Chapter 8
Driveshafts

Contents

Degrees of difficulty

Easy, suitable for novice with little experience	**Fairly easy,** suitable for beginner with some experience	**Fairly difficult,** suitable for competent DIY mechanic	**Difficult,** suitable for experienced DIY mechanic	**Very difficult,** suitable for expert DIY or professional

Specifications

General

Type	Unequal-length, solid steel shafts, splined to inner and outer constant velocity joints. Intermediate shaft with support bearing on 1.8 litre models with equal length driveshafts.
Damping weight position:	
1.2 and 1.4 litre models	201 mm from inner end of driveshaft
1.6 litre models:	
Early models	Either 290 to 295 mm, or 292 to 297 mm from inner end of driveshaft
Later models	Recess on driveshaft
1.8 litre models	Recess on driveshaft
Inner gaiter bearing position (1.6 litre models):	
Left-hand driveshaft	Either 133 or 135 mm from inner end of driveshaft
Right-hand driveshaft	Either 108 or 110 mm from inner end of driveshaft

Lubrication

Lubricant type	FIAT specification grease, supplied with gaiter repair kit

Torque wrench settings

	Nm	lbf ft
Hub (driveshaft) nut (M22)	240	177
Intermediate shaft damping weight	7	5
Intermediate shaft mounting bracket	49	36
Suspension strut-to-hub carrier bolts	70	52
Track-rod balljoint to hub carrier	40	30
Wheel bolts	86	63

1 General information

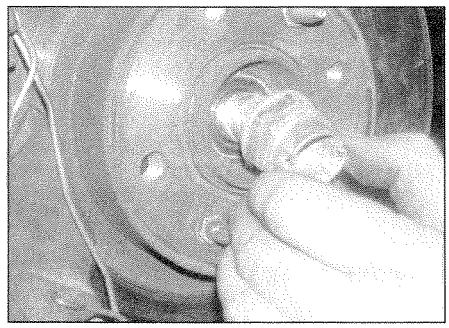
Power is transmitted from the differential to the roadwheels by the driveshafts, via inboard and outboard constant velocity (CV) joints.

An intermediate shaft, with its own support bearing is fitted between the transmission output and right-hand driveshaft on 1.8 litre models. This has the effect of equalising driveshaft angles at all suspension positions and reduces driveshaft flexing, which improves directional stability, particularly under acceleration.

The outer Rzeppa type CV joints allow smooth transmission of drive to the wheels at all steering and suspension angles. Drive is transmitted by means of a number of steel balls that run in grooves between the two halves of the joint.

On 1.2 and 1.4 litre models, and 1.6 litre automatic transmission models, the inboard CV joint is of tripod type; drive is transmitted across the joint by means of three rollers, mounted on the driveshaft in a tripod arrangement, which is free to slide in the grooved cup. On 1.6 litre models with manual transmission, the inboard CV joint is similar to that of the 1.2 and 1.4 litre models, except that the tripod and rollers are located directly in the differential sun gears, and the rubber gaiters do not rotate with the driveshaft. The gaiters are secured to the transmission side flanges by clips. On 1.8 litre models, the inboard CV joints are of constant velocity type, like the outer joints, and are bolted to drive flanges on the left-hand side of the transmission and on the right-hand end of the intermediate shaft.

The joint rubber gaiters are packed with grease, to provide permanent lubrication. If wear is detected in the joint, it can be detached from the driveshaft and renewed. Normally, the CV joints do not require additional lubrication, unless they have been overhauled or the rubber gaiters have been damaged, allowing the grease to become contaminated. Refer to Chapter 1, Section 10, for guidance on checking the condition of the driveshaft gaiters.



2.3 Removing the driveshaft securing nut (hub nut)

Both driveshafts are splined at their outer ends, to accept the wheel hubs, and are threaded so that the hubs can be fastened to the driveshafts by means of a large, staked nut.

2 Driveshafts - removal and refitting

Note: *A balljoint separator tool will be required to separate the steering track-rod end from the hub carrier.*

Removal

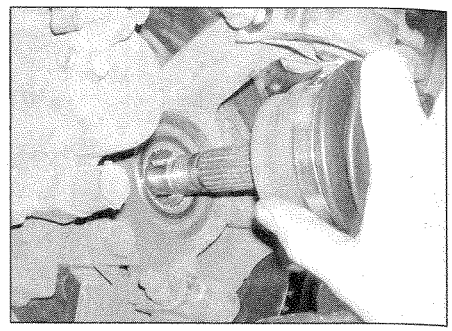
1 Remove the wheel trim from the appropriate wheel, then loosen the driveshaft securing nut with the vehicle resting on its wheels and the handbrake firmly applied. The nut is very tight and an extension bar may be necessary to loosen it. Also loosen the wheel bolts half a turn.

2 Apply the handbrake, then jack up the front of the vehicle and support it on axle stands (see *Jacking and vehicle support*). Remove the appropriate roadwheel. Note that improved access to the driveshaft may be gained by removing the wheel arch liner from under the relevant front wing.

3 Unscrew and remove the driveshaft securing nut (hub nut) and discard it - a new one must be used on refitting **(see illustration)**.

4 Unscrew the nut securing the steering track-rod end to the hub carrier steering arm. Using a balljoint removal tool, separate the track-rod end from the arm.

5 Support the suspension lower arm with a trolley jack, then unscrew and remove the bolts securing the hub carrier to the bottom of the strut (see Chapter 10). Note which way round the bolts are fitted, and note the location of the spacers.



2.6 Extracting the driveshaft from the hub carrier

6 Pull out the top of the hub carrier and lower the jack at the same time. Take care not to stretch the hydraulic brake hose. Press the driveshaft from the splined hub **(see illustration)**. If it is tight, use a mallet to drive out the driveshaft.

1.2 and 1.4 litre models and 1.6 litre models (automatic transmission)

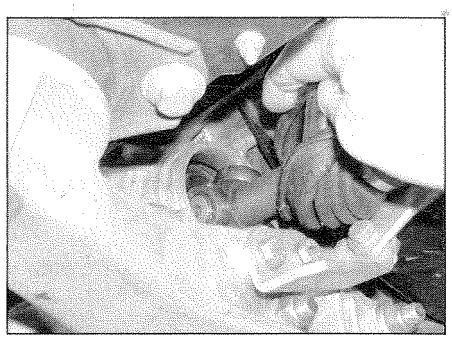
7 Position a container beneath the transmission to catch spilt oil/fluid. Lever out the driveshaft, using a suitable lever and piece of thin wood to protect the transmission casing. Withdraw the driveshaft from the car.

1.6 litre models (manual transmission)

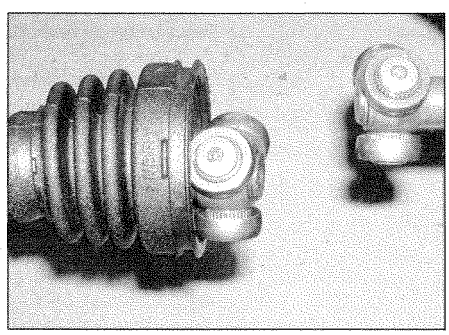
8 Position a container beneath the transmission to catch spilt oil. Loosen the clip and release the driveshaft gaiter from the transmission side flange. There is no need to remove the flange bolted to the left-hand side of the transmission. Carefully withdraw the driveshaft inner joint tripod from the transmission differential sun gear, then withdraw the driveshaft from the car **(see illustrations)**.

1.8 litre models

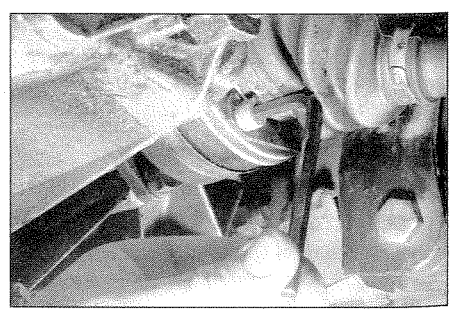
9 Using a long extension and Allen key, unscrew and remove the bolts securing the driveshaft inner joint to the transmission (LHS) or intermediate (RHS) drive flange **(see illustration)**. Withdraw the driveshaft from the car.



2.8a Removing the driveshaft inner joint tripod from the transmission



2.8b Driveshaft inner joint tripods removed from the transmission



2.9 On 1.8 litre models, unscrew the driveshaft Allen bolts (right-hand driveshaft shown)

Refitting

1.2 and 1.4 litre models and 1.6 litre models (automatic transmission)

10 Before inserting the driveshaft, check the condition of the oil seal in the transmission casing, and if necessary renew it with reference to Chapter 7A or 7B. Briefly, the work involves unbolting the side flange, hooking out the old oil seal, then driving in the new oil seal using a suitable socket or metal tube on the hard outer surface, and finally refitting the flange.

11 Carefully insert the inner end of the driveshaft so that it engages the splines of the differential gears, then press it firmly inwards until the circlip is felt to engage the groove in the gear.

1.6 litre models (manual transmission)

12 Before refitting the driveshaft, check the condition of the gaiter and if necessary renew it with reference to Section 3.

13 Clean the flange on the side of the transmission, then insert the driveshaft inner joint tripod into the differential sun gear. Locate the gaiter on the transmission flange, and tighten the clip.

1.8 litre models

14 Clean the drive flange then locate the driveshaft inner joint on it and insert the bolts. Tighten the bolts securely in a progressive manner.

All models

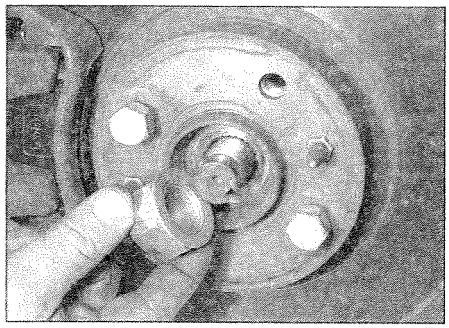
15 Locate the outer end of the driveshaft in the splined hub and press in the top of the hub carrier.

16 Engage the hub carrier with the bottom of the strut, then insert the bolts together with the spacers. The heads of the bolts face the rear of the car. Tighten the bolts to the specified torque.

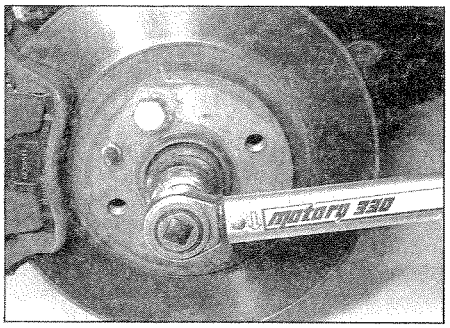
17 Reconnect the steering track-rod end with the hub carrier steering arm, then refit and tighten the nut. If the track-rod end stub turns in the steering arm, press down on it while tightening the nut.

18 Screw on the new driveshaft (hub) nut and tighten it moderately at this stage **(see illustration)**.

19 Refit the roadwheel and lower the car to the ground.



2.18 Fitting a new driveshaft nut



2.20a Tighten the driveshaft nut to the specified torque (roadwheel removed for clarity)

20 Tighten the roadwheel bolts to the specified torque, then tighten the hub nut to the specified torque. Stake the rim of the hub nut into the machined recess in the end of the driveshaft using a hammer and punch **(see illustrations)**. Refit the wheel trim.

21 Check and top-up the transmission oil/fluid with reference to Chapter 1.

3 Driveshaft overhaul and rubber gaiter renewal

1.2 and 1.4 litre models and 1.6 litre models (automatic transmission)

Dismantling

1 Remove the driveshaft from the vehicle as described in Section 2, and mount it in a vice.

2 Release the clips and move the gaiter away from the driveshaft inner joint housing. Slide the inner joint housing from the tripod joint.

3 At the inboard end of the driveshaft, use a hammer and centre punch to mark the relationship between the shaft and tripod joint. Remove the circlip with a pair of circlip pliers, then using a three-legged puller if required, draw the tripod joint off the end of the driveshaft. Ensure that the legs of the puller bear upon the cast centre section of the joint, not the roller bearings **(see illustration)**.

4 At the outer end of the driveshaft, release the clips and move the gaiter away from the driveshaft outer joint housing.

5 Mark the relationship between the outer joint and the driveshaft using a scriber or a dab of paint.

6 Using a pair of circlip pliers, expand the circlip that holds the joint in place and withdraw the joint from the end of the driveshaft. Note that the circlip is captive in the joint, and need not be removed, unless it appears damaged or worn.

7 Slide both rubber gaiters off the driveshaft. It is recommended that the gaiters are renewed whenever removed from the driveshaft.

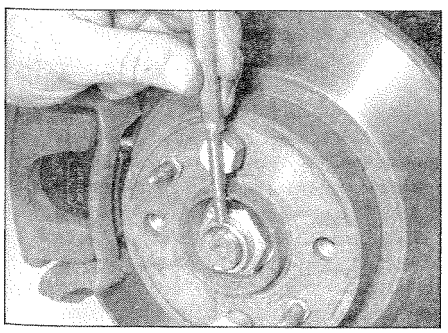
8 If necessary, the damping weight may be removed from the right-hand driveshaft, however note its fitted position first.

Inspection

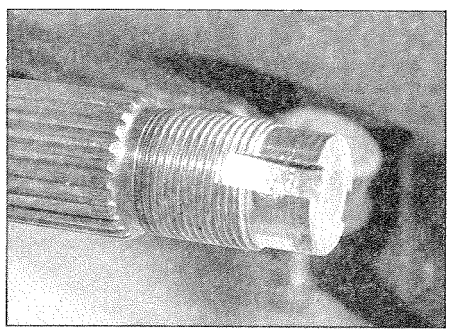
9 Thoroughly clean the driveshaft splines, and CV joint components with paraffin or a suitable solvent, taking care not to destroy any alignment marks made during removal. It is not recommended that the joint is completely dismantled, however, if it falls apart accidentally, it is important that it is correctly reassembled. The small webs of the hub must align with the large webs of the housing, and vice versa.

10 Examine the CV joint components for wear and damage. In particular, check the balls and corresponding grooves for pitting and corrosion. If evidence of wear is visible, then the joint must be renewed.

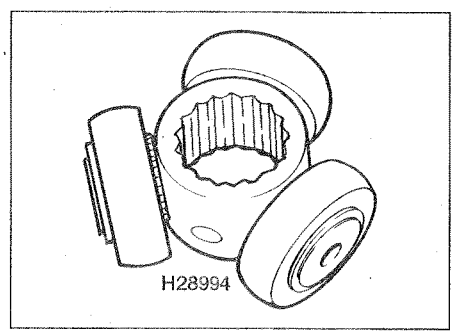
11 Examine the tripod joint components for wear. Check that the three rollers are free to



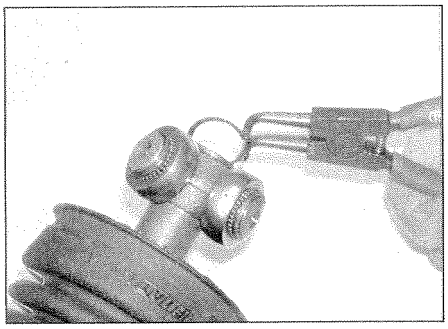
2.20b Stake the rim of the nut into the recess in the driveshaft



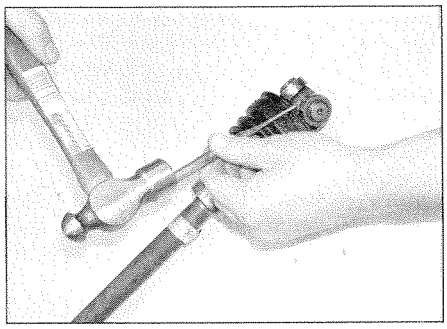
2.20c Recess machined into end of the driveshaft



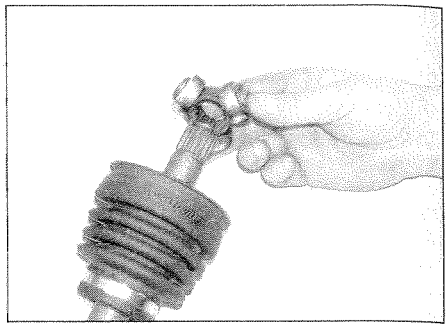
3.3 Draw the tripod joint off the end of the driveshaft



3.23a Extract the circlip . . .



3.23b . . . then use a soft-metal punch to . . .



3.23c . . . remove the tripod joint

rotate without resistance and are not worn, damaged or corroded. If wear is discovered, the tripod joint and housing must be renewed.

Reassembly

12 Refit the damping weight to the right-hand driveshaft, making sure it is located in its previously noted position as given in the Specifications.

13 Fit a new rubber gaiter to the inboard end of the driveshaft and secure it in place on the shaft with a clip.

14 Using the alignment marks made during removal, fit the tripod joint onto the splines of the driveshaft and tap it fully onto the shaft. To ensure that the tripod joint rollers and driveshaft splines are not damaged, use a socket with an internal diameter slightly larger than that of the driveshaft as a drift. Refit the circlip.

15 Pack the tripod joint, inner joint housing and gaiter with grease from the service kit, then locate the housing over the tripod joint. Position the gaiter on the housing and secure with the clip.

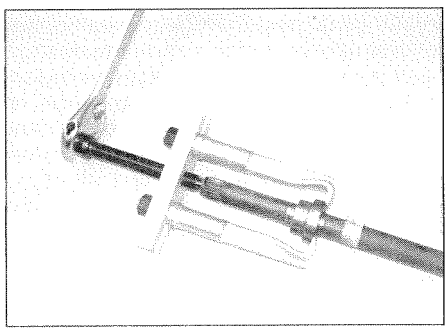
16 Fit a new rubber gaiter to the outboard end of the driveshaft and secure it in place with a clip.

17 Pack the CV joint and gaiter with grease from the service kit, pushing it into the joint ball grooves and expelling any air that may be trapped underneath.

18 Lubricate the splines of the drive shaft with a smear of grease, then slide the CV joint onto the shaft splines while observing the alignment marks made during removal. Press on the joint until the circlip engages the groove. Pull on the shaft to check that it is held firmly in position.

19 Position the rubber gaiter onto the outer joint housing. Briefly lift the lip of the gaiter to expel all the air from the joint, then secure it in place with a clip.

20 Wipe any excess grease from the driveshaft, then refit the driveshaft as described in Section 2.



3.24 Using a puller to remove the sealed bearing from the inner end of the driveshaft

1.6 litre models (manual transmission)

Dismantling

21 Remove the driveshaft from the vehicle as described in Section 2, and mount it in a vice.

22 Release the clip, then move the inner gaiter along the driveshaft away from the inner joint tripod joint and off of the bearing.

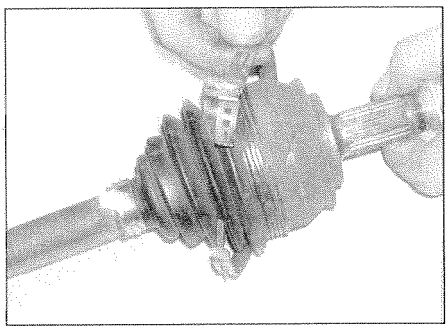
23 Use a hammer and centre punch to mark the relationship between the shaft and tripod joint. Remove the circlip with a pair of circlip pliers, then using a three-legged puller if required, draw the tripod joint off the end of the driveshaft. Ensure that the legs of the puller bear upon the cast centre section of the joint, not the roller bearings. Alternatively, use a soft-metal punch to drive the joint from the driveshaft **(see illustrations)**.

24 Note the fitted position of the sealed bearing on the driveshaft - there are two possibilities for each side as given in the Specifications. Using the puller, draw the bearing off the inner end of the driveshaft **(see illustration)**.

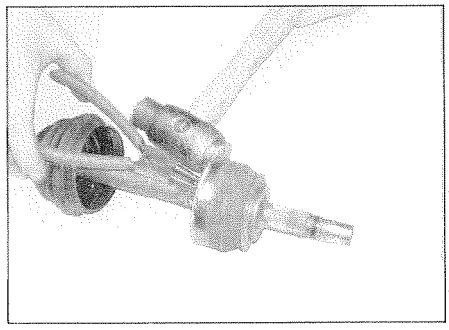
25 At the outer end of the driveshaft, release the clips and move the gaiter away from the driveshaft outer joint housing **(see illustration)**.

26 Mark the relationship between the outer joint and the driveshaft using a scriber or a dab of paint. Using a pair of circlip pliers, expand the circlip that holds the joint in place and drive the joint from the end of the driveshaft **(see illustration)**. Note that the circlip is captive in the joint, and need not be removed, unless it appears damaged or worn.

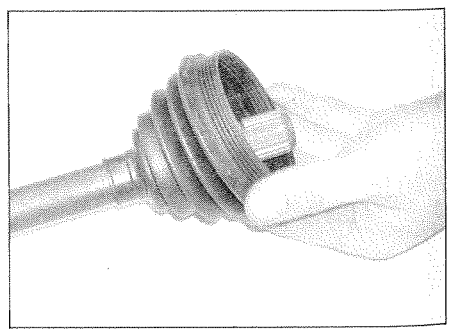
27 Slide both rubber gaiters off the driveshaft **(see illustration)**. It is recommended that the gaiters are renewed whenever removed from the driveshaft.



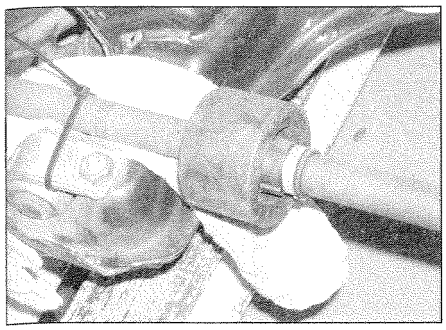
3.25 Release the clips from the outer joint gaiter



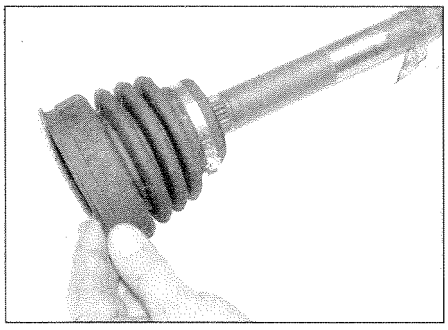
3.26 Removing the outer joint from the driveshaft



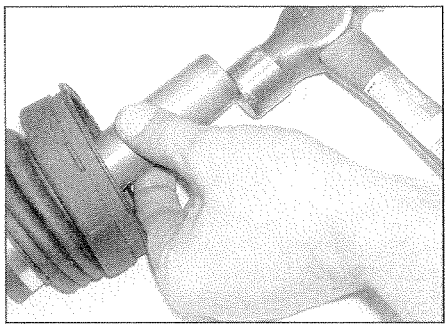
3.27 Removing the gaiters



3.28 Damping weight on the right-hand driveshaft



3.35 Locating a new clip and rubber gaiter onto the inboard end of the driveshaft



3.36 Driving the sealed bearing onto the inner end of the driveshaft

28 If necessary, the damping weight may be removed from the right-hand driveshaft, however note its fitted position first **(see illustration)**.

Inspection

29 Thoroughly clean the driveshaft splines, and CV joint components with paraffin or a suitable solvent, taking care not to destroy any alignment marks made during removal. It is not recommended that the joint is completely dismantled, however, if it falls apart accidentally, it is important that it is correctly reassembled. The small webs of the hub must align with the large webs of the housing, and vice versa.

31 Examine the CV joint components for wear and damage. In particular, check the balls and corresponding grooves for pitting and corrosion. If evidence of wear is visible, then the joint must be renewed.

32 Examine the tripod joint components for wear. Check that the three rollers are free to rotate without resistance and are not worn, damaged or corroded. If wear is discovered, the tripod joint must be renewed, however, if wear is found on the tripod joint location in the differential gears, more extensive work may be required on the transmission itself (see Chapter 7A or 7B).

33 Examine the gaiter bearing for wear and if necessary renew it.

Reassembly

34 Refit the damping weight to the right-hand driveshaft, making sure it is located in its previously noted position (see Specifications).

35 Locate a new clip and rubber gaiter onto the inboard end of the driveshaft **(see illustration)**.

36 Using a metal tube, drive the sealed bearing onto the inner end of the driveshaft, making sure that its closed end faces towards the outer bearing position and its position from the inner end of the driveshaft is as given in the Specifications **(see illustration)**. The tube must only locate on the inner race of the bearing as it is being fitted.

37 Using the alignment marks made during removal, fit the tripod joint onto the splines of the driveshaft and tap it fully onto the shaft. To ensure that the tripod joint rollers and driveshaft splines are not damaged, use a socket with an internal diameter slightly larger than that of the driveshaft as a drift. Refit the circlip.

38 Locate the gaiter on the bearing and secure with the clip.

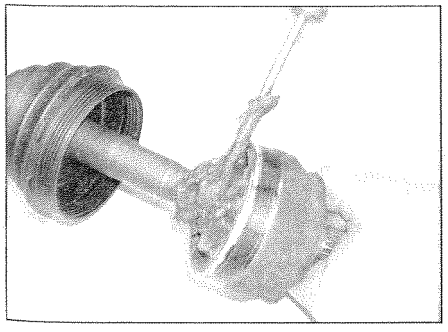
39 Fit a new rubber gaiter to the outboard end of the driveshaft and secure it in place with a clip.

40 Pack the CV joint and gaiter with grease from the service kit, pushing it into the joint ball grooves and expelling any air that may be trapped underneath **(see illustration)**.

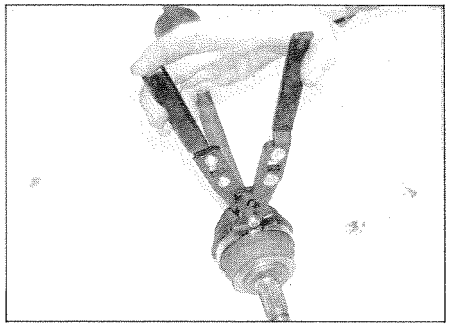
41 Lubricate the splines of the drive shaft with a smear of grease, then slide the CV joint onto the shaft splines while observing the alignment marks made during removal. Press on the joint until the circlip engages the groove. Pull on the shaft to check that it is held firmly in position.

42 Position the rubber gaiter onto the outer joint housing. Briefly lift the lip of the gaiter to expel all the air from the joint, then secure it in place with a clip. Note that the clips supplied with the new gaiters require a special tool to tighten the clip **(see illustration)**.

43 Wipe any excess grease from the driveshaft, then refit the driveshaft as described in Section 2.



3.40 Packing the CV joint with grease from the service kit



3.42 Using the special tool to tighten the clip onto the outer joint housing

1.8 litre models

Dismantling

44 Remove the driveshaft from the vehicle as described in Section 2, and mount it in a vice.

45 At the outer end of the driveshaft, release the clips and move the gaiter away from the driveshaft outer joint housing.

46 Mark the relationship between the outer joint and the driveshaft using a scriber or a dab of paint. Using a pair of circlip pliers, expand the circlip that holds the joint in place and withdraw the joint from the end of the driveshaft. Note that the circlip is captive in the joint, and need not be removed, unless it appears damaged or worn. Alternatively, remove the joint by tapping it with a mallet, or by using a slide hammer attached to the hub nut threads on the end of the driveshaft.

47 Remove the protective cup from the inner end of the driveshaft, then release the two clips from the gaiter, and move the gaiter away from the inner joint.

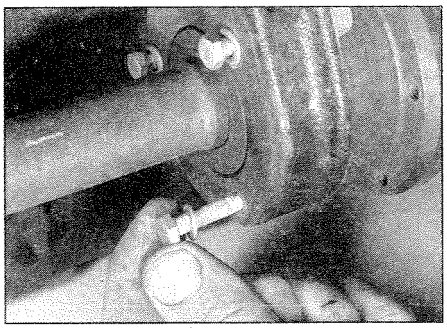
48 Mark the relationship between the inner joint and the driveshaft using a scriber or a dab of paint. Using a pair of circlip pliers, expand the circlip that holds the joint in place and withdraw the joint from the end of the driveshaft. Note that the circlip is captive in the joint, and need not be removed, unless it appears damaged or worn.

49 Remove the inner and outer driveshaft gaiters.

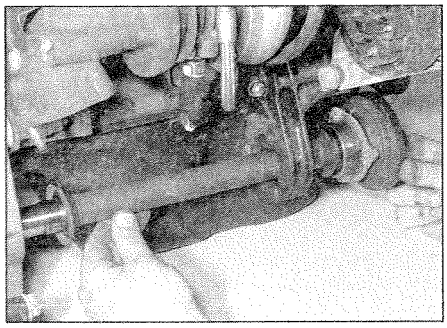
50 Identify the damping weight for position so that it can be refitted in exactly the same place. Undo the screws and remove the weight half shells from the driveshaft, then slide off the rubber buffer.

Inspection

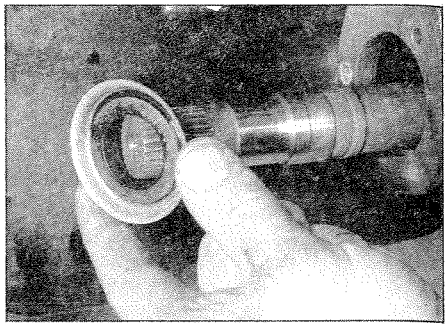
51 Thoroughly clean the driveshaft splines, and CV joint components with paraffin or a suitable solvent, taking care not to destroy any alignment marks made during removal. It is not recommended that the joint is



4.7 Unbolt the intermediate shaft from the support bracket



4.8a Withdraw the intermediate shaft from the transmission . . .



4.5b . . . and recover the dust seal

completely dismantled, however, if it falls apart accidentally, it is important that it is correctly reassembled. The small webs of the hub must align with the large webs of the housing, and vice versa.

52 Examine the CV joint components for wear and damage. In particular, check the balls and corresponding grooves for pitting and corrosion. If evidence of wear is visible, then the joint must be renewed.

Reassembly

53 Refit the damping weight to the right-hand driveshaft, making sure it is located in its previously noted position.

54 Fit a new rubber gaiter onto the inner end of the driveshaft and secure it in place with a clip.

55 Pack the CV joint and gaiter with grease from the service kit, pushing it into the joint ball grooves and expelling any air that may be trapped underneath.

56 Lubricate the splines of the drive shaft with a smear of grease, then slide the CV joint onto the shaft splines while observing the alignment marks made during removal. Press on the joint until the circlip engages the groove. Pull on the shaft to check that it is held firmly in position.

57 Position the rubber gaiter onto the inner joint housing. Briefly lift the lip of the gaiter to expel all the air from the joint, then secure it in place with a clip. Refit the protective cup onto the inner joint housing.

58 Fit a new rubber gaiter onto the outer end of the driveshaft and secure it in place with a clip.

59 Pack the CV joint and gaiter with grease from the service kit, pushing it into the joint ball grooves and expelling any air that may be trapped underneath.

60 Lubricate the splines of the drive shaft with a smear of grease, then slide the CV joint onto the shaft splines while observing the alignment marks made during removal. Press on the joint until the circlip engages the groove. Pull on the shaft to check that it is held firmly in position.

61 Position the rubber gaiter onto the inner joint housing. Briefly lift the lip of the gaiter to expel all the air from the joint, then secure it in place with a clip.

62 Wipe any excess grease from the driveshaft, then refit the driveshaft as described in Section 2.

4 Intermediate shaft - removal, inspection and refitting

Removal

Note: *This procedure applies only to 1.8 litre models. Note also that the intermediate shaft and bearing are not available as separate spares and can only be renewed as a complete assembly.*

Removal

1 Apply the handbrake, then jack up the front of the vehicle and support it on axle stands (see *Jacking and vehicle support*). Remove the right-hand front roadwheel.

2 Undo the screws and remove the wheel arch liner from beneath the right-hand front wing.

3 Unscrew the nut securing the steering track-rod end to the hub carrier steering arm. Using a balljoint removal tool, separate the track-rod end from the arm.

4 Unbolt and remove the vertical link for access to the rear of the engine.

5 Refer to Section 2 and unbolt the inboard end of the right hand driveshaft from the intermediate shaft flange. Suspend the disconnected end of the driveshaft from a convenient point on the subframe, using wire or a cable-tie, to avoid straining the joint and gaiter.

6 Drain the oil from the transmission, with reference to Chapters 1 and 7A.

7 Unbolt the intermediate shaft from the support bracket on the rear of the engine **(see illustration)**.

8 Withdraw the intermediate shaft flange from the support bracket, and draw the splined end of the shaft out of the transmission. If it is tight, attach a slide hammer to the shaft. Take care to avoid damaging the oil seal. Recover the dust seal **(see illustrations)**.

9 A modified (solid) intermediate shaft was fitted in 1997, replacing the previous tubular type. Where the modified type is fitted, undo the screws and remove the damping weight shells, then slide off the rubber buffer.

Inspection

10 Examine the oil seal in the transmission for signs of damage or deterioration and, if necessary, renew it with reference to Chapter 7A.

11 Spin the bearing on the intermediate shaft and check for roughness or seizing. If the bearing is worn or damaged, the complete shaft must be renewed.

12 Where applicable, check the rubber buffer for condition and renew it if necessary.

Refitting

13 On the modified intermediate shaft, refit the rubber buffer and damping weight shells, and tighten the screws securely.

14 Thoroughly clean the intermediate shaft splines and the aperture in the transmission. Fit a new dust seal to the shaft, then apply a thin film of grease to the oil seal lips, and to the intermediate shaft splines and shoulders.

15 Insert the shaft squarely into the transmission, taking care to avoid damaging the oil seal. Align the intermediate shaft bearing with the support bracket, then insert the bolts and tighten them securely.

16 Refit the right hand driveshaft to the intermediate shaft with reference to Section 2.

17 Refit the vertical link and steering track-rod end, and tighten the nuts/bolts.

18 Refit the wheel arch liner.

19 Refit the roadwheel and lower the vehicle to the ground. Tighten the roadwheel bolts to the specified torque.

20 On completion refill the transmission with the specified quantity and grade of oil with reference to Chapters 1 and 7A.