

# Chapter 10

## Braking system

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### Degrees of difficulty

<b>Easy</b> , suitable for novice with little experience 	<b>Fairly easy</b> , suitable for beginner with some experience 	<b>Fairly difficult</b> , suitable for competent DIY mechanic 	<b>Difficult</b> , suitable for experienced DIY mechanic 	<b>Very difficult</b> , suitable for expert DIY or professional 
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### Specifications

#### System type

Conventional braking system (except P100 models)	Front discs and rear drums with vacuum servo assistance, dual hydraulic circuit split front/rear, deceleration sensitive pressure relief valve in rear hydraulic circuit. Cable-operated handbrake on rear wheels.
ABS	Front and rear discs operated via electrically-driven hydraulic pump, dual hydraulic circuit split front/rear, pressure regulating valve in rear hydraulic circuit. Cable-operated handbrake on rear wheels
P100 models	Front discs and rear drums with vacuum servo assistance, dual hydraulic circuit split front/rear, load apportioning valve in rear hydraulic circuit. Cable-operated handbrake on rear wheels

#### Front discs

Type:	Solid
1.3 and 1.6 litre models	Ventilated
1.8 and 2.0 litre models	240.0 mm (9.46 in)
Diameter	0.15 mm (0.006 in)
Maximum disc run-out	1.5 mm (0.06 in)
Minimum pad friction material thickness	

#### Rear discs

Type	Solid
Diameter	252.7 mm (9.96 in)
Maximum disc run-out	0.15 mm (0.006 in)
Minimum pad friction material thickness	1.5 mm (0.06 in)

#### Rear drums

Internal diameter:	
1.3 and 1.6 litre Saloon and Hatchback models	203.2 mm (8.0 in)
1.8 and 2.0 litre Saloon and Hatchback models and all Estate models	228.6 mm (9.0 in)
P100 models	256.0 mm (10.1 in)
Minimum shoe friction material thickness	1.0 mm (0.04 in)

**Torque wrench settings**

	Nm	lbf ft
Caliper carrier bracket-to-hub carrier bolts	51 to 61	38 to 45
Front caliper guide bolts	20 to 25	15 to 18
Rear caliper guide bolts	31 to 35	23 to 26
Rear brake backplate nuts - P100 models	45 to 54	33 to 40
Servo-to-bulkhead nuts (conventional braking system)	35 to 45	26 to 33
Master cylinder-to-servo nuts	20 to 25	15 to 18
Hydraulic unit-to-bulkhead nuts (ABS)	41 to 51	30 to 38
Hydraulic unit accumulator (ABS)	34 to 46	25 to 34
Pump mounting bolt (ABS)	7 to 9	5 to 7
High pressure hose-to-pump union (ABS)	7 to 12	5 to 9
Wheel sensor mounting bolts (ABS)	8 to 11	6 to 8

**1 General information and precautions****General information**

The braking system is of the dual circuit hydraulic type. The front and rear circuits are operated independently from a tandem master cylinder, so that in the event of a hydraulic failure in one circuit, full braking force will still be available to two wheels through the remaining circuit.

A deceleration sensitive valve on Saloon, Hatchback and Estate models not fitted with an Anti-lock Braking System (ABS), and a load apportioning valve on P100 models, is incorporated in the rear brake hydraulic circuit. The valve regulates the pressure applied to the rear brakes and reduces the possibility of the rear wheels locking under heavy braking.

All models are fitted with front disc brakes, with solid or ventilated discs depending on model. The calipers are of single piston sliding type, which ensures that equal pressure is applied to each disc pad.

Non-ABS models are fitted with rear disc brakes or rear drum brakes, incorporating leading and trailing shoes operated by double-acting wheel cylinders. A self-adjuster mechanism is fitted which consists of a toothed quadrant which is kept in contact with a toothed pin attached to the shoe strut by means of a spring. The quadrant incorporates an arm which locates in a slot in the leading shoe. As the shoe linings wear the quadrant is pulled from the pin when the footbrake is operated, and automatically repositioned to effectively lengthen the shoe strut.

ABS is available as an option for all models except the P100. The system comprises an electronic control unit, roadwheel sensors, hydraulic actuator with electrically-driven hydraulic pump, and the necessary valves and switches. Disc brakes are fitted to all four wheels. The front disc brakes are similar to those fitted to non-ABS models, but the rear brakes incorporate a self-adjusting mechanism, and a mechanical handbrake mechanism. The purpose of the system is to prevent wheel(s) locking during heavy brake applications. This is achieved by automatic release of the brake on the locked wheel,

followed by reapplication of the brake. This procedure is carried out four times per second by the control valves in the valve block. The valves are controlled by the electronic control unit which itself receives signals from the wheel sensors, which monitor the locked or unlocked state of the wheels. A pressure regulating valve is incorporated in the rear hydraulic circuit to maintain the desired pressure ratio between the front and rear circuits.

**Precautions**

**Note:** *Hydraulic fluid is poisonous; wash off immediately and thoroughly in the case of skin contact and seek immediate medical advice if any fluid is swallowed or gets into the eyes. Certain types of hydraulic fluid are inflammable and may ignite when allowed into contact with hot components; when servicing any hydraulic system it is safest to assume that the fluid is inflammable and to take precautions against the risk of fire as though it is petrol that is being handled. Hydraulic fluid is also an effective paint stripper and will attack plastics; if any is spilt, it should be washed off immediately using copious quantities of fresh water. Finally, it is hygroscopic (it absorbs moisture from the air) old fluid may be contaminated and unfit for further use. When topping-up or renewing the fluid, always use the recommended type and ensure that it comes from a freshly-opened sealed container*

**Note:** *When working on the brake components, take care not to disperse brake dust into the air, or to inhale it, since it may contain asbestos which is injurious to health.*



**2.5 Removing the dust cap from a wheel cylinder bleed screw**

**2 Brake hydraulic system (conventional braking system) - bleeding**

**Caution:** Refer to the precautions in Section 1.

**General**

**1** If any of the hydraulic components in the braking system have been removed or disconnected, or if the fluid level in the reservoir has been allowed to fall appreciably, it is inevitable that air will have been introduced into the system. The removal of all this air from the hydraulic system is essential if the brakes are to function correctly, and the process of removing it is known as bleeding.

**2** Where an operation has only affected one circuit (front or rear) of the hydraulic system, then it will only be necessary to bleed the relevant circuit. If the master cylinder has been disconnected and reconnected, or the fluid level has been allowed to fall appreciably, then the complete system must be bled.

**3** One of three methods can be used to bleed the system.

**Bleeding****Two-man method**

**4** Gather together a clean jar and a length of rubber or plastic bleed tubing which will fit the bleed screws tightly. The help of an assistant will be required.

**5** Remove the dust cap where fitted, and clean around the bleed screw on the relevant caliper or wheel cylinder, then attach the bleed tube to the screw (**see illustration**). If the complete system is being bled, start at the front left-hand caliper.

**6** Check that the fluid reservoir is topped up and then destroy the vacuum in the brake servo by giving several applications of the brake pedal.

**7** Immerse the open end of the bleed tube in the jar which should contain two or three inches of hydraulic fluid. The jar should be positioned about 300 mm (12.0 in) above the bleedscrew to prevent any possibility of air entering the system down the threads of the bleed screw when it is slackened.

8 Open the bleed screw half a turn and have your assistant depress the brake pedal slowly to the floor and then, after the bleed screw is retightened, quickly remove his foot to allow the pedal to return unimpeded. Repeat the procedure.

9 Observe the submerged end of the tube in the jar. When air bubbles cease to appear, tighten the bleed screw when the pedal is being held fully down by your assistant.

10 Top-up the fluid reservoir. It must be kept topped up throughout the bleeding operations. If the connecting hoses to the master cylinder are exposed at any time due to low fluid level, then air will be drawn into the system and work will have to start all over again.

11 Assuming that the complete system is being bled, the procedure described in the preceding paragraphs should be repeated on the front right-hand caliper followed by the rear right-hand and left-hand wheel cylinders.

12 On completion, remove the bleed tube, and discard the fluid which has been bled from the system unless it is required for bleed jar purposes. Never re-use old fluid.

13 On completion of bleeding, top-up the fluid level in the reservoir. Check the action of the brake pedal, which should be firm and free from any "sponginess" which would indicate that air is still present in the system.

#### With one-way valve

14 There are a number of one-man brake bleeding kits currently available from motor accessory shops. It is recommended that one of these kits should be used whenever possible, as they greatly simplify the bleeding operation and also reduce the risk of expelled air or fluid being drawn back into the system.

15 Proceed as described in paragraphs 5 and 6.

16 Open the bleed screw half a turn then depress the brake pedal to the floor and slowly release it. The one-way valve in the bleeder device will prevent expelled air from returning to the system at the completion of each stroke. Repeat this operation until clear hydraulic fluid, free from air bubbles, can be seen coming through the tube. Tighten the bleed screw.

17 Proceed as shown in paragraphs 11 to 13.

#### With pressure bleeding kit

18 These too are available from motor accessory shops and are usually operated by air pressure from the spare tyre.

19 By connecting a pressurised container to the master cylinder fluid reservoir, bleeding is then carried out by simply opening each bleed screw in turn and allowing the fluid to run out, rather like turning on a tap, until no air bubbles are visible in the fluid being expelled.

20 Using this system, the large reserve of fluid provides a safeguard against air being drawn into the master cylinder during the bleeding operations.

21 This method is particularly effective when bleeding "difficult" systems or when bleeding the entire system at time of routine fluid renewal.

22 Begin bleeding with reference to paragraphs 5 and 6 and proceed as described in paragraphs 11 to 13.

### 3 Brake hydraulic system (ABS) - bleeding



**Caution: The rear brake hydraulic circuit may be under considerable pressure, take care not to allow hydraulic fluid**

**to spray into the face or eyes. Refer to the precautions in Section 1.**

1 Keep the fluid reservoir replenished throughout the bleeding operations.

2 Remove the dust cap where fitted, and clean around the bleed screw on the left-hand front caliper. Fit a bleed tube to the screw and immerse the open end in a jar containing clean hydraulic fluid.

3 Open the bleed valve one full turn and have an assistant depress the brake pedal fully and hold it down.

4 Close the bleed valve and release the brake pedal. Repeat the procedure until fluid ejected from the end of the tube is free from air bubbles.

5 Repeat the operations on the right-hand front caliper.

6 Fit the bleed tube to the left-hand rear caliper and open the bleed valve one full turn.

7 Have an assistant depress the brake pedal fully and hold it down.

8 Switch on the ignition to position II.

9 Allow the fluid to bleed from the tube for at least 15 seconds, when the fluid should be free from air bubbles.

10 Close the bleed valve.

11 Release the brake pedal and wait for the hydraulic pump to stop.

12 Fit the bleed tube to the right-hand rear caliper and open the bleed valve one full turn.

13 Have your assistant depress the brake pedal through half its travel and hold it there. Allow the fluid to bleed from the tube for at least 15 seconds, when the fluid should be free from air bubbles.

14 Close the bleed valve.

15 Release the brake pedal and wait for the hydraulic pump to stop then switch off the ignition.

16 Top-up the reservoir with clean fluid.

17 When the hydraulic system is being bled for the purpose of renewing the fluid at the specified interval, as each caliper is bled, operate the brake pedal continuously until clean fluid is seen to enter the jar.

18 When the hydraulic pump is running its note will be heard to change once fluid has purged through it. Do not allow the pump to

run continuously for more than two minutes. If it does run for a longer period, switch off the ignition and allow the motor to cool for ten minutes.

19 On completion, discard the fluid which has been bled from the system unless it is required for bleed jar purposes. Never re-use old fluid.

20 Check the action of the brake pedal, which should be firm and free from any "sponginess", which would indicate that air is still present in the system.

### 4 Disc pads - inspection and renewal



**Caution: Refer to the precautions in Section 1.**

#### Front disc pads

1 The disc pad friction material can be inspected for wear without removing the roadwheels. Working beneath the vehicle, insert a mirror between the caliper and the roadwheel and check that the friction material thickness is not less than the minimum given in the Specifications.

2 If any one of the pads has worn below the specified limit, the front pads must be renewed as an axle set (4 pads).

3 To renew the pads, slacken the front roadwheel nuts, apply the handbrake, then jack up the front of the vehicle and support on axle stands (see "Jacking and Vehicle Support"). Remove the roadwheels. On P100 models, mark the position of the roadwheels in relation to the wheel studs before removal.

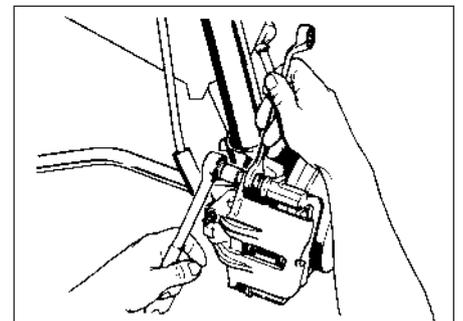
4 Proceed as follows according to model:

#### Girling caliper (1.3 and early 1.6 litre models)

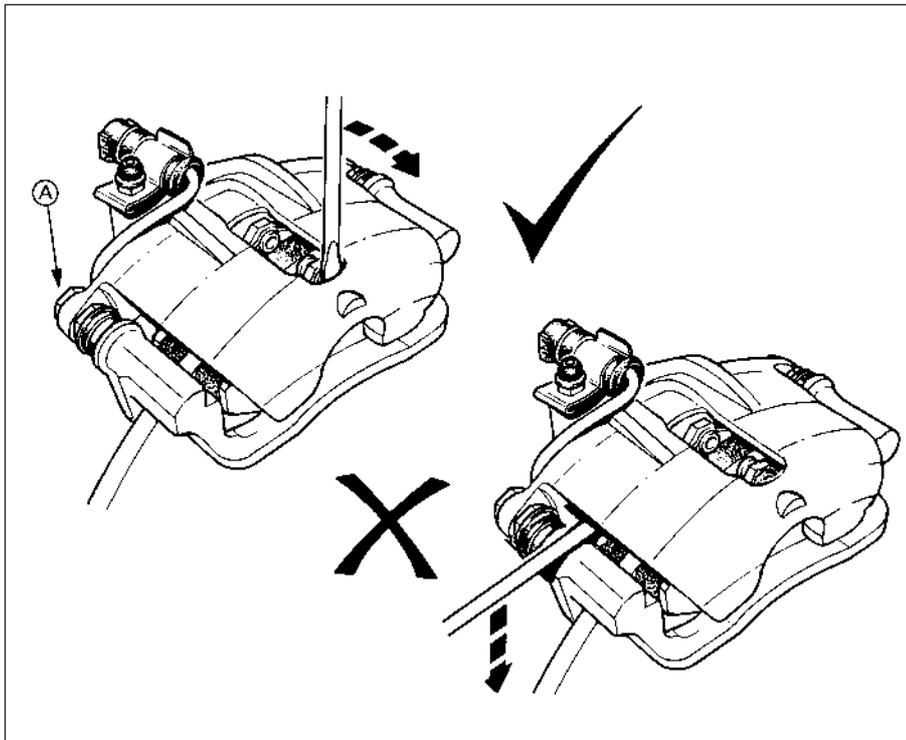
5 Where applicable, disconnect the wiring to the disc pad wear sensor.

6 Unscrew and remove the bolt from the upper caliper guide pin while holding the pin stationary with a spanner (see illustration).

7 Swing the caliper downwards and lift out the disc pads. If the outboard pad is stuck to



4.6 Unscrewing the bolt from the upper caliper guide pin - Girling caliper



4.7 Correct and incorrect methods of freeing stuck outboard disc pad. Guide pin bolt (A) must be in position - Girling caliper

the caliper, free it using a screwdriver with the guide pin bolt fitted, as shown (see illustration). Do not use a screwdriver to free the inboard pad, as this may damage the piston dust seal. The inboard pad can be freed by hand after lowering the caliper.

8 Brush all dust and dirt from the caliper, pads and disc, but do not inhale it as it may be injurious to health. Scrape any corrosion from the disc.

9 As the new pads will be thicker than the old ones, the piston must be pushed squarely into its bore to accommodate the new thicker pads. Depressing the piston will cause the fluid level in the reservoir to rise so to avoid spillage, syphon out some fluid using an old hydrometer or a teat pipette. Do not lever between the piston and disc to depress the piston ideally a spreader tool, applying equal force to both sides of the caliper, should be used (see illustration).

10 Further refitting is a reversal of removal bearing in mind the following points.

11 If disc pads with wear sensors are fitted, the pad with the sensor wire should be fitted inboard.

12 Ensure that the anti-rattle clips are correctly located on the caliper.

13 Repeat the procedure on the opposite front brake.

14 On completion, apply the footbrake hard several times to settle the pads, then check and if necessary top-up the fluid level in the reservoir.

15 Avoid heavy braking, if possible, for the first hundred miles or so after fitting new pads. This will allow the pads to bed in and reach full efficiency.

#### Teves caliper (Later 1.6, 1.8 and 2.0 litre models)

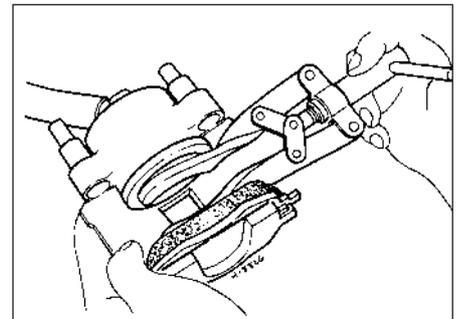
16 Prise the retaining clip from the caliper. Hold it with a pair of pliers to avoid it causing personal injury.

17 Unclip the pad wear sensor from the caliper, and disconnect the wiring plug (see illustration).

18 Using a 7 mm Allen key, unscrew and remove the two guide bolts securing the caliper to the carrier bracket, and withdraw the caliper (see illustration). Support the caliper on an axle stand to avoid straining the hydraulic hose.



4.18 Withdrawing a caliper from its carrier bracket - Teves caliper



4.9 Using a spreader tool to depress the caliper piston into its bore



4.17 Disconnect the pad wear sensor wiring plug - Teves caliper

19 Withdraw the disc pads from the caliper (see illustration). It may be necessary to prise the outboard pad with a screwdriver to release it from the caliper. Do not use a screwdriver to free the inboard pad, as this may damage the piston dust seal.

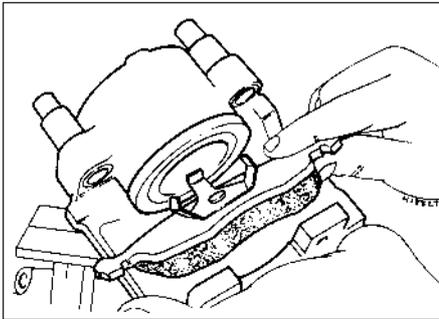
20 Proceed as described in paragraphs 8 to 15 inclusive, but in addition ensure that the clip on the back of the inboard pad fits into the piston recess (see illustration), refit the caliper retaining clip, and ignore the reference to the anti-rattle clips (see illustration). On P100 models align the previously made marks on the roadwheels and wheel studs.

#### Late model modification

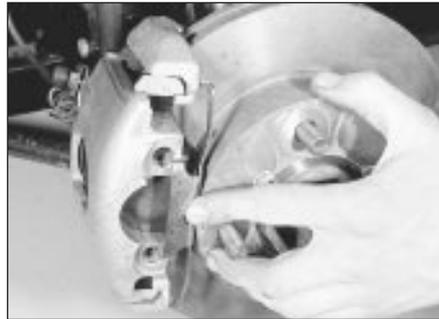
21 On some later models, slightly revised front brake components are used. A new type of retaining clip is used to secure the pads in



4.19 Withdraw the disc pads from the caliper - Teves caliper



4.20a The clip on the back of the inboard disc pad fits into the piston recess - Teves caliper



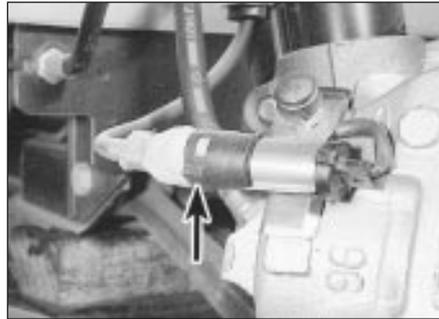
4.20b Refitting the caliper retaining clip - Teves caliper



4.21a Later type front disc pad retaining clip



4.21b Removing a caliper guide bolt cover - later type



4.28 Rear disc pad wear sensor wiring clip (arrowed)

the caliper, and the caliper body is modified accordingly. Also, plastic covers are fitted to the caliper guide bolts (see illustrations).

22 Procedures are unchanged from those given above.

### Rear disc pads

23 Slacken the rear roadwheel nuts, chock the front wheels, then jack up the rear of the vehicle and support on axle stands. (see "Jacking and Vehicle Support"). Remove the roadwheel.

24 The disc pads can be inspected through the top of the caliper after removal of the blanking spring clip. Check that the friction material thickness is not less than the minimum given in the Specifications.

25 If any one of the pads has worn below the specified limit, the rear pads must be renewed

as an axle set (4 pads).

26 To renew the pads, proceed as follows.

27 Release the handbrake, and free the handbrake cable from the suspension lower arm by bending back the tangs.

28 Where applicable, disconnect the wiring to the disc pad wear sensor (see illustration).

29 Unscrew and remove the bolt from the forward caliper guide pin, while holding the pin stationary with a spanner (see illustration).

30 Swing the caliper rearwards and lift out the disc pads (see illustration). Do not depress the brake pedal with the caliper removed.

31 Brush all dirt and dust from the caliper, pads and disc, but do not inhale it as it may be injurious to health. Scrape any corrosion from the disc.

32 As the new pads will be thicker than the old ones, the piston must be retracted into its bore to accommodate the new thicker pads. Retracting the piston will cause the fluid level in the reservoir to rise, so to avoid spillage, syphon out some fluid using an old hydrometer or a teat pipette. Retract the caliper piston by turning it clockwise. Ford tool No 12-006 is designed for this purpose, but a pair of circlip pliers or any similar tool can be used instead (see illustration).

33 Remove the backing paper from the new pads, and fit them to the caliper.

34 Further refitting is a reversal of removal, bearing in mind the following points.

35 If disc pads with wear sensors are fitted, the pad with the sensor wire should be fitted inboard.

36 Repeat the procedure on the opposite rear brake.

37 On completion, switch on the ignition and apply the footbrake hard several times to settle the pads. Switch off the ignition, then check and if necessary top-up the fluid level in the reservoir. Check the operation of the handbrake.

38 Avoid heavy braking, if possible, for the first hundred miles or so after fitting new pads. This will allow the pads to bed in and reach full efficiency.



4.29 Unscrewing the forward caliper guide pin bolt



4.30 Lift out the disc pads



4.32 Retracting the piston using circlip pliers



5.5a Brake drum retaining spire washer (arrowed)



5.5b Releasing the automatic adjuster using a screwdriver



5.5c Drum removed showing screwdriver pressing on adjuster ratchet

**5 Rear drum brake shoes**  
- inspection and renewal



**Caution:** Refer to the precautions in Section 1

1 The shoe friction material can be inspected for wear without removing the roadwheels. Working beneath the vehicle, prise the plug from the brake backplate, and using an inspection lamp or torch, check that the friction material thickness is not less than the minimum given in the Specifications.

2 If any one of the shoes has worn below the specified limit, the shoes must be renewed as an axle set (4 shoes).

3 To renew the shoes, slacken the rear roadwheel nuts, chock the front wheels, then

jack up the rear of the vehicle and support on axle stands (see "Jacking and Vehicle Support"). Remove the rear roadwheels, and release the handbrake. On P100 models, mark the position of the roadwheels in relation to the brake drums before removal.

4 Proceed as follows according to model:

**1.3 and 1.6 litre models**

5 Remove the brake drum retaining spire washer(s) from the wheel stud(s) and remove the brake drum. If the drum will not pass over the shoes, it is possible to release the automatic adjuster mechanism by inserting a screwdriver through the small hole in the drum and pressing down on the ratchet (see illustrations).

6 Using a wire hook or a pair of long-nosed pliers, remove the top and bottom shoe return springs. Note the fitted positions of the

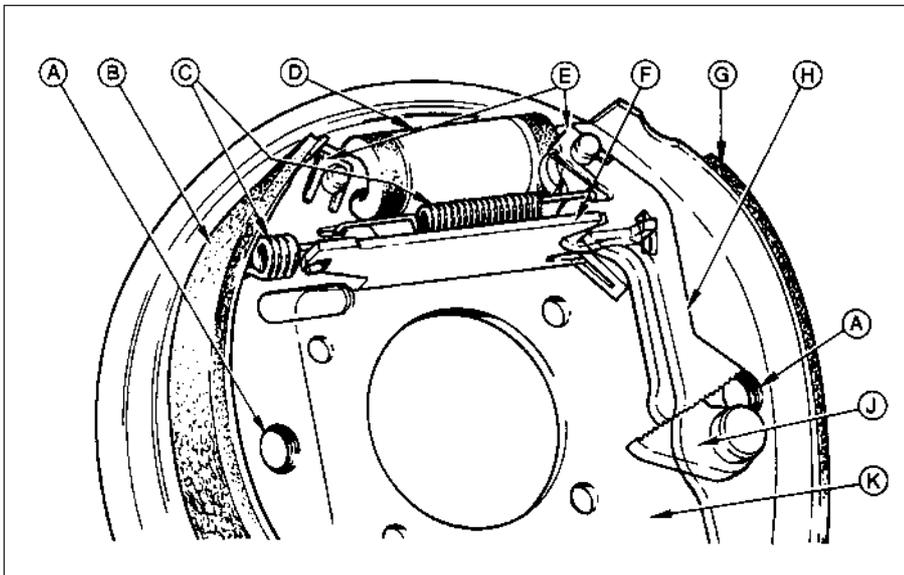
springs for reference when refitting (see illustrations).

7 Remove the hold-down cup, spring and pin from each shoe by depressing the cup and turning it through 90° (see illustration).

8 Pull the bottom of the leading (front) shoe towards the front of the vehicle so that the self-adjuster ratchets separate, then disengage the shoe from the strut by twisting it. Remove the shoe and adjuster mechanism.

9 Pull the trailing (rear) shoe away from the backplate far enough to gain access to the handbrake cable. Disconnect the handbrake cable from the lever and remove the shoe with strut and lever (see illustration).

10 Clean and inspect all components, and lubricate the shoe contact points on the backplate (see illustration). Take care not to inhale any dust, as it may be injurious to health.



5.5d Rear drum brake self-adjuster assembly - 1.3 and 1.6 litre models

- A Shoe hold-down points
- B Trailing brake shoe
- C Self-adjuster strut and top return springs
- D Wheel cylinder
- E Spring clips

- F Self-adjuster strut
- G Leading brake shoe
- H Large ratchet segment
- J Small ratchet segment
- K Brake backplate



5.6a Top shoe return spring (arrowed)



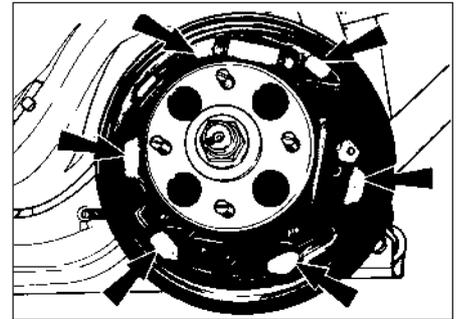
5.6b Bottom shoe return spring



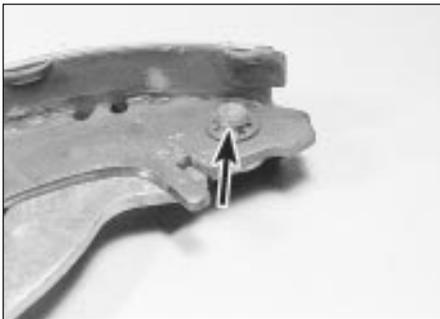
5.7 Using pliers to remove a shoe hold-down cup



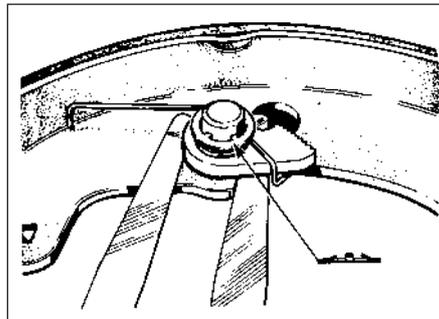
5.9 Disconnecting the handbrake cable from the trailing shoe lever



5.10 Lubrication points on brake backplate



5.11 Handbrake lever-to-trailing shoe securing clip (arrowed)



5.12 Using feeler blades to set clearance between smaller ratchet segment and brake shoe web. Spring clip arrowed



5.13 Fully retract the self-adjuster ratchet (arrowed) before refitting the trailing shoe

11 Remove the strut from the trailing shoe by unhooking it from its spring. If a handbrake lever is not attached to the new shoe, remove the old lever by prising off the clip and driving out the pin. Use a new clip on reassembly (see illustration).

12 Similarly transfer the self-adjuster components to the new leading shoe. Note that a small clearance (0.2 mm/0.008 in) must exist between the underside of the smaller ratchet segment and the brake shoe web. Insert feeler blades of the correct thickness beneath the ratchet when fitting the spring clip, then withdraw the blades (see illustration). The larger segment should be fitted without any clearance.

13 Commence reassembly by engaging the self-adjuster ratchet teeth as shown (see illustration).

14 Offer the trailing shoe to the backplate, fitting the handbrake cable to the handbrake lever and (if not already done) the strut and spring to the top of the shoe (see illustration).

15 Fit the leading shoe and adjuster mechanism, engaging the hole in the adjuster with the hook on the strut (see illustration).

16 Fit the top and bottom return springs: this is most easily done by allowing the ends of the shoe to pass in front of the wheel cylinder and the bottom pivot point, then engaging the shoes in their correct positions after the springs have been fitted. Be careful not to damage the wheel cylinder rubber boots.

17 Fit and secure the hold-down pins, springs and cups.

18 Back off the self-adjuster mechanism, by depressing the lower (small) ratchet segment, to enable the brake drum to pass over the shoes. Centre the shoes relative to the backplate.

19 Refit the drum, making sure that the small hole is in line with one of the two large holes in the drive flange. Secure the drum by pushing the spire washer(s) over the wheel stud(s).

20 Have an assistant operate the footbrake several times: a series of clicks should be heard from the drum as the self-adjuster mechanism operates. When the clicking no longer occurs, adjustment is complete.

21 Renew the brake shoes on the other side of the vehicle, then check the handbrake adjustment.

22 Refit the roadwheels, lower the car and tighten the wheel nuts.

23 Avoid harsh braking if possible for the first hundred miles or so until the new linings have bedded in.

### 1.8 and 2.0 litre models

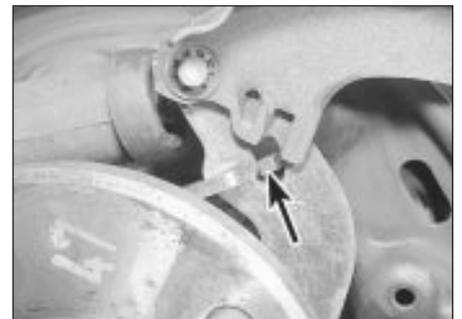
24 Proceed as described in paragraph 5, but on P100 models mark the position of the brake drum in relation to one of the wheel studs (see illustration).

25 Remove the hold-down cup, spring and pin from the leading (front) shoe by depressing the cup and turning it through 90° (see illustration).

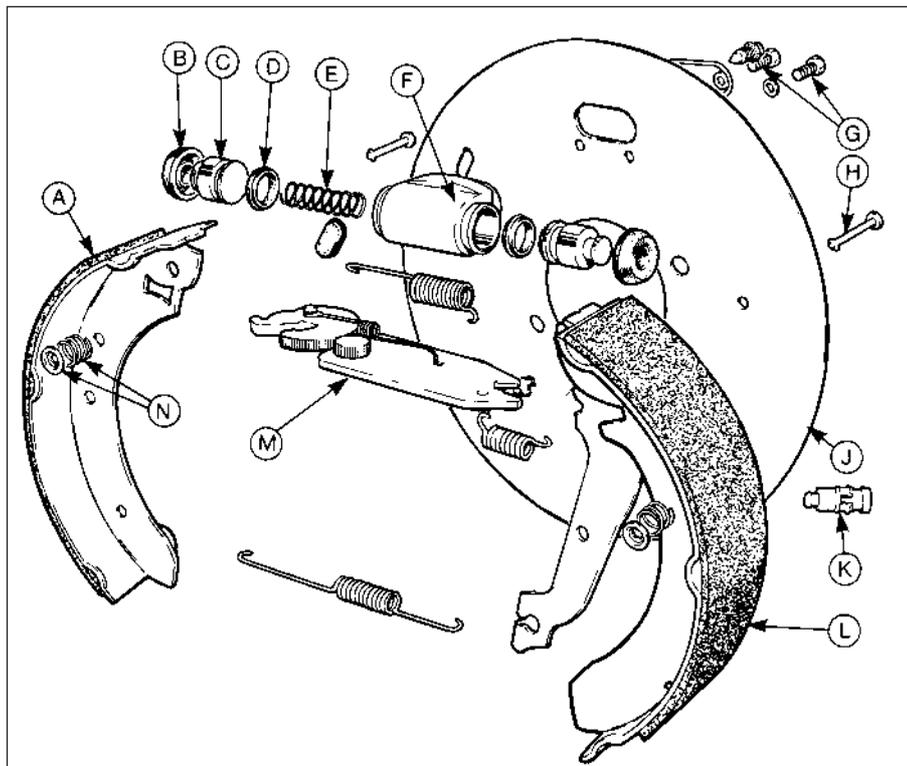
26 Note the fitted positions of the shoe return springs for reference when refitting, then release the leading shoes from the wheel cylinder and the anchor bracket using a screwdriver as a lever.



5.14 Strut and spring fitted to top of trailing shoe



5.15 Engage the hole in the adjuster with the hook on the strut (arrowed)



5.24 Exploded view of rear drum brake assembly - 1.8 and 2.0 litre models

- |                       |                          |                            |
|-----------------------|--------------------------|----------------------------|
| A Leading brake shoe  | F Wheel cylinder housing | L Trailing brake shoe      |
| B Dust-excluding seal | G Bolts                  | M Self-adjuster strut      |
| C Piston              | H Hold-down pin          | N Hold-down spring and cup |
| D Piston seal         | J Brake backplate        |                            |
| E Spring              | K Adjuster plunger       |                            |

27 Unhook the return springs and remove the leading shoe. Note the direction of wheel rotation arrows on the shoes.

28 Remove the hold-down cup, spring and pin from the trailing (rear) shoe by depressing the cup and turning it through 90°.

29 Withdraw the trailing shoe and disconnect the handbrake cable from the lever (see illustration).

30 Unhook the springs from the trailing shoe and remove the self-adjuster strut.

31 Clean and inspect all components and lubricate the shoe contact points on the backplate - refer to illustration, paragraph 10. Take care not to inhale any dust, as it may be injurious to health.

32 Commence reassembly by fitting the springs to the trailing shoe and attaching the self-adjuster strut.

33 Attach the handbrake cable to the lever and position the trailing shoe on the wheel cylinder and anchor bracket. Ensure that the upper return spring is located on the self-adjuster strut.

34 Refit the hold-down pin, spring and cup to the trailing shoe.

35 Connect the return springs to the leading shoe, then locate the lower end in the anchor bracket and lever the upper end onto the toothed quadrant lever and wheel cylinder. Be careful not to damage the wheel cylinder rubber boot.

36 Refit the hold-down pin, spring and cup to the leading shoe.

37 Using a screwdriver, push the self-adjuster toothed quadrant fully towards the backplate to its initial setting.

38 Proceed as described in paragraphs 19 to 23 inclusive, but on P100 models, align the previously made marks on the brake drums and wheel studs, and on the roadwheels and brake drums.

**6 Front disc caliper - removal, overhaul and refitting**



**Caution:** Refer to the precautions in Section 1.

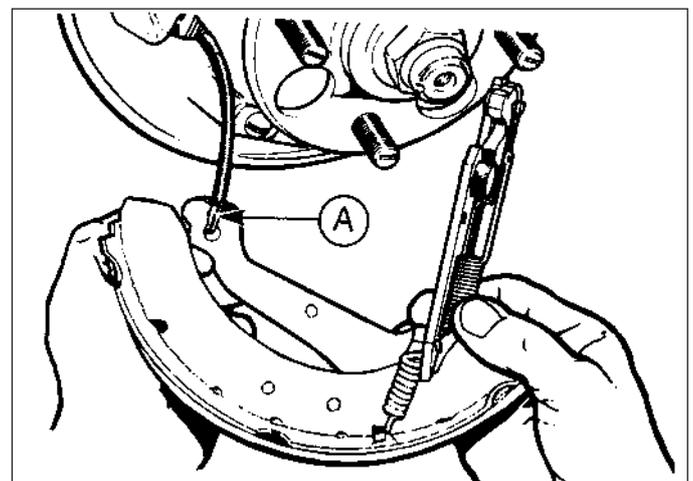
**Removal**

1 Apply the handbrake, loosen the relevant roadwheel nuts, then jack up the front of the vehicle and support on axle stands. (see "Jacking and Vehicle Support"). Remove the roadwheel. On P100 models, mark the position of the roadwheel in relation to one of the wheel studs before removal.

2 Remove the brake fluid reservoir cap and secure a piece of polythene over the filler



5.25 Leading shoe hold-down cup (arrowed)



5.29 Removing the trailing brake shoe  
A Handbrake cable and slot

neck with a rubber band, or by refitting the cap. This will reduce the loss of fluid during the following procedure.

3 Disconnect the flexible fluid hose from the rigid brake pipe under the wing of the vehicle, or alternatively unscrew the flexible hose from the union on the caliper. Take care not to twist the hose, and plug the open ends to prevent fluid loss and dirt ingress.

4 Remove the disc pads.

5 On models fitted with Girling calipers (1.3 and early 1.6 litre models) (see illustration), unscrew and remove the bolt from the lower caliper guide pin, while holding the pin stationary with a spanner, then remove the caliper.

6 On models fitted with Teves calipers (later 1.6, 1.8 and 2.0 litre models) (see illustration), remove the caliper from the vehicle.

7 If required, the caliper carrier bracket can be unbolted and removed from the hub carrier.

### Overhaul

8 Brush away all external dirt and dust, but take care not to inhale any dust as it may be injurious to health.

9 Pull the dust-excluding rubber seal from the end of the piston.

10 Apply air pressure to the fluid inlet union, and eject the piston. Only low air pressure is required for this, such as is produced by a foot-operated tyre pump. Position a thin piece of wood between the piston and caliper body to prevent damage to the end face of the piston in the event of its being ejected suddenly.

11 Using a suitable pointed instrument, prise the piston seal from the groove in the cylinder bore. Take care not to scratch the surface of the bore.

12 Clean the piston and caliper body with methylated spirit and allow to dry. Examine the surfaces of the piston and cylinder bore for wear, damage and corrosion. If the piston surface alone is unserviceable, a new piston must be obtained, along with seals. If the cylinder bore is unserviceable, the complete caliper must be renewed. The seals must be renewed regardless of the condition of the other components.

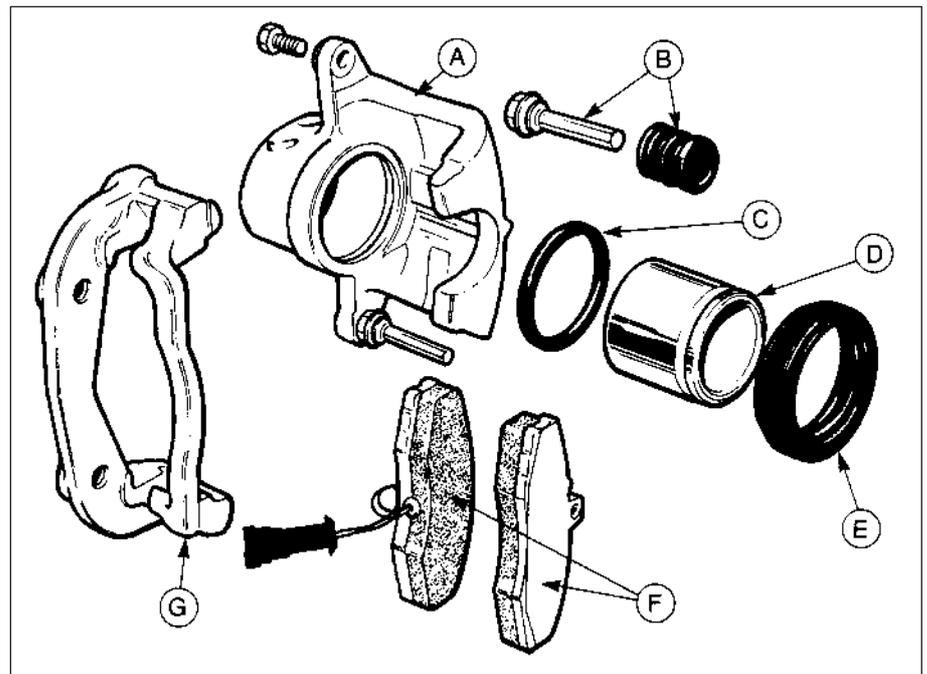
13 Coat the piston and seals with clean brake fluid, then manipulate the piston seal into the groove in the cylinder bore.

14 Push the piston squarely into its bore.

15 Fit the dust-excluding rubber seal between the piston and caliper, then depress the piston fully.

### Refitting

16 Refit the caliper and where applicable the carrier bracket by reversing the removal operations. Tighten the mounting bolts to the specified torque.



6.5 Exploded view of Girling front disc caliper

A Caliper

B Guide pin and dust boot

C Piston seal

D Piston

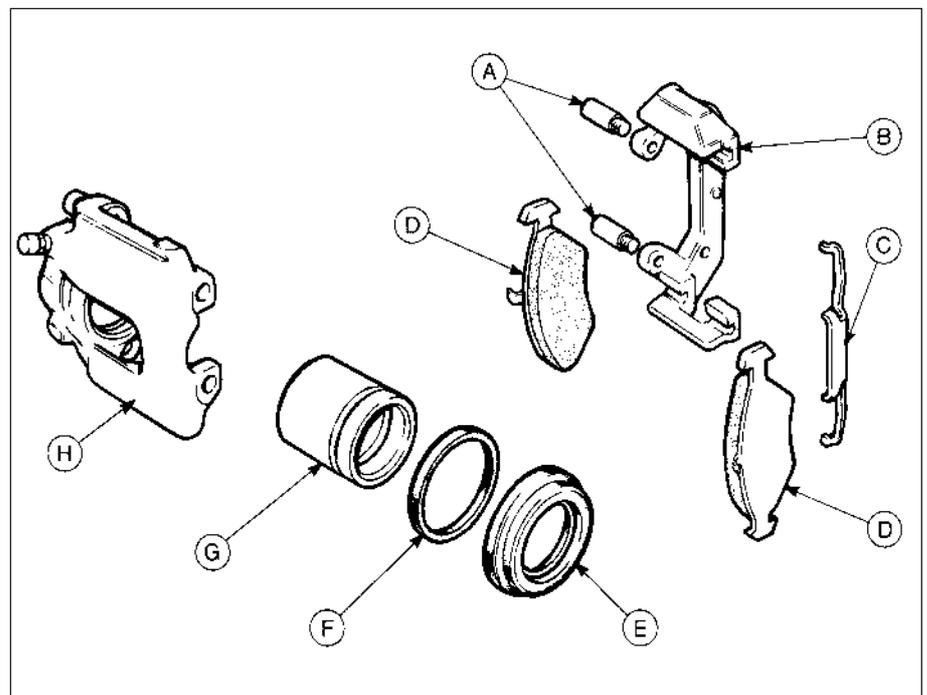
F Disc pads

G Caliper carrier bracket

E Dust-excluding seal

17 On P100 models, when refitting the roadwheel align the previously made marks on the roadwheel and wheel stud.

18 On completion, bleed the front brake circuit.



6.6 Exploded view of Teves front disc caliper

A Guide bolts

B Caliper carrier bracket

C Caliper retaining clip

D Disc pads

E Dust-excluding seal

F Piston seal

G Piston

H Caliper



7.10a Remove the circlip from the rear caliper piston . . .



7.10b . . . followed by the thrustwasher . . .



7.10c . . . a wave washer and (not shown) another thrustwasher . . .



7.10d . . . then the thrust bearing . . .



7.10e . . . and finally the adjuster nut itself. Note the seal (arrowed) on the nut



7.13 Using the piston adjuster nut to compress the adjuster spring

## 7 Rear disc caliper - removal, overhaul and refitting



**Note:** Complete dismantling of the rear caliper should not be attempted unless Ford spring compressor (tool No 12-007) is available, or unless the problems likely to arise in the absence of the tool are understood. Renewal of the piston seal dust-excluding seal and piston adjuster nut seal requires no special tools.



**Caution:** Refer to the precautions in Section 1.

### Removal

- 1 With the ignition switched off, pump the brake pedal at least 20 times, or until it becomes hard, to depressurise the system.
- 2 Chock the front wheels, slacken the relevant roadwheel nuts, then jack up the rear of the vehicle and support on axle stands (see "Jacking and Vehicle Support"). Remove the roadwheel and release the handbrake.
- 3 Where applicable, disconnect the wiring to the disc pad wear sensor.
- 4 Proceed as described in Section 6, paragraphs 2 and 3, but note that the rigid brake pipe is clipped to the suspension lower arm.
- 5 Unscrew and remove the two guide bolts securing the caliper to the carrier bracket, while holding the pins with a spanner. Unhook

the handbrake cable from the lever, and withdraw the caliper. Alternatively, the two carrier bracket-to-hub carrier bolts can be separated on the bench, but in this case the handbrake cable must be disconnected from the carrier bracket by removing the retaining circlip.

### Overhaul

- 6 Clean the caliper, taking care not to inhale any dust which may be injurious to health, and mount it in a soft-jawed vice.
- 7 Rotate the piston anti-clockwise, using Ford tool No 12-006, or a pair of circlip pliers or similar tool, until it protrudes from the caliper bore by approximately 20.0 mm (0.8 in). Free the dust-excluding seal from the groove in the piston, then continue unscrewing the piston and remove it. Remove and discard the dust-excluding seal.
- 8 The piston and bore may now be cleaned and examined as described in Section 6, paragraph 12.
- 9 The piston adjuster nut seal should be renewed as follows.
- 10 Remove the circlip from the piston, then extract the thrustwashers, wave washer and thrust bearing. Note the fitted sequence of these components. Finally remove the nut (see illustrations).
- 11 Remove the seal from the nut, noting which way round it is fitted. Clean the nut with methylated spirit. Lubricate the new seal with clean hydraulic fluid and fit it to the nut.

12 If no further dismantling is required, proceed to paragraph 20.

13 For further dismantling it is virtually essential to have Ford tool 12-007 in order to compress the adjuster spring. This tool appears to be a cut-down adjuster nut with a handle for turning it. In the workshop it was found that the actual piston adjuster nut could be used to compress the spring if it were turned with circlip pliers (see illustration). This works well enough for dismantling, but reassembly proved extremely difficult because of the limited clearance between the skirt of the nut and the caliper bore.

14 Having compressed the adjuster spring just enough to take the load off the circlip, release the circlip inside the caliper bore. Remove the spring compressor, then extract the circlip, spring cover, spring and washer (see illustrations).



7.14a Extract the circlip from the caliper bore . . .



7.14b ... then the spring cover ...



7.14c ... the spring itself ...



7.14d ... and the washer



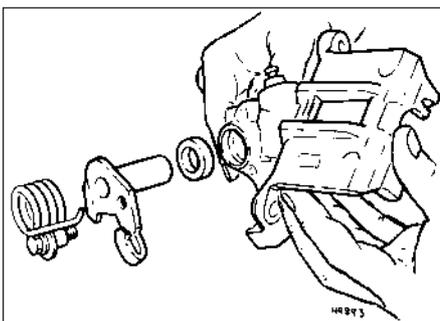
7.15 Remove the circlip (ends arrowed) to release the pushrod and key plate

15 A long thin pair of circlip pliers will now be required to release the key plate retaining circlip from the caliper bore (see illustration). With the circlip removed, the pushrod and key plate can be pulled out.

16 Remove the handbrake strut from the caliper bore.

17 Remove the handbrake lever return spring and stop bolt. Pull the lever and shaft nut out of the caliper. Prise out the shaft seal (see illustration).

18 Clean the handbrake shaft using wire wool; renew the shaft if it is badly corroded. The shaft bush in the caliper can also be renewed if necessary. Pull out the old bush with an internal puller or slide hammer, and press in the new bush to 7.5 mm (0.30 in) below the shaft seal lip (see illustration). The slot in the side of the bush must line up with the pushrod bore in the caliper.



7.17 Handbrake shaft and associated components

19 Having renewed components as necessary, commence reassembly by smearing a little brake grease or anti-seize compound on the handbrake shaft and bush.

20 Fit a new handbrake shaft seal to the caliper. Pass the shaft through the seal and into the caliper, taking care not to damage the seal lips.

21 Refit the handbrake lever stop bolt and return spring.

22 Refit the handbrake strut, lubricating it with brake grease.

23 Fit a new O-ring to the base of the pushrod. Refit the pushrod and the key plate, engaging the pip on the key plate with the recess in the caliper. Secure the key plate with the circlip.

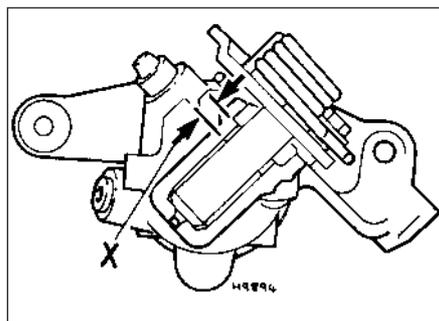
24 Refit the washer, spring and spring cover. Compress the spring and refit the circlip, then release the spring compressor.

25 Lubricate the caliper bore with clean hydraulic fluid and fit a new piston seal.

26 Reassemble the piston components. Lubricate the contact face of the adjuster nut with a little brake grease, then fit the adjuster nut (with new seal), thrust bearing, thrustwasher, wave washer and the second thrustwasher. Secure with the circlip.

27 Fit a new dust-excluding seal to the grooves in the piston and caliper bore as the piston is refitted (see illustration). Screw the piston into the caliper bore with the tool used during removal.

28 Renew the guide pin gaiters and apply a little brake grease or anti-seize compound to the guide pins when refitting the caliper to its carrier bracket.



7.18 Handbrake shaft bush correctly fitted  
X = 7.5 mm (0.30 in)

### Refitting

29 Refitting is a reversal of removal, but on completion bleed the rear brake circuit and check the operation of the handbrake.

### 8 Brake disc - examination, removal and refitting



**Note:** From 1987, thicker brake discs were fitted. If the later discs are fitted to earlier models, longer wheel studs must be fitted to accommodate the increased thickness. Consult a dealer for further advice.



**Caution:** Refer to the precautions in Section 1.

### Front disc

1 Apply the handbrake, loosen the relevant roadwheel nuts, then jack up the front of the vehicle and support on axle stands (see "Jacking and Vehicle Support"). Remove the roadwheel.

2 Remove the disc caliper and carrier bracket but do not disconnect the flexible hose. Support the caliper on an axle stand to avoid straining the flexible hose.

3 Rotate the disc and examine it for deep scoring or grooving. Light scoring is normal, but if excessive, the disc should be removed and either renewed or reground by a suitable specialist. Scrape any corrosion from the disc.

4 Using a dial gauge or a flat metal block and feeler blades, check that the disc run-out does not exceed the limit given in the



7.27 Dust-excluding seal fitted to piston and caliper bore

## 10•12 Braking system

Specifications. To do this, fix the measuring equipment, and rotate the disc, noting the variation in measurement as the disc is rotated. The difference between the minimum and maximum measurements recorded is known as disc run-out.

**5** Mark the position of the brake disc in relation to the drive flange and on Saloon, Hatchback and Estate models, remove the retaining screw or spire washer(s), as applicable, and remove the disc. On P100 models, also mark the position of the wheel adapter plate in relation to the disc and drive flange, then unscrew the five retaining nuts and remove the wheel adapter plate and disc.

**6** Refitting is a reversal of removal, but when refitting ensure that the mating faces of the disc, drive flange and on P100 models the wheel adapter plate, are clean. Align the marks made on the disc, drive flange, and where applicable the wheel adapter plate, during removal. Refit the disc caliper and carrier bracket.

### Rear disc

**7** Chock the front wheels, loosen the relevant roadwheel nuts, then jack up the rear of the vehicle and support on axle stands.(see "Jacking and Vehicle Support"). Remove the roadwheel and release the handbrake.

**8** Detach the handbrake cable from the retaining clip on the lower arm.

**9** Unscrew the two caliper carrier bracket-to-hub carrier bolts and remove the caliper assembly. Support the caliper on an axle stand to avoid straining the flexible hose.

**10** Proceed as described in paragraphs 3 and 4.

**11** Mark the position of the brake disc in relation to the drive flange, remove the retaining spire washer(s), and withdraw the disc.

**12** Refitting is a reversal of removal, but ensure that the mating faces of the disc and drive flanges are clean, and align the marks made on the disc and drive flange during removal.

### 9 Brake drum - inspection and renewal

**1** Whenever a brake drum is removed, brush out the dust, taking care not to inhale any, as it may be injurious to health.

**2** Examine the internal friction surface of the drum. If deeply scored, or so worn that the drum has become ridged to the width of the shoes, then both drums must be renewed.

**3** Regrinding is not recommended as the internal diameter of the drum will no longer be compatible with the shoe friction material contact diameter.

### 10 Rear wheel cylinder (drum brakes) - removal, overhaul and refitting



**Caution:** Refer to the precautions in Section 1.

#### Saloon, Hatchback and Estate models

**1** Chock the front wheels, loosen the relevant roadwheel nuts, then jack up the rear of the vehicle and support on axle stands (see "Jacking and Vehicle Support"). Remove the roadwheel and release the handbrake.

**2** Remove the retaining spire washer(s) from the wheel stud(s) and pull off the brake drum. If the drum will not pass over the shoes, it is possible to release the automatic adjuster mechanism by inserting a screwdriver through the small hole in the drum and pressing down on the ratchet.

**3** Remove the brake fluid reservoir cap and secure a piece of polythene over the filler neck with a rubber band, or by refitting the cap. This will reduce the loss of fluid during the following procedure.

**4** Unscrew the union nut and disconnect the fluid pipe from the wheel cylinder (see illustration). Plug the open ends of the pipe and wheel cylinder to prevent fluid loss and dirt ingress.

**5** Pull the tops of the brake shoes apart so that the self-adjuster mechanism holds them clear of the wheel cylinder.

**6** Unscrew the two retaining bolts from the rear of the brake backplate, and withdraw the wheel cylinder and sealing ring.

**7** The wheel cylinder can now be dismantled as follows.

**8** Prise the dust-excluding rubber seals from the ends of the wheel cylinder, and withdraw the pistons and central spring, identifying the pistons so that they can be refitted in their original positions.

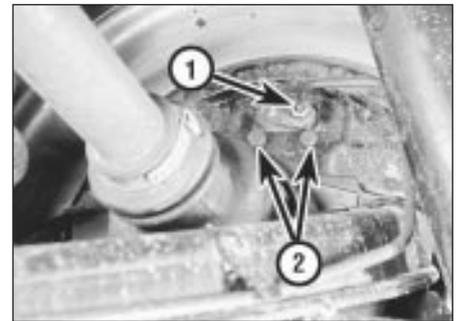
**9** Prise the seals from the pistons.

**10** Clean all the components in methylated spirit and allow to dry. Examine the surfaces of the pistons and cylinder bore for wear, scoring and corrosion. If evident, the complete wheel cylinder must be renewed, but if the components are in good condition, discard the seals and obtain a repair kit.

**11** Dip the new seals in clean brake fluid and fit them to the piston grooves, using fingers only to manipulate them. Ensure that the seal lips face into the wheel cylinder.

**12** Carefully insert the pistons and central spring into the cylinder, and fit the dust-excluding rubber seals. Ensure that the pistons are fitted in their original positions.

**13** Wipe the brake backplate clean, then fit the wheel cylinder together with a new sealing ring, and tighten the securing bolts.



10.4 Fluid pipe union (1) and wheel cylinder retaining bolts (2)

**14** Reconnect the fluid pipe to the wheel cylinder and tighten the union nut.

**15** Using a screwdriver, push the self-adjuster toothed quadrant fully towards the backplate to its initial setting.

**16** Further refitting is a reversal of removal, but on completion apply the footbrake several times in order to set the brake shoes in their normal positions, and bleed the rear brake circuit.

#### P100 models

**17** The procedure is as described in paragraphs 1 to 16 inclusive, but with the following differences.

**18** Before removing the roadwheel, mark its position in relation to the brake drum. Similarly, mark the position of the brake drum in relation to one of the wheel studs. Align the marks when refitting.

**19** The wheel cylinder is secured to the brake backplate by a circlip instead of the two bolts used on other models (see illustration).

### 11 Rear brake backplate (drum brakes) - removal and refitting

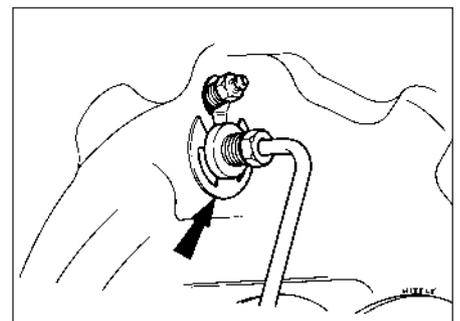


**Caution:** Refer to the precautions in Section 1.

#### Saloon, Hatchback and Estate models

**1** Remove the rear brake shoes.

**2** Disconnect the handbrake cable from the backplate by extracting the U-clip.



10.19 Wheel cylinder securing circlip (arrowed)

- 3 Remove the wheel cylinder.
- 4 Remove the driveshaft but do not refit the securing bolts to the backplate.
- 5 Remove the backplate.
- 6 If required, prise out the handbrake stop button.
- 7 Refitting is a reversal of removal.

**P 100 models**

**Note:** When refitting the backplate, a new rear hub nut and driveshaft O-ring must be used.

- 8 Proceed as described in paragraphs 1 to 3 inclusive.
- 9 Remove the driveshaft.
- 10 Relieve the staking on the rear hub nut, and using a 50 mm socket and a suitable extension bar, unscrew the nut. Note that the nut is extremely tight.
- 11 Pull off the hub.
- 12 Unscrew the six retaining nuts and remove the backplate and the oil baffle (see illustration).
- 13 If required, prise out the handbrake stop button.
- 14 Refitting is a reversal of removal, bearing in mind the following points.
- 15 When refitting the backplate and the oil baffle, coat the area of the oil baffle shown (see illustration - Chapter 9) with sealant to Ford spec SPM-4G-9112-F, then refit the baffle and the backplate to the axle, tightening the six securing nuts to the specified torque.
- 16 Use a new rear hub nut, and tighten to the specified torque. Stake the nut into the groove in the axle tube after tightening.
- 17 Refit the driveshaft, using a new O-ring.

**12 Rear disc splash shield - removal and refitting**

**Note:** A suitable puller will be required to remove the drive flange, and a new rear hub nut must be used on reassembly.



**Caution:** Refer to the precautions in Section 1.

**Removal**

- 1 Loosen the rear hub nut with the vehicle resting on its wheels. Note that the left-hand nut has a left-hand thread, ie it is undone in a clockwise direction. Before loosening the nut, ensure that the handbrake is applied, and chock the relevant rear wheel. A suitable extension bar will be required, as the nut is extremely tight.
- 2 Loosen the relevant rear roadwheel nuts, chock the front wheels, then jack up the rear of the vehicle and support on axle stands (see "Jacking and Vehicle Support"). Remove the roadwheel and release the handbrake.
- 3 Free the handbrake cable from its clip on the suspension lower arm.
- 4 Unscrew the two caliper carrier bracket-to-hub carrier bolts, and remove the caliper, supporting it on an axle stand to avoid straining the flexible hose.
- 5 Mark the position of the brake disc in relation to the drive flange, remove the retaining spire washer(s), and remove the disc.
- 6 Unscrew and remove the rear hub nut, and using a suitable puller, pull off the drive flange.
- 7 Unscrew the four bolts securing the hub carrier and splash shield to the lower arm. Remove the hub carrier and splash shield, whilst supporting the driveshaft. Support the driveshaft by placing axle stands underneath it, or by securing with string to the underbody. Avoid bending the driveshaft joints to excessive angles, and do not allow the shaft to hang down from one end.

**Refitting**

- 8 Refitting is a reversal of removal, bearing in mind the following points.
- 9 When reassembling the drive flange and the hub carrier, fit the drive flange to the hub carrier in order to centralise the bearings, then using a soft-faced mallet, drive the drive flange/hub carrier assembly onto the end of the stub axle.

- 10 Refit the hub carrier/splash shield-to-lower arm securing bolts. Note that there are two types of bolts used to secure the rear hub carrier to the lower arm. The two types of bolt must not be mixed on a vehicle but can be changed in complete sets for the alternative type. A complete set is eight bolts, four each side. Note that the two types of bolt have different torque wrench settings. When renewing the wheel bearings a suitable puller will be required to remove the drive flange, and a new rear hub nut must be used on reassembly.
- 11 When refitting the brake disc, align the previously made marks on disc and drive flange.
- 12 Fit a new rear hub nut of the correct type, and tighten it with the vehicle resting on its roadwheels. Apply the handbrake and chock the relevant rear wheel when finally tightening the hub nut.

**13 Master cylinder (conventional braking system) - removal, overhaul and refitting**



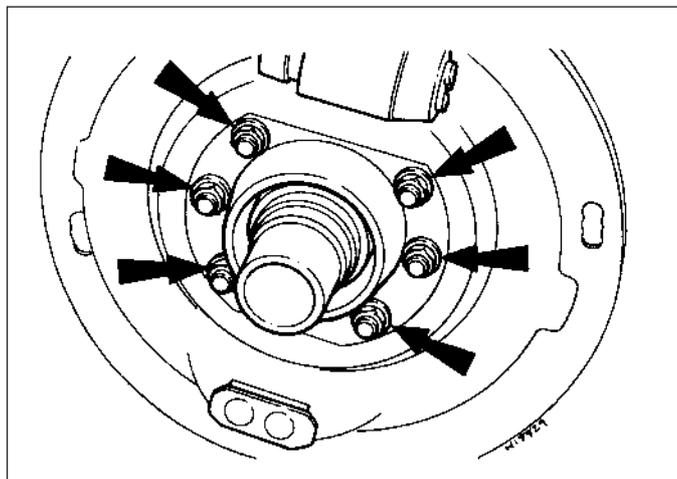
**Note:** Before commencing overhaul obtain a repair kit containing new pistons and seals.



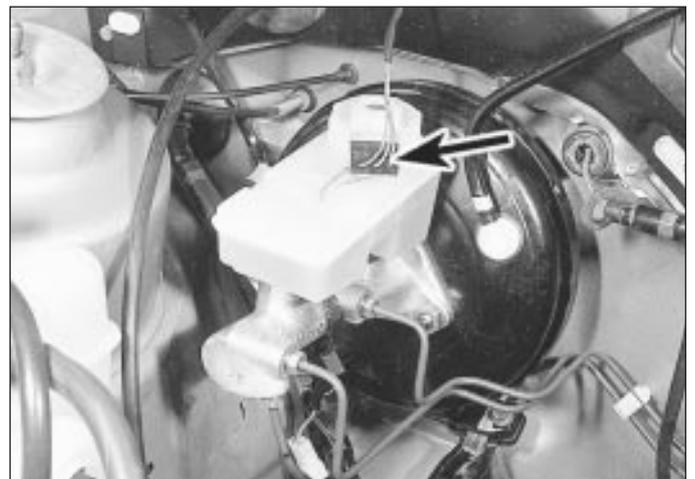
**Caution:** Refer to the precautions in Section 1.

**Removal**

- 1 Depress the brake pedal several times to dissipate the vacuum in the servo.
- 2 Disconnect the wiring plug from the low fluid level switch (see illustration).
- 3 Place a suitable container beneath the master cylinder, then unscrew the union nuts and disconnect the two fluid pipes. Plug the ends of the pipes to prevent dirt ingress.



11.12 Brake backplate and oil baffle retaining nuts



13.2 Disconnect the wiring plug from the low fluid level switch (arrowed)

## 10•14 Braking system

4 Unscrew the two mounting nuts and spring washers, and withdraw the master cylinder from the servo. Cover the master cylinder with rag or a plastic bag to prevent spillage of hydraulic fluid on the vehicle paintwork. If fluid is accidentally spilt on the paintwork, wash off immediately with cold water.

### Overhaul

5 Drain the remaining fluid from the master cylinder, and clean the exterior surfaces with methylated spirit.

6 Pull the fluid reservoir from the top of the master cylinder and prise out the sealing rubbers (see illustration).

7 Mount the master cylinder in a vice, then depress the primary piston slightly and extract the circlip and washer. Withdraw the primary piston assembly.

8 Depress the secondary piston and remove the stop pin from the fluid aperture.

9 Remove the master cylinder from the vice and tap it on the bench to remove the secondary piston assembly.

10 Prise the seals from the secondary piston. Do not attempt to dismantle the primary piston.

11 Clean all the components in methylated spirit and examine them for wear and damage. In particular check the surfaces of the pistons and cylinder bore for scoring and corrosion. If the cylinder bore is worn, renew the complete master cylinder, otherwise obtain a repair kit including pistons and seals.

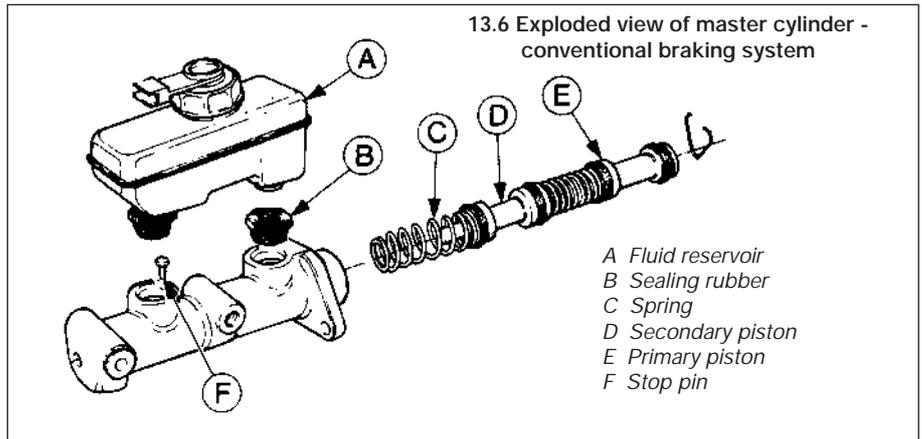
12 Check that the fluid inlet and outlet ports are free and unobstructed. Dip the new pistons and seals in clean brake fluid.

13 Fit the seals to the secondary piston using the fingers only to manipulate them into the grooves. Note that the sealing lips must face away from each other.

14 Insert the secondary piston and spring into the cylinder. Turn the piston slowly as the first seal enters to avoid trapping the sealing lip. Similarly insert the primary piston and spring, then fit the washer and circlip.

15 Depress the primary and secondary pistons and refit the secondary piston stop pin.

16 Fit the fluid reservoir sealing rubbers and



press the reservoir into them. If the rubbers are worn or perished, or if leakage has been evident, fit the new rubbers.

### Refitting

17 Refitting is a reversal of removal but tighten the mounting nuts and pipe union nuts to the specified torque and finally bleed the hydraulic system.

## 14 Vacuum servo (conventional braking system) - removal and refitting



**Caution:** Refer to the precautions in Section 1.

### Removal

1 To remove the servo, first remove the master cylinder.

2 Disconnect the vacuum hose from the servo (see illustration).

3 Working inside the vehicle, remove the lower fascia panel from the driver's side.

4 Remove the clip from the servo pushrod on the brake pedal (see illustration).

5 Unscrew the two mounting nuts and washers securing the servo to the bulkhead, and lift the servo from the bulkhead. Note that the two mounting nuts also secure the pedal bracket to the bulkhead.

6 If required, the vacuum hose can be disconnected from the inlet manifold, and the non-return valve can be checked for correct operation by ensuring that it is only possible to blow through it in one direction.

7 No overhaul of the servo is possible, and if faulty, it must be renewed as a complete unit.

### Refitting

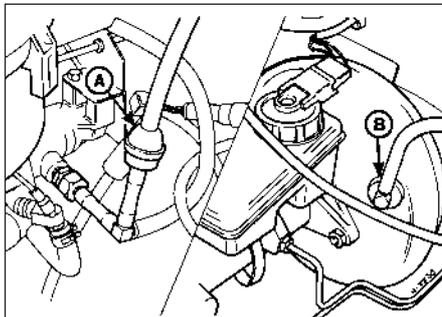
8 Refitting is a reversal of removal, but when refitting the servo to the bulkhead, ensure that the pushrod is correctly located in the pedal and that the clip is secure.

### Vacuum hose - modification

9 From mid-1989, a new type of brake servo vacuum hose-to-inlet manifold connector has been used in production. The connector comprises three parts; a collet which locks the hose in position, an O-ring, and a brass insert which is pressed into the inlet manifold.

10 To disconnect the hose from the inlet manifold, apply light even pressure, push and hold the flange of the collet against the manifold. While holding the collet forward, gently pull the hose from the collet (see illustration). Take care not to pull at an angle or use excessive force, as this can cause the collet to snatch and lock the hose.

11 To reconnect the hose, push the hose into the collet until the swage on the hose is hard against the collet flange. Pull gently on the hose to check that it is locked by the collet.



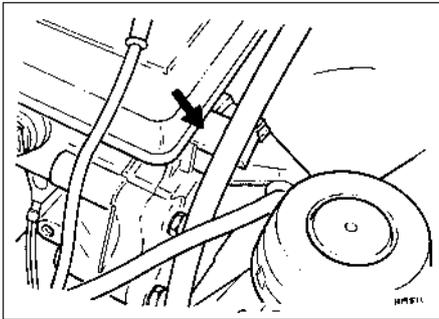
14.2 Servo vacuum hose non-return valve (A) and servo connection (B) - conventional braking system



14.4 Remove the clip (arrowed) from the servo pushrod



14.10 Disconnecting a later-type brake servo vacuum hose



15.4 Reservoir securing clip (arrowed) also supports clutch cable - ABS



15.5a Remove the securing spring clip . . .



15.5b . . . and disconnect the low pressure fluid hose - ABS



15.6 Removing the fluid reservoir from the hydraulic unit - ABS



15.7 Removing the spigot locating bush from the rear hydraulic unit inlet - ABS

## 16 Hydraulic unit (ABS) - removal and refitting



**Note:** A new gasket must be used between the hydraulic unit and the bulkhead on refitting.



**Caution:** Refer to the precautions in Section 1.

### Removal

- 1 Disconnect the battery negative lead.
- 2 Depressurise the hydraulic system by pumping the brake pedal at least 20 times, or until it becomes hard.
- 3 Disconnect the six multi-plugs from the hydraulic unit. They are all different, so there is no need to label them. When a plug has a spring clip retainer, lift the clip before pulling out the plug. To release the pump plug, pull back the rubber boot and the plug sleeve (see illustrations).
- 4 Unbolt the earth strap from the unit.
- 5 Prepare a suitable container to catch spill fluid. Mark the hydraulic pipes so that they can be refitted in their original positions, then disconnect them from the base of the unit. Plug the open ends of the pipes and hydraulic unit to prevent fluid leakage and dirt ingress. If fluid is accidentally spilt on the paintwork, wash off immediately with cold water.
- 6 Working inside the vehicle, remove the lower fascia panel from the driver's side.

## 15 Fluid reservoir (ABS) - removal and refitting



**Note:** New seals must be used between the reservoir and the hydraulic unit on reassembly.



**Caution:** Refer to the precautions in Section 1.

### Removal

- 1 Disconnect the battery negative lead.
- 2 Depressurise the hydraulic system by pumping the brake pedal at least 20 times, or until it becomes hard.
- 3 Disconnect the wiring multi-plugs from the reservoir cap and remove the cap.
- 4 Unscrew the reservoir securing screw, and remove the securing clip, noting that the clip also supports the clutch cable (see illustration).

- 5 Prepare a suitable container to collect the fluid as the hydraulic unit is drained, then remove the securing spring clip and disconnect the low pressure fluid hose from the pump (see illustrations). Allow the fluid to drain out of the hose into the container. If fluid is accidentally spilt on the paintwork, wash off immediately with cold water.

- 6 Pull the reservoir out of the seals on the hydraulic unit and remove it (see illustration).
- 7 Note the spigot locating bush on the rear hydraulic unit inlet, which may stay in the hydraulic unit or may come out with the reservoir (see illustration).

### Refitting

- 8 Refitting is a reversal of removal, but use new seals between the reservoir and the hydraulic unit.
- 9 On completion, bleed the complete hydraulic system and check for leaks around all disturbed components.



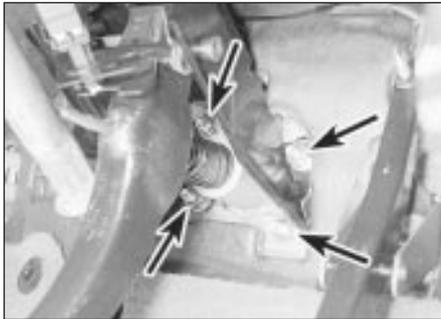
16.3a Disconnecting the low fluid level switch multi-plug . . .



16.3b . . . the main valve multi-plug . . .



16.3c . . . and the pressure switch multi-plug - ABS



16.8 Hydraulic unit-to-bulkhead securing nuts (arrowed) - ABS

- 7 Remove the clip from the hydraulic unit pushrod on the brake pedal.
- 8 With an assistant supporting the hydraulic unit, unscrew the four nuts which secure the unit to the bulkhead (see illustration). Withdraw the unit from under the bonnet.
- 9 Recover the gasket fitted between the unit and the bulkhead.
- 10 Drain the fluid from the reservoir. Do not actuate the pushrod with the unit removed.
- 11 Dismantling of the hydraulic unit should be limited to the operations described in the following Sections (see illustration).

**Refitting**

12 Refitting is a reversal of removal, bearing in mind the following points.

- 13 Do not refill the fluid reservoir until reassembly and refitting is complete.
- 14 Use a new gasket between the hydraulic unit and the bulkhead.
- 15 Ensure that the hydraulic pipes are reconnected to the correct unions.
- 16 On completion, bleed the complete hydraulic system and check for leaks around all disturbed components.

**17 Hydraulic unit accumulator (ABS) - removal and refitting**

**Note:** A new O-ring must be used between the accumulator and the hydraulic unit on refitting.



**Caution:** Refer to the precautions in Section 1.

**Removal**

- 1 Disconnect the battery negative lead.
- 2 Depressurise the hydraulic system by pumping the brake pedal at least 20 times, or until it becomes hard.
- 3 Wrap a clean rag round the base of the accumulator to catch any spilt fluid.
- 4 Unscrew the accumulator using a hexagon key. Remove the accumulator, noting the sealing ring and being prepared for fluid spillage (see illustration). If fluid is

accidentally spilt on the paintwork, wash off immediately with cold water.

**Refitting**

- 5 Fit a new O-ring to the base of the accumulator, fit the accumulator and tighten it.
- 6 Reconnect the battery. Switch on the ignition and check that the hydraulic unit pump stops within 60 seconds; if not, the accumulator is likely to be faulty.
- 7 On completion, bleed the complete hydraulic system and check for leaks around all disturbed components.

**18 Hydraulic unit pump and motor (ABS) - removal and refitting**

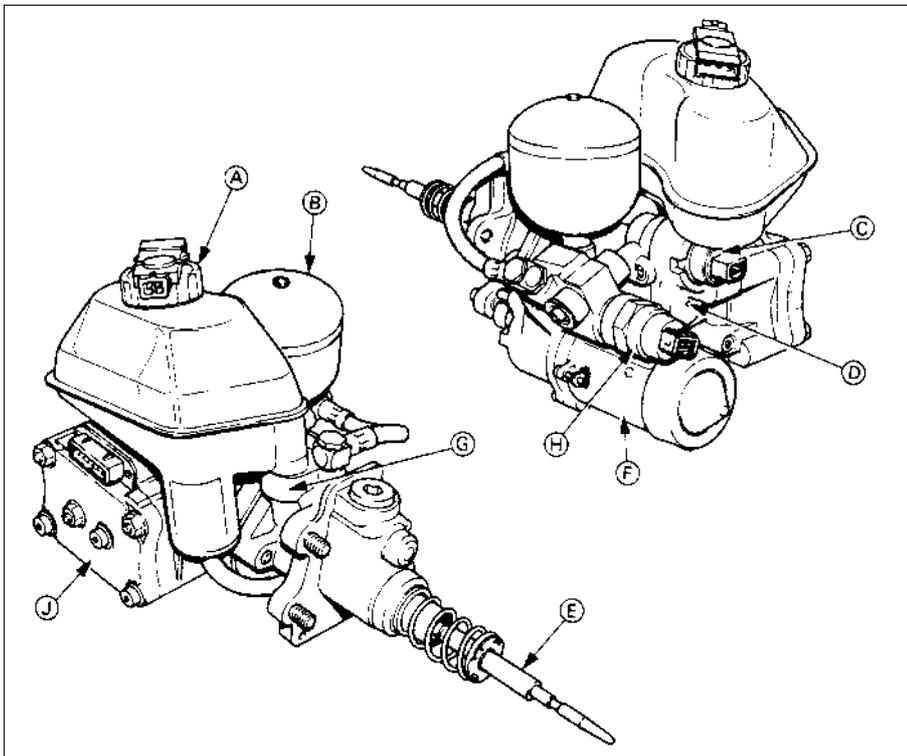
**Note:** New sealing washers must be used on the high pressure fluid hose banjo union, and a new O-ring must be used between the accumulator and the hydraulic unit on refitting.



**Caution:** Refer to the precautions in Section 1.

**Removal**

- 1 Remove the accumulator.
- 2 Prepare a suitable container to catch spilt fluid, and disconnect the high pressure fluid hose from the pump.
- 3 Remove the securing spring clip and disconnect the low pressure fluid hose from the pump. Allow the fluid to drain out of the hose into the container. If fluid is accidentally spilt on the paintwork, wash off immediately with cold water.
- 4 Disconnect the multi-plugs from the pressure switch and the pump motor.
- 5 Remove the pump mounting bolt (see illustration).
- 6 Pull the pump and motor assembly off the mounting spigot and remove it.
- 7 Recover the mounting bushes and renew them if necessary.
- 8 If a new pump is to be fitted, transfer the pressure switch to it, using a new O-ring.



16.11 Hydraulic unit components - ABS

- |                   |                   |                   |
|-------------------|-------------------|-------------------|
| A Fluid reservoir | D Master cylinder | G Booster         |
| B Accumulator     | E Pushrod         | H Pressure switch |
| C Main valve      | F Pump and motor  | J Valve block     |



17.4 Unscrew the accumulator and remove it, noting the O-ring (arrowed)



18.5 Hydraulic unit pump mounting bolt - ABS

### Refitting

9 Commence refitting by offering the pump to the mounting spigot, then reconnecting the low pressure fluid hose.

10 Refit and tighten the pump mounting bolt.

11 Reconnect the high pressure fluid hose, using new sealing washers on the banjo union.

12 Refit the accumulator, using a new O-ring.

13 Reconnect the multi-plugs and the battery.

14 Refill the fluid reservoir, then switch on the ignition and allow the pump to prime itself. Allow the pump to run for a maximum of two minutes at a time then leave it for ten minutes to cool down.

15 On completion, bleed the complete hydraulic system and check for leaks around all disturbed components.

### 19 Hydraulic unit pressure switch (ABS) - removal and refitting

**Note:** To remove the pressure switch from the hydraulic unit in situ, Ford tool No 12-008 or a locally made equivalent will be required. The switch may be removed without special tools after removing the hydraulic unit complete or the pump above. A new O-ring must be used when refitting the switch.



**Caution:** Refer to the precautions in Section 1.

### Removal

1 Disconnect the battery negative lead.

2 Depressurise the hydraulic system by pumping the brake pedal at least 20 times, or until it becomes hard.

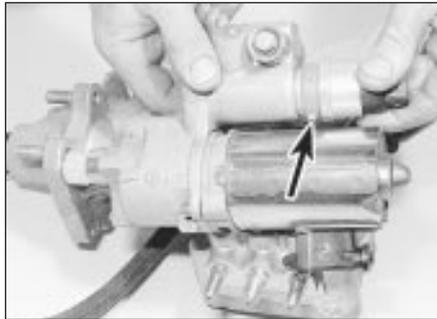
3 Disconnect the multi-plug from the switch, then unscrew and remove the switch.

### Refitting

4 Refit the switch using a new O-ring. Position the plastic sleeve so that the drain hole faces the pump motor, then tighten the switch (see illustration).

5 Reconnect the multi-plug and the battery.

6 On completion, bleed the complete hydraulic system and check for leaks around all disturbed components.



19.4 Refit the pressure switch with the drain hole (arrowed) in the plastic sleeve facing the pump motor - ABS

### 20 Valve block (ABS) - removal and refitting



**Caution:** Refer to the precautions in Section 1.

### Removal

1 Disconnect the battery negative lead.

2 Depressurise the hydraulic system by pumping the brake pedal at least 20 times, or until it becomes hard.

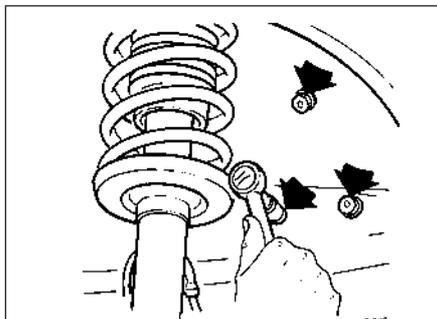
3 Apply the handbrake, and slacken the left-hand front wheel nuts. Jack up the front of the vehicle and support on axle stands (see "Jacking and Vehicle Support"). Remove the left-hand front wheel.

4 Remove the plastic liner from under the wheel arch.

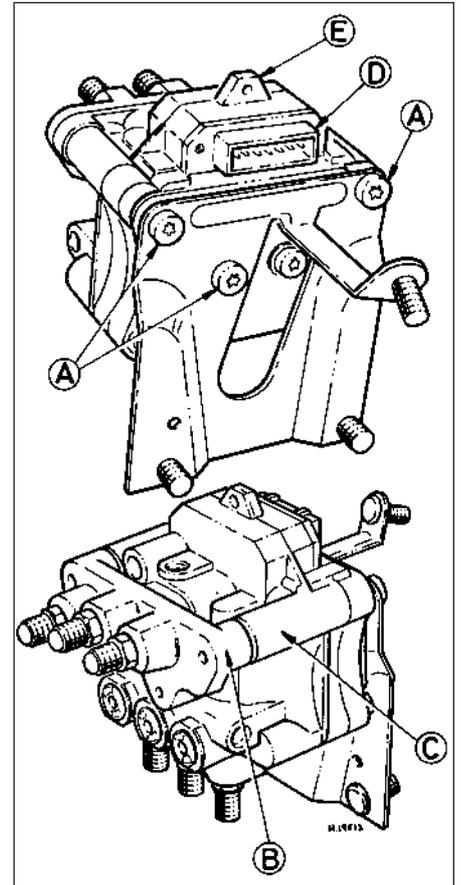
5 Prepare a suitable container to catch spilt fluid, clean around the unions on the valve block, then unscrew and disconnect the fluid pipes (see illustration). Plug the open ends of the pipes and valve block to prevent fluid leakage and dirt ingress. If fluid is accidentally spilt on the paintwork, wash off immediately with cold water.

6 Disconnect the multi-plug and the earth strap from the valve block.

7 Working through the wheel arch, unscrew the three nuts which secure the valve block mounting bracket (see illustration).



20.7 Unscrewing the valve block mounting bracket nuts (arrowed) - ABS



20.5 Valve block and associated components - ABS

A Bracket screws

B Adapter plate

C valve block

D Multi-plug

E Earth strap

anchor point

8 Remove the valve block and mounting bracket, taking care not to spill brake fluid on the paintwork.

9 No further dismantling of the valve block is possible, but the pressure regulating valve in the rear brake pipe union can be renewed if desired.

### Refitting

10 Refitting is a reversal of removal.

11 On completion, bleed the complete hydraulic system and check for leaks around all disturbed components.

### 21 Computer module (ABS) - removal and refitting

#### Removal

1 Disconnect the battery.

2 Working inside the vehicle, prise out the facia trim panel from the passenger's side. Remove the insulation.

3 To remove the now exposed module, push it as necessary to release the retaining catch.



21.4 Withdraw the module and disconnect the multi-plug - ABS

4 Withdraw the module, and disconnect the multi-plug (see illustration).

**Refitting**

5 Refitting is a reversal of removal but on completion check the operation of the ABS warning lamp as described in the manufacturer's handbook.

**22 Wheel sensor (ABS)  
- removal and refitting**



**Note:** A new O-ring must be used when refitting a sensor.

**Front wheel sensor**

1 Apply the handbrake, loosen the relevant front roadwheel nuts, then jack up the front of the vehicle and support on axle stands (see "Jacking and Vehicle Support"). Remove the roadwheel.

2 Working under the bonnet, unclip the ABS wiring loom from the chassis side member, and disconnect the wheel sensor wiring plug.

3 Unscrew the mounting bolt and withdraw the sensor (see illustration).

4 Refitting is a reversal of removal, bearing in mind the following points.

5 Clean the bore in the hub carrier, and smear the bore and the sensor with lithium based grease.

6 Use a new O-ring seal when refitting the sensor.

**Rear wheel sensor**

7 Chock the front wheels, loosen the relevant rear roadwheel nuts, then jack up the rear of the vehicle and support on axle stands. Release the handbrake and remove the roadwheel.

8 Working inside the vehicle, lift up the rear seat cushion, then remove the side kick panel and fold the carpet forwards to gain access to the wheel sensor wiring plug (see illustrations).

9 Remove the wiring plug from its clip, and disconnect it.

10 Prise out the floor panel grommet, then feed the sensor wiring through the floor panel.

11 Free the handbrake cable from its clip on the suspension lower arm.



22.3 Unscrew the mounting bolt and withdraw the front wheel sensor - ABS

12 Where applicable, disconnect the wiring to the disc pad wear sensor.

13 Unscrew and remove the bolt from the forward caliper guide pin, while holding the pin stationary with a spanner.

14 Swing the caliper rearwards to gain access to the wheel sensor.

15 Unscrew the bolt securing the sensor to its mounting bracket.

16 Refitting is a reversal of removal, bearing in mind the following points.

17 Clean the bore in the sensor mounting bracket, and smear the bore and the sensor with lithium based grease.

18 Use a new O-ring seal when refitting the sensor.

**23 Deceleration sensitive valve  
(all models with conventional  
braking system)  
- removal and refitting**



**Caution:** Refer to the precautions in Section 1.

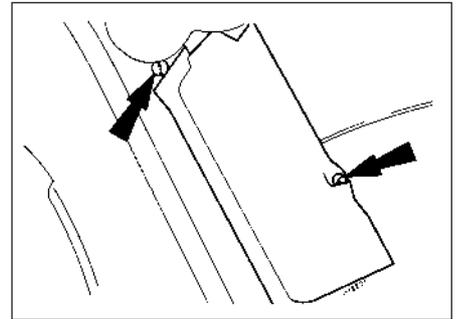
**Removal**

1 The deceleration sensitive valve is located on the left-hand side of the engine compartment (see illustrations).

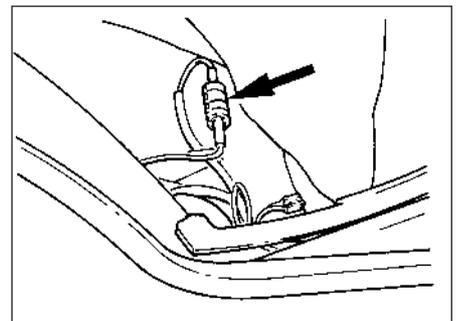
2 Place a suitable container beneath the valve to catch spilt fluid, then unscrew the union nuts and disconnect the fluid pipes.



23.1a Early type deceleration sensitive valve



22.8a Remove the side kick panel (securing screws arrowed) for access to the rear wheel sensor wiring plug - ABS



22.8b Rear wheel sensor wiring plug (arrowed) - ABS

Plug the open ends of the pipes and valve to prevent fluid leakage and dirt ingress. If fluid is accidentally spilt on the paintwork, wash off immediately with cold water.

3 On early models, the valve is secured to the mounting bracket on the inner wing by a single bolt. Unscrew the bolt and remove the valve.

4 On later models, the valve is secured to the mounting bracket by a clip. Remove the clip and slide out the valve.

**Refitting**

5 Refitting is a reversal of removal, but note that the early type of valve must be fitted with the cover bolts facing forwards, and the later type of valve must be fitted with the smaller diameter stepped end facing forwards.

6 On completion, bleed the rear hydraulic circuit.



23.1b Later type deceleration sensitive valve



24.3 Remove the spring clip (arrowed) and clevis pin from the valve operating lever

## 24 Load apportioning valve (P100 models) - removal and refitting



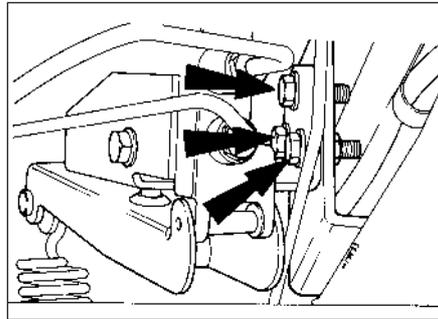
**Caution:** Refer to the precautions in Section 1.

### Removal

- 1 Chock the front wheels, jack up the rear of the vehicle and support on axle stands (see "Jacking and Vehicle Support").
- 2 The load apportioning valve is located on the right-hand side of the vehicle underbody above the axle.
- 3 Remove the spring clip and clevis pin, and detach the spring from the valve operating lever (see illustration).
- 4 Place a suitable container beneath the valve to catch spilt fluid, then unscrew the union nuts and disconnect the fluid pipes. Plug the open ends of the pipes and valve to prevent fluid leakage and dirt ingress.
- 5 Unscrew the three securing nuts and bolts from the valve mounting bracket, and remove the valve assembly (see illustration).

### Refitting

- 6 Refitting is a reversal of removal, but note that the fluid inlet pipe from the master cylinder



24.5 Load apportioning valve securing bolts (arrowed)

must be connected to the lower valve port, and the fluid outlet pipe to the rear brakes must be connected to the upper valve port.

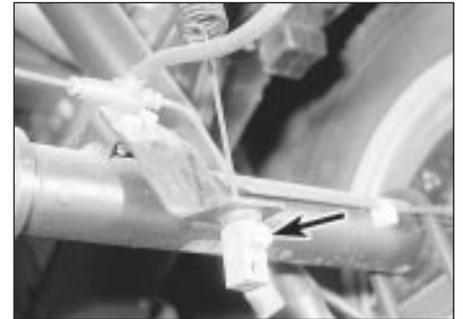
- 7 On completion, bleed the rear hydraulic circuit and check the valve adjustment.

## 25 Load apportioning valve (P100 models) - adjustment



### Models before mid-April 1989

- 1 The vehicle must be unladen, at normal kerb weight (a full tank of petrol, but no driver or load).
- 2 With the vehicle standing on its roadwheels, remove the spring clip and clevis pin, and detach the spring from the valve operating lever.
- 3 Loosen the locknut on the abutment block at the bottom of the spring (see illustration).
- 4 Slide the spring through the grommet in the bracket on the axle, until the correct "X" dimension is obtained between the centre of the spring eye and the centre of the valve operating lever eye (see illustration).
- 5 Hold the spring in position, slide the abutment block against the underside of the grommet, and tighten the locknut.
- 6 Attach the free end of the spring to the valve operating lever, and refit the clevis pin and spring clip.



25.3 Loosen the locknut (arrowed) on the abutment block

### Models from mid-April 1989

- 7 The procedure is as described above, but note that the dimension "X" has been revised to 92.0 mm (3.6 in) with the vehicle unladen at normal kerb weight.

## 26 Brake fluid pipes and hoses - removal and refitting



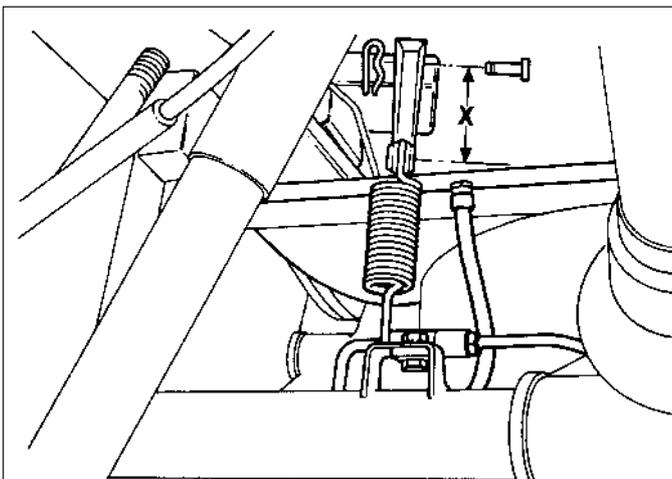
**Caution:** Refer to the precautions in Section 1.

### Removal

- 1 To remove a flexible hose, always free it from any mounting bracket(s) first by prising out the U-shaped retaining clip, and then using two close-fitting spanners to disconnect the hose-to-rigid pipe union (see illustration).
- 2 Once disconnected from the rigid pipe, the flexible hose may be unscrewed from the caliper or wheel cylinder union, as applicable.

### Refitting

- 3 When reconnecting pipe or hose fittings, note that the seal is made at the swaged end of the pipe, so do not continue to tighten a union if it is tight, yet still stands proud of the surface into which it is screwed.



25.4 Load apportioning valve adjustment

$X = 77.0 \text{ mm (3.0 in)}$  with vehicle unladen at normal kerb weight



26.1 Flexible hose-to-rigid pipe union. U-shaped retaining clip arrowed

## 10•20 Braking system

4 A flexible hose must never be installed twisted, but a slight "set" is permissible to give it clearance from adjacent components. This can be achieved by turning the hose slightly before fitting the U-shaped retaining clip to the mounting bracket.

5 Rigid pipelines can be made to pattern by motor factors supplying brake components.

### 27 Handbrake cable - removal and refitting



#### Removal

1 Chock the front wheels, loosen the rear roadwheel nuts, then jack up the rear of the vehicle and support on axle stands. Release the handbrake and remove the roadwheels.

2 Slacken the handbrake cable adjuster.

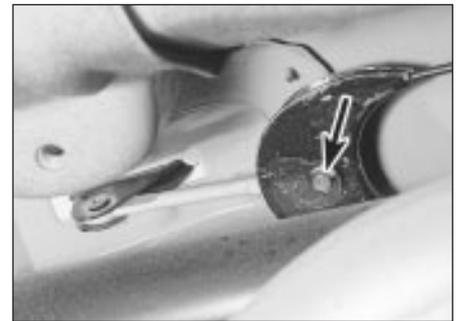
3 Extract the securing circlip and pivot pin, and detach the handbrake equaliser from the linkage on the underbody (see illustration).

4 On models with a conventional braking system, remove the brake shoes and disconnect the handbrake cables from the operating levers, then disconnect the cables from the brake backplates by extracting the U-clips.

5 On models with ABS, unhook the handbrake cables from the operating levers on the calipers, then disconnect the cables from the caliper carrier brackets by removing the retaining circlips (see illustrations).

6 On Saloon, Hatchback and Estate models bend back the tangs and release the cables from the lower suspension arms, then feed the cables through the holes in the suspension crossmember and release them from the brackets on the underbody, noting that the right-hand cable is retained by a circlip (see illustration). Withdraw the cable assembly from the vehicle.

7 On P100 models, release the cables from the brackets on the chassis crossmember, noting that the left-hand cable is retained by a circlip, then unhook the cable support springs



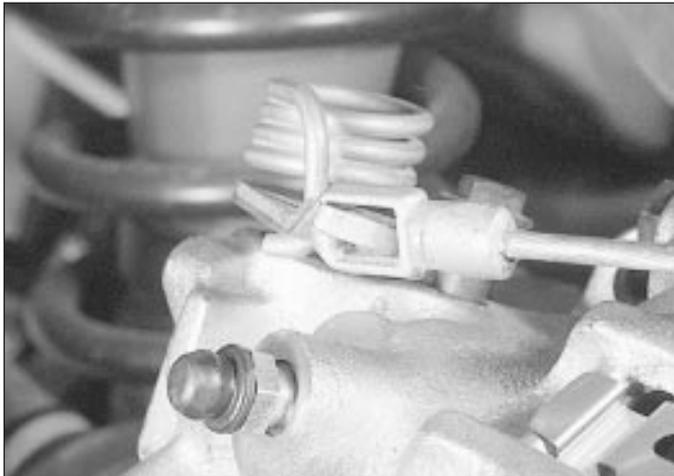
27.3 Handbrake equaliser securing circlip (arrowed) and pivot pin

and withdraw the cable assembly from the vehicle (see illustration).

#### Refitting

8 Refitting is a reversal of removal. On models with a conventional braking system refit the brake shoes.

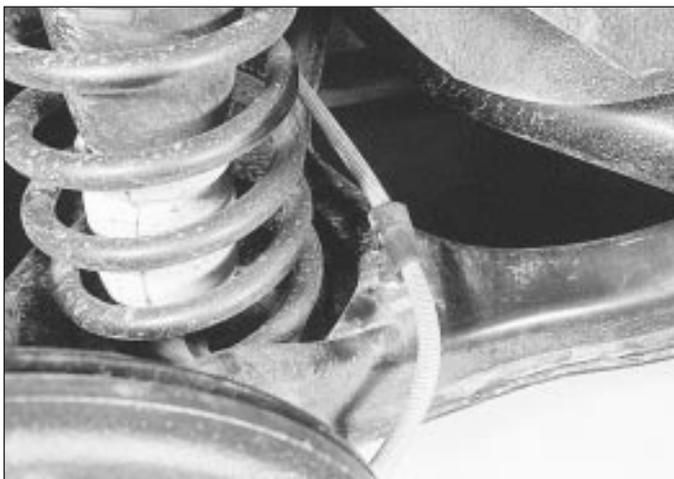
9 On completion, adjust the cable.



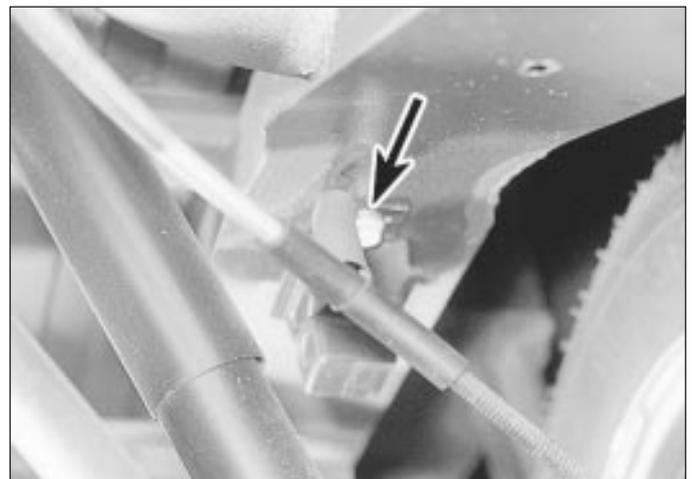
27.5a Handbrake cable-to-operating lever attachment - ABS



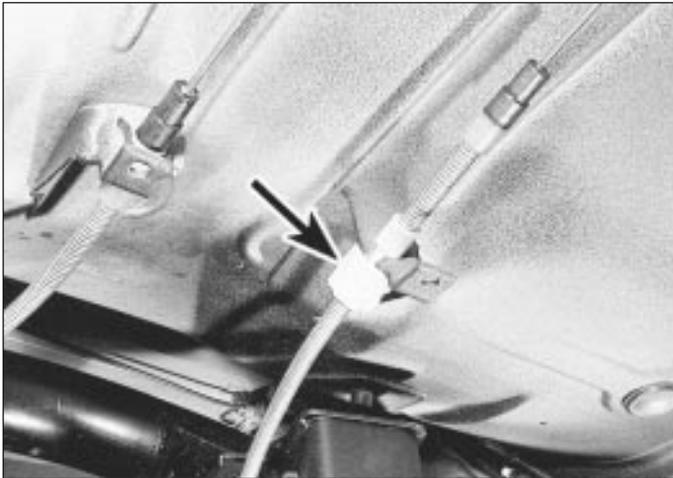
27.5b Handbrake cable-to-caliper carrier bracket attachment - ABS



27.6 Handbrake cable-to-lower suspension arm attachment



27.7 Handbrake cable support spring (arrowed)



28.3 Handbrake cable adjuster on left-hand underbody bracket (arrowed)



28.5 Plastic plunger (arrowed) in brake backplate

## 28 Handbrake cable - adjustment

**Note:** Where fitted, the adjuster locking pin must be renewed on completion of adjustment.

### Conventional braking system (except P100 models)

- 1 The handbrake cable is normally self-adjusting in use, however adjustment may be required to compensate for cable stretch over a long period, and is also necessary after fitting a new cable.
- 2 Chock the front wheels, jack up the rear of the vehicle and support on axle stands (see "Jacking and Vehicle Support"). Release the handbrake.
- 3 Unscrew the locknut from the adjuster located on the left-hand underbody bracket (see illustration). On later models, a locking pin is fitted to the bracket to lock the adjuster nuts in position. Where applicable, remove the locking pin before unscrewing the locknut.



28.11 Make alignment marks between each handbrake operating lever and caliper body (arrowed) - ABS

- 4 Apply the footbrake vigorously several times to set the self-adjuster mechanism.
- 5 Turn the adjuster until the plastic plungers located in the brake lockplates are free to turn, and the total movement of both plungers added together is between 0.5 and 1.0 mm (0.02 and 0.04 in) (see illustration).
- 6 Tighten the adjuster locknut against the adjuster nut by hand (two clicks), then tighten further by a minimum of two and a maximum of four clicks, using a suitable spanner or pliers.
- 7 Where applicable, fit a new adjuster locking pin. The old pin should not be re-used.
- 8 Check that with the handbrake released, the rear wheels are free to rotate and no brake "bind" is evident. The handbrake lever travel should be between two and four clicks of the ratchet. If brake "bind" or excessive lever travel is evident, check the handbrake cable routing, and check the self-adjuster mechanism for wear or damage.

### ABS

- 9 Proceed as described in paragraphs 1 to 3 inclusive.
- 10 Bend back the tangs and release the cables from the lower suspension arms.
- 11 Ensure that both handbrake operating levers are returned to their stops on the calipers, then make alignment marks between the levers and the caliper bodies (see illustration).
- 12 Turn the adjuster until either lever just starts to move, as indicated by the alignment marks.
- 13 Apply the handbrake and release it several times to equalise the cable runs.
- 14 With the handbrake released, proceed as described in paragraphs 6 and 7.
- 15 Refit the cables to the lower suspension arms, and secure by bending over the tangs.
- 16 Check that with the handbrake released, the rear wheels are free to rotate and no brake

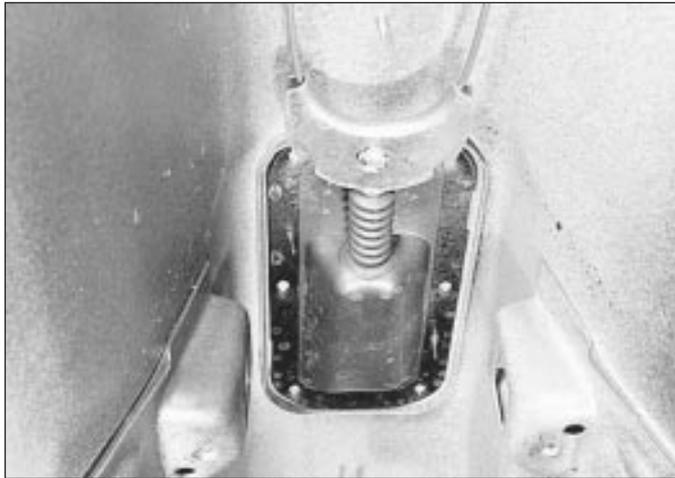
"bind" is evident. The handbrake lever travel should be between two and four clicks of the ratchet. If brake "bind" or excessive lever travel is evident, check the handbrake cable routing, and check the caliper mechanism for wear or damage.

### P100 models

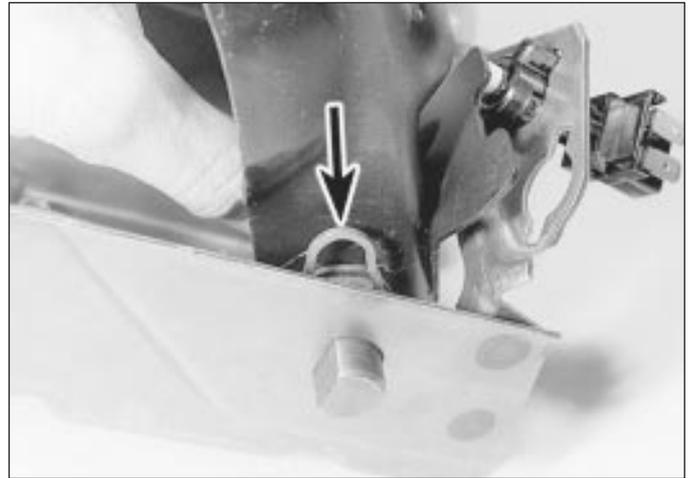
- 17 Proceed as described in paragraphs 1 to 4 inclusive, but note that the adjuster is located on the right-hand side of the chassis crossmember (see illustration).
- 18 Apply the handbrake, pulling the lever upwards three clicks.
- 19 Turn the adjuster until both rear wheels are locked and cannot be turned by hand.
- 20 Proceed as described in paragraphs 6 and 7.
- 21 Check that with the handbrake released, the rear wheels are free to rotate and no brake "bind" is evident. The handbrake lever travel should be between three and five clicks of the ratchet. If brake "bind" or excessive lever travel is evident, check the handbrake cable routing, and check the self-adjuster mechanism for wear or damage.



28.17 Handbrake cable adjuster on right-hand side of chassis crossmember



29.3 Handbrake equaliser and linkage on underbody



30.2 Extract the inboard circlip (arrowed) to remove the pedal pivot shaft

### 29 Handbrake lever - removal and refitting



#### Removal

- 1 Chock the rear wheels, jack up the front of the vehicle and support on axle stands. Release the handbrake. Disconnect the battery negative lead.
- 2 Slacken the handbrake cable adjuster.
- 3 Extract the securing circlip and pivot pin, and detach the handbrake equaliser from the linkage on the underbody (see illustration).
- 4 Working inside the vehicle, remove the handbrake lever rubber gaiter and/or the centre console, as necessary.
- 5 Disconnect the wiring connector from the handbrake "on" warning switch.

- 6 Unscrew the two handbrake lever mounting bolts, and carefully lift the lever through the underfloor gaiter.
- 7 If required, the handbrake "on" warning switch can be removed.

#### Refitting

- 8 Refitting is a reversal of removal, but on completion, adjust the handbrake cable.

### 30 Brake pedal - removal and refitting



#### Removal

- 1 Remove the clutch pedal as described in Chapter 6.
- 2 Extract the inboard circlip from the brake pedal end of the pivot shaft (see illustration).

- 3 The brake pedal can now be removed from the pedal bracket by sliding out the pivot shaft, noting the position of any washers and spacers which may be fitted.
- 4 If desired, the nylon bushes can be prised from each side of the pedal for renewal, and the brake lamp switch removed.

#### Refitting

- 5 Refitting is a reversal of removal, fitting any washers and spacers in their original positions. Refit the clutch pedal.