caps in accordance with the standard torque figures quoted in Chapter P.
27. Release the side cover retaining nuts approximately 3,17 mm (0.125 in) to release the casing load.
28. Remove the stiffening bar RH 8032, fit the gasket and end cover. Fit and tighten the four setscrews adjacent to the two dowels.
29. After applying a light coating of SQ32M jointing compound to the flange faces, progressively tighten the side cover retaining nuts previously released in Operation 27.
30. Rotate the pinion coupling flange to ensure that there are no tight spots or roughness of operation.

Final drive - To fit (cars fitted with ball and trunnion joints - see Introduction)

Fit the final drive unit by reversing the removal procedure, noting the following.

1. Ensure that oil has not drained from the half-shaft trunnion joints. Each joint should contain 150 ml (5.25 fl oz) of lubricant (see Chapter D).
2. When connecting the universal joints ensure that the needle roller bearing caps are located correctly into the hub yokes before fitting the retaining caps and setscrews.
3. When tightening the bolts securing the final drive assembly to the final drive crossmember, it is essential that the two, torque arm to front crossmember bolt holes are in alignment. If the holes do not align, correct alignment **must** be achieved by slackening off the torqe arm to axle case securing setscrews. Reposition the torque arm.

Note

Should any other method be used to force an alignment, the resultant higher stresses within the sub-frame members will cause premature failure.

4. The propeller shaft and pinion flange faces must be clean and free from damage before assembly.
5. All bolts and setscrews should be tightened in accordance with the standard torque figures quoted in Chapter P.
6. This operation should be carried out with the car standing in a level condition.

Check that the drain plug has been tightened. Remove the filler plug from the rear of the crossmember and fill the axle with one of the recommended lubricants (see Chapter D), up to the level of the plug, approximately 2 litres (2.3 Imp pints, 4.8 US pints). Fit the filler plug together with a new washer.

7. The suspension springs must only be released after the torque arm securing bolts and setscrews have been torque tightened to the figures quoted in Section J6.
8. The following operation only applies to cars which are fitted with the front rectangular engine mount stop.

If the front engine mount stop has been released it must be reset to give a clearance of between 1.52 mm and 2.28 mm (0.060 in and 0.090 in) between the rubber face of the stop plate and the crossmember stop bracket.

9. After assembly the rear brake calipers and hydraulic suspension struts must be bled as described in Chapter G.

Before starting the engine in order to pressurize the hydraulic systems; replace the gearbox isolator, switch on the ignition, move the gearchange lever to the Park position, switch off the ignition and remove the gearbox isolator.

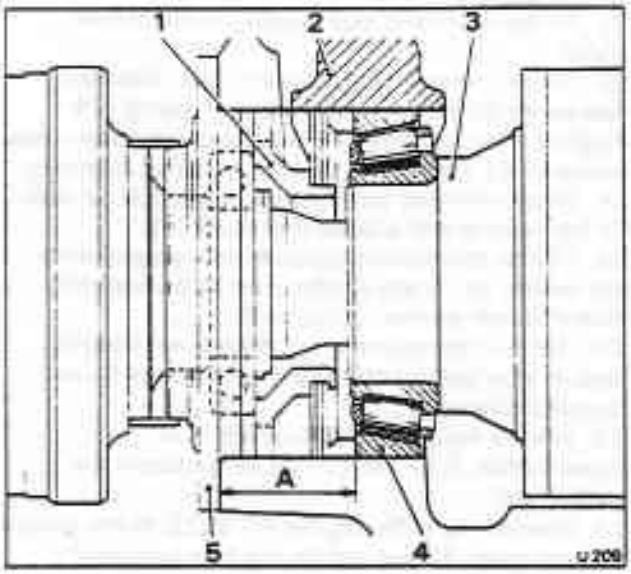


Fig. J1-11 Casing flange to bearing measurement

1 Belleville washer and spacer assembly
2 Bearing cap
3 Differential housing
4 Bearing
5 Side bearing housing

Final drive - To fit (cars fitted with constant velocity joints - see Introduction)

Fit the final drive unit by reversing the removal procedure, noting the following.

1. Each end of the drive-shaft must be clean and free from damage. Ensure that the retaining screws are in good condition.
2. The propeller shaft and pinion flange faces must be clean and free from damage.
3. When tightening the bolts securing the final drive assembly to the final drive crossmember, it is essential that the two torque arm to front crossmember bolt holes are in alignment. If the holes do not align, correct alignment **must** be achieved by slackening off the torque arm to axle case securing setscrews. Reposition the torque arm.

Note

Should any other method be used to force an alignment, the resultant higher stresses within the sub-frame members will cause premature failure.

4. All bolts, setscrews, and capscrews should be torque tightened in accordance with the figures quoted in Section J6 and Chapter P.
5. This operation should be carried out with the car standing in a level condition.

Check that the drain plug has been tightened.

Remove the filler plug from the rear of the final drive casing and fill the axle with one of the recommended lubricants (see Chapter D) up to the bottom of the filler plug hole, approximately 2.3 litres (4 Imp pints, 4.8 US pints). Fit the filler plug together with a new washer.

6. The following operation only applies to cars which are fitted with the front rectangular engine mount stop.

If the front engine mount stop has been released it must be reset to give a clearance of between 1.52 mm and 2.28 mm (0.060 in and 0.090 in) between the rubber face of the stop plate and the crossmember stop bracket.

7. Before starting the engine in order to pressurize the hydraulic system, replace the gearbox isolator, switch on the ignition and move the gear range selector lever to the Park position. Switch off the ignition and remove the gearbox isolator from the fuseboard.

Pinion flange oil seal - To renew

The pinion flange oil seal can be removed with the final drive unit in position.

1. Place the car on a ramp and securely chock the front road wheels.
2. Position a trolley jack or stand underneath the final drive casing and raise the rear of the car. Position sill blocks beneath the rear end of the car sills and lower the rear of the car onto the sill blocks.
3. Switch on the ignition. Select the Neutral position on the gearchange selector. Remove the gearbox isolator from the fuseboard. Switch off the ignition.
4. Remove the retaining clamp securing the right-hand front silencer to the intermediate pipe and collect the sealing ring.
5. Remove the four nuts and bolts securing the parking brake bridge support to the tunnel. Retain the nuts and bolts.
6. Remove the bolts securing the centre crossmember. Remove the crossmember. Collect and retain the bolts and washers. Retain the parking brake pull off spring and link noting their position for re-assembly.
7. Remove the nuts and bolts securing the propeller shaft front flange to the transmission output flange.
8. Remove the nuts and bolts securing the propeller shaft to the pinion flange. Carefully lower the shaft from the car.
9. Scribe correlation marks across the pinion face, coupling flange, and transmission damper (if fitted).
10. Using the hydraulic ram RH 8017 and special extractor RH 8470 remove the pinion flange.
11. Using a lever or simple extractor remove the oil seal from the pinion housing.
12. Fit a new oil seal, ensuring that it is fitted squarely, with the lip pointing inward and that the front face of the seal is 3,20 mm (0.125 in) below the front face of the housing. If a P.T.F.E. oil seal is being fitted **do not** lubricate, as this type of oil seal is coated with a sealing element that is more efficient when fitted dry. It should be noted that is is only P.T.F.E. seals that do not require lubrication when fitting.
13. Clean and fit the pinion flange and damper (if fitted) ensuring that the correlation marks are in line. Failure to do this will result in pinion imbalance. Fit and torque tighten the nut to the figures quoted in Section J6.
14. Assemble by reversing the dismantling procedure.
15. Torque tighten the propeller shaft bolts to the figures quoted in Section J6.

Torque arm - To remove

1. Place the car on a ramp and securely chock the front road wheels.

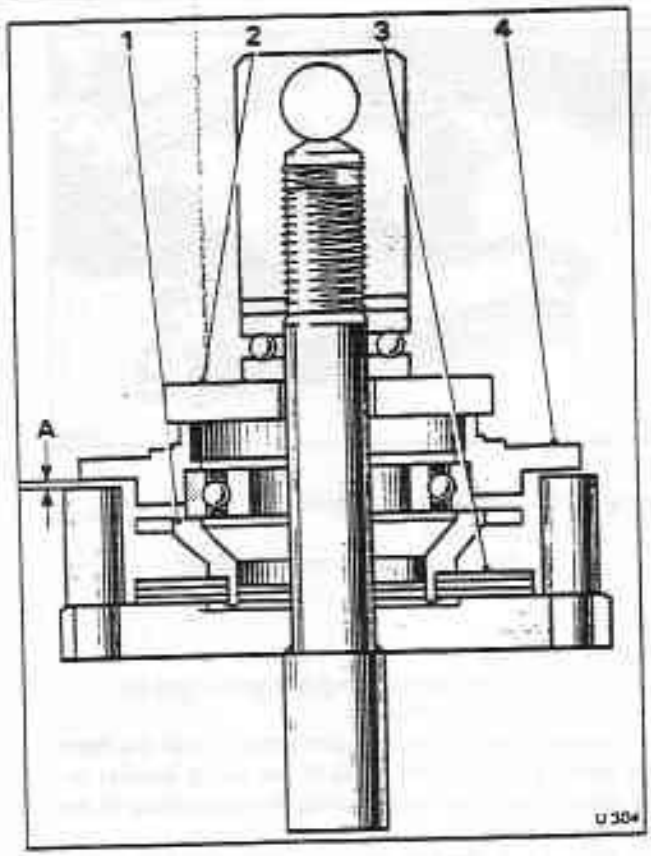


Fig. J1-12 Belleville washer setting

1 Distance piece
2 Tool (RH 9578)
3 Belleville washers
4 Final drive side housing
A Measured gap

2. Depressurize the hydraulic system as described in Chapter G.
3. Insert spring retainers RH 9299 through both rear springs.
4. Locate a hydraulic jack under the final drive centre case and raise the rear of the car. Position sill blocks beneath the car sills. Lower the hydraulic jack and allow the sill blocks to support the car.
5. Support the final drive by placing a jack beneath the centre casing.
6. Remove one of the small dampers fitted to each end of the rear suspension crossmember. Insert a Jury bolt RH 9575 and secure it in position (see fig. J1-13). Ensure that a load is not applied to the crossmember by the Jury bolt. Repeat the operation on the other end of the crossmember.
7. Remove the two bolts securing the upper and lower frame tubes to the final drive crossmember on the torque arm side of the final drive.

Carefully note the positions of the tubes and to which side of the mounting bracket they are secured. Also the direction in which the bolts are fitted.

8. Remove the setscrews and bolts securing the torque arm to the final drive casing, and suspension crossmember. Lower the torque arm from the car.

Drive-shafts

Introduction
On cars other than those conforming to a North American specification, and cars prior to vehicle identification number (VIN)*SCAZS0009BCH02573* (with the exception of cars listed on page J1-1), the drive-shafts are of the ball and trunnion joint type. This type of shaft was also fitted to Silver Shadow series cars prior to serial number 50001 except that the shaft on these cars was of a shorter length.

Care must therefore be taken not to interchange the two types of shafts.

Drive-shaft assemblies, complete with ball and trunnion joint, seal, and universal joint are available as service exchange items.

To enable this type of drive-shaft to be removed it is necessary to remove the rear hub and brake caliper assembly from the trailing arm.

On cars conforming to a North American specification and cars from vehicle identification number (VIN)*SCAZS0009BCH02573*(including cars listed on page J1-1), the drive-shafts utilize constant velocity joints (see fig. J2-1) and can be removed from the car without removal of other components.

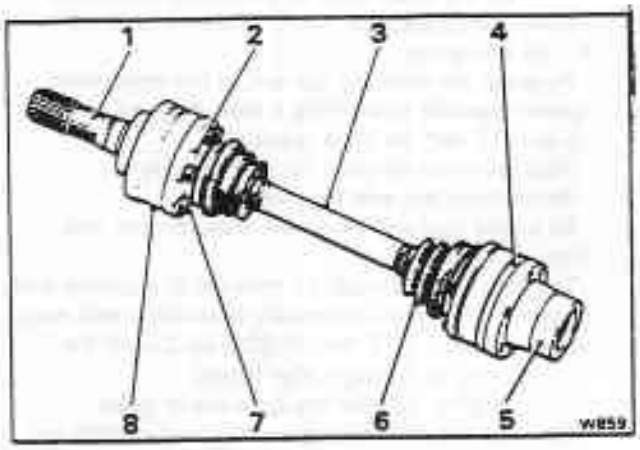


Fig. J2-1 Constant velocity joint
1 Output shaft
2 Load spreading washers (6)
3 Drive-shaft
4 End cap - grease retainer (2)
5 Hub coupling
6 Convoluted seal (2)
7 Retaining screws (12)
8 Constant velocity joint body (2)

Drive-shaft - To remove (cars fitted with ball and trunnion joints - see page J1-1)
1. Drive the car onto a ramp and securely chock the front road wheels.
2. On the respective side, remove the wheel disc/trim and loosen but do not remove the wheel nuts.
3. Using a hydraulic jack and hardwood block placed beneath the final drive casing, raise the rear of the car until the road wheel is clear of the ramp.
4. Position sill blocks beneath the car sill. Lower the hydraulic jack to allow the blocks to support the car. Support the trailing arm on a jack.
5. Remove the road wheel.
6. Depressurize the hydraulic system as described in Chapter G.
7. Remove the rear hub and caliper assembly as described in Section J4.
8. Remove the six nuts securing the bearing housing to the side of the final drive casing, tap the housing with a nylon mallet to break the joint.
9. Withdraw the drive-shaft trunnion joint and drive-shaft from the final drive casing.

Note
When handling the drive-shaft assembly, both ends should be supported. Do not carry the shaft holding one end only, place the shaft in an unsupported position or allow the trunnion body to hang downwards, otherwise oil may be lost through the small breather hole in the centre of the splined shaft.

10. After removal of the drive-shaft assembly the final drive casing must be blanked off to prevent the ingress of foreign matter.

Drive-shaft - To dismantle
1. Remove the circlip and washer retaining the ball and trunnion joint body to the side bearing housing. Remove the housing from the splined shaft.
2. Remove the drain plug from the joint body and drain the oil from the housing (each trunnion joint holds approximately 150 ml of lubricant).
3. Release the clips securing the convoluted seal to the joint body and drive-shaft.
4. Position the joint body with the drain plug horizontal. Ease the seal over the edge of the body, and down the shaft. Carefully withdraw the shaft from the body; retain the buttons on the trunnion pin, during removal.
5. Remove the trunnion buttons, adjusting washers, bearing outer races, and needle rollers from the trunnion pin (see fig. J2-2). Keep each assembly separate and note from which side of the pin they have been removed.
6. Whilst dismantled, the trunnion bearing assemblies should be lubricated and wrapped in

It is essential that the side bearing housings removed from the final drive assembly are fitted to the drive-shafts, as the fitting of any other housing will result in an incorrectly adjusted final drive assembly.

3. Remove the drain plug from the trunnion joint body. Inject 150 ml of recommended lubricant (see Chapter D) into the joint body and fit the plug.
4. Prior to fitting the drive-shaft to the final drive casing, coat the face of the side bearing housing with an approved sealant.
5. Fit the drive-shaft to the car. When fitting a right-hand drive-shaft, care must be taken to ensure that the belleville washers and distance piece are retained in position. Also, ensure that the belleville washers are fitted with the concave side of the washers facing the crown wheel assembly.
6. When fitting the drive-shaft assembly to the final drive casing it should be noted that the bearing housing has one offset hole and can only be fitted in one position. Therefore, the holes should be aligned as the shaft is inserted into the final drive unit.
7. Fit the rear hub and caliper assembly as described in Section J4.
8. Ensure that the needle bearings caps are located correctly in the hub yoke. Fit the bearing cap clamps and torque tighten the four setscrews in accordance with the standard torque figures quoted in Chapter P.
9. Fit the road wheel and nuts, remove the sill beams and blocks from beneath the car, tighten the wheel nuts (see Chapter R) and fit the disc/trim.
10. All nuts and setscrews should be torque tightened in accordance with the standard torque figures quoted in Chapter P.
11. When the drive-shaft has been fitted to the car and with the car in its normal standing height position, inspect the seal to ensure that the seal convolutions are not crimped or strained. If they are, the postion of the seal should be adjusted on the shaft.
12. Bleed the hydraulic system as described in Chapter G.

Universal joint - To remove

1. Remove the drive-shaft as described under Drive-shaft - To remove.
2. Remove any paint or foreign matter from around the circlips in the universal joint yoke eyes and remove the circlips.

Note

Due to circlips of different thickness having been fitted, care should be taken to ensure that the circlips are fitted to their original locations. if new circlips are fitted they should be of the same thickness as those they replace.

3. Hold the shaft with both ends supported to avoid excessive strain being put on the convoluted seal. Using a nylon mallet shock drive the races from the yoke eyes.

Universal joint - To fit

1. Ensure that the bores in the yokes are clean and in good condition; lightly grease the needle rollers and locate them in their housing. Each bearing housing is fitted with 38 needle roller bearings.
2. Fit the crosspiece minus the needle roller and housing assemblies into the yoke eyes. Hold the crosspiece central and press the bearing housing assemblies into the yoke bores sufficiently to enable the circlips to be fitted. Care should be taken not to damage the joint seals during this operation.
3. Fit the circlips and check the free movement of the universal joint.
4. Grease the universal joint at the nipple provided.

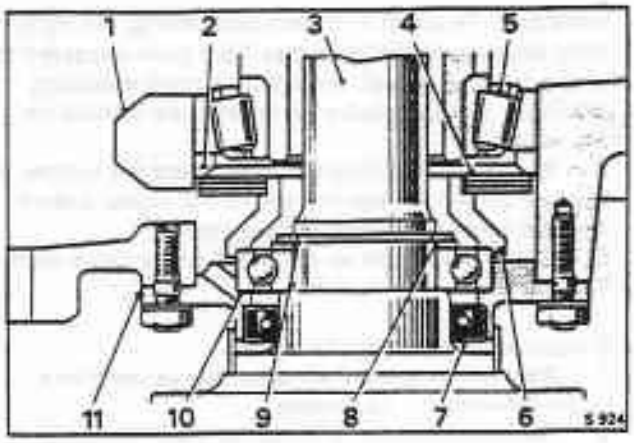


Fig. J2-3 Final drive side housing

1 Differential housing bearing cap
2 Adjusting washer
3 Ball and trunnion joint splined shaft
4 Belleville washers
5 Taper roller bearing
6 Distance piece
7 Ball and trunnion shaft oil seal
8 Retaining washer
9 Retaining circlip
10 Bearing
11 Final drive side housing

Output shaft oil seal - To renew (see fig. J2-3)

The oil seals on the ball and trunnion joint shaft are located in the housings on each side of the final drive unit, and can be renewed with the final drive in position.

1. Remove the drive-shaft assembly as described under Drive-shaft - To remove.
2. Remove the circlip and washer located on the ball and trunnion joint shaft behind the bearing housing and remove the housing from the shaft.
3. Remove the seal from the housing.
4. Fit a new seal, ensuring that it is fitted squarely into its locating bore and with the seal lip pointing inwards towards the bearing.

Note

If a P.T.F.E. oil seal is being fitted **do not** lubricate, as this type of oil seal is coated with a sealing element that is more efficient when fitted dry. It should be noted that it is **only** P.T.F.E. seals that do not require

lubrication. To assist in correct assembling, the right-hand housing oil seal bore may have been increased to accept a larger oil seal. Directional arrows indicating clockwise and anti-clockwise rotation are marked on the seals.
5. Fit the housing onto the shaft, place the washer in position behind the bearing and fit the circlip, ensure that it is correctly located in the groove.
6. Fit the drive-shaft as described under Drive-shaft - To fit.

Output shaft bearing - To renew
1. Remove the drive-shaft assembly as described under Drive-shaft - To remove
2. Remove the circlip and washer from the ball and trunnion joint shaft and remove the housing from the shaft.
3. Left-hand housings have a circlip fitted to retain the bearing. Remove this circlip.
4. Remove the bearing from the housing using a mandral or drift. Remove the seal and discard.
5. Clean and inspect the housing bore and lightly stone out any damage marks or burrs.
6. Fit a new bearing ensuring that it is fitted squarely in the bore and up to its abutment face.

Note
On left-hand housings the bearing is retained in position with a circlip, ensure that the bearing is located correctly.

7. Fit a new seal, ensuring that it is fitted squarely with the lip pointing inwards towards the bearing.

Note
If a P.T.F.E. oil seal is being fitted **do not** lubricate, as this type is more efficient when fitted dry. It should be noted that it is **only** P.T.F.E. seals that do not require lubrication. To assist in correct assembling, the right-hand housing oil seal bore may have been increased to accept a larger oil seal. Directional arrows indicating clockwise and anti-clockwise rotation are marked on the seals.
8. Fit the housing to the ball and trunnion joint shaft, fit the washer and circlip. Apply a smear of Wellseal sealant to the housing face.
9. Fit the drive-shaft assembly to the car as described under Drive-shaft - To fit.

Drive-shaft - To remove (cars fitted with constant velocity joints including Mulsanne Turbo - see page J1-1)
1. Drive the car onto a ramp and securely chock the front road wheels.
2. Using a hydraulic jack and a hardwood block placed beneath the final drive casing, raise the rear of the car until the road wheel is clear of the ramp.
3. Position sill blocks beneath the car sill. Lower the hydraulic jack to allow the blocks to support the car. Support the trailing arm on a jack.
4. Remove the six retaining screws from each end of the drive-shaft, taking care not to damage the joint and convoluted seals. Collect the retaining screws and load spreading washers. Remove the drive-shaft.
5. Inspect the drive-shaft joints and convoluted seals.

Note
If one or both of the convoluted seals are found to be unserviceable, the constant velocity joints must be removed from the shaft in order to fit replacements. However, if more serious damage has occured, the complete drive-shaft assembly must be renewed.

Convoluted seal - To renew
1. Release the two convoluted seal retaining clips and slide the seal down the shaft.
2. Remove the convoluted seal retainer from the constant velocity joint. Slide the retainer down the shaft.
3. Remove the closed end cap from the end of the constant velocity joint.
4. Remove the circlips from the end of the drive-shaft. Using suitable press, remove the constant velocity joint from the shaft.
5. Remove the convoluted seal and its retainer from the shaft. Discard the seal.
6. Clean the metal components with a suitable solvent.
7. Examine the components for adverse wear. Replace parts if necessary.
8. Pack the constant velocity joint with Rocol MTS 1000 grease, until the grease is level with the outer faces.
9. Fit and slide the new convoluted seal onto the shaft, followed by its retainer.
10. Press the constant velocity joint onto the shaft. Secure it in place with the circlip.
11. Lightly smear the flange of the convoluted seal retainer with Wellseal sealant.
Fit the retainer to the constant velocity joint. Ensure that the six bolt holes align correctly.
12. Fit the convoluted seal. Secure in position using new retaining clips.
13. Lightly smear the flange of the joint end cap with Wellseal sealant. Fit to the joint, ensuring that the six bolt holes align.

Drive-shaft - To fit
Fit the drive-shaft by reversing the removal procedure noting the following.
1. Ensure that the load spreading washers are fitted beneath the retaining screws.
2. Torque tighten the retaining screws in accordance with the figures quoted in Section J6.

Output shaft oil seal - To renew
The oil seal on the splined output shafts are located in the housings, on each side of the final drive unit and can be renewed with the final drive in position.
1. Remove the drive-shaft as described under Drive-shaft - To remove.
2. Remove the six nuts securing the bearing housing to the final drive casing. If necessary, tap the housing with a nylon mallet to break the joint.
3. Withdraw the output shaft and housing from the

final drive casing.
4. Remove the circlip and washer located on the output shaft behind the bearing housing. Remove the shaft from the housing.
5. Remove the seal from the housing.
6. Fit a new seal, ensuring that it is fitted squarely into its locating bore and with the lip pointing inwards towards the bearing.

Note

If a P.T.F.E. oil seal is being fitted **do not** lubricate, as this type of oil seal is coated with a sealing element that is more efficient when fitted dry. It should be noted that it is **only** P.T.F.E. seals that do not require lubrication. To assist in correct assembling, the right-hand housing oil seal bore may have been increased to accept a larger oil seal. Directional arrows indicating clockwise and anti-clockwise rotation are marked on the seals.

7. Fit the housing onto the shaft, place the washer in position behind the bearing and fit the circlip. Ensure that the circlip locates correctly into its groove.
8. Fit the output shaft and housing assembly to the final drive casing. Secure with six nuts.
9. Torque tighten the nuts in accordance with the figures quoted in Section J6.
10. Fit the drive-shaft as described under Drive-shaft - To fit.

Output shaft bearing - To renew

1. Carry out Operations 1 to 4 inclusive of Output shaft oil seal - To renew.
2. Remove the bearing from the housing using a mandrel or drift. Remove the seal and discard.

Note

Left-hand housings have a circlip fitted to retain the bearing. Remove this circlip before attempting to remove the bearing.

3. Clean and inspect the housing bore. Lightly stone out any damage marks and burrs.
4. Fit a new bearing. Ensure that it is fitted squarely into the bore and up to its abutment face.

Note

On left-hand housings the bearing is retained in position with a circlip, ensure that the bearing is located correctly.

5. Fit a new seal ensuring that it is fitted squarely with the lip pointing inwards.

Note

If a P.T.F.E. oil seal is being fitted **do not** lubricate, as this type is more efficient when fitted dry. It should be noted that it is **only** P.T.F.E. seals that do not require lubrication. To assist in correct assembling, the right-hand housing oil seal bore may have been increased to accept a larger oil seal. Directional arrows indicating clockwise and anti-clockwise rotation are marked on the seals.

6. Lightly smear the output shaft housing sealing face with Wellseal. Fit the assembly onto the final drive casing. Secure with six nuts.
7. Torque tighten the nuts in accordance with the figures quoted in Section J6.
8. Fit the drive-shafts as described under Drive-shaft - To fit.

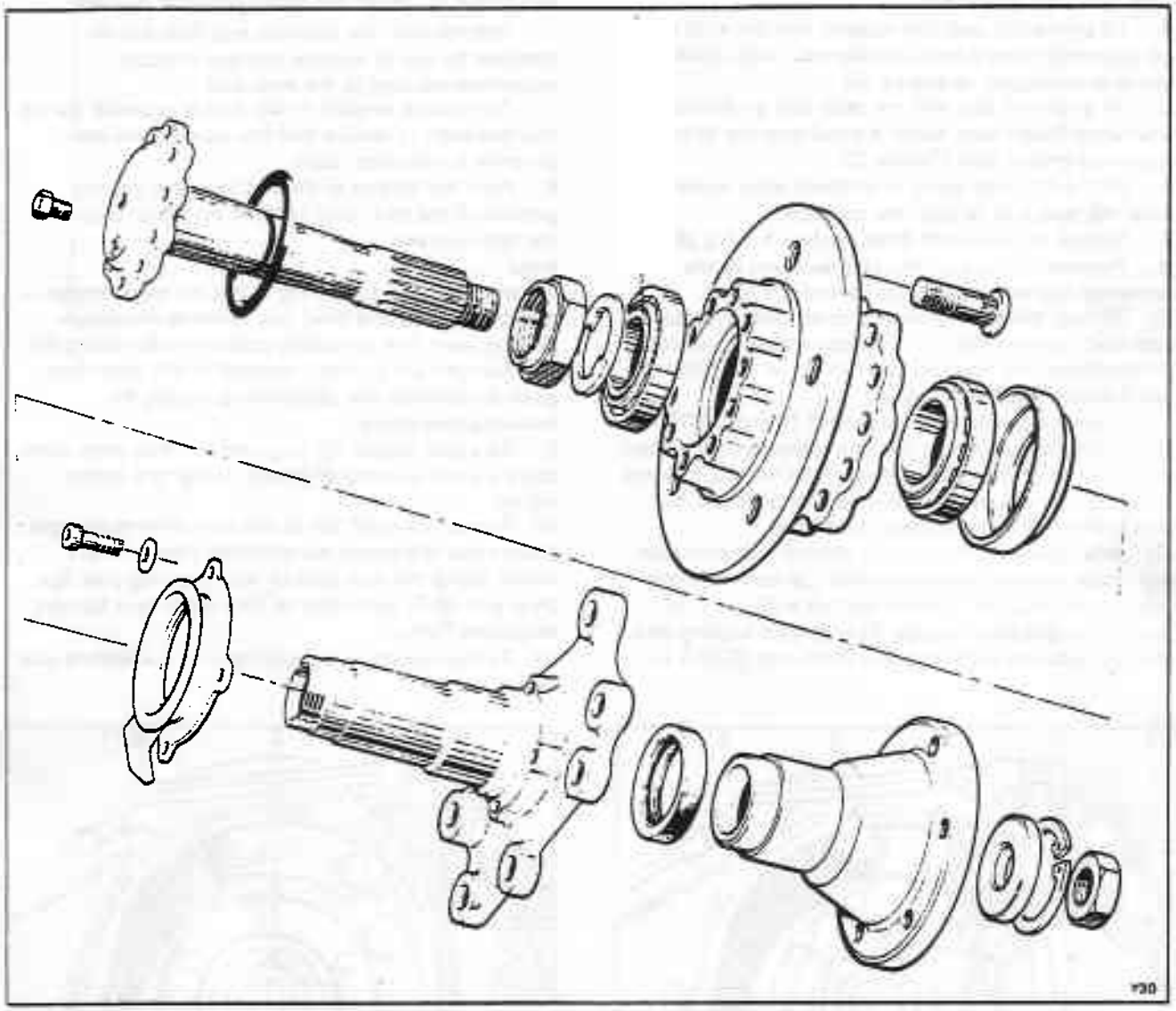


Fig. J4-3 Rear hub (cars fitted with constant velocity joints) Bentley Mulsanne Turbo

hub coupling to the hub drive-shaft (see figs. J4-4 and J4-5).

5. Remove either the yoke or coupling from off the tapered hub drive-shaft. Collect the Woodruff key.

Use extractor tool RH 9690, which is specifically for use with the constant velocity arrangement, but the ram plate can be used to withdraw the yoke from the Detroit shaft arrangement, having had 4 extra holes added.

6. Remove the large nut and circlip that secures the hub coupling onto the hub drive-shaft. Remove the splined hub coupling from off the hub drive-shaft (see fig. J4-3), applicable to Bentley Mulsanne Turbo cars.

7. Remove the setscrews securing the outer flange of the drive-shaft to the hub. Withdraw the drive-shaft from the hollow stub axle.

8. Unlock and remove the shrouded nut and the key washer from the stub axle.

9. Withdraw the hub complete with bearings from the stub axle, collect the chamfered distance piece.

10. Remove the outer bearing inner race. Using a soft metal drift, drive out the inner bearing together with the grease retainer.

11. Drive out the outer bearing track from the hub.

12. Remove the retainer and felt seal from the stub axle counterbore, on cars other than Bentley Mulsanne Turbo.

13. Remove the oil seal from the stub axle counterbore, applicable to Bentley Mulsanne Turbo cars only.

14. With the hub dismantled inspect the brake disc and caliper pads for wear or damage. If it is necessary to remove the brake disc, remove the securing setscrews and withdraw the disc from the hub.

15. Thoroughly clean all hub components and inspect for wear and damage.

Hub unit - To assemble

1. Fit a new felt seal and retainer into the stub axle on cars other than Bentley Mulsanne Turbo, (soak the felt seal thoroughly in engine oil).
2. Fit a new oil seal into the stub axle on Bentley Mulsanne Turbo cars. Apply a small quantity of an approved grease (see Chapter D).
3. Fit the distance piece, chamfered edge leading onto the stub axle to abut the shoulder.
4. Repack the hub with Shell Retinex A 57 g (2 oz).
5. Position the hub on the stub axle and fit the hardened key washer and new shrouded nut.
6. Tighten the nut sufficiently to remove any bearing end-float. Using a dial test indicator mounted adjacent to the brake disc measure the run-out of the disc at the maximum possible radius.

The run-out must not exceed 0,18 mm (0.007 in) total indicator reading as this is a measure of the stack tolerance of all the components. If the run-out exceeds this figure, it will be necessary to dismantle the hub and brake disc to investigate the cause.

7. After checking the run-out slacken the shrouded nut. Place a feeler gauge between the outer bearing and the key washer. Tighten the nut sufficiently to lightly grip the feeler gauge. This gives a bearing end-float of between 0,05 mm and 0,10 mm (0.002 in and 0.004 in), when the feeler gauge is removed.

Alternatively, the required end-float can be obtained by use of suitable dial test indicator equipment secured to the stub axle.

Continuous rotation of the hub is essential during this operation to ensure that the taper rollers seat correctly in the outer races.

8. Peen the shroud of the nut to locate into the grooves of the stub axle: remove the feeler gauge or dial test indicator.

Note

Incorrect setting i.e. exerting a load on the bearings or giving excessive end-float, will promote premature bearing wear. The remaining operations for fitting the rear hub unit are a careful reversal of the procedure given for removal and dismantling, noting the following operations.

9. Fit a new rubber 'O' ring onto the hub drive-shaft, apply a small quantity of grease to the ring before fitting.
10. Fit the Woodruff key to the hub drive-shaft taper. Ensure that the tapers are perfectly clean and dry before fitting the hub yoke or hub coupling (see figs. J4-6 and J4-7) applicable to cars other than Bentley Mulsanne Turbo.
11. Fit the splined hub coupling onto the splined hub

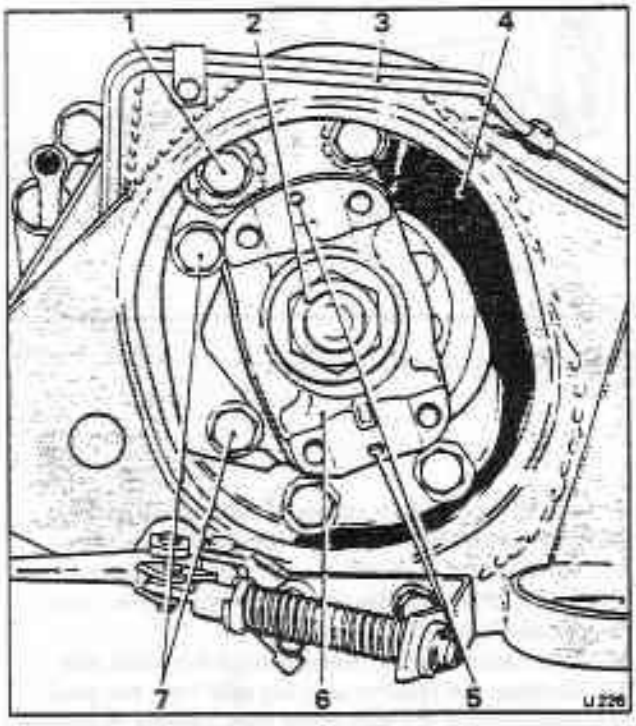


Fig. J4-4 Rear hub and brake caliper mounting (cars fitted with ball and trunnion joints)

1 Hub mounting setscrew (4)
2 Hub drive-shaft retaining nut
3 Hydraulic brake pipes
4 Trailing arm
5 Universal joint location dowels
6 Hub yoke
7 Brake caliper mounting bolts

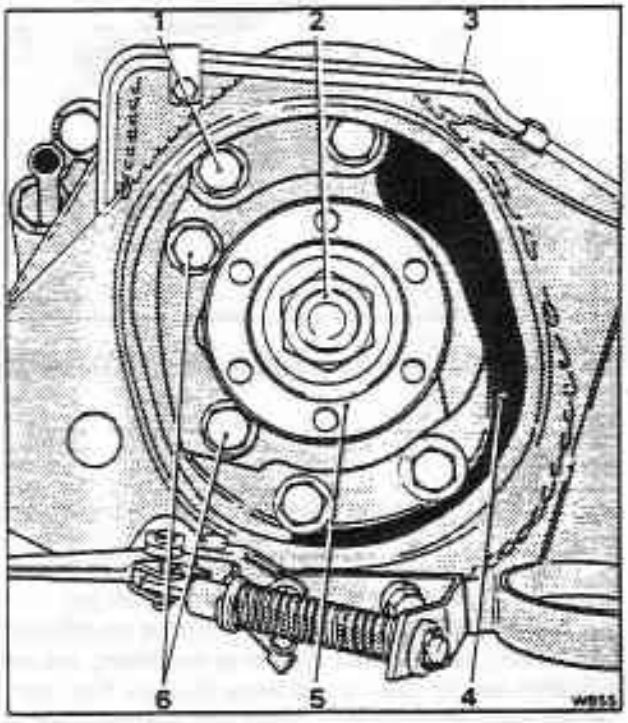


Fig. J4-5 Rear hub and brake caliper mounting (cars fitted with constant velocity joints)

1 Hub mounting setscrew (4)
2 Hub drive-shaft retaining nut
3 Hydraulic brake pipes
4 Trailing arm
5 Hub coupling
6 Brake caliper mounting bolts

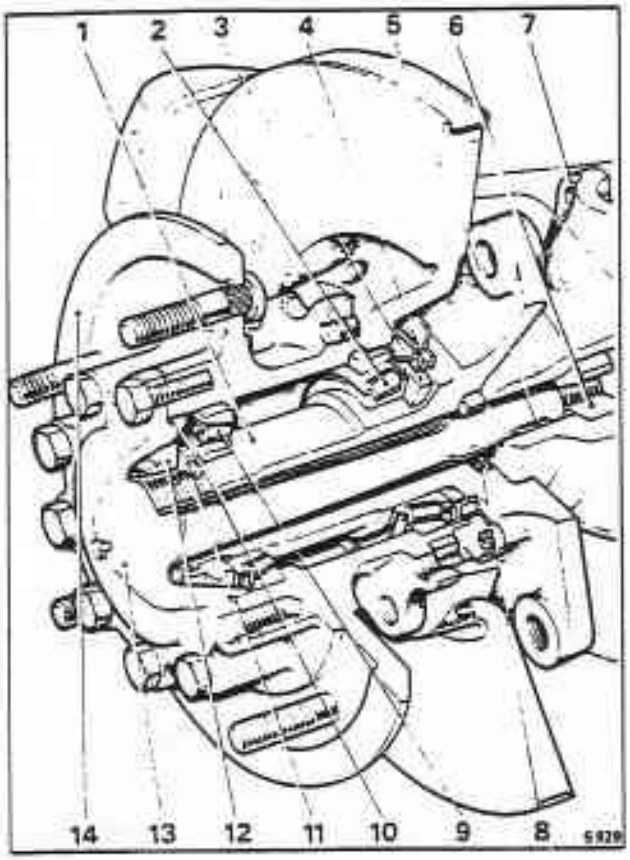


Fig. J4-6 Rear hub (cars fitted with ball and trunnion joints)

1 Stub axle
2 Inner taper roller bearing
3 Distance piece
4 Acme thread seal
5 Woodruff key
6 Nut
7 Hub yoke
8 Felt seal and retainer
9 Outer taper roller bearing
10 Seal
11 Keyed adjusting washer
12 Shrouded nut
13 Hub drive-shaft
14 Hub

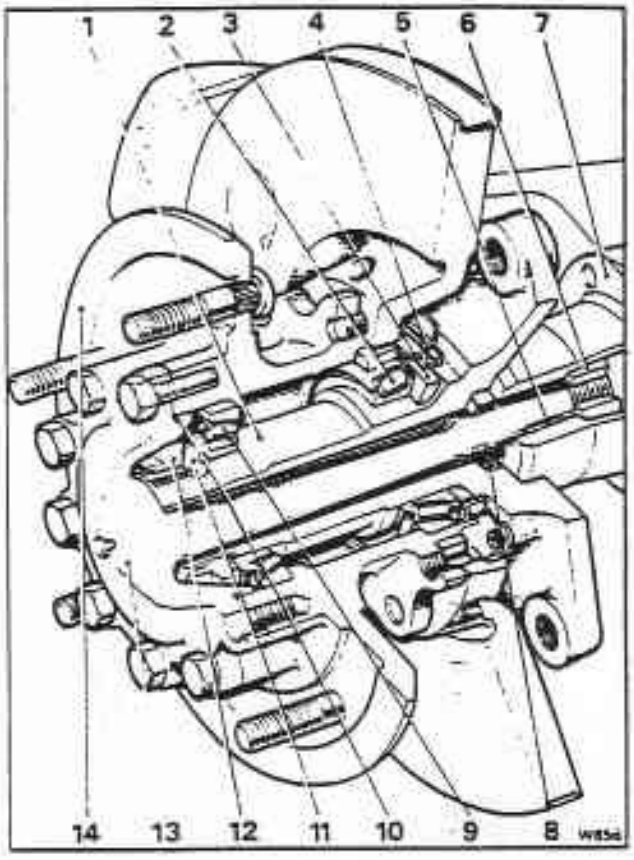


Fig. J4-7 Rear hub (cars fitted with constant velocity joints)

1 Stub axle
2 Inner taper roller bearing
3 Distance piece
4 Acme thread seal
5 Woodruff key
6 Nut
7 Hub coupling
8 Felt seal and retainer
9 Outer taper roller bearing
10 Seal
11 Keyed adjusting washer
12 Shrouded nut
13 Hub drive-shaft
14 Hub

drive-shaft, secure by fitting a new circlip, (see fig. J4-3), applicable to Bentley Mulsanne Turbo cars.
12. Apply Rocol MTS 1000 grease to the abutment face of the hub yoke or hub coupling retaining nut.
13. Torque tighten the nut in accordance with the figure quoted in Section J6 using torque spanner RH 8014 and socket RH 8026 (see figs J4-6 and J4-7). Socket RH 8026 on all cars other than Bentley Mulsanne Turbo.
14. Fit the drive-shaft assembly into position and torque tighten the retaining screws in accordance with the figures quoted in Section J6.

When fitting a universal joint type of drive-shaft to the hub yoke, always ensure that the bearing cap seats correctly in the yoke.
15. When fitting the brake feed pipes and parking brake linkage refer to Chapter G for information regarding bleeding procedure and precautions to be taken.
16. Check the adjustment and operation of the parking brake as described in Chapter G.
17. Fit the road wheel and remove the supports beneath the body and trailing arms.
18. Tighten the wheel nuts and fit the wheel disc/trim.

Dimensional data

Final drive unit	
Backlash - pinion to crown wheel	Etched on crown wheel
Backlash - differential housing pinions	0,0762 mm (0.003 in)
End-float - differential housing pinions	Nil
Crown wheel run-out (maximum)	0,05 mm (0.002 in)
Differential housing - trunnion diameters	19,042 mm - 19,05 mm (0.7497 in - 0.750 in)
Differential housing pinion - bore diameters	19,062 mm - 19.075 mm (0.7505 in - 0.751 in)
Differential housing bevel pinion gear - bearing diameter	44,272 mm - 44,297 mm (1.743 in - 1.744 in)
Differential housing bevel pinion gear bore diameter	44,450 mm - 44,475 mm (1.750 in - 1.751 in)
Differential housing and end cap - bearing locating diameters	50,85 mm - 50,863 mm (2.002 in - 2.0025 in) 66,732 mm - 66,738 mm (2.62725 in - 2.6275 in)
Differential housing bearings - bore diameters	50,8 mm - 50,812 mm (2.000 in - 2.0005 in) 66,675 mm - 66,687 mm (2.625 in - 2.6255 in)
Differential housing bearings - outside diameters	88,9 mm - 88,925 mm (3.500 in - 3.501 in) 107,950 mm - 107,975 mm (4.250 in - 4.251 in)
Final drive casing - differential housing bearing locating bores	88,925 mm - 88,938 mm (3.501 in - 3.5015 in) 107,975 mm - 108,0 mm (4.251 in - 4.252 in)
Final drive casing - pinion housing locating diameters	105,410 mm - 105,422 mm (4.150 in - 4.1505 in) 105,715 mm - 105,73 mm (4.162 in - 4.1625 in)
Pinion housing - Locating diameters	105,410 mm - 105,422 mm (4.150 in - 4.1505 in) 105,753 mm - 105,765 mm (4.1635 in - 4.164 in)
Pinion shaft - bearing locating diameters	34,956 mm - 34,963 mm (1.37625 in - 1.3765 in) 44,481 mm - 44,488 mm (1.75125 in - 1.7515 in)
Pinion bearings - bore diameters	34,925 mm - 34,937 mm (1.375 in - 1.3755 in) (44,450 mm - 44,462 mm (1.750 in - 1.7505 in)
Pinion housing - pinion bearing locating diameters	72,194 mm - 72,219 mm (2.8423 in - 2.8433 in) 95,199 mm - 95,224 mm (3.748 in - 3.749 in)
Pinion bearings - outside diameters	72,232 mm - 72,257 mm (2.8438 in - 2.8448 in) 95,250 mm - 95,275 mm (3.750 in - 3.751 in)
Pinion - splined diameter	40,546 mm - 40,609 mm (1.5963 in - 1.5988 in) over 4,000 mm (0.1575 in) diameter rollers
Pinion - nose bearing locating diameter	38,524 mm - 38,536 mm (1.5167 in - 1.5172 in)
Final drive casing - pinion nose bearing bore diameter	61,981 mm - 61,986 mm (2.4402 in - 2.4404 in)
Pinion nose bearing - outside diameter	61,987 mm - 62,000 mm (2.44045 in - 2.44095 in)
Pinion nose bearing - running clearance	0,0127 mm - 0,038 mm (0.0005 in - 0.0015 in)
Pinion bearing housing - oil seal locating diameter	80,9498 mm - 80,9625 mm (3.187 in - 3.1875 in)
Oil seal - pinion bearing housing locating diameter	81,03 mm - 81,13 mm (3.190 in - 3.194 in)

Final drive - drive-shafts

Side housings - bearing locating bore	66,655 mm - 66,661 mm (2.6242 in - 2.62445 in)
Bearing - side housings - outside diameter	66,649 mm - 66,662 mm (2.6240 in - 2.6245 in)
Bearing - side housings - bore diameter	38,092 mm - 38,105 mm (1.4997 in - 1.5002 in)
Side housing - oil seal locating bore - right-hand	64,77 mm - 64,81 mm (2.550 in - 2.5515 in)
Oil seal - right-hand	To suit above housing
Side housing - oil seal locating bore - left-hand	63,50 mm - 63,54 mm (2.500 in - 2.5015 in)
Oil seal - left-hand	To suit above housing
Ball and trunnion joint shaft - bearing diameter	38,093 mm 38,10 mm (1.49975 in - 1.500 in)
Ball and trunnion joint spline diameter	41,846 mm - 41,859 mm (1.6475 in - 1.6481 in) over 3,9578 mm (0.1512 in) diameter rollers
Hub coupling - constant velocity joint bearing diameter	38,093 mm - 38,10 mm (1.49975 in - 1.500 in)
Hub coupling - constant velocity joint spline diameter	41,846 mm - 41,859 mm (1.6475 in - 1.6481 in) over 3,840 mm (0.1512 in) diameter rollers
Ball and trunnion joint - trunnion pin bore	24,780 mm - 25,775 mm (0.9756 in - 0.9754 in)
Ball and trunnion joint - trunnion pin diameter	24,827 mm - 24,832 mm (0.97745 in - 0.97765 in)
Trunnion pin - minimum pressing load	308 bar (2 ton f in^2)
Ball and trunnion joint - spherical ball diameter	44,424 mm - 44,437 mm (1.7490 in - 1.7495 in)
Ball and trunnion joint - spherical ball bore	30,822 mm - 30,835 mm (1.2135 in - 1.2140 in)
Needle rollers (29 off) - diameter	2,997 mm - 3,002 mm (0.1180 in - 0.1182 in)
Ball and trunnion joint - spherical ball locating bores	44,450 mm - 44,475 mm (1.750 in - 1.751 in)

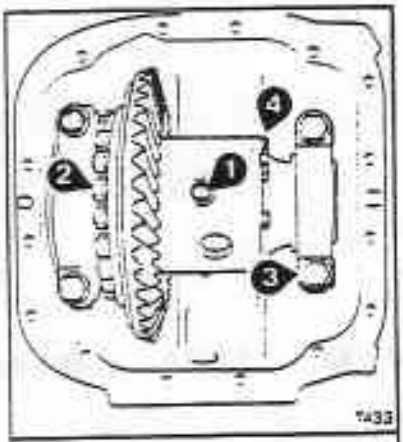
Special torque tightening figures

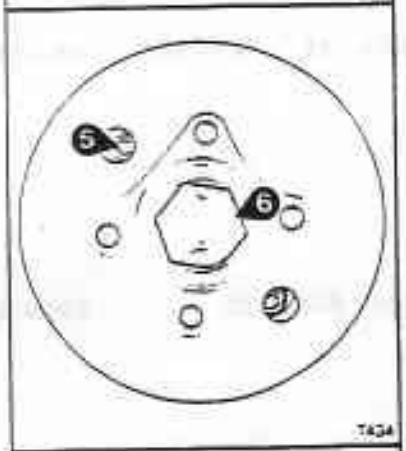
Introduction
This section contains the special torque tightening figures applicable to Chapter J.

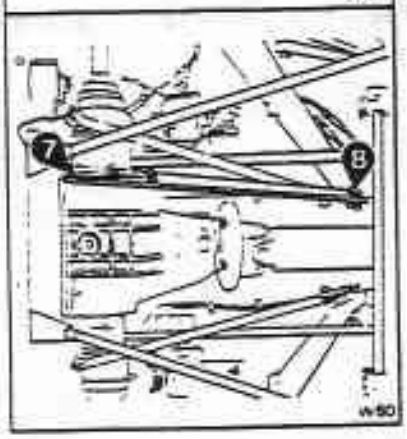
For standard torque tightening figures refer to Chapter P.

Components used during manufacture of the vehicle have different thread formations (Metric, UNF, UNC, etc.). Therefore, when fitting nuts, bolts, and setscrews it is important to ensure that the correct type and size of thread formation is used.

Section J1

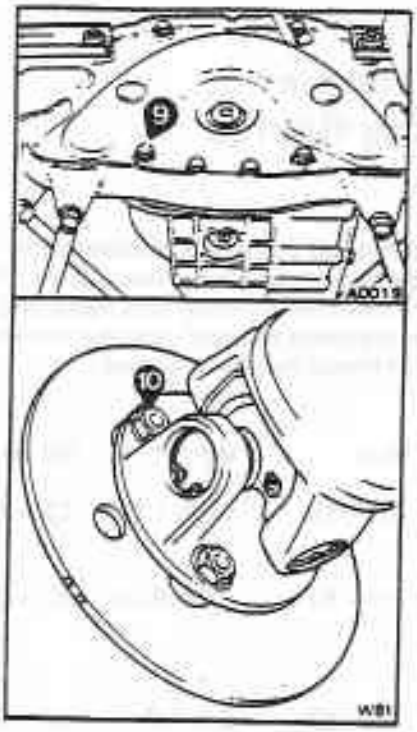






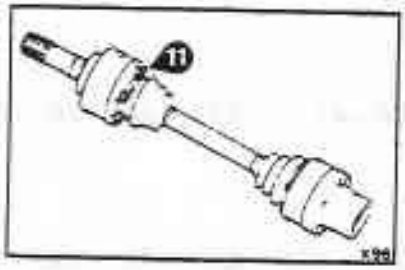
Ref.	Component	Nm	kgf m	lbf ft
1	Differential trunnion - bolt and lock-nut	16 – 19	1,63–1,94	12 – 14
2	Crownwheel to differential housing - nut	57 – 61	5,82–6,22	42 – 45
3	Nut - bearing cap final drive	81 – 88	8,3–8,9	60 – 65
4	Setscrew - end cover differential housing	11 – 13	1,10–1,38	8 – 10
5	Pinion housing to differential housing casing - capscrews	39 – 43	3,98–4,38	29 – 32
6	Input flange to input pinion - nut	373 – 407	3,87–4,18	275 – 300
7	Torque arm mount to final drive casing - bolts	46 – 50	4,70–5,10	34 – 37
8	Torque arm front mount - nuts and bolts	81 – 88	8,3–8,9	60 – 65

Section J1



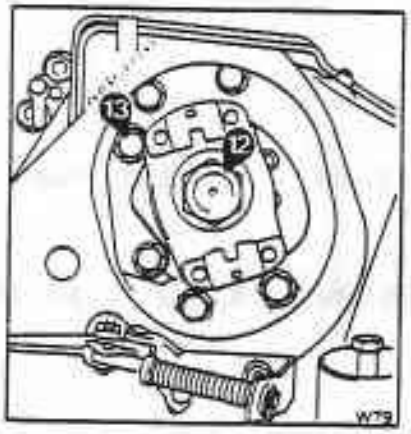
Ref.	Component	Nm	kgf m	lbf ft
9	Setscrew - final drive to crossmember	39 – 43	3,98–4,38	29 – 32
10	Propeller shaft flange - nuts	57 – 61	6 – 8	42 – 45

Section J2



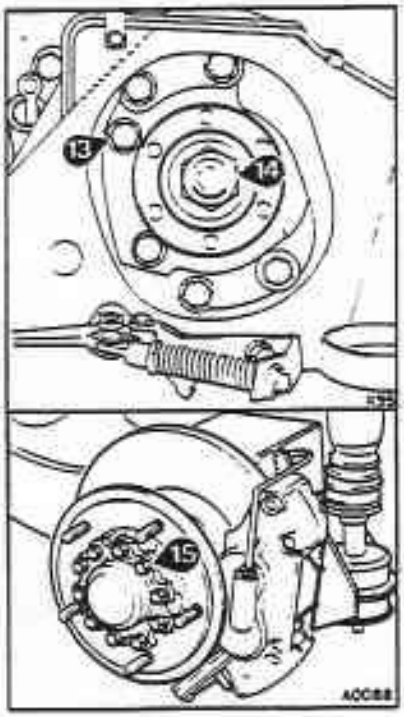
Ref.	Component	Nm	kgf m	lbf ft
11	Constant velocity joint - bolts (cars other than Mulsanne Turbo)	81 – 88	8,3–8,9	60 – 65
	Constant velocity joint - capscrews (Mulsanne Turbo only)	95 – 101	9,7–10,3	70 – 75

Section J4



Ref.	Component	Nm	kgf m	lbf ft
12	End yoke to driving shaft-nut (cars fitted with the ball and trunnion arrangement)	664 – 692	70	490 – 510
13	Rear brake caliper to stub axle - setscrew (cars fitted with ball and trunnion/constant velocity joint arrangements)	108 – 115	11 – 12	80 – 85

Section J4



Ref.	Component	Nm	kgf m	lbf ft
14	Coupling flange to driving shaft - nut (cars fitted with the constant velocity joint arrangement) All cars other than Mulsanne Turbo	664 – 692	70	490 – 510
	Coupling flange to driving shaft-nut. On all Mulsanne Turbo cars	108 – 115	11 – 12	80 – 85
15	Setscrew - drive-shaft to rear hub	44 – 48	4,4-5,0	32 – 36

Workshop tools

RH 8014	Torque wrench - 0 lbf ft to 600 lbf ft Hub yoke nut
RH 8016	Extractor beam When used in conjunction with RH 8017, RH 8020, RH 8021, and RH 8022, the extractor beam can be Used to remove the rear tapered roller bearing from the final drive pinion
RH 8017	Hydraulic ram To be used in conjunction with RH 8016, RH 8020, RH 8021, and RH 8022 as detailed above
RH 8020	Separator See RH 8017 for uses
RH 8021	Bolt - See RH 8017 for uses
RH 8022	Pressure pads See RH 8017 for uses
RH 8026	Socket head 1 11/16 A/F To be used in conjunction with RH 8014
RH 8032	Stiffening bar - Final drive casing
RH 8307	Converter - Torque spanner Converts the 19 mm (0.75 in) square drive of the torque spanner RH 8014 to 25.4 mm (1.0 in) square drive
RH 8308	Applicator - Rear drive-shaft rubber seal
RH 8457	Assembly tool - Pinion coupling flange
RH 8470	Extractor - Pinion coupling flange To be used in conjunction with RH 8017
RH 9005	Hydraulic ram. To be used in conjunction with RH 9690
RH 9299	Compression bolt - rear springs
RH 9575	Jury bolt - Torque arm removal
RH 9578	Pre-loading jig - Bellevilie washers - Final drive right-hand side housing
RH 9690	Extractor - Rear hub end yoke/ coupling flange. To be used in conjunction with RH 9005 (cars fitted with ball and trunnion/constant velocity joint arrangements)