Chapter 9 Braking system

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Degrees of difficulty

Easy, suitable for novice with little experience

Fairly easy, suitable for beginner with some experience

Fairly difficult, suitable for competent DIY mechanic **Difficult**, suitable for experienced DIY mechanic

Ve

Very difficult, suitable for expert DIY or professional



Specifications

Brake system

Туре

Front brakes

Disc thickness:	
New:	
1.05 and 1.3 litre	10.0 mm
1.6 and 1.8 litre	12.0 mm
1.8 litre with ventilated discs	20.0 mm
Minimum:	
1.05 and 1.3 litre	8.0 mm
1.6 and 1.8 litre	10.0 mm
1.8 litre with ventilated discs	18.0 mm
Pad thickness:	
New - excluding backplate:	
1.05 and 1.3 litre	12.0 mm
1.6 and 1.8 litre	14.0 mm
1.8 litre with ventilated discs	10.0 mm
Minimum - including backplate:	
All models	7.0 mm
Describer the states	
Rear drum brakes	
Drum internal diameter:	
New	180.0 mm
Maximum	181.0 mm
Drum maximum run-out:	
Radial - at friction surface	0.05 mm
Lateral - wheel contact surface	0.2 mm
Lining thickness:	
Minimum - including shoe	5.0 mm

Minimum - excluding shoe

Hydraulic, dual circuit, split diagonally, pressure regulator on some models. Disc front brakes. Drum or disc rear brakes. Cable-operated handbrake on rear wheels.

9.1

2.5 mm

Rear disc brakes		
Disc thickness:		
New	10.0 mm	
Minimum	8.0 mm	
Disc maximum run-out	0.06 mm	
Pad thickness:		
New - including backplate	12.0 mm	
Minimum - including backplate	7.0 mm	
Master cylinder		
Diameter	20.65 mm	
Wheel cylinder		
Diameter	14.29 mm	
Servo unit		
Diameter:		
Manual gearbox	178.0 mm	
Automatic transmission	228.0 mm	
Torque wrench settings	Nm	lbf ft
Caliper upper securing bolt	25	19
Caliper lower securing bolt	25	19
Master cylinder securing nuts	20	15
Servo unit securing nuts	20	15
Splash guard to strut	10	7
Backplate to rear axle	60	44
Rear disc brake guide pin (self-locking)	35	26
Rear disc brake carrier bolts	65	48
Rear disc brake cover plate-to-axle bolts	60	44
Roadwheel bolt	110	81

1 General information and precautions

General information

The braking system is of hydraulic, dual circuit type with discs at the front and drum or discs at the rear. The hydraulic circuit is split diagonally so that with the failure of one circuit, one front and one rear brake remain operative.

A load-sensitive pressure regulator is incorporated in the rear hydraulic circuits on some models to prevent the rear wheels locking in advance of the front wheels during heavy application of the brakes. The regulator proportions the hydraulic pressure between the front and rear brakes according to the load being carried and is located on the under-body, in front of the left-hand rear wheel.

A vacuum servo unit is located between the brake pedal and master cylinder. It provides assistance to the driver when the brake pedal is depressed. The unit operates by vacuum from the inlet manifold and comprises a diaphragm and non-return valve. With the brake pedal released, vacuum is channelled to both sides of the diaphragm. With the pedal depressed, one side is opened to atmosphere. The resultant unequal pressures are harnessed to assist in depressing the master cylinder pistons. The handbrake operates on the rear wheels only, its lever incorporating a switch which illuminates a warning light on the instrument panel when the handbrake is applied. The same warning light is wired into the low hydraulic fluid switch circuit.

Precautions

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 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, that is it absorbs moisture from the air. Old fluid may be contaminated and unfit for further use.

When topping-up or renewing fluid, always use the recommended type and ensure that it comes from a freshly-opened sealed container.

When working on the brake components, take care not to disperse brake dust into the air, or to inhale it, since it may contain asbestos which is injurious to health When servicing any part of the system, work carefully and methodically. Observe scrupulous cleanliness when overhauling any part of the system. Always renew components (in axle sets, where applicable) if in doubt about their condition and use only genuine VW replacement parts, or at least those of known good quality.

2 Brake pads - inspection and renewal



Warning: When working on brake components, take care not to disperse brake dust into the air or to inhale it, since it

may contain asbestos which is injurious to health.



Warning: Always support the vehicle on axle stands before removing the roadwheel to service brake assemblies.

Front pads

Inspection

1 Refer to Chapter 1, Section 26.

Removal

2 To remove the pads, first jack up the front of the vehicle and support it on axle stands (see "*Jacking and vehicle support*"). Apply the handbrake and remove both front wheels.



2.3a Caliper securing bolt removal

3 Use an Allen key and unscrew the upper and lower caliper securing bolts (see illustration). Withdraw the caliper and tie it up out of the way. Do not allow the weight of the caliper to stretch or distort the brake hose (see illustration).

4 Withdraw each pad by sliding it sideways from the wheel bearing housing. Note that the pads differ, the pad with the larger friction area being fitted to the outside.

5 The retaining spring can be detached from the wheel bearing housing whilst noting its orientation (see illustration). Renew the spring when renewing the pads.

6 Brush the dust and dirt from the caliper, piston, disc and pads whilst taking care not to inhale it. Scrape any scale or rust from the disc and pad backing plates.

7 If the pads are to be renewed, they must be



2.3b Removing the caliper

replaced as a set on both sides at the front. If the original pads are to be re-used they must be refitted to their original positions each side.

Fitting

8 Using a piece of wood, push the piston back into the caliper. While doing this, check the level of the fluid in the reservoir and if necessary draw off some with a pipette or release some from the caliper bleed screw. Tighten the screw immediately afterwards.

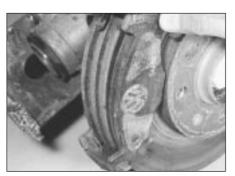
9 Relocate the retaining spring (see illustration).

10 Refit the inner pad (smaller friction area), followed by the outer pad. Locate the pad backing plate notches as shown (see illustration).

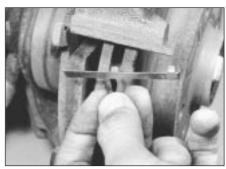
11 Refit the brake caliper, locating it at the top end first. Pivot the bottom end into position,



2.9 Pad retaining spring is located as shown



2.10 Refitting front brake pads



2.5 Removing a pad retaining spring

align the upper and lower retaining bolt holes, then insert the bolts. Take care not to press the caliper in more than is necessary when fitting the bolts or the retainer springs may be distorted which, in turn, will give noisy braking. Tighten the bolts to the specified torque.

12 On completion, the brake pedal should be depressed firmly several times with the vehicle stationary so that the brake pads take up their normal running positions. Check the fluid level in the reservoir and top-up if necessary.

Rear pads

Inspection

13 Refer to Chapter 1, Section 26.

Removal

14 To remove the pads, chock the front wheels, jack up the rear of the vehicle and support it on axle stands (see "Jacking and vehicle support"). Remove both rear wheels.

15 Release the handbrake then detach the handbrake cable from the caliper (see illustration).

16 If the brake hydraulic hose connects to the underside of the caliper, undo the caliper upper retaining bolt **(see illustration)**. If the hydraulic hose connects to the top of the caliper, undo both caliper retaining bolts. Note that these self-locking bolts must be renewed on reassembly.

17 If the upper retaining bolt was removed, pivot the caliper downwards (see illustration).



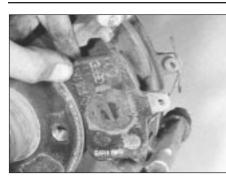
2.15 Release handbrake cable (arrowed) from caliper



2.16 Rear caliper bolt removal Prevent guide pin from turning with openended spanner



2.17 Rear brake caliper removal



2.18 Removing rear brake pads

If both bolts were removed, carefully lift off and support the caliper.

18 If the pads are to be re-used, mark them for identification to ensure that they are refitted to their original location. Their positions must not be changed **(see illustration)**.

19 Brush all dust and dirt from the caliper, piston, disc and pads whilst taking care not to inhale it. Scrape any scale or rust from the disc and pad backing plates.

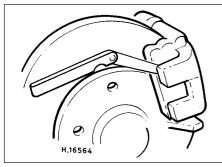
Fitting

20 Move the piston back into the caliper by turning it clockwise using either an Allen key or a pair of angled circlip pliers according to caliper type (see illustrations). As the piston moves back into the caliper, check the fluid level in the reservoir and if necessary draw some off with a pipette or release some from the caliper bleed screw. Tighten the screw immediately afterwards.

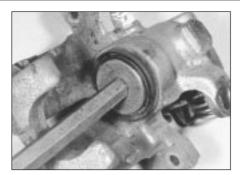
21 Locate the respective brake pads in position.

22 Before refitting the caliper, piston position must be set to provide a 1.0 mm clearance between the outer pad and the caliper. Check the adjustment by temporarily refitting the caliper and retaining bolts (use the old ones) and check the clearance with a feeler blade as shown (see illustration). If adjustment is necessary, remove the caliper and rotate the piston clockwise or anti-clockwise until the correct clearance is achieved.

23 Refit the caliper and insert the new self-locking bolts when adjustment is correct. Tighten the bolts to the specified torque setting.



2.22 Checking outer brake pad-to-caliper clearance

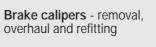


2.20a Retracting caliper piston using an Allen key

24 If new brake pads and/or discs have been fitted, it is necessary to carry out a basic rear brake adjustment before reconnecting the handbrake cable. To do this, apply a medium pressure to the brake pedal and depress it a total of 40 times (vehicle stationary).

25 Reconnect the handbrake cable to the caliper.

26 On completion, check handbrake adjustment.



Warning: Brake hydraulic fluid may be under considerable pressure in a pipeline, take care not to allow hydraulic fluid to spray into the face or eyes when loosening a connection.



3

Warning: Never refit old seals when reassembling brake system components

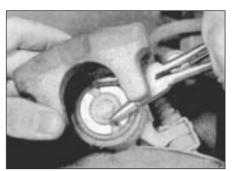
Front calipers

1 Jack up the front of the vehicle and support it on axle stands (see *"Jacking and vehicle support"*). Apply the handbrake and remove both front wheels. Unbolt and remove the caliper from the wheel bearing housing.

2 If available, fit a hose clamp to the caliper flexible brake hose. Alternatively, remove the fluid reservoir filler cap and tighten it down onto a piece of polythene sheet in order to reduce any loss of hydraulic fluid.



3.5 Removing the dust seal



2.20b Retracting caliper piston using a pair of angled circlip pliers

3 Loosen and detach the brake hose union at the caliper, allowing for a certain amount of fluid spillage. Plug the hose union to prevent ingress of dirt.

4 Clean the external surfaces of the caliper with paraffin and wipe dry. Plug the fluid inlet during this operation.

5 Prise free and remove the dust seal from the piston (see illustration).

6 Using air pressure from a foot pump in the fluid inlet, blow the piston from the cylinder whilst taking care not to drop the piston. Prise the sealing ring from the cylinder bore. Take care not to scratch the cylinder bore.

7 Clean all components with methylated spirit and allow to dry. Inspect the surfaces of the piston, cylinder and frames for wear, damage and corrosion. If necessary, renew the caliper. If all components are in good condition then obtain a repair kit of seals.

8 Dip the new sealing ring in brake fluid and locate it in the cylinder bore groove using the fingers only to manipulate it.

9 Manipulate the new dust cap into position on the piston, engaging the inner seal lip in the piston groove. Use a suitable screwdriver to ease it into position whilst taking care not to damage the seal or scratch the piston (see illustration).

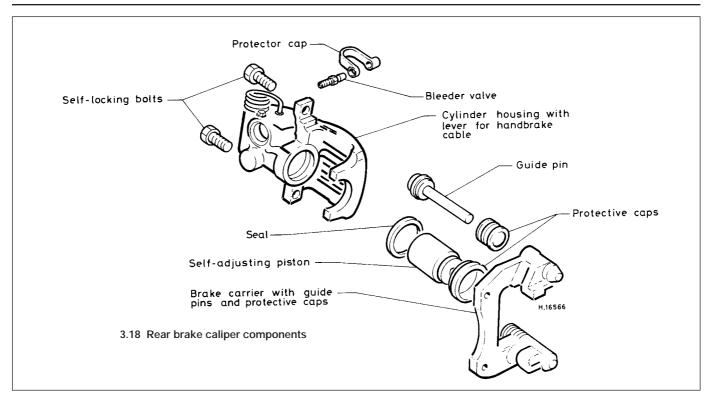
10 Smear the piston with brake fluid and press it into position in the caliper bore.

11 Check that the brake hose union is clean, then unplug it and refit it to the caliper. Do not fully tighten it at this stage.

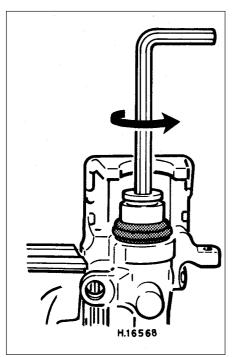
12 Refit the caliper to the wheel bearing housing.



3.9 Dust seal location on caliper piston



13 Tighten the brake hose union so that the hose is not twisted or in a position where it will chafe against surrounding components.14 Remove the hose clamp or polythene sheet from the reservoir. Top-up the brake fluid and bleed the brakes.



3.20 Removing the piston from the cylinder

Rear calipers

15 Chock the front wheels, jack up the rear of the vehicle and support it on axle stands (see *"Jacking and vehicle support"*). Remove both rear wheels and remove the brake pads.

16 If available, fit a hose clamp to the caliper flexible brake hose. Alternatively, remove the fluid reservoir filler cap and tighten it down onto a piece of polythene sheet in order to reduce any loss of hydraulic fluid.

17 Loosen and detach the brake hose union at the caliper. Allow for a certain amount of fluid spillage and plug the hose union to prevent the ingress of dirt.

18 Unscrew and remove the lower caliper retaining bolt (where applicable) and remove the caliper **(see illustration)**. This self-locking bolt must be removed.

19 Clean the external surfaces of the caliper with paraffin and wipe dry. Plug the fluid inlet during this operation.

20 Secure the caliper in a soft-jawed vice. Using an Allen key or angled circlip pliers, unscrew the piston from the cylinder (see illustration).

21 Using a screwdriver, carefully ease out the O-ring from the cylinder bore (see illustration).22 Prise free the protective cap from the piston.

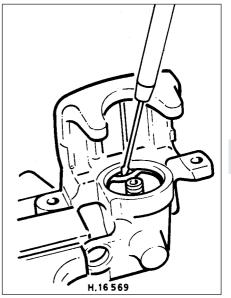
23 Clean the components with methylated spirit and allow to dry. Inspect the surfaces of the piston, cylinder and frames for wear, damage and corrosion. If necessary, renew the caliper. If the components are in good condition then obtain a repair kit of seals.

24 Dip the new O-ring in brake fluid and

locate it in the cylinder bore groove using the fingers only to manipulate it.

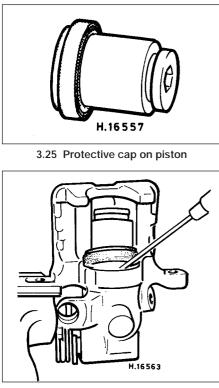
25 Smear the piston with brake fluid then manipulate the new protective cap into position on the inner end of the piston with the outer seal lip on the piston (see illustration).26 Hold the piston at the entrance to the cylinder housing and carefully manipulate the

cylinder housing and carefully manipulate the inner seal lip of the protective cap into the groove in the cylinder bore using a suitable screwdriver **(see illustration)**.



3.21 Removing the O-ring seal from the cylinder

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3.26 Manipulating inner seal lip of protective cap into cylinder bore groove

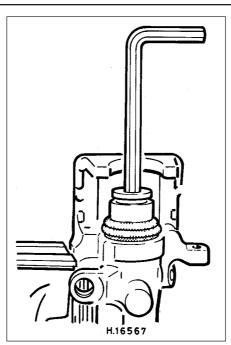
27 Locate the Allen key or angled circlip pliers into the piston and pressing firmly down, screw the piston fully home into the cylinder so that the outer seal lip of the protective cap springs into the location groove in the piston (see illustration).

28 Caliper reassembly is now complete but before refitting it to the vehicle, it must be topped up with brake fluid and bled. To do this, unscrew the bleeder valve then support the caliper in the upright position. Connect a suitable union, hose and fluid supply applicator to the bleed valve connection in the caliper. Apply fluid and top-up the caliper until fluid is seen to emerge from the brake hose connection without air bubbles. Tighten the bleed valve and plug the brake hose connection aperture (see illustration).

29 The caliper can now be refitted to the vehicle.



4.5 Front brake disc retaining screw (arrowed)



3.27 Screwing piston downwards through protective cap and into position in cylinder

4 Brake discs - examination, removal and refitting

Front discs

1 Jack up the front of the vehicle and support it on axle stands (see "*Jacking and vehicle support*"). Apply the handbrake and remove both front wheels.

2 Using an Allen key, unscrew the upper and lower caliper securing bolts. Withdraw the caliper and tie it clear of the disc. Do not allow the weight of the caliper to stretch or distort the brake hose.

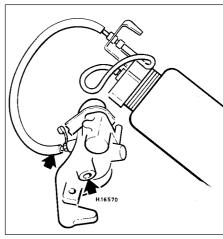
3 Rotate the disc and examine it for deep scoring or grooving.

4 Using a micrometer, check that the disc thickness is not less than the minimum amount specified.

5 Remove the cross-head screw and withdraw the brake disc from the hub (see illustration).



4.13 Prise free the hub cap . . .



3.28 Bleeding rear brake caliper unit prior to refitting

Arrows indicate brake bleed valve and brake hose connection point

6 If necessary, the splash guard can be removed from the wheel bearing housing by unscrewing the three bolts.

7 Refitting is a reversal of removal. Ensure that the mating faces of the disc and hub are clean.

Rear discs

8 Chock the front wheels, jack up the rear of the vehicle and support it on axle stands. Remove both rear wheels.

9 Remove the caliper and tie it clear of the disc. Do not allow the weight of the caliper to stretch or distort the brake hose.

10 Rotate the disc and examine it for deep scoring or grooving.

11 Using a micrometer, check that the disc thickness is not less than the minimum amount specified.

12 Using a dial gauge or metal block and feeler blades, check that the disc run-out measured on the friction surface does not exceed the maximum amount specified.

13 Unbolt and remove the rear brake carrier. Use a screwdriver and prise free the hub cap **(see illustration)**.

14 Straighten and extract the split pin, then withdraw the locking ring (see illustration).



4.14 ... remove the split pin and lock ring ...



4.15 ... followed by the outer washer and bearing

15 Undo the hub nut and then withdraw the thrustwasher and outer taper bearing race (see illustration).

16 Withdraw the disc from the stub axle.

17 Unless a disc is being renewed after a low mileage due to damage or other defect, both discs must be renewed at the same time.

18 Refer to the following Section for hub bearing replacement.

19 Lubricate the stub axle with grease then fit the disc over it, taking care not to damage the inner oil seal lips.

20 Lubricate the outer taper roller bearing with grease and locate it onto the stub axle against its bearing outer race.

21 Refit the thrustwasher, engaging the inner lug with the groove in the stub axle. Hand tighten the securing nut to the point where the thrustwasher can just be moved with a screwdriver and finger pressure but without levering it. Check that the disc rotates freely without binding or excessive endfloat, then locate the locking ring over the nut and insert a new split pin to secure.

22 Half fill the hub cap with bearing grease and tap it carefully into position .

23 Before refitting the brake carrier, check that the protective caps and guide pins are not damaged. If they are, then the carrier must be renewed. Locate and fit the carrier retaining bolts, tightening to the specified torque setting.

24 The caliper can now be refitted.

5 Rear hub bearings - renewal

1 Remove the rear brake disc.

2 Remove the inner bearing from the disc by levering free the dust cap, prising out the oil seal and extracting the bearing.

3 The bearing outer races can be removed from the disc by drifting them out with a soft drift whilst supporting the disc.

4 Check that the bearing recesses in the disc are clean, support the disc and drive the new bearing outer races into position by using a suitable tube drift. Ensure that they are fully home.

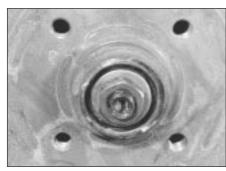
5 Lubricate the inner bearing with grease and locate it onto its outer race. The oil seal can now be driven into position. Lubricate its seal lip when fitted.

6 Drive the dust cap into position using a suitable tube drift.

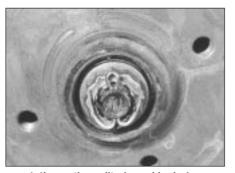
7 Refit the rear brake disc.



6.4a Remove the hub cap . . .



6.5a Undo the hub nut . . .



6.4b ... the split pin and lock ring



6.5b ... remove the thrustwasher ...

6 Rear brake shoes - inspection and renewal



Inspection

1 Jack up the rear of the vehicle and support it on axle stands (see "*Jacking and vehicle support*"). Chock the front wheels.

2 Working beneath the vehicle, remove the rubber plugs from the front of the backplates and check with a torch that the linings are not worn below the minimum thickness specified. On completion, refit the plugs.

Removal

3 Remove the rear wheels.

4 Prise off the hub cap then extract the split pin and remove the locking ring (see illustrations).

5 Unscrew the hub nut and remove the thrustwasher and outer wheel bearing (see illustrations).

6 Check that the handbrake is fully released, then withdraw the brake drum. If difficulty is experienced, the brake shoes must be backed away from the drum first. To do this, insert a screwdriver through one of the bolt holes and push the automatic adjuster wedge upwards against the spring tension. This will release the shoes from the drum.

7 Brush all dust from the brake drum, shoes and backplate whilst taking care not inhale it. Scrape any scale or rust from the drum. Note that the shoes should be renewed as a set of four.

8 Using a pair of pliers, depress the steady spring cups, turn them through 90° and remove the cups, springs and pins (see illustration).

9 Note the location of the return springs and strut on the brake shoes, then lever the shoes from the bottom anchor. Unhook and remove the lower return spring (see illustration).

10 Disengage the handbrake cable from the lever on the trailing brake shoe (see illustration).

11 Release the brake shoes from the wheel cylinder, unhook the wedge spring and upper return spring and withdraw the shoes (see illustration).



6.5c . . . and outer bearing

9



6.8 Brake shoe steady spring and cup (arrowed)

12 Grip the strut in a vice and release the shoe, then remove the wedge and spring. The backplate and stub axle may be removed if necessary, by unscrewing the four bolts after removing the wheel cylinder. Note the location of the handbrake cable bracket. If the wheel cylinder is being left in position, retain the pistons with an elastic band. Check that there are no signs of fluid leakage and, if necessary, repair or renew the wheel cylinder.

Fitting

13 Fit the new brake shoes using a reversal of the removal procedure. Note that the lug on the wedge faces the backplate.

14 Check the brake drum for wear and damage.

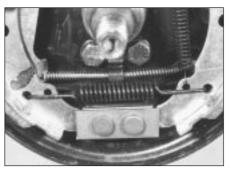
15 Before refitting the brake drum, smear the lips of the oil seal with a little grease.

16 Refit the drum onto the stub axle whilst taking care not to damage the oil seal, then lubricate the outer taper roller bearing and fit it onto the stub axle.

17 Fit the thrustwasher and hub nut then tighten the nut, hand tight only.

18 Refit the wheel.

19 With the hub cap, split pin and locking ring removed, tighten the hub nut firmly while



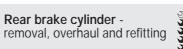
6.9 Lower return spring fixing points to brake shoes

turning the wheel in order to settle the bearings.

20 Back off the nut then tighten it until it is just possible to move the thrustwasher laterally with a screwdriver under finger pressure. Do not twist the screwdriver or lever it.

21 Fit the locking ring, together with a new split pin, then tap the hub cap into the drum with a mallet.

22 Check that the brake drum rotates freely then refit the roadwheel(s) and lower the vehicle to the ground. Finally, fully depress the brake pedal several times in order to set the shoes in their correct position.

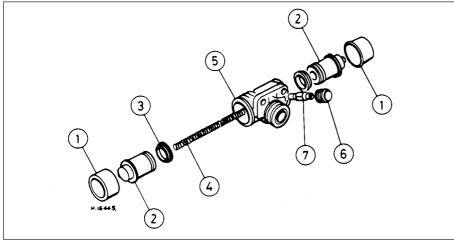


Removal

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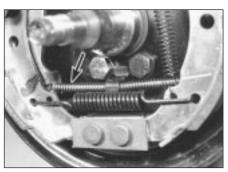
1 Remove the rear brake shoes.

2 If available, fit a hose clamp to the flexible brake hose. Alternatively, remove the fluid reservoir filler cap and tighten it down onto a piece of polythene sheet in order to reduce any loss of hydraulic fluid.



7.5 Rear wheel cylinder components (typical)

- 1 Boot
- 2 Piston
- 3 Cap 4 Spring
- 5 Brake cylinder housing
- 6 Dust cap7 Bleed valve
- ler housing



6.10 Handbrake cable attachment point to trailing brake shoe (arrowed)



6.11 Wheel cylinder, upper return spring and pushrod assembly

3 Unscrew the hydraulic pipe union from the rear of the cylinder and plug the end of the pipe.

4 Remove the two screws and withdraw the wheel cylinder from the backplate.

Overhaul

5 Prise off the dust caps then remove the pistons, keeping them identified for location. If necessary, use air pressure from a foot pump in the fluid inlet (see illustration).

6 Remove the internal spring and, if necessary, unscrew the bleed valve.

7 Clean all components in methylated spirit and allow to dry. Examine the surfaces of the piston and cylinder bore for wear, scoring and corrosion. If evident, renew the complete wheel cylinder. If the components are in good condition, discard the seals and obtain a repair kit.

8 Dip the inner seals in clean brake fluid then fit them to the piston grooves using the fingers only to manipulate them. Ensure that the larger diameter ends face the inner ends of the pistons.

9 Smear brake fluid on the pistons then insert the spring and press the pistons into the cylinder, taking care not to damage the seal lips.

10 Locate the dust caps on the pistons and in the grooves on the outside of the cylinder.11 Insert and tighten the bleed valve.

Refitting

12 Clean the mating faces then fit the wheel cylinder to the backplate and tighten the screws.

13 Refit the hydraulic pipe and tighten the union. Remove the hose clamp or polythene sheet.

14 Refit the brake shoes.

15 Top-up the brake fluid reservoir and bleed the valves.

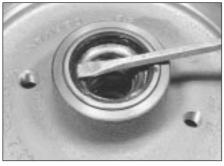
8 Rear brake drum - examination and renovation



1 Whenever the brake drums are removed, they should be checked for wear and damage. Light scoring of the friction surface is normal but if excessive, the drums must either be renewed as a pair or reground provided that the maximum internal diameter specified is not exceeded.

2 After a high mileage, the drums may become warped and oval. Run-out can be checked with a dial gauge and, if in excess of the maximum amount specified, the drums should be renewed as a pair.

3 The inner oil seal should be checked for condition and if necessary, renewed. Prise out the old seal using a screwdriver **(see illustration)**. Drive the new seal into position so that it is flush with the boss face.



8.3 Prising out brake drum oil seal

9 Master cylinder - removal and refitting

Removal

1 Disconnect the battery negative lead.

2 Disconnect the wiring from the fluid level switches on the master cylinder and fluid reservoir filler cap.

3 On carburettor models, remove the air cleaner.

4 On fuel injection models, detach the injection hoses from the retaining clips on the inlet ducting, then unclip and detach the inlet duct between the fuel distributor unit and the throttle housing.

5 Place a suitable container beneath the master cylinder and place some cloth on the surrounding body to protect it from any spilled brake fluid.

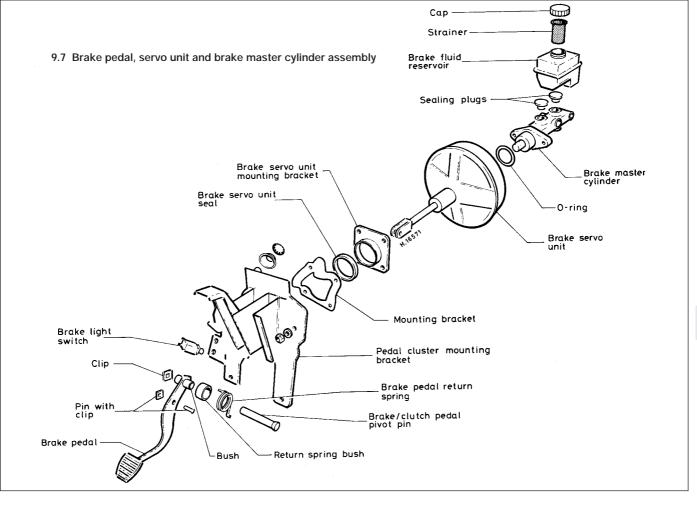
6 Unscrew the unions and disconnect the hydraulic fluid pipes from the master cylinder.7 Unscrew the mounting nuts and withdraw the master cylinder from the servo unit. Remove the spacer and seal where applicable (see illustration).

8 Remove the master cylinder from the engine compartment, taking care not to spill any hydraulic fluid on the body paintwork.

9 Clean the exterior of the master cylinder with paraffin and wipe dry.

10 If the master cylinder is defective it cannot be overhauled and must be renewed as a unit. This being the case, remove the reservoir by pulling it free from the rubber grommets, then prise free the grommets from the cylinder.

11 Commence reassembly by smearing the rubber grommets in brake fluid and pressing them into the cylinder, then press the reservoir into the grommets.



Refitting

12 Refitting the master cylinder is a reversal of the removal procedure. Fit a new mounting seal between the cylinder and servo unit.13 On completion, bleed the brake hydraulic system.

10 Brake pressure regulator - testing, removal and refitting

1 The regulator is located on the under-body, in front of the left-hand rear wheel (see illustration).

2 Checking of the regulator is best left to a VW garage, as special pressure gauges and spring tensioning tools are required.

3 Adjustment is made by varying the spring tension. Again, this must be carried out by a VW garage.

4 Removal and refitting are straightforward. After fitting, bleed the hydraulic system and have the regulator adjusted by a VW garage.

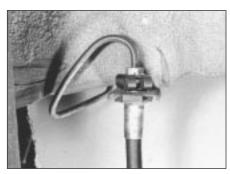
5 When bleeding the hydraulic system of vehicles fitted with a pressure regulator, the lever of the regulator should be pressed toward the rear axle.

11 Hydraulic pipes and hoses renewal

1 To remove a rigid brake pipe, unscrew the union nuts at each end and where necessary, remove the line from its retaining clips. Refitting is a reversal of removal.

2 To remove a flexible brake hose, unscrew the union nut securing the rigid brake pipe to the end of the flexible hose and remove the spring clip and hose end fitting from the bracket (see illustration). Unscrew the remaining end from the component or rigid pipe according to position. Refitting is a reversal of removal.

3 Bleed the complete hydraulic system after fitting a brake pipe or hose.



11.2 Rigid pipe-to-flexible hose connection



10.1 Brake pressure regulator unit



Caution: Take great care not to spill brake fluid onto paintwork as it will act as a paint stripper. If spilled, wash it off at once with cold water.

1 Bleeding of the hydraulic system will be required after any component in the system has been disturbed or any part of the system "broken". When an operation has only affected one circuit of the system, then bleeding will normally only be required to that circuit (front and rear diagonally opposite).

2 If the master cylinder or pressure regulating valve have been disturbed, then the complete system must be bled. Note that where a brake pressure regulator is fitted, the regulator lever should be pressed toward the rear axle during the bleeding of the rear brakes.

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

Two-man method

4 Obtain a clean jar and length of tube which will fit the bleed valve tightly. The help of an assistant will be required.

5 Clean around the bleed valve on the rear brake and attach the bleed tube to the valve (see illustration)

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



12.5 Connect bleed tube to bleed valve

7 Immerse the open end of the bleed tube in the jar, which should contain 50 to 76 mm depth of hydraulic fluid. The jar should be positioned about 300 mm above the bleed valve to prevent any possibility of air entering the system down the threads of the bleed valve when it is slackened.

8 Open the bleed valve half a turn and have your assistant depress the brake pedal slowly to the floor and then quickly remove his foot to allow the pedal to return unimpeded. Tighten the bleed valve at the end of each downstroke to prevent expelled air and fluid being drawn back into the system.

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

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

11 Repeat the operation on the diagonally opposite front brake.

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

With one-way valve

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

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

15 Repeat the procedure on the on the diagonally opposite brake whilst remembering to keep the master cylinder reservoir full.

With pressure bleeding kits

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

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

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

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

All methods

20 If the entire system is being bled, the procedures described above should now be repeated at each wheel. The correct sequence is as follows. Do not forget to recheck the fluid level in the master cylinder at regular intervals and top-up as necessary.

Right-hand rear wheel

Left-hand rear wheel

Right-hand front wheel

Left-hand front wheel

21 When completed, recheck the fluid level in the master cylinder, top-up if necessary and refit the cap. Check the feel of the brake pedal which should be firm and free from any sponginess which would indicate air still present in the system.



12.23 Fit bleed valve the protector cap

22 Discard any expelled hydraulic fluid as it is likely to be contaminated with moisture, air and dirt, which makes it unsuitable for further use.

23 On completion, refit the rubber protector caps over each bleed valve (see illustration).

13 Handbrake lever - removal and refitting



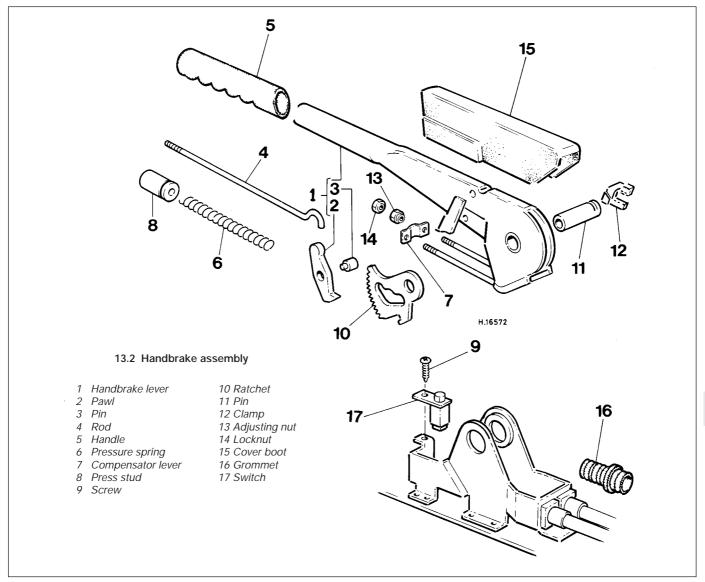
Removal

1 Position a chock each side of the front wheels. Pull the cover from the lever by prising open its bottom edges, then fully release the handbrake.

2 Undo each cable locknut and adjuster nut then disconnect the cables from the compensating lever (see illustration).

3 Prise free the lever retaining clamp on the right-hand side, then withdraw the pivot pin and remove the lever.

4 If required, remove the screw from the lever switch, disconnect the wiring and remove the switch.



Refitting

5 Refitting is a reversal of removal. Lubricate the pivot pin and on completion, adjust the handbrake cables.

14 Handbrake cables - removal, refitting and adjustment

Removal

1 Chock the front wheels, then jack up the rear of the vehicle and support it on axle stands (see *"Jacking and vehicle support"*). Release the handbrake.

2 Remove the cover from the handbrake lever then undo the locknut and adjuster nut from the cable concerned.

3 Remove the rear roadwheel(s).

4 On drum brake models, remove the brake drum and disconnect the cable from the shoe operating lever. Detach the cable from the backplate.

5 On models fitted with rear disc brakes, disengage the cable from the caliper lever then prise free the outer cable retaining clip from the caliper. Note how the clip is located.
6 Release the cable from its retaining clips and then carefully withdraw it from under the vehicle (see illustration).

Refitting

7 Refitting is a reversal of removal, but adjust the cable as follows before lowering the vehicle.

Adjustment

Drum brakes

8 With the handbrake lever fully released, depress the footbrake applying firm pressure, once only. Now pull the handbrake up onto its second notch position.

9 Tighten the adjuster nut on the cable concerned so that the rear roadwheel is just felt to bind when rotated. Fully release the handbrake lever then check that the roadwheel spins freely without binding. Tighten the locknut against the adjuster nut

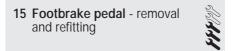
then apply the handbrake and check that the wheel is locked. Repeat the procedure with the other cable.

Disc brakes

10 Before checking and adjusting the handbrake cables, first check the outer brake pad to caliper clearance.

11 Fully release the handbrake lever then tighten the cable adjuster nut to the point where the caliper lever just separates from its stop (see illustration). An assistant is useful here to ensure that as the nut is tightened, the lever-to-stop clearance does not exceed 1.0 mm. Tighten the locknut then fully release the handbrake and check that the roadwheel rotates freely, then apply the handbrake and check that the roadwheel is locked.

12 Repeat the procedure on the other side.



Removal

 The brake and clutch pedals share a common bracket assembly and pivot shaft.
 Remove the clutch pedal.

3 Extract the clip and withdraw the clevis pin securing the servo pushrod.

4 Extract the clip from the pivot shaft, unhook the return spring, withdraw the pivot shaft and remove the pedal.

5 Check the pedal bushes for wear. If necessary, drive them out from each side and press in new bushes using a soft-jawed vice.

Refitting

6 Refitting is a reversal of removal, but lubricate the pivot shaft with a little multi-purpose grease.

16 Vacuum servo unit - testing



1 The vacuum servo unit is located between the brake pedal and the master cylinder.

2 Normally, the unit is very reliable but if it becomes faulty, it should be renewed. In the event of a failure, the hydraulic system is in no way affected, except that higher pedal pressures will be necessary.

3 To test the servo unit, depress the brake pedal several times with the engine switched off to dissipate the vacuum. Apply moderate pressure to the brake pedal then start the engine. The pedal should move down slightly if the servo unit is operating correctly.

4 To test the check valve in the vacuum hose, disconnect it from the hose then blow through the valve in the direction of the arrow marking. Air should pass through the valve. If air is blown in the reverse direction, it should not pass through the valve. Renew the valve if defective.

17 Vacuum servo unit - removal and refitting

Removal

1 Remove the brake master cylinder.

2 Pull the vacuum hose free from the servo unit connector and, where applicable, the non-return valve.

3 Working inside the vehicle, detach the lower trim panel on the driver's side.

4 Disconnect the pushrod clevis from the brake pedal by releasing the clip and withdrawing the clevis pin.

5 Unscrew the mounting nuts and withdraw the servo unit from the bulkhead into the engine compartment.

Refitting

6 Refitting is a reversal of removal. Lubricate the clevis pin with a little molybdenum disulphide based grease. The mounting nuts are self-locking and should always be renewed.



14.6 Handbrake cable retaining clip (arrowed) at rear axle beam pivot



14.11 Handbrake adjustment on rear disc brakes

Lever on caliper (arrowed) should be just clear of stop