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

Driveshaft type	Steel shafts with outer constant velocity joints and inner tripode joints. Intermediate shaft from right-hand side of transmission to driveshaft
Lubrication (overhaul or repair only)	Use only special grease supplied in sachets with gaiter/overhaul kits; joints are otherwise prepacked with grease and sealed

Joint grease quantity

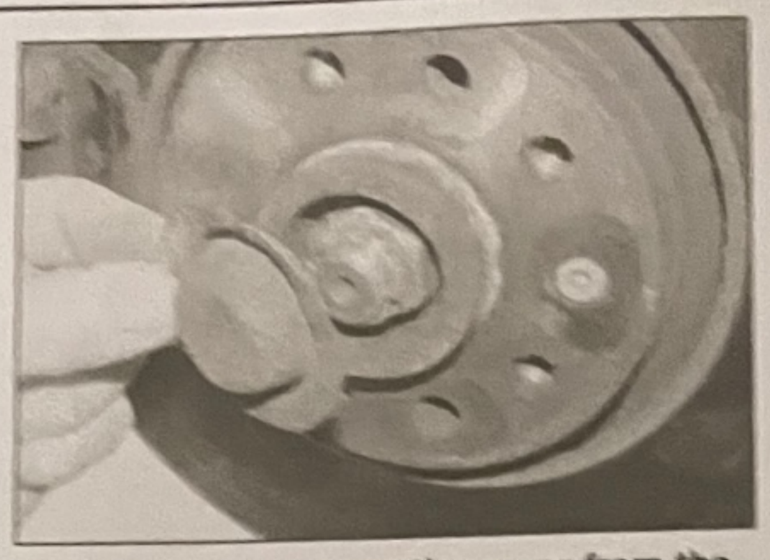
Outer joint	120 g
Inner joint:	200 g
Automatic transmission	185 g
Manual transmission	

Torque wrench settings

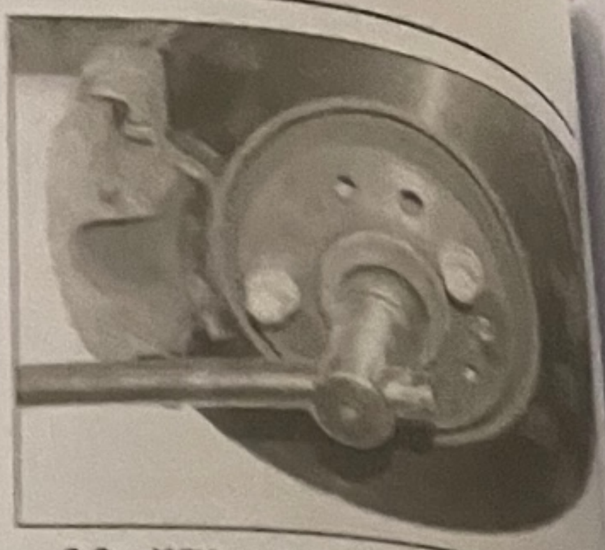
	Nm	lbf ft
Driveshaft/hub nut*	230	170
Front suspension lower balljoint clamp bolt	50	37
Intermediate driveshaft bracket-to-engine bolts	30	22
Intermediate driveshaft bracket-to-engine bolts:		
Petrol models	47	35
Diesel models	20	15
Wheel bolts	110	81

* Do not re-use

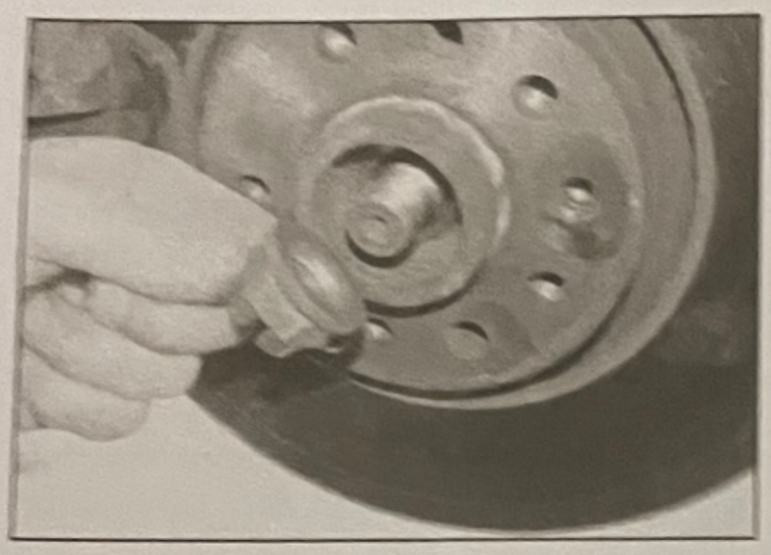
2.2a Use a small chisel to free the metal dust cover . . .



2.2b . . . then remove the cover from the hub flange



2.3a With an assistant depressing the footbrake pedal, loosen the hub nut



2.3b . . . then unscrew it completely

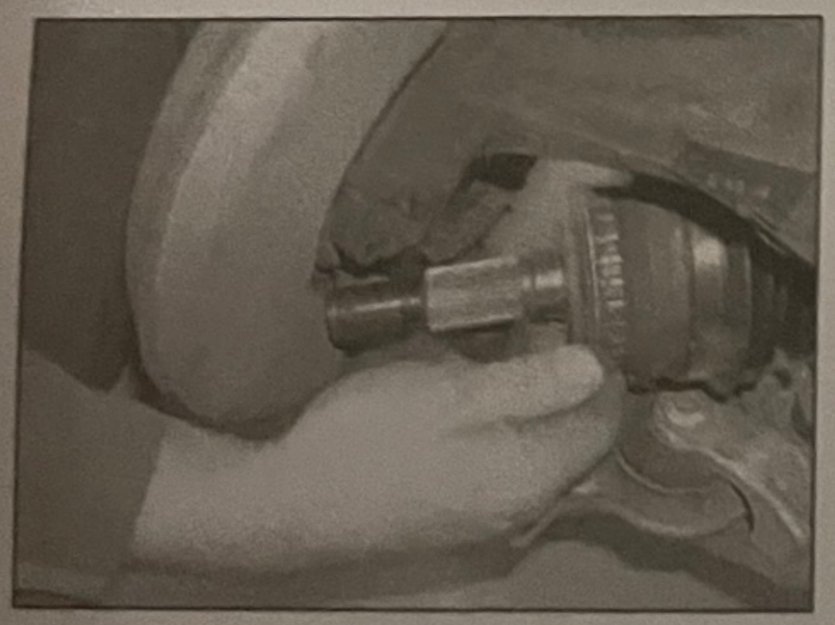
2.4 Disconnect the sensor arm (arrowed) from the lower arm

1 General information

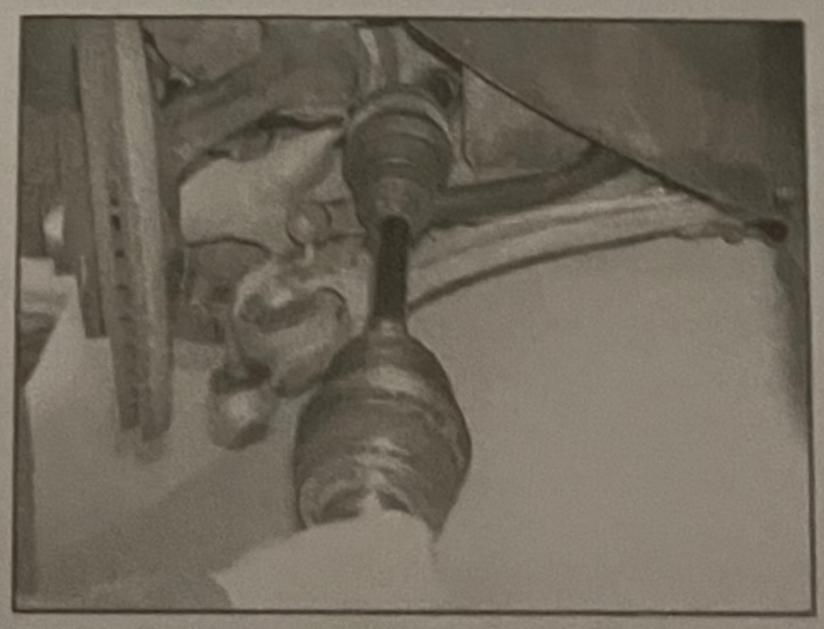
Power is transmitted from the transmission final drive to the roadwheels by the driveshafts. The outer joints on all models are of 'constant velocity' (CV) type, consisting of six balls running in axial grooves. The driveshaft outer joints incorporate stub axles, which are splined to the hubs located in the front suspension hub carriers. The inner 'universal' joints are designed to move in a smaller arc than the outer CV joints, and can also move axially to allow for movements of the front suspension. They are of tripod type consisting of a three-armed 'spider' with needle bearings and outer race splined to the driveshaft, and an outer housing with three corresponding cut-outs for the bearing races to slide in.

An intermediate shaft, with its own support bearing, is fitted between the transmission and right-hand driveshaft – a design which equalises driveshaft angles at all suspension positions, and reduces driveshaft flexing, improving directional stability under hard acceleration.

The universal and CV joints allow smooth transmission of drive to the wheels at all steering and suspension angles. The joints are protected by rubber gaiters that are packed with grease, to provide permanent lubrication. In the event of wear being detected, the joint can be renewed separately from the driveshaft. The joints do not require additional lubrication, unless they have been renovated or the rubber gaiters have been damaged, allowing the grease to become contaminated. Refer to Chapter 1A or 1B for guidance in checking the condition of the driveshaft gaiters.



2.9a Removing the driveshaft from the splines in the hub



2.9b Withdrawing the driveshaft from the transmission

2 Driveshafts – removal and refitting

Removal

1 Jack up the front of the vehicle and support it on axle stands (see Jacking and vehicle support). Remove the relevant roadwheel and, where applicable, the engine undershield.

2 Tap off the metal dust cover for access to the hub nut **(see illustrations)**. Note that the cover cannot be removed with the roadwheel in position, so it is not possible to loosen the hub nut before raising the front of the vehicle.

3 Temporarily refit two of the roadwheel bolts and tighten them to hold the brake disc onto the hub flange, then have an assistant depress the footbrake pedal, while the hub nut is being loosened. Unscrew and remove the hub nut **(see illustrations)**. Discard the nut, as a new one must be used on refitting.

4 Remove the inner splash cover from inside the wheel arch. If removing the right-hand driveshaft on models fitted with a headlamp position sensor, disconnect the sensor arm from the lower suspension arm **(see illustration)**, and if required, unbolt the sensor from its mounting bracket and position it to one side.

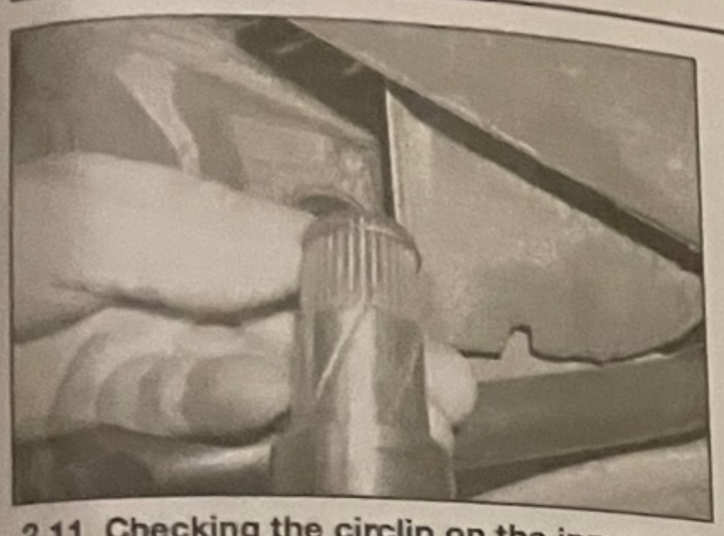
5 Unscrew the clamp bolt securing the front suspension lower balljoint to the hub carrier, then lever down the lower arm and disconnect the balljoint. Secure the lower arm in this position using a block of wood positioned between the arm and anti-roll bar.

6 If removing the left-hand driveshaft, carefully lever the inner joint from the transmission. Be prepared for some loss of oil, and take care not to force the inner joint apart.

7 If removing the right-hand driveshaft, use a soft-faced mallet to drive the driveshaft from the intermediate shaft. Note that the right-hand driveshaft inner joint splines incorporate a circlip, which engages a groove inside the splined end of the intermediate shaft.

8 Release the brake hydraulic hose and ABS cable from the front suspension strut.

9 Pull out the front suspension strut, then use the soft-faced mallet to drive the driveshaft out from the hub. Withdraw it from under the vehicle **(see illustrations)**. Take care not to



2.11 Checking the circlip on the inner end of the driveshaft

damage the hub nut threads on the driveshaft. If the driveshaft is tight, a suitable three-legged puller may be used to force it out of the hub.

Refitting

10 Before refitting the left-hand driveshaft, check the oil seal in the transmission and if necessary renew it with reference to Chapter 7A or 7B. Lightly smear the oil seal with fresh transmission oil.

11 On both left- and right-hand driveshafts, check that the inner retaining circlip is in good condition and correctly located in the driveshaft groove **(see illustration)**.

12 Ensure that the splines at the outboard end of the driveshaft are clean, then pull out the strut and insert the driveshaft through the hub into engagement with the hub splines. Refit the new hub nut and hand-tighten it at this stage.

13 Lubricate the splines at the inner end of the driveshaft with transmission oil, then locate the inner end in the transmission sun (left-hand side) or intermediate shaft hand side), pressing it fully in until the s heard to snap into the groove.

ttach the brake hydraulic hose and ABS ble to the front suspension strut.

Relocate the front suspension lower nt to the hub carrier, make sure it is fully d, then insert the clamp bolt and tighten e specified torque.

Caution: Make sure that the balljoint is fully entered in the hub carrier.

16 Refit the headlamp position sensor and inner splash cover as applicable.

17 With two of the roadwheel bolts holding the brake disc in position, have an assistant depress the footbrake pedal, and then tighten the hub nut to the specified torque.

18 Tap the metal dust cover onto the hub flange.

19 Check and if necessary top-up the transmission oil/fluid level with reference to Chapter 1A or 1B.

20 Refit the undershield where applicable, then refit the roadwheel and lower the vehicle to the ground. Tighten the wheel bolts to the specified torque.

3 Driveshafts – inspection, joint renewal and cleaning

Inspection

1 If any of the checks described in Chapter 1A or 1B reveal apparent excessive wear or play, first remove the wheel cover and check that the hub nut (driveshaft outer nut) is tightened to the specified torque. Repeat this check on the hub nut on the other side.

2 To check for driveshaft wear, road test the vehicle, driving it slowly in a circle on full steering lock (carry out the test on both left and right lock), while listening for a metallic clicking or knocking sound coming from the front wheels. An assistant in the passenger seat can listen for the sound from the nearside joint. If such a sound is heard, this indicates wear in the outer joint.

3 If vibration proportional to roadspeed is felt through the car when accelerating or on over-run, there is a possibility of wear in the inner joints. For a more thorough check, remove and dismantle the driveshafts where possible as described in the following Sections. Refer to a Saab dealer for information on the availability of driveshaft components.

4 Continual noise from the area of the right-hand driveshaft, increasing with roadspeed, may indicate wear in the support bearing.

Outer joint renewal

5 Remove the driveshaft as described in Section 2, then thoroughly clean it and mount it in a vice. It is important that foreign matter, such as dust and dirt, is prevented from entering the joint.

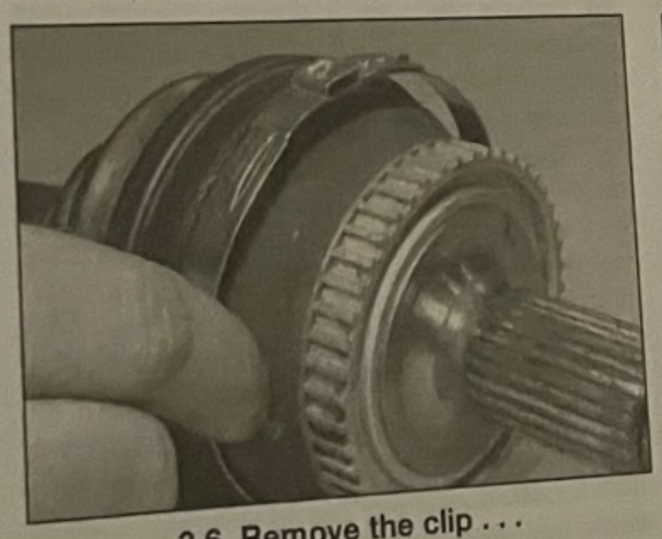
6 Release the large clip securing the rubber gaiter to the outer joint housing **(see illustration)**, then similarly release the small clip securing the rubber gaiter to the driveshaft. Note the fitted position of the gaiter.

7 Slide the rubber gaiter along the driveshaft, away from the joint **(see illustration)**. Scoop out as much of the grease as possible from the joint and gaiter.

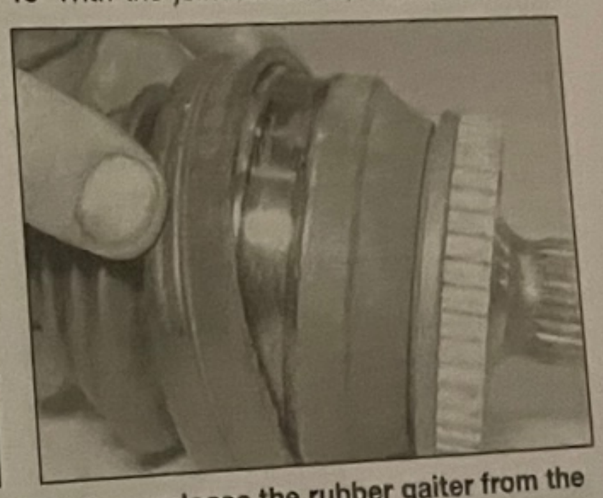
8 Using a dab of paint, mark the outer joint and driveshaft in relation to each other to ensure correct refitting.

9 Using circlip pliers at the inner end of the joint, open the circlip then slide the joint from the end of the driveshaft **(see illustrations)**. If it is tight, use a hammer and soft drift to tap the joint hub from the splines. Note that on later models, it may not be necessary to open the circlip, as it will release from the driveshaft as the joint is being tapped off.

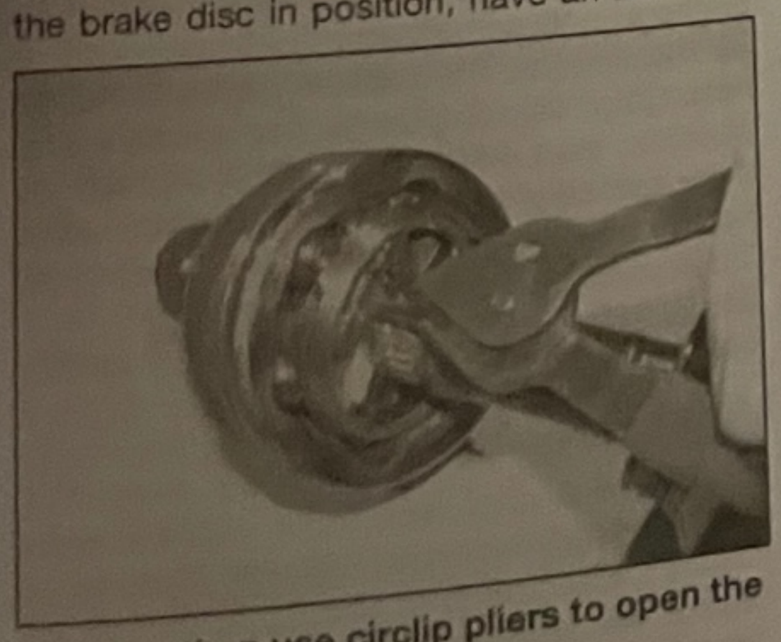
10 With the joint removed, slide the rubber



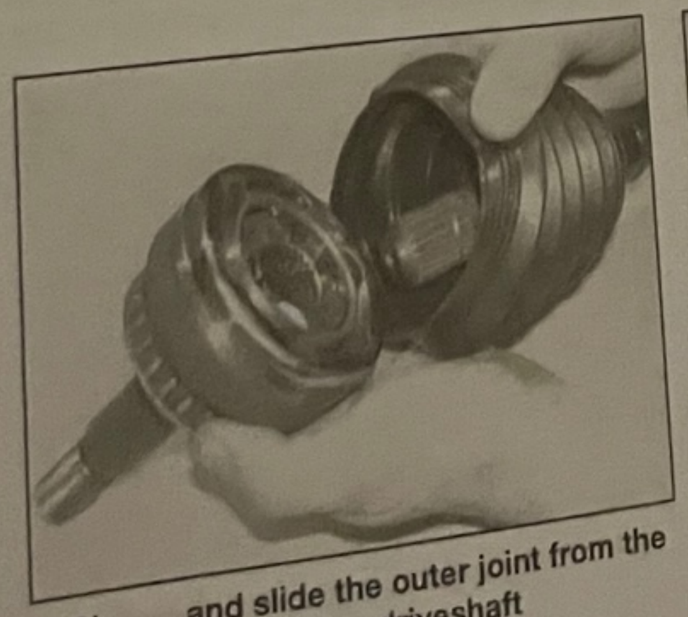
3.6 Remove the clip . . .



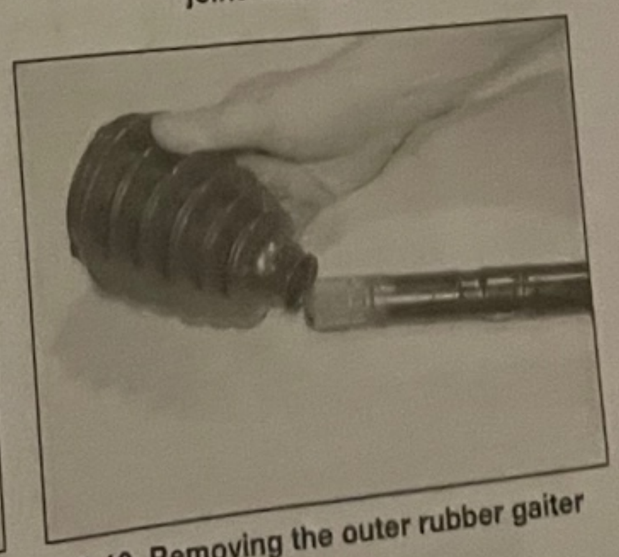
3.7 . . . release the rubber gaiter from the joint housing . . .



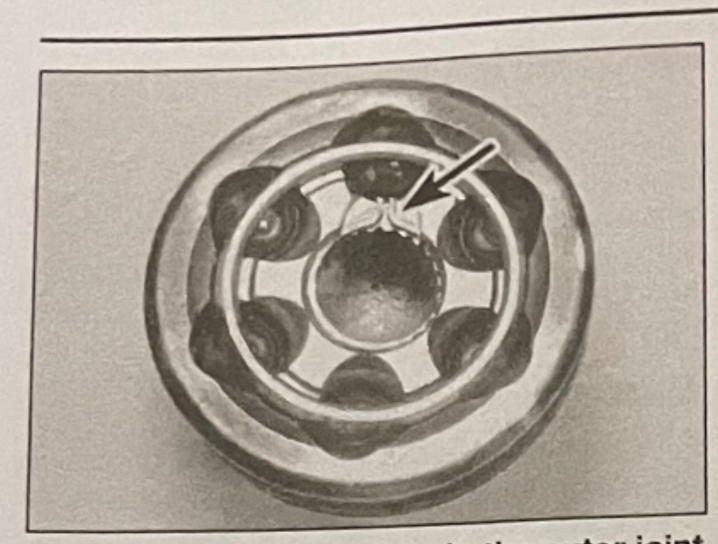
3.9a . . . then use circlip pliers to open the circlip . . .



3.9b . . . and slide the outer joint from the end of the driveshaft

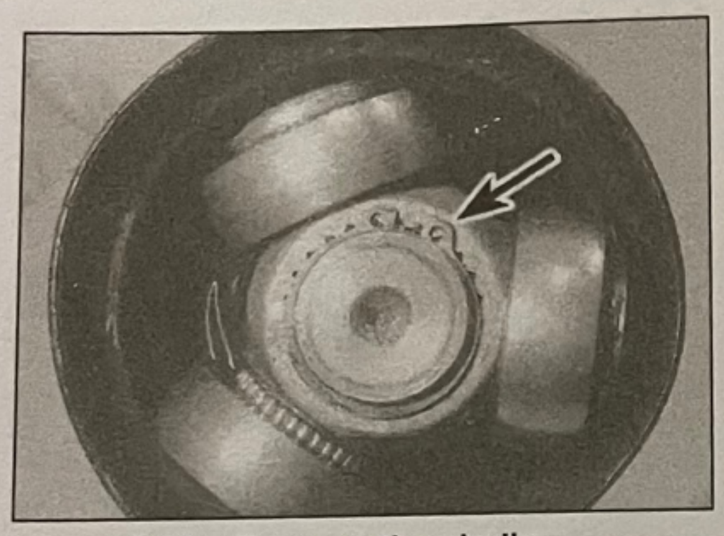


3.10 Removing the outer rubber gaiter

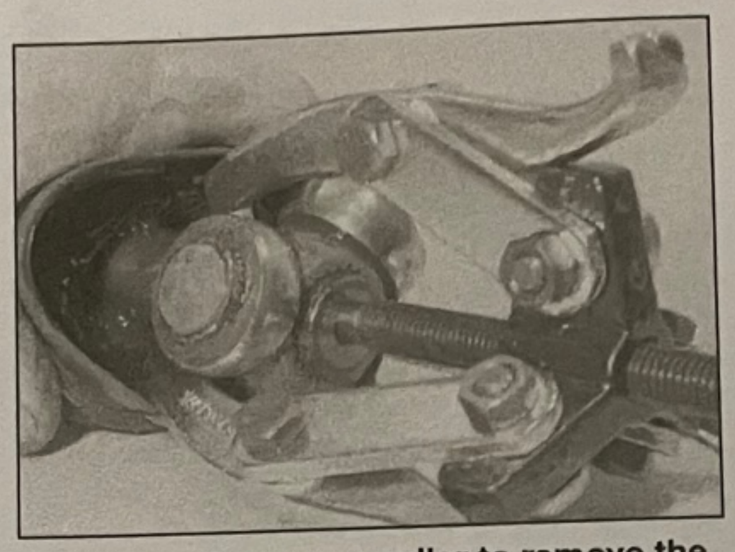


3.11 The circlip is captive in the outer joint

3.13 Pack the CV joint with grease from the service kit



3.22a Remove the circlip . . .



3.22b . . . then use a puller to remove the spider from the driveshaft splines

gaiter and small clip from the driveshaft **(see illustration)**. Check the rubber gaiter for cracks or slits, and renew it if necessary.

11 Thoroughly clean the splines of the driveshaft and outer joint, and also the rubber gaiter contact surfaces. If the joint has been contaminated with road grit or water, it must be dismantled and cleaned as described later in this Section. Check the condition of the circlip, which is captive in the outer joint, and renew it if necessary **(see illustration)**.

12 Locate the gaiter, together with small clip, on the outer end of the driveshaft. Smear a little grease onto the driveshaft to facilitate this.

13 Pack the joint with the specified quantity of grease, working it well into the cavities of the housing **(see illustration)**.

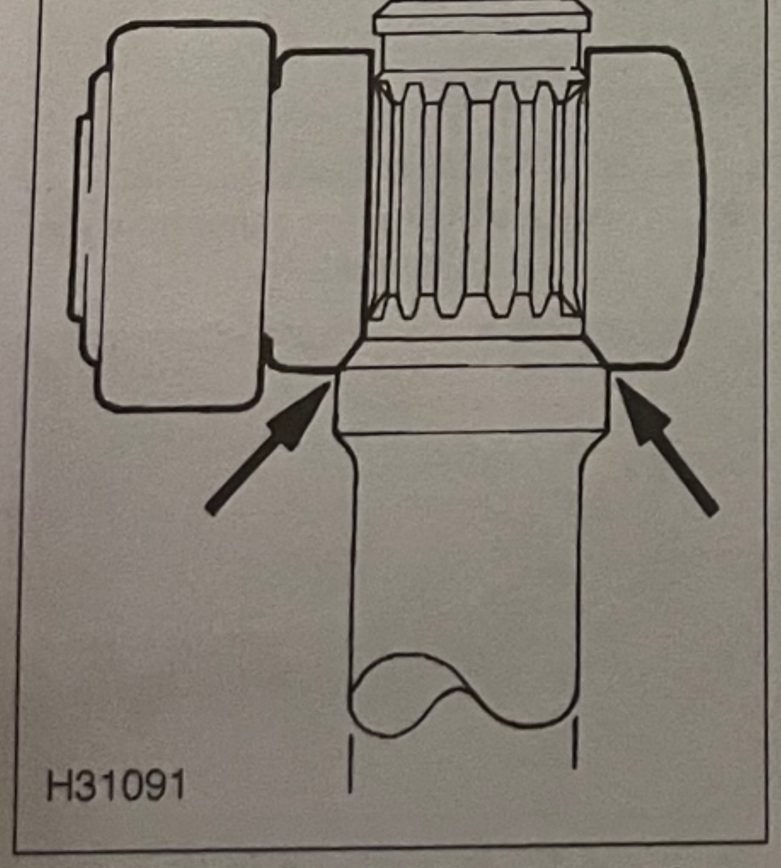
14 Locate the outer joint onto the driveshaft splines in its previously-noted position, and press it on until the internal circlip engages with the groove.

15 Reposition the rubber gaiter onto the joint outer housing in its previously-noted position, and then refit the two clips. Tighten the clips securely.

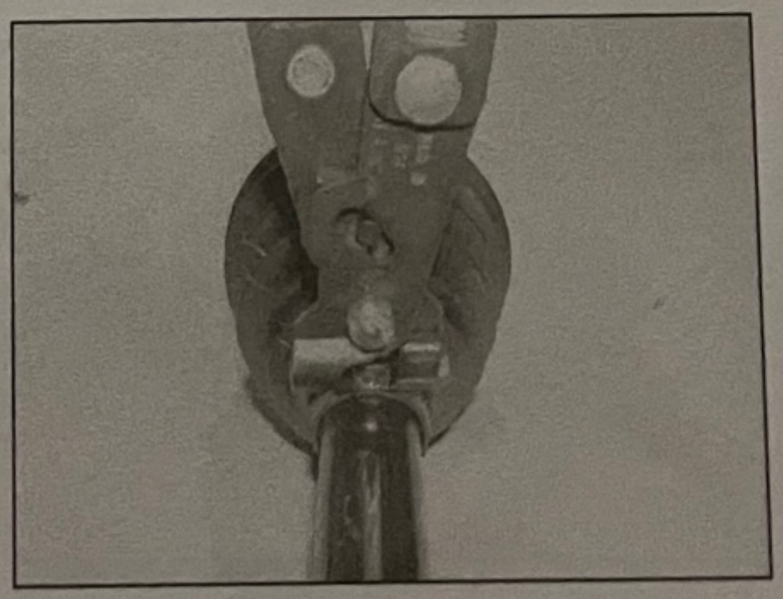
16 Refit the driveshaft with reference to Section 2.

Inner joint renewal

17 Remove the driveshaft as described in Section 2, then thoroughly clean it and mount it in a vice. It is important that foreign matter, such as dust and dirt, is prevented from entering the joint.



3.26 On the inner joint, make sure that the chamfer is located against the inner shoulder on the driveshaft



3.28 Using a crimping tool to tighten the gaiter clips

18 Release the large clip securing the [illegible] gaiter to the inner joint housing, then [illegible] release the small clip securing the [illegible] gaiter to the driveshaft. Note the fitted [illegible] of the gaiter. Where the original factory [illegible] is fitted, it will be necessary to bend up [illegible] metal plate to release it from the joint [illegible] however, it is not necessary to bend the [illegible] down for the refitting procedure.

19 Slide the rubber gaiter along the driveshaft away from the joint.

20 Scoop out as much of the grease as possible from the joint and gaiter.

21 Mark the driveshaft and inner joint housing in relation to each other using a centre-punch or dab of paint, then withdraw the housing from the tripod.

22 Mark the driveshaft and tripod in relation to each other using a centre-punch or dab of paint. Using circlip pliers, expand and remove the circlip from the end of the driveshaft, then use a puller to remove the tripod together with needle roller bearings **(see illustrations)**. Note that the chamfered edge of the tripod faces the centre of the driveshaft.

23 Slide the rubber gaiter and small clip from the driveshaft. Check the rubber gaiter for cracks or slits, and renew it if necessary.

24 Thoroughly clean the splines of the driveshaft and inner joint, and also the rubber gaiter contact surfaces. If the joint has been exposed to road grit or water, it should be thoroughly cleaned as described later in this Section. Check the condition of the circlip and renew it if necessary. Check that the three tripod bearings are free to rotate without resistance, and that they are not excessively worn.

25 Locate the gaiter, together with small clip, on the inner end of the driveshaft. Smear a little grease onto the driveshaft to facilitate this.

26 Locate the tripod on the driveshaft splines, chamfered edge first, making sure that the previously-made marks are aligned **(see illustration)**. Using a socket or metal tube, drive the tripod fully onto the driveshaft, then refit the circlip, making sure that it is correctly located in its groove.

27 Pack the tripod joint and inner joint housing with the specified quantity of grease, working it well into the bearings. Locate the inner joint housing onto the tripod in its previously-noted position.

28 Reposition the rubber gaiter onto the inner joint housing in its previously-noted position, then refit the two clips. Tighten the clips securely. If crimp-type clips are being fitted, use a crimping tool to tighten them **(see illustration)**.

29 Refit the driveshaft with reference to Section 2.

Joint cleaning

30 Where a joint has been contaminated with road grit or water through a damaged rubber gaiter, the joint should be completely dismantled and cleaned. Remove the joint as described previously in this Section.

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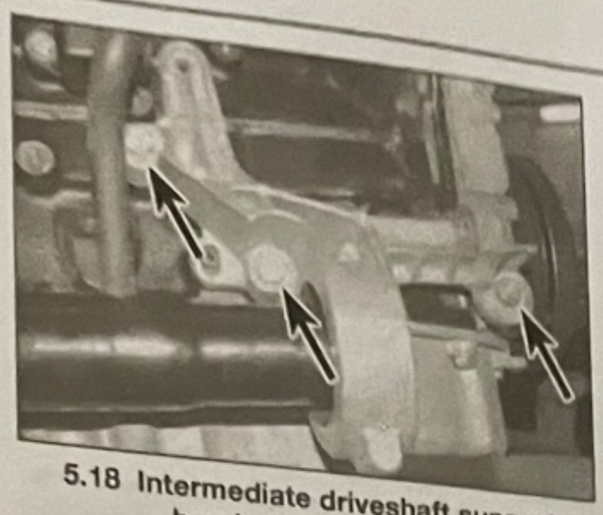
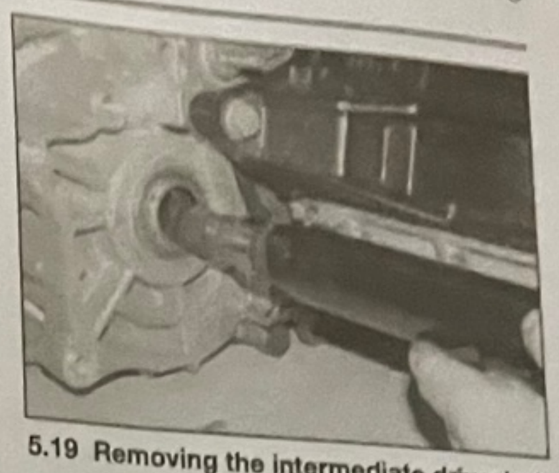
5.12 Disconnect the sensor arm from the lower arm



5.18 Intermediate driveshaft support bearing bracket bolts



5.19 Removing the intermediate driveshaft from the transmission

31 To dismantle the outer joint, mount it vertically in a soft-jawed vice, then turn the splined hub and ball cage so that the balls can be removed individually. Remove the hub followed by the ball cage.

32 The inner joint is dismantled during removal, however, the tripod joint bearings should be washed in suitable solvent to remove all traces of grease.

33 Thoroughly clean the inner and outer joint housings, together with the ball-bearings, cages and hubs, removing all traces of grease and foreign matter.

34 To reassemble the outer joint, first insert the cage, followed by the splined hub. Manoeuvre the hub and carrier so that the balls can be inserted one at a time.

ft gaiters –

1 Obtain a kit comprising new gaiters and retaining clips from a Saab dealer or motor factor.

2 Removal and refitting of the gaiters is described in Section 3.

5 Intermediate driveshaft and support bearing – removal, overhaul and refitting

Removal

1 Disconnect the battery negative lead.

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 right-hand front roadwheel.

3 Working under the right-hand wheel arch, undo the fasteners and remove the splash cover for access to the right-hand side of the engine.

4 In the engine compartment, remove the engine top cover.

5 Remove the clamp for the power steering servo pipe.

6 Support the right-hand side of the engine with a trolley jack and block of wood beneath the sump. Alternatively, wedge a block of wood between the subframe and engine sump.

7 Unbolt and remove the right-hand upper engine mounting bracket (refer to Chapter 2A or 2B if necessary).

8 Note the fitted routing of the auxiliary drivebelt, and mark it with an arrow to indicate its normal running direction.

9 Using a square-drive extension bar, turn the tensioner clockwise to release its tension, then slip the auxiliary drivebelt off of the crankshaft, alternator, air conditioning compressor and idler pulleys. Release the tensioner.

10 Using an 8.0 mm Allen key, unbolt the tensioner from the engine. Also, unscrew and remove the alternator upper mounting bolt.

11 Unclip the front brake hydraulic hose, and move the hose to one side. Also disconnect the ABS wiring.

12 On models fitted with a headlamp position sensor, disconnect the sensor arm to the lower suspension arm **(see illustration)**, then (if required) unbolt the sensor from its mounting bracket and position it to one side.

13 Unscrew and remove the clamp bolt securing the front suspension lower balljoint to the hub carrier, noting which way round the bolt is fitted. Lever the lower arm downwards and disconnect the balljoint from the hub carrier, then hold the arm in this position with a block of wood between the arm and anti-roll bar.

14 Using a soft-faced mallet, tap the driveshaft inner joint off of the intermediate shaft and lower the driveshaft onto the subframe and lower arm. If the retaining circlip is tight, hold the joint firmly against the circlip before tapping it with the mallet. If necessary, have an assistant pull out the strut while the driveshaft is being disconnected.

15 On the rear of the alternator, unscrew the nuts and disconnect the battery positive cable together with the warning light cable.

16 Unscrew the alternator lower mounting bolt and position the alternator to one side.

17 Position a container beneath the transmission to catch spilled oil/fluid when the intermediate shaft is removed.

18 Unscrew the bolts securing the support-bearing bracket to the rear of the cylinder block **(see illustration)**.

19 Using a screwdriver, lever the bracket away from the dowels on the cylinder block, then withdraw the intermediate driveshaft from the splined sun gear in the transmission **(see illustration)**.

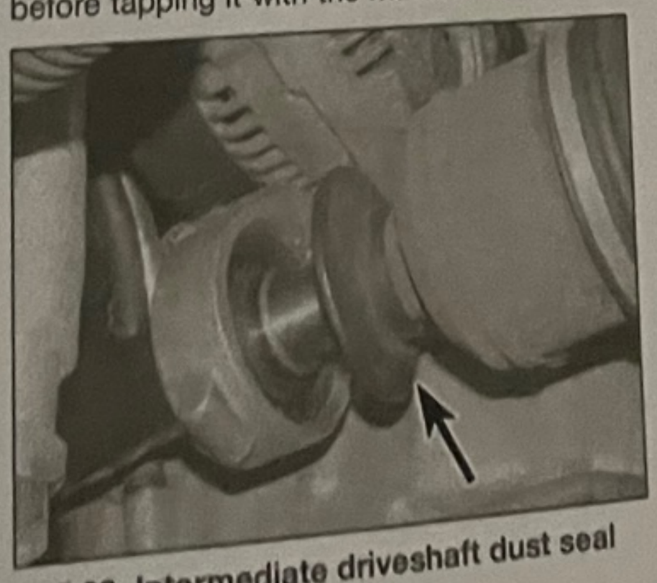
Overhaul

20 With the intermediate shaft and bracket on the bench, remove the dust seal from the end of the shaft. The seal may have come away with the right-hand driveshaft **(see illustration)**.

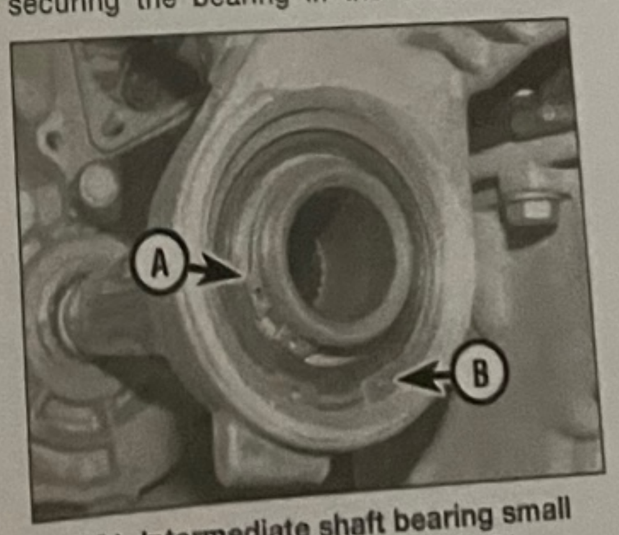
21 Using circlip pliers, extract the outer small circlip from the end of the intermediate shaft **(see illustration)**.

22 The intermediate shaft must now be pressed out of the bearing. To do this, support the bracket in a vice, then press or drive out the shaft. If the shaft is being renewed, extract the inner small circlip from the shaft **(see illustration)**.

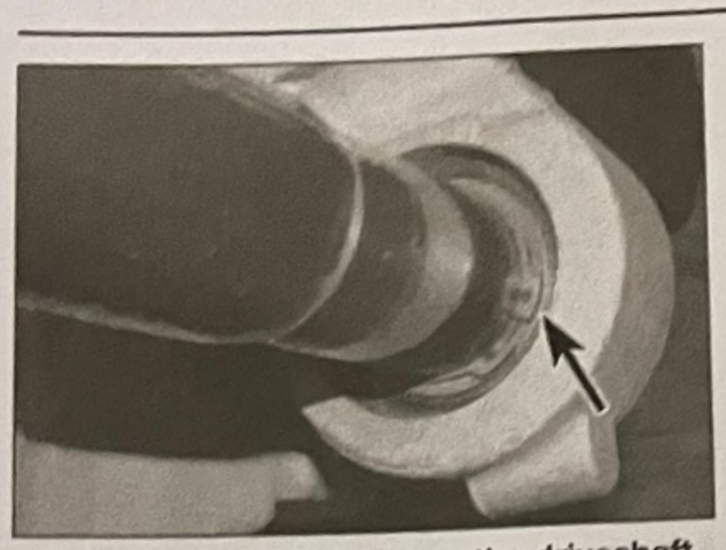
23 Using circlip pliers, extract the large circlip securing the bearing in the bracket. The



5.20 Intermediate driveshaft dust seal



5.21 Intermediate shaft bearing small circlip (A) and large circlip (B)



5.22 Inner small circlip on the driveshaft

bearing must now be pressed or driven out of the bracket. Support the bracket in a vice to do this.

24 Support the bracket with its open end upwards, then locate the new bearing and press or drive it fully in using a metal tube on the outer race. Fit the large circlip to secure the bearing in the bracket.

25 With the intermediate driveshaft mounted in the vice, refit the small circlip to the driveshaft, then refit the bearing with bracket onto the driveshaft and press or drive on the bearing inner race until it contacts the circlip. Make sure that the bracket is fitted the correct way round, and press only on the inner race.

26 Fit the small circlip in the groove, making sure that the concave side faces the bearing.

27 Fit a new dust seal over the outer end of the intermediate shaft.

Refitting

28 Wipe clean the transmission oil seal then smear a little oil on the seal lips. It is recommended that the oil seal is always renewed, with reference to Chapter 7A or 7B, considering the amount of work necessary to renew it separately.

29 Insert the intermediate driveshaft into the transmission side gear, and engage the splines with each other.

30 Locate the bracket on the dowels, then refit the bolts and tighten to the specified torque.

31 Refer to Chapter 5A and check that the alternator adjuster sleeves in the mounting bracket are tapped out approximately 1.0 mm, then refit the alternator mounting bolts and tighten securely.

32 Reconnect the battery positive and warning light cables to the rear of the alternator and tighten securely.

33 Pull out the strut, then locate the driveshaft inner joint splines in the splined intermediate shaft. Press on the joint until the internal circlip engages with its groove at the end of the splines.

34 Remove the block of wood, and hold the suspension lower arm down while the balljoint is located in the hub carrier. Make sure the balljoint is fully entered in the hub carrier, then refit the clamp bolt with its head in the previously-noted position and tighten to the specified torque.

35 Refit the headlamp position sensor (where fitted) and tighten the mounting bolts.

36 Refit the brake hydraulic hose to the strut clips, and reconnect the ABS wiring.

37 Refit the alternator upper mounting bolt and tighten securely.

38 Refit the auxiliary drivebelt tensioner and tighten the bolts with the 8.0 mm Allen key.

39 Using the square drive, turn the tensioner clockwise then refit the auxiliary drivebelt on the pulleys. Make sure that it is routed correctly, and engaged with all of the pulley grooves, then release the tensioner.

40 Refit the right-hand upper engine mounting bracket and tighten the bolts to the specified torque (see Chapter 2A or 2B). Remove the support from the right-hand side of the engine.

41 Refit the clamp for the power steering servo pipe.

42 Top-up the transmission oil/fluid with reference to Chapter 1A or 1B.

43 Refit the engine top cover.

44 Refit the splash cover under the right-hand wheel arch.

45 Refit the roadwheel, then lower the vehicle to the ground.

46 Reconnect the battery negative lead.

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