






Chapter 9

Braking system

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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	
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Specifications

System type	Diagonally split dual circuit, hydraulic with pressure regulating valve to rear brakes. Servo assistance and Anti-lock Braking System (ABS) as standard or optional equipment according to model. Cable-operated handbrake on rear brakes
Front brakes	
Type	Solid or ventilated disc with single piston sliding calipers
Disc diameter	239.45 mm
Disc thickness:	
Solid disc	10.0 mm
Ventilated disc	24.0 mm
Minimum disc thickness:	
Solid disc	8.7 mm
Ventilated disc	22.7 mm
Maximum disc run-out	0.15 mm
Minimum disc pad thickness	1.5 mm
Rear brakes	
Type	Self-adjusting single leading shoe drum
Drum diameter:	
Standard hub/drum	180.0 mm
Van, XR3i, RS Turbo and certain 1.6 litre models	203.2 mm
Wheel cylinder diameter	17.78 mm, 19.05 mm or 22.2 mm according to model - see text
Minimum brake shoe lining thickness	1.0 mm

Torque wrench settings

	Nm	lbf ft
Caliper piston housing to anchor bracket	20 to 25	15 to 18
Caliper anchor bracket to hub carrier	50 to 66	37 to 49
Rear brake backplate bolts	45 to 55	33 to 40
Brake pressure regulating valve mounting bolts	20 to 25	15 to 18
Light laden valve to mounting bracket	20 to 25	15 to 18
Hydraulic unions	12 to 15	9 to 11
Master cylinder to servo	21 to 26	15 to 19
Modulator pivot bolt (ABS)	22 to 28	16 to 21
Modulator adjuster bolt (ABS)	22 to 28	16 to 21
Modulator drivebelt cover (ABS)	8 to 11	6 to 8
Load apportioning valve adjusting bracket nuts (ABS)	21 to 29	15 to 21
Load apportioning valve to mounting bracket (ABS)	21 to 29	15 to 21
Rear suspension arm inner mounting nuts	70 to 90	52 to 66
Front suspension lower arm balljoint pinch-bolt	48 to 60	35 to 44
Tie-rod balljoint nut	57 to 68	42 to 50

1 General description

The braking system is of the dual circuit hydraulic type with disc brakes at the front and drum brakes at the rear. A diagonally split dual circuit hydraulic system is employed in which each circuit operates one front and one diagonally opposite rear brake from a tandem master cylinder. Under normal conditions both circuits operate in unison; however, in the event of hydraulic failure in one circuit, full braking force will still be available at two wheels. A pressure regulating valve on Saloon



2.2 Disconnect the disc pad wear sensor lead at the connector



2.3 Disc pad retaining clip

and Estate models, and a light laden valve on Van models is incorporated in the rear brake hydraulic circuit. The valve regulates the pressure applied to each rear brake and reduces the possibility of the rear wheels locking under heavy braking.

The front brakes utilise solid or ventilated discs according to model and are operated by single piston sliding type calipers. At the rear, leading and trailing shoes are operated by twin piston wheel cylinders and are self-adjusting by footbrake application. A cable-operated handbrake provides an independent mechanical means of rear brake operation.

From 1986 onwards an anti-lock braking system is available as standard or optional equipment according to model. Further information on this system will be found in later Sections of this Chapter.

Note: When servicing any part of the system, work carefully and methodically; also observe scrupulous cleanliness when overhauling any part of the hydraulic system. Always renew components (in axle sets, where applicable) if in doubt about their condition, and use only genuine Ford replacement parts, or at least those of known good quality. Note the warnings given in "Safety first" and at the relevant points in this Chapter concerning the dangers of asbestos dust and hydraulic fluid.



2.4a Unscrew the caliper bolt using an Allen key ...

2 Front disc pads - renewal



Warning: Renew both sets of front brake pads at the same time - never renew the pads on only one wheel, as uneven braking may result. Note that the dust created by wear of the pads may contain asbestos, which is a health hazard. Never blow it out with compressed air, and don't inhale any of it. An approved filtering mask should be worn when working on the brakes. DO NOT use petrol or petroleum-based solvents to clean brake parts; use brake cleaner or methylated spirit only.

- 1 Slacken the roadwheel bolts, raise the front of the vehicle, support it with safety stands (see "Jacking and Vehicle Support") and remove the roadwheel(s).
- 2 Where fitted, disengage the brake pad wear sensor from its retaining clip (beneath the bleed screw) and disconnect the lead connector (see illustration).
- 3 Using a screwdriver, prise free the retaining clip from the caliper (see illustration).
- 4 Using a 7 mm Allen key, unscrew the bolts until they can be withdrawn from the caliper anchor brackets (see illustrations).
- 5 Withdraw the piston housing and tie it up



2.4b ... and withdraw the bolt from the anchor bracket



2.5 Withdraw the caliper piston housing



2.6 Removing the inboard pad from the piston housing . . .



2.7 . . . and the outboard pad from the anchor bracket

with a length of wire to prevent strain on the flexible hose (see illustration).

6 Withdraw the inboard pad from the piston housing (see illustration).

7 Withdraw the outboard pad from the anchor bracket (see illustration).

8 Clean away all residual dust or dirt, **taking care not to inhale the dust** as, being asbestos based, it is injurious to health.

9 Using a piece of flat wood, a tyre lever or similar, push the piston squarely into its bore. This is necessary in order to accommodate the new thicker pads when they are fitted.

10 Depressing the piston will cause the fluid level in the master cylinder reservoir to rise, so anticipate this by siphoning out some fluid using an old hydrometer or poultry baster.

Take care not to drip hydraulic fluid onto the paintwork; it acts as an effective paint stripper.

11 Commence reassembly by fitting the inboard pad into the piston housing. Make sure that the spring on the back of the pad fits into the piston.

12 The wear sensor wire should be routed to ensure that it cannot chafe against any moving parts. Attach the wear sensor connector to the bleed screw clip (where applicable), and reconnect it.

13 Where the cable has become unwound, loosely coil the surplus wire so that slack is taken out, yet enough flexibility (25 mm) is still allowed for pad wear. The coiled wire must on no account be stretched.

14 Peel back the protective paper covering

from the surface of the new outboard pad and locate it in the jaws of the caliper anchor bracket.

15 Locate the caliper piston housing and screw in the Allen bolts to the specified torque.

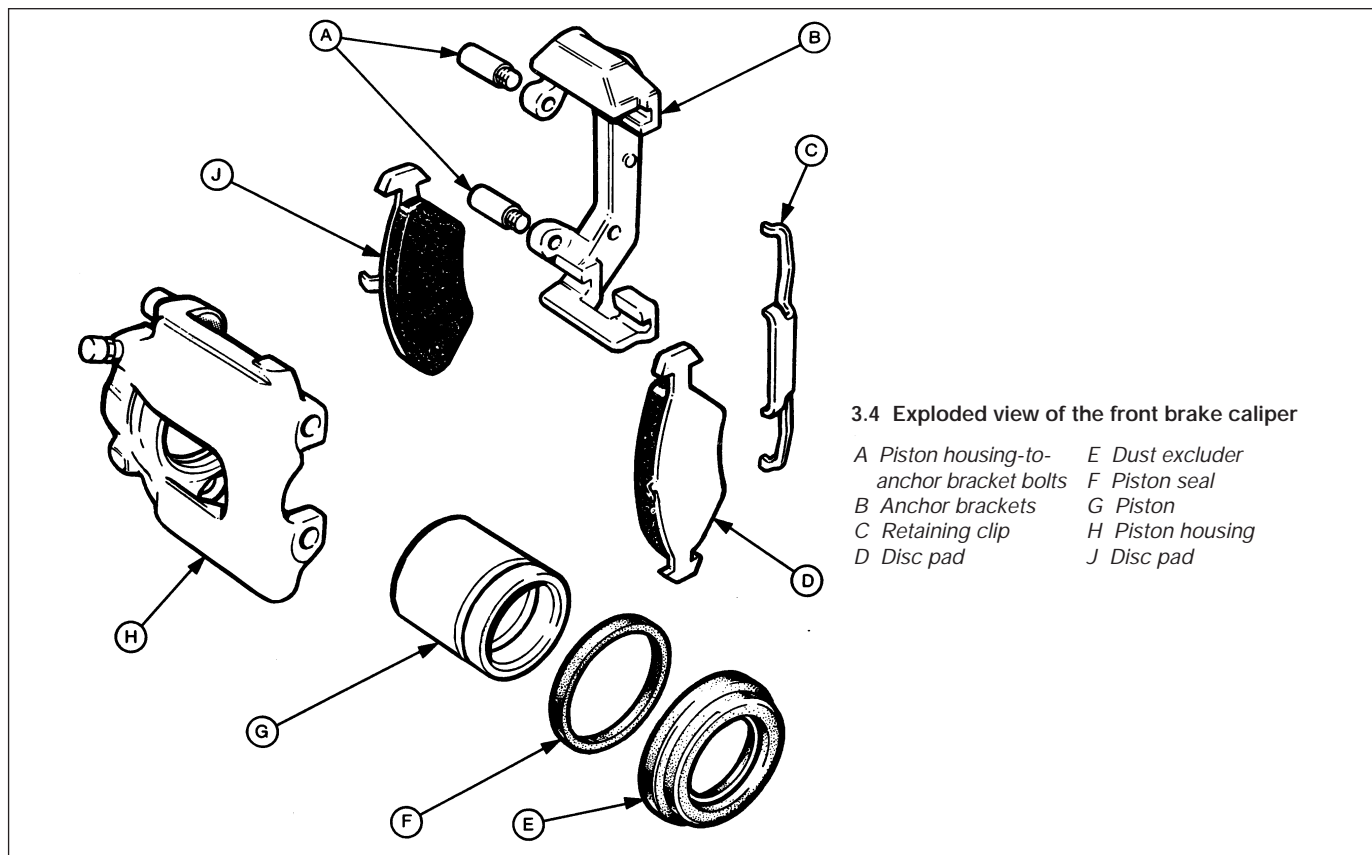
16 Fit the retaining clip.

17 Repeat the operations on the opposite brake.

18 Apply the footbrake hard several times to position the pads against the disc and then check and top-up the fluid in the master cylinder reservoir.

19 Fit the roadwheel(s) and lower the vehicle.

20 Avoid heavy braking (if possible) for the first hundred miles or so when new pads have been fitted. This is to allow them to bed in and reach full efficiency.



3.4 Exploded view of the front brake caliper

- | | |
|--|------------------|
| A Piston housing-to-anchor bracket bolts | E Dust excluder |
| B Anchor brackets | F Piston seal |
| C Retaining clip | G Piston |
| D Disc pad | H Piston housing |
| | J Disc pad |

3 Front brake caliper - removal, overhaul and refitting



Warning: 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, use the recommended type, and ensure that it comes from a freshly-opened sealed container.

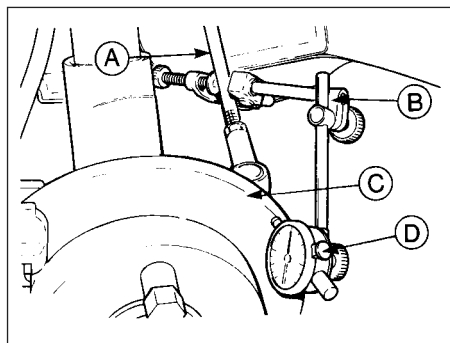
Note: Before starting work, refer to the warning at the beginning of Section 2 concerning the dangers of asbestos dust.

Removal

- 1 Proceed as described in paragraphs 1 to 8 in the previous Section.
- 2 Disconnect the brake flexible hose from the caliper. This can be carried out in one of two ways. Either disconnect the flexible hose from the rigid hydraulic pipeline at the support bracket by unscrewing the union, or, once the caliper is detached, hold the end fitting of the hose in an open-ended spanner and unscrew the caliper from the hose. Do not allow the hose to twist, and plug its end after caliper removal.

Overhaul

- 3 Brush away all external dirt and pull off the piston dust-excluding cover.



4.3 Checking brake disc run-out

- | | |
|------------------------------|--------------|
| A Steering tie-rod | C Brake disc |
| B Dial gauge support fixture | D Dial gauge |

- 4 Apply air pressure to the fluid inlet hole and eject the piston (see illustration). Only low air pressure is needed for this, such as is produced by a foot-operated tyre pump.

- 5 Using a sharp pointed instrument, pick out the piston seal from the groove in the cylinder bore. Do not scratch the surface of the bore.

- 6 Examine the surfaces of the piston and the cylinder bore. If they are scored or show evidence of metal-to-metal rubbing, then a new piston housing will be required. Where the components are in good condition, discard the seal and obtain a repair kit.

- 7 Wash the internal components in clean brake hydraulic fluid or methylated spirit only, nothing else.

- 8 Using the fingers, manipulate the new seal into its groove in the cylinder bore.

- 9 Dip the piston in clean hydraulic fluid and insert it squarely into its bore.

- 10 Connect the rubber dust excluder between the piston and the piston housing, and then depress the piston fully.

Refitting

- 11 Refit the caliper by reversing the removal operations, referring to paragraphs 11 to 16 in the previous Section.

- 12 Reconnect the brake hose to the caliper, taking care not to distort it. When secured it must not interfere with any of the adjacent steering or suspension components.

- 13 Bleed the brake hydraulic circuit as given in Section 11 or 23, as applicable, then refit the roadwheel(s) and lower the vehicle.

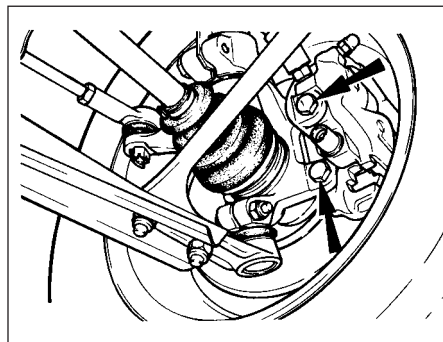
4 Front brake disc - inspection, removal and refitting

Note: Before starting work, refer to the warning at the beginning of Section 2 concerning the dangers of asbestos dust.

Inspection

- 1 Fully apply the handbrake then loosen the front roadwheel bolts. Raise and support the front of the vehicle on safety stands (see "Jacking and Vehicle Support") and remove the roadwheel(s).

- 2 Examine the surface of the disc. If it is deeply grooved or scored or if any small



4.6 Caliper anchor bracket-to-hub carrier retaining bolts (arrowed)

cracks are evident, it must either be refinished or renewed. Any refinishing must not reduce the thickness of the disc to below a certain minimum (see "Specifications"). Light scoring on a brake disc is normal and should be ignored.

- 3 If disc distortion is suspected, the disc can be checked for run-out using a dial gauge or feeler blades located between its face and a fixed point as the disc is rotated (see illustration).

- 4 Where the run-out exceeds the specified figure, renew the disc.

Removal

- 5 With the roadwheel removed (see paragraph 1), proceed as follows.

- 6 To remove a disc, unbolt the caliper anchor bracket, withdraw it and tie it up to the suspension strut to avoid strain on the flexible hose (if necessary, remove the brake pads as described in Section 2) (see illustration).

- 7 Extract the small disc retaining screw and pull the disc from the hub (see illustration).

Refitting

- 8 If a new disc is being installed, clean its surface free from preservative.

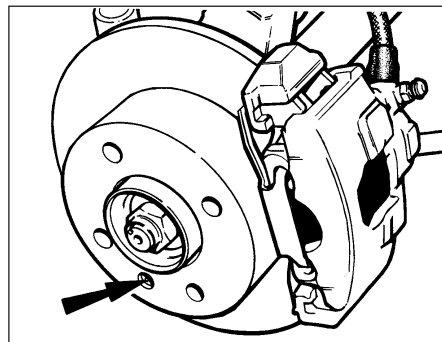
- 9 Fit the disc and tighten the retaining screw.

- 10 Refit the caliper anchor bracket (and where applicable the brake pads - see Section 2), and the roadwheel and lower the vehicle to the floor.

5 Rear brake shoes - renewal



Warning: Brake shoes must be renewed on both rear wheels at the same time - never renew the shoes on only one wheel, as uneven braking may result. Also, the dust created by wear of the shoes may contain asbestos, which is a health hazard. Never blow it out with compressed air, and don't inhale any of it. An approved filtering mask should be worn when working on the brakes. DO NOT use petrol or petroleum-based solvents to clean brake parts; use brake cleaner or methylated spirit only.



4.7 Brake disc retaining screw location (arrowed)



5.3a Remove the rear hub dust cap . . .



5.3b . . . extract the split pin and nut retainer . . .



5.3c . . . then unscrew the hub nut . . .



5.3d . . . and remove the thrustwasher



5.4 Remove the hub outer bearing . . .



5.5 . . . followed by the hub/drum assembly

Carburettor engine models except Van variants

1 Slacken the roadwheel bolts, raise the rear of the vehicle and support it securely (see "Jacking and Vehicle Support"). Remove the roadwheels.

2 Release the handbrake fully.

3 Tap off the hub dust cap, remove the split pin, nut retainer, nut and thrustwasher (see illustrations).

4 Pull the hub/drum towards you and then push it back enough to be able to take the outer bearing from the spindle (see illustration).

5 Remove the hub/drum and brush out any dust taking care not to inhale it (see illustration).

6 Remove the shoe hold-down spring from the leading shoe (see illustration). Do this by gripping the dished washer with a pair of pliers, depressing it and turning it through 90°. Remove the washer, spring and the hold-down post. Note the locations of the leading and trailing shoes and the cut-back of the linings at the leading ends.

7 Pull the leading shoe outwards and upwards away from the backplate (see illustration).

8 Twist the shoe to disengage it from the return springs and adjuster strut. On models with the later type rear brake assembly it will be necessary to move the auto adjuster to maximum adjustment to disengage the shoe from the strut. Make a note of the return spring arrangement and hole locations if in any doubt (see illustrations).

9 Remove the trailing shoe in a similar way, at the same time withdrawing the adjuster strut.

10 Release the end of the handbrake cable from the lever on the shoe (see illustration).

11 Disconnect the trailing shoe from the adjuster strut by pulling the shoe outwards and twisting the shoe spring (see illustration).

12 Before reassembly, sparingly lubricate the brake shoe contact areas on the backplate, fixed abutment and wheel cylinder pistons with a high melting-point brake grease.

13 Commence reassembly by installing the trailing shoe. Do this by engaging the handbrake lever return spring to the shoe. Hook the strut onto the spring and lever it into position. Set the strut self-adjusting

mechanism to its contracted position (early type) or maximum position (later type).

14 Locate the webs of the trailing shoe on the wheel cylinder and the fixed abutment, making sure that the lower end of the handbrake lever is correctly located on the face of the plastic plunger and not trapped behind it.

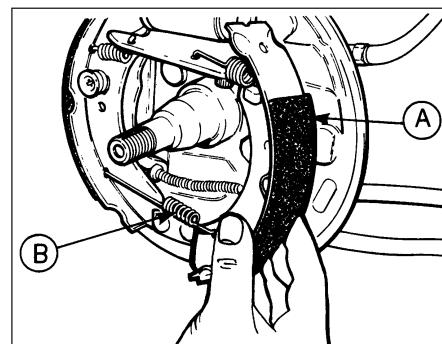
15 Fit the trailing shoe hold-down post and spring. Hold the leading shoe in position.

16 Connect the larger shoe return spring at the lower (abutment) position between both shoes.

17 Holding the leading shoe almost at right-angles to the backplate, connect the spring between it and the strut and then engage the bottom end of the shoe behind the abutment retainer plate.

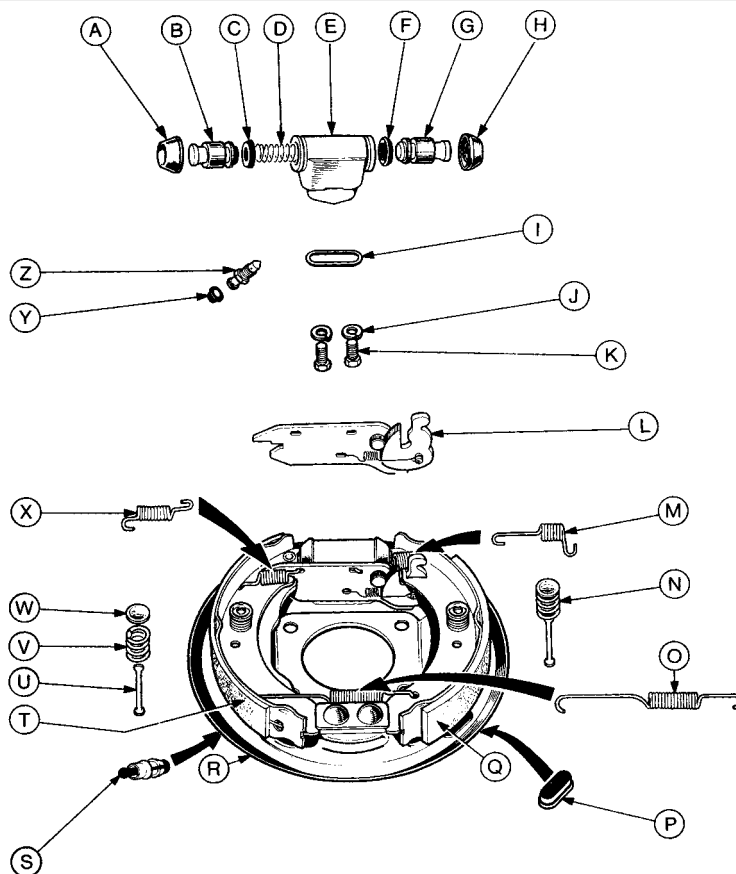


5.6 Removing the brake shoe hold-down washer and spring

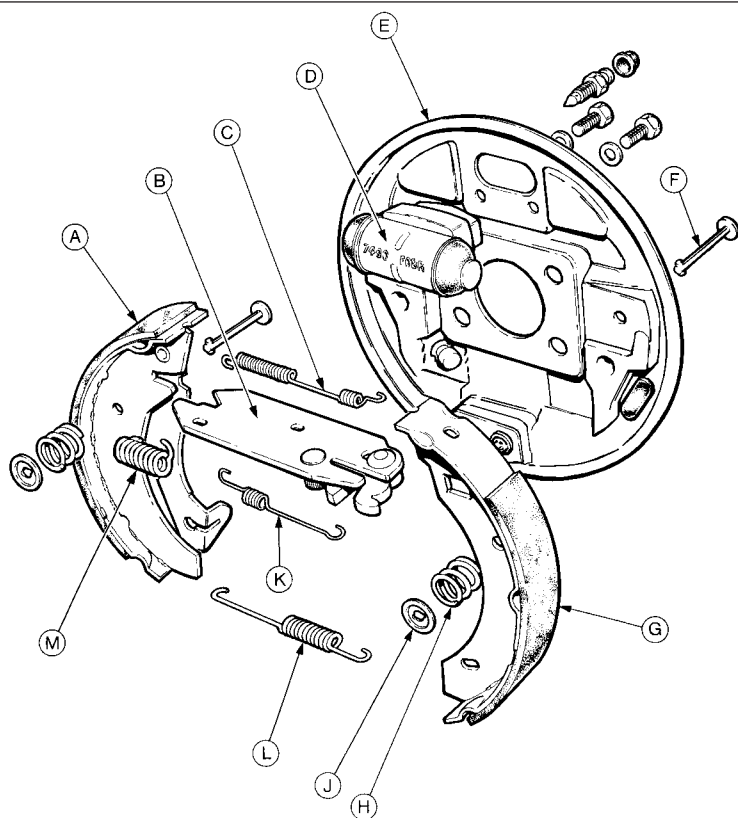
5.7 Removing the leading brake shoe
A Leading shoe B Lower spring

5.8a Exploded view of the rear brake assembly as fitted to early models

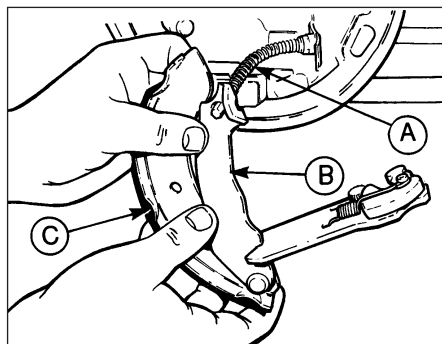
- A Dust excluder
- B Piston
- C Seal
- D Spring
- E Cylinder body
- F Seal
- G Piston
- H Dust excluder
- I Gasket
- J Spring washer
- K Mounting bolt
- L Adjuster strut
- M Return spring
- N Hold-down spring
- O Return spring
- P Inspection hole plug
- Q Leading shoe
- R Backplate
- S Handbrake lever plunger
- T Trailing shoe
- U Hold-down post
- V Spring
- W Dished washer
- X Return spring
- Y Dust cover
- Z Bleed screw



5.8b Exploded view of the rear brake assembly as fitted to fuel-injected models, Van variants and later Saloon and Estate models



- A Trailing shoe
- B Adjuster strut
- C Spring
- D Wheel cylinder
- E Backplate
- F Hold-down post
- G Leading shoe
- H Spring
- J Dished washer
- K Ratchet pawl spring
- L Return spring
- M Return spring



5.10 Removing the handbrake cable from the trailing brake shoe

A Handbrake cable C Trailing shoe
B Lever

18 Swivel the shoe towards the backplate so that the cut-out in its web passes over the quadrant lever. Fit the shoe hold-down post, spring and washer.

19 Centralise the shoes within the backplate by tapping them if necessary with the hand, then fit the hub/drum and slide the outer bearing onto the spindle.

20 Fit the thrustwasher and hub nut finger tight only.

21 Tighten the hub nut to a torque of between 20 and 25 Nm (15 and 18 lbf ft), at the same time rotating the roadwheel in an anti-clockwise direction.

22 Unscrew the nut one half a turn and then tighten it only finger tight.

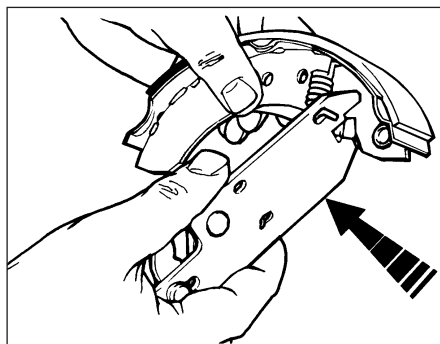
23 Fit the nut retainer so that two of its slots line up with the split pin hole. Insert a new split pin, bending the end around the nut, not over the end of the stub axle.

24 Tap the dust cap into position.

25 Refit the roadwheel and check that a small amount of hub bearing free play can be felt when the wheel is rocked at the top and bottom.

26 Depress the brake pedal fully several times to operate the self-adjusting mechanism then lower the car to the ground.

27 Recheck the tightness of the wheel bolts.



5.11 Separating the trailing brake shoe from the adjuster strut

Fuel-injection engine models and Van variants

28 On these vehicles the brake drum is separate from the hub and can be removed without the need to remove the hub as well. The bearings will therefore not need to be readjusted during reassembly.

29 The brake shoe inspection and removal procedure is very similar to that described previously but note the following differences.

30 Before removing the drum unscrew the drum retaining screw (see illustration).

31 Disconnect the lower shoe return spring which bridges the shoes and then disconnect the handbrake cable from the lever.

32 Prise the shoes away from the lower pivot, twist them from the wheel cylinder and remove as an assembly.

33 With the shoes removed they can be separated from the strut. Note how the components are positioned before dismantling (see illustrations).

34 Refitting is a reversal of the removal procedure.

6 Rear wheel cylinder - removal, overhaul and refitting

Note: Before starting work, refer to the warning at the beginning of Section 2 concerning the dangers of asbestos dust, and



5.30 Removing the drum retaining screw on models with a separate brake drum

to the warning at the beginning of Section 3 concerning the dangers of hydraulic fluid.

Removal

1 Remove the rear brake shoes, as described in the preceding Section.

2 Disconnect the fluid pipeline from the wheel cylinder and cap the end of the pipe to prevent loss of fluid.

HAYNES HINT A bleed screw rubber dust cap is useful to prevent fluid loss.

3 Unscrew the two bolts which hold the wheel cylinder to the brake backplate and remove the cylinder with sealing gasket (see illustration).

Overhaul

4 Clean away external dirt and then pull off the dust-excluding covers.

5 The pistons and seals will probably shake out. If they do not, apply air pressure (from a tyre pump) at the inlet hole to eject them (see illustration).

6 Examine the surfaces of the pistons and the cylinder bores for scoring or metal-to-metal rubbing areas. If evident, renew the complete cylinder assembly.

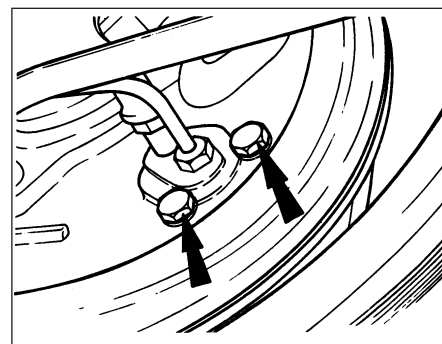
7 If the cylinder is to be renewed note that any one of three different sizes may be fitted



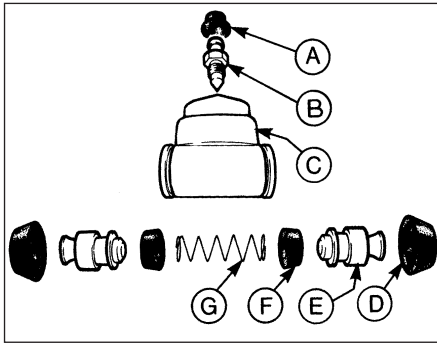
5.33a Brake shoe return spring and adjuster strut arrangement on Van, fuel-injected models and later Saloon and Estate models



5.33b Automatic adjuster assembly on Van, fuel-injected models and later Saloon and Estate models



6.3 Rear wheel cylinder retaining bolts (arrowed)



6.5 Exploded view of the rear wheel cylinder

- | | |
|------------------|---------------|
| A Dust cap | E Piston |
| B Bleed screw | F Piston seal |
| C Wheel cylinder | G Spring |
| D Dust excluder | |

according to model and year. The wheel cylinders are identified by a letter stamped on the rear face which corresponds to the following (see illustration):

- Letter "T" = 22.2 mm diameter cylinder
- Letter "L" = 19.05 mm diameter cylinder
- Letter "H" = 17.78 mm diameter cylinder

Ensure that the new cylinder obtained is the same as the one removed and more importantly, is the same as the cylinder on the other rear brake.

8 Where the components are in good condition, discard the rubber seals and dust excluders and obtain a repair kit.

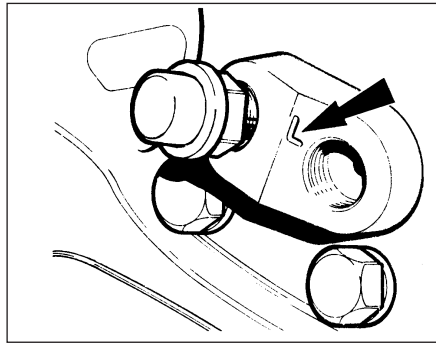
9 Any cleaning should be done using hydraulic fluid or methylated spirit-nothing else.

10 Reassemble by dipping the first piston in clean hydraulic fluid and inserting it into the cylinder. Fit a dust excluder to it.

11 From the opposite end of the cylinder body, insert a new seal, spring, a second new seal, the second piston and the remaining dust excluder. Use only the fingers to manipulate the seals into position and make quite sure that the lips of the seals are the correct way round.

Refitting

12 Bolt the wheel cylinder to the backplate,



6.7 Wheel cylinder identification letter location (arrowed)

reconnect the fluid line and refit the shoes (Section 5).

13 Refit the brake drum and roadwheel and lower the vehicle to the floor.

14 Bleed the brake hydraulic system as described in Section 11 or 23 as applicable.

7 Brake drum - inspection and renewal

Note: Before starting work, refer to the note at the beginning of Section 2 concerning the dangers of asbestos dust.

1 Whenever a brake drum is removed, brush out dust from it, **taking care not to inhale it** as it contains asbestos and is injurious to health.

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

3 Regrinding is not recommended as the internal diameter will no longer be compatible with the shoe lining contact diameter.

8 Handbrake - adjustment

1 Adjustment of the handbrake is normally automatic by means of the self-adjusting mechanism working on the rear brake shoes.

2 However, due to cable stretch, occasional inspection of the handbrake adjusters is

recommended. Adjustment must be carried out if the movement of the control lever becomes excessive.

3 Chock the front wheels. Release the handbrake.

4 Raise and support the vehicle at the rear with safety stands (see "Jacking and Vehicle Support").

5 Grip each adjustment plunger, one located on each rear brake backplate, and move it in and out (see illustration).

6 If the total movement of both plungers added together is between 0.5 and 2.0 mm (0.02 and 0.08 in) then adjustment of the handbrake is satisfactory. If the plunger movement is not as specified proceed as follows.

7 Two cable types are used on Escort models according to year of manufacture and it is necessary to identify the type being worked on before proceeding.

8 Locate the cable adjuster which is located just forward of the fuel tank. If the cable adjuster nut has finger grips but the abutment sleeve is smooth, proceed as follows. If both the cable adjuster and abutment sleeve have finger grips, proceed to paragraph 14 (see illustration).

Early type cable with smooth abutment sleeve

9 Make sure that the abutment sleeve on the cable is fully engaged in its bracket slot. Unlock the adjusting nut by levering between the shoulders of the nut and the sleeve.

10 Now turn the adjuster nut to eliminate slackness from the cable so that it is just possible to rotate the adjustment plungers on the brake backplates.

11 Apply the handbrake fully to seat the adjusting nut against its sleeve.

12 If adjustment of the cable does not alter the plunger movement then the handbrake cable is likely to be binding or seized or the brake mechanism is at fault.

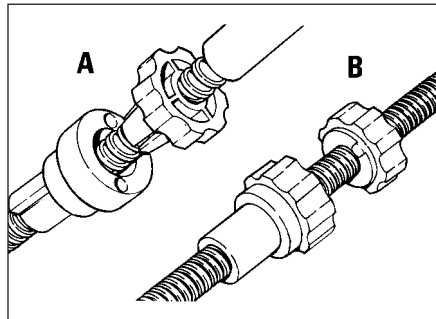
13 On completion lower the car to the ground.

Later type cable with finger grip abutment sleeve

14 If the cable adjuster and abutment sleeve both have finger grips check to see if a nylon



8.5 Handbrake adjustment plunger location (arrowed) on backplate



8.8 Handbrake cable identification

- A Early cable with smooth abutment sleeve
- B Later cable with finger grip abutment sleeve



8.14 Handbrake cable adjuster nylon locking pin (arrowed)

locking pin is used to lock the adjusting nut in position (see illustration). If so remove the locking pin using pliers. Note that a new pin will be needed after adjustment.

15 Slacken the adjusting nut then apply the footbrake hard several times to ensure full self-adjustment of the brake shoes.

16 Turn the abutment sleeve as necessary until the total movement of both adjustment plungers added together is between 0.5 and 2.0 mm (0.02 and 0.08 in).

17 Tighten the adjusting nut against the abutment sleeve as tight as possible by hand (2 clicks) then tighten it by a further 2 clicks (maximum) using a suitable wrench.

18 Where applicable fit a new locking pin and tap it into place.

19 On completion lower the car to the ground.

9 Handbrake cables - renewal

1 Chock the front wheels, then fully release the handbrake.

2 Raise and support the vehicle at the rear with axle stands (see "Jacking and Vehicle Support").

Primary cable

3 Extract the spring clip and clevis pin and disconnect the primary cable from the equaliser (see illustrations).

4 Working inside the vehicle, disconnect the cable from the hand-brake control lever, again by removal of clip and pin. Drift out the cable guide to the rear and withdraw the cable through the floorpan.

5 Refitting is a reversal of removal. Adjust the handbrake, if necessary, as described in Section 8.

Secondary cable

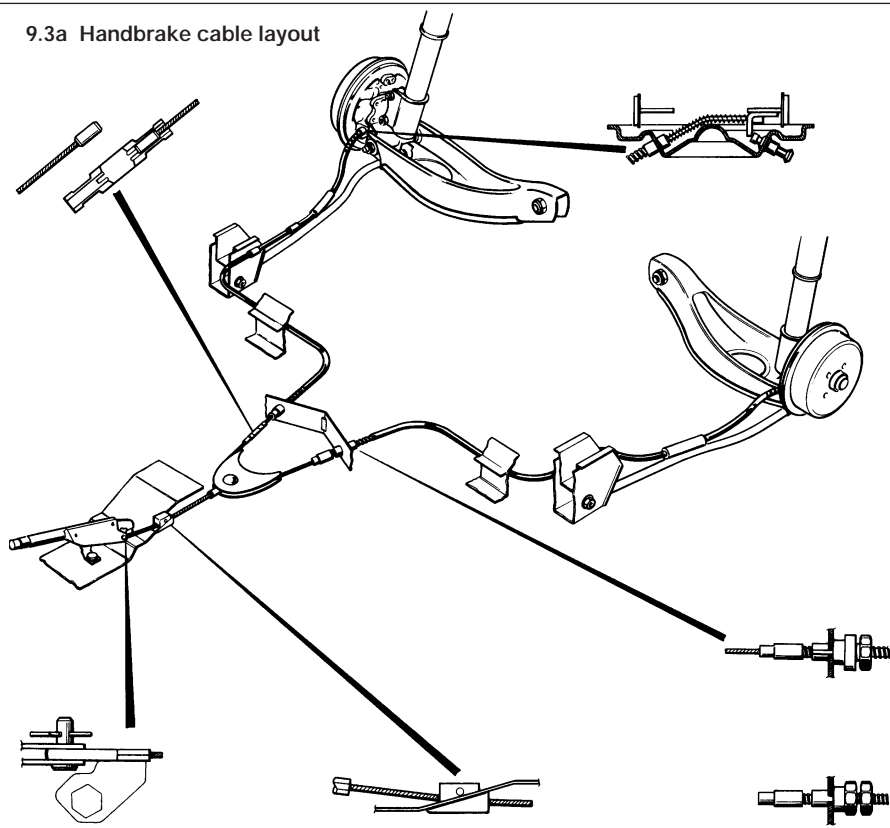
6 Using the procedure described in Section 8, slacken the cable adjusting nut so that the abutment sleeve can be disengaged from its body guide (see illustration).

7 Release the cable connector from its body guide by extracting the spring clip and passing the inner cable through the slit in the guide (see illustration).



9.3b Primary cable-to-equaliser clevis pin and spring clip (arrowed)

9.3a Handbrake cable layout



8 Now disconnect the cable from its body guide on the right-hand side of the vehicle.

9 Separate the cable assembly/equaliser from the primary cable by extracting the spring clip and clevis pin.

10 Release the cable from the body guides.

11 Remove the rear roadwheels and the brake drums.

12 Release the shoe hold-down spring so that the shoe can be swivelled and the handbrake lever unclipped from the relay lever.

13 Remove the cable ends through the brake backplate and withdraw the complete cable assembly from the vehicle.

14 Refitting is a reversal of removal. Grease the cable groove in the equaliser and adjust the handbrake, as described in Section 8.

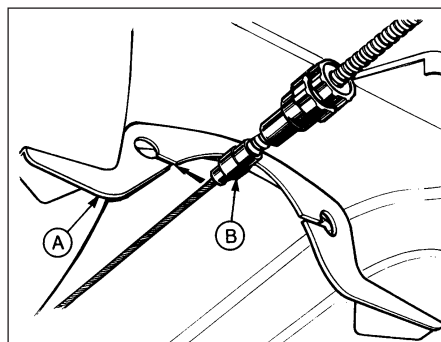
10 Handbrake lever - removal and refitting

Removal

1 Chock the front wheels, raise and support the vehicle at the rear using stands (see "Jacking and Vehicle Support") then release the handbrake.

2 Working underneath, extract the spring clip and clevis pin and disconnect the primary cable from the equaliser.

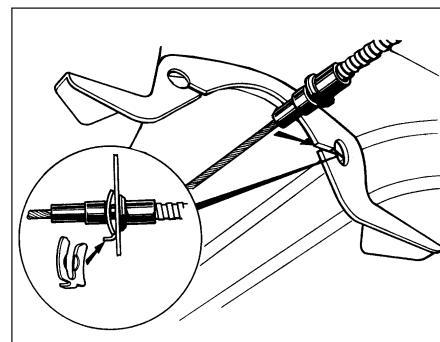
3 From inside the car detach the handbrake warning switch.



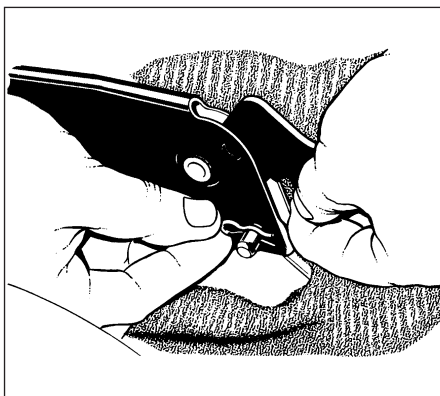
9.6 Removing handbrake cable abutment sleeve from the body guide

A Body guide

B Secondary cable



9.7 Handbrake cable connector spring clip removal



10.4 Removing handbrake lever clevis pin and clip

4 Disconnect the cable from the handbrake lever by extracting the clip and clevis pin (see illustration).

5 Unscrew the lever securing bolts and remove the lever.

Refitting

6 Refitting is the reverse sequence to removal. On completion adjust the handbrake cable, if necessary, as described in Section 8.

11 Hydraulic system - bleeding (conventional braking system)



Note: On cars equipped with the Anti-lock Braking System, refer to Section 23.



Warning: 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.

1 This is not a routine operation but will be required after any component in the system has been removed and refitted or any part of the hydraulic system has been opened. Where an operation has only affected one circuit of the hydraulic system, then bleeding will normally only be required to that circuit (front

and rear diagonally opposite). If the master cylinder or the pressure regulating valve have been disconnected and reconnected, then the complete system must be bled.

2 When bleeding the brake hydraulic system on a Van, tie the light laden valve actuating lever to the right-hand rear roadspring so that it is in the fully open position (see illustration). This will ensure full fluid flow during the bleeding operations.

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 screw tightly. The help of an assistant will be required.

5 Take care not to spill fluid onto the paintwork as it will act as a paint stripper. If any is spilled, wash it off at once with cold water.

6 Clean around the bleed screw on the front right-hand caliper and attach the bleed tube to the screw.

7 Check that the master cylinder reservoir is topped up and then destroy the vacuum in the brake servo (where fitted) by giving several applications of the brake foot pedal.

8 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 above the bleed nipple to prevent any possibility of air entering the system down the threads of the bleed screw when it is slackened.

9 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.

10 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.

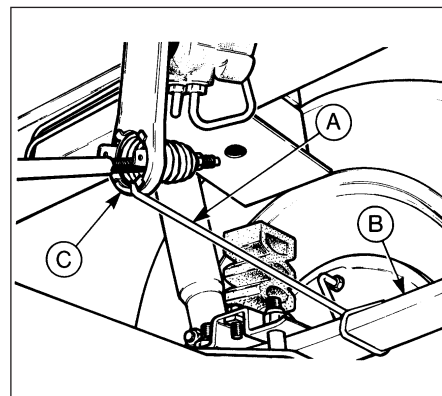
11 Top-up the fluid reservoir. It must be kept topped up throughout the bleeding operations. If the connecting holes to the master cylinder are exposed at any time due to low fluid level, then air will be drawn into the system and work will have to start all over again.

12 Repeat the operations on the left-hand rear brake, the left-hand front and the right-hand rear brake in that order (assuming that the whole system is being bled).

13 On completion, remove the bleed tube. Discard the fluid which has been bled from the system unless it is required for bleed jar purposes, never use it for filling the system.

Bleeding - 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



11.2 Light laden valve retained in open position - Van models

A Wire
B Roadspring

C Actuating lever

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

16 Repeat the procedure on the remaining bleed nipples in the order described in paragraph 12. Remember to keep the master cylinder reservoir full.

Bleeding - with pressure bleeding kit

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

18 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.

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

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

All systems

21 On completion of bleeding, top-up the fluid level to the mark. Check the feel of the brake pedal, which should be firm and free from any "sponginess" which would indicate air still being present in the system.

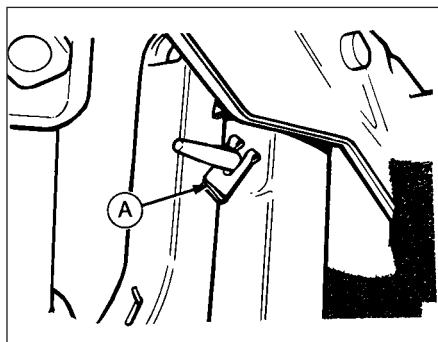
22 On Van models release the light laden valve actuating lever.

12 Master cylinder - removal, overhaul and refitting

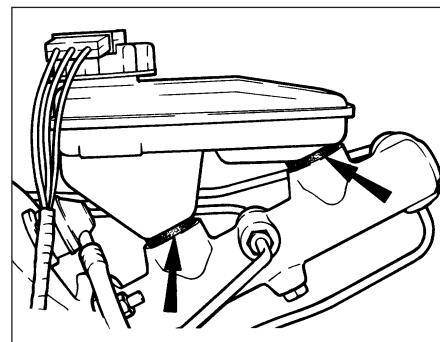
Note: Before starting work, refer to the warning at the beginning of Section 3 concerning the dangers of hydraulic fluid.

Removal

- 1 Disconnect the leads from the level warning switch in the reservoir cap. Remove the cap.
- 2 Syphon out as much fluid as possible from the master cylinder reservoir using an old battery hydrometer or a poultry baster. Do not drip the fluid onto the paintwork as it will act as an effective paint stripper.
- 3 Disconnect the pipelines from the master cylinder by unscrewing the unions. Additionally on models equipped with the anti-lock braking system, release the clips and disconnect the two modulator fluid return pipes.
- 4 On non-servo models release the retaining clip securing the master cylinder pushrod to the brake pedal (see illustration).
- 5 Unbolt the master cylinder unit from the servo unit or bulkhead, as applicable, and withdraw it.



12.4 Master cylinder push rod-to-pedal retaining clip (A) - non-servo models

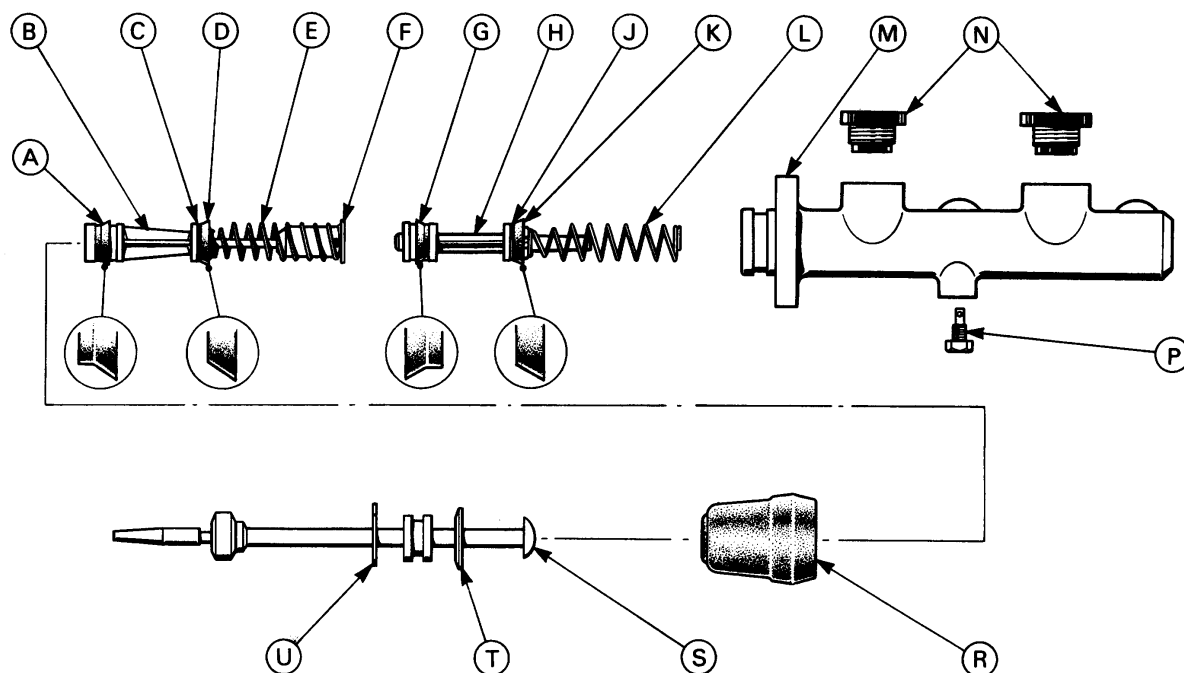


12.6 Master cylinder reservoir rubber seals (arrowed)

Overhaul

- 6 Clean away external dirt and then detach the fluid reservoir by tilting it sideways and gently pulling. Remove the two rubber seals (see illustration).
- 7 Secure the master cylinder carefully in a vice fitted with jaw protectors.
- 8 Unscrew and remove the piston stop bolt.
- 9 Pull the dust excluder back and, using circlip pliers, extract the circlip which is now exposed (see illustration).

- 10 Remove the pushrod, dust excluder and washer.
- 11 Withdraw the primary piston assembly, which will already have been partially ejected.
- 12 Tap the end of the master cylinder on a block of wood and eject the secondary piston assembly.
- 13 Examine the piston and cylinder bore surface for scoring or signs of metal-to-metal rubbing. If evident, renew the cylinder complete.



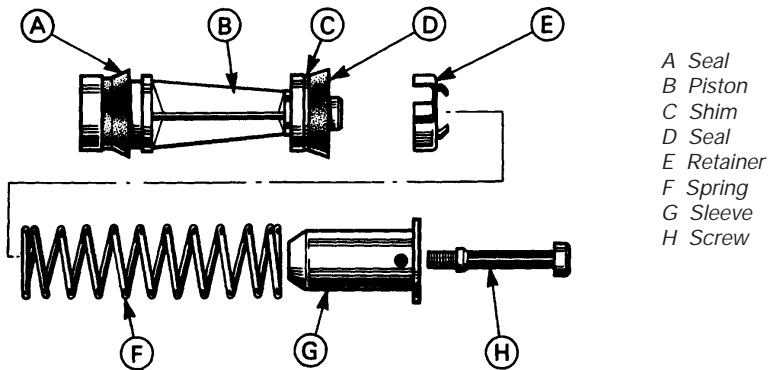
12.9 Exploded view of the master cylinder

A Seal
B Primary piston
C Shim
D Seal
E Spring
F Retainer

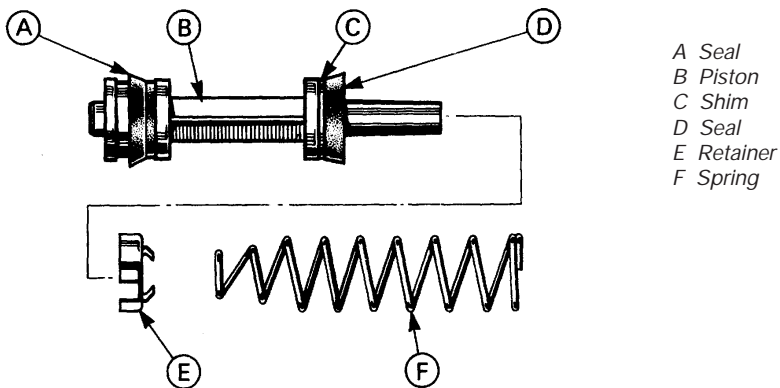
G Seal
H Secondary piston
J Shim
K Seal
L Spring
M Cylinder body

N Reservoir seals
P Piston stop bolt
R Boot
S Pushrod
T Washer
U Circlip

12.14 Master cylinder primary piston components



12.15 Master cylinder secondary piston components



14 Where the components are in good condition, dismantle the primary piston by unscrewing the screw and removing the sleeve. Remove the spring, retainer, seal and shim. Prise the second seal from the piston (see illustration).

15 Dismantle the secondary piston in a similar way (see illustration).

16 Discard all seals and obtain a repair kit.

17 Cleaning of components should be done in brake hydraulic fluid or methylated spirit - nothing else.

18 Using the new seals from the repair kit, assemble the pistons, making sure that the seal lips are the correct way round.

19 Dip the piston assemblies in clean hydraulic fluid and enter them into the cylinder bore.

20 Fit the pushrod complete with new dust excluder and secure with a new circlip.

21 Engage the dust excluder with the master cylinder.

22 Depress the pushrod and screw in the stop bolt.

23 Locate the two rubber seals and push the fluid reservoir into position.

24 It is recommended that a small quantity of fluid is now poured into the reservoir and the pushrod operated several times to prime the unit.

Refitting

25 Refit the master cylinder by reversing the removal operations.

26 Bleed the complete hydraulic system on completion of work (see Section 11 or 23 as applicable).

13 Pressure regulating valve (Saloon and Estate models) - removal and refitting

1 The brake pressure regulating valve is located within the engine compartment, just above the aperture in the wing inner panel through which the steering tie-rod passes. On pre-1986 models the valves comprise a metal housing bolted to the inner panel. On later models the valves, one for each brake circuit, are individually located in a bracket attached to the inner panel (see illustrations).

Removal

Note: Before starting work, refer to the warning at the beginning of Section 3 concerning the dangers of hydraulic fluid.

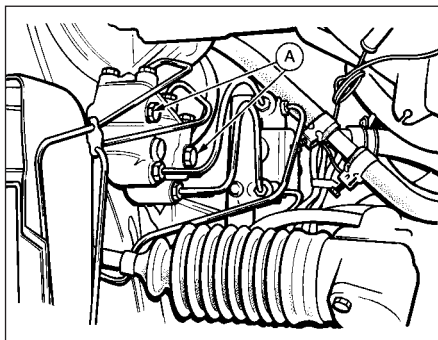
2 Unscrew the unions, noting their locations and disconnect the hydraulic pipes from the valve(s). Cap the ends of the pipes with bleed nipple dust caps to prevent fluid loss.

3 Unscrew the mounting bolts and remove the valve or mounting bracket as applicable. On later models extract the retaining clips and remove the valves from the bracket (see illustration).

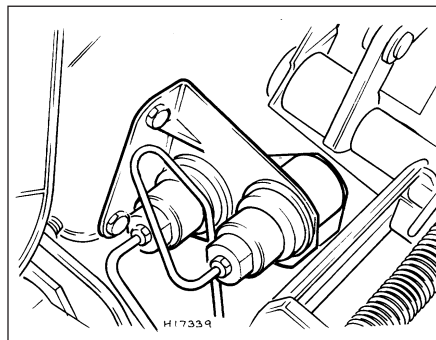
4 On both versions the valves are sealed units and only serviced as complete assemblies.

Refitting

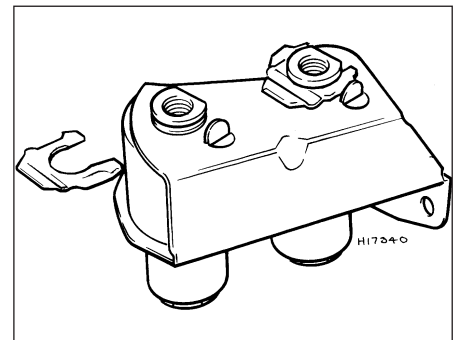
5 Refitting is the reverse sequence to removal but bleed the hydraulic system as described in Section 11 on completion.



13.1a Pressure regulating valve mounting bolts (A) - pre-1986 models



13.1b Pressure regulating valves and mounting bracket - 1986 models onward



13.3 Pressure regulating valve-to-bracket retaining clip - 1986 models onward

14 Light laden valve (Van models) - adjustment, removal and refitting

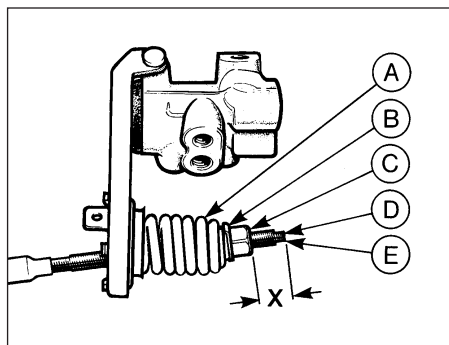
1 The light laden valve used on Van models is a pressure regulating valve which reacts to suspension height according to vehicle load. The valve is mounted on the underside of the vehicle above the rear axle tube and is connected to the axle by a rod (see illustration).

2 The valve should never be dismantled but it must be adjusted whenever the valve itself, the axle tube, spring or shock absorber have been removed, refitted or renewed.

Adjustment

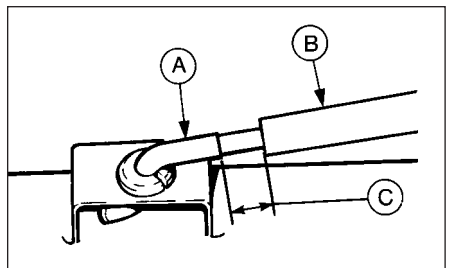
3 Follow this adjustment procedure provided the original roadsprings have been refitted, but when new valve linkage has been installed. Measure the dimension "X" and if necessary adjust the position of the nut to make the dimension between 10 and 12 mm (see illustration).

4 Rotate the spacer tube so that the dimension "C" is between 18.5 and 20.5 mm (see illustration). Crimp the end of the spacer tube adjacent to the knurled section of the tube to prevent the tube from rotating.



14.3 Light laden valve adjustment diagram - Van models

- | | |
|--------------------------|-----------------|
| A Control spring | D Threaded rod |
| B Linkage retaining clip | E Flats |
| C Adjuster nut | X = 10 to 12 mm |

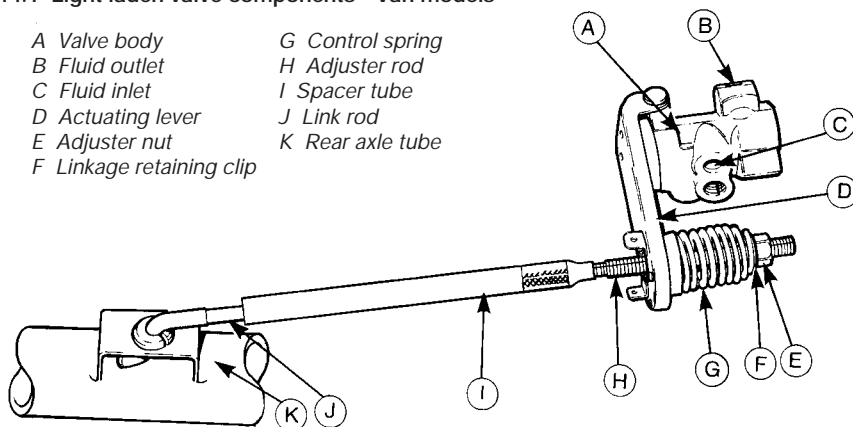


14.4 Light laden valve linkage adjustment diagram with original roadsprings - Van models

- | | |
|---------------|---------------------|
| A Link rod | C = 18.5 to 20.5 mm |
| B Spacer tube | |

14.1 Light laden valve components - Van models

- | | |
|--------------------------|------------------|
| A Valve body | G Control spring |
| B Fluid outlet | H Adjuster rod |
| C Fluid inlet | I Spacer tube |
| D Actuating lever | J Link rod |
| E Adjuster nut | K Rear axle tube |
| F Linkage retaining clip | |



5 If the original roadsprings have been refitted and also the original valve linkage, hold the threaded adjustment rod by means of its flats and turn the adjusting nut in either direction until the correct dimensions are obtained.

6 If one or both rear roadsprings have been renewed, carry out the adjustment procedure described in paragraph 3, except that the end of the spacer tube should be aligned with the groove in the link rod (see illustration).

Removal

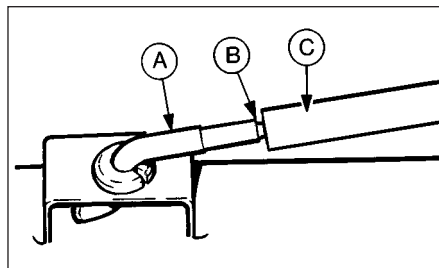
Note: Before starting work, refer to the warning at the beginning of Section 3 concerning the dangers of hydraulic fluid.

7 If the pressure regulating valve must be removed, first disconnect the hydraulic pipelines from the valve and cap the pipes.

8 Unbolt the valve from its mounting bracket, lower the valve and slide the spacer tube assembly off the link rod. Remove the link rod.

Refitting

9 Refitting is a reversal of removal, but bleed the brakes (Section 11) and adjust the valve as described previously in this Section.



14.6 Light laden valve linkage adjustment diagram with new roadsprings - Van models

- | | |
|------------|---------------|
| A Link rod | C Spacer tube |
| B Groove | |

15 Hydraulic pipes and hoses - renewal

Note: Before starting work, refer to the warning at the beginning of Section 3 concerning the dangers of hydraulic fluid.

1 Always disconnect a flexible hose by prising out the spring anchor clip from the support bracket and then, using two close-fitting spanners, disconnect the rigid line from the flexible hose (see illustration).

2 Once disconnected from the rigid pipe, the flexible hose may be unscrewed from the caliper or wheel cylinder.

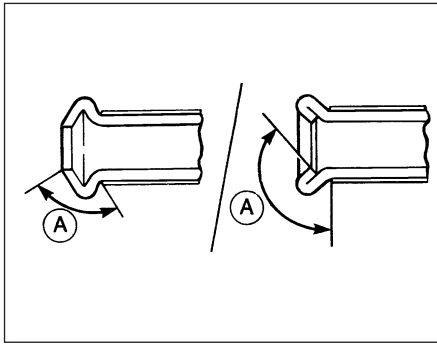
3 When reconnecting pipelines, or hose fittings, remember that all union threads are to metric sizes. No copper washers are used at unions and the seal is made at the swaged end of the pipe, so do not try to wind a union in if it is tight yet still stands proud of the surface into which it is screwed.

4 A flexible hose must never be installed twisted, but a slight "set" is permissible to give it clearance from an adjacent component. Do this by turning the hose slightly before inserting the bracket spring clip.

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



15.1 Removing a flexible hose spring anchor clip


15.8 Brake pipe flare

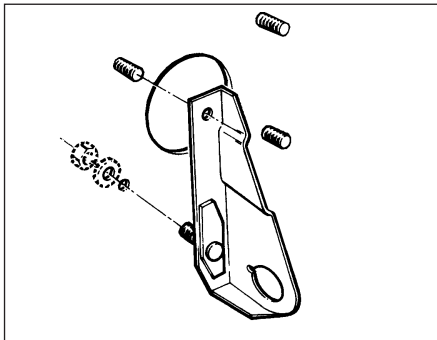
A Protective coating removed before flaring

- 6 If you are making up a brake pipe yourself, observe the following essential requirements.
- 7 Before flaring the ends of the pipe, trim back the protective plastic coating by a distance of 5.0 mm.
- 8 Flare the end of the pipe as shown (see illustration).
- 9 The minimum pipe bend radius is 12.0 mm, but bends of less than 20.0 mm should be avoided if possible.

16 Vacuum servo unit and linkage - removal and refitting

Removal

- 1 Refer to Section 12 and remove the master cylinder.
- 2 On fuel-injection models unclip and lift out the front section of the heater plenum chamber to provide access to the connecting linkage across the lower bulkhead (see illustration).
- 3 Working inside the vehicle, remove the spring clip which attaches the pushrod to the arm of the brake pedal.
- 4 Unscrew the nuts which hold the servo to its mounting bracket, also the servo support brace to the body.
- 5 Disconnect the valve hose from the servo.
- 6 Detach the linkage arm spring at the rear of the servo and then pull the servo forward until the servo operating rod can be unclipped from the linkage.


16.8b Vacuum servo unit connecting link bracket on driver's side

16.2 Heater plenum chamber removal

- 7 Remove the servo from the vehicle. It must be renewed if defective, no repair is possible.
- 8 If necessary, the rest of the servo operating linkage can be removed from under the instrument panel once the covering and cowl side trim have been removed from above the brake pedal inside the vehicle. Unbolt the connecting link bracket from the driver's side (see illustrations).

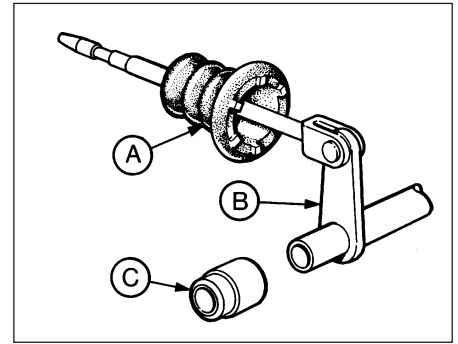
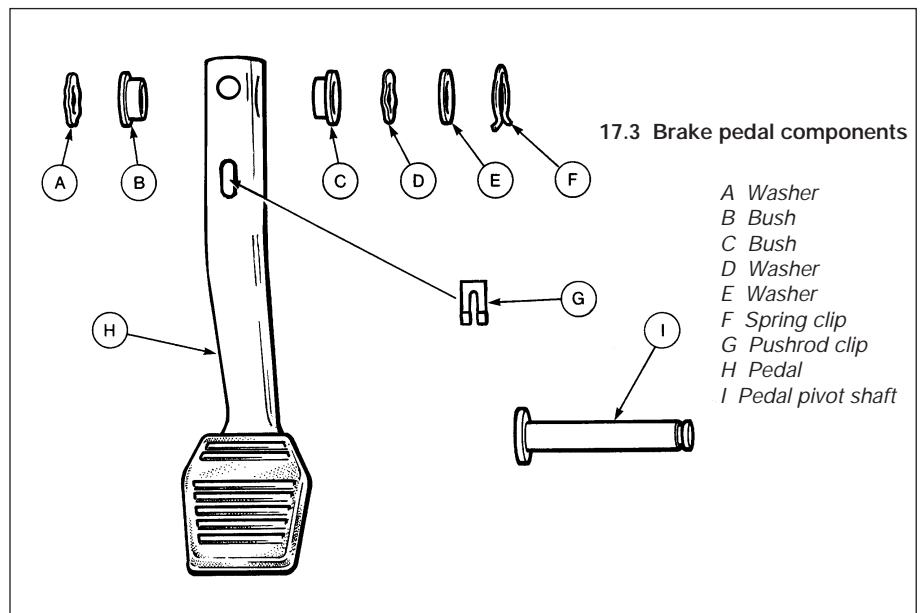
Refitting

- 9 Refitting is the reverse sequence to removal. Refit the master cylinder as described in Section 12 and bleed the hydraulic system as described in Sections 11 or 23 as applicable.

17 Brake pedal - removal, refitting and adjustment

Removal

- 1 Working within the vehicle, remove the under-dash cover panel.
- 2 Extract the spring clip which connects the pushrod to the arm of the brake pedal.


16.8a Vacuum servo unit connecting linkage

*A Grommet C Bush
B Connecting link*

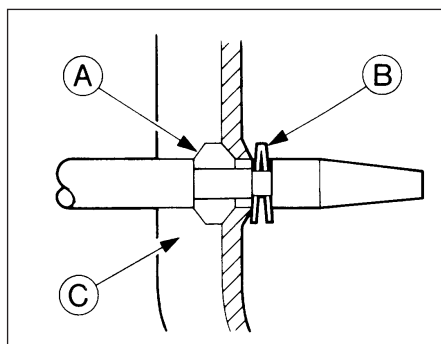
- 3 Extract the circlip from the end of the pedal pivot shaft and withdraw the shaft with clutch pedal and the flat and wave washers (see illustration).
- 4 Renew the bushes as necessary.

Refitting

- 5 Reassembly and refitting are reversals of removal and dismantling. Apply a little grease to the bushes when installing.

Adjustment

- 6 Although the braking system may be in satisfactory condition generally, it is possible that some drivers may feel that the brake pedal travel is excessive. The travel can be reduced in the following way if the upper surface of the pedal pad is less than 200.0 mm above the metal surface of the floor.
- 7 Remove the brake pedal as described above.
- 8 Remove the white plastic bush (see illustration).



17.8 Sectional view of brake pedal and pushrod

A White plastic bush

B Pushrod clip
C Pedal arm

9 Fit a new bush which is red in colour and will increase the pedal height. Once this type of bush has been fitted it will not be possible to refit the anti-rattle retainer. This does not matter.

10 Adjust the stop-lamp switch (Section 18).

18 Braking system warning lamps and electrical switches - removal and refitting



General

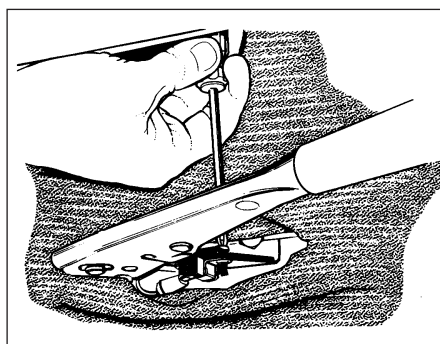
1 All models are fitted with a low fluid level warning switch in the master cylinder reservoir cap and a brake pedal stop-lamp switch.

2 Some versions have front disc pad wear sensors and a handbrake "ON" warning switch.

3 Warning indicator lamps are mounted on the instrument panel. Their renewal is covered in Chapter 12.

Handbrake "ON" warning lamp switch

4 The handbrake "ON" warning switch is attached to the handbrake lever and can be



18.4 Removing handbrake warning switch

removed after disconnecting the wiring and undoing the retaining screw (see illustration).

Stop-lamp switch

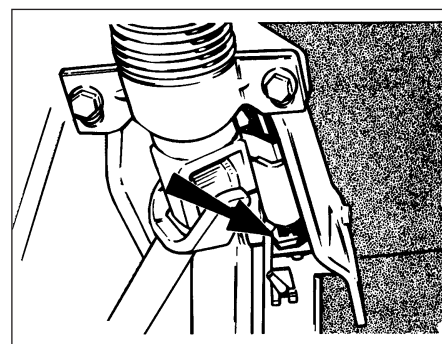
5 The stop-lamp switch can be removed by disconnecting the leads and unscrewing the locknut which holds the switch to its bracket under the fascia (see illustration).

6 When fitting the switch, adjust its position by screwing it in or out so that it does not actuate during the first 5.0 mm of pedal travel.

19 Anti-lock Braking System - description

1 From 1986 onward an anti-lock braking system is available as standard or optional equipment on certain Escort models.

2 The system comprises four main components: two modulators, one for each brake circuit, and two rear axle load apportioning valves, again, one for each brake circuit. Apart from the additional hydraulic piping the remainder of the braking system is the same as for conventional models (see illustration).



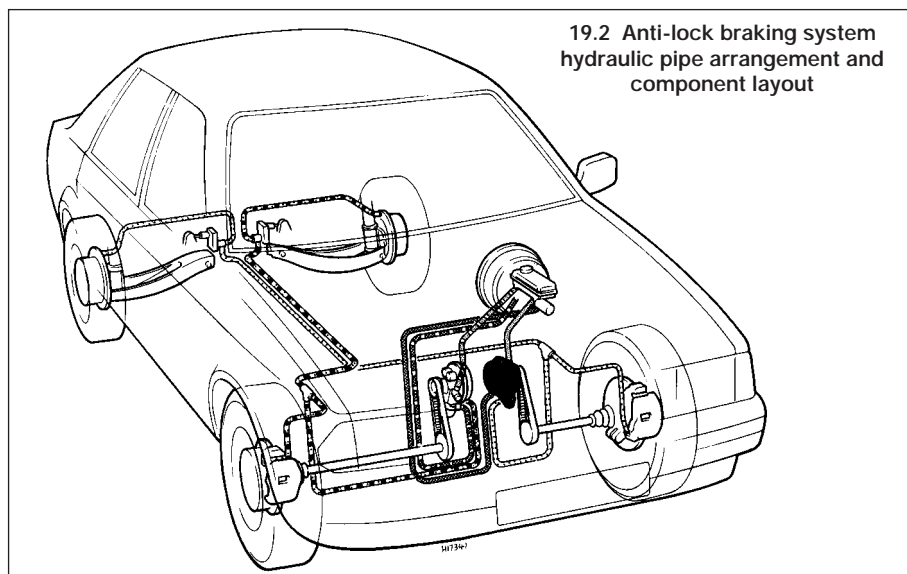
18.5 Brake stop-lamp switch locknut location (arrowed)

3 The modulators are located in the engine compartment with one mounted on each side of the transmission, directly above the driveshaft inner constant velocity joints. Each modulator contains a shaft which actuates a flywheel by means of a ball and ramp clutch. A rubber toothed belt is used to drive the modulator shaft from the driveshaft inner constant velocity joint.

4 During driving and under normal braking, the modulator shaft and the flywheel rotate together and at the same speed through the engagement of a ball and ramp clutch. In this condition, hydraulic pressure from the master cylinder passes to the modulators and then to each brake in the conventional way. In the event of a front wheel locking the modulator shaft rotation will be less than that of the flywheel and the flywheel will overrun the ball and ramp clutch. This causes the flywheel to slide on the modulator shaft, move inward and operate a lever which in turn opens a dump valve. Hydraulic pressure to the locked brake is released via a de-boost piston allowing the wheel to once again revolve. Fluid passed through the dump valve is returned to the master cylinder reservoir via the modulator return pipes. At the same time hydraulic pressure from the master cylinder causes a pump piston to contact an eccentric cam on the modulator shaft. The flywheel is then decelerated at a controlled rate by the flywheel friction clutch. When the speed of the modulator shaft and flywheel are once again equal the dump valve closes and the cycle repeats. This complete operation takes place many times a second until the vehicle stops or the brakes are released.

5 The load apportioning valves are mounted on the rear crossmember and connected to each rear suspension arm via a linkage. The valves regulate hydraulic pressure to the rear brakes in accordance with vehicle load and attitude in such a way that braking force at the front brakes will always be greater than that at the rear.

6 A belt break warning switch is fitted to the cover which surrounds each modulator drivebelt. The switch contains an arm which is in contact with the drivebelt at all times. If the belt should break, or if the adjustment of the belt is too slack, the arm will move out closing the switch contacts and informing the driver via an instrument panel warning light.



19.2 Anti-lock braking system hydraulic pipe arrangement and component layout



20.2 Removing the belt break switch from the modulator drivebelt cover

20 Modulator drivebelt (anti-lock braking system) - removal and refitting



Note: Whenever an ABS modulator adjuster bolt is slackened or removed, the bolt threads should be lightly coated with grease to prevent the possibility of bolt seizure. Take care not to contaminate surrounding components when applying the grease.

Right-hand side

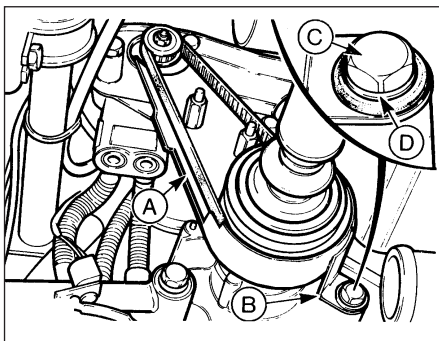
Removal

Note: A new driveshaft snap-ring and a new tie-rod balljoint split-pin will be required on refitting.

1 Jack up the front of the car, support it on stands (see "Jacking and Vehicle Support") and remove the roadwheel.

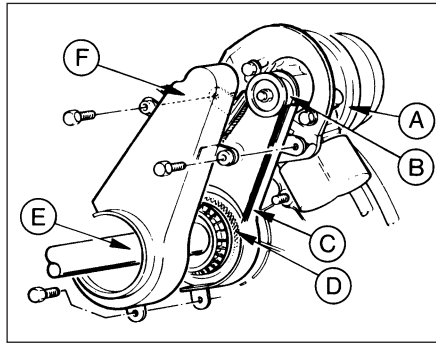
2 Remove the belt break switch from the drivebelt cover by pushing it upward and carefully levering out the bottom edge. Pull the switch down, withdraw the switch arm from the opening in the cover and place the switch to one side (see illustration).

3 Undo the two drivebelt cover retaining nuts and washers, and on later models (1987-on), the retaining bolt (see illustrations).



20.3c Right-hand side ABS modulator drivebelt cover - 1987-on models

A Guard
B Support bracket
C Bolt
D Washer



20.3a Modulator and drivebelt details

A Modulator
B Sprocket
C Drivebelt
D Constant velocity joint
E Driveshaft
F Drivebelt cover

4 Withdraw the cover from the studs and remove it by moving it upwards to clear the oil filter.

5 Slacken the modulator adjuster bolt, move the modulator to relieve the tension on the drivebelt then slip the belt off the modulator sprocket (see illustration).

6 Extract the split pin, undo the retaining nut and separate the tie-rod balljoint from the steering arm using a suitable balljoint separator tool.

7 Disconnect the front suspension lower arm balljoint from the hub carrier by removing the nut and pinch-bolt (see illustration). Note that the pinch-bolt is of the socket-headed (Torx) type and a special key or socket bit will be required for this purpose. These are readily available from most accessory shops.

8 Place a suitable container beneath the driveshaft inner constant velocity joint.

9 Insert a lever between the inner constant velocity joint and the transmission housing. Firmly strike the lever to release the constant velocity joint from the differential.

10 Pull the driveshaft out of the transmission and slip the modulator drivebelt off the joint. Allow the transmission oil to drain into the container.

11 With the driveshaft disconnected, suspend it in such a way so as not to adopt an



20.5 Modulator adjuster bolt (arrowed)



20.3b Drivebelt cover retaining nuts (arrowed) - models up to 1987

angle of more than 45° from the outer constant velocity joint.

Refitting

12 Before refitting the drivebelt, renew the snap-ring fitted to the splines of the inner constant velocity joint.

13 Ensure that the modulator sprocket and constant velocity joint splines are clean and dry then slip the drivebelt over the joint.

14 Engage the joint splines with the differential and firmly push the hub carrier inwards to force the joint home.

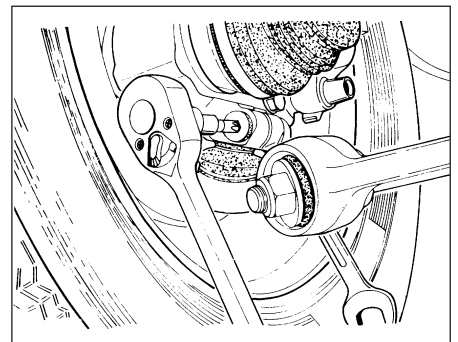
15 Reconnect the lower arm balljoint to the hub carrier and insert the Torx bolt with its head to the rear. Refit the nut and tighten to the specified torque.

16 Reconnect the tie-rod balljoint to the steering arm, fit and tighten the nut to the specified torque and secure with a new split pin.

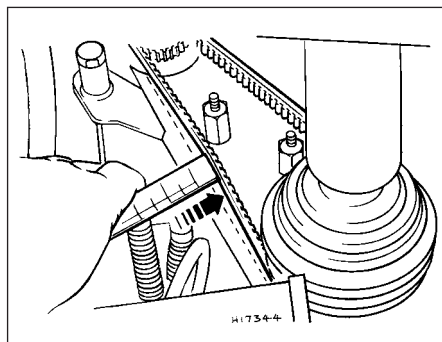
17 Slip the drivebelt over the modulator sprocket ensuring that it sits squarely in the sprocket teeth.

18 Move the modulator as necessary to tension the belt so that the belt deflection, under light finger pressure, is 5.0 mm. Check this using a ruler at a point midway between the two sprockets (see illustration).

19 With the belt tensioned correctly, tighten the modulator adjuster bolt. Before tightening, the adjuster bolt threads should be coated with grease - refer to the note at the beginning of this Section.



20.7 Removing suspension lower arm balljoint pinch-bolt



20.18 Using a ruler to check right-hand drivebelt adjustment

20 Refit the drivebelt cover and secure with the two nuts and washers, and the bolt (where applicable).

21 Engage the belt break switch arm upwards through the opening in the drivebelt cover then locate the switch in position. Pull the switch downward to secure.

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

23 Top-up the transmission oil as described in Chapter 1.

Left-hand side

24 The procedure is the same as for the right-hand side but note the following differences.

25 Remove the engine splash shield from the inner wheel arch.

26 When removing the drivebelt cover note that it is secured by three bolts, two at the top and one at the bottom (see illustration).

27 To move the modulator for adjustment of the belt tension, use a suitable length of wood inserted through the steering tie-rod aperture in the inner wheel arch, to push on the modulator as necessary.

21 Modulator (anti-lock braking system) - removal and refitting

Note: Whenever an ABS modulator adjuster bolt is slackened or removed, the bolt threads should be lightly coated with grease to prevent the possibility of bolt seizure. Take care not to contaminate surrounding components when applying the grease.

Note: Before starting work, refer to the warning at the beginning of Section 3 concerning the dangers of hydraulic fluid.

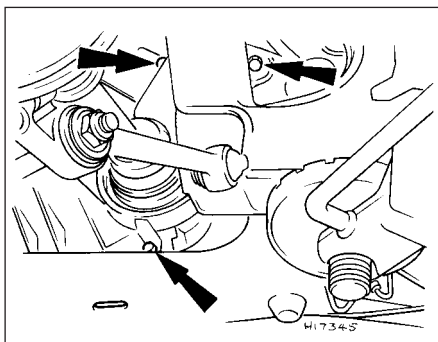
Right-hand side

Removal

1 Disconnect the wiring plug from the level warning switch in the master cylinder reservoir filler cap. Remove the cap.

2 Syphon out as much fluid as possible from the reservoir using an old battery hydrometer. Do not drip the fluid onto the paintwork as it will act as an effective paint stripper.

3 Release the hose clip and disconnect the



20.26 Left-hand drivebelt cover retaining bolt locations (arrowed)

right-hand modulator fluid return pipe at the master cylinder reservoir (nearest to the vacuum servo unit) (see illustration).

4 Jack up the front of the car and support it on stands (see "Jacking and Vehicle Support").

5 Remove the belt break switch from the drivebelt cover by pushing it upward and carefully levering out the bottom edge. Pull the switch down, withdraw the switch arm from the opening in the cover and place the switch to one side.

6 Undo the two drivebelt cover retaining nuts and washers, and on later models (1987-on), the retaining bolt.

7 Withdraw the cover from the studs and remove it by moving it upwards to clear the oil filter.

8 Disconnect the two hydraulic pipes and hoses with the yellow bands at the pipe bracket on the transmission support crossmember (see illustration). Allow the remaining hydraulic fluid to drain into a suitable container.

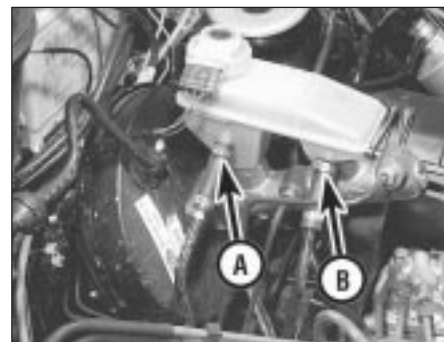
9 Slacken the modulator adjuster bolt, move the modulator to relieve the tension on the drivebelt then slip the belt off the modulator sprocket (see illustration).

10 Undo and remove the adjuster bolt and the modulator pivot bolt and withdraw the modulator from the engine compartment.

11 If required, disconnect the hydraulic hoses at the modulator after removal. Plug or tape over all pipe ends and orifices to prevent dirt ingress.



21.8 Hydraulic pipe and hose unions (arrowed) at the pipe bracket on the transmission support crossmember



21.3 Modulator fluid return pipes at master cylinder reservoir

A To right-hand modulator
B To left-hand modulator

Refitting

12 If a new unit is being fitted check that it has a yellow arrow marked on its cover and a part number suffix "A" indicating a right-hand side modulator. Note that the units are not interchangeable from side to side.

13 Reconnect the modulator hydraulic hoses if applicable.

14 Locate the modulator on its mounting bracket, fit the pivot bolt and tighten it to the specified torque.

15 Slip the drivebelt over the modulator sprocket ensuring that it sits squarely in the sprocket teeth.

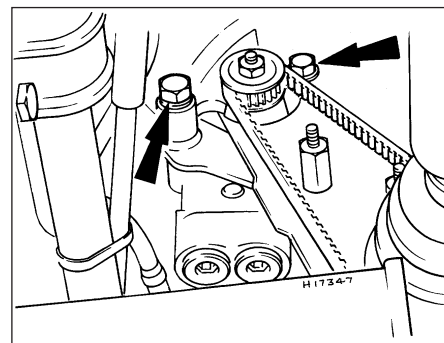
16 Move the modulator as necessary to tension the belt so that the belt deflection, under light finger pressure is 5.0 mm. Check this using a ruler at a point midway between the two sprockets.

17 With the belt tensioned correctly, tighten the modulator adjuster bolt. Before tightening, the adjuster bolt threads should be coated with grease - refer to the note at the beginning of this Section.

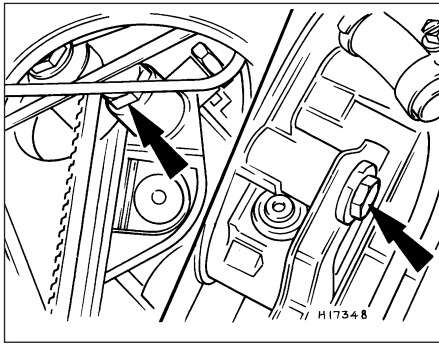
18 Reconnect the two modulator hydraulic pipes and hoses.

19 Refit the drivebelt cover and secure with the two nuts and washers, and the bolt (where applicable).

20 Engage the belt break switch arm upwards through the opening in the drivebelt



21.9 Right-hand modulator adjuster and pivot bolts (arrowed)



21.32 Left-hand modulator adjuster and pivot bolts (arrowed)

cover then locate the switch in position. Pull the switch downwards to secure.

21 Lower the car to the ground.

22 Reconnect the modulator fluid return pipe to the master cylinder reservoir then fill the reservoir with fresh fluid of the specified type.

23 Bleed the hydraulic system (Section 23).

Left-hand side

Removal

24 Disconnect the wiring plug from the level warning switch in the master cylinder reservoir filler cap. Remove the cap.

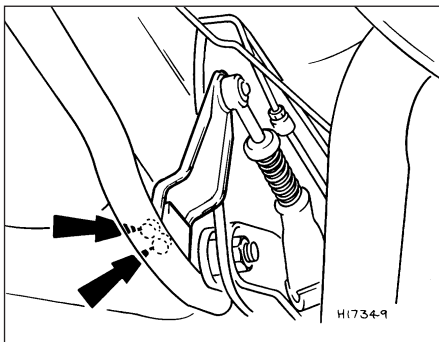
25 Syphon out as much fluid as possible from the reservoir using an old battery hydrometer or a poultry baster. Do not drip the fluid onto the paintwork as it will act as an effective paint stripper.

26 Release the hose clip and disconnect the left-hand modulator fluid return pipe at the master cylinder reservoir (the one furthest away from the vacuum servo unit).

27 Jack up the front of the car and support it on stands (see "Jacking and Vehicle Support"). Remove the left-hand roadwheel.

28 Remove the engine splash shield from the inner wheel arch.

29 Remove the belt break switch from the drivebelt cover by pushing it upwards and carefully levering out the bottom edge. Pull the switch down, withdraw the switch arm from the opening in the cover and place the switch to one side.



22.5 Load apportioning valve adjusting bracket retaining nut locations (arrowed)

30 Undo the three bolts, two at the top and one at the bottom securing the drivebelt cover to the modulator bracket. Remove the cover.

31 Disconnect the two hydraulic pipes and hoses with the white bands at the pipe bracket on the transmission support crossmember. Allow the remaining hydraulic fluid to drain into a suitable container.

32 Slacken the modulator adjuster bolt, move the modulator to relieve the tension on the drivebelt then slip the belt off the modulator sprocket (see illustration).

33 Remove the distributor cap, rotor arm and shield. Disconnect the left-hand belt break switch wiring at the multi-plug.

34 Undo and remove the adjuster bolt and the modulator pivot bolt and withdraw the modulator upwards out of the engine compartment.

35 If required, disconnect the hydraulic hoses at the modulator after removal. Plug or tape over all pipe ends and orifices to prevent dirt ingress.

Refitting

36 If a new unit is being fitted check that it has a white arrow marked on its cover and a part number suffix "C" indicating a left-hand side modulator. Note that the units are not interchangeable from side to side.

37 Reconnect the modulator hydraulic pipes if applicable.

38 Locate the modulator on its mounting bracket, fit the pivot bolt and tighten it to the specified torque.

39 Slip the drivebelt over the modulator sprocket ensuring that it sits squarely in the sprocket teeth.

40 Adjust the drivebelt tension as described in paragraphs 16 and 17, but use a suitable length of wood inserted through the steering tie-rod aperture in the inner wheel arch, to push on the modulator as necessary.

41 Reconnect the two modulator hydraulic pipes and hoses.

42 Refit the drivebelt cover and secure with the three bolts.

43 Refit the belt break switch as described in paragraph 20.

44 Refit the engine splash shield.

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

46 Reconnect the belt break switch wiring multi-plug then refit the shield, rotor arm and distributor cap.

47 Reconnect the modulator fluid return pipe to the master cylinder reservoir then fill the reservoir with fresh fluid of the specified type.

48 Bleed the hydraulic system as described in Section 23.

22 Load apportioning valve (anti-lock braking system) - removal and refitting

Note: Before starting work, refer to the warning at the beginning of Section 3 concerning the dangers of hydraulic fluid.

Removal

1 Raise the car on a hoist or drive the rear of the car up on ramps. The rear wheels must not hang free.

2 If removing the right-hand side load apportioning valve on fuel-injected models, undo the nut and bolt securing the fuel pump mounting bracket to the underbody. Move the fuel pump aside to gain access to the valve.

3 Disconnect the hydraulic pipes at the valve then plug the pipes and orifices to prevent loss of fluid and dirt ingress.

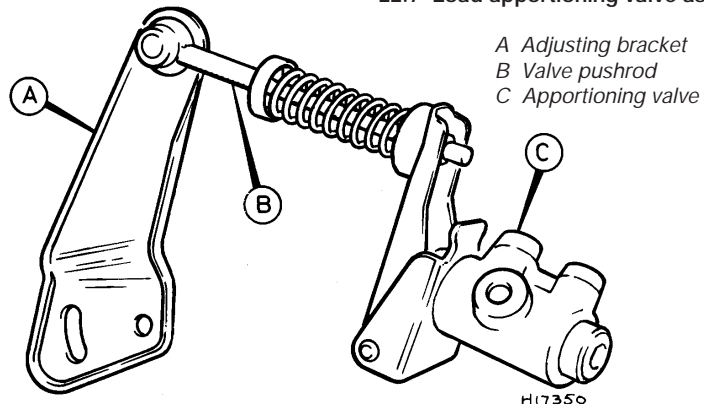
4 As an aid to reassembly, accurately mark the position of the valve adjusting bracket on the rear suspension arm. This will ensure that the valve adjustment is not lost when refitting.

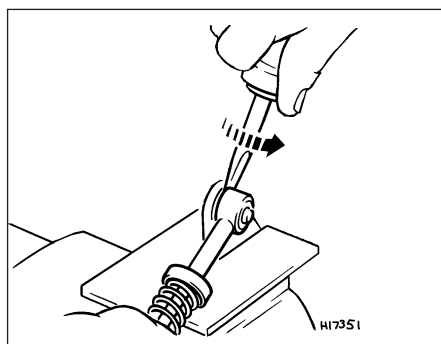
5 Undo the nuts and remove the stud plate securing the adjusting bracket to the suspension arm (see illustration).

6 Undo both rear suspension arm inner mounting nuts and remove the load apportioning valve mounting plate.

7 Undo the bolts securing the valve to the mounting plate and remove the valve and adjusting bracket from under the car (see illustration).

22.7 Load apportioning valve assembly





22.8 Separating apportioning valve pushrod from adjusting bracket

8 If required separate the valve pushrod from the adjusting bracket by levering off the pushrod trunnion with a screwdriver (see illustration). Lubricate the trunnion rubber bush to aid removal.

Refitting

9 If a new valve is being fitted it will be supplied with nylon setting spacers and ties attached, to ensure correct adjustment of the valve. Leave these in position until the valve is installed.

10 Refit the pushrod trunnion to the adjusting bracket using a suitable socket and a vice.

11 Locate the valve on its mounting plate and secure with the retaining bolts.

12 Position the mounting plate over the suspension arm mounting bolts and secure with the nuts tightened to the specified torque.

13 Reconnect the hydraulic pipes to the valve.

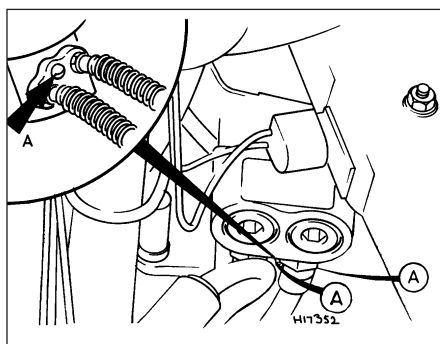
14 Refit the stud plate and adjusting bracket to the suspension arm ensuring that the previously made marks are aligned if the original components are being refitted. Secure the adjusting bracket with the retaining nuts tightened to the specified torque.

15 If a new valve assembly is being fitted, remove the nylon setting spacers and ties.

16 Where applicable refit the fuel pump mounting bracket.

17 Lower the car to the ground.

18 Bleed the hydraulic system as described in Section 23.



23.5 Modulator bypass valve (A) location

19 It is recommended that the load apportioning valve adjustment be checked by a dealer if the original unit has been refitted. Special gauges are needed for this operation and it is not a DIY proposition.

23 Hydraulic system - bleeding (anti-lock braking system)



Note: Before starting work, refer to the warning at the beginning of Section 11 concerning the dangers of hydraulic fluid.

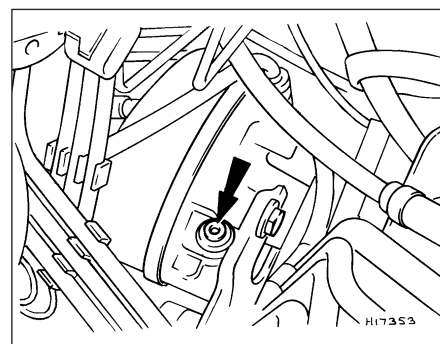
1 On cars equipped with the anti-lock braking system there are two bleed procedures possible according to which part of the hydraulic system has been disconnected.

2 If any one of the following conditions are present, bleed procedure A should be adopted:

- a) A modulator has been removed.
- b) A modulator-to-master cylinder return hose has been drained.
- c) The two modulator hydraulic hoses have been removed.

3 If any one of the following conditions are present, bleed procedure B should be adopted:

- a) Any condition where the master cylinder has been drained providing that the modulator fluid return pipe has not lost its head of fluid.
- b) Removal of any of the basic braking system components ie brake caliper, flexible hose or pipe, wheel cylinder, load apportioning valve.



23.6 Modulator auto bleed plunger location (arrowed)

Bleed procedure A

4 Top-up the master cylinder reservoir to the "MAX" mark using the specified type of fluid and keep it topped up throughout the bleed procedure.

5 Using a Torx type key or socket bit slacken the bypass valve on the relevant modulator by one to one and a half turns. The bypass valve is located between the two flexible hoses on the side of the modulator (see illustration).

6 Fully depress and hold depressed the auto bleed plunger on the modulator so that the plunger circlip contacts the modulator body (see illustration).

7 Have an assistant steadily pump the brake pedal at least twenty times while you observe the fluid returning to the master cylinder reservoir. Continue this operation until the returning fluid is free from air bubbles.

8 Release the auto bleed plunger ensuring that it has fully returned. Pull it out by hand if necessary.

9 Tighten the bypass valve on the modulator.

10 Now carry out bleed procedure B.

Bleed procedure B

11 This procedure is the same as for conventional braking systems and reference should be made to Section 11. Note, however, that all the weight of the car must be on the roadwheels, not suspended wheel free, otherwise the load apportioning valves will not bleed.

