

Chapter 6

Clutch

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Degrees of difficulty

Easy, suitable for novice with little experience



Fairly easy, suitable for beginner with some experience



Fairly difficult, suitable for competent DIY mechanic



Difficult, suitable for experienced DIY mechanic



Very difficult, suitable for expert DIY or professional



Specifications

General

Clutch type	Single dry plate, diaphragm spring, hydraulically-operated
Adjustment	Automatic
Hydraulic fluid type	See end of <i>Weekly checks</i>

Clutch disc

Diameter:	
Petrol models	267 mm
Diesel models	235 mm

Torque wrench settings

	Nm	lbf ft
Clutch cover bolts	28	21
Clutch slave cylinder bolts	25	18
Hydraulic fluid pipe and hose unions	15	11

1 General information

All manual transmission models are fitted with a single dry plate clutch, which consists of five main components - friction disc, pressure plate, diaphragm spring, cover, and release bearing.

The friction disc is free to slide along the splines of the transmission input shaft, and is held in position between the flywheel and the pressure plate by the pressure exerted on the pressure plate by the diaphragm spring. Friction lining material is riveted to both sides of the friction disc, and spring cushioning between the friction linings and the hub absorbs transmission shocks, and helps to ensure a smooth take-up of power as the clutch is engaged.

The diaphragm spring is mounted on pins, and is held in place in the cover by annular fulcrum rings.

The release bearing is located on a guide sleeve at the front of the transmission, and the

bearing is free to slide on the sleeve, under the action of the release arm which pivots inside the clutch bellhousing.

The release mechanism is operated by the clutch pedal, using hydraulic pressure. The pedal acts on the hydraulic master cylinder pushrod, and a slave cylinder, mounted on the transmission bellhousing, operates the clutch release lever via a pushrod.

On diesel models, a hydraulic damper is fitted between the master cylinder and the slave cylinder. The damper absorbs the small fluctuations in hydraulic pressure caused by slight variations in engine speed at low rpm.

When the clutch pedal is depressed, the release arm pushes the release bearing forwards, to bear against the centre of the diaphragm spring, thus pushing the centre of the diaphragm spring inwards. The diaphragm spring acts against the fulcrum rings in the cover, and so as the centre of the spring is pushed in, the outside of the spring is pushed out, so allowing the pressure plate to move backwards away from the friction disc.

When the clutch pedal is released, the diaphragm spring forces the pressure plate

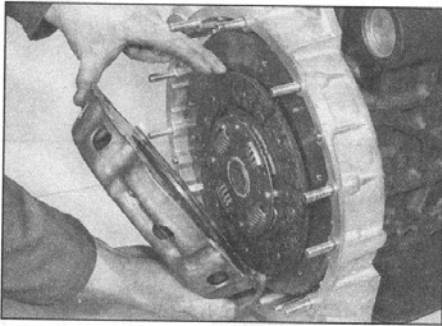
into contact with the friction linings on the friction disc, and simultaneously pushes the friction disc forwards on its splines, forcing it against the flywheel. The friction disc is now firmly sandwiched between the pressure plate and the flywheel, and drive is taken up.

The clutch is self-adjusting. As wear takes place on the friction disc over a period of time, the pressure plate automatically moves closer to the friction plate to compensate.

2 Clutch assembly - removal, inspection and refitting



Warning: Dust created by clutch wear and deposited on the clutch components may contain asbestos, which is a health hazard. DO NOT blow it out with compressed air, or inhale any of it. DO NOT use petrol (or petroleum-based solvents) to clean off the dust. Brake system cleaner or methylated spirit should be used to flush the dust into a suitable receptacle. After



2.4 Withdrawing the clutch cover and friction disc

the clutch components are wiped clean with rags, dispose of the contaminated rags and cleaner in a sealed, marked container.

Removal

1 Remove the transmission, as described in Chapter 7A, or the engine, as described in Chapter 2C. Note that if no other work is to be carried out on the transmission, it is far simpler to remove the engine.

2 If the original clutch is to be refitted, make alignment marks between the clutch cover and the flywheel, so that the clutch can be refitted in its original position.

3 Progressively unscrew the bolts securing the clutch cover to the flywheel, and recover the washers. Do not disturb the three bolts located in the side of the clutch cover.

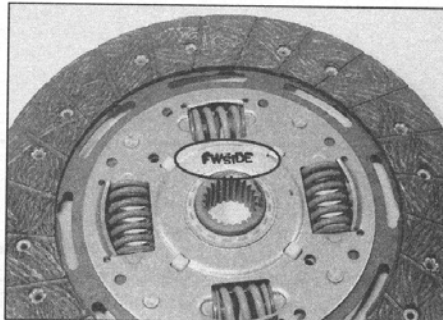
4 Withdraw the clutch cover from the flywheel. Be prepared to catch the clutch friction disc, which may drop out of the cover as it is withdrawn, and note which way round the friction disc is fitted (see illustration). The greater projecting side of the hub faces the flywheel.

Inspection

5 With the clutch assembly removed, clean off all traces of dust using a dry cloth. Although most friction discs now have asbestos-free linings, some do not, and it is wise to take suitable precautions; *asbestos dust is harmful, and must not be inhaled.*

6 Examine the linings of the clutch disc for wear and loose rivets, and the disc for distortion, cracks, broken torsion springs, and worn splines. The surface of the friction linings may be highly glazed, but, as long as the friction material pattern can be clearly seen, this is satisfactory. The disc must be renewed if the lining thickness has worn down to, or just above, the level of the rivet heads.

7 If there is any sign of oil contamination, indicated by a continuous, or patchy, shiny black discolouration, the disc must be renewed. The source of the contamination must be traced and rectified before fitting new clutch components; typically, a leaking crankshaft rear oil seal or transmission input shaft oil seal - or both - will be to blame



2.11 FW SIDE mark on clutch friction disc

(renewal procedures are given in the relevant part of Chapter 2 and Chapter 7A respectively).

8 Check the machined faces of the flywheel and pressure plate. If either is grooved, or heavily scored, renewal is necessary. The pressure plate must also be renewed if any cracks are apparent, or if the diaphragm spring is damaged or its pressure suspect.

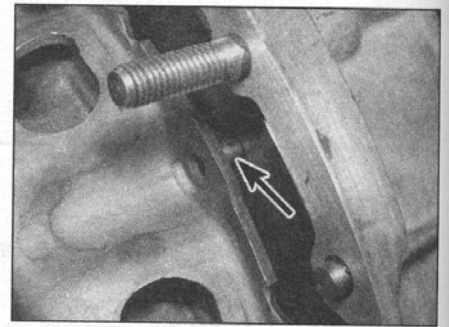
9 With the clutch removed, it is advisable to check the condition of the release bearing, as described in Section 3. It is considered good practice to renew the release bearing at the same time as the rest of the clutch components, given the amount of work necessary to gain access to it.

Refitting

10 It is important to ensure that no oil or grease gets onto the friction disc linings, or the pressure plate and flywheel faces. It is advisable to refit the clutch assembly with clean hands, and to wipe down the pressure plate and flywheel faces with a clean rag before assembly begins.

11 Apply a smear of molybdenum disulphide grease to the splines of the friction disc hub, then offer the disc to the flywheel, with the greater projecting side of the hub facing the flywheel (most friction discs will have a Flywheel Side or FW SIDE marking, which should face the flywheel) (see illustration). Hold the friction disc against the flywheel while the cover/pressure plate assembly is offered into position.

12 Fit the clutch cover assembly, where applicable aligning the marks on the flywheel



2.12 The pressure plate assembly locates on dowels (arrowed)

and clutch cover. Insert the securing bolts and washers, and tighten them finger-tight, so that the friction disc is gripped, but can still be moved. Note that pressure plate assembly locates on dowels (see illustration).

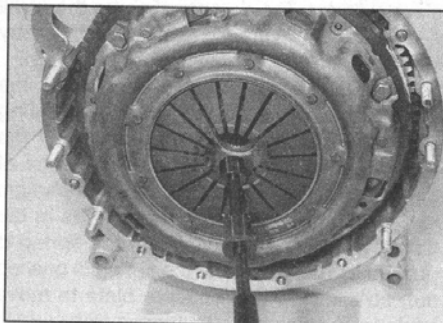
13 The friction disc must now be centralised, so that when the engine and transmission are mated, the transmission input shaft splines will pass through the splines in the friction disc hub.

14 Ideally, a dedicated clutch aligning tool should be used, as this will eliminate much of the guesswork (see illustrations). Centralisation can be carried out by inserting a round bar or a long screwdriver through the hole in the centre of the friction disc, so that the end of the bar rests in the spigot bearing in the centre of the crankshaft. Where possible, use a blunt instrument; if a screwdriver is used, wrap tape around the blade, to prevent damage to the bearing surface.

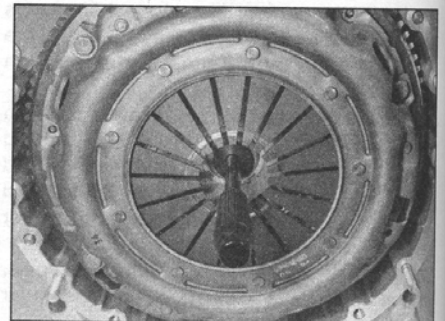
15 Moving the bar sideways or up and down as necessary, move the friction disc in whichever direction is necessary to achieve centralisation. With the bar removed, view the friction disc hub in relation to the hole in the centre of the crankshaft and the circle created by the ends of the diaphragm spring fingers. When the hub appears exactly in the centre, all is correct.

16 Tighten the cover retaining bolts gradually in a diagonal sequence, to the specified torque. Remove the alignment tool.

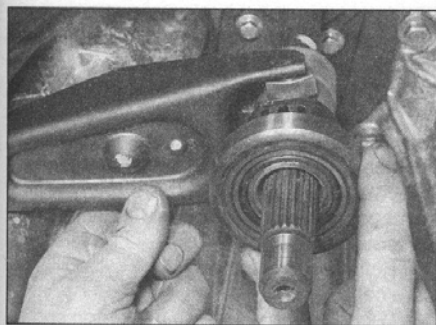
17 Refit the transmission or engine, as applicable, as described in Chapter 7A or Chapter 2C respectively.



2.14a Using a clutch alignment tool . . .



2.14b . . . to centre the friction disc



3.3 Sliding the clutch release bearing from the guide sleeve

3 Clutch release bearing and lever - removal, inspection and refitting



Release bearing

Removal

1 Remove the transmission, as described in Chapter 7A, or the engine, as described in Chapter 2C. Note that if no other work is to be carried out on the transmission, it is far simpler to remove the engine.

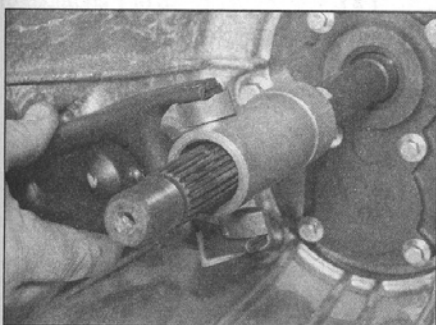
2 Where applicable, remove the clip securing the release bearing assembly to the release lever. Note that the clip is used to hold the bearing in position when mating the engine and transmission in production - the clip may fall out or become dislodged with no adverse effects.

3 Slide the bearing assembly from the guide sleeve (**see illustration**).

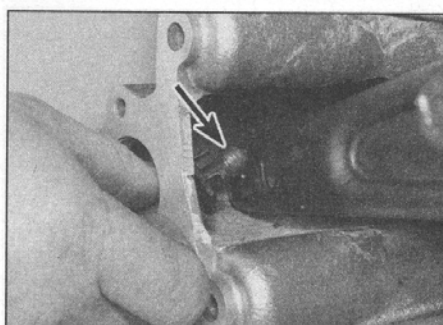
4 On certain models, the bearing is attached to a separate retaining sleeve, and if the bearing is to be renewed, it must be pressed from the sleeve.

Inspection

5 Spin the release bearing, and check it for excessive roughness. Hold the outer race, and attempt to move it laterally against the inner race. If any excessive movement or roughness is evident, renew the bearing. If a new clutch has been fitted, it is wise to renew the release bearing as a matter of course.



3.15a Withdraw the release lever . . .



3.12 Withdrawing the slave cylinder pushrod from the bellhousing

Refitting

6 On models with a separate bearing retaining sleeve, if a new bearing is to be fitted, press the new bearing onto the retaining sleeve. Note that the domed face of the bearing must face away from the sleeve (the domed face acts on the clutch pressure plate).

7 Lightly smear the outer faces of the release bearing guide sleeve with molybdenum disulphide grease.

8 Slide the bearing assembly onto the guide sleeve, ensuring that the guide slippers on the release arm engage with the release bearing collar.

9 Where applicable, refit the clip securing the release bearing assembly to the release lever.

10 Refit the transmission or engine, as applicable, as described in Chapter 7A or Chapter 2C respectively.

Release lever

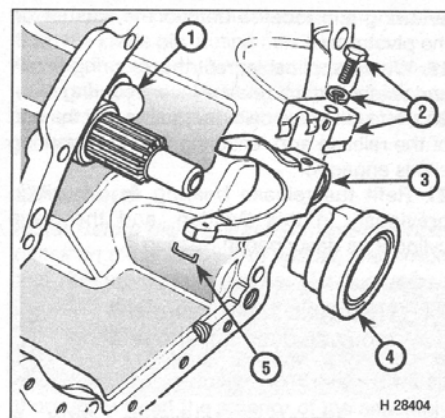
Removal

11 Remove the release bearing, as described previously in this Section, and the slave cylinder, as described in Section 4 (note that if the transmission is in position in the vehicle, there is no need to disconnect the hydraulic fluid pipe from the slave cylinder - move the slave cylinder to one side, leaving the pipe connected).

12 Unclip the slave cylinder pushrod from the end of the release lever, and withdraw the pushrod through the bellhousing (**see illustration**).



3.15b . . . and recover the release bearing guide slippers. Note release bearing securing clip (arrowed)



3.13 Clutch release components (gearbox shown inverted) - early models

- 1 Release lever pivot post
- 2 Release lever securing clip, screw and washer
- 3 Release lever
- 4 Release bearing
- 5 Release bearing securing clip

13 Where applicable, remove the securing screw (and washer), and prise off the clip securing the release lever to the pivot post. Note that the clip locates behind the washer on the pivot post (**see illustration**).

14 On models where there is no screw securing the release lever clip, pull the release lever out, and slide it towards the release bearing guide sleeve to release the clip from the pivot post.

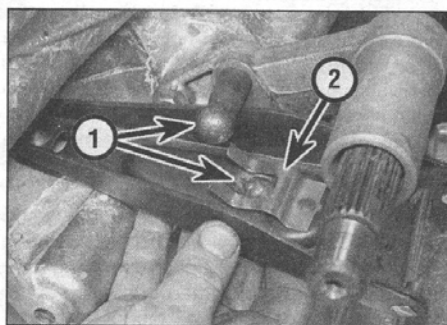
15 Withdraw the release lever from the bellhousing, and (where applicable) recover the release bearing guide slippers (**see illustrations**).

Refitting

16 Where applicable, ensure that the release bearing guide slippers are in position on the release lever.

17 Apply a little high-melting-point grease to the contact faces of the pivot post and the release lever (**see illustration**).

18 Manipulate the release lever into position on the pivot post, and engage the securing clip. Where applicable, ensure that the



3.17 Apply high-melting-point grease to the contact faces (1). Note release lever securing clip (2)

securing clip locates behind the washer on the pivot post.

19 Where applicable, refit the securing screw and washer to the release lever securing clip.

20 Refit the slave cylinder pushrod to the end of the release arm, ensuring that the securing clip is engaged.

21 Refit the release bearing as described previously in this Section, and the slave cylinder as described in Section 4.

4 Hydraulic slave cylinder - removal, overhaul and refitting



Warning: Hydraulic fluid is poisonous; wash off immediately and thoroughly in the case of skin contact, and seek

immediate medical advice if any fluid is swallowed or gets into the eyes. Certain types of hydraulic fluid are inflammable, and may ignite when allowed into contact with hot components; when servicing any hydraulic system, it is safest to assume that the fluid IS inflammable, and to take precautions against the risk of fire as though it is petrol that is being handled. 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.

Removal

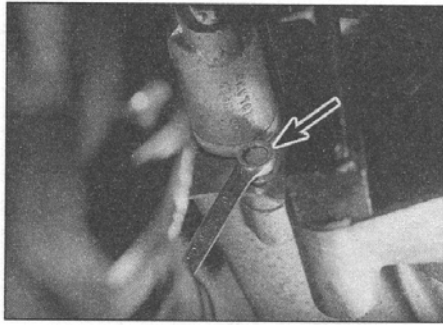
Note: Suitable jointing compound will be required to coat the mating faces of the slave cylinder mounting plate on refitting.

1 Disconnect the battery negative lead.

2 To reduce fluid spillage, drain the clutch hydraulic system. Follow the procedure described in Section 7 for bleeding the hydraulic system, but do not top-up the fluid reservoir. Pump the clutch pedal until all the hydraulic fluid has been expelled from the bleed screw.

3 Unscrew the union nuts, and remove the hydraulic fluid pipe which connects the slave cylinder to the hydraulic damper.

4 Unscrew the two securing bolts, and withdraw the slave cylinder and the mounting plate from the transmission bellhousing (see illustration). Note that the bolts also secure the hydraulic damper mounting bracket - move the assembly to one side, taking care not to strain the hydraulic hose. Recover the slave cylinder pushrod if it is loose.



4.4 Unscrewing a clutch slave cylinder securing bolt (arrowed)

5 Both sides of the mounting plate are coated with jointing compound - if necessary, carefully separate the components, taking care not to damage the mating faces or the dust cover.

Overhaul

Note: Before dismantling the slave cylinder, check on the availability of spares, and ensure that the appropriate overhaul kit is obtained. Suitable rubber grease will be required to pack the dust cover on refitting.

6 With the slave cylinder removed, as described previously in this Section, thoroughly clean the exterior of the assembly, then proceed as follows.

7 If not already done, withdraw the dust cover and the pushrod from the end of the cylinder.

8 Using a suitable pair of circlip pliers, remove the piston retaining circlip from the cylinder bore (see illustration).

9 Extract the piston and seal assembly from the cylinder bore. If necessary, tap the cylinder body on a clean wooden surface to dislodge the components - alternatively, apply low-pressure air (such as from a tyre foot-pump) to the fluid inlet to eject the components.

10 Prise the seal from the groove in the piston.

11 Withdraw the spring from the cylinder bore.

12 Unscrew the bleed screw from the rear of the cylinder.

13 Clean all the components thoroughly, using clean fresh hydraulic fluid, and dry them using a clean, lint-free cloth. Check that the fluid inlet port is free from obstructions.

14 Examine the cylinder bore, which must be free from corrosion, scoring and ridges. Similarly, examine the piston. If either the cylinder bore or the piston show signs of damage or wear, the complete assembly must be renewed.

15 Refit the bleed screw to the cylinder. Take care not to overtighten the screw.

16 Lubricate the new seal, the piston and the cylinder bore with clean, fresh hydraulic fluid.

17 Fit the seal to the groove in the piston, noting that the larger diameter of the seal should face towards the rear (fluid inlet end) of the cylinder.

18 Push the spring and piston assembly to the cylinder bore (using a wooden dowel if necessary), ensuring that the piston seal does not fold back. Note that the smaller diameter of the piston should seat against the spring.

19 Secure the piston assembly with the circlip.

20 Fill the dust cover with suitable rubber grease, then fit the dust cover to the groove in the end of the cylinder.

21 Where applicable, feed the pushrod through the dust cover, ensuring that the pushrod engages with the piston.

22 Refit the assembly as described in the following paragraphs.

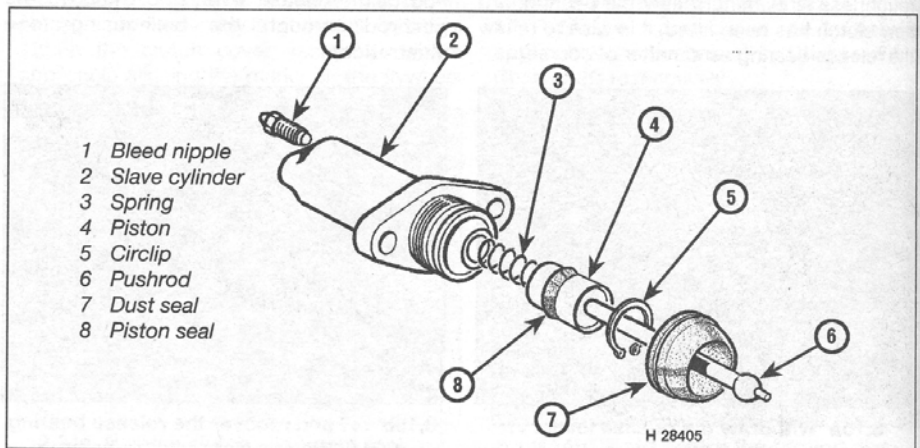
Refitting

23 Commence refitting by cleaning all traces of sealant from the mating faces of the mounting plate, slave cylinder and bellhousing.

24 Coat both sides of the mounting plate with suitable jointing compound.

25 Fit the mounting plate to the slave cylinder. Where applicable, also fit the dust cover, ensuring that it engages with the groove in the slave cylinder.

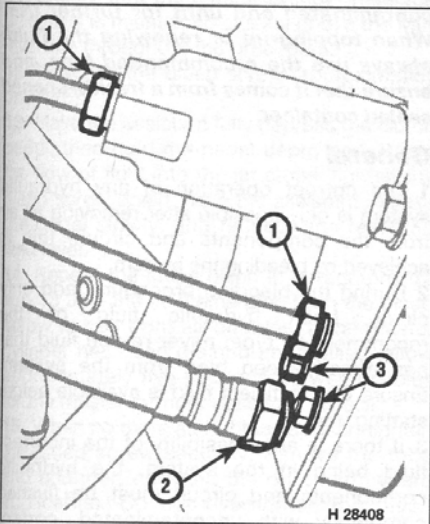
26 Manipulate the slave cylinder into position in the bellhousing, and feed the pushrod through the slave cylinder dust cover,



- 1 Bleed nipple
- 2 Slave cylinder
- 3 Spring
- 4 Piston
- 5 Circlip
- 6 Pushrod
- 7 Dust seal
- 8 Piston seal

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4.8 Slave cylinder components



5.3 Clutch hydraulic damper

- 1 Fluid pipe unions
- 2 Fluid hose union
- 3 Damper securing bolts

ensuring that the pushrod engages with the slave cylinder piston. Note that the slave cylinder should be fitted with the bleed screw uppermost.

- 27 Ensure that the hydraulic damper mounting bracket is in position, then refit and tighten the slave cylinder securing bolts.
- 28 Refit the slave cylinder-to-hydraulic damper fluid pipe, and tighten the union nuts.
- 29 Refill the clutch hydraulic fluid reservoir, and bleed the hydraulic system as described in Section 7.
- 30 Reconnect the battery negative lead.

5 Hydraulic damper (diesel models) - removal and refitting

Warning: Refer to the warning at the beginning of Section 4 before proceeding.

Removal

- 1 Proceed as described in Section 4, paragraphs 1 to 3.



6.5 Master cylinder pushrod-to-clutch pedal clevis pin spring clip (arrowed)

- 2 Unscrew the union nut and disconnect the fluid hose from the damper.
- 3 Unscrew the two bolts securing the damper to the bracket, and withdraw the damper (see illustration).

Refitting

- 4 Refitting is a reversal of removal, but on completion, refill the clutch hydraulic fluid reservoir, and bleed the hydraulic system as described in Section 7.

6 Master cylinder - removal, overhaul and refitting



Warning: Refer to the warning at the beginning of Section 4 before proceeding.

Removal

- 1 Disconnect the battery negative lead.
- 2 Drain the clutch hydraulic system. Follow the procedure described in Section 7 for bleeding the hydraulic system, but do not top-up the fluid reservoir. Pump the clutch pedal until all the hydraulic fluid has been expelled from the bleed screw.
- 3 Unscrew the union nut, and disconnect the fluid pipe from the master cylinder. Plug the open ends of the master cylinder and the pipe, to prevent dirt ingress.
- 4 Working inside the vehicle, release the securing clips and withdraw the driver's side lower fascia panel for access to the clutch pedal assembly.
- 5 The clevis pin securing the master cylinder pushrod to the pedal must now be removed. The clevis pin may be secured by a spring clip, or by a nut and washer. Prise off the spring clip, or unscrew the securing nut (as applicable), and withdraw the clevis pin (see illustration). Where

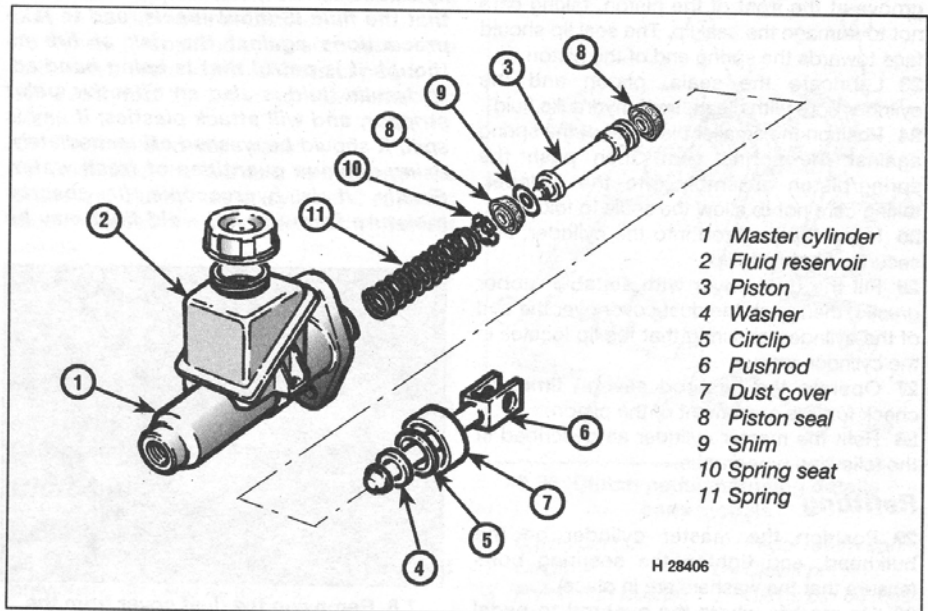
applicable, recover the washer and bushes from the clevis pin, noting their locations.

- 6 Working in the engine compartment, unscrew the two securing bolts and recover the washers, then withdraw the master cylinder.

Overhaul

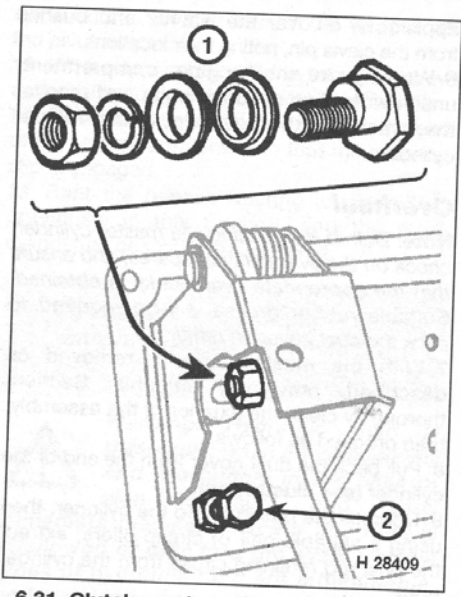
Note: Before dismantling the master cylinder, check on the availability of spares, and ensure that the appropriate overhaul kit is obtained. Suitable rubber grease will be required to pack the dust cover on refitting.

- 7 With the master cylinder removed as described previously in this Section, thoroughly clean the exterior of the assembly, then proceed as follows.
- 8 Pull back the dust cover from the end of the cylinder (see illustration).
- 9 Depress the pushrod into the cylinder, then using a suitable pair of circlip pliers, extract the pushrod retaining circlip from the cylinder bore.
- 10 Withdraw the pushrod, complete with the dust cover, circlip and washer.
- 11 Remove the dust cover from the pushrod.
- 12 Withdraw the piston assembly and spring.
- 13 Prise the spring seat from the rear of the piston assembly, then remove the rear seal and the shim.
- 14 Prise the front seal from the piston.
- 15 Clean all the components thoroughly, using clean fresh hydraulic fluid, and dry them using a clean, lint-free cloth. Check that the fluid ports are free from obstructions.
- 16 Examine the cylinder bore, which must be free from corrosion, scoring and ridges. Similarly, examine the piston. If either the cylinder bore or the piston show signs of damage or wear, the complete assembly must be renewed.
- 17 Clean the fluid reservoir cap, and check



- 1 Master cylinder
- 2 Fluid reservoir
- 3 Piston
- 4 Washer
- 5 Circlip
- 6 Pushrod
- 7 Dust cover
- 8 Piston seal
- 9 Shim
- 10 Spring seat
- 11 Spring

6.8 Clutch master cylinder components



6.31 Clutch master cylinder pushrod-to-pedal clevis pin details - early models

- 1 Clevis pin components
- 2 Pedal stop-bolt

that the vent hole in the cap is free from obstructions.

- 18 Fit the new dust cover to the pushrod.
- 19 Check that the three holes in the rear of the piston are unobstructed, then fit the new shim to the rear of the piston.
- 20 Fit the thinner of the two new seals to the rear of the piston, with the flat side of the seal against the shim.
- 21 Fit the spring seat to the end of the piston (larger diameter against the seal), ensuring that the seat locates in the piston groove.
- 22 Carefully fit the remaining seal to the groove at the front of the piston, taking care not to damage the seal lip. The seal lip should face towards the spring end of the piston.
- 23 Lubricate the seals, piston and the cylinder bore with clean, fresh hydraulic fluid.
- 24 Position the smaller diameter of the spring against the spring seat, then push the spring/piston assembly into the cylinder, taking care not to allow the seals to fold back.
- 25 Insert the pushrod into the cylinder, and secure with the circlip.
- 26 Fill the dust cover with suitable rubber grease, then push the dust cover over the end of the cylinder, ensuring that the lip locates in the cylinder groove.
- 27 Operate the pushrod several times to check for free movement of the piston.
- 28 Refit the master cylinder as described in the following paragraphs.

Refitting

- 29 Position the master cylinder on the bulkhead, and tighten the securing bolts (ensure that the washers are in place).
- 30 On models where the pushrod-to-pedal clevis pin is secured by a spring clip, refit the

clevis pin, and secure with the spring clip. Proceed to paragraph 32.

- 31 On models where the pushrod-to-pedal clevis pin is secured by a nut, proceed as follows (see illustration):
 - a) Connect the pushrod to the pedal, and refit the clevis pin. Position the bushes as noted before removal. Refit the washer and nut, but do not tighten the nut at this stage.
 - b) Turn the clevis pin (the pin has an eccentric shank) until the clutch pedal rests at the same height as the brake pedal, then tighten the clevis pin nut.
 - c) Loosen the locknut on the clutch pedal stop-bolt, and back off the stop-bolt (turn the bolt clockwise).
 - d) Fully depress the clutch pedal, then unscrew the stop-bolt until it just touches the pedal. Unscrew the stop-bolt one further turn, then tighten the locknut.
- 32 Refit the lower fascia panel.
- 33 Reconnect the fluid pipe to the master cylinder, and tighten the union nut.
- 34 Refill the fluid reservoir and bleed the hydraulic system as described in Section 7.
- 35 Reconnect the battery negative lead.

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.

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, fresh 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 the incorrect fluid being in the system, the hydraulic components and circuit must be flushed completely with uncontaminated, correct fluid, and new seals should be fitted throughout the system.
- 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.

7 Hydraulic system - bleeding



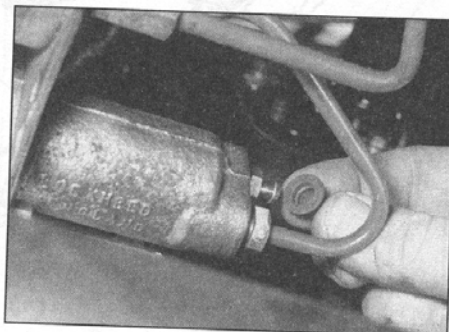
Warning: Hydraulic fluid is poisonous; wash off immediately and thoroughly in the case of skin contact, and seek immediate medical advice if any fluid is swallowed or gets into the eyes. Certain types of hydraulic fluid are inflammable, and may ignite when allowed into contact with hot components; when 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. Hydraulic fluid is also an effective paint stripper, and will attack plastics; if any is spilt, it should be washed off immediately, using copious quantities of fresh water. Finally, it is hygroscopic (it absorbs moisture from the air) - old fluid may be

Bleeding procedure

- 5 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, otherwise there is a risk of further air entering the system.
- 6 There are a number of one-man, do-it-yourself brake/clutch 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.
- 7 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.

Bleeding - basic (two-man) method

- 8 Clean the area around the bleed screw at the rear of the clutch slave cylinder (located on the transmission bellhousing). Where applicable, remove the dust cover from the bleed screw (see illustration).
- 9 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.
- 10 Fit a suitable 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.



7.8 Removing the dust cover from the clutch slave cylinder bleed screw

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

12 Unscrew the bleed screw (approximately one turn).

13 Have the assistant fully depress the clutch pedal, then hold the pedal depressed. When the flow of fluid into the jar stops, tighten the bleed screw again, have the assistant release the pedal slowly, and recheck the reservoir fluid level.

14 Repeat the steps given in paragraphs 12 and 13 until the fluid emerging from the bleed screw is free from air bubbles. If the master cylinder has been drained and refilled, allow approximately five seconds between cycles for the master cylinder passages to refill.

15 When no more air bubbles appear, tighten the bleed screw securely, remove the tube and spanner, and refit the dust cap (where applicable). Do not overtighten the bleed screw.

16 On completion, recheck the fluid level in the reservoir, and top-up if necessary.

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

Bleeding - using a one-way valve kit

18 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.

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

20 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.

8 Clutch pedal - removal and refitting

General

1 In order to remove the clutch pedal, the complete pedal box assembly must be removed, complete with the brake servo and brake and clutch master cylinders. Proceed as described in the following sub-sections.

Pedal box



Warning: Refer to the warning at the beginning of Section 4 before proceeding.

Removal

2 Disconnect the battery negative lead.

3 Release the retaining clips, and withdraw

the driver's side lower fascia panel for access to the clutch pedal assembly.

4 Working in the engine compartment, disconnect the wiring plug(s) from the brake fluid reservoir cap.

5 Place a suitable container beneath the brake master cylinder to catch escaping fluid, then unscrew the union nuts, and disconnect the brake pipes from the master cylinder, noting their locations. Plug or cover the open ends of the pipes and master cylinder, to prevent dirt ingress and further fluid loss.

6 Similarly, unscrew the union nut, and disconnect the fluid pipe from the clutch hydraulic master cylinder.

7 Disconnect the vacuum hose from the brake vacuum servo.

8 Working inside the vehicle, disconnect the wiring plug from the brake light switch.

9 Where applicable, disconnect the accelerator cable from the accelerator pedal (see the relevant part of Chapter 4).

10 On later models, where the steering column passes through the pedal box, remove the steering column as described in Chapter 11.

11 Unscrew the fixings securing the pedal box to the bulkhead. On early models, the pedal box is secured by nuts, which are accessible from the engine compartment. On later models, the pedal box is secured by bolts - the upper bolts are accessible from the engine compartment, and the lower bolts are reached from the driver's footwell.

12 Manipulate the complete pedal box assembly into the engine compartment, and withdraw it from the vehicle.

13 Remove the clutch pedal as described in the following sub-section.

Refitting

14 Manoeuvre the pedal box into position on the bulkhead, then refit and tighten the fixings.

15 Where applicable, refit the steering column as described in Chapter 11.

16 Where applicable, reconnect the accelerator cable to the accelerator pedal.

17 Reconnect the brake light switch wiring plug.

18 Refit the lower fascia panel.

19 Reconnect the hydraulic fluid pipes to the brake and clutch master cylinders, ensuring that the pipes are reconnected to their correct unions.

20 Reconnect the brake vacuum servo hose.

21 Reconnect the wiring plug(s) to the brake fluid reservoir cap.

22 Bleed the brake hydraulic system as described in Chapter 10.

23 Bleed the clutch hydraulic system as described in Section 7.

24 Reconnect the battery negative lead.

Clutch pedal

Removal

25 With the pedal box removed as described previously, proceed as follows.

26 Unscrew the nut, or prise the spring

clip, as applicable, from the end of the clutch pedal-to-pushrod clevis pin (see illustration).

27 Withdraw the clevis pin, and (where applicable) recover the washer and bushes, noting their locations to ensure correct refitting.

28 On early models, the pedal pivot shaft is secured by circlips, and on later models, the shaft is secured by bolts screwed into the ends of the shaft, and roll-pins.

29 Remove the circlip from the relevant end of the shaft (using circlip pliers), or unscrew the relevant bolt and extract the roll-pins, as applicable.

30 Where applicable, release the clutch assist spring from the pedal, noting its orientation.

31 Slide the pedal pivot shaft from the pedal sufficiently to enable removal or the clutch pedal. Release the return spring from the pedal as the pedal is removed - take care, as the spring tension is high.

Refitting

32 If necessary, the pedal pivot bushes can be renewed. Press the old bushes from the pedal, or remove them from the pivot shaft (as applicable), and press the new bushes into position.

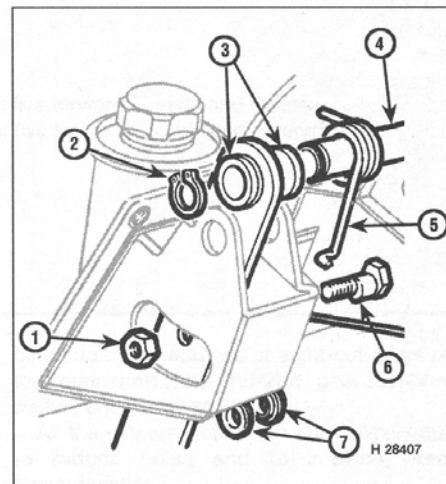
33 Lightly grease the pedal pivot shaft.

34 Position the pedal in the pedal box, then reconnect the return spring, and slide the pivot shaft through the pedal.

35 Refit the circlip to the end of the pivot shaft, or refit the securing bolt and fit new roll-pins, as applicable.

36 Where applicable, reconnect the clutch assist spring to the pedal, ensuring that it is orientated as noted before removal.

37 On models where the pushrod-to-pedal clevis pin is secured by a spring clip, connect



8.26 Clutch pedal mounting details - early models

- | | |
|----------------------|-----------------------|
| 1 Clevis pin nut | 5 Pedal return spring |
| 2 Circlip | 6 Clevis pin |
| 3 Pivot shaft bushes | 7 Clevis pin bushes |
| 4 Pivot shaft | |

the pushrod to the pedal, then refit the clevis pin, and secure with the spring clip. Proceed to paragraph 39.

38 On models where the pushrod-to-pedal clevis pin is secured by a nut, proceed as follows:

a) *Connect the pushrod to the pedal, and refit the clevis pin. Position the bushes as noted before removal. Refit the washer*

and nut, but do not tighten the nut at this stage.

b) *Turn the clevis pin (the pin has an eccentric shank) until the clutch pedal rests at the same height as the brake pedal, then tighten the clevis pin nut.*

c) *Loosen the locknut on the clutch pedal stop-bolt, and back off the stop-bolt (turn the bolt clockwise).*

d) *Fully depress the clutch pedal, then unscrew the stop-bolt until it just touches the pedal. Unscrew the stop-bolt one further turn, then tighten the locknut (if desired, this last operation can be carried out when the pedal box has been refitted, when the pedal will be easier to depress).*

39 Refit the pedal box as described previously.



Fig. 25 Clutch pedal assembly details

