Front and rear disc brakes

Introduction

Two twin cylinder calipers are fitted to each front wheel and a four cylinder caliper to each rear wheel.

On cars fitted with anti-lock braking, there are two independently operated hydraulic systems. System 1 operates the rear brakes and levelling. System 2 operates the front brakes only.

Bleed screws are fitted to the inner face of each front leading caliper and also to both rear calipers. These facilitate the bleeding of the two systems.

On cars not fitted with anti-lock braking, the calipers are divided between the two independently operated hydraulic systems. System 1 operates the front calipers on the front wheels and the upper cylinders on the rear wheel calipers. System 2 operates the rear calipers on the front wheels and the lower cylinders on the rear wheel calipers.

Bleed screws are fitted to the inner face of each caliper to facilitate bleeding of the two systems.

Brake calipers fitted to cars with mineral oil hydraulic systems are similar in appearance to those fitted to cars using conventional brake fluid (i.e. RR363). In order to distinguish calipers suitable for use with hydraulic system mineral oil, a section of the

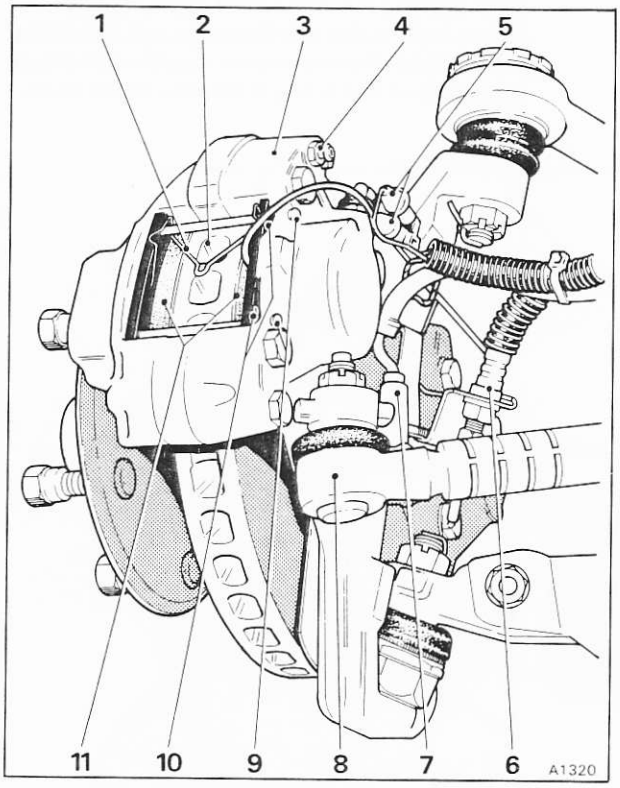

Fig. G19-1 Front wheel brake caliper (cars fitted with anti-lock braking)

1 'M' spring
2 Brake disc
3 Brake caliper
4 Bleed screw
5 Pad wear sensor connections
6 Brake pressure supply pipe
7 Anti-lock braking sensor
8 Track rod
9 Brake pad retaining pins
10 Pin retaining clips
11 Brake pads

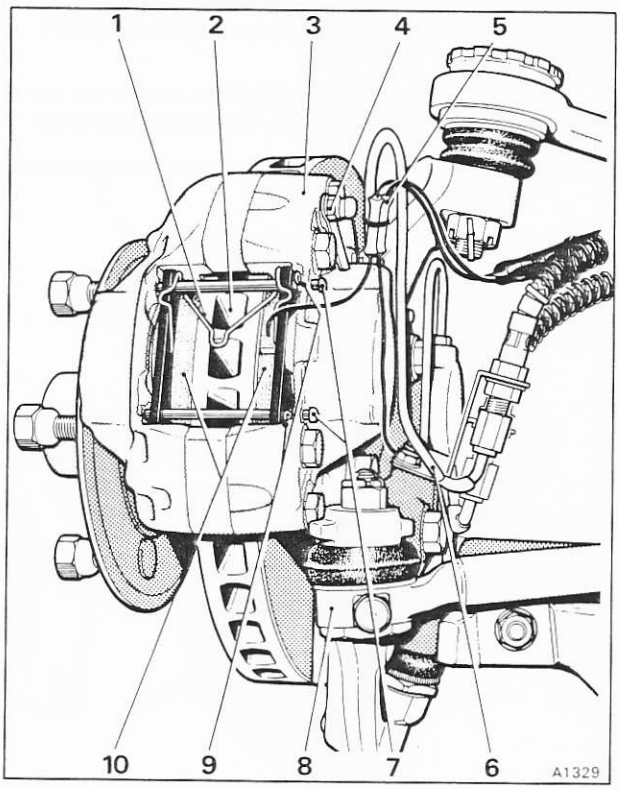

Fig. G19-2 Front wheel brake caliper (cars not fitted with anti-lock braking)

1 'M' spring
2 Brake disc
3 Brake caliper
4 Bleed screw
5 Pad wear sensor connections
6 Brake pressure supply pipe
7 Brake pad retaining pins
8 Track rod
9 Pin retaining clips
10 Brake pads

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outer surface is painted green. The calipers are also fitted with a green identification tag around each bleed screw.

Under no circumstances should a caliper for use with a conventional brake fluid be used as a replacement.

Brake pad wear sensors are fitted to the front leading calipers only. If the warning panel on the facia illuminates, **all** the brake pads should be renewed.

In order to obtain maximum efficiency and safety from the braking systems, it is important that only replacement disc pads of an approved design and material specification are fitted.

Brake pads of a different specification or different manufacture vary in their friction, wear, and operating characteristics and if mixed could have an adverse effect on the braking performance.

It is important when changing the brake pads that the friction material of the new pads is of the same type and grade as that fitted to the other brake calipers, otherwise it will be necessary to renew all the brake pads.

Inspection of all brake pads must be carried out at the specified service intervals; for details reference should be made to the Service Schedule Manual, publication number TSD 4702.

The brake pads must be renewed if any of the pad linings are worn to within 3,18 mm (0.125 in) of the backplate.

After fitting new brake pads an initial running-in period of between 1100 kilometres and 1300 kilometres (700 miles and 800 miles) should be observed.

During this initial running-in period, the brakes should not be applied harshly or for prolonged periods from high speeds except in an emergency. The force with which the brakes are applied may be progressively increased towards the end of the running-in period.

Note If the brakes are to be relined with pads which have different recommended linings from those previously fitted, the disc faces should be cleaned prior to fitting the new pads. All traces of the old pad material should be removed by hand rotating the disc whilst applying fine emery cloth to the disc faces. Do not emery the disc radially. Always ensure that the same type and grade of pad lining is fitted to all six brake calipers.

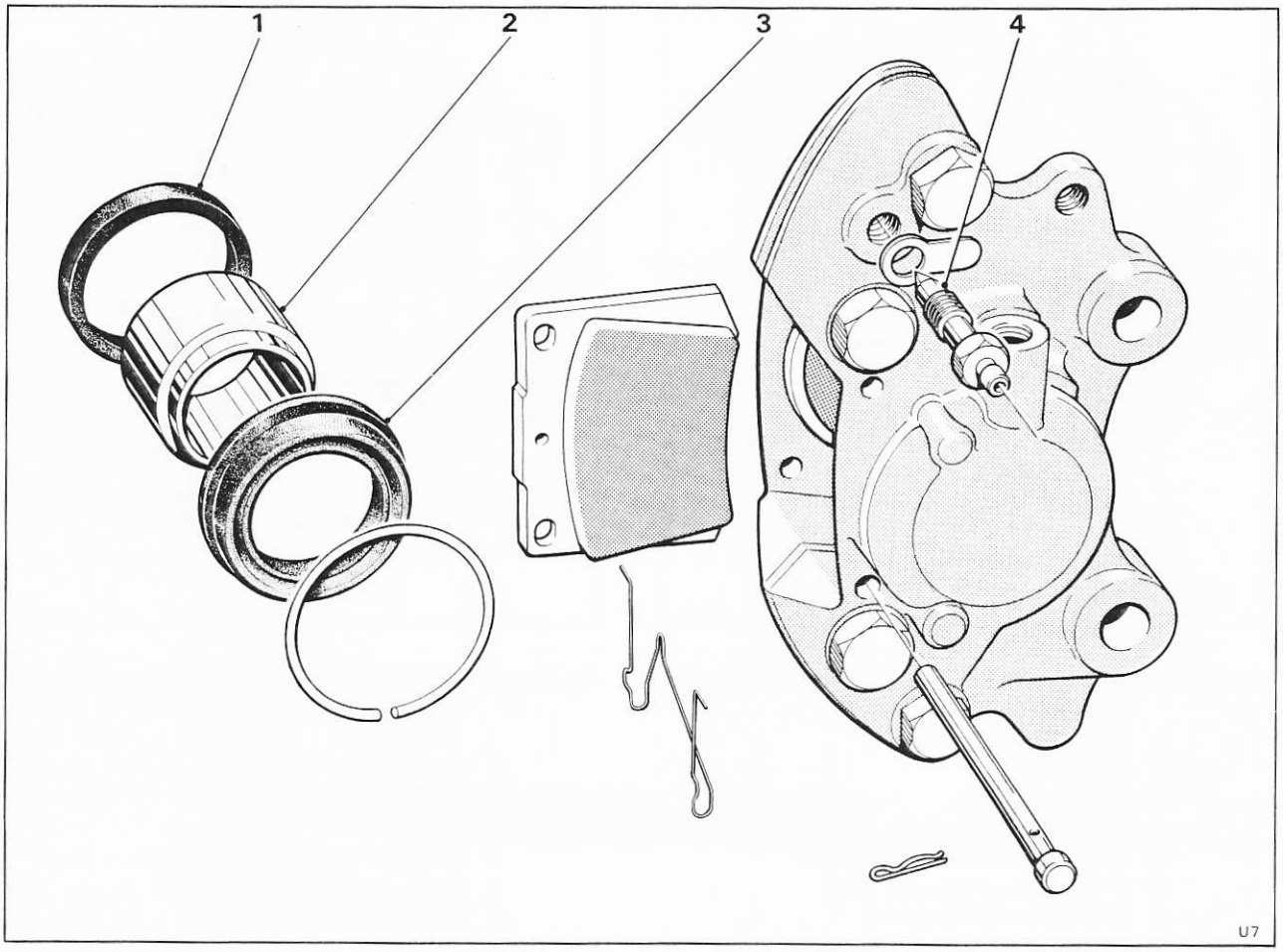

Fig. G19-3 Front wheel brake caliper (left-hand trailing caliper shown)

1 Piston seal
2 Piston
3 Dust seal
4 Bleed screw

Brake discs and pads

Periodically, the surfaces of the brake discs and pads should be cleaned during driving.

When driving at high speeds and when traffic conditions permit the car should be braked by applying the brake pedal very firmly two or three times. On cars not fitted with an anti-lock braking system take care when braking to avoid locking the wheels.

Similar applications should be carried out during long journeys in poor weather conditions, particularly in winter when salt may have been used on the roads. Care should be taken however, if the outside temperature is approaching freezing point.

On completion of a journey which has been undertaken during wet conditions, especially if salt has been used on the roads, apply the brakes lightly whilst parking the car until it is stationary. This will dry the brake discs and inhibit corrosion.

These procedures will not only test the efficiency of the brakes but will maintain them in a state of readiness for whatever conditions may be encountered.

Front wheel brake pads – To renew

(see figs. G19-1, G19-2, and G19-3)

1. Slacken but do not remove the front road wheel retaining nuts.
2. Securely chock the rear road wheels. Jack up the front of the car. Support the car with stands and sill blocks (see Chapter S).
3. Remove the front road wheels.
4. Remove the spring clips from the two brake pad retaining pins. Withdraw the pins from the caliper. Unclip the 'M' spring from the rear of each brake pad. Disconnect the pad wear sensor cable (front leading caliper only).
5. Withdraw the brake pads from the caliper.
6. Prior to fitting the new brake pads; inspect the caliper piston dust seals for signs of damage or heat hardening and renew as necessary.
7. Carefully press the caliper pistons back into their bores, taking care not to damage or trap the piston seals. Ensure that the piston seal retaining clips are correctly located.
8. Fit the new brake pads into position in the caliper. Ensure that the brake pad incorporating a sensor cable is fitted into the front leading caliper, inner position. Connect the cable to the connector.
9. Fit the trailing brake pad retaining pin through the caliper and brake pads. Secure the pin with the retaining clip. Ensure that the pads slide freely.
10. Locate the ends of the 'M' spring into the centre holes of the brake pad backplate. Ease the spring into position and secure with the leading pad retaining pin. Fit the pin retaining clip. When fitted the 'ears' of the 'M' spring must rest on the edge of the brake pad backing plate, with the bends at the top of the 'M' figuration butting against the caliper body.

Note The 'M' spring is only fitted onto the brake pad retaining pin at the leading end of the caliper, i.e. upper pin on the front brake caliper and lower pin on the rear brake caliper.

When fitting the 'M' spring do not compress the spring, more than the normal gap between the two brake pads, otherwise permanent distortion of the spring may occur.

Due to inherent distortion during pad wear, new 'M' springs should be fitted whenever the brake pads are renewed.

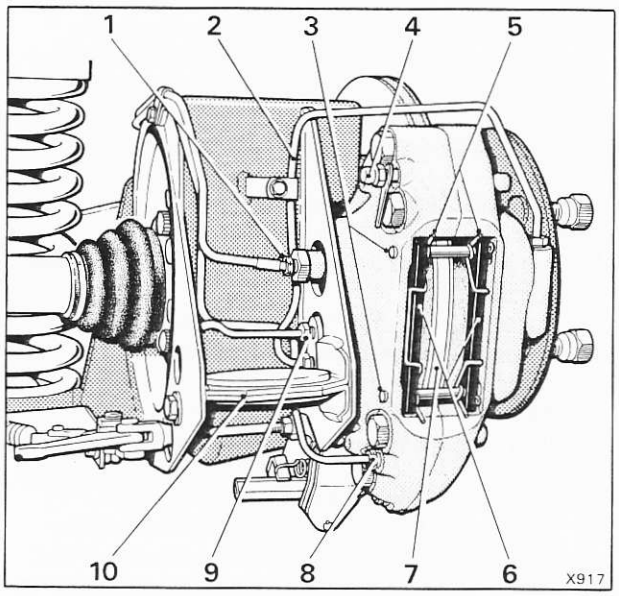

Fig. G19-4 Rear wheel brake caliper

1 Upper cylinder supply pipe
2 Lower cylinder supply pipe
3 Brake pad retaining pins
4 Upper cylinder bleed screw
5 Anti-rattle spring clips
6 Brake pads
7 Brake disc
8 Lower cylinder supply pipe
9 Lower cylinder bleed
10 Trailing arm suspension strut mount

Rear wheel brake pads – To renew

(see figs. G19-4 and G19-5)

1. Securely chock the front road wheels. Jack up the rear of the car. Support the car with stands and sill blocks.
2. Remove the rear road wheels.
3. Remove the spring clips from the two brake pad retaining pins. Withdraw the pins. Collect the anti-rattle spring clips from the rear of each brake pad.
4. Withdraw the brake pads from the caliper.
5. Prior to fitting the new pads, inspect the caliper piston dust seals for signs of damage or heat hardening. Renew as necessary.
6. Carefully press the caliper pistons back into their bores, taking care not to damage or trap the seals. Ensure that the seal retaining clips are correctly located.

7. Fit the new pads by reversing the removal procedure, ensure that the pads slide freely. Ensure that the anti-rattle spring clips and pad retaining pin clips are correctly located; the heads of the retaining pins to be on the wheel side of the caliper.

Front brake caliper – To remove
(see figs. G19-1, G19-2, and G19-3)
1. Depressurize the hydraulic systems as described in Section G3.
2. Securely chock the rear road wheels.
3. Remove the wheel trim, then slacken but do not remove the wheel retaining nuts.
4. Raise the front of the car on a hydraulic jack. Securely support the car on stands and sill blocks (see Chapter S).
5. Remove the road wheels.
6. Disconnect the caliper feed pipe, blank off the pipe end and caliper port against the ingress of dirt.
7. Remove the bolts which secure the caliper to the axle yoke. Withdraw the caliper from the brake disc.
8. It is recommended that a distance piece is fitted between the caliper pads after removal, to prevent the pistons easing out of their bores.

Rear brake caliper – To remove
(see figs. G19-4 and G19-5)
1. Depressurize the hydraulic systems as described in Section G3.
2. Securely chock the front wheels of the car.
3. Remove the wheel trim, then slacken but do not remove the wheel retaining nuts.
4. Raise the rear of the car with a hydraulic jack. Securely support the car on stands and sill blocks (see Chapter S).
5. Remove the road wheels.
6. Disconnect the parking brake operating rod from the caliper lever.
7. Disconnect the two feed pipes from the caliper; fit blanks to the pipe ends and caliper ports.
8. Remove the caliper bridge pipe; fit blanks to the pipe ends and caliper ports.

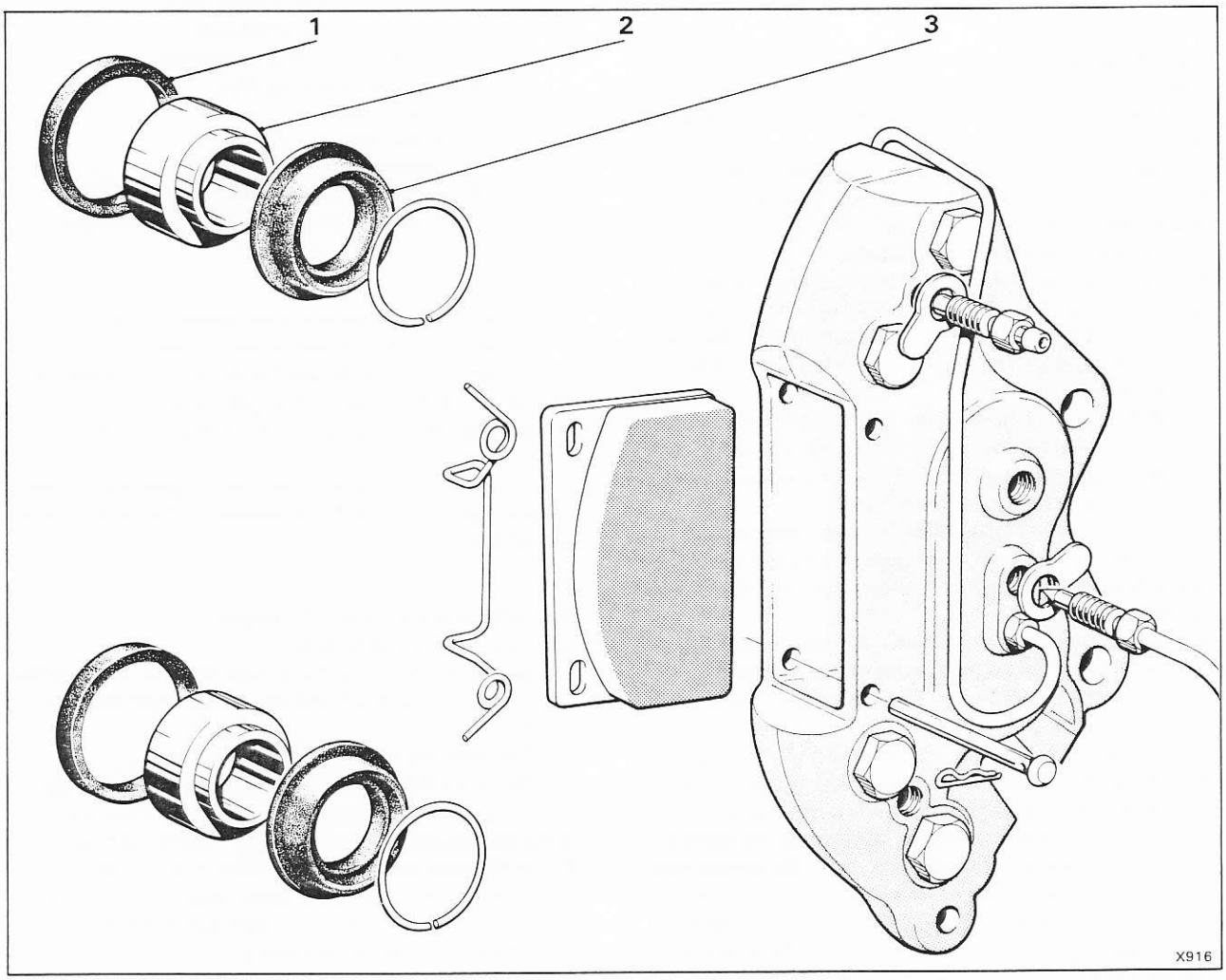

Fig. G19-5 Rear wheel brake caliper
1 Piston seal
2 Piston
3 Dust seal

9. Remove the pipe connection adapter and lower bleed screws from the inner face of the caliper.
10. Remove the bolts securing the caliper to the rear hub yoke.
11. Carefully withdraw the caliper from the brake disc.
12. Slacken the four bolts securing the hub yoke to the trailing arm, approximately four revolutions. Carefully draw the hub assembly away from the trailing arm until sufficient clearance is obtained to allow the removal of the caliper from the brake discs.

Brake caliper piston seals – To renew

The brake caliper seals should be renewed at the intervals specified in the Service Schedule Manual, publication number TSD 4702.

Only seals suitable for use with hydraulic system mineral oil must be fitted. Under no circumstances should seals for use with conventional brake fluid (i.e. RR363) be used.

1. Depressurize the hydraulic systems as described in Section G3.
2. Remove the brake caliper from the car and remove the brake pads as described previously.
3. Remove the spring clip retaining the caliper piston dust seal; remove the dust seal.
4. Ease the piston from its bore taking care not to damage the piston.
5. Remove the piston seal from the caliper bore.
6. Clean the caliper bore and piston with petroleum ether (120/160°C). Dry thoroughly, using dry compressed air, not any type of cloth.
7. Immerse the new piston seal in an approved hydraulic system mineral oil (refer to Chapter D). Then, carefully insert it into the groove in the caliper bore, ensuring that it is correctly seated.
8. Lubricate the piston outside diameter with a small quantity of an approved hydraulic system mineral oil, carefully fit the piston.
9. Fit a new dust seal around the piston top and over the caliper bore flange. Fit the spring ring taking care not to 'pinch' the seal with the ends of the ring.

Brake calipers – To fit

Fit the brake calipers by reversing the respective removal procedure noting the following.

1. All setscrews and pipe connections must be torque tightened in accordance with the figures quoted in Section G22 and Chapter P.
2. Ensure that a minimum clearance of 8,0 mm (0.312 in) is maintained between the caliper bridge pipe and the brake disc when fitting rear brake calipers.
3. When fitting is completed, bleed the hydraulic systems as described in Section G5.

Note The supply pipe connection ports on the front wheel brake calipers are a metric thread formation and only pipes fitted with the correct metric pipe nuts should be used.

Brake disc – To remove

1. Depressurize the hydraulic systems as described in Section G3.
2. Remove the front or rear hub as necessary, following the procedure described in Chapter H, Front hubs or Chapter J, Rear hubs.
3. To remove a front disc remove the setscrews securing the disc to the hub.
4. To remove a rear brake disc dismantle the rear hub as described in Chapter J, then unscrew the disc retaining setscrews.

Brake disc – To fit

Fit the brake disc by reversing the procedure for removal noting the following.

1. All setscrews must be torque tightened in accordance with the figures quoted in Section G22.
2. The hubs must be assembled and fitted as described in their respective Chapters H or J.
3. On completion the hydraulic systems must be bled as described in Section G5.

Note New brake discs are treated with a protective film. When a new disc has been fitted, the brakes should be applied gently until the protective film has been removed from the working surface of the disc by the first few brake applications.

If only one front brake disc has been replaced, the car will pull slightly to the side opposite the new disc until the protective film has been removed.