






# Chapter 9 Braking system

## Contents

Anti-lock Braking System (ABS) - general information. . . . .	22	Master cylinder - removal, overhaul and refitting. . . . .	13
Anti-lock Braking System (ABS) components - removal and refitting. . . . .	23	Rear brake caliper - removal, overhaul and refitting. . . . .	11
Brake pedal - removal and refitting. . . . .	14	Rear brake disc - inspection, removal and refitting. . . . .	8
Front brake caliper - removal, overhaul and refitting. . . . .	10	Rear brake drum - removal, inspection and refitting. . . . .	9
Front brake disc - inspection, removal and refitting. . . . .	7	Rear brake pad wear check. . . . .	See Chapter 1
Front brake pad wear check. . . . .	See Chapter 1	Rear brake pads - renewal. . . . .	5
Front brake pads - renewal. . . . .	4	Rear brake pressure-regulating valves (models with rear disc brakes) - removal and refitting. . . . .	20
General information. . . . .	1	Rear brake shoe wear check. . . . .	See Chapter 1
Handbrake - adjustment. . . . .	17	Rear brake shoes - renewal. . . . .	6
Handbrake cables - removal and refitting. . . . .	19	Rear wheel cylinder - removal and refitting. . . . .	12
Handbrake lever - removal and refitting. . . . .	18	Stop-light switch - removal, refitting and adjustment. . . . .	21
Hydraulic fluid level check. . . . .	See Chapter 1	Vacuum pump (16-valve models) - removal and refitting. . . . .	24
Hydraulic fluid renewal. . . . .	See Chapter 1	Vacuum pump (16-valve models) - testing and overhaul. . . . .	25
Hydraulic pipes and hoses - renewal. . . . .	3	Vacuum servo unit - testing, removal and refitting. . . . .	15
Hydraulic system - bleeding. . . . .	2	Vacuum servo unit check valve - removal, testing and refitting. . . . .	16

## 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	
--	---	---	---	---	---	--	---	---	---

## Specifications

### Front brakes

Type. . . . .	Disc, with single-piston sliding caliper
Disc diameter:	
16-valve models. . . . .	266 mm
All other models. . . . .	247 mm
Disc thickness:	
New:	
Solid disc. . . . .	10 mm
Ventilated disc. . . . .	20.4 mm
Minimum thickness:	
Solid disc. . . . .	8.0 mm
Ventilated disc. . . . .	18.4 mm
Maximum disc run-out. . . . .	0.2 mm
Brake pad minimum thickness. . . . .	2.0 mm

### Rear brakes

Type:	
Larger-engined models, and all models with ABS. . . . .	Disc, with single-piston sliding caliper
All other non-ABS models. . . . .	Single leading shoe drum
Drum brakes:	
Drum diameter:	
New. . . . .	180 mm
Maximum diameter after machining. . . . .	182 mm
Brake shoe thickness:	
New. . . . .	4.85 mm
Minimum. . . . .	1.5 mm
Disc brakes:	
Disc diameter. . . . .	247 mm
Disc thickness:	
New. . . . .	8.0 mm
Minimum thickness. . . . .	6.0 mm
Maximum disc run-out. . . . .	0.2 mm
Brake pad minimum thickness. . . . .	2.0 mm

ABS system

Wheel sensor-to-reluctor ring air gap. . . . . 0.3 to 1.2 mm

Torque wrench settings

	Nm	lbf·ft
Front brake caliper:		
Guide pin bolts (Girling caliper). . . . .	.35	26
Mounting bracket-to-swivel hub bolts. . . . .	.120	89
Rear brake caliper mounting bolts. . . . .	.120	89
Rear hub nut:		
Models with rear drum brakes. . . . .	.200	148
Models with rear disc brakes. . . . .	.180	133
Master cylinder-to-servo unit nuts. . . . .	.10	7
Brake pedal pivot bolt. . . . .	.25	18
Pedal bracket retaining nuts. . . . .	.5	4
Vacuum servo unit mounting nuts. . . . .	.20	15
ABS wheel sensor retaining bolts. . . . .	.9	7
Roadwheel bolts. . . . .	.90	66

1 General information

The braking system is of the servo-assisted, dual-circuit hydraulic type. The arrangement of the hydraulic system is such that each circuit operates one front and one rear brake from a tandem master cylinder. Under normal circumstances, 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.

Most large-capacity engine models have disc brakes all round as standard; all other models not equipped with the Anti-lock Braking System (ABS) are fitted with front disc brakes and rear drum brakes. ABS is fitted as standard to the 16-valve model, and was offered as an option on most other models; on models equipped with ABS, disc brakes are fitted at both the front and rear (refer to Section 22 for further information on ABS operation).

The front disc brakes are actuated by single-piston sliding type calipers, which ensure that equal pressure is applied to each disc pad.

On models with rear drum brakes, the rear brakes incorporate leading and trailing shoes, which are actuated by twin-piston wheel cylinders. The wheel cylinders incorporate integral pressure-regulating valves, which control the hydraulic pressure applied to the rear brakes. The regulating valves help to prevent rear wheel lock-up during emergency braking. A self-adjust mechanism is incorporated, to automatically compensate for brake shoe wear. As the brake shoe linings wear, the footbrake operation automatically operates the adjuster mechanism, which effectively lengthens the shoe strut and repositions the brake shoes, to remove the lining-to-drum clearance.

On models with rear disc brakes, the brakes are actuated by single-piston sliding calipers which incorporate mechanical handbrake mechanisms. A pressure-regulating valve is situated in the brake line to

each rear caliper. The regulating valve is similar to that fitted to the rear wheel cylinders on drum brake models, and helps to prevent rear wheel lock-up during emergency braking.

On all models, the handbrake provides an independent mechanical means of rear brake application.

On 16-valve models, due to the ACAV intake system, there is insufficient vacuum in the inlet manifold to operate the braking system servo effectively at all times. To overcome this problem, a vacuum pump is fitted to the engine, to supplement the inlet manifold vacuum and ensure that sufficient vacuum is always present in the servo unit. The vacuum pump is mounted on the end of the cylinder head, and driven directly off the end of the inlet camshaft.


**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 Citroen replacement parts, or at least those of known good quality. Note the warnings given in "Safety first" and at relevant points in this Chapter concerning the dangers of asbestos dust and hydraulic fluid.

2 Hydraulic system - bleeding



**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.. 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.**



**Hydraulic fluid is an effective paint stripper, and will attack plastics; if any is spilt, it should be washed off immediately, using copious quantities of fresh water**

General

- 1 The correct operation of any hydraulic system is only possible after removing all air from the components and circuit; -this is achieved by bleeding the system.
- 2 During the bleeding procedure, add only clean, unused hydraulic fluid of the recommended type; never re-use fluid that has already been bled from the system. Ensure that sufficient fluid is available before starting work.
- 3 If there is any possibility of incorrect fluid being already in the system, the brake components and circuit must be flushed completely with uncontaminated, correct fluid, and new seals should be fitted to the various components.
- 4 If hydraulic fluid has been lost from the system, or air has entered because of a leak, ensure that the fault is cured before proceeding further.
- 5 Park the vehicle on level ground, switch off the engine and select first or reverse gear, then chock the wheels and release the handbrake.
- 6 Check that all pipes and hoses are secure, unions tight and bleed screws closed. Clean any dirt from around the bleed screws.
- 7 Unscrew the master cylinder reservoir cap, and top the master cylinder reservoir up to the "MAX" level line; refit the cap loosely, and remember to maintain the fluid level at least above the "MIN" level line throughout the procedure, or there is a risk of further air entering the system.
- 8 There are a number of one-man, do-it-yourself brake bleeding kits currently available

from motor accessory shops. It is recommended that one of these kits is used whenever possible, as they greatly simplify the bleeding operation, and also reduce the risk of expelled air and fluid being drawn back into the system. If such a kit is not available, the basic (two-man) method must be used, which is described in detail below.

**9** If a kit is to be used, prepare the vehicle as described previously, and follow the kit manufacturer's instructions, as the procedure may vary slightly according to the type being used; generally, they are as outlined below in the relevant sub-section.

**10** Whichever method is used, the same sequence must be followed (paras 11 and 12) to ensure the removal of all air from the system.

### Bleeding sequence

**11** If the system has been only partially disconnected, and suitable precautions were taken to minimise fluid loss, it should be necessary only to bleed that part of the system (ie the primary or secondary circuit).

**12** If the complete system is to be bled, then it should be done working in the following sequence:

#### Non-ABS models

- (a) Left-hand rear brake.
- (b) Right-hand front brake.
- (c) Right-hand rear brake.
- (d) Left-hand front brake.

#### ABS models

- (a) Left-hand front brake.
- (b) Right-hand front brake.
- (c) Left-hand rear brake,
- (d) Right-hand rear brake.

**Note:** If difficulty is experienced in bleeding the braking circuit on models with ABS, try bleeding the complete system working in the reverse of the specified sequence, starting with the right-hand rear brake and finishing with the left-hand front brake.

### Bleeding - basic (two-man) method

**13** Collect a clean glass jar, a suitable length of plastic or rubber tubing which is a tight fit over the bleed screw, and a ring spanner to fit the screw. The help of an assistant will also be required.

**14** Remove the dust cap from the first screw in the sequence. Fit the spanner and tube to the screw, place the other end of the tube in the jar, and pour in sufficient fluid to cover the end of the tube.

**15** Ensure that the master cylinder reservoir fluid level is maintained at least above the "MIN" level line throughout the procedure.

**16** Have the assistant fully depress the brake pedal several times to build up pressure, then maintain it on the final downstroke.

**17** While pedal pressure is maintained, unscrew the bleed screw (approximately one turn) and allow the compressed fluid and air to flow into the jar. The assistant should maintain pedal pressure, following it down to the floor if necessary, and should not release it until

instructed to do so. When the flow stops, tighten the bleed screw again, have the assistant release the pedal slowly, and recheck the reservoir fluid level.

**18** Repeat the steps given in paragraphs 16 and 17 until the fluid emerging from the bleed screw is free from air bubbles. If the master cylinder has been drained and refilled, and air is being bled from the first screw in the sequence, allow approximately five seconds between cycles for the master cylinder passages to refill.

**19** When no more air bubbles appear, tighten the bleed screw securely, remove the tube and spanner, and refit the dust cap. Do not overtighten the bleed screw.

**20** Repeat the procedure on the remaining screws in the sequence, until all air is removed from the system and the brake pedal feels firm again.

### Bleeding - using a one-way valve kit

**21** As their name implies, these kits consist of a length of tubing with a one-way valve fitted, to prevent expelled air and fluid being drawn back into the system; some kits include a translucent container, which can be positioned so that the air bubbles can be more easily seen flowing from the end of the tube.

**22** The kit is connected to the bleed screw, which is then opened. The user returns to the driver's seat, depresses the brake pedal with a smooth, steady stroke, and slowly releases it; this is repeated until the expelled fluid is clear of air bubbles (see illustration).

**23** Note that these kits simplify work so much that it is easy to forget the master cylinder reservoir fluid level; ensure that this is maintained at least above the "MIN" level line at all times.

### Bleeding - using a pressure-bleeding kit

**24** These kits are usually operated by the reservoir of pressurised air contained in the spare tyre. However, note that it will probably be necessary to reduce the pressure to a lower level than normal; refer to the instructions supplied with the kit.

**25** By connecting a pressurised, fluid-filled container to the master cylinder reservoir, bleeding can be carried out simply by opening each screw in turn (in the specified sequence), and allowing the fluid to flow out until no more air bubbles can be seen in the expelled fluid.

**26** This method has the advantage that the large reservoir of fluid provides an additional safeguard against air being drawn into the system during bleeding.

**27** Pressure-bleeding is particularly effective when bleeding "difficult" systems, or when bleeding the complete system at the time of routine fluid renewal.

### All methods of bleeding

**28** When bleeding is complete, and firm pedal feel is restored, wash off any spilt fluid, tighten the bleed screws securely, and refit their dust caps.



### 2.22 Bleeding a rear brake caliper using a one-way valve kit

**29** Check the hydraulic fluid level in the master cylinder reservoir, and top-up if necessary (Chapter 1).

**30** Discard any hydraulic fluid that has been bled from the system; it will not be fit for re-use.

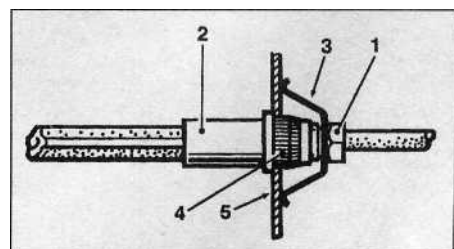
**31** Check the feel of the brake pedal. If it feels at all spongy, air must still be present in the system, and further bleeding is required. Failure to bleed satisfactorily after a reasonable repetition of the bleeding procedure may be due to worn master cylinder seals.

## 3 Hydraulic pipes and hoses - renewal

**Note:** Before starting work, refer to the note at the beginning of Section 2 concerning the dangers of hydraulic fluid.

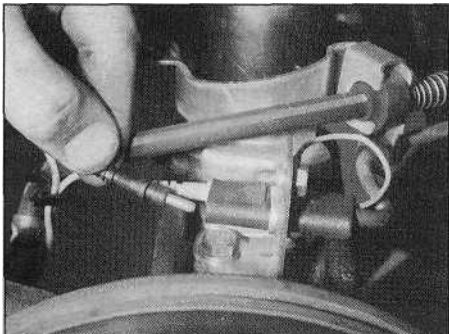
**1** If any pipe or hose is to be renewed, minimise fluid loss by first removing the master cylinder reservoir cap, then tightening it down onto a piece of polythene to obtain an airtight seal. Alternatively, flexible hoses can be sealed, if required, using a proprietary brake hose clamp; metal brake pipe unions can be plugged (if care is taken not to allow dirt into the system) or capped immediately they are disconnected. Place a wad of rag under any union that is to be disconnected, to catch any spilt fluid.

**2** If a flexible hose is to be disconnected, unscrew the brake pipe union nut before removing the spring clip which secures the hose to its mounting bracket (see illustration).



### 3.2 Hydraulic pipe-to-flexible hose connection

- 1 Union nut
- 2 Flexible hose
- 3 Spring clip support
- 4 Splined end fitting
- 5 Mounting bracket



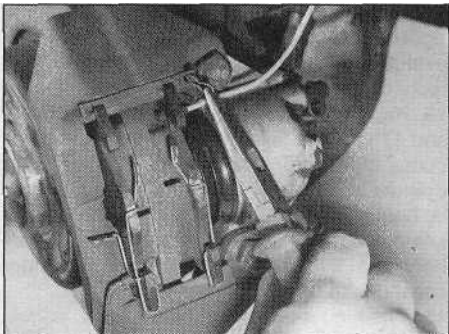
4.2 Disconnecting the pad wear sensor wiring from its connector

3 To unscrew the union nuts, it is preferable to obtain a brake pipe spanner of the correct size; these are available from most large motor accessory shops. Failing this, a close-fitting open-ended spanner will be required, though if the nuts are tight or corroded, their flats may be rounded-off if the spanner slips. In such a case, a self-locking wrench is often the only way to unscrew a stubborn union, but it follows that the pipe and the damaged nuts must be renewed on reassembly. Always clean a union and surrounding area before disconnecting it. If disconnecting a component with more than one union, make a careful note of the connections before disturbing any of them.

4 If a brake pipe is to be renewed, it can be obtained, cut to length and with the union nuts and end flares in place, from Citroen dealers. All that is then necessary is to bend it to shape, following the line of the original, before fitting it to the car. Alternatively, most motor accessory shops can make up brake pipes from kits, but this requires very careful measurement of the original, to ensure that the replacement is of the correct length. The safest answer is usually to take the original to the shop as a pattern.

5 On refitting, do not overtighten the union nuts. It is not necessary to exercise brute force to obtain a sound joint.

6 Ensure that the pipes and hoses are correctly routed, with no kinks, and that they are secured in the clips or brackets provided. After fitting, remove the polythene from the



4.5a On the Bendix caliper, remove the spring clip ...

reservoir, and bleed the hydraulic system as described in Section 2. Wash off any spilt fluid, and check carefully for fluid leaks.

4 Front brake pads - renewal

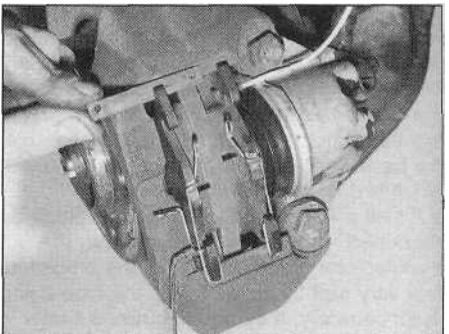
**Warning: Renew both sets of front brake pads at the same time - never renew the pads on only one wheel, as uneven braking may result. Note that the dust created by wear of the pads may contain asbestos, which is a health hazard. Never blow it out with compressed air, and don't inhale any of it. An 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 Apply the handbrake, then jack up the front of the vehicle and support it on axle stands. Remove the front roadwheels.

2 Trace the brake pad wear sensor wiring back from the pads, and disconnect it from the wiring connector (see illustration). Note the routing of the wiring, and free it from any relevant retaining clips.

3 Push the piston into its bore by pulling the caliper outwards.

4 There are two different types of front brake caliper fitted to the models covered in this manual. On 1124 cc and 1360 cc models, Bendix calipers are fitted, whereas on all



4.5b ... then slide out the retaining plate...

1580 cc and larger-engined models, Girling calipers are used. Proceed as described under the relevant sub-heading.

Bendix caliper

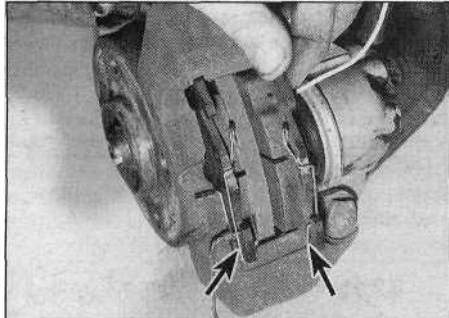
5 Using pliers, extract the small spring clip from the pad retaining plate, and then slide the plate out of the caliper (see illustrations).

6 Withdraw the pads from the caliper, then make a note of the correct fitted position of each anti-rattle spring, and remove the spring from each pad (see illustration).

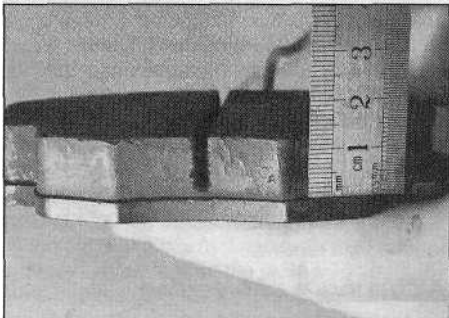
7 First measure the thickness of each brake pad's friction material. If either pad is worn at any point to the specified minimum thickness or less, all four pads must be renewed (see illustration). Also, the pads should be renewed if any are fouled with oil or grease; there is no satisfactory way of degreasing friction material, once contaminated. If any of the brake pads are worn unevenly, or are fouled with oil or grease, trace and rectify the cause before reassembly. New brake pads and spring kits are available from Citroen dealers.

8 If the brake pads are still serviceable, carefully clean them using a clean, fine wire brush or similar, paying particular attention to the sides and back of the metal backing. Clean out the grooves in the friction material, and pick out any large embedded particles of dirt or debris. Carefully clean the pad locations in the caliper body/mounting bracket.

9 Prior to fitting the pads, check that the guide pins are free to slide easily in the caliper body/mounting bracket, and check that the



4.6 ... and remove the pads. Note the correct fitted positions on pad springs (arrowed)



4.7 Measuring brake pad friction material thickness



4.9 While the caliper is removed, check the condition of the guide pins and gaiters - Girling caliper shown

rubber guide pin gaiters are undamaged (**see illustration**). Brush the dust and dirt from the caliper and piston, but do *not* inhale it, as it is injurious to health. Damage the dust seal around the piston for damage, and the piston for evidence of fluid leaks, corrosion or damage. If attention to any of these components is necessary, refer to Section 10.

**10** If new brake pads are to be fitted, the caliper piston must be pushed back into the cylinder to make room for them. Either use a G-clamp or similar tool, or use suitable pieces of wood as levers. Provided that the master cylinder reservoir has not been overfilled with hydraulic fluid, there should be no spillage, but keep a careful watch on the fluid level while retracting the piston. If the fluid level rises above the "MAX" level line at any time, the surplus should be syphoned off or ejected via a plastic tube connected to the bleed screw (**see Section 2**). **Note:** *Do not syphon the fluid by mouth, as it is poisonous; use a syringe or an old poultry baster.*

**11** Fit the anti-rattle springs to the pads, so that when the pads are installed in the caliper, the spring end will be located at the opposite end of the pad in relation to the pad retaining plate.

**12** Locate the pads in the caliper, ensuring that the friction material of each pad is against the brake disc, and check that the anti-rattle spring ends are at the opposite end of the pad to which the retaining plate is to be inserted. Note that if the pads are installed correctly, looking at the pads from the front of the vehicle, the innermost pad groove must be higher than the outer pad groove. Ensure the pads are fitted correctly before proceeding (**see illustration**).

**13** Slide the retaining plate into place, and install the new small spring clip at its inner end. It may be necessary to file an entry chamfer on the edge of the retaining plate, to enable it to be fitted without difficulty.

**14** Reconnect the brake pad wear sensor wiring connectors, ensuring that the outer wire is correctly routed through the anti-rattle spring loops, and that both wires pass through the loop of the bleed screw cap.

**15** Depress the brake pedal repeatedly, until

the pads are pressed into firm contact with the brake disc, and normal (non-assisted) pedal pressure is restored.

**16** Repeat the above procedure on the remaining front brake caliper.

**17** Refit the roadwheels, then lower the vehicle to the ground and tighten the roadwheel bolts to the specified torque setting.

**18** Check the hydraulic fluid level as described in Chapter 1.

### Girling caliper

**19** Slacken and remove the upper and lower caliper guide pin bolts, using a slim open-ended spanner to prevent the guide pin itself from rotating (**see illustration**). Where possible, new guide pin bolts should be used on refitting, otherwise clean the old ones thoroughly.

**20** With the guide pin bolts removed, lift the caliper away from the brake pads and mounting bracket, and tie it to the suspension strut using a suitable piece of wire. Do not allow the caliper to hang unsupported on the flexible brake hose.

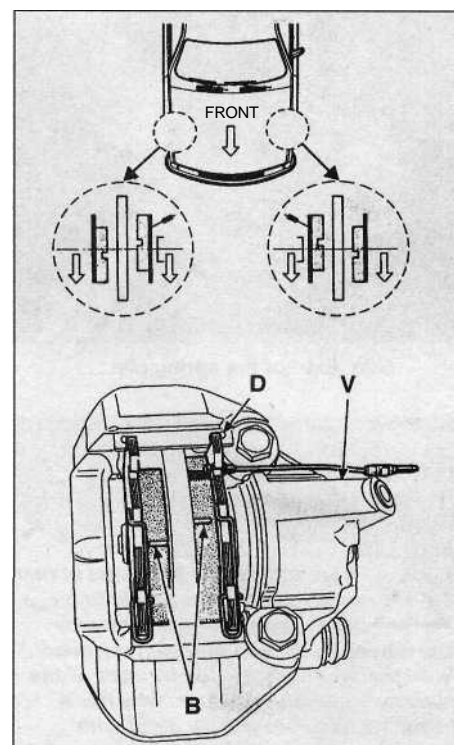
**21** Withdraw the two brake pads from the caliper mounting bracket, and examine them as described above in paragraphs 7 to 10.

**22** Install the pads in the caliper mounting bracket, ensuring that the friction material of each pad is against the brake disc (**see illustration**).

**23** Position the caliper over the pads, and pass the pad warning sensor wiring through the caliper aperture and underneath the retaining clip (**see illustration**). If the threads of the guide pin bolts are not already coated with locking compound, apply a suitable thread-locking compound to them. Press the caliper into position, then install the guide pin bolts, tightening them to the specified torque setting while retaining the guide pins with an open-ended spanner.

**24** Reconnect the brake pad wear sensor wiring connectors, ensuring that the wiring is correctly routed through the loop of the caliper bleed screw cap.

**25** Depress the brake pedal repeatedly, until the pads are pressed into firm contact with the brake disc, and normal (non-assisted) pedal pressure is restored.



**4.12 Correct fitting of brake pads - Bendix caliper**

B Grooves

D Pad retaining plate spring clip

V Bleed screw

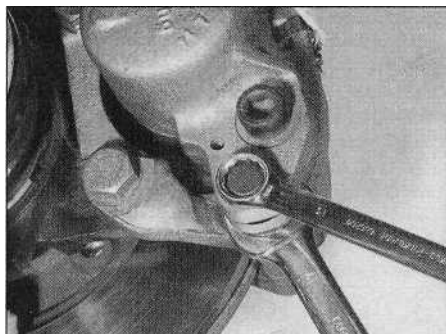
**26** Repeat the above procedure on the remaining front brake caliper.

**27** Refit the roadwheels, then lower the vehicle to the ground and tighten the roadwheel bolts to the specified torque setting.

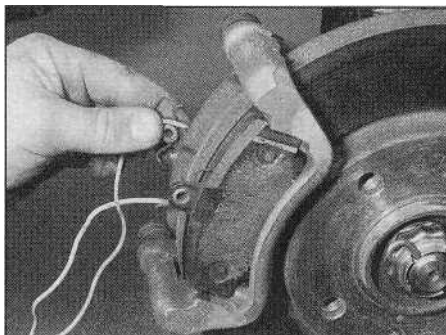
**28** Check the hydraulic fluid level as described in Chapter 1.

### All calipers

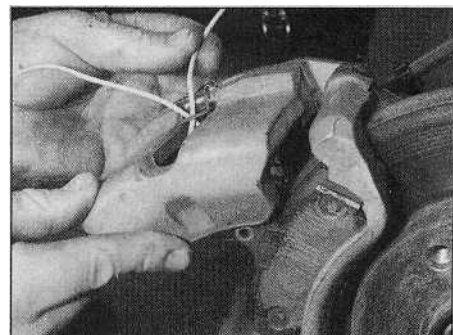
**29** New pads will not give full braking efficiency until they have bedded in. Be prepared for this, and avoid hard braking as far as possible for the first hundred miles or so after pad renewal.



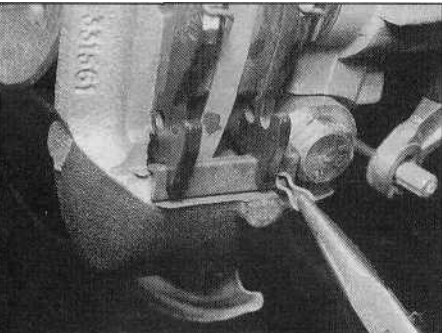
**4.19 On the Girling caliper, retain the guide pin with an open-ended spanner while slackening the guide pin bolt**



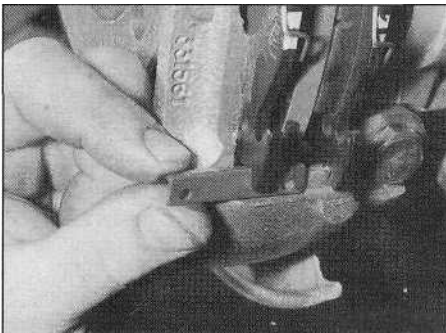
**4.22 Ensure that the brake pads are fitted the correct way around, with friction material facing the disc ...**



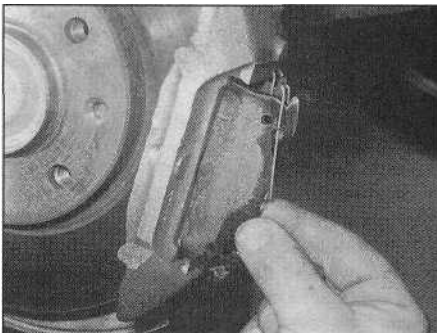
**4.23 ... then refit the caliper, feeding the pad wiring through the caliper aperture**



5.2a
Extract the spring clip ...



5.2b
... then slide out the pad retaining plate...



5.3
... and withdraw the brake pads from the caliper

5
Rear brake pads - renewal

**Warning:** Renew both sets of rear 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 Chock the front wheels, then jack up the rear of the vehicle and support it on axle stands. Remove the rear wheels.
- 2 Extract the small spring clip from the pad retaining plate, and then slide the plate out of the caliper (see illustrations). Discard the spring clip - a new one must be used on refitting.
- 3 Using pliers if necessary, withdraw both the inner and outer pads from the caliper (see illustration). Make a note of the correct fitted position of the anti-rattle springs, and remove the springs from each pad.
- 4 First measure the thickness of the friction material of each brake pad. If either pad is

worn at any point to the specified minimum thickness or less, all four pads must be renewed. Also, the pads should be renewed if any are fouled with oil or grease; there is no satisfactory way of degreasing friction material, once contaminated. If any of the brake pads are worn unevenly, or fouled with oil or grease, trace and rectify the cause before reassembly. New brake pads and spring kits are available from Citroen dealers.

5 If the brake pads are still serviceable, carefully clean them using a clean, fine wire brush or similar, paying particular attention to the sides and back of the metal backing. Clean out the grooves in the friction material, and pick out any large embedded particles of dirt or debris. Carefully clean the pad locations in the caliper body/mounting bracket.

6 Prior to fitting the pads, check that the guide sleeves are free to slide easily in the caliper body, and check that the rubber guide sleeve gaiters are undamaged. Brush the dust and dirt from the caliper and piston, but do not inhale it, as it is injurious to health. Inspect the dust seal around the piston for damage, and the piston for evidence of fluid leaks, corrosion or damage. If attention to any of these components is necessary, refer to Section 11.

7 If new brake pads are to be fitted, it will be necessary to retract the piston fully into the

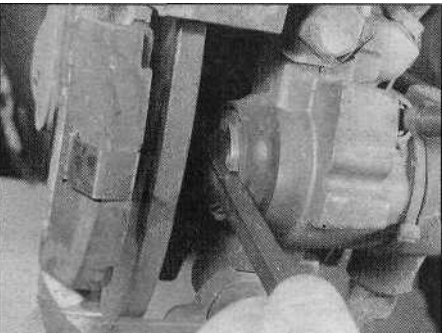
caliper bore, by rotating it in a clockwise direction. This can be achieved using a suitable square-section bar, such as the shaft of a screwdriver, which locates snugly in the caliper piston slots (see illustration). Provided that the master cylinder reservoir has not been overfilled with hydraulic fluid, there should be no spillage, but keep a careful watch on the fluid level while retracting the piston. If the fluid level rises above the "MAX" level line at any time, the surplus should be syphoned off, or ejected via a plastic tube connected to the bleed screw (see Section 2).

**Note:** Do not syphon the fluid by mouth, as it is poisonous; use a syringe or an old poultry baster.

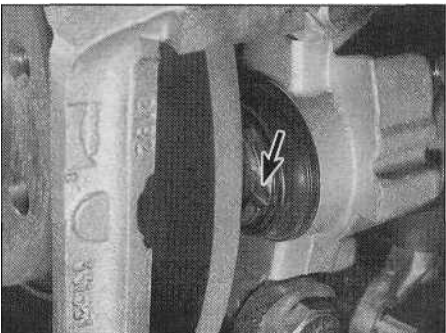
8 Position the caliper piston so that its piston slot is horizontal; this is necessary to ensure that the lug on the inner pad will locate with the caliper piston slot on installation (see illustration).

9 The brake pad with the lug on its backing plate is the inner pad. Refit the anti-rattle springs to the pads, so that when the pads are installed in the caliper, the spring end will be located at the opposite end of the pad, in relation to the pad retaining plate (see illustration).

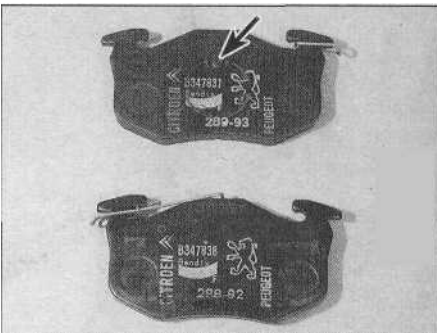
10 Locate the outer brake pad in the caliper body, ensuring that its friction material is against the brake disc. Slide the inner pad into position in the caliper, ensuring that the lug on



5.7
Retract the piston using a square-section bar...

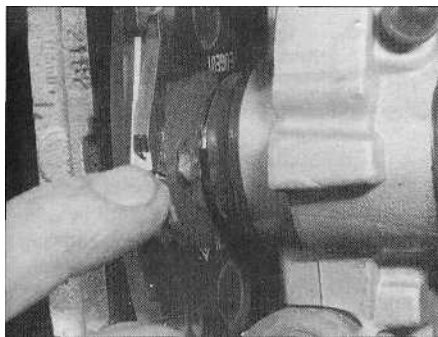


5.8
... and position the piston so that its slot (arrowed) is horizontal to the ground



5.9
Inner brake pad can be identified by its locating lug (arrowed). Note the correct fitted positions of the anti-rattle springs





**5.10** Install the inner pad, ensuring its locating lug is correctly engaged in the piston slot

its backing plate is aligned with the slot in the caliper piston (see illustration).

**11** Ensure that the anti-rattle spring ends on both pads are correctly positioned, then slide the retaining plate into place, and secure it in position with a new spring clip. It may be necessary to file an entry chamfer on the edge of the retaining plate, to enable it to be fitted without difficulty.

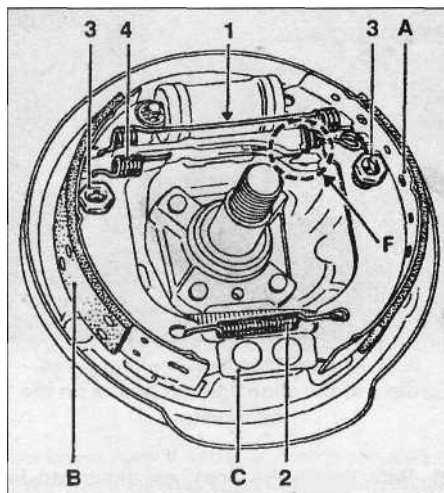
**12** Depress the brake pedal repeatedly until the pads are pressed into firm contact with the brake disc, and normal (non-assisted) pedal pressure is restored. Check that the inner pad lug is correctly engaged with one of the caliper piston slots.

**13** Repeat the above procedure on the remaining rear brake caliper.

**14** Check the handbrake cable adjustment as described in Section 17, then refit the roadwheels and lower the vehicle to the ground. Tighten the roadwheel bolts to the specified torque setting.

**15** Check the hydraulic fluid level as described in Chapter 1.

**16** Be prepared for reduced braking efficiency while the new pads bed in, as described at the end of the previous Section.



**6.6a** Correct fitted positions of the Bendix rear brake components

- A Leading shoe
- B Trailing shoe
- C Lower pivot point
- F Adjuster strut mechanism
- 1 Upper return spring
- 2 Lower return spring
- 3 Retaining pin, spring and spring cup
- 4 Adjuster strut-to-trailing shoe spring

material of each brake shoe at several points; if either shoe is worn at any point to the specified minimum thickness or less, all four shoes must be renewed as a set. The shoes should also be renewed if any are fouled with oil or grease; there is no satisfactory way of degreasing friction material, once contaminated.

**4** If any of the brake shoes are worn unevenly, or fouled with oil or grease, trace and rectify the cause before reassembly.

**5** To renew the brake shoes, proceed as described under the relevant sub-heading.

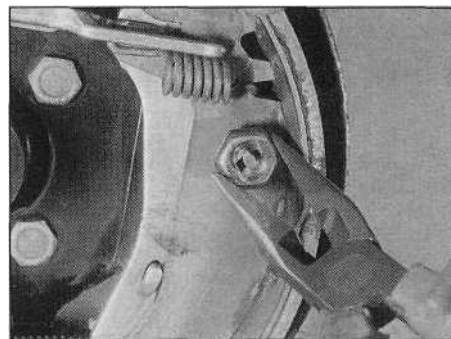
### Bendix brake shoes

**6** Using a pair of pliers, remove the shoe retainer spring cups by depressing and turning them through 90° (see illustrations). With the cups removed, lift off the springs and withdraw the retainer pins.

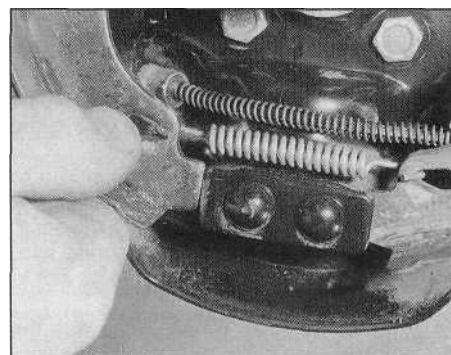
**7** Ease the shoes out one at a time from the lower pivot point, to release the tension of the return spring, then disconnect the lower return spring from both shoes (see illustration).

**8** Ease the upper end of both shoes out from their wheel cylinder locations, taking care not to damage the wheel cylinder seals, and disconnect the handbrake cable from the trailing shoe. The brake shoe and adjuster strut assembly can then be manoeuvred out of position and away from the backplate. Do not depress the brake pedal until the brakes are reassembled; wrap a strong elastic band around the wheel cylinder pistons to retain them.

**9** With the shoe and adjuster strut assembly on a bench, make a note of the correct fitted



**6.6b** Removing a shoe retainer spring cup



**6.7** On Bendix rear brake shoes, ease the shoes out of the lower pivot point, and disconnect the lower return spring

positions of the springs and adjuster strut, to use as a guide on reassembly. Release the handbrake lever stop-peg (if not already done), then carefully detach the adjuster strut bolt retaining spring from the leading shoe. Disconnect the upper return spring, then detach the leading shoe and return spring from the trailing shoe and strut assembly. Unhook the spring securing the adjuster strut to the trailing shoe, and separate the two.

**10** If genuine Citroen brake shoes are being installed, it will be necessary to remove the handbrake lever from the original trailing shoe, and install it on the new shoe. Secure the lever in position with a new retaining clip. All return springs should be renewed, regardless of their apparent condition; spring kits are also available from Citroen dealers.

**11** Withdraw the adjuster bolt from the strut, and carefully examine the assembly for signs of wear or damage. Pay particular attention to the threads of the adjuster bolt and the knurled adjuster wheel, and renew if necessary. Note that left-hand and right-hand struts are not interchangeable - they are marked "G" (gauche) and "D" (droit) respectively. Also note that the strut adjuster bolts are not interchangeable; the left-hand strut bolt has a left-handed thread, and the right-hand bolt a right-handed thread.

**12** Ensure the components on the end of the strut are correctly positioned, then apply a little high-melting-point grease to the threads

## 6 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.**

**1** Remove the brake drum as described in Section 9.

**2** Working carefully, and taking the necessary precautions, remove all traces of brake dust from the brake drum, backplate and shoes.

**3** Measure the thickness of the friction



**6.12 Correct fitted position of Bendix adjuster strut components**

of the adjuster bolt (**see illustration**). Screw the adjuster wheel onto the bolt until only a small gap exists between the wheel and the head of the bolt, then install the bolt in the strut.

**13** Fit the adjuster strut retaining spring to the trailing shoe, ensuring that the shorter hook of the spring is engaged with the shoe. Attach the adjuster strut to the spring end, then ease the strut into position in its slot in the trailing shoe.

**14** Engage the upper return spring with the trailing shoe, then hook the leading shoe onto the other end of the spring, and lever the leading shoe down until the adjuster bolt head is correctly located in its groove. Once the bolt is correctly located, hook its retaining spring into the slot on the leading shoe.

**15** Peel back the rubber protective caps, and check the wheel cylinder for fluid leaks or other damage; check that both cylinder pistons are free to move easily. Refer to Section 12, if necessary, for information on wheel cylinder renewal.

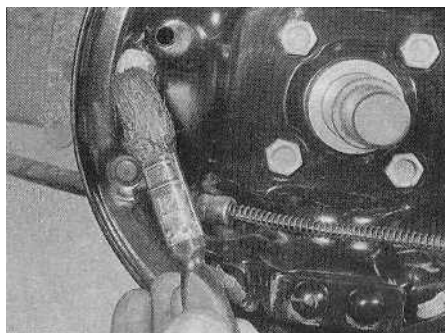
**16** Prior to installation, clean the backplate, and apply a thin smear of high-temperature brake grease or anti-seize compound to all those surfaces of the backplate which bear on the shoes, particularly the wheel cylinder pistons and lower pivot point (**see illustration**). Do not allow the lubricant to foul the friction material.

**17** Ensure the handbrake lever stop-peg is correctly located against the edge of the trailing shoe, and remove the elastic band fitted to the wheel cylinder.

**18** Manoeuvre the shoe and strut assembly into position on the vehicle, and locate the upper end of both shoes with the wheel cylinder pistons. Attach the handbrake cable to the trailing shoe lever. Fit the lower return spring to both shoes, and ease the shoes into position on the lower pivot point.

**19** Tap the shoes to centralise them with the backplate, then refit the shoe retainer pins and springs, and secure them in position with the spring cups.

**20** Using a screwdriver, turn the strut adjuster wheel to expand the shoes until the brake drum just slides over the shoes.



**6.16 Apply a little high-melting-point grease to the shoe contact points on the backplate**

**21** Refit the brake drum as described in Section 9.

**22** Repeat the above procedure on the remaining rear brake.

**23** Once both sets of rear shoes have been renewed, adjust the lining-to-drum clearance by repeatedly depressing the brake pedal. Whilst depressing the pedal, have an assistant listen to the rear drums, to check that the adjuster strut is functioning correctly; if so, a clicking sound will be emitted by the strut as the pedal is depressed.

**24** Check and, if necessary, adjust the handbrake as described in Section 17.

**25** On completion, check the hydraulic fluid level as described in Chapter 1.

### **Girling brake shoes**

**26** Make a note of the correct fitted positions of the springs and adjuster strut, to use as a guide on reassembly.

**27** Carefully unhook both the upper and lower return springs, and remove them from the brake shoes.

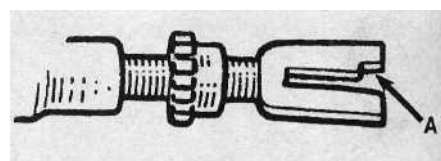
**28** Using a pair of pliers, remove the leading shoe retainer spring cup by depressing it and turning through 90°. With the cup removed, lift off the spring, then withdraw the retainer pin and remove the shoe from the backplate. Unhook the adjusting lever spring, and remove it from the leading shoe.

**29** Detach the adjuster strut, and remove it from the trailing shoe.

**30** Remove the trailing shoe retainer spring cup, spring and pin as described above, then detach the handbrake cable and remove the shoe from the vehicle. Do not depress the brake pedal until the brakes are reassembled; wrap a strong elastic band around the wheel cylinder pistons to retain them.

**31** If genuine Citroen brake shoes are being installed, it will be necessary to remove the adjusting lever from the original leading shoe, and install it on the new shoe. All return springs should be renewed, regardless of their apparent condition; spring kits are also available from Citroen dealers.

**32** Withdraw the forked end from the strut, and carefully examine the assembly for signs of wear or damage. Pay particular attention to



**6.37 On Girling rear brake shoes, adjuster strut fork cut-out (A) must engage with leading shoe adjusting lever on refitting**

the threads and the knurled adjuster wheel, and renew if necessary. Note that left-hand and right-hand struts are not interchangeable; the left-hand fork has a right-handed thread, and the right-hand fork a left-handed thread.

**33** Peel back the rubber protective caps, and check the wheel cylinder for fluid leaks or other damage; check that both cylinder pistons are free to move easily. Refer to Section 12, if necessary, for information on wheel cylinder renewal.

**34** Prior to installation, clean the backplate, and apply a thin smear of high-temperature brake grease or anti-seize compound to all those surfaces of the backplate which bear on the shoes, particularly the wheel cylinder pistons and lower pivot point. Do not allow the lubricant to foul the friction material.

**35** Ensure the handbrake lever stop-peg is correctly located against the edge of the trailing shoe, and remove the elastic band fitted to the wheel cylinder.

**36** Locate the upper end of the trailing shoe in the wheel cylinder piston, then refit the retainer pin and spring, and secure it in position with the spring cup. Connect the handbrake cable to the lever.

**37** Screw in the adjuster wheel until the minimum strut length is obtained, then hook the strut into position on the trailing shoe. Rotate the adjuster strut forked end, so that the cut-out of the fork will engage with the leading shoe adjusting lever once the shoe is installed (**see illustration**).

**38** Fit the spring to the leading shoe adjusting lever, so that the shorter hook of the spring engages with the lever.

**39** Slide the leading shoe assembly into position, ensuring that it is correctly engaged with the adjuster strut fork, and that the fork cut-out is engaged with the adjusting lever. Ensure the upper end of the shoe is located in the wheel cylinder piston, then secure the shoe in position with the retainer pin, spring and spring cup.

**40** Install the upper and lower return springs, then tap the shoes to centralise them with the backplate.

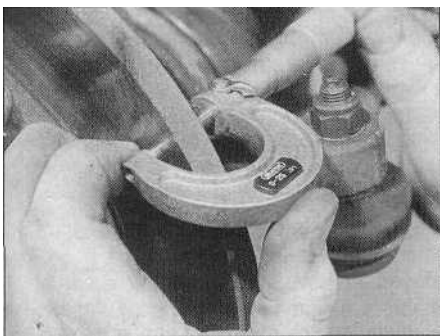
**41** Using a screwdriver, turn the strut adjuster wheel to expand the shoes until the brake drum just slides over the shoes.

**42** Refit the brake drum as described in Section 9.

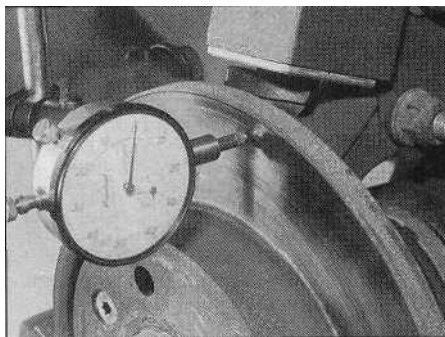
**43** Repeat the above procedure on the remaining rear brake.

**44** Once both sets of rear shoes have been renewed, adjust the lining-to-drum clearance

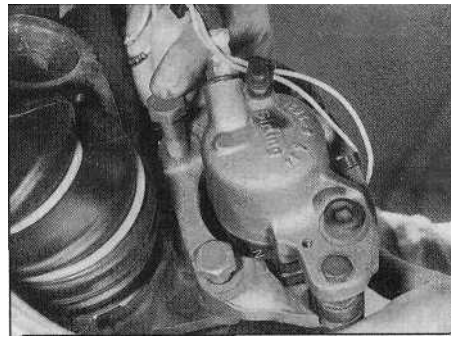




**7.3** Using a micrometer to measure disc thickness



**7.4** Checking disc run-out using a dial gauge



**7.7a** Undo the two mounting bolts ...

by repeatedly depressing the brake pedal. Whilst depressing the pedal, have an assistant listen to the rear drums, to check that the adjuster strut is functioning correctly; if so, a clicking sound will be emitted by the strut as the pedal is depressed.

**45** Check and, if necessary, adjust the handbrake as described in Section 17.

**46** On completion, check the hydraulic fluid level as described in Chapter 1.

### All shoes

**47** Be prepared for reduced braking efficiency while the new shoes bed in, as described at the end of Section 4.

### 7 Front brake disc - inspection, removal and refitting

**Note:** Before starting work, refer to the note at the beginning of Section 4 concerning the dangers of asbestos dust.

### Inspection

**Note:** If either disc requires renewal, **BOTH** should be renewed at the same time, to ensure even and consistent braking. New brake pads should also be fitted.

**1** Apply the handbrake, then jack up the front of the car and support it on axle stands. Remove the appropriate front roadwheel.

**2** Slowly rotate the brake disc so that the full area of both sides can be checked; remove

the brake pads if better access is required to the inboard surface. Ught scoring is normal in the area swept by the brake pads, but if heavy scoring or cracks are found, the disc must be renewed.

**3** It is normal to find a lip of rust and brake dust around the disc's perimeter; this can be scraped off if required. If, however, a lip has formed due to excessive wear of the brake pad swept area, then the disc's thickness must be measured using a micrometer (**see illustration**). Take measurements at several places around the disc, at the inside and outside of the pad swept area; if the disc has worn at any point to the specified minimum thickness or less, the disc must be renewed.

**4** If the disc is thought to be warped, it can be checked for run-out. Either use a dial gauge mounted on any convenient fixed point, while the disc is slowly rotated, or use feeler gauges to measure (at several points all around the disc) the clearance between the disc and a fixed point, such as the caliper mounting bracket (**see illustration**). If the measurements obtained are at the specified maximum or beyond, the disc is excessively warped, and must be renewed; however, it is worth checking first that the hub bearing is in good condition (Chapters 1 and/or 10). Also try the effect of removing the disc and turning it through 180°, to reposition it on the hub; if the run-out is still excessive, the disc must be renewed.

**5** Check the disc for cracks, especially

around the wheel bolt holes, and any other wear or damage, and renew if necessary.

### Removal

**6** On 1124 cc and 1360 cc models, remove the brake pads as described in Section 4, paragraphs 1 to 6.

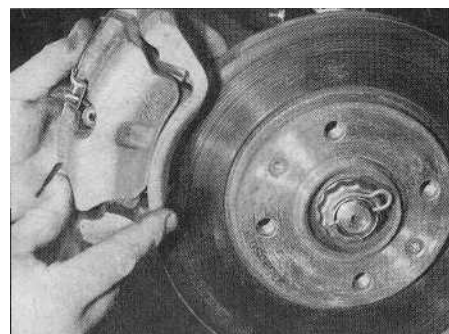
**7** On all 1580 cc and larger-engined models, unscrew the two bolts securing the brake caliper to the swivel hub, and discard them - new bolts must be used on refitting. Slacken and remove the bolt securing the wiring retaining bracket to the swivel hub, then slide the caliper assembly off the disc. Using a piece of wire or string, tie the caliper to the front suspension coil spring, to avoid placing any strain on the hydraulic brake hose (**see illustrations**).

**8** Use chalk or paint to mark the relationship of the disc to the hub, then remove the screws securing the brake disc to the hub, and remove the disc (**see illustration**). If it is tight, lightly tap its rear face with a hide or plastic mallet.

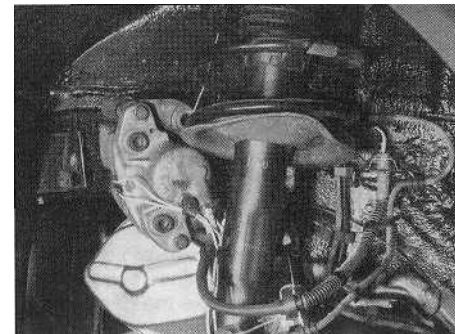
### Refitting

**9** Refitting is the reverse of the removal procedure, noting the following points:

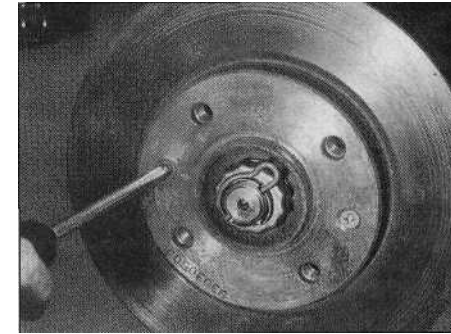
- (a) Ensure that the mating surfaces of the disc and hub are clean and flat.
- (b) Align (if applicable) the marks made on removal, and securely tighten the disc retaining screws.
- (c) If a new disc has been fitted, use a



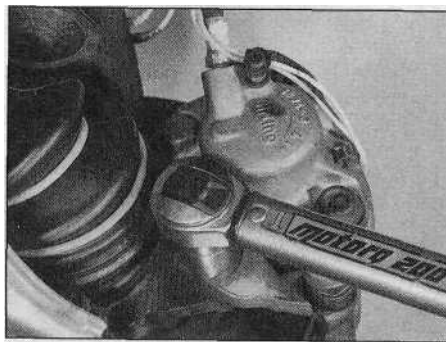
**7.7b** ... then slide the caliper assembly off the disc ...



**7.7c** ... and tie it to the suspension strut, to avoid placing any strain on the flexible hose



**7.8** Undo the two retaining screws and remove the disc



### 7.9 On refitting, tighten the caliper mounting bolts to the specified torque setting

suitable solvent to wipe any preservative coating from the disc, before refitting the caliper.

- (d) On 1580 cc and larger-engined models, if the threads of the new caliper mounting bolts are not already pre-coated with locking compound, apply a suitable locking compound to them. Refit the caliper, and tighten the mounting bolts to the specified torque setting (see illustration).
- (e) On 1124 cc and 1360 cc models, refit the pads as described in paragraphs 12 to 18 of Section 4.
- (f) Refit the roadwheel, then lower the vehicle to the ground and tighten the roadwheel bolts to the specified torque. On completion, repeatedly depress the brake pedal until normal (non-assisted) pedal pressure returns.

### 8 Rear brake disc - inspection, removal and refitting

**Note:** Before starting work, refer to the note at the beginning of Section 5 concerning the dangers of asbestos dust.

#### Inspection

**Note:** If either disc requires renewal, BOTH should be renewed at the same time, to ensure even and consistent braking. New brake pads should be fitted also.

1 Firmly chock the front wheels, then jack up the rear of the car and support it on axle stands. Remove the appropriate rear roadwheel.

2 Inspect the disc as described in Section 7.

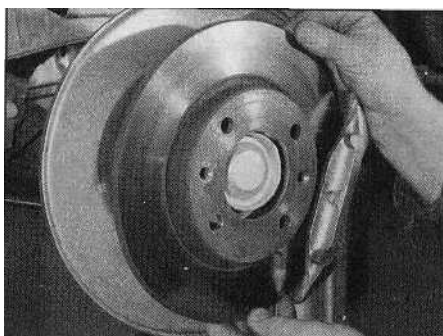
#### Removal

3 Remove the brake pads as described in Section 5.

4 Use chalk or paint to mark the relationship of the disc to the hub, then remove the screw securing the brake disc to the hub, and remove the disc (see illustration). If it is tight, lightly tap its rear face with a hide or plastic mallet.

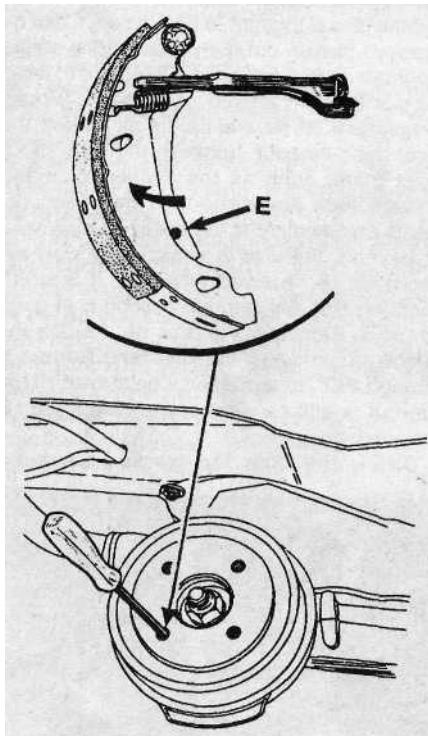
#### Refitting

5 Refitting is the reverse of the removal procedure, noting the following points:



### 8.4 Removing the rear brake disc

- (a) Ensure that the mating surfaces of the disc and hub are clean and flat.
- (b) Align (if applicable) the marks made on removal, and securely tighten the disc retaining screws.
- (c) If a new disc has been fitted, use a suitable solvent to wipe any preservative coating from the disc, before refitting the caliper.
- (d) Refit the brake pads as described in Section 5.
- (e) Refit the roadwheel, then lower the vehicle to the ground and tighten the roadwheel bolts to the specified torque.



9.6a Using a screwdriver inserted through the brake drum to release the handbrake operating lever

E Handbrake operating lever stop-peg location

### 9 Rear brake drum - removal, inspection and refitting

**Note:** Before starting work, refer to the note at the beginning of Section 6 concerning the dangers of asbestos dust.

#### Removal

1 Chock the front wheels, then jack up the rear of the vehicle and support it on axle stands. Remove the appropriate rear wheel.

2 Using a hammer and a large flat-bladed screwdriver, carefully tap and prise the cap out of the centre of the brake drum. Discard the cap - a new one must be used on refitting. Using a hammer and chisel, tap up the staking securing the hub retaining nut to the groove in the stub axle.

3 Using a socket and long bar, slacken and remove the rear hub nut, and withdraw the thrustwasher. Discard the hub nut - a new nut must be used on refitting.

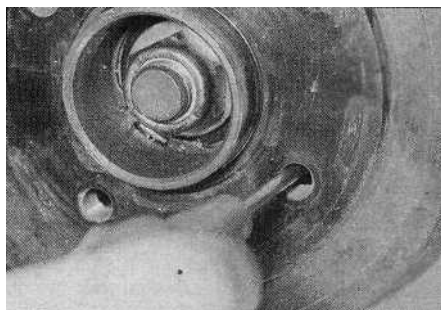
4 It should now be possible to withdraw the brake drum and hub bearing assembly from the stub axle by hand. It may be difficult to remove the drum due to the tightness of the hub bearing on the stub axle, or due to the brake shoes binding on the inner circumference of the drum. If the bearing is tight, tap the periphery of the drum using a hide or plastic mallet, or use a universal puller, secured to the drum with the wheel bolts, to pull it off. If the brake shoes are binding, first check that the handbrake is fully released, then proceed as follows.

5 Referring to Section 17 for further information, fully slacken the handbrake cable adjuster nut, to obtain maximum free play in the cable.

6 Insert a screwdriver through one of the wheel bolt holes in the brake drum, so that it contacts the handbrake operating lever on the trailing brake shoe. Push the lever until the stop-peg slips behind the brake shoe web, allowing the brake shoes to retract fully (see illustrations). The brake drum can now be withdrawn, and the seal slid off the stub axle.

#### Inspection

**Note:** If either drum requires renewal, BOTH should be renewed at the same time, to ensure even and consistent braking. New brake shoes should also be fitted.



9.6b Releasing the handbrake operating lever

**7** Working carefully, remove all traces of brake dust from the drum, but *avoid inhaling the dust, as it is injurious to health.*

**8** Clean the outside of the drum, and check it for obvious signs of wear or damage, such as cracks around the roadwheel bolt holes; renew the drum if necessary.

**9** Examine carefully the inside of the drum. Light scoring of the friction surface is normal, but if heavy scoring is found, the drum must be renewed. It is usual to find a lip on the drum's inboard edge which consists of a mixture of rust and brake dust; this should be scraped away, to leave a smooth surface which can be polished with fine (120- to 150-grade) emery paper. If, however, the lip is due to the friction surface being recessed by excessive wear, then the drum must be renewed.

**10** If the drum is thought to be excessively worn, or oval, its internal diameter must be measured at several points using an internal micrometer. Take measurements in pairs, the second at right-angles to the first, and compare the two, to check for signs of ovality. Provided that it does not enlarge the drum to beyond the specified maximum diameter, it may be possible to have the drum refinished by skimming or grinding; if this is not possible, the drums on both sides must be renewed. Note that if the drum is to be skimmed, BOTH drums must be refinished, to maintain a consistent internal diameter on both sides.

## Refitting

**11** If a new brake drum is to be installed, use a suitable solvent to remove any preservative coating that may have been applied to its interior. Note that it may also be necessary to shorten the adjuster strut length, by rotating the strut wheel, to allow the drum to pass over the brake shoes.

**12** Ensure that the handbrake lever stop-peg is correctly repositioned against the edge of the brake shoe web (*see illustration*), then apply a smear of clean engine oil to the stub axle, and slide on the seal and brake drum.

**13** Fit the thrustwasher and new hub nut, and tighten the hub nut to the specified torque. Stake the nut firmly into the groove on the

stub axle, to secure it in position, then tap the new hub cap into place in the centre of the brake drum.

**14** Depress the footbrake several times to operate the self-adjusting mechanism.

**15** Repeat the above procedure on the remaining rear brake assembly (where necessary), then check and, if necessary, adjust the handbrake cable as described in Section 17.

**16** On completion, refit the roadwheels, then lower the vehicle to the ground and tighten the wheel bolts to the specified torque.

## 10 Front brake caliper - removal, overhaul and refitting

**Note:** Before starting work, refer to the note at the beginning of Section 2 concerning the dangers of hydraulic fluid, and to the warning at the beginning of Section 4 concerning the dangers of asbestos dust.

### Removal

**1** Apply the handbrake, then jack up the front of the vehicle and support it on axle stands. Remove the appropriate roadwheel.

**2** Minimise fluid loss by first removing the master cylinder reservoir cap, and then tightening it down onto a piece of polythene, to obtain an airtight seal. Alternatively, use a brake hose clamp, a G-clamp or a similar tool to clamp the flexible hose.

### Bendix caliper -1124 cc and 1360 cc models

**3** Remove the brake pads as described in Section 4.

**4** Clean the area around the union, then loosen the brake hose union nut.

**5** Slacken the two bolts securing the caliper assembly to the swivel hub and remove them along with the mounting plate, noting which way around the plate is fitted. Lift the caliper assembly away from the brake disc, and unscrew it from the end of the brake hose.

### Girling caliper -1580 cc and larger-engined models

**6** Clean the area around the union, then loosen the brake hose union nut. Disconnect the pad wear warning sensor wiring from the connector, and free it from any relevant retaining clips.

**7** Slacken and remove the upper and lower caliper guide pin bolts, using a slim open-ended spanner to prevent the guide pin itself from rotating. Discard the guide pin bolts - new bolts must be used on refitting. With the guide pin bolts removed, lift the caliper away from the brake disc, then unscrew the caliper from the end of the brake hose. Note that the brake pads need not be disturbed, and can be left in position in the caliper mounting bracket.

### Overhaul

**8** With the caliper on the bench, wipe away all traces of dust and dirt, but *avoid inhaling the dust, as it is injurious to health.*

**9** Where necessary, use a small flat-bladed screwdriver to carefully prise the dust seal retaining clip out of the caliper bore.

**10** Withdraw the partially-ejected piston from the caliper body, and remove the dust seal. The piston can be withdrawn by hand, or if necessary pushed out by applying compressed air to the brake hose union hole. Only low pressure should be required, such as is generated by a foot pump.



**Caution:** The piston may be ejected with some force.

**11** Using a small screwdriver, extract the piston hydraulic seal, taking great care not to damage the caliper bore.

**12** Withdraw the guide sleeves/pins from the caliper body/mounting bracket (as applicable), and remove the rubber gaiters.

**13** Thoroughly clean all components, using only methylated spirit, isopropyl alcohol or clean hydraulic fluid as a cleaning medium. Never use mineral-based solvents such as petrol or paraffin, as they will attack the hydraulic system's rubber components. Dry the components immediately, using compressed air or a clean, lint-free cloth. Use compressed air to blow clear the fluid passages.

**14** Check all components, and renew any that are worn or damaged. Check particularly the cylinder bore and piston; these should be renewed (note that this means the renewal of the complete body assembly) if they are scratched, worn or corroded in any way. Similarly check the condition of the guide sleeves/pins and their bores in the caliper body/mounting bracket (as applicable); both sleeves/pins should be undamaged and (when cleaned) a reasonably tight sliding fit in the body/mounting bracket bores. If there is any doubt about the condition of any component, renew it.

**15** If the assembly is fit for further use, obtain the appropriate repair kit; the components are available from Citroen dealers in various combinations.

**16** Renew all rubber seals, dust covers and caps disturbed on dismantling as a matter of course; these should never be re-used.

**17** On reassembly, ensure that all components are absolutely clean and dry.

**18** Soak the piston and the new piston (fluid) seal in clean hydraulic fluid. Smear clean fluid on the cylinder bore surface.

**19** Fit the new piston (fluid) seal, using only your fingers (no tools) to manipulate it into the cylinder bore groove. Fit the new dust seal to the piston, and refit the piston to the cylinder bore using a twisting motion; ensure that the piston enters squarely into the bore. Press the piston fully into the bore, then press the dust seal into the caliper body.

**20** Where fitted, install the dust seal retaining clip, ensuring that it is correctly seated in the caliper groove.

**21** Apply the grease supplied in the repair kit,



**9.12** Check that the handbrake lever stop-peg is correctly positioned against the shoe edge

or a good quality high-temperature brake grease or anti-seize compound, to the guide sleeves/pins. Fit the guide sleeves/pins to the caliper body/mounting bracket, and fit the new rubber gaiters, ensuring that they are correctly located in the grooves on both the sleeve/pin and body/mounting bracket (as applicable).

Refitting

Bendix caliper -1124 cc and 1360 cc models

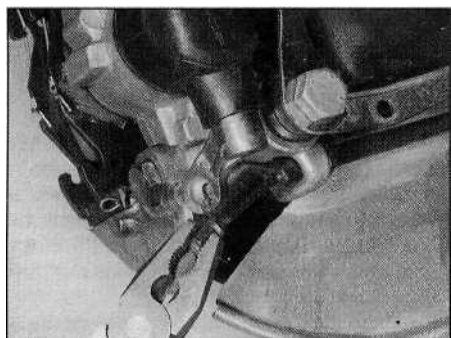
- 22 Screw the caliper fully onto the flexible hose union, then position the caliper over the brake disc.
- 23 If the threads of the new caliper mounting bolts are not already pre-coated with locking compound, apply a suitable locking compound to them. Refit the bolts along with the mounting plate, ensuring that the plate is fitted so that its bend curves away from the caliper body. With the plate correctly positioned, tighten the caliper bolts to the specified torque.

- 24 Securely tighten the brake hose union nut, then refit the brake pads as described in Section 4.
- 25 Remove the brake hose clamp or polythene, as applicable, and bleed the hydraulic system as described in Section 2. Note that, providing the precautions described were taken to minimise brake fluid loss, it should only be necessary to bleed the relevant front brake.

- 26 Refit the roadwheel, then lower the vehicle to the ground and tighten the roadwheel bolts to the specified torque.

Girling caliper -1580 cc and larger-engined models

- 27 Screw the caliper body fully onto the flexible hose union, then check that the brake pads are still correctly fitted in the caliper mounting bracket.
- 28 Position the caliper over the pads, and pass the pad warning sensor wiring through the caliper aperture. If the threads of the new guide pin bolts are not already pre-coated with locking compound, apply a suitable locking compound to them. Fit the new lower guide pin bolt, then press the caliper into



11.3a Disconnect the handbrake inner cable from the caliper lever...

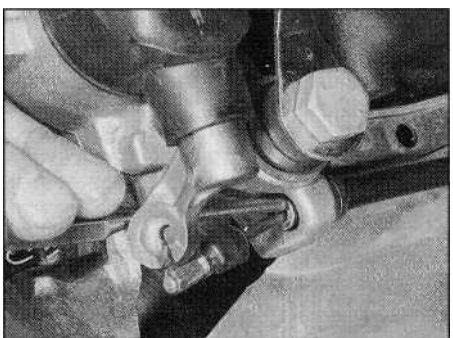
- position and fit the new upper guide pin bolt. Securely tighten both the guide pin bolts, while retaining the guide pin with an open-ended spanner.
- 29 Reconnect the brake pad wear sensor wiring connectors, ensuring that the wiring is correctly routed through the loop of the caliper bleed screw cap.
- 30 Tighten the brake hose union nut securely, then remove the brake hose clamp or polythene, where fitted, and bleed the hydraulic system as described in Section 2. Note that, providing the precautions described were taken to minimise brake fluid loss, it should only be necessary to bleed the relevant front brake.
- 31 Depress the brake pedal repeatedly, until the pads are pressed into firm contact with the brake disc, and normal (non-assisted) pedal pressure is restored.
- 32 Refit the roadwheel, then lower the vehicle to the ground and tighten the roadwheel bolts to the specified torque.

11 Rear brake caliper - removal, overhaul and refitting

Note: Before starting work, refer to the note at the beginning of Section 2 concerning the dangers of hydraulic fluid, and to the warning at the beginning of Section 5 concerning the dangers of asbestos dust.

Removal

- 1 Chock the front wheels, then jack up the rear of the vehicle and support on axle stands. Remove the relevant rear wheel.
- 2 Remove the brake pads as described in Section 5.
- 3 Ensure the handbrake is fully released, then free the handbrake inner cable from the caliper handbrake operating lever. Tap the outer cable out of its bracket on the caliper body (see illustrations).
- 4 Minimise fluid loss by first removing the master cylinder reservoir cap, and then tightening it down onto a piece of polythene, to obtain an airtight seal. Alternatively, use a brake hose clamp, a G-clamp or a similar tool to clamp the flexible hose at the nearest



11.3b ... then tap the outer cable out from the caliper body

- convenient point to the brake caliper.
- 5 Wipe away all traces of dirt around the brake pipe union on the caliper, and slacken the union nut.
- 6 Slacken the two bolts securing the caliper assembly to the trailing arm, and remove them along with the mounting plate, noting which way around the plate is fitted. Lift the caliper assembly away from the brake disc, and unscrew it from the end of the brake hose. Discard the caliper mounting bolts - they should be renewed whenever they are disturbed.

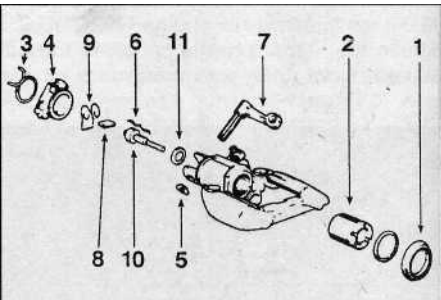
Overhaul

- 7 With the caliper on the bench, wipe away all traces of dust and dirt, but avoid inhaling the dust, as it is injurious to health.
- 8 Using a small screwdriver, carefully prise out the dust seal from the caliper bore, taking care not to damage the piston (see illustration).
- 9 Remove the piston from the caliper bore by rotating it in an anti-clockwise direction. This can be achieved using a suitable square-section bar, such as the shaft of a screwdriver, which locates snugly in the caliper piston slots. Once the piston turns freely but does not come out any further, the piston can be withdrawn by hand, or if necessary pushed out by applying compressed air to the union bolt hole. Only low pressure should be required, such as is generated by a foot pump.



Caution: The piston may be ejected with some force.

- 10 Using a small screwdriver, extract the piston hydraulic seal, taking care not to damage the caliper bore.
- 11 Withdraw the guide sleeves from the caliper body, and remove the guide sleeve gaiters.
- 12 Inspect all the caliper components as described in Section 10, paragraphs 13 to 17,



11.8 Exploded view of the rear brake caliper

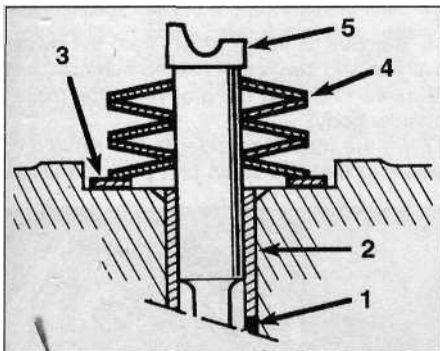
- |                                  |                             |
|----------------------------------|-----------------------------|
| 1 Dust seal                      | 6 Spring washers            |
| 2 Piston                         | 7 Handbrake operating lever |
| 3 Retaining clip                 | 8 Plunger cam               |
| 4 Handbrake mechanism dust cover | 9 Return spring             |
| 5 Circlip                        | 10 Adjusting screw          |
|                                  | 11 Thrustwasher             |

and renew as necessary, noting that the inside of the caliper piston must **not** be dismantled. If necessary, the handbrake mechanism can be overhauled as described in the following paragraphs; if it is not wished to overhaul the handbrake mechanism, proceed straight to paragraph 16.

**13** Release the handbrake dust cover retaining clip, and peel the cover away from the rear of the caliper; make a note of the correct fitted positions of the relative components, to use as a guide on reassembly. Remove the circlip from the base of the operating lever shaft, then compress the adjusting screw spring washers, and withdraw the operating lever and dust cover from the caliper body. With the lever withdrawn, remove the return spring, plunger cam, adjusting screw and spring washers, and thrustwasher from the rear of the caliper body. Using a suitable pin punch, carefully tap the adjusting screw bush out of the caliper body, and remove the O-ring.

**14** Clean all the handbrake components in methylated spirit, and examine them for wear. If there is any sign of wear or damage, the complete handbrake mechanism assembly should be renewed; a kit is available from your Citroen dealer. On reassembly, ensure that all components are absolutely clean and dry.

**15** Install the O-ring, then press the adjusting screw bush into position in the rear of the caliper body until its outer edge is flush with the caliper body; if necessary, tap the bush into position using a tubular drift. Fit the thrustwasher, then install the adjusting screw and spring washers, ensuring that the washers are correctly positioned (**see illustration**). Locate the plunger cam in the end of the adjusting screw, and position the return spring in the caliper housing. Fit the new dust cover to the operating lever, then compress the adjusting screw spring washers



**11.15 Correct fitted positions of the rear brake caliper handbrake mechanism adjuster screw and associated components**

- 1 O-ring
- 2 Adjusting screw bush
- 3 Thrustwasher
- 4 Correct arrangement of spring washers
- 5 Adjusting screw

and insert the lever shaft through the caliper body, ensuring that it is correctly engaged with the return spring and plunger cam. Secure the operating lever in position with the circlip, then release the spring washers and check the operation of the handbrake mechanism. Apply a smear of high-melting-point grease to the operating lever shaft and adjusting screw, then slide the dust cover over the caliper body, and secure it in position with a cable tie.

**16** Soak the piston and the new piston (fluid) seal in clean hydraulic fluid. Smear clean fluid on the cylinder bore surface.

**17** Fit the new piston (fluid) seal, using only the fingers to manipulate it into the cylinder bore groove, and refit the piston assembly. Turn the piston in a clockwise direction, using the method employed on dismantling, until it is fully retracted into the caliper bore.

**18** Fit the dust seal to the caliper, ensuring that it is correctly located in the caliper and also the groove on the piston.

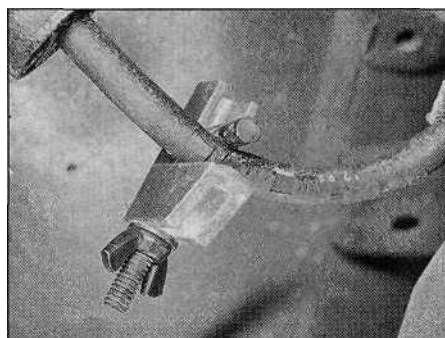
**19** Apply the grease supplied in the repair kit, or a good quality high-temperature brake grease or anti-seize compound, to the guide sleeves. Fit the guide sleeves to the caliper body, and fit the new gaiters, ensuring that the gaiters are correctly located in the grooves on both the guide sleeve and caliper body.

### Refitting

**20** Screw the caliper fully onto the brake hose, then position the caliper over the brake disc. If the threads of the new caliper mounting bolts are not already pre-coated with locking compound, apply a suitable locking compound to them. Install the new caliper mounting bolts and the mounting plate, noting that the mounting plate must be fitted so that its bend curves away from the caliper body. With the plate correctly positioned, tighten the caliper bolts to the specified torque.

**21** Tighten the brake hose union securely, then remove the clamp from the flexible brake hose, or the polythene from the master cylinder reservoir (as applicable).

**22** Insert the handbrake cable through its bracket on the caliper, and tap the outer cable into position using a hammer and suitable pin



**12.3 To minimise fluid loss, fit a brake hose clamp to the flexible hose**

punch. Reconnect the inner cable to the caliper operating lever.

**23** Refit the brake pads as described in Section 5.

**24** Bleed the hydraulic system as described in Section 2. Note that, providing the precautions described were taken to minimise brake fluid loss, it should only be necessary to bleed the relevant rear brake.

**25** Repeatedly apply the brake pedal until normal (non-assisted) pedal pressure returns. Check and if necessary adjust the handbrake cable as described in Section 17.

**26** Refit the roadwheel, then lower the vehicle to the ground and tighten the wheel bolts to the specified torque. On completion, check the hydraulic fluid level as described in Chapter 1.

## 12 Rear wheel cylinder - removal and refitting



**Note:** Before starting work, refer to the note at the beginning of Section 2 concerning the dangers of hydraulic fluid, and to the warning at the beginning of Section 6 concerning the dangers of asbestos dust.

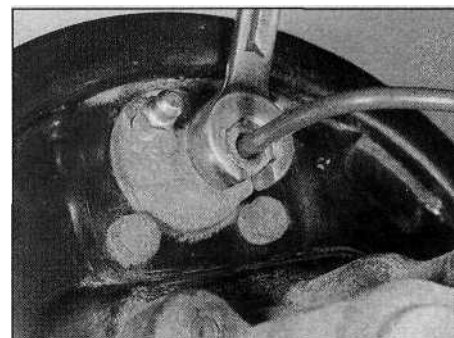
### Removal

**1** Remove the brake drum as described in Section 9.

**2** Using pliers, carefully unhook the upper brake shoe return spring, and remove it from both brake shoes. Pull the upper ends of the shoes away from the wheel cylinder to disengage them from the pistons.

**3** Minimise fluid loss by first removing the master cylinder reservoir cap, and then tightening it down onto a piece of polythene, to obtain an airtight seal. Alternatively, use a brake hose clamp, a G-clamp or a similar tool to clamp the flexible hose at the nearest convenient point to the wheel cylinder (**see illustration**).

**4** Wipe away all traces of dirt around the brake pipe union at the rear of the wheel cylinder, and unscrew the union nut (**see illustration**). Carefully ease the pipe out of the wheel cylinder, and plug or tape over its end to prevent dirt entry. Wipe off any spilt fluid immediately.



**12.4 Using a brake pipe spanner to unscrew the wheel cylinder union nut**



**5** Unscrew the two wheel cylinder retaining bolts from the rear of the backplate, and remove the cylinder, taking great care not to allow surplus hydraulic fluid to contaminate the brake shoe linings.

**6** Note that it is not possible to overhaul the cylinder, since no components are available separately. If faulty, the complete wheel cylinder assembly must be renewed.

### Refitting

**7** Ensure the backplate and wheel cylinder mating surfaces are clean, then spread the brake shoes and manoeuvre the wheel cylinder into position.

**8** Engage the brake pipe, and screw in the union nut two or three turns to ensure that the thread has started.

**9** Insert the two wheel cylinder retaining bolts, and tighten them securely. Now fully tighten the brake pipe union nut.

**10** Remove the clamp from the flexible brake hose, or the polythene from the master cylinder reservoir (as applicable).

**11** Ensure the brake shoes are correctly located in the cylinder pistons, then carefully refit the brake shoe upper return spring, using a screwdriver to stretch the spring into position.

**12** Refit the brake drum as described in Section 9.

**13** Bleed the brake hydraulic system as described in Section 2. Providing suitable precautions were taken to minimise loss of fluid, it should only be necessary to bleed the relevant rear brake.

### 13 Master cylinder - removal, overhaul and refitting



**Note:** Before starting work, refer to the warning at the beginning of Section 2 concerning the dangers of hydraulic fluid.

### Removal

**1** On left-hand-drive models, remove the battery and battery tray as described in Chapter 5.

**2** On all models, remove the master cylinder reservoir cap, and syphon the hydraulic fluid

from the reservoir. **Note:** Do not syphon the fluid by mouth, as it is poisonous; use a syringe or an old poultry baster. Alternatively, open any convenient bleed screw in the system, and gently pump the brake pedal to expel the fluid through a plastic tube connected to the screw (see Section 2). Disconnect the wiring connector from the brake fluid level sender unit (see illustration).

**3** Wipe clean the area around the brake pipe unions on the side of the master cylinder, and place absorbent rags beneath the pipe unions to catch any surplus fluid. Make a note of the correct fitted positions of the unions, then unscrew the union nuts and carefully withdraw the pipes (see illustration). Plug or tape over the pipe ends and master cylinder orifices, to minimise the loss of brake fluid, and to prevent the entry of dirt into the system. Wash off any spilt fluid immediately with cold water.

**4** Slacken and remove the two nuts securing the master cylinder to the vacuum servo unit, then withdraw the unit from the engine compartment (see illustration). Remove the O-ring from the rear of the master cylinder, and discard it.

### Overhaul

**5** Slacken the fluid reservoir retaining clamp screw, then unhook the clamp and remove the fluid reservoir and reservoir seals from the master cylinder body.

**6** Using a wooden dowel, press the piston assembly into the master cylinder body, then extract the circlip from the end of the master cylinder bore.

**7** Noting the order of removal, and the direction of fitting of each component, withdraw the washer, and the piston assemblies with their springs and seals, tapping the body on to a clean wooden surface to dislodge them. If necessary, clamp the master cylinder body in a vice (fitted with soft jaw covers) and use compressed air (applied through the secondary circuit fluid port) to assist the removal of the secondary piston assembly.

**8** Thoroughly clean all components, using only methylated spirit, isopropyl alcohol or clean hydraulic fluid as a cleaning medium.

Never use mineral-based solvents such as petrol or paraffin, as they will attack the hydraulic system's rubber components. Dry the components immediately, using compressed air or a clean, lint-free cloth.

**9** Check all components, and renew any that are worn or damaged. Check particularly the cylinder bores and pistons; the complete assembly should be renewed if these are scratched, worn or corroded. If there is any doubt about the condition of the assembly or of any of its components, renew it. Check that the body's fluid passages are clear.

**10** If the assembly is fit for further use, obtain a repair kit from your Citroen dealer; the kit consists of both piston assemblies and springs, as well as a new circlip. Renew all seals and sealing O-rings disturbed on dismantling as a matter of course; these should never be re-used.

**11** On reassembly, soak the pistons and the new seals in clean hydraulic fluid. Smear clean fluid into the cylinder bore.

**12** Insert the pistons into the bore, using a twisting motion to avoid trapping the seal lips. Ensure that all components are refitted in the correct order and the right way round, then fit the washer to the end of the primary piston.

**13** Press the piston assemblies fully into the bore using a clean wooden dowel, and secure them in position with the new circlip. Ensure the circlip is correctly located in the groove in the cylinder bore.

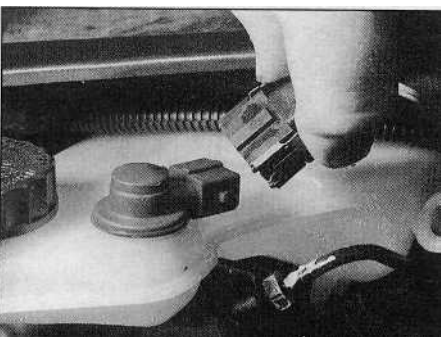
**14** Fit the new mounting seals to the master cylinder body, then refit the reservoir. Clip the retaining clamp onto the reservoir, and securely tighten its clamp screw.

### Refitting

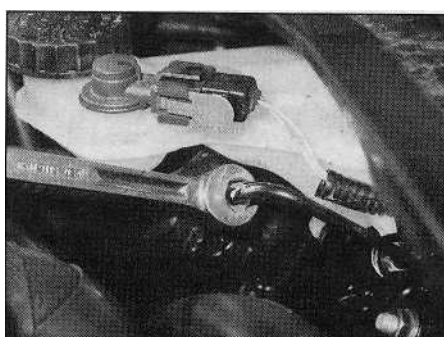
**15** Before refitting the master cylinder, clean the mounting faces, and check the distance between the tip of the master cylinder end of the pushrod and front of the servo unit, using the information given in Section 15, paragraph 9.

**16** Remove all traces of dirt from the master cylinder and servo unit mating surfaces, and fit a new O-ring to the groove on the master cylinder body.

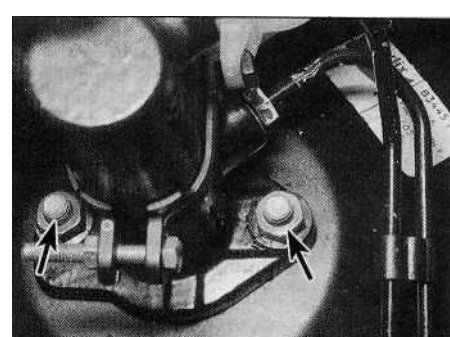
**17** Fit the master cylinder to the servo unit, ensuring that the servo unit pushrod enters



**13.2** Disconnecting the wiring connector from the master cylinder fluid level sender

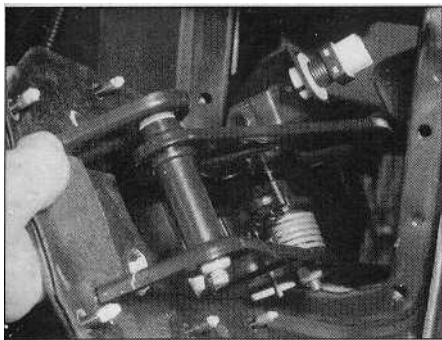


**13.3** Using a brake pipe spanner to unscrew the master cylinder union nut

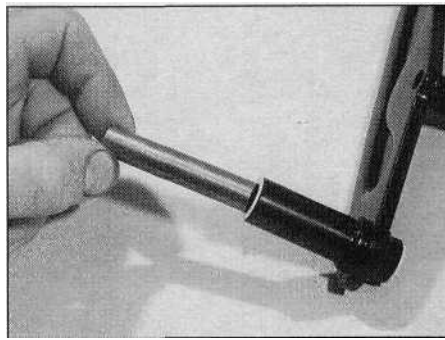


**13.4** Master cylinder retaining nuts (arrowed)

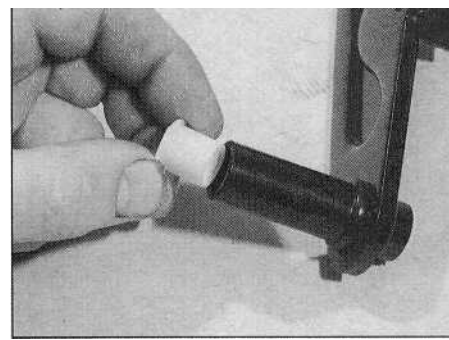




**14.5 Removing the pedal bracket assembly from the bulkhead**



**14.6a With draw the spacer from the brake pedal...**



**14.6b ... and remove the pedal pivot bushes**

the master cylinder bore centrally. Refit the master cylinder mounting nuts, and tighten them to the specified torque.

**18** Wipe clean the brake pipe unions, then refit them to the master cylinder ports and tighten them securely.

**19** On left-hand-drive models, refit the battery tray and battery as described in Chapter 5.

**20** On all models, refill the master cylinder reservoir with new fluid, and bleed the complete hydraulic system as described in Section 2.

## 14 Brake pedal - removal and refitting



### Removal

**1** Remove the steering column as described in Chapter 10.

**2** Remove the vacuum servo unit as described in Section 15.

**3** On models with manual transmission, referring to Chapter 6 for further information, slacken the clutch cable adjuster nut to obtain maximum cable free play. From inside the vehicle, depress the metal retaining clip, and free the inner cable from the plastic retainer fitted to the upper end of the clutch pedal.

**4** Disconnect the wiring connector from the stop-light switch.

**5** Slacken and remove the six pedal bracket retaining nuts, then return to the engine

compartment and manoeuvre the pedal bracket assembly out from the vehicle, noting its rubber seal (**see illustration**).

**6** With the pedal bracket assembly on the bench, slacken the nut, then withdraw the pedal pivot pin, and separate the pedal from the bracket. Slide the spacer out from the centre of the pedal bore, and remove the pivot bushes (**see illustrations**).

**7** Carefully clean all components, and renew any that are worn or damaged; check the bearing surfaces of the pivot bushes and spacer with particular care; the bushes can be renewed separately if worn.

### Refitting

**8** Press the pivot bushes into the pedal bore, then apply a smear of multi-purpose grease to their bearing surfaces, and slide in the spacer.

**9** Refit the pedal to the bracket, and install the pivot bolt. Refit the pivot bolt nut, and tighten it to the specified torque setting (see **illustrations**). Check that the pedal pivots smoothly before proceeding further.

**10** Ensure that the seal is correctly located, then manoeuvre the pedal bracket assembly back into position from the engine compartment. Refit the pedal bracket retaining nuts, and tighten them to the specified torque setting.

**11** Where necessary, feed the clutch cable back through the bracket, and engage the inner cable with the plastic retainer on the clutch pedal. Check that it is securely retained

by the metal clip. Adjust the clutch cable as described in Chapter 6.

**12** Connect the wiring connector to the stop-light switch.

**13** Refit the servo unit as described in Section 15.

**14** Refit the steering column as described in Chapter 10. Prior to refitting the lower facia panel, check and, if necessary, adjust the stop-light switch as described in Section 21.

## 15 Vacuum servo unit - testing, removal and refitting



### Testing

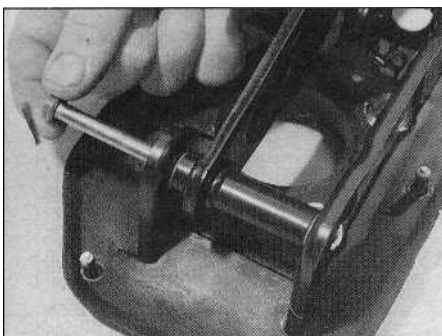
**1** To test the operation of the servo unit, depress the footbrake several times to exhaust the vacuum, then start the engine whilst keeping the pedal firmly depressed. As the engine starts, there should be a noticeable "give" in the brake pedal as the vacuum builds up. Allow the engine to run for at least two minutes, then switch it off. If the brake pedal is now depressed it should feel normal, but further applications should result in the pedal feeling firmer, with the pedal stroke decreasing with each application.

**2** If the servo does not operate as described, first inspect the servo unit check valve as described in Section 16. On 16-valve models, also check the operation of the vacuum pump as described in Section 25.

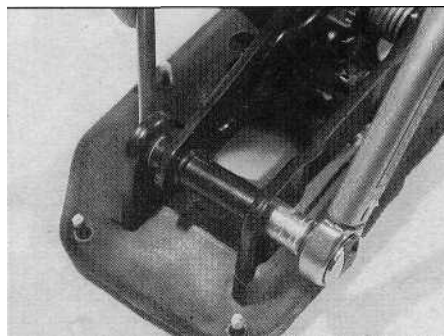
**3** If the servo unit still fails to operate satisfactorily, the fault lies within the unit itself. Repairs to the unit are not possible - if faulty, the servo unit must be renewed.

### Removal

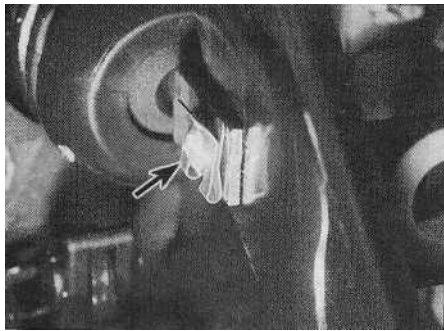
**Note:** On certain right-hand-drive models, to gain the clearance required to remove the servo unit, it may prove necessary to split the right-hand engine/transmission mounting and move the engine unit forward slightly; this is due to the lack of clearance between the servo unit and the rear of the engine. If this proves necessary, refer to the relevant Part of Chapter 2 for further information on supporting the engine unit and dismantling the mounting.



**14.9a Locate the pedal in the bracket, and insert the pivot bolt...**



**14.9b ... then refit the nut, and tighten it to the specified torque setting**

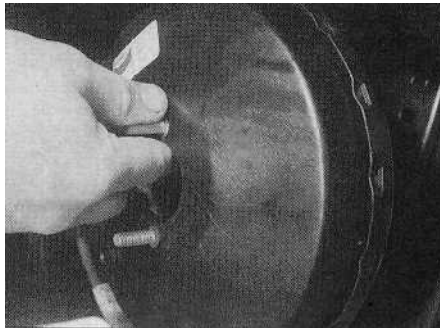


**15.7 Servo unit pushrod clevis pin spring clip (arrowed)**

**4** Remove the master cylinder as described in Section 13.

**5** Slacken the retaining clip (where fitted) and disconnect the vacuum hose from the servo unit check valve.

**6** From inside the vehicle, release the panel fasteners by rotating them through a quarter



**15.8 Removing the servo unit**

of a turn, and remove the driver's side lower facia panel. Release the heater duct, and remove the duct to improve access to the rear of the servo unit.

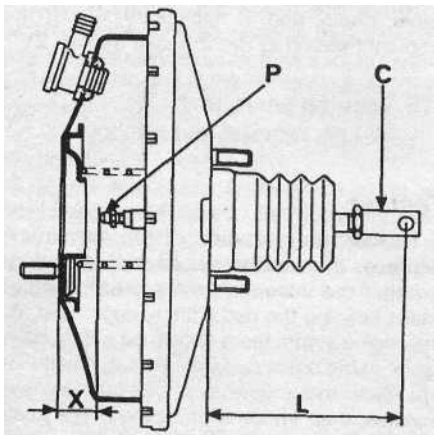
**7** Prise off the spring clip, then withdraw the clevis pin securing the servo unit pushrod to the brake pedal (**see illustration**).

**8** Undo the four retaining nuts securing the servo unit to the pedal mounting bracket, then return to the engine compartment and manoeuvre the servo unit out of position, noting the gasket which is fitted to the rear of the unit (**see illustration**).

### Refitting

**9** Prior to refitting, check the servo unit dimensions as follows. With the gasket removed, check that the pushrod protrusion from the rear of the unit, dimension "L", (measured from the rear of the servo unit to the centre of the pushrod clevis pin hole), and the distance between the tip of the master cylinder end of the pushrod and front of the unit, dimension "X", are as shown in **illustration 15.9a**. Where possible, dimension "L" can be altered by slackening the locknut and repositioning the pushrod clevis (C). Dimension "X" can be altered by repositioning the nut (P) (**see illustrations**). After adjustment, ensure the clevis locknut is securely tightened. Note that on some servo units adjustment is not possible.

**10** Check the servo unit check valve sealing grommet for signs of damage or deterioration, and renew if necessary.



**15.9a Vacuum servo unit adjustment dimensions**

C Pushrod clevis

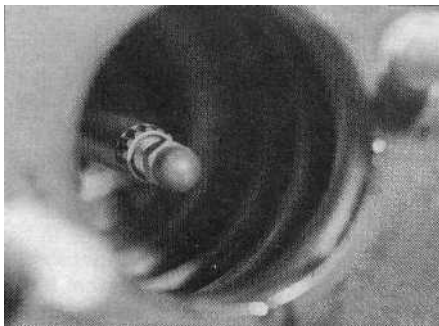
P Pushrod nut

L Non-ABS models:  $22.3 \pm 0.1$  mm

ABS models:  $24.8 \pm 0.1$  mm

X Bendix servo unit:  $88.0 \pm 0.5$  mm

Teves servo unit:  $86.0 \pm 0.5$  mm



**15.9b Servo unit pushrod adjustment nut**



**15.11 Prior to refitting, fit a new sealing gasket to the rear of the servo unit**

**11** Fit a new gasket to the rear of the servo unit, and reposition the unit in the engine compartment (**see illustration**).

**12** From inside the vehicle, ensure that the servo unit pushrod is correctly engaged with the brake pedal, then refit the servo unit mounting nuts and tighten them to the specified torque setting.

**13** Refit the servo unit pushrod-to-brake pedal clevis pin, and secure it in position with the spring clip.

**14** Refit the heater duct, ensuring it is securely connected at either end, then refit the lower facia panel.

**15** Reconnect the vacuum hose to the servo unit check valve and, where necessary, securely tighten its retaining clip.

**16** Refit the master cylinder as described in Section 13 of this Chapter.

**17** On completion, start the engine and check for air leaks at the vacuum hose-to-servo unit connection; check the operation of the braking system.

## 16 Vacuum servo unit check valve - removal, testing and refitting

### Removal

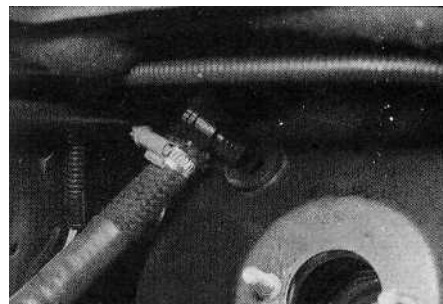
**1** Slacken the retaining clip (where fitted), and disconnect the vacuum hose from the servo unit check valve.

**2** Withdraw the valve from its rubber sealing grommet, using a pulling and twisting motion. Remove the grommet from the servo (**see illustration**).

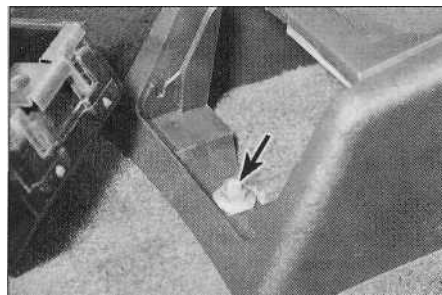
### Testing

**3** Examine the check valve for signs of damage, and renew if necessary. The valve may be tested by blowing through it in both directions. Air should flow through the valve in one direction only - when blown through from the servo unit end of the valve.. Renew the valve if this is not the case.

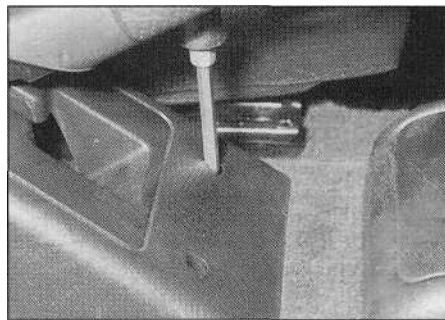
**4** Examine the rubber sealing grommet and flexible vacuum hose for signs of damage or deterioration, and renew as necessary.



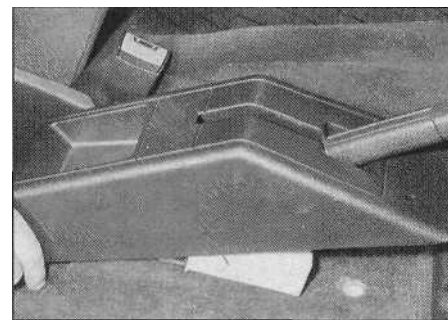
**16.2 Servo unit check valve is a push fit in its sealing grommet (master cylinder removed for clarity)**



**17.2a** Remove the ashtray from the rear of the handbrake cover, then undo the retaining nut (arrowed)...



**17.2b** ... and the two front retaining screws...



**17.2c** ... and lift the cover off the handbrake lever

## Refitting

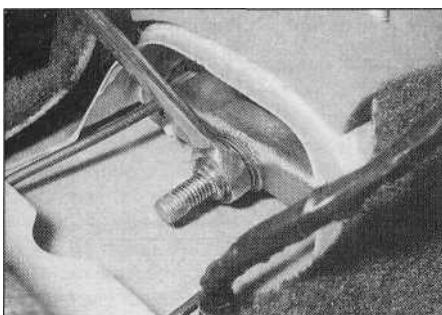
- 5** Fit the sealing grommet into position in the servo unit.
- 6** Carefully ease the check valve into position, taking great care not to displace or damage the grommet. Reconnect the vacuum hose to the valve and, where necessary, securely tighten its retaining clip.
- 7** On completion, start the engine and check the check valve-to-servo unit connection for signs of air leaks.



## 17 Handbrake - adjustment

**1** To check the handbrake adjustment, first apply the footbrake firmly several times to establish correct shoe-to-drum/pad-to-disc clearance, then apply and release the handbrake several times to ensure the self-adjust mechanism is fully adjusted. Applying normal moderate pressure, pull the handbrake lever to the fully-applied position, counting the number of clicks emitted from the handbrake ratchet mechanism. If adjustment is correct, there should be between 4 and 7 clicks before the handbrake is fully applied. If this is not the case, adjust as follows.

**2** Open up the rear ashtray, then depress the retaining tang and remove the ashtray from the handbrake lever cover panel. Slacken and remove the rear retaining nut and the two front retaining screws, then manoeuvre the cover panel off the handbrake lever (see illustrations).



**17.4** Adjusting the handbrake

## 18 Handbrake lever - removal and refitting

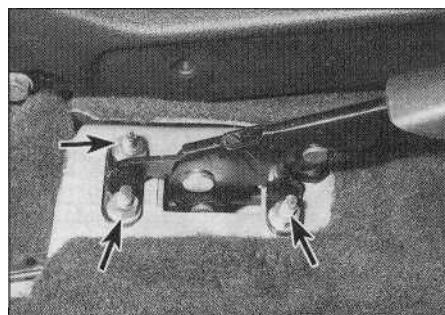


### Removal

- 1** Remove the handbrake lever cover panel as described in paragraph 2 of Section 17.
- 2** Slacken the handbrake lever adjusting nut to obtain maximum free play in the cables, and disengage the inner cables from the handbrake lever plate.
- 3** On models with central locking, undo the nut and free the central locking control unit from the handbrake lever mounting studs.
- 4** Slacken and remove the three handbrake lever retaining nuts, and remove the lever from the vehicle (see illustration).

### Refitting

- 5** Refitting is a reversal of the removal. Prior to



**18.4** Handbrake lever is retained by three nuts (arrowed)

refitting the handbrake lever cover panel, adjust the handbrake as described in Section 17.

## 19 Handbrake cables - removal and refitting

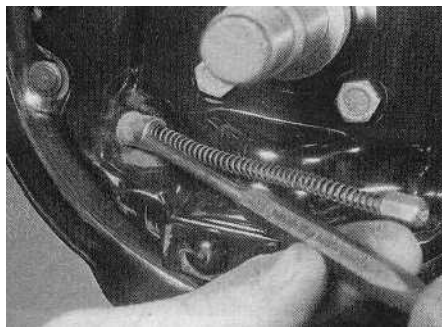


### Removal

- 1** Remove the handbrake lever cover panel as described in paragraph 2 of Section 17. The handbrake cable consists of two sections, a right- and a left-hand section, which are linked to the lever by an equalizer plate. Each section can be removed individually.
- 2** Slacken the handbrake lever adjusting nut to obtain maximum free play in the cable(s), and disengage the inner cables from the handbrake lever plate.
- 3** Firmly chock the front wheels, then jack up the rear of the vehicle and support it on axle stands.
- 4** Slacken and remove the retaining nuts, then release the exhaust system rear heat shield from the vehicle underbody, to gain access to the front of the relevant handbrake cable. Free the front end of the outer cable from the body, and withdraw the cable from its support guide.
- 5** Working back along the length of the cable prise off the retaining clip and free it from its guide, then depress the retaining tangs and free the cable from its trailing arm bracket (see illustration).
- 6** On models with rear drum brakes, remove the rear brake shoes from the relevant side as described in Section 6. Using a hammer and



**19.5** Handbrake cable trailing arm bracket



**19.6** On drum brake models, drive the outer cable out from the brake backplate

pin punch, carefully tap the outer cable out from the brake backplate, and remove it from underneath the vehicle (see illustration).

**7** On models with rear disc brakes, disengage the inner cable from the caliper handbrake lever then, using a hammer and pin punch, tap the outer cable out of its mounting bracket on the caliper, and remove the cable from underneath the vehicle (see illustration).

#### Refitting

**8** Refitting is a reversal of the removal procedure, adjusting the handbrake as described in Section 17.

### 20 Rear brake pressure-regulating valves (models with rear disc brakes) - removal and refitting



**Note:** Before starting work, refer to the warning at the beginning of Section 2 concerning the dangers of hydraulic fluid.

#### Removal

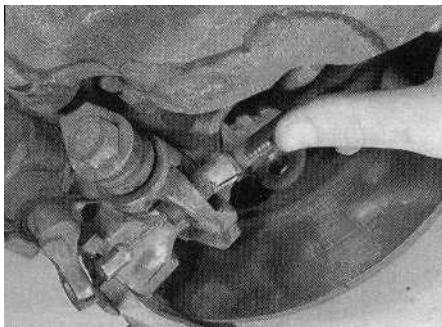
**1** Firmly chock the front wheels, then jack up the rear of the vehicle and support it on axle stands. The pressure-regulating valves are located just in front of the rear axle assembly; there are two valves, one for each rear brake caliper (see illustration).

**2** Minimise fluid loss by first removing the master cylinder reservoir cap, and then tightening it down onto a piece of polythene, to obtain an airtight seal.

**3** Wipe clean the area around the brake pipe unions on the relevant valve, and place absorbent rags beneath the pipe unions to catch any surplus fluid. Retain the relevant pressure-regulating valve with a suitable open-ended spanner, then slacken the union nuts, disconnect both brake pipes, and remove the valve from underneath the vehicle. Plug or tape over the pipe ends and valve orifices, to minimise the loss of brake fluid, and to prevent the entry of dirt into the system. Wash off any spilt fluid immediately with cold water.

#### Refitting

**4** Refitting is a reverse of the removal procedure, ensuring that the pipe union nuts



**19.7** On disc brake models, disconnect the cable from the brake caliper

are securely tightened. On completion, bleed the complete braking system as described in Section 2.

### 21 Stop-light switch - removal, refitting and adjustment



#### Removal

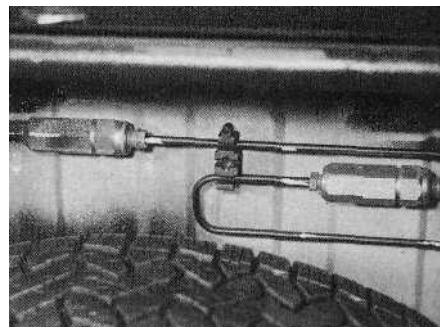
**1** The stop-light switch is located on the pedal bracket behind the facia.

**2** To remove the switch, release the driver's side lower facia panel fasteners by rotating them through a quarter of a turn, and remove the panel. Release the heater duct, and remove the duct to gain access to the switch.

**3** Disconnect the wiring connector, and unscrew the switch from its mounting bracket.

#### Refitting and adjustment

**4** Screw the switch back into position in the mounting bracket, until the gap between the



**20.1** Rear disc brake pressure-regulating valves

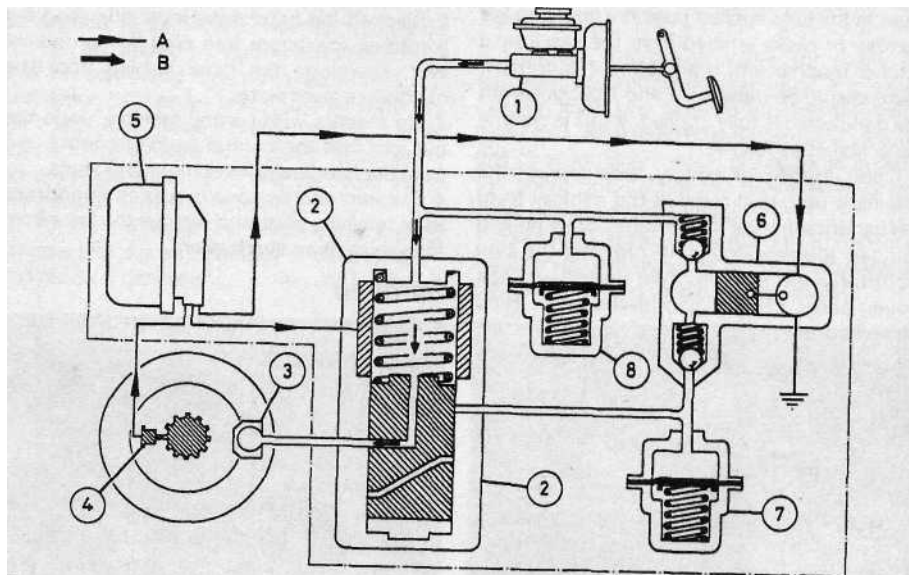
end of the main body of the switch and the lug on the brake pedal is approximately 2 to 3 mm.

**5** Once the stop-light switch is correctly positioned, reconnect the wiring connector, and check the operation of the stop-lights. The stop-lights should illuminate after the brake pedal has travelled approximately 5 mm.

**6** Refit the heater duct, ensuring it is securely connected at either end. Refit the lower facia panel, and secure it in position by rotating its fasteners through a quarter of a turn.

### 22 Anti-lock braking system (ABS) - general information

**1** ABS is available as an option on all models covered in this manual. The system comprises a modulator block which contains the ABS computer, the hydraulic solenoid valves and



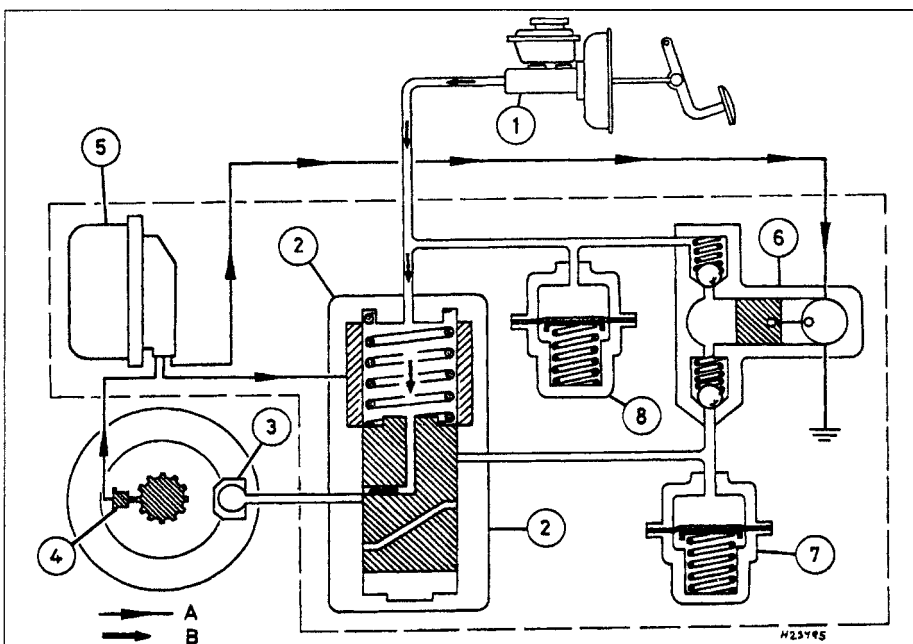
**22.2** ABS system normal operation

- 1 Master cylinder
- 2 Solenoid valve
- 3 Brake caliper

- 4 Wheel sensor and reluctor ring
- 5 ABS computer

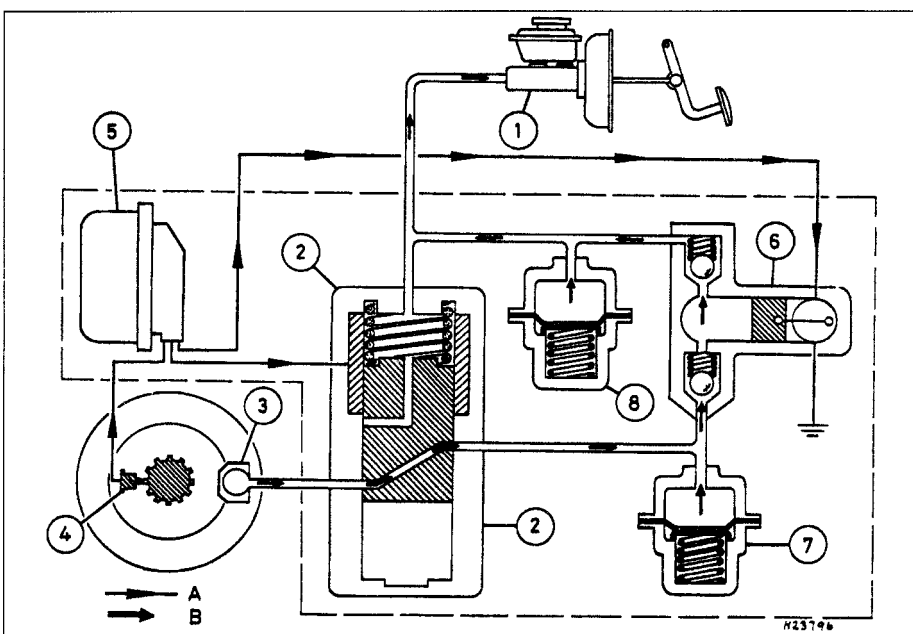
- 6 Return pump
- 7 Accumulator
- 8 Accumulator

- A Flow of electrical signal
- B Flow of hydraulic fluid



**22.3 ABS system "pressure-maintain" phase**

*Refer to illustration 22.2 for key*



**22.4 ABS system "pressure-decrease" phase**

*Refer to illustration 22.2 for key*

accumulators, the electrically-driven return pump, and four roadwheel sensors; one fitted to each wheel. The purpose of the system is to prevent the wheel(s) locking during heavy braking. This is achieved by automatic release of the brake on the relevant wheel, followed by re-application of the brake.

**2** The solenoids are controlled by the computer, which itself receives signals from the four wheel sensors (one fitted on each hub), which monitor the speed of rotation of

each wheel. By comparing these speed signals from the four wheels, the computer can determine the speed at which the vehicle is travelling. It can then use this speed to determine when a wheel is decelerating at an abnormal rate, compared to the speed of the vehicle, and therefore predicts when a wheel is about to lock. During normal operation, the system functions in the same way as a non-ABS braking system (see illustration).

**3** If the computer senses that a wheel is

about to lock, the ABS system enters the "pressure-maintain" phase (see illustration). The computer operates the relevant solenoid valve in the modulator block, which then isolates the brake caliper on the wheel which is about to lock from the master cylinder, effectively sealing-in the hydraulic pressure.

**4** If the speed of rotation of the wheel continues to decrease at an abnormal rate, the ABS system then enters the "pressure-decrease" phase (see illustration), where the electrically-driven return pump operates and pumps the hydraulic fluid back into the master cylinder, releasing pressure on the brake caliper so that the brake is released. Once the speed of rotation of the wheel returns to an acceptable rate, the pump stops; the solenoid valve opens, allowing the hydraulic master cylinder pressure to return to the caliper, which then re-applies the brake. This cycle can be carried out at up to 10 times a second.

**5** The action of the solenoid valves and return pump creates pulses in the hydraulic circuit. When the ABS system is functioning, these pulses can be felt through the brake pedal.

**6** The solenoid valves connected to the front calipers operate independently, but the valve connected to the rear calipers operates both calipers simultaneously. Since the braking circuit is split diagonally, a separate mechanical plunger valve in the modulator block divides the rear solenoid valve hydraulic outlet into two separate circuits; one for each rear brake.

**7** The operation of the ABS system is entirely dependent on electrical signals. To prevent the system responding to any inaccurate signals, a built-in safety circuit monitors all signals received by the computer. If an inaccurate signal or low battery voltage is detected, the ABS system is automatically shut down, and the warning light on the instrument panel is illuminated, to inform the driver that the ABS system is not operational. Normal braking should still be available, however.

**8** If a fault does develop in the ABS system, the vehicle must be taken to a Citroen dealer for fault diagnosis and repair.

## 23 Anti-lock braking system (ABS) components - removal and refitting

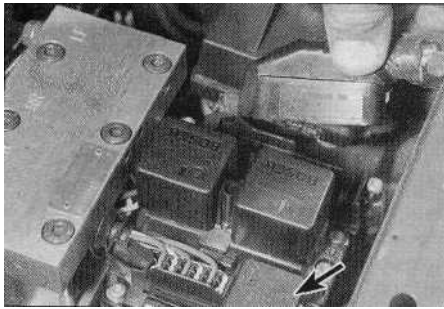
### Modulator assembly

**Note:** Before starting work, refer to the note at the beginning of Section 2 concerning the dangers of hydraulic fluid.

### Removal

- 1** Disconnect the battery negative terminal.
- 2** Undo the retaining screw, and remove the relay cover from the modulator assembly.
- 3** Disconnect the large 15-pin connector, the



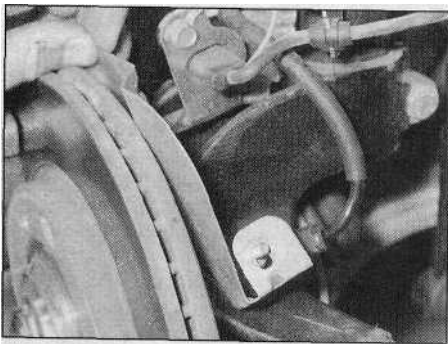


**23.3** Disconnecting the large wiring connector from ABS modulator computer (square connector arrowed)

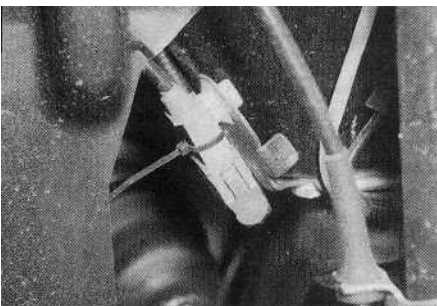
square 4-pin connector, and the return pump earth lead, from the modulator (see illustration).

**4** Unscrew the master cylinder reservoir filler cap, then place a piece of polythene over the filler neck, and securely refit the cap. This will minimise brake fluid loss during subsequent operations. As a precaution, place absorbent rags beneath the modulator brake pipe unions.

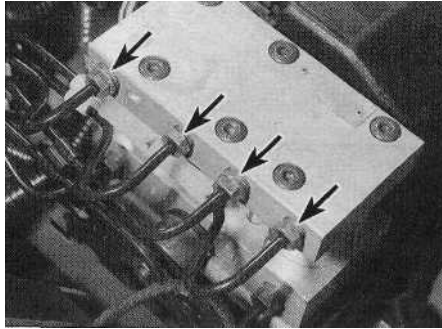
**5** Wipe clean the area around the modulator brake pipe unions, then make a note of how the pipes are arranged, to use as a reference on refitting; the four modulator outlet unions are marked, to aid refitting. Unscrew the union nuts, and carefully withdraw the pipes (see illustration). Plug or tape over the pipe ends and valve orifices, to minimise the loss of



**23.12** Remove the shield from the top of the front wheel sensor ...



**23.13** ... then trace the sensor wiring back to its wiring connector, and disconnect it



**23.5** ABS modulator block brake pipe unions (arrowed)

brake fluid, and to prevent the entry of dirt into the system. Wash off any spilt fluid immediately with cold water.

**6** Slacken the mounting nuts, and remove the modulator assembly from the engine compartment. Note that the nuts do not need to be removed, since the mounting bracket bolt holes are slotted. **Note:** Do not attempt to dismantle the modulator block hydraulic assembly. Overhaul of the unit is a complex job, which if necessary should be entrusted to a Citroen dealer.

### Refitting

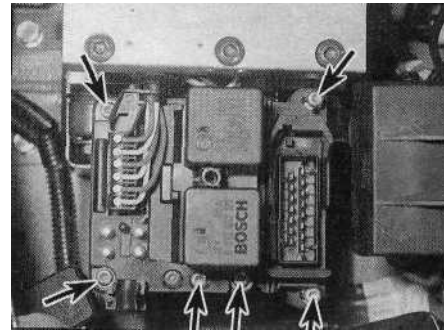
**7** Refitting is the reverse of the removal procedure, noting the following points:

- Tighten the modulator block mounting nuts securely.
- Refit the brake pipes to their respective unions, and securely tighten the union nuts.
- Ensure the wiring is correctly routed, and the connectors firmly pressed into position.
- On completion, and prior to refitting the battery, bleed the complete braking system as described in Section 2. Ensure the system is bled in the correct order, to prevent air entering the modulator return pump.

### ABS computer

#### Removal

**8** Disconnect the battery negative terminal,



**23.9** ABS modulator computer retaining screws (arrowed)

then slacken the retaining screw, and remove the relay cover from the modulator assembly.

**9** Disconnect the three wiring connectors from the computer unit, then slacken and remove the six Torx retaining screws, and lift the computer away from the modulator assembly (see illustration).

### Refitting

**10** Refitting is a reversal of the removal procedure, ensuring that the computer retaining screws are securely tightened and the wiring connectors are firmly reconnected.

### Front wheel sensor

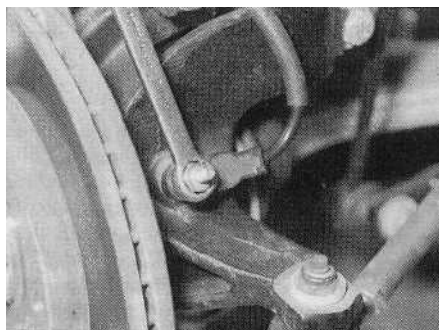
#### Removal

**11** Chock the rear wheels, then firmly apply the handbrake, jack up the front of the vehicle and support on axle stands. Remove the appropriate front roadwheel.

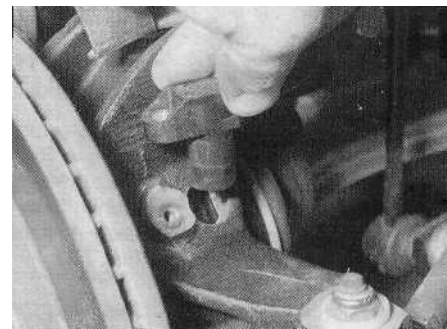
**12** Slacken and remove the bolt securing the wiring retaining bracket to the top of the swivel hub assembly, then undo the retaining nut and remove the shield from the top of the sensor (see illustration).

**13** Trace the wiring back from the sensor to the connector, freeing it from all the relevant retaining clips, and disconnect it from the main loom (see illustration).

**14** Slacken and remove the bolt securing the sensor to the swivel hub, and remove the sensor and lead assembly from the vehicle (see illustrations).

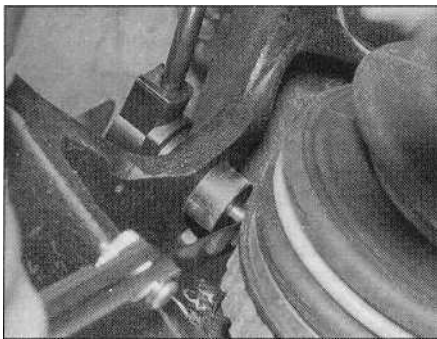


**23.14a** Slacken and remove the retaining bolt...

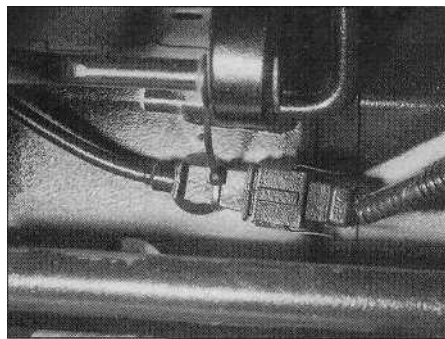


**23.14b** ... and remove the sensor from the swivel hub

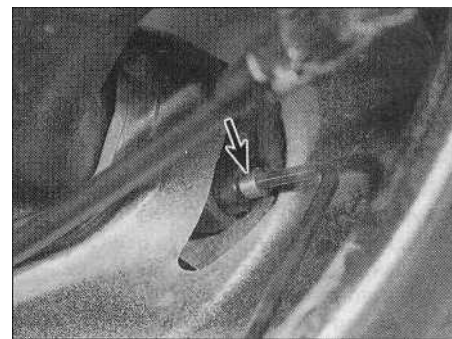




**23.17** Checking the front wheel sensor air gap



**23.21** Rear wheel sensor wiring connectors are located just in front of the rear axle



**23.23a** Undo the retaining bolt (arrowed)...

## Refitting

**15** Prior to refitting, apply a thin coat of multi-purpose grease to the sensor tip.

**16** Ensure that the sensor and swivel hub sealing faces are clean, then fit the sensor to the hub. Apply a few drops of locking fluid to the sensor bolt, then refit the bolt and tighten it to the specified torque.

**17** Rotate the hub until one of the reluctor ring teeth is correctly aligned with the sensor tip. Using feeler gauges, measure the air gap between the tooth and sensor tip (**see illustration**). Rotate the hub, and repeat the procedure on several other teeth. If the air gap is not within the specified range given in the Specifications at the start of this Chapter, then the advice of a Citroen dealer must be sought.

**18** Ensure the sensor wiring is correctly routed and retained by all the necessary clips, and reconnect it to its wiring connector.

**19** Refit the roadwheel, then lower the vehicle to the ground and tighten the roadwheel bolts to the specified torque.

## Rear wheel sensor

### Removal

**20** Chock the front wheels, then jack up the rear of the vehicle and support it on axle stands. Remove the appropriate roadwheel.

**21** Trace the wiring back from the sensor to its wiring connector, which is situated just in

front of the rear axle (**see illustration**). Free the connector from its retaining clip, and disconnect the wiring from the main wiring loom.

**22** Work back along the sensor wiring, and free it from any relevant retaining clips.

**23** Slacken and remove the bolt securing the sensor unit to the trailing arm, and remove the sensor and lead assembly from the vehicle (**see illustrations**).

### Refitting

**24** Prior to refitting, apply a thin coat of multi-purpose grease to the sensor tip.

**25** Ensure that the sensor and trailing arm sealing faces are clean, then fit the sensor and tighten its retaining bolt to the specified torque.

**26** Rotate the disc until one of the reluctor ring teeth is correctly aligned with sensor tip. Using feeler gauges, measure the air gap between the tooth and sensor tip. Note that this may prove difficult with the disc shield in position. Rotate the disc, and repeat the procedure on several other teeth. If the air gap is not within the specified range given in the Specifications at the start of this Chapter, then the advice of a Citroen dealer must be sought.

**27** Ensure the sensor wiring is correctly routed and retained by all the necessary retaining clips, and reconnect it to the wiring connector.

**28** Refit the roadwheel, then lower the vehicle to the ground and tighten the roadwheel bolts to the specified torque.

## Front reluctor rings

**29** The front reluctor rings are an integral part of the driveshaft outer constant velocity (CV) joints, and cannot be renewed separately. Examine the rings for damage such as chipped or missing teeth. If renewal is necessary, the complete outer constant velocity joint must be renewed as described in Chapter 8.

## Rear reluctor rings

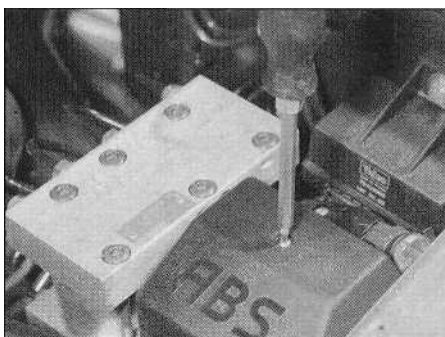
**30** The rear reluctor rings are an integral part of the rear hub assembly, and cannot be renewed separately. Examine the rings for signs of damage such as chipped or missing teeth, and renew as necessary. If renewal is necessary, the rear hub assembly must be renewed as described in Chapter 10.

## Relays

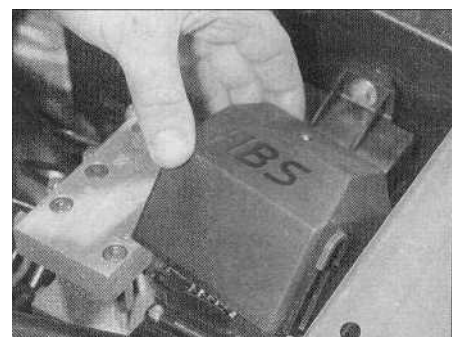
**31** Both the solenoid relay and return pump relay are located in the modulator block assembly. To gain access to them, undo the relay cover retaining screw and lift off the cover. Either relay can then be simply pulled out of position (**see illustrations**). Refer to Chapter 12 for further information on relays.



**23.23b** ... and remove the rear wheel sensor from the trailing arm



**23.31a** Undo the retaining screw ...



**23.31 b** ... and lift the relay cover off the modulator block ...

### 24 Vacuum pump (16-valve models) - removal and refitting

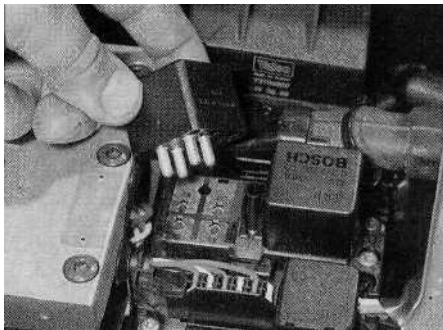


#### Removal

- 1 Release the retaining clip and disconnect the vacuum hose from the top of pump.
- 2 Slacken and remove the two bolts securing the pump to the left-hand end of the cylinder head, then remove the pump. Remove the pump O-ring (where fitted) and discard it - a new one must be used on refitting.

#### Refitting

- 3 Where an O-ring was fitted, fit a new O-ring to the pump. Where no O-ring was fitted, apply a smear of suitable sealant to the pump mating surface.
- 4 Align the pump drive dog with the slot in the



23.31c ... to gain access to the ABS relays

- camshaft end, then refit the pump to the cylinder head. Refit the pump mounting bolts, and tighten them securely.
- 5 Reconnect the vacuum hose to the pump, and securely tighten its retaining clip.

### 25 Vacuum pump (16-valve models) - testing and overhaul



- 1 The operation of the braking system vacuum pump can be checked using a vacuum gauge.
- 2 Disconnect the vacuum pipe from the pump, and connect the gauge to the pump union using a suitable length of hose.
- 3 Start the engine and allow it to idle, then measure the vacuum created by the pump. As a guide, after one minute, a minimum of approximately 500 mm Hg should be recorded. If the vacuum registered is significantly less than this, it is likely that the pump is faulty. However, seek the advice of a Citroen dealer before condemning the pump.
- 4 Overhaul of the vacuum pump is not possible, since no components are available separately for it. If faulty, the complete pump assembly must be renewed.