Girling disc brakes (front & rear)

Introduction

The Girling Disc Brake (Fig. 1) consists of a disc and caliper made from high quality cast iron. The caliper is bolted to the stub axle flange and straddles the disc, which is attached to and rotates with the wheel hub.

The cylinders each side of the caliper contain a piston protected by a dust cover and a seal positioned in a groove in the cylinder wall. Inserted between the piston, or pistons, and the disc is a lining pad bonded to a steel plate; the plate is retained in the caliper body by a pin and spring clip.

Some disc brakes incorporate pad damping shims and/or anti-rattle springs depending on the installation.

Cylinder sizes and numbers vary (between two and four) to suit the different installations and to maintain the correct front-to-rear braking ratio. Rear disc brake calipers incorporate mounting lugs which accommodate a separate mechanical handbrake mechanism.

When the brake pedal is depressed the hydraulic pressure generated moves the pistons and clamps the disc between the pads with equal and opposite force. When the pressure is released, the piston seals retract the pistons a sufficient amount for them to remain in a relaxed position in the cylinders with the pads in close proximity to the disc, ready for the next brake application as shown on the illustration (Fig. 1). Adjustment for lining wear is therefore automatic and no manual adjustment is required.

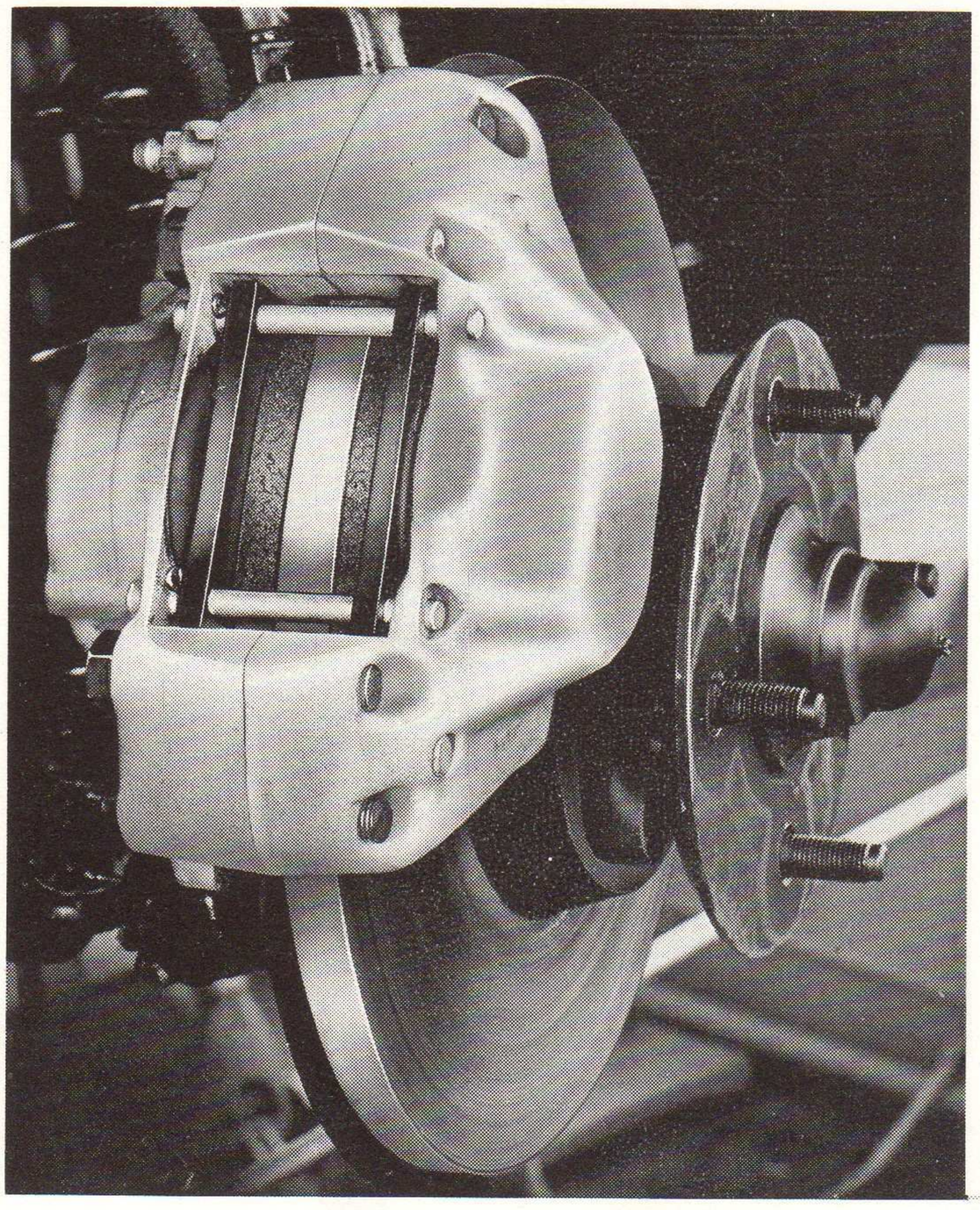
The 'swept' area of the braking surface is always exposed to the cooling airstream and maximum dissipation of heat is thus assured. The disc brake therefore provides consistent performance with virtually no change in pedal effort, even on frequent stops from high speed.

Servicing

To maintain the efficiency of the brake system, preventive maintenance is essential and the following recommendations should be observed at the intervals stated. Full details of preventive maintenance are incorporated in Section 1, Page 1A1.

1. Check the pads for wear every 5,000 miles (8,000 km) and fit new pads when the lining thickness has worn to 1/16 of an inch (1.5 mm). If electrical wear indicators are incorporated the examinations should be unnecessary.
2. Every 10,000 miles (16,000 km) examine all brake pipes and flexible hoses for corrosion, fretting and signs of damage. Renew suspect parts and take action where applicable to prevent a recurrence of the trouble.
3. Change the Brake Fluid every eighteen months.
4. Every 40,000 miles (64,000 km) or three years, whichever occurs first, the caliper should be overhauled. All other hydraulic parts on the vehicle should also be replaced or overhauled and new hydraulic hoses should be fitted.

1



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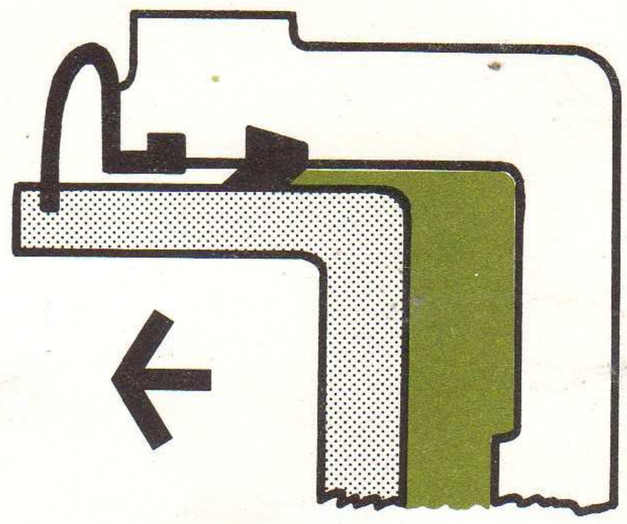
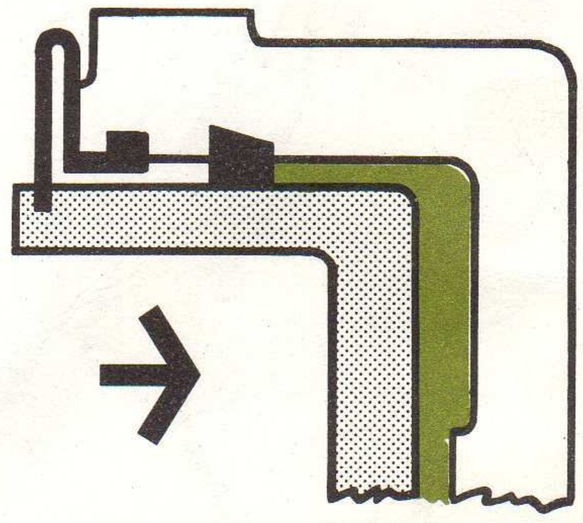




A 0374

Girling disc brakes (front & rear)

Fitting New Pads

When the lining has worn to 1/8 of an inch (3 mm) the disc pads should be replaced. And if fitted, the damping shims or anti-rattle springs should also be renewed.

The illustrations Figs. 3, 4 and 5 show exploded views of three typical calipers. Although the details may vary from those shown, the service procedures remain the same.

Jack up the car and remove the wheels.

Clean the exterior of the caliper with a wire brush and, if applicable, note the position of any damping shims or anti-rattle springs.

Pull out the clips and remove the pad retaining pins. Examine the clips and if worn, fit new ones on re-assembly. If the caliper is the early type and the pads are retained by a plate, unscrew the bolt and swing the plate round.

Remove the shims and worn pads, using pliers if necessary.

Ensure the piston dust covers are in good condition. If damaged or cracked, examine the pistons for signs of corrosion and, if evident, fit new pistons and seals. No attempt should be made to clean up corroded or seized pistons. If the pistons are in good working order and not corroded, new dust covers can be fitted.

Examine the disc and if there is evidence of wear on one side only, one of the pistons is seized and it's best to fit a new caliper and new disc immediately. But provided the cylinders are in good working order and not damaged new pistons and seals may be fitted. If the condition of the disc is satisfactory remove all scale and rust from around the edge - particularly that which is creeping over the braking area. A scraper, or an old screwdriver supported on the caliper body whilst the disc is rotated will remove most of the corrosion and finish off with emery-cloth.

Taking care not to damage the piston dust covers, clean the pad apertures, especially the areas where the new pads seat. Open the bleedscrew one full turn to prevent fluid pressure building up when the pistons are pushed back. Some calipers have more than one bleedscrew and in such instances the other bleedscrews should also be opened one turn.

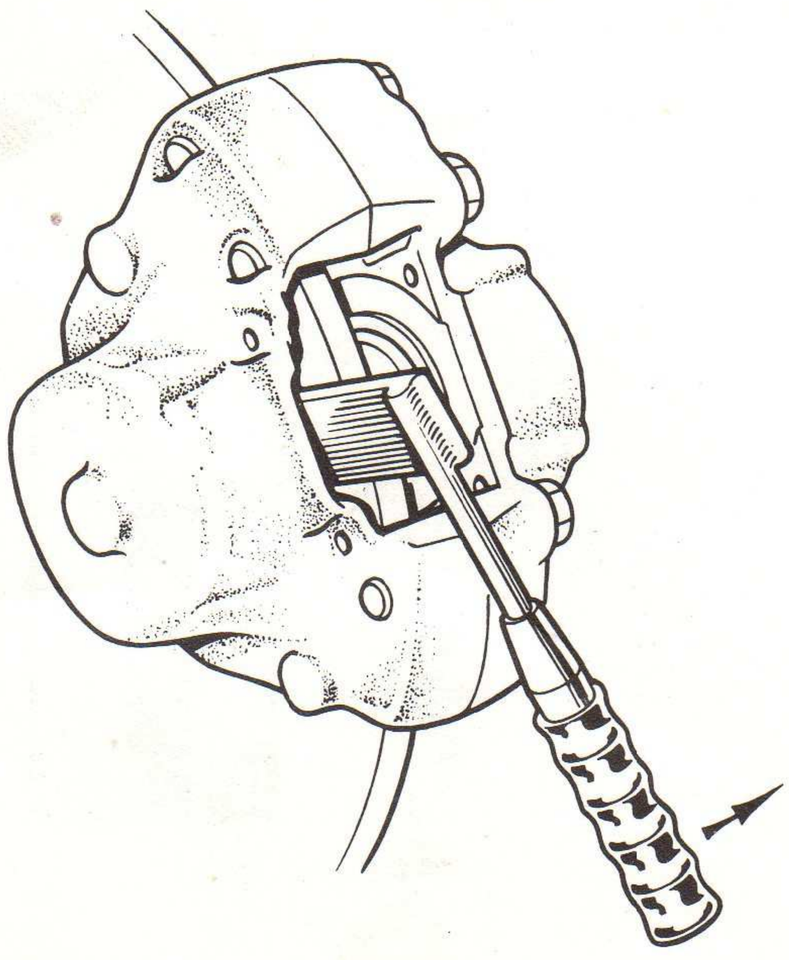
Using the Girling Piston Retraction Tool (Fig. 2), slowly and evenly press each piston back into its cylinder. Tighten the bleedscrews, but do not use excessive force.

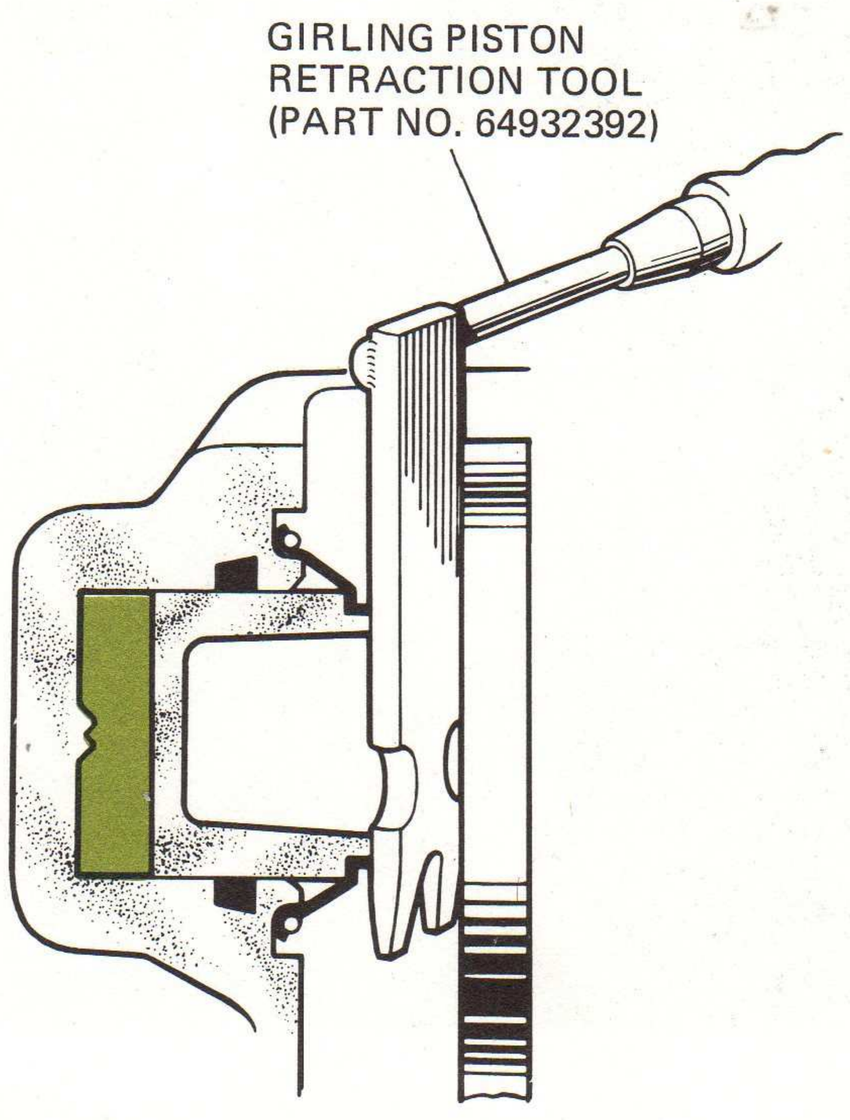
If damping shims are fitted these should be replaced and the new shim kit will contain a sachet of Squeal Deterrent Grease. Smear the special grease on both sides of the new shims and the backplates of the new pads. Ensure that no grease gets on the pad linings.

Insert the new pads and if applicable new shims. Fit the pad retaining pins and secure with the hairpin clips.

Repeat procedure with the caliper on the opposite wheel and pump the brake pedal to move the pistons and pads up to the disc. Bleeding is unnecessary, but top up the fluid reservoir with Castrol-Girling Brake Fluid, refit wheels, jack down and road test.

2





A 0095

Girling disc brakes (front & rear)

Cylinder Maintenance

No attempt should be made to unscrew the bolts and separate the two halves of the caliper body. Early disc brakes were made from a solid casting and the bores machined from one side and sealed on the outside by a threaded plug; the plug must not be disturbed.

To replace the piston sealing rings it is necessary to remove the caliper from the vehicle. Have ready the relevant Girling Service Kit which will contain the sealing rings, dust covers and retaining rings to service both front and rear calipers, as applicable. Always service disc brakes in axle sets.

Drain the fluid from the system by attaching a rubber bleed tube to a bleedscrew; hang the other end of the tube in a container and unscrew the bleedscrew one turn. Pump the brake pedal to discharge the fluid.

If a brake pipe is connected directly to the caliper, unscrew the pipe nut. If a flexible hose is connected, disconnect the brake pipe from the flexible hose and the hose from the adjacent bracket. Unscrew the bolts retaining the disc brake to the stub axle and remove complete with hose. Take note of any shims between the mounting faces so they can be replaced in the same position when re-fitting the disc brake to the vehicle.

Remove the pads as described previously — refer to 'Fitting New Pads'.

Note if the dust covers are retained to the pistons by rings (see Fig. 6F).

Pack a clean piece of rag between the pistons then eject them from the cylinders by applying compressed air to the inlet connection.

The sealing rings may now be removed from the cylinders, but take care not to damage the bore or locating groove.

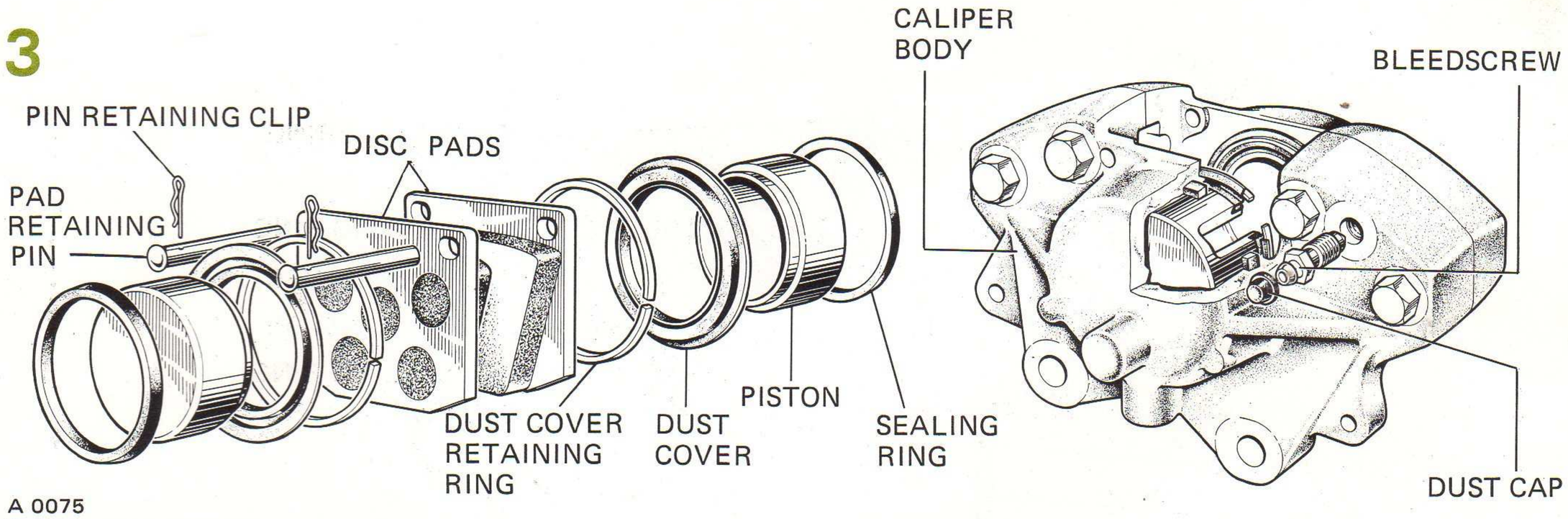
Unscrew the bleedscrew and remove the dust cap.

Cleaning

Clean all parts thoroughly with Girling Cleaning Fluid or unused Castrol-Girling Brake Fluid. The use of other fluids can be dangerous, use only the recommended fluids.

Examine the cylinder bores and the pistons carefully for signs of damage, abrasion, scuffing or corrosion. The pistons may be replaced, but if the cylinder is damaged a new disc brake must be used.

3



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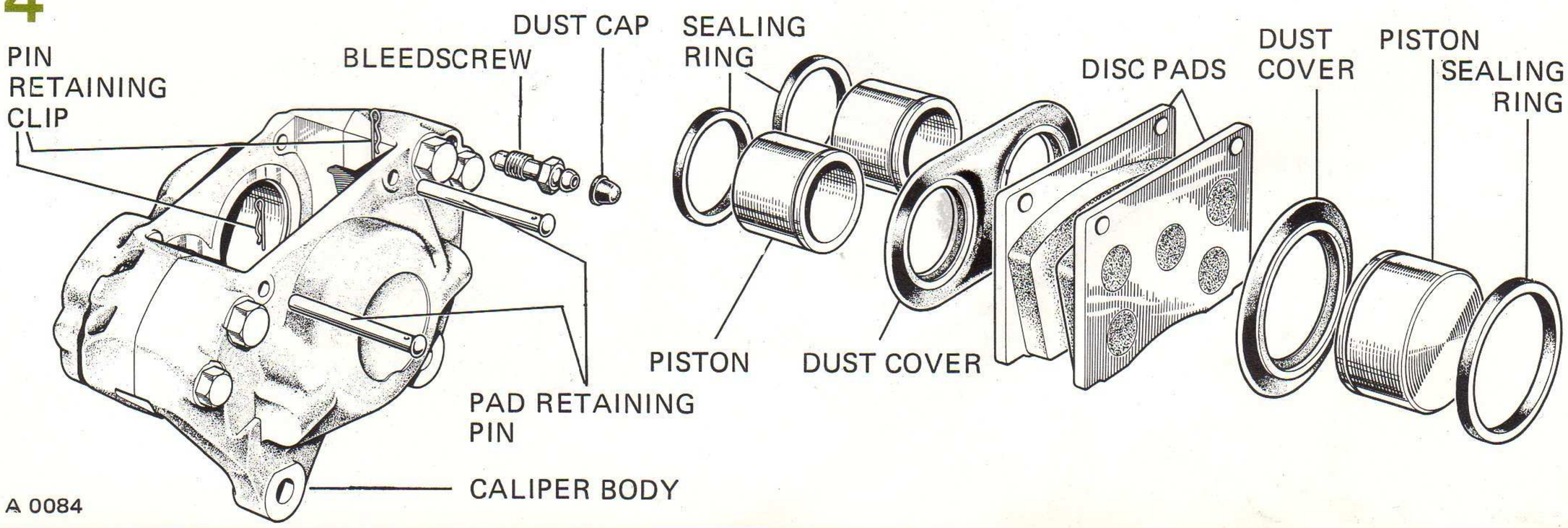


Girling disc brakes (front & rear)

Assembly

Lubricate the cylinders and the new sealing rings with clean, unused Castrol-Girling Brake Fluid and fit the sealing rings into the grooves.

The illustration (Fig. 6) shows the various types of dust cover in use. A comparison of the parts with the illustrations will determine which of the following fitting instructions is relevant. To ease assembly keep the dust cover dry and do not lubricate.

Types 'A' & 'B'
Insert the piston into the cylinder and fit the dust cover and retaining rings.

If the pistons are the special A.S.B. type, press them back into the cylinder with a 'G' clamp as shown on Fig. 8.

Type 'C'
Locate the dust cover on the piston before inserting the piston into the cylinder, then locate the cover in the groove in the body.

Type 'D'
Locate the dust cover lip in the groove in the body and insert the piston through the dust cover into the cylinder bore, then locate the cover in the groove in the piston.

NOTE: With three cylinder calipers the two small pistons have a single dust cover which should be fitted in a similar manner to that described above, Type 'D'.

Type 'E'
Place the appropriate retaining ring inside the cover and locate the dust cover lip in the groove in the body. Locate the retaining ring in the recess using two screwdrivers; care must be taken and the rings must not be distorted.

Insert the piston through the dust cover and into the cylinder bore, then locate the cover on the piston.

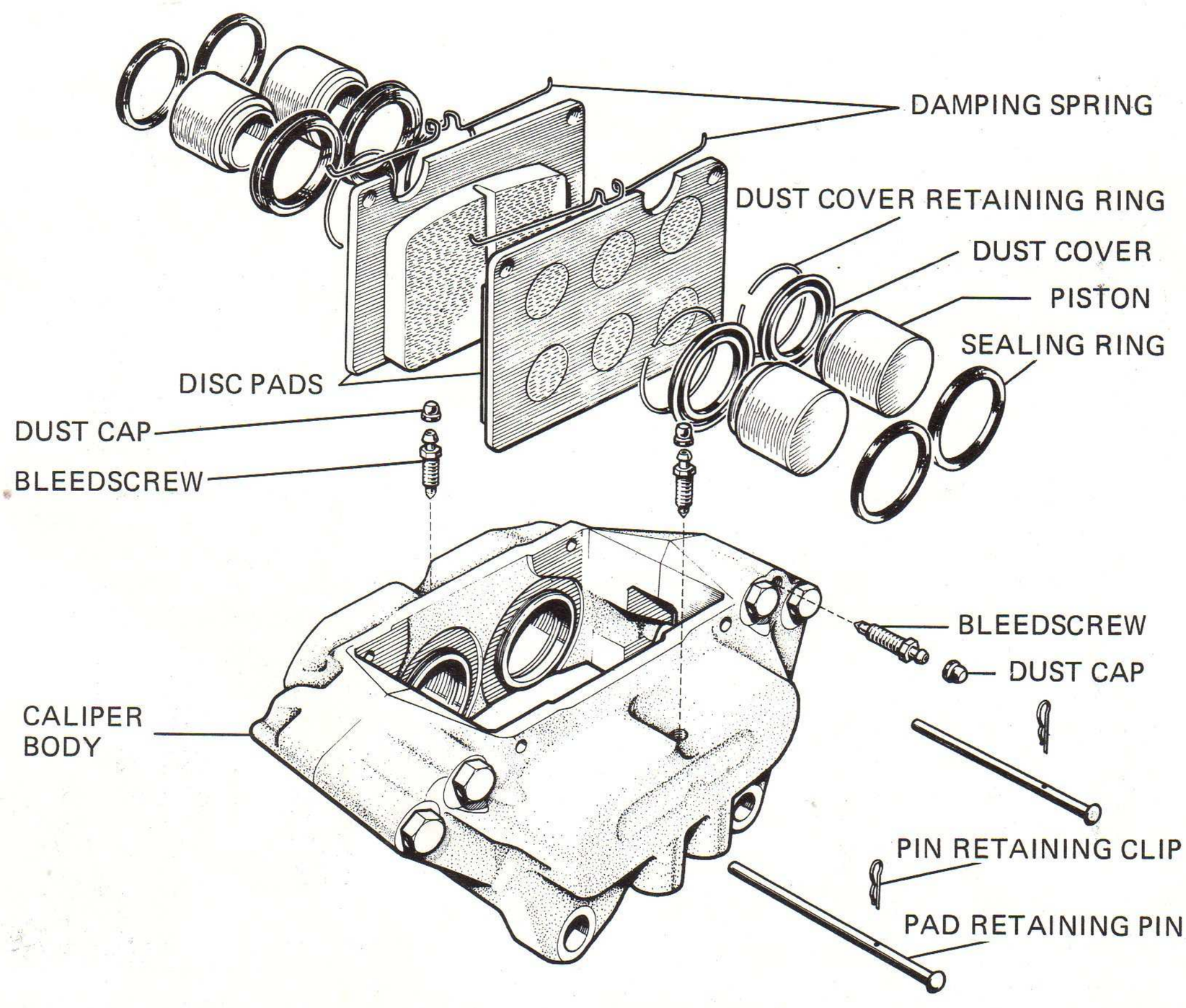
Service kits for this type of caliper contain additional rings which were used to retain the dust cover to the early type piston (see illustration 6F). On later calipers the piston design was changed and the rings are not required (illustration 6E). If, when dismantling, rings were fitted, fit the new ones otherwise they should be discarded.

All types
Ensure the dust covers are correctly fitted and replace the pads, retaining pins and clips.

Refit the caliper to the vehicle ensuring that any shims, originally fitted between the mounting faces are correctly positioned.

Re-connect the hose and bleed the system as detailed in Section 1, Page 1D1 using new unused Castrol-Girling Brake Fluid. Never re-use fluid drained from a vehicle. Before road testing the car, ensure the fluid in the reservoir is at the correct level and pump the pedal until a solid resistance is felt to reposition the pads against the disc.

5



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Girling disc brakes (front & rear)

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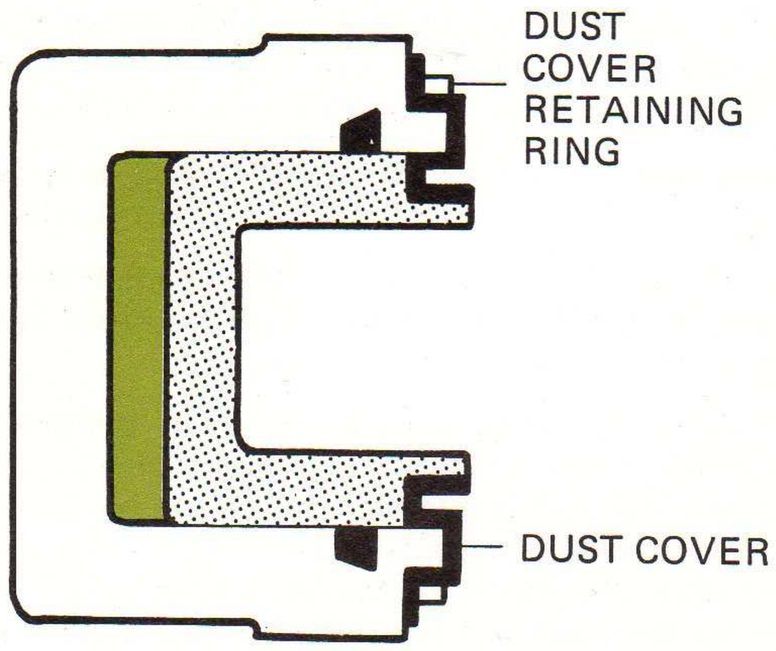
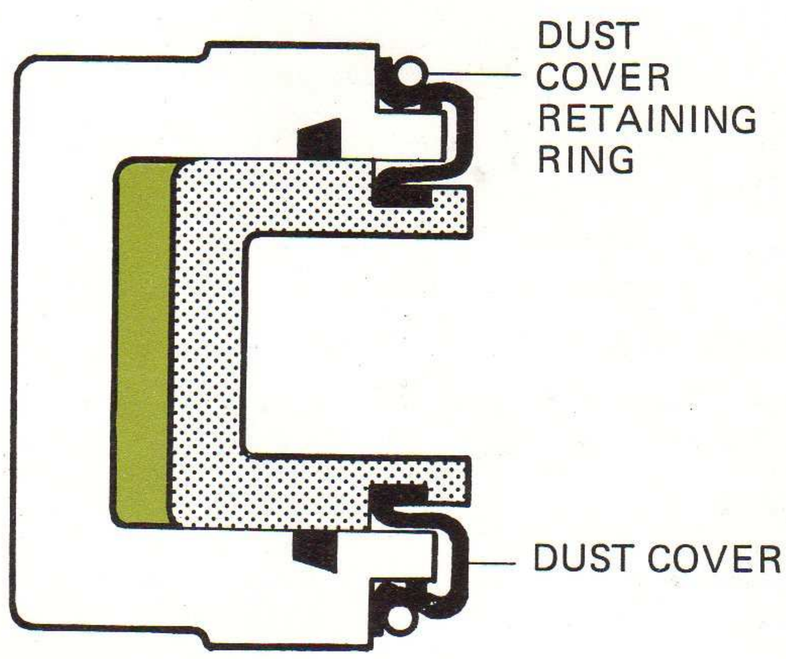
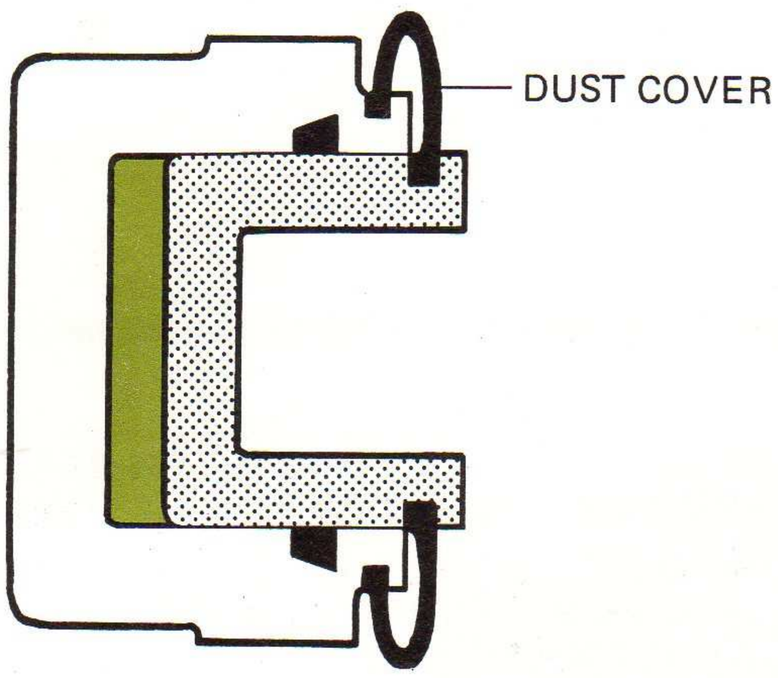


TYPE 'A'



TYPE 'B'



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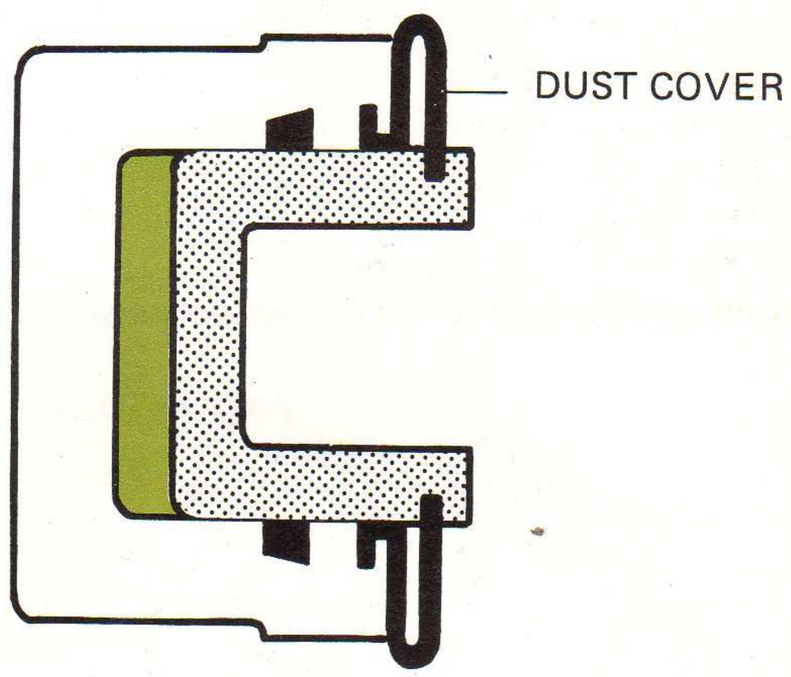
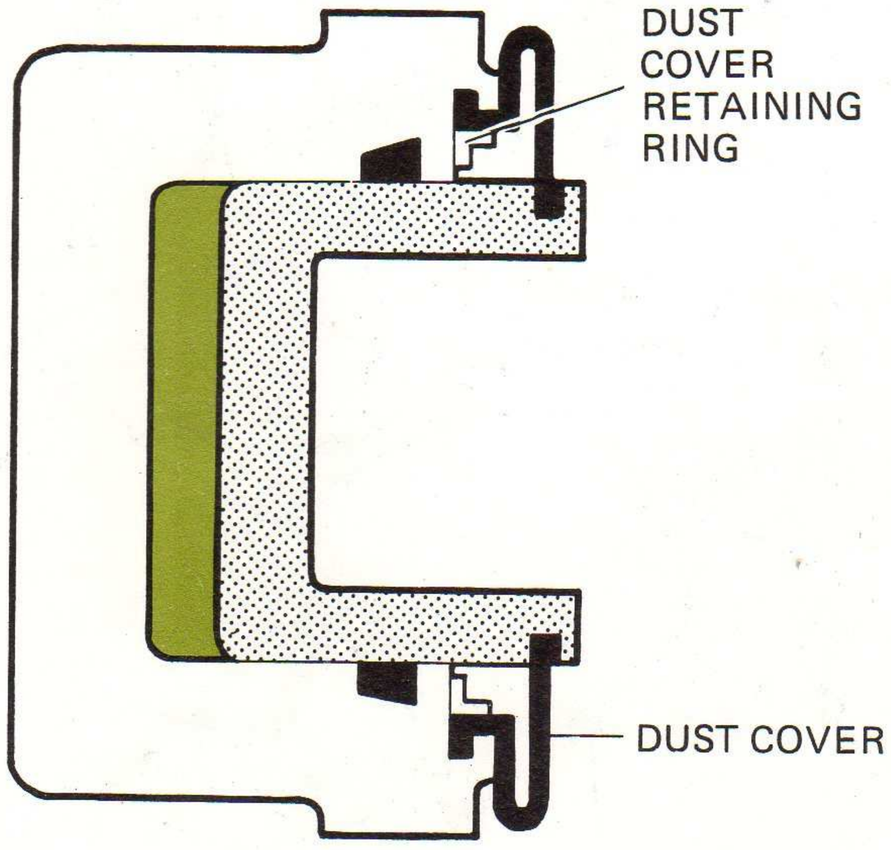
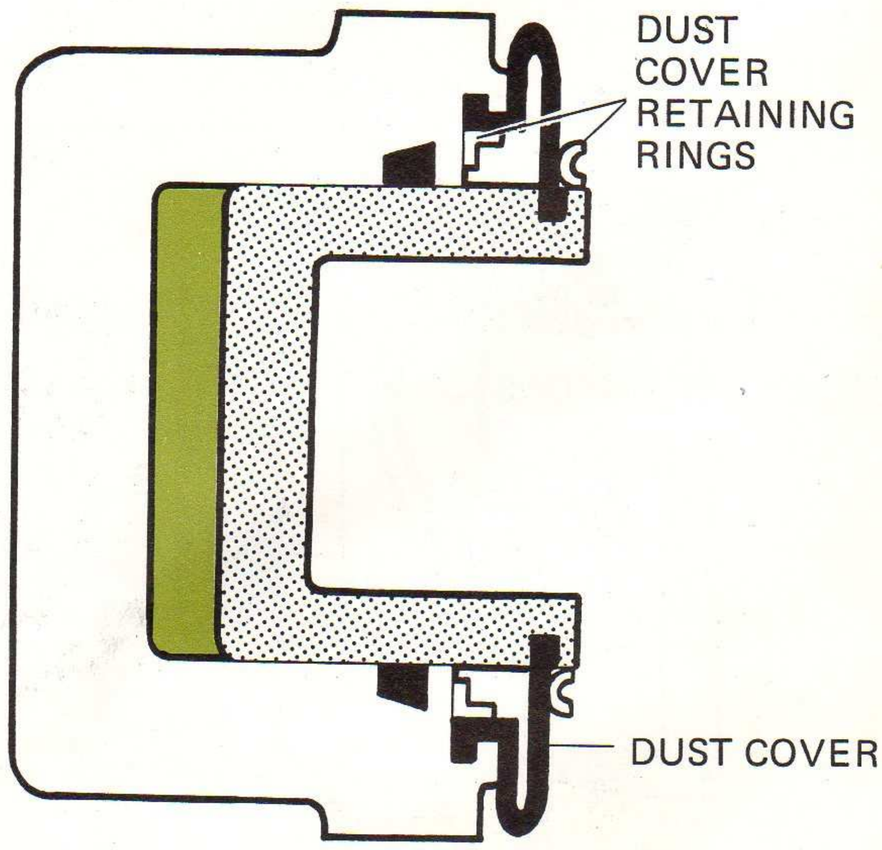


TYPE 'D'



TYPE 'E'



TYPE 'F'

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Girling disc brakes (front & rear)

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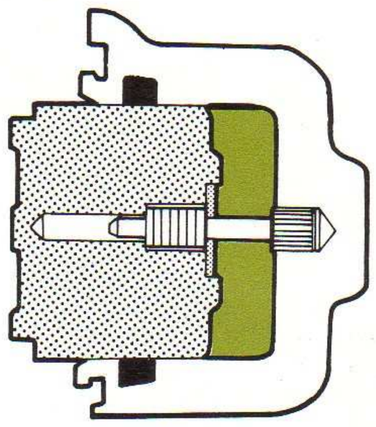

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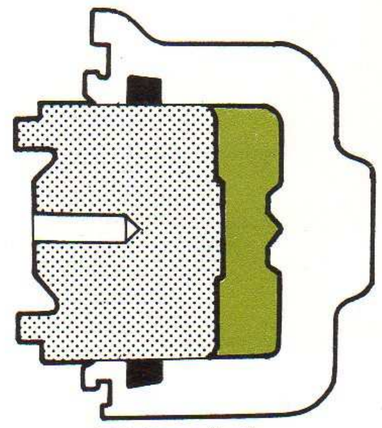

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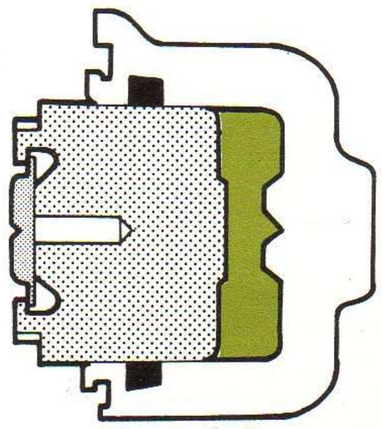

TYPE 'C'

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Special Calipers

Some special calipers called 9LV and 10LV calipers, incorporate solid pistons of different design. The illustrations (Figs. 7 and 8) show a typical caliper and the pistons.

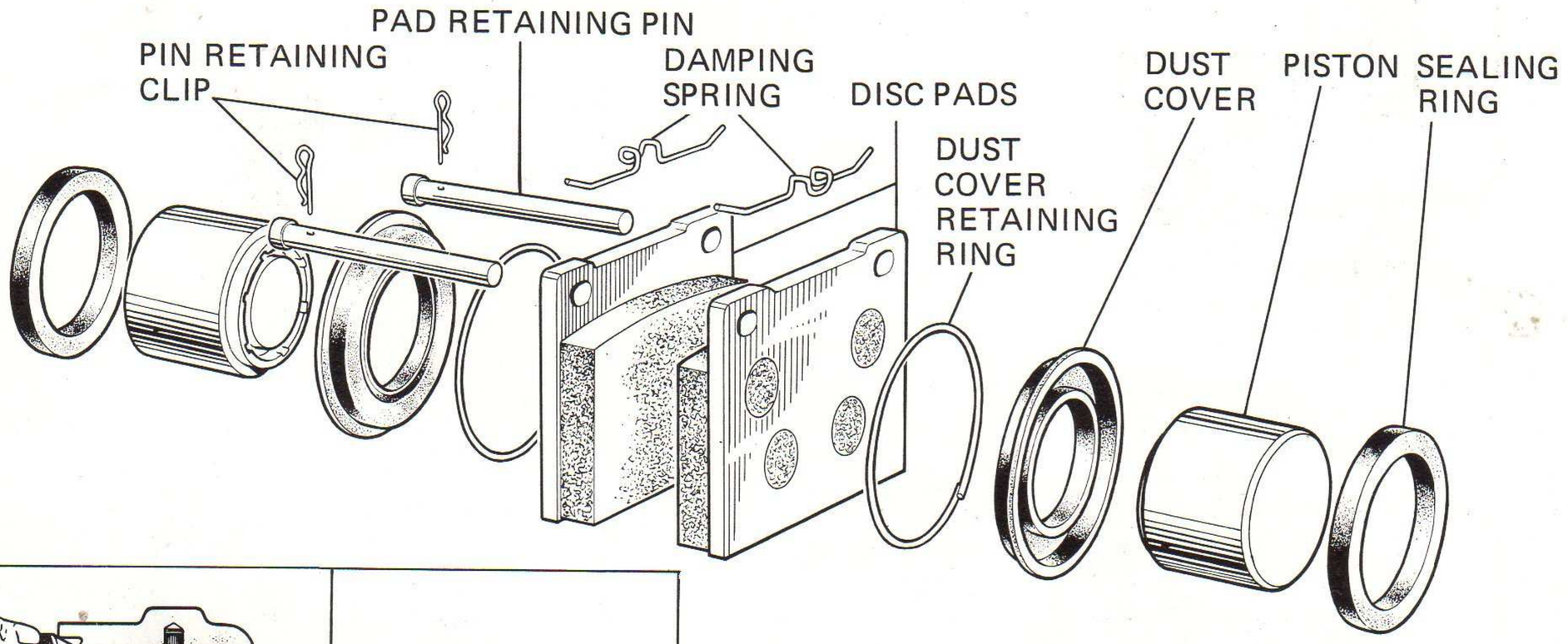
Type 'A' piston incorporated a small spring which gripped tightly on a pin fitted in the base of the cylinder. These pistons were called A.S.B. (Anti-Shake Back) Pistons.

On some vehicles, the piston was changed to type 'B' and the pin was no longer fitted in the base of the cylinders.

Later type 'C' piston was introduced on some vehicles and this piston is the same as type 'B' except an insert is fitted to the piston to help overcome pad rattle.

When servicing calipers with type 'A' piston fitted, it is important to note it requires an air pressure of approximately 100 p.s.i. (7.5 kilogrammes per square centimeter) to eject one piston from its cylinder. The second piston can only be ejected when the open bore has been blanked off in the manner shown on the inset and air pressure re-applied to the hydraulic inlet connection. When re-fitting, fill the drilling in the base of each piston with unused Castrol-Girling Brake Fluid to assist when bleeding, then press the piston into the bore using a suitable 'G' clamp as illustrated. If the pin in the base of the bore is bent or damaged, fit a new caliper.

8



A 0183

A 0266

Girling disc brakes (front & rear)

Discs

The condition of the disc (Fig. 9) is a vital factor in the efficient functioning of the brake.

The disc should run true between the pads. The maximum run-out permissible on the disc is 0.004 in. (0.1 mm) and if this tolerance is exceeded it will cause knock back of the pistons which will be recognised by pedal flutter. If there is any doubt concerning this condition the disc should be replaced.

The surface of the disc should be smooth. The scratches and the light scoring which appear after normal use are not detrimental, but a heavily scored disc will impair efficiency and increase pad wear. Again if there is doubt a new disc should be fitted.

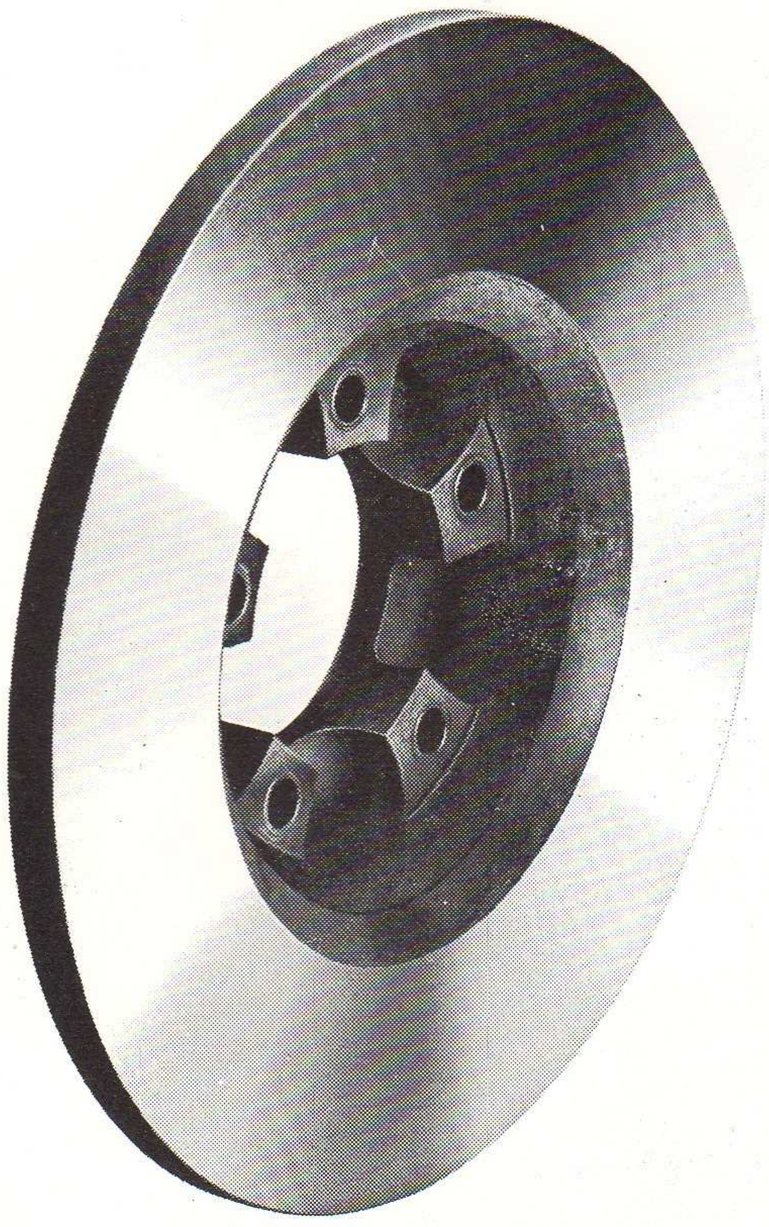
If replacement of the disc is impossible it is permissible to regrind but great care has to be exercised, and it should be done only by competent engineers with suitable grinding equipment. The disc must be rotary ground with the vertically mounted grinding wheel traversing the horizontal disc. The ground surface should be quite flat and parallel to the mounting face, with a fine finish. Special care should be taken to avoid sharp corners at the inner circumference of the ground surface. Both sides must be ground equally but the thickness of the disc should not, under any circumstances, be reduced below 0.050 in. (1.2 mm) of the original thickness. There are three thicknesses of discs being manufactured at the present time, these are 3/8 in. (9.5 mm), 1/2 in. (12,7 mm) and 9/16 in. (14.3 mm). The importance of accuracy of this work cannot be over-emphasised and regrinding should only be considered if a new disc cannot be obtained.

When fitted, the disc must run equidistant between the caliper cylinders and this condition should be checked by feeler gauges between the pad abutments and the disc face (arrowed in Fig. 10). The gap on opposite sides of the disc may differ by 0.010 in. (0.25 mm) but there should be no difference between the gaps at the two abutments on the same side.

This ensures that the caliper is in line and the pads and pistons are square with the discs.

Shims should be used at the caliper mounting to correct any discrepancy.

9



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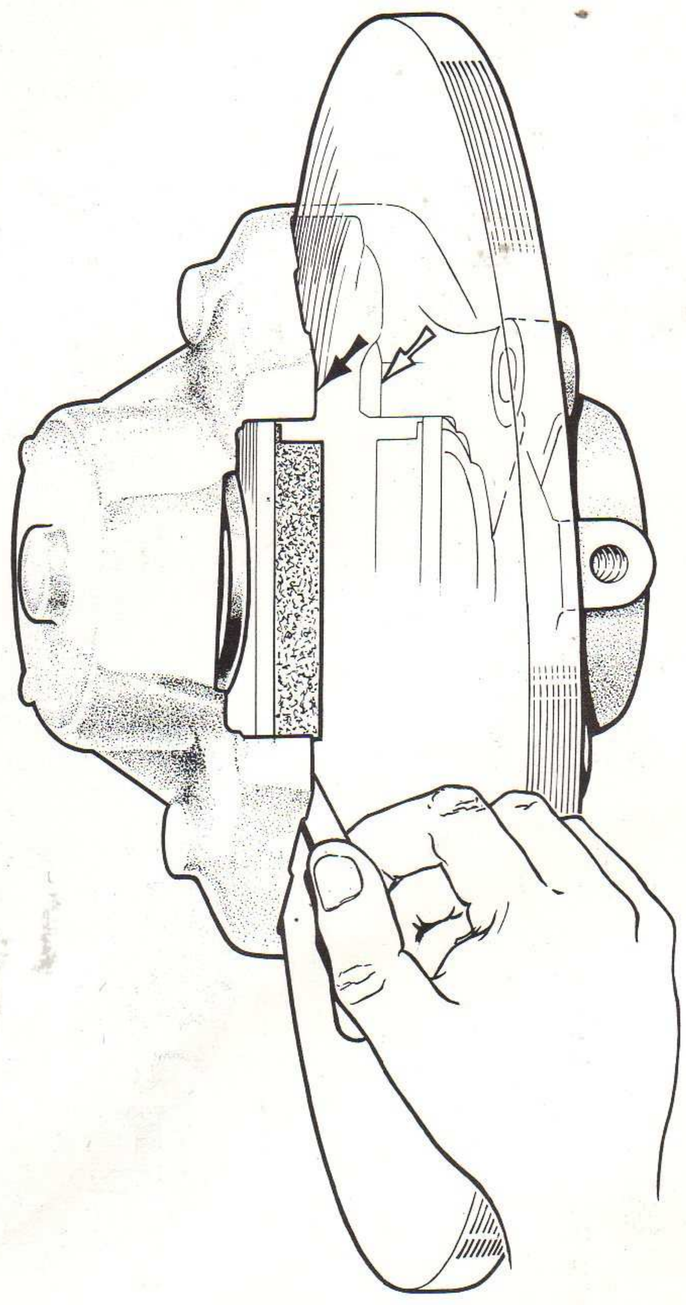


A 0081

Girling disc brakes (front & rear)

The Girling Disc Brake - with Handbrake Mechanism

Two variations of the conventional Girling disc brake designed for rear axles are shown on Figs. 12 and 13. The hydraulic operation, cylinder maintenance and replacement of pads is exactly as described for front disc brakes.

The handbrake mechanism consists of an operating lever and two clamping levers fitted with pads. A tie-rod connects the clamping levers and its length requires adjustment as the pads wear. The clamping levers pivot from lugs in the caliper body whilst the operating lever pivots on the inner clamping lever. Some assemblies have centralising strips which retract the pads from the disc when the handbrake is released.

The operation of the handbrake mechanisms shown on the two illustrations is the same; the operating lever is pulled outwards by the handbrake cable or linkage, which moves one clamping lever and pad by the tie-rod and the other by the reaction of the lever pivot. The disc is thus clamped between the pads. As the pads wear, movement of the operating lever increases and adjustment is necessary. This is automatic with the disc brake shown on Fig. 12, the adjusting nut being turned the equivalent of one tooth by the spring lever, after the operating lever moves a pre-determined amount. Adjustment is therefore automatic throughout the life of the pads with this brake. The brake shown on Fig. 13 requires manual adjustment and this procedure is described below.

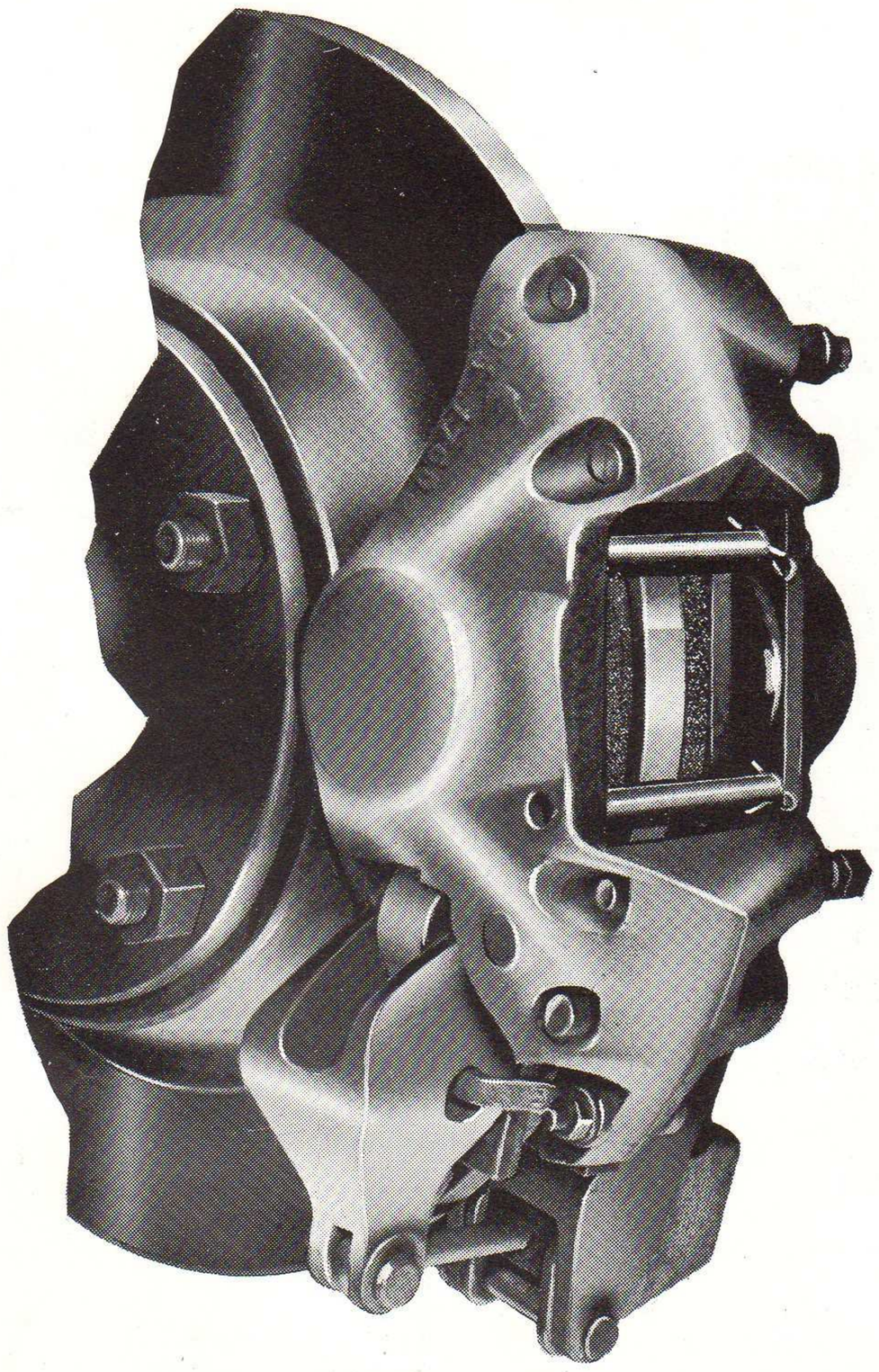
Handbrake Adjustment (Manually Adjusted Handbrakes Only)

The clearance between each pad and disc should be maintained at a maximum of 0.003 in. (0.1 mm) to ensure peak efficiency.

Tighten the adjusting nut on the tie-rod until the correct clearance is obtained.

No alteration of the handbrake cable or linkage should normally be required, but, if the handbrake lever travel is still excessive after adjustment, the handbrake should be released, the pads tightened on the disc by rotating the adjusting nut and the cables or linkage adjusted in accordance with the vehicle manufacturer's instructions. Afterwards, reset the recommended gap between pads and disc.

If the cables or linkage require adjustment with the automatic adjusted handbrake, take care not to over-adjust and pull the operating lever off its stop.



A 0462

Girling disc brakes (front & rear)

Fitting New Pads

When the lining material has worn to approximately 1/16 of an inch (1.5 mm) thick new pads and new centralising strips should be fitted.

Manually Adjusted Handbrakes

Unscrew the nut and bolt and remove the centralising strips.

Remove the split pin and withdraw the pivot pin from the tie-rod. Swing the two levers apart; on some installations it may be necessary to disconnect the handbrake rod, and remove the pads by working the hooked ends from around the lever pivot pins. The hook on the inboard pad will foul the operating lever and it must be pulled to one side before the pad can be removed.

Clean the threads on the tie-rod and ensure all levers pivot freely. If necessary, remove the pivot pins and lightly smear with Girling Brake Grease. Use the centralising strip securing bolt, or another suitable 2BA bolt, to withdraw the clamping lever pivot pins from their locations.

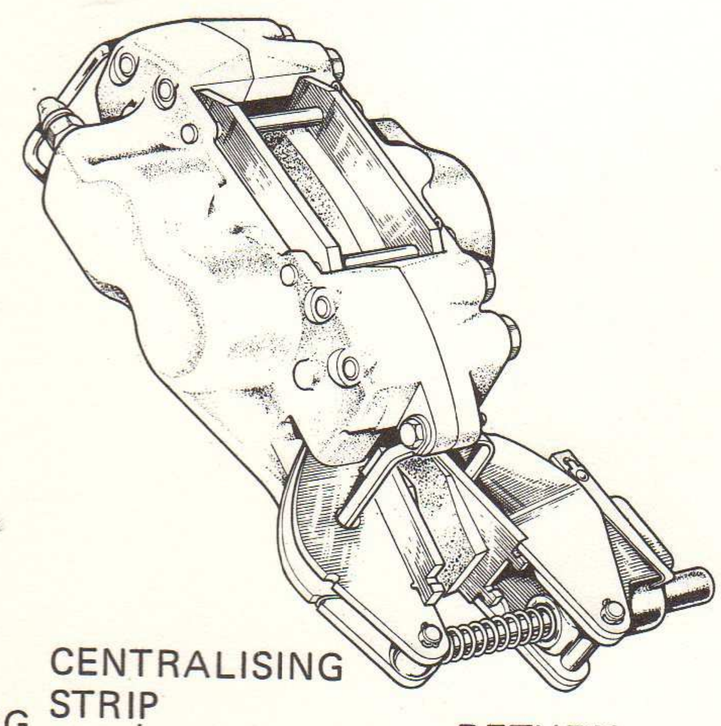
Reverse the dismantling procedure and fit the new pads and centralising strips. Adjust the nut on the tie-rod to obtain the recommended clearance between pad and disc, then apply the handbrake. When the handbrake is released, the clamping levers should return to the central position with the pads retracted off the disc.

Automatic Adjusting Handbrakes

Detach springs and remove pads. Remove centralising strips and check that the levers pivot easily. If necessary, remove pivot pins and lightly smear with Girling Rubber Grease. The pivot pins fitted to the clamping levers and caliper are retained by spring pins; withdraw these and extract the pivot pins using the centralising strip retaining bolt, or another suitable 2BA bolt.

Remove the rubber boot, slacken off adjuster nut and fit new pads. Screw in adjuster nut until both pads are almost touching the disc. Smear the threads of the tie-rod and pack the rubber boot with Girling Rubber Grease. Fit the rubber boot over the adjusting nut, ensuring the spring lever locates in the boot slot and the boot locates in the groove in the trunnion. Fit new centralising strips and apply the handbrake. When the handbrake is released, the clamping lever should return to the central position with the pads retracted off the disc.

12



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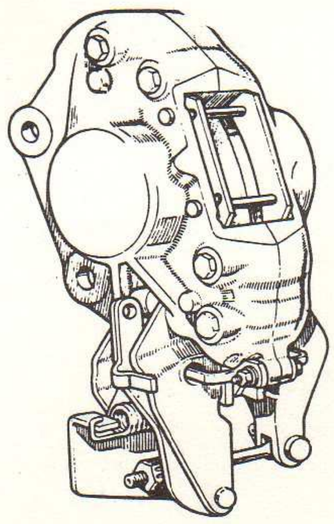


A 0463

Girling-Dunlop MK.1 caliper

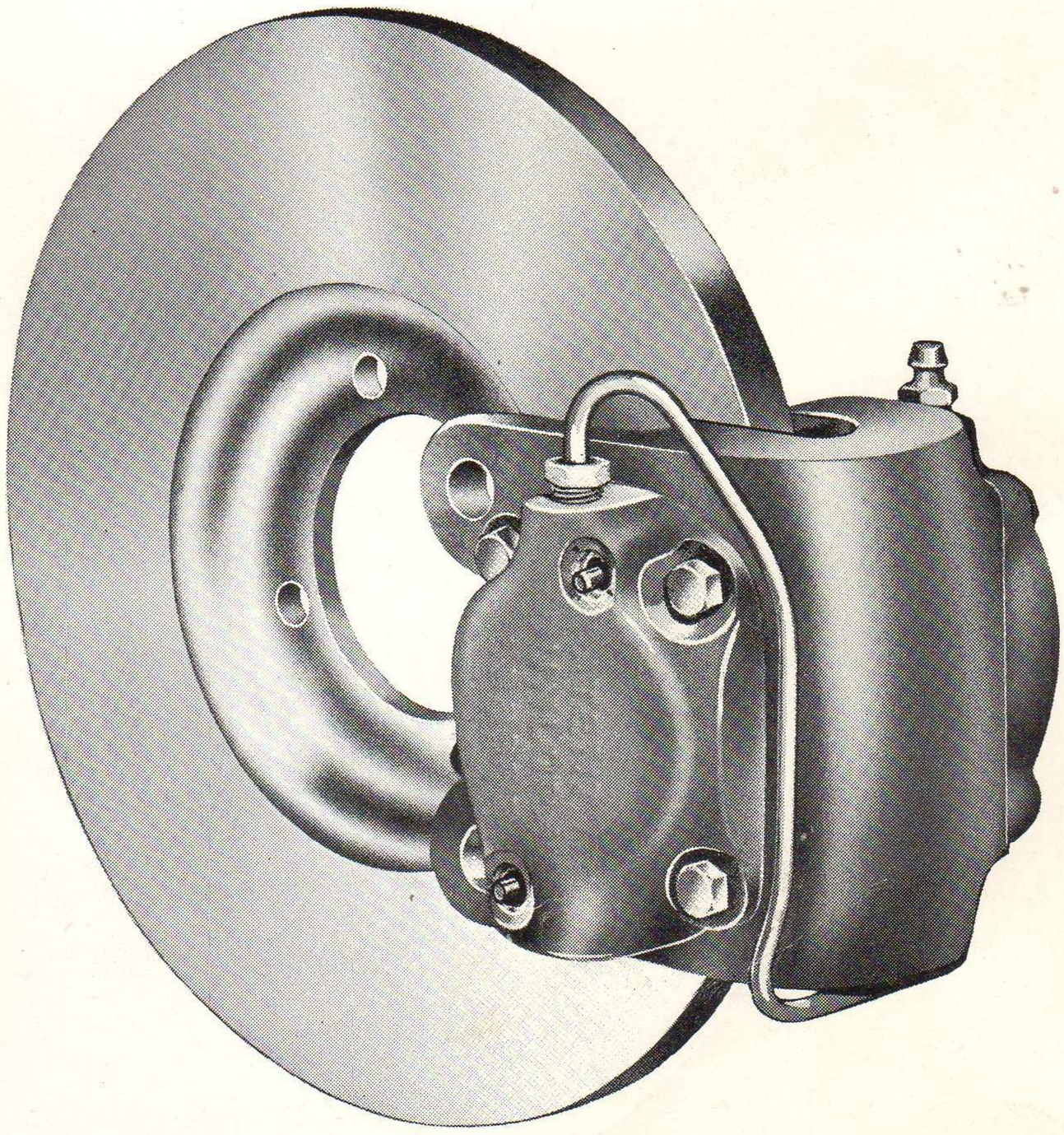
Introduction

The Mk. 1 disc brake (illustrated below) featured round pads without backplates and cylinders with open-ended retraction pins. Cylinder sizes varied to suit the different installations and to maintain the correct front-to-rear braking ratio. Rear calipers incorporated mounting lugs which accommodate a separate mechanical handbrake.

Servicing

Mk. 1 disc brakes should be serviced by replacing them in axle sets with Mk. II disc brakes of the correct cylinder size.

For description and servicing details of the Mk. II disc brakes, refer to Page 2A 3, this Section.



Girling-Dunlop MK.2 caliper

Introduction

The Mk II disc brake (Fig. 1) incorporates automatic pad retraction which maintains a specific clearance between pad and disc. Cylinder sizes vary to suit different installations and to maintain the correct front-to-rear braking ratio. Rear disc brake calipers incorporate mounting lugs which accommodate a separate mechanical handbrake mechanism.

The disc brake consists of a caliper with a removable cylinder assembly bolted onto each side. On current units the retraction assembly is incorporated in a counterbore in the piston, but with some early units the assembly was peened into the base of the cylinder. The current type of retraction is shown on Fig. 2.

A friction pad is attached to a raised spigot on each piston by a keyway formed between the pad and pad backing plate. Hydraulic pressure is introduced into the lower part of one cylinder and transferred to the opposite cylinder via a bridge pipe. When the brake is applied (Fig. 2) the pistons clamp with equal pressure against the disc. As each piston moves inwards, it takes up a specific clearance between a retaining plate and the spring housing of the reaction assembly, and draws a tightly gripping retraction bush along a pin as the movement continues.

When the pressure behind the piston is released, the compression spring acts on the retaining plate and withdraws the piston and pad; thus restoring the clearance between retaining plate and spring housing and the pad and disc.

Servicing

To maintain the efficiency of the brake system, preventive maintenance is essential and the following recommendations should be observed at the intervals stated. Full details of preventive maintenance are incorporated in Section 1, Page 1A1.

1. Regularly check the pads for wear every 5,000 miles (8,000 km) and fit new pads when the lining thickness has worn to ¼ of an inch (6 mm).
2. Every 10,000 miles (16,000 km) examine the brake pipes and flexible hoses for corrosion, fretting and signs of damage. Renew suspect parts and take action, where applicable, to prevent a recurrence of the trouble.
3. Change the brake fluid every eighteen months.
4. Every 40,000 miles (64,000 km) or three years, whichever occurs first, disc brakes should be overhauled. All other hydraulic parts on the vehicle should also be replaced or overhauled and new hydraulic hoses should be fitted.

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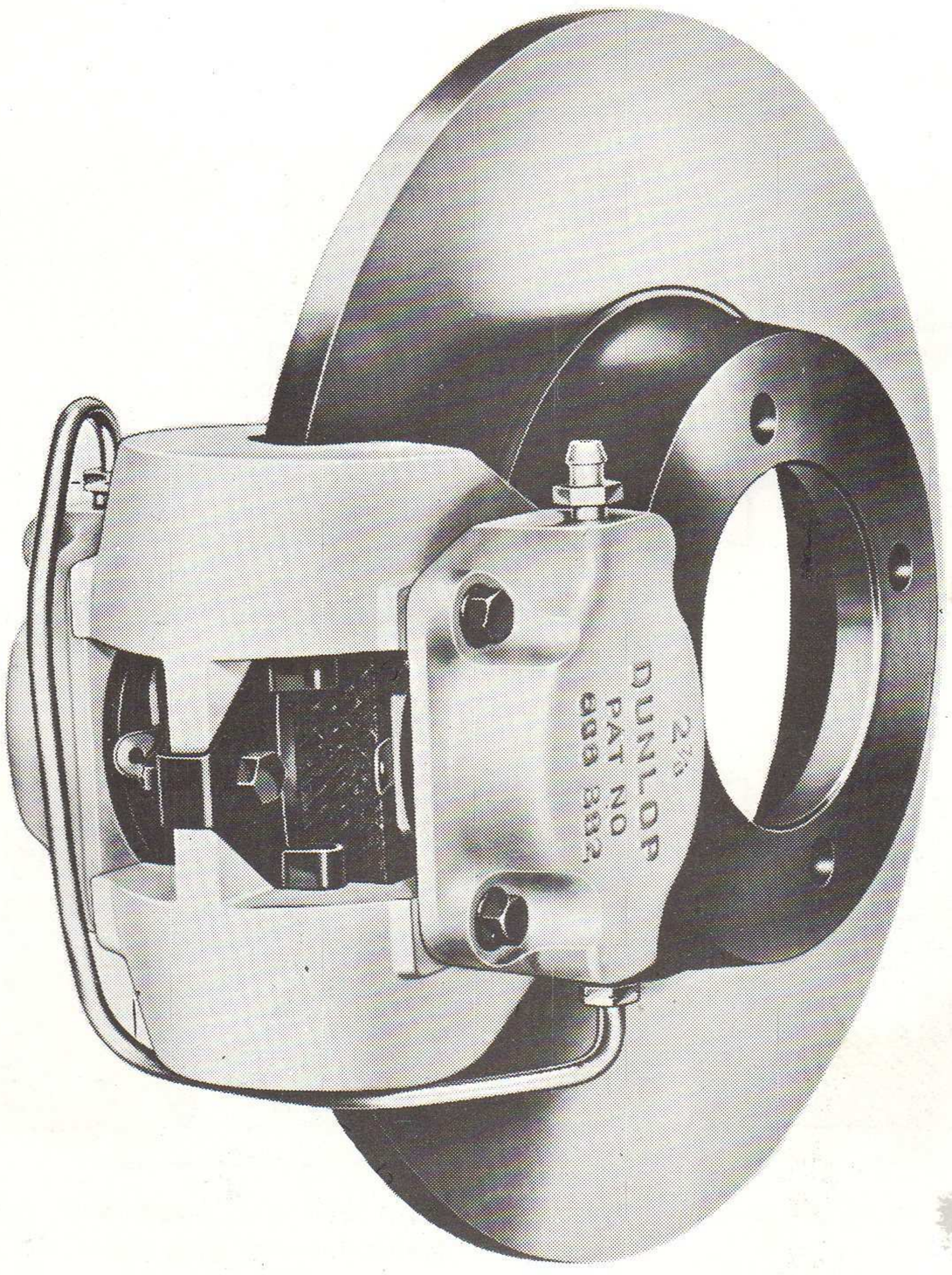

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Girling-Dunlop MK.2 caliper

Fitting New Pads

When the lining material has worn to ¼ of an inch (6 mm) new pads should be fitted. Loss of braking efficiency is an indication that the piston has reached its stop and the pads must be renewed, but it is better that such warnings do not occur.

Clean the exterior of the caliper with a wire brush and a clean rag.

Remove the bolt, nut and washer and withdraw the pad retaining plate.

Withdraw the pads using pliers. If necessary, slacken the bolts securing the cylinders to the caliper to give additional clearance. Re-tighten the bolts after the pads have been removed.

Thoroughly clean the caliper recess and exposed areas of the pistons and dust covers with Girling Cleaning Fluid. Examine the raised spigot in the centre of the pistons for signs of any damage which could prevent the pads fitting correctly. Brake binding can occur if the pad is not correctly located on the spigot.

Ensure the piston dust covers are in good condition and not damaged or cracked. Lift each dust cover and inspect for signs of corrosion. If evident, fit new piston and cylinder assemblies. No attempt should be made to clean up corroded or seized pistons and cylinders.

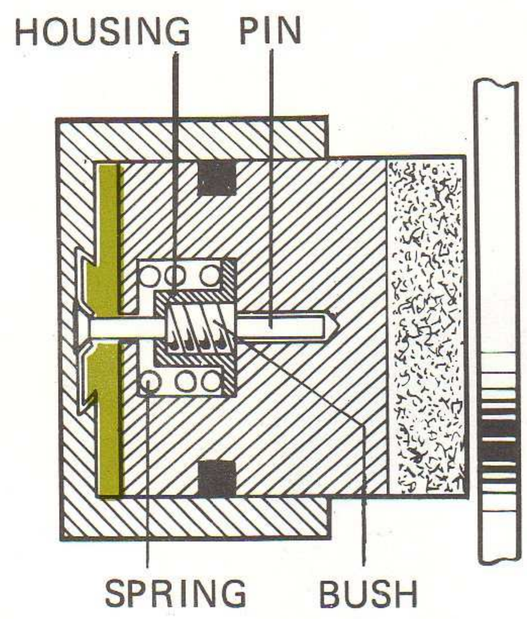
Examine the disc and if there is evidence of wear on one side only, one of the pistons is seized and it is best to fit a new disc and a new piston and cylinder assembly immediately. The other piston and cylinder assemblies on the vehicle should also be examined to see they are in good working order and replaced if necessary. If the condition of the disc is satisfactory with no signs of cracking or other damage, remove all scale and rust from around the edge with a scraper or an old screwdriver. Support the scraper on the caliper body and hold it against the disc whilst rotating the disc by hand. Finish off the cleaning operation with emery-cloth and clean off any bits from the caliper.

Unscrew the bleedscrew one turn. Using the Girling Piston Retraction Tool (Fig. 5), press back the pistons into the cylinder. Tighten the bleedscrew and fit the new pads, ensuring the spigot on the piston engages the slot in the pad backing plate.

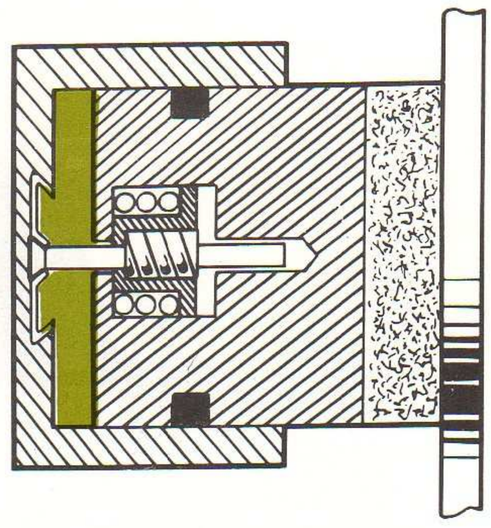
Fit the pad retaining plate and secure with nut, bolt and washer. Repeat procedure with the opposite caliper.

Bleeding is unnecessary but the foot pedal should be pumped until a solid resistance is felt to reposition the pads close to the disc. Top up the supply tank with unused Castrol-Girling Brake Fluid. Fit wheels, jack down and road test the vehicle.

2 DISC BRAKE OPERATION

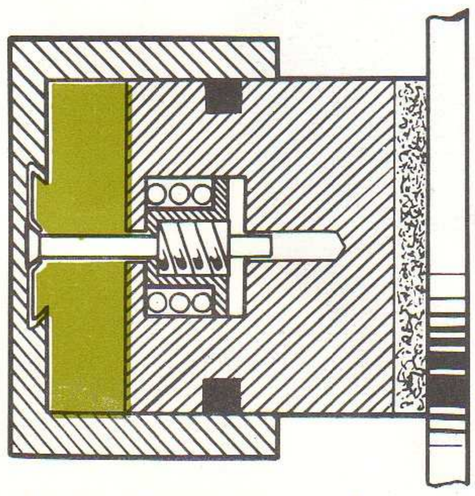


BRAKE OFF
NEW PADS



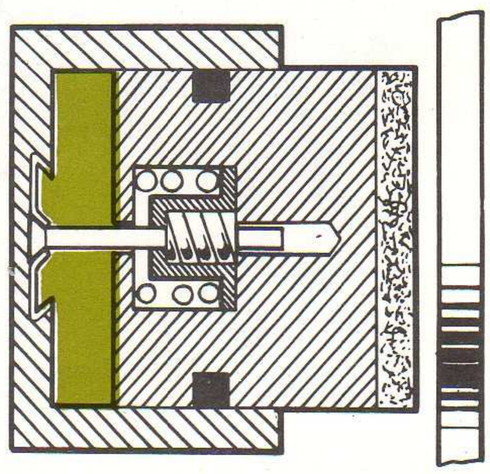
BRAKE ON
NEW PADS

Note position of retractor stop bush.



BRAKE ON
WORN PADS

Retractor bush drawn along pin as pad wears



BRAKE OFF
WORN PADS

Bush retains its position on pin and spring returns, thus restoring correct clearance between pad and disc.

A0082

Girling-Dunlop MK.2 caliper 2A 3c

disc brakes

Dismantling

Drain the fluid from the system and remove the caliper from the vehicle by unscrewing the securing bolts; note the position of any packing shims.

Remove the pads as previously described.

Remove the bridge pipe. Unscrew the cylinder retaining bolts and separate the cylinders from the calipers.

NOTE: The cylinder retaining bolts should be discarded and new bolts used when reassembling.

Withdraw the pad support plates.

Disengage the dust covers from the cylinders and eject the pistons by applying a steady air pressure to the fluid inlet ports. Remove the seals and dust covers from the pistons.

Piston and cylinders with the early type retraction, should be discarded and replaced by new assemblies with the current retraction mechanism (Fig. 2).

Unscrew the bleedscrew.

Cleaning

Clean all parts thoroughly with Girling Cleaning Fluid or unused Castrol-Girling Brake Fluid.

Examine each cylinder bore for signs of scoring and corrosion. Ensure the retraction pin is undamaged and securely held by the retaining cap. If damaged or corroded, fit new piston and cylinder assemblies.

Assembly

Lubricate the rubber seals with unused Castrol-Girling Brake Fluid and fit to the piston grooves.

Smear the cylinder bore and piston barrel with unused Castrol-Girling Brake Fluid and offer the piston to the cylinder, locating the piston over the retraction pin. Using a suitable handpress apply an even load to the piston. Ensure the piston does not cross bind and the edge of the piston seal is not trapped as it enters the bores.

Treat the cavity around the piston with unused Castrol-Girling Brake Fluid and fit the dust cover.

Fit the support plates.

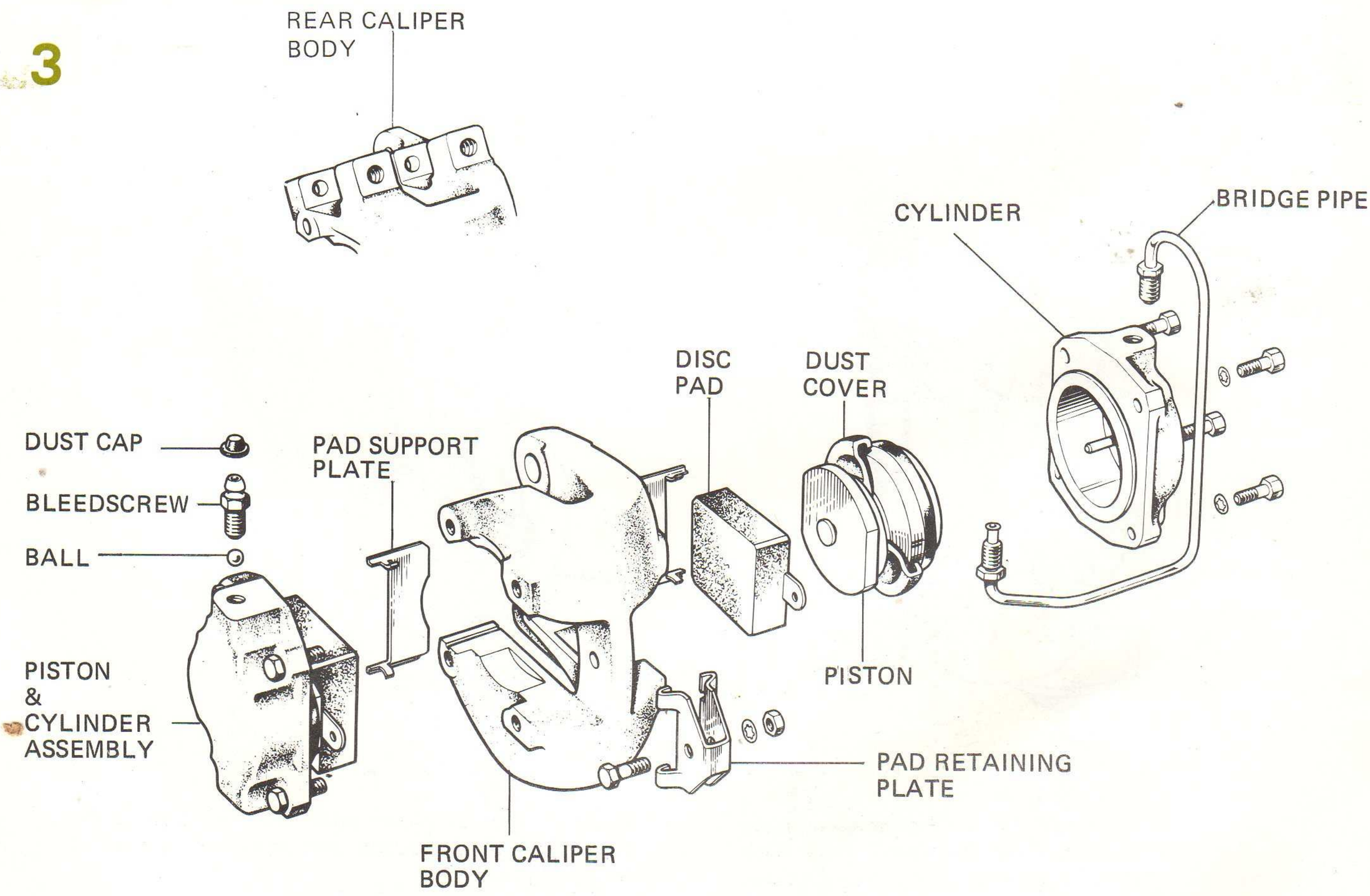
To ensure correct alignment, eject the piston from the cylinder ½ an inch (12 mm) using clean compressed air pressure; then bolt the cylinders to the caliper. Tighten the bolts to a torque of 11 lb. ft. (15 Nm).

Press back the pistons and fit the new pads as previously described.

Fit the bleedscrew and bridge pipe and refit the caliper to the vehicle. Ensure that any shims are replaced in their original position and that the bridge pipe does not foul the wheel.

Connect the hydraulic pipes and bleed the system, as described in Section 1, Page 1D1, using new unused Castrol-Girling Brake Fluid. Never re-use fluid drained from a vehicle. Before road testing the car, ensure the fluid is at the correct level and pump the pedal until a solid resistance is felt to reposition the pads close to the disc.

3



A0079

Girling-Dunlop MK.2 caliper

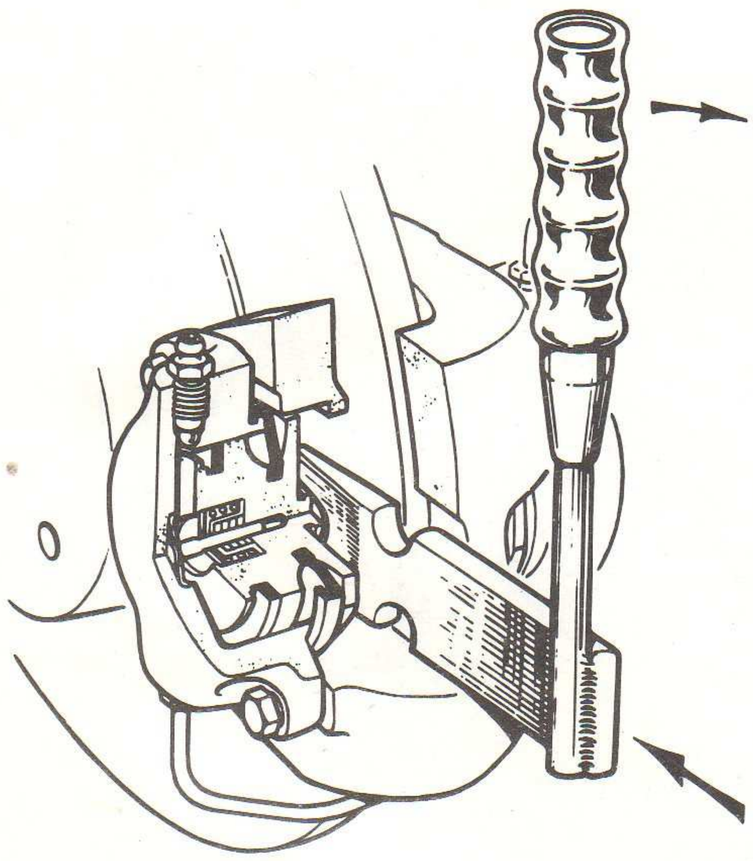
Discs

A certain amount of disc scoring and wear is to be expected in service but this is not detrimental to braking efficiency. Discs need only be regarded as unsatisfactory when this condition has reached an advanced stage and difficulty is experienced in withdrawing the disc pad past the disc periphery.

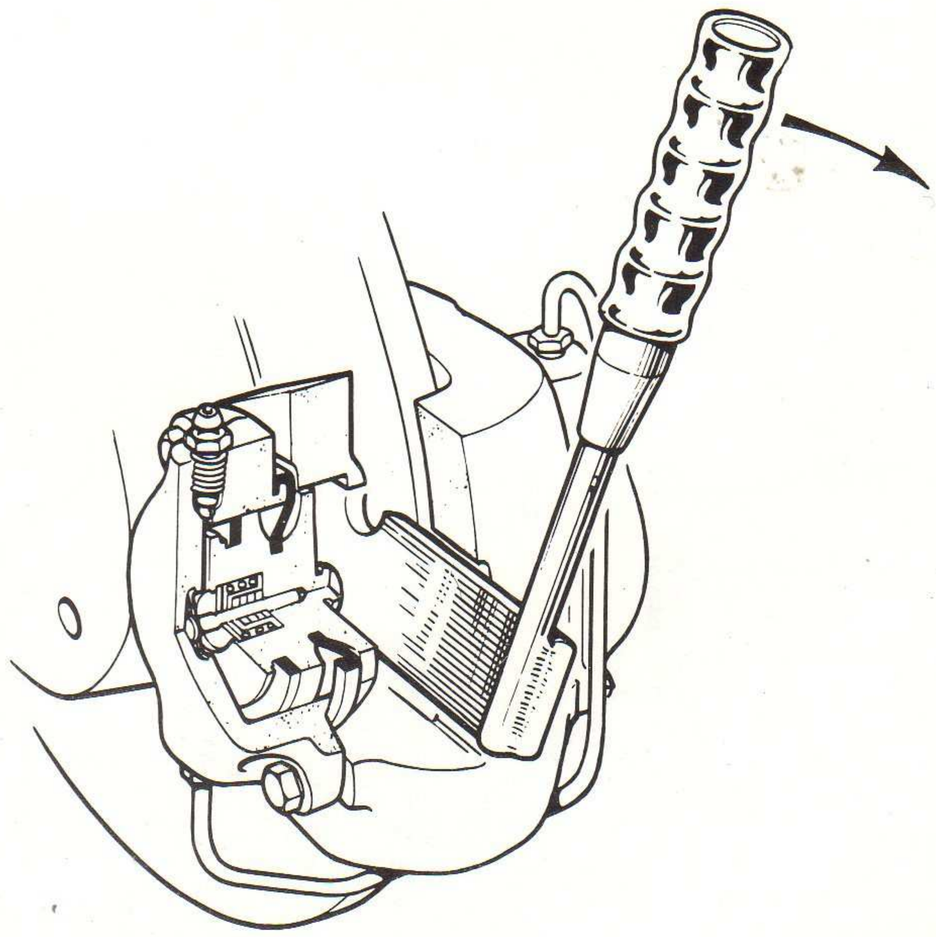
The disc run-out must not exceed 0.004 in. (0.15 mm) and check the disc runs equidistant between the caliper cylinders. The gap on opposite sides of the disc may differ by 0.010 in. (0.25 mm) but there should be no difference between two gaps on any one side. Correct any discrepancy with shims at the caliper mounting to ensure the caliper is in line and the pads and pistons are square with the disc.

When renewing a defective disc, ensure the hub end float is within the limits specified by the vehicle manufacturer.

4 GIRLING PISTON RETRACTION TOOL (PART No. 64932392)



If the pads are worn low and the gap between piston and disc is small, insert tool as shown. Press back piston to increase clearance between piston and disc and withdraw tool.



Re-insert tool as shown with the edge against the centre line of the piston, and press back piston to bottom of bore.

Girling-Dunlop series 3 caliper 2A 4a

disc brakes

Introduction

The Series 3 disc brake (Fig. 1) incorporates automatic pad retraction which maintains a specific clearance between pad and disc. Cylinder sizes vary to suit different installations and to maintain the correct front-to-rear braking ratio. Rear disc brake calipers incorporate mounting lugs which accommodate a separate mechanical handbrake mechanism.

The disc brake consists of a caliper with an outboard cylinder cast integrally with the body and a removable inboard cylinder. Support plates bolted onto the caliper seat the pads, which are retained by a pin passing through the pad backing plates and into the castings. A spring clip riveted to the pad backing plate is attached to a spigot on the piston.

Each piston accommodates a retraction assembly retained by a peened over washer; the assembly comprises a retraction bush, spring and housing. The bush grips tightly on a pin which is anchored to the base of the cylinder (Fig. 2).

There is a slight variation in the Series 3B calipers. These are fitted to 'off-the-road' vehicles and the pistons do not include any pad retraction mechanism. In all other features they are the same.

On some 'off-the-road' vehicles (with Series 3 and Series 3B units), Mineral Fluid is used and special rubber seals and dust covers are fitted. It is essential that only Castrol-Girling Mineral Fluid (BLUE) is used in these systems, which can usually be identified by the blue paint and parts on the cylinders. But where doubt exists, the vehicle manufacturer's handbook should be referred to.

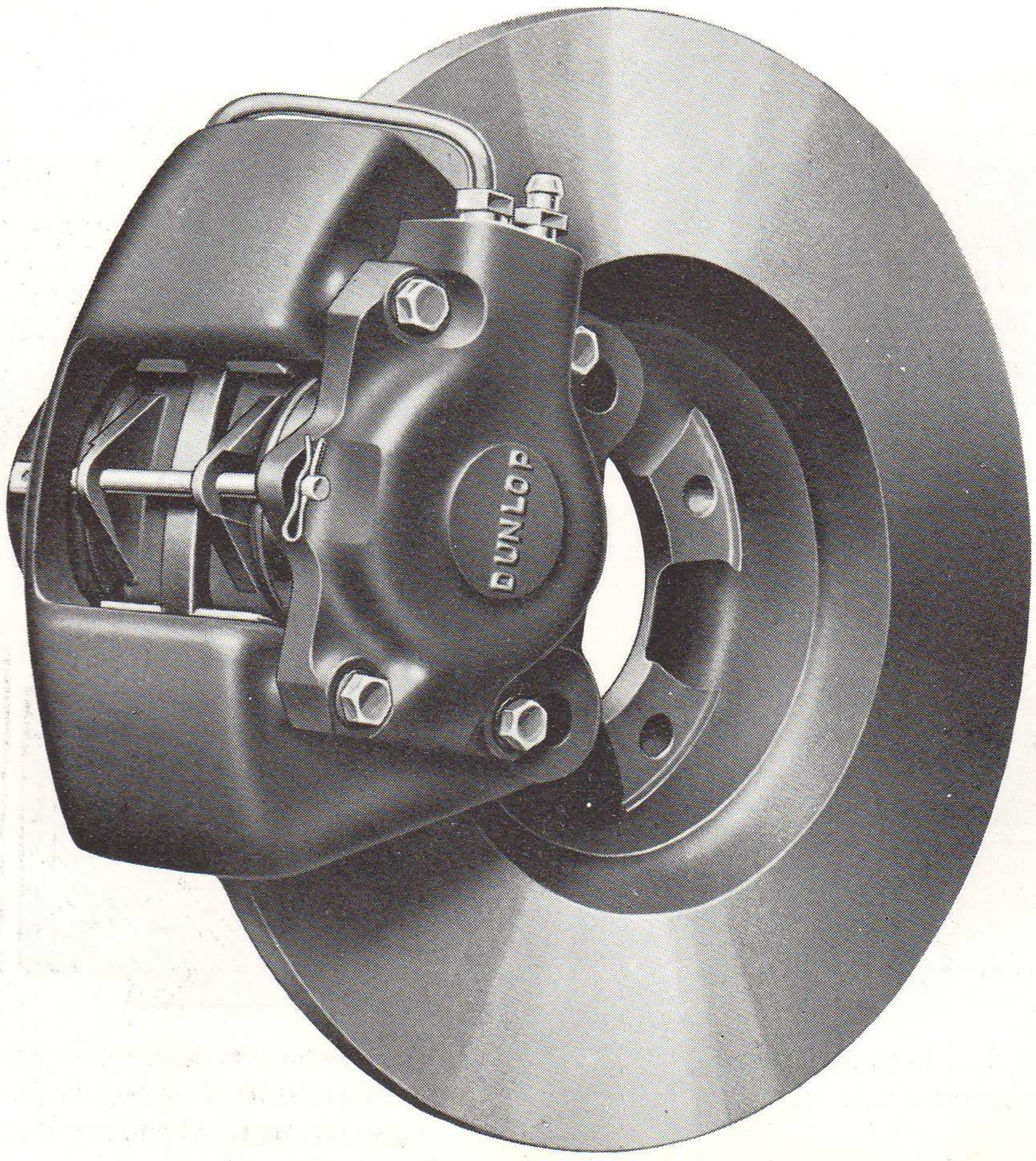
Hydraulic pressure is introduced into the lower part of the integral cylinder and transferred to the top of the removable cylinder by a bridge pipe. When the brake is applied (Fig. 2), the pistons clamp with equal pressure against the disc. As each piston moves inwards it takes up a specific clearance between the retaining plate and spring housing of the retraction assembly and, as the movement continues, draws the tightly gripping retraction bush along the pin. When the pressure behind the pistons is released the compression spring acts on the retaining plate and withdraws the piston and pad; thus restoring the clearance between the retaining plate and spring housing and the pad and disc.

Servicing

To maintain the efficiency of the brake system, preventive maintenance is essential and the following recommendations should be observed at the intervals stated. Full details of preventive maintenance are incorporated in Section 1, Page 1A1.

1. Check the pads for wear every 5,000 miles (8,000 km) and fit new pads when the old ones have worn to ¼ of an inch (6 mm).
2. Every 10,000 miles (16,000 km) examine the brake pipes and flexible hoses for corrosion, fretting and signs of damage. Renew suspect parts and take action, where applicable, to prevent a recurrence of the trouble.
3. Change the brake fluid every eighteen months and use only the recommended fluids. Use Castrol-Girling Brake Fluid for Vegetable based systems and Castrol-Girling Mineral Fluid (BLUE) for Mineral based systems. Where doubt exists, consult the vehicle manufacturer's handbook.
4. Every 40,000 miles (64,000 km) or three years, whichever occurs first, disc brakes should be overhauled.

1



A0555

All hydraulic other parts on the vehicle should also be replaced or overhauled and new hydraulic hoses should be fitted.

Fitting New Pads

When the pads have worn to ¼ of an inch (6 mm) new pads should be fitted.

Clean the exterior of the caliper with a wire brush and a clean rag.

Remove the spring clip and withdraw the pad retaining pin. Remove the pad stop plate, if fitted.

Withdraw the pads using pliers. If necessary, slacken the bolts securing the cylinder to the caliper to give additional clearance. Re-tighten the bolts after the pad has been removed.

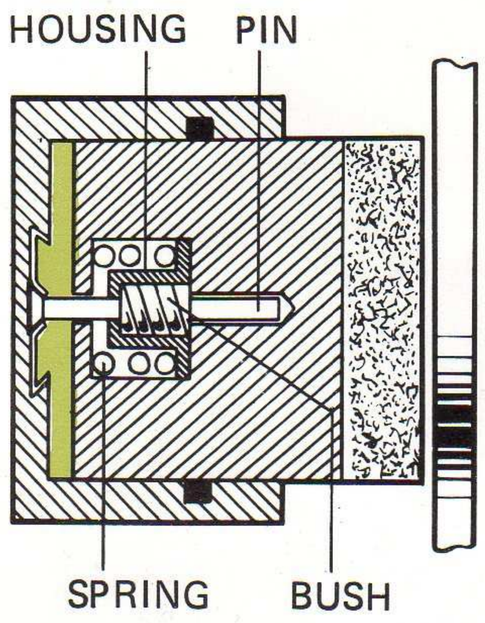
Thoroughly clean the caliper recess and exposed areas of the pistons and dust cover with Girling Cleaning Fluid. Examine the raised spigot in the centre of the pistons for any signs of damage that would prevent the pads fitting correctly. Brake binding can occur if the pad is not correctly located on the spigot.

Ensure the piston dust covers are in good condition and not damaged or cracked. Lift each dust cover and inspect the piston and cylinder for signs of corrosion. If evident, fit a new piston and seal or a new piston and cylinder assembly. No attempt should be made to clean up corroded or seized pistons.

Examine the disc and if there is evidence of wear on one side only, one of the pistons is seized and it is best to fit a new disc and a new caliper, or a new piston and cylinder assembly immediately. If the condition of the disc is satisfactory with no signs of cracking or other damage, remove all scale and rust from around the edge with a scraper or an old screwdriver. Support the scraper on the caliper body and hold it against the disc whilst rotating the disc by hand. Finish of the cleaning operation with emery-cloth and clean off any bits from the caliper.

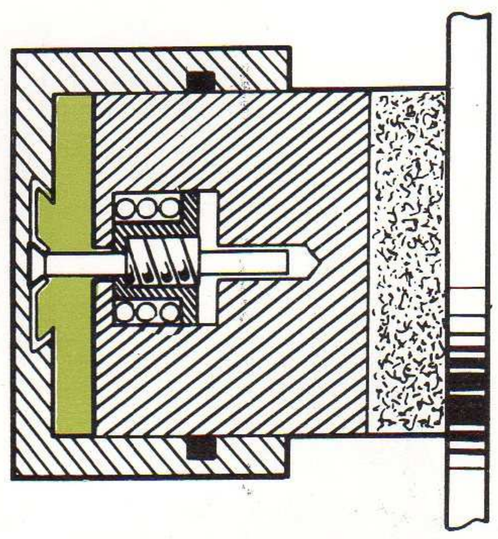
Unscrew the bleedscrew one turn and, using the Girling Piston Retraction Tool (Fig. 4), press back the pistons into the cylinders. Tighten the bleedscrew and fit the new pads, ensuring the spigot on the pistons engages the slot in the pad backing plates. Fit the pad retaining pin and, if applicable, stop plate; secure with the spring clip. Bleeding is unnecessary but the foot pedal should be pumped to reposition the pads close to the disc. Top up the supply tank with unused Brake Fluid of the recommended type, fit wheels, jack down and road test.

2 DISC BRAKE OPERATION



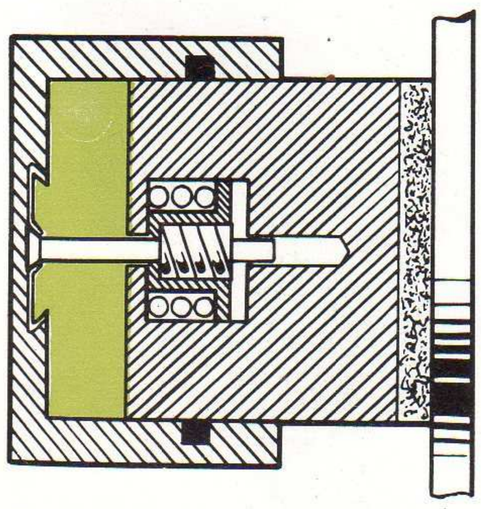
BRAKE OFF
NEW PADS

BRAKE ON
NEW PADS



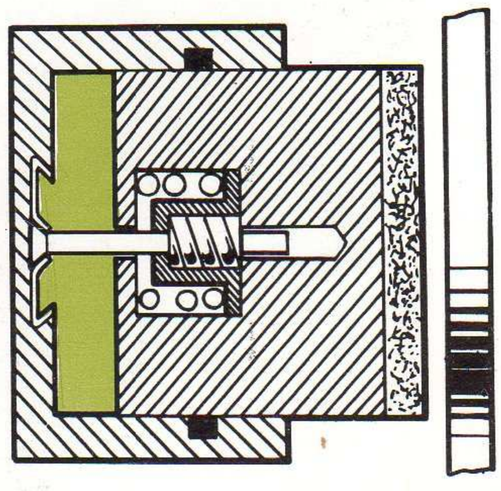
Note position of retractor stop bush.

BRAKE ON
WORN PADS



Retractor bush drawn along pin as pad wears.

BRAKE OFF
WORN PADS



Bush retains its position on pin and spring returns, thus restoring correct clearance between pad and disc.

A0082

Girling-Dunlop series 3 caliper 2A 4c

disc brakes

Dismantling

Drain the fluid from the system and remove the caliper from the vehicle by unscrewing the securing bolts; note the position of any packing shims.

Remove the pads as previously described.

Remove the bridge pipe. Unscrew the inboard cylinder retaining bolts and remove the cylinder.

NOTE: The cylinder retaining bolts should be discarded and new bolts used when re-assembling.

Remove the dust covers and eject the pistons by applying a steady air pressure to the fluid inlet port. Remove the seal from the cylinder bores.

Unscrew the bleedscrew

Cleaning

Clean all parts thoroughly with Girling Cleaning Fluid or unused Brake Fluid of the recommended type.

Examine the cylinder bores and pistons for signs of scoring and corrosion. Ensure the retraction pins are undamaged and securely held by the retaining caps.

Assembly

Smear the cylinder bore and piston barrel with unused Brake Fluid of the recommended type and fit the seals to the grooves in the cylinders. Locate the piston over the retraction pin and refit to the cylinder using a suitable handpress. Apply an even load to the handpress and ensure the piston does not cross-bind.

Treat the cavity around the piston with unused Brake Fluid and fit the dust cover. Ensure the dust cover is located correctly in the grooves in piston and cylinder.

Refit the inboard cylinder and tighten the bolts to a torque of 11 lb. ft. (15 Nm) for ¼ in. (6 mm) bolts and 19 lb.ft. (26 Nm) for 5/16 in. (8 mm) bolts. Fit the pads as previously described.

Fit the bleedscrew and bridge pipe and refit the caliper to the vehicle.

Ensure that any shims are replaced in their original position and that the bridge pipe does not foul the wheel.

Connect the hydraulic pipes, top up the supply tank with Brake Fluid of the recommended type and bleed the system as described in Section 1, Page 1D1. Before road testing the car, ensure the fluid in the reservoir is at the correct level and pump the pedal until a solid resistance is felt to reposition the pads close to the disc.

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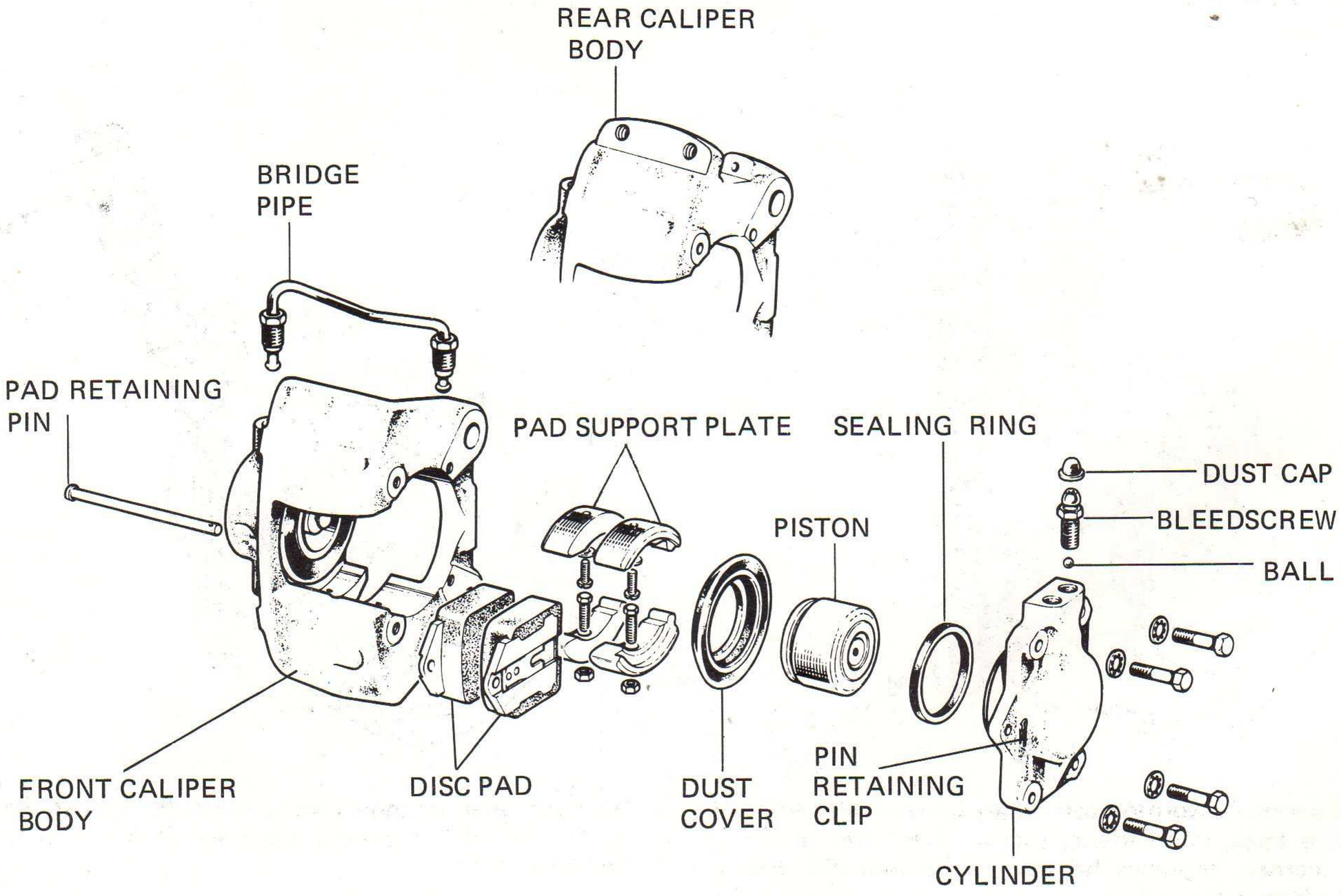


A0111

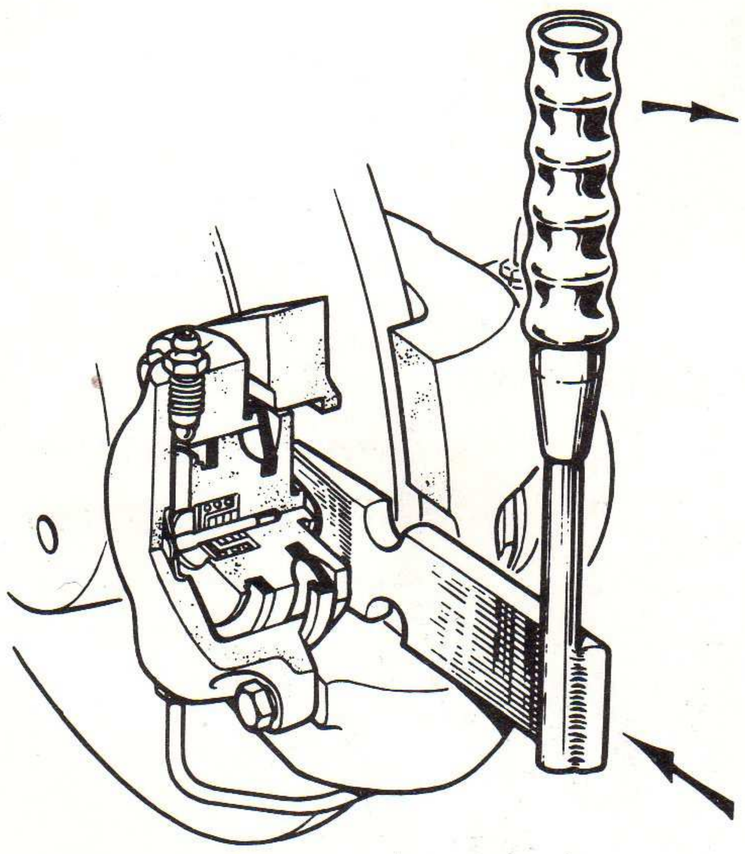
Discs

A certain amount of disc scoring and wear is to be expected in service, but this is not detrimental to brake efficiency. Discs need only be regarded as unsatisfactory when this condition has reached an advanced stage and difficulty is experienced in withdrawing the pad past the disc periphery.

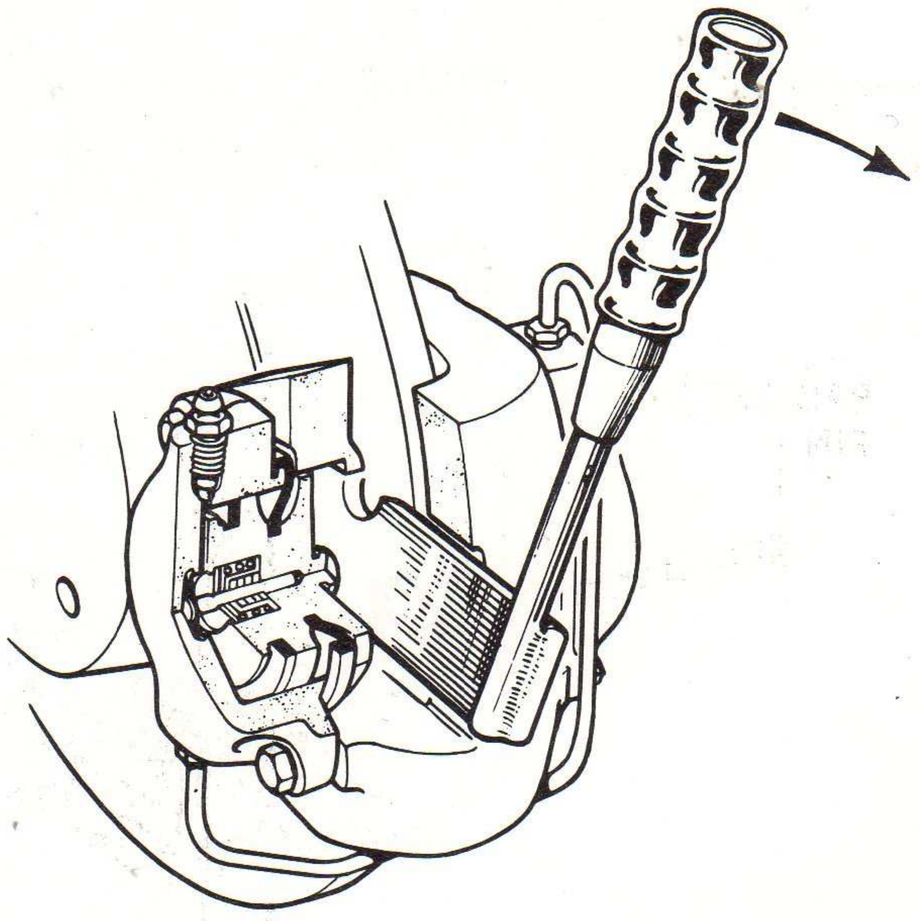
The disc run-out must not exceed 0.004 in. (0.15 mm) and check the disc runs equidistant between the caliper cylinders. The gap on opposite sides of the disc may differ by 0.010 in. (0.25 mm) but there should be no difference between the two gaps on any one side. Correct any discrepancy with shims at the caliper mounting to ensure the caliper is in line and the pads and pistons are square with the disc.

When renewing a defective disc, ensure the hub end float is within the limits specified by the vehicle manufacturer.

4 GIRLING PISTON RETRACTION TOOL (PART No. 64932392)



If the pads are worn low and the gap between piston and disc is small, insert tool as shown. Press back piston to increase clearance between piston and disc and withdraw tool.



Re-insert tool as shown with the edge against the centre line of the piston, and press back piston to bottom of bore.

Girling-Dunlop series 4 caliper 2A 5a

disc brakes

Introduction

The Series 4 Disc Brake (Fig. 1) is a dual purpose rear brake incorporating automatic adjustment, operated either hydraulically or mechanically.

The disc brake consists of a caliper body which straddles the disc, two opposed friction pad levers and an operating lever. The pad levers are mounted on fulcrum pins attached to the caliper and linked by an adjustable cross bolt. One end of the cross bolt is pinned to the outer pad lever and the opposite end is secured to the nut of the self-adjusting mechanism housed in the operating lever. Connected to the other end of the operating lever are the handbrake cable and the operating cylinder assembly (Fig. 2).

The friction pad assemblies are housed within a steel frame bolted to the caliper and retained with a removable strut to facilitate replacement when the pads are worn. Any tendency for the pads to tilt within the frame is resisted by the right angle backing plates moulded to the friction material. The friction pads are centralised by the retraction plates bolted to the caliper and located in the holes in the levers.
After each brake application the retraction plates withdraw the pads off the disc and so maintain a constant minimum clearance between pads and disc. The operating lever incorporates a ratchet mechanism which consists of an adjusting nut with ratchet teeth and a spring loaded pawl attached to the lever. As the pads wear movement of the operating lever increases until it exceeds a predetermined amount; the adjusting nut is then turned the equivalent of one tooth by the pawl as the brake is released. Adjustment is therefore automatic throughout the life of the pads.

The operation of the brake is shown on the illustration (Fig. 3). The operating lever pivots about the hinge pin and tensions the cross bolt, which forces the pad levers to move inwards and clamp the friction pads against the disc. The pressure both sides of the disc is then equal and the action is the same whether the operating lever is applied hydraulically or mechanically. When the pressure is released, the friction pads are retracted from the disc by the retraction plates to ensure a constant minimum clearance between pads and disc.

Servicing

To maintain the efficiency of the brake system, preventive maintenance is essential and the following recommendations should be observed at the intervals stated. Full details of preventive maintenance are incorporated in Section 1, Page 1A1.

1. Check the pads for wear every 5,000 miles (8,000 km) and fit new pads when the lining thickness has worn to 3/16 of an inch (4.8 mm) of the backing plate.

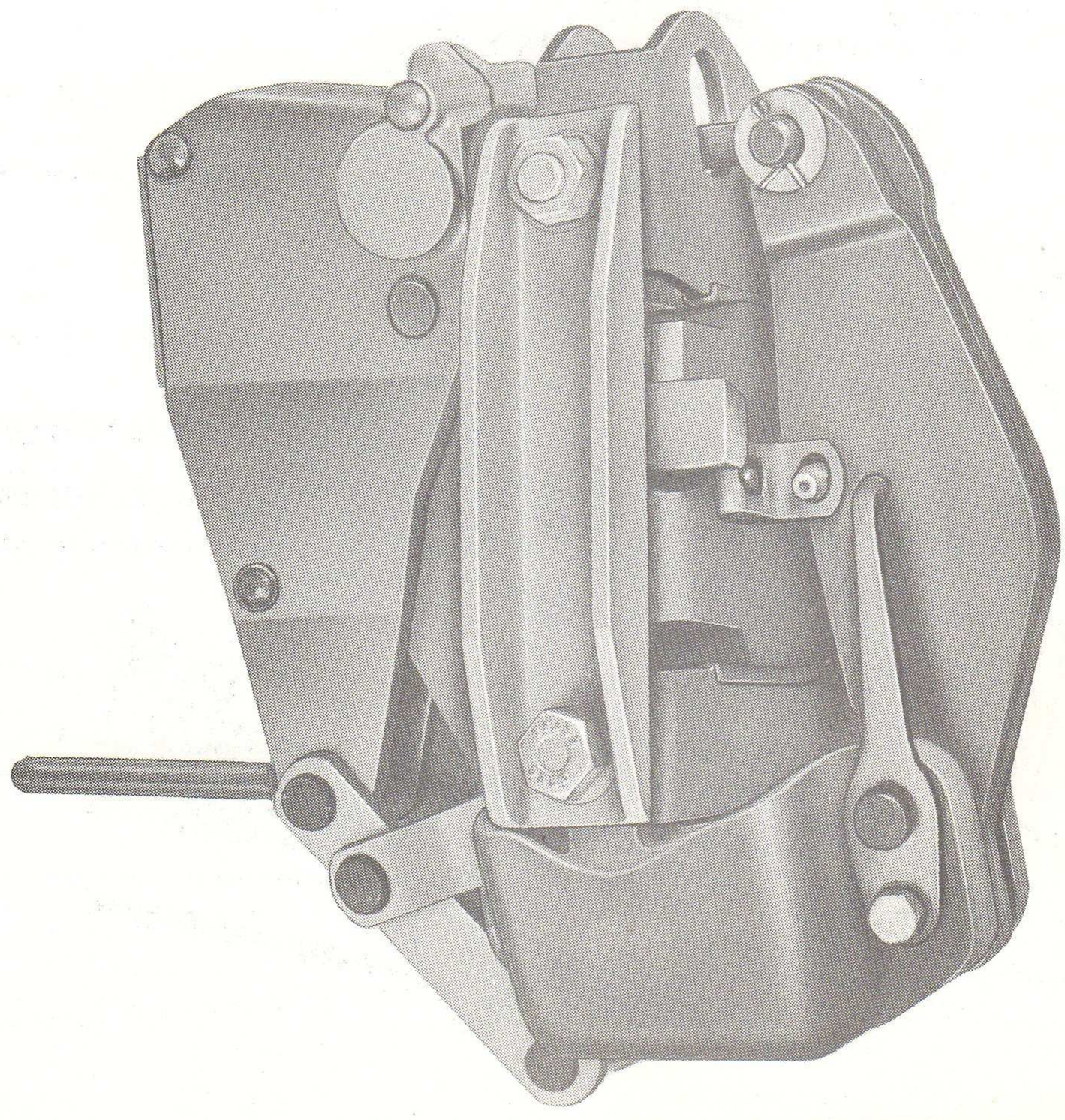
   Lubricate the handbrake linkage in accordance with the vehicle manufacturer's instructions and lightly smear the pivot pins and the threads of the adjustable cross bolt with Girling Brake Grease.

2. Every 10,000 miles (16,000 km) examine the brake pipes and flexible hoses for corrosion, fretting and signs of damage. Renew suspect parts and take action where applicable to prevent a recurrance of the trouble.

3. Change the Brake Fluid every eighteen months.

4. Every 40,000 miles (64,000 km) or three years, whichever occurs first, the hydraulic cylinders should be replaced or overhauled and new hydraulic hoses should be fitted.

1



A0493

Fitting New Pads

Chock the front wheels, jack up and remove the rear wheels and release the handbrake. Clean the external surfaces of the caliper (Fig. 4) and unscrew the nuts and bolts securing the tie strut. Remove the tie strut and extract the worn pads.

Disconnect the cross bolt from the outer pad lever and pull the levers apart to permit the entry of the new pads. Carefully examine the retraction plates for signs of fracture and renew if necessary.

Lightly smear the pivot pins and the threads of the adjuster bolt with Girling Brake Grease.

Insert the new pads, ensuring the clips on the pads engage the pegs on the levers. Rotate the adjuster bolt anti-clockwise until the bolt can be reconnected to the outer pad lever and fit the hinge pin, washer and new split pin.

Replace the tie strut and secure with the nuts and bolts.

Move the pads to the correct operating position by lightly pumping the foot pedal until a solid resistance is felt and top up the level in the supply tank with the recommended fluid. Check the movement of the handbrake lever and adjust the cable if necessary. Replace wheels, jack down and road test.

Adjusting the Handbrake Cable

The automatic adjustment mechanism will usually adjust the handbrake lever travel but, if there is excessive handbrake lever movement reset in the following manner.

Chock the front wheels, jack up the rear wheels and release the handbrake. Disconnect the handbrake cable from the operating levers and operate each lever 20 to 30 times to ensure the pads are in the correct operating position.

Adjust the handbrake cable so that the clevis can just be connected to the operating lever without strain; i.e. the cable should just be taut without pulling the operating levers from the fully off position.

Replace wheels, jack down and road test.

Operating Cylinder Assembly

Replace or overhaul the operating cylinder at the intervals stated under servicing.

NOTE: Vegetable and Mineral Fluids have been used and the two must not be mixed. It is essential therefore to ensure that the correct replacement parts are obtained. Where doubt exists, consult the vehicle manufacturer's handbook.

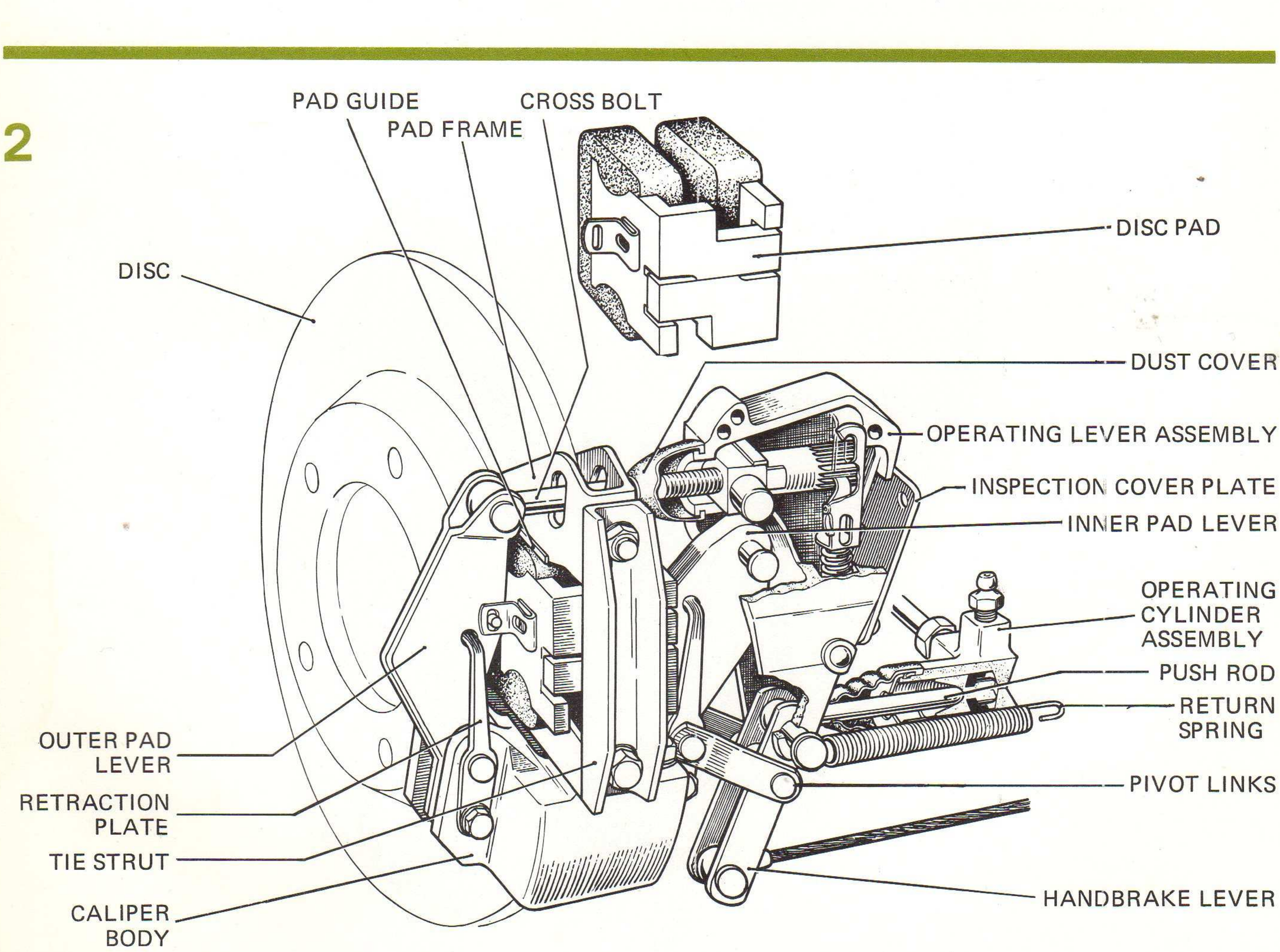
The Brake Unit

When the hydraulic cylinders and hoses are replaced the brake unit should also be overhauled.

Dismantle in the obvious manner.

NOTE: It is not normally necessary to remove the caliper from the vehicle. Clean the parts and lay out on a clean sheet of paper. Examine all parts for wear and corrosion, paying particular attention to the pivot pins and retraction plates.

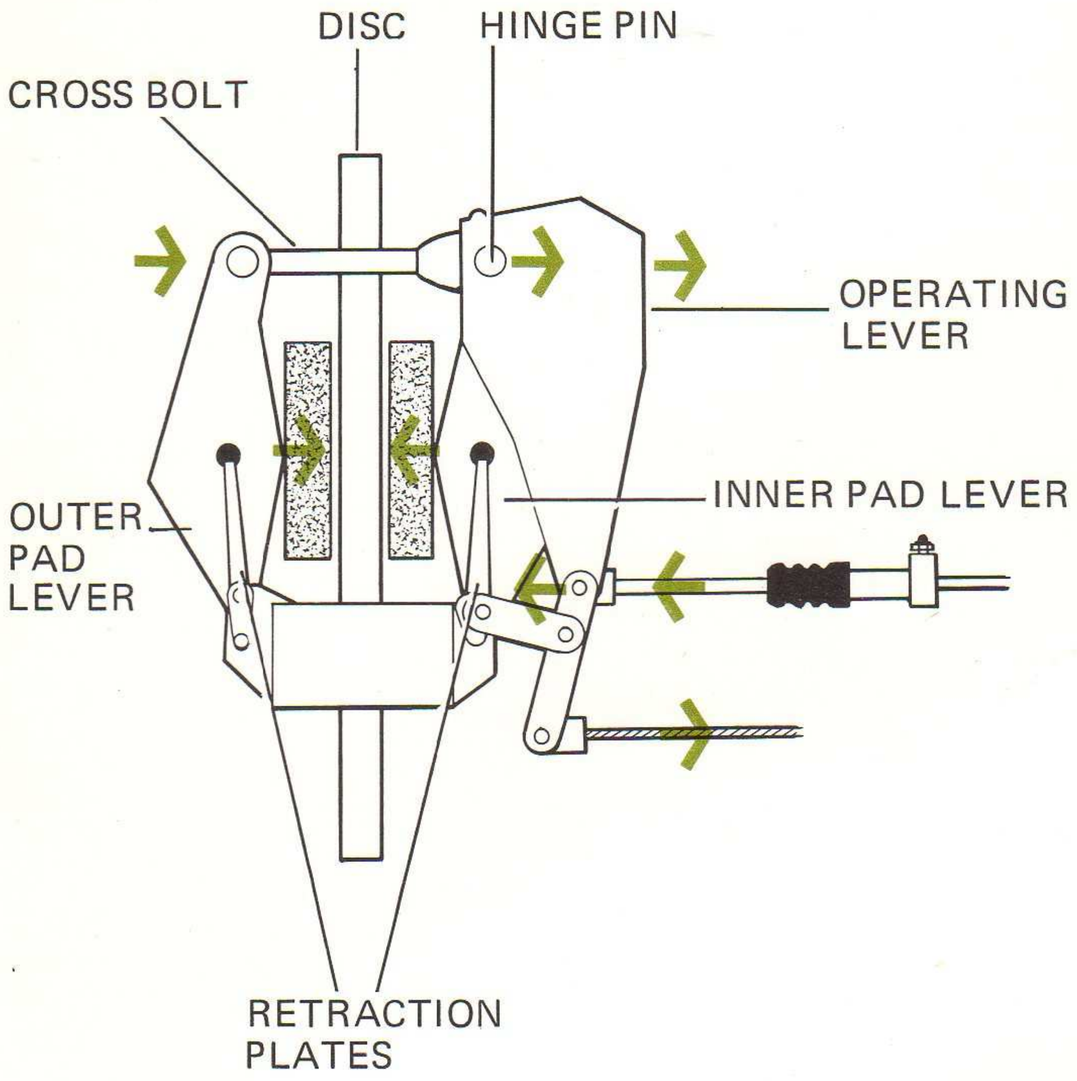
2



A 0307

disc brakes

3



A0454

Replace worn parts and obtain new split pins.

Reverse the dismantling procedure and reassemble the unit, lubricating the pivot pins with Girling Brake Grease and fitting the new split pins. Lubricate the threads of the cross bolt before fitting and pack the operating lever assembly with Girling Brake Grease and refit the inspection cover plate. Refit pads, attach handbrake cable and operating cylinder push rod. Move pads to the correct operating position by lightly pumping the foot pedal until a solid resistance is felt.

NOTE: If the operating cylinder assembly has been replaced or overhauled the system must be bled in the recommended manner (Refer to Section 1, Page 1D1).

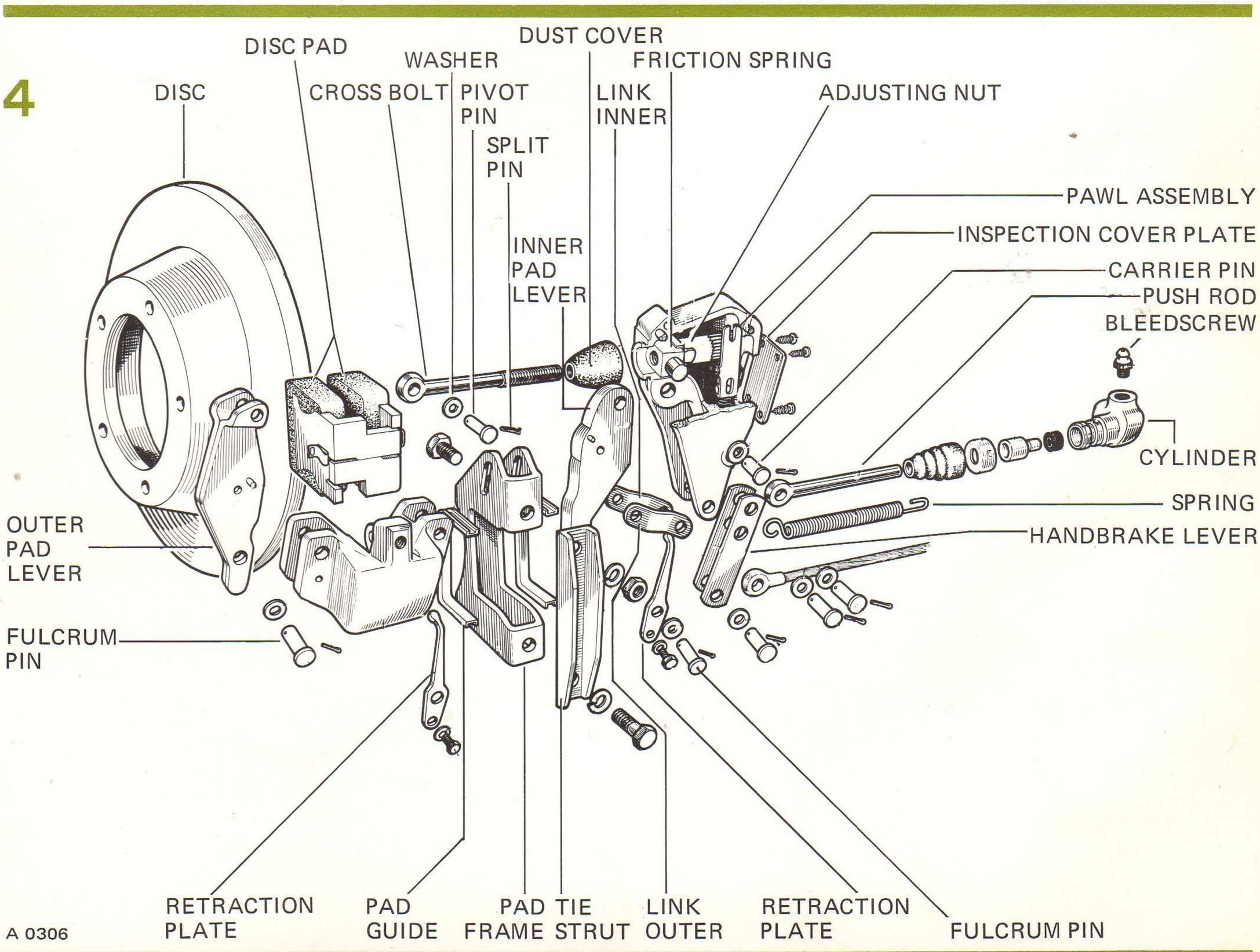
Top up the level of the fluid in the supply tank with the recommended fluid. Check the movement of the handbrake lever and adjust the cable if necessary. Replace wheels, jack down and road test.

Discs

A certain amount of disc scoring and wear is to be expected in service but this is not detrimental to brake efficiency. Discs need only be regarded as unsatisfactory when this condition has reached an advanced stage. The disc run out must not exceed 0.004 in. (0.15 mm).

When renewing a defective disc, ensure the end float is within the limits specified by the vehicle manufacturer.

4



A 0306

Girling 'A' type caliper 2A 6a

Introduction

The caliper (Fig. 1) consists of a cylinder assembly, a yoke and two pads. The cylinder is rigidly fixed to the axle whilst the yoke slides in grooves incorporated in the cylinder body.

Hydraulic pressure is directed between the two pistons in the cylinder and the pistons move outwards (Fig. 2). The direct pad is pushed against the disc by the one piston whilst the opposite piston pushes against the yoke which slides in the cylinder grooves to bring the indirect pad against the disc. The pressure both sides of the disc is then equal. When the pressure is released, the piston seals fitted in the walls of the cylinder retract the pistons a small amount, which allows the moving parts to relax sufficiently for the pads to remain in close proximity to the disc ready for the next brake application. Adjustment for lining wear is therefore automatic.

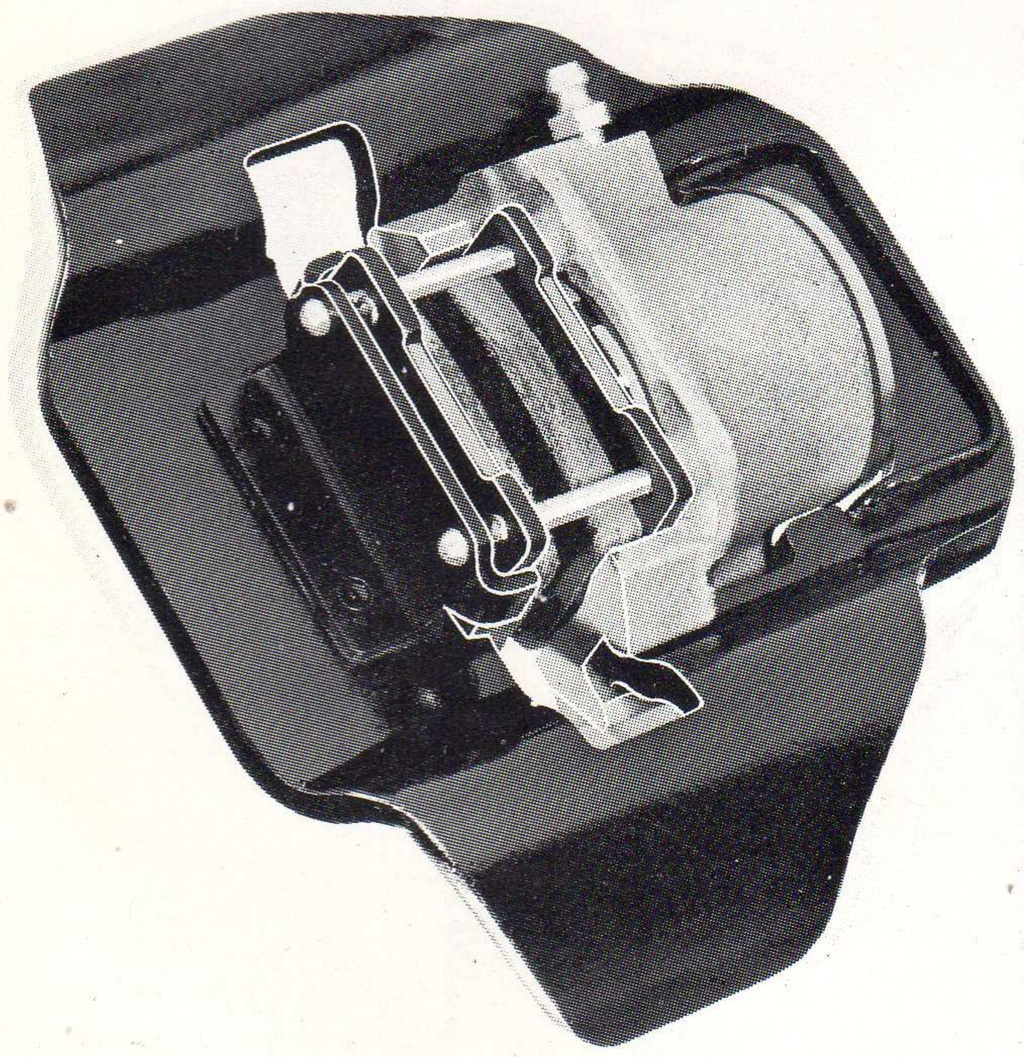
To reduce the tendency of the yoke to rattle on the cylinder, the gap between the yoke and the grooves in the cylinder body is kept to a minimum and the yoke is spring loaded to the body is the forward direction of disc rotation. On some models spring plates are inserted between the yoke and the cylinder body and the yoke spring is simplified (Figs. 3 and 4).

Servicing

To maintain the efficiency of the brake system, preventive maintenance is essential and the following recommendations should be observed at the intervals stated. Full details of preventive maintenance are incorporated in Section 1, Page 1A1.

1. Check the pads for wear every 5,000 miles (8,000 km) and fit new pads when the lining thickness has worn to 1/16 of an inch (1.5 mm). If electrical wear indicators are incorporated the examinations should be unnecessary.
2. Every 10,000 miles (16,000 km) examine all brake pipes and flexible hoses for corrosion, fretting and signs of damage. Renew suspect parts and take action where applicable to prevent a recurrence of the trouble.
3. Change the Brake Fluid every eighteen months.
4. Every 40,000 miles (64,000 km) or three years, whichever occurs first, the caliper should be overhauled. All other hydraulic parts on the vehicle should also be replaced or overhauled and new hydraulic hoses should be fitted.

1



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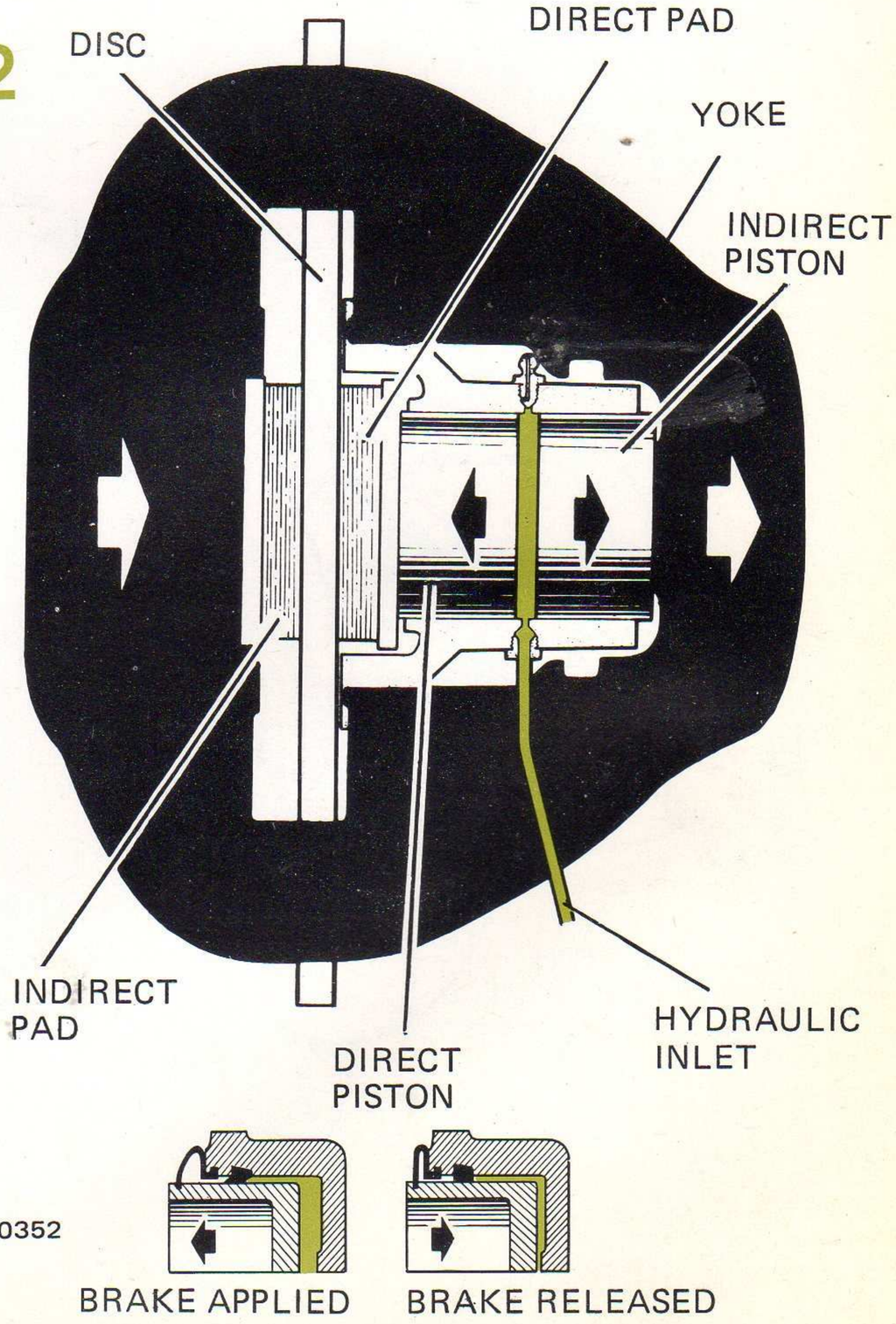

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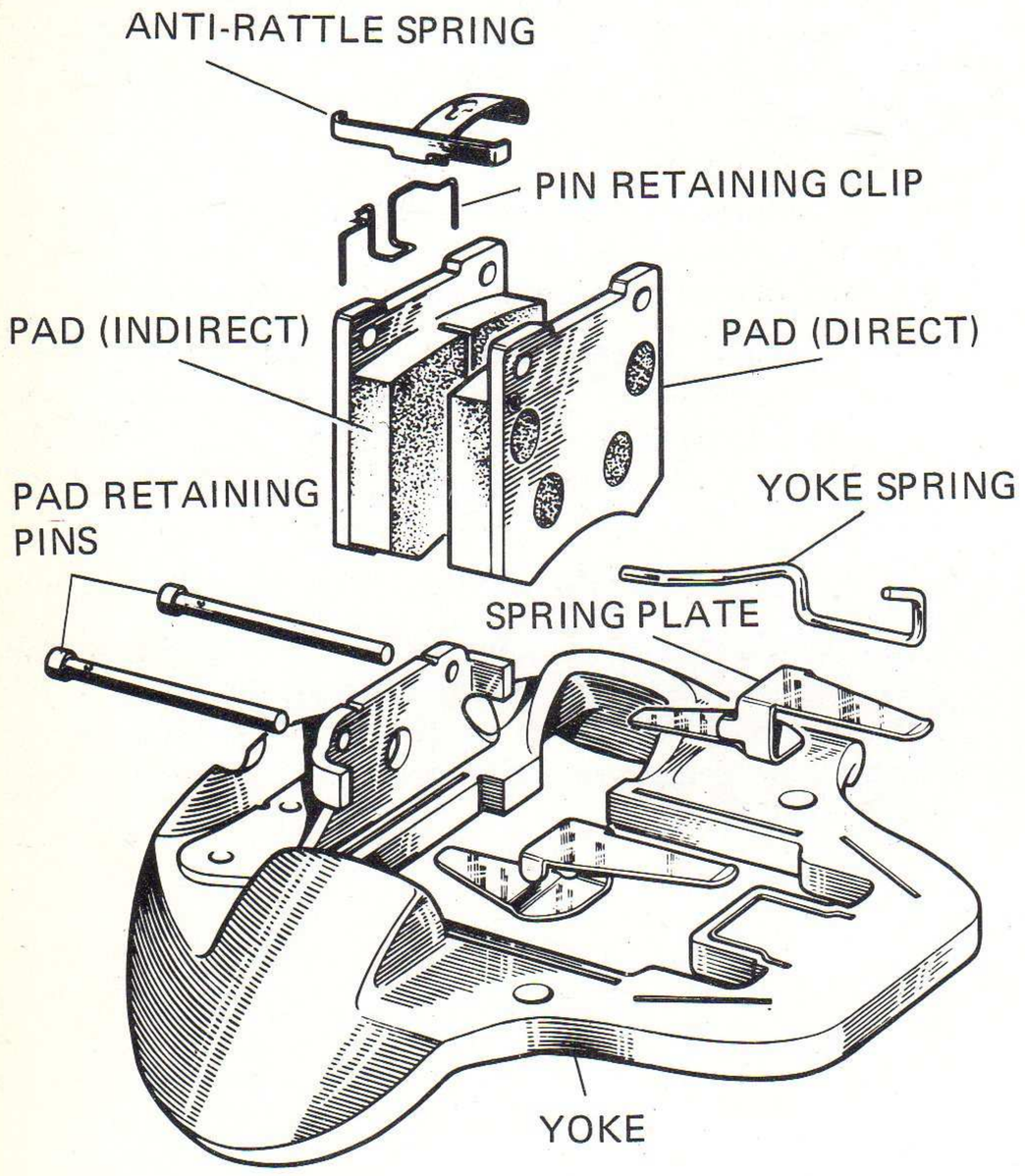

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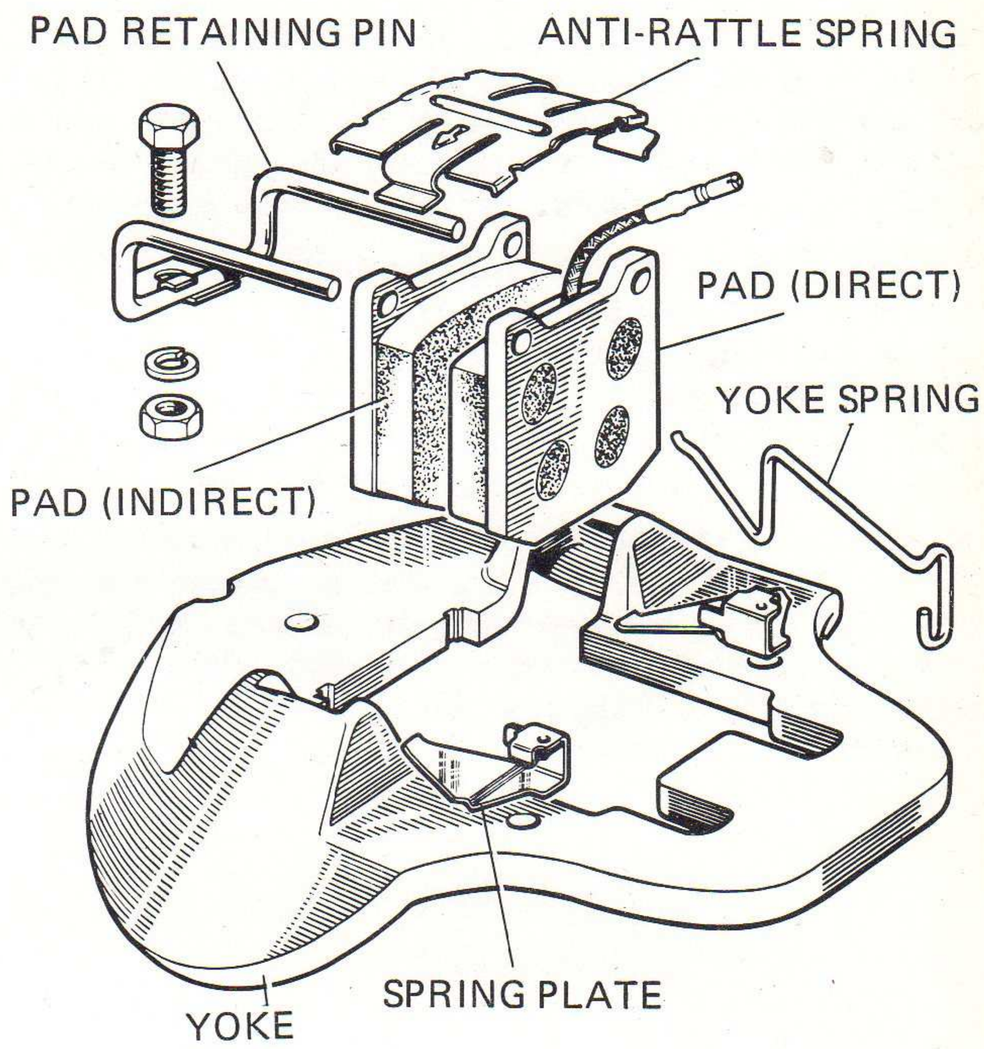

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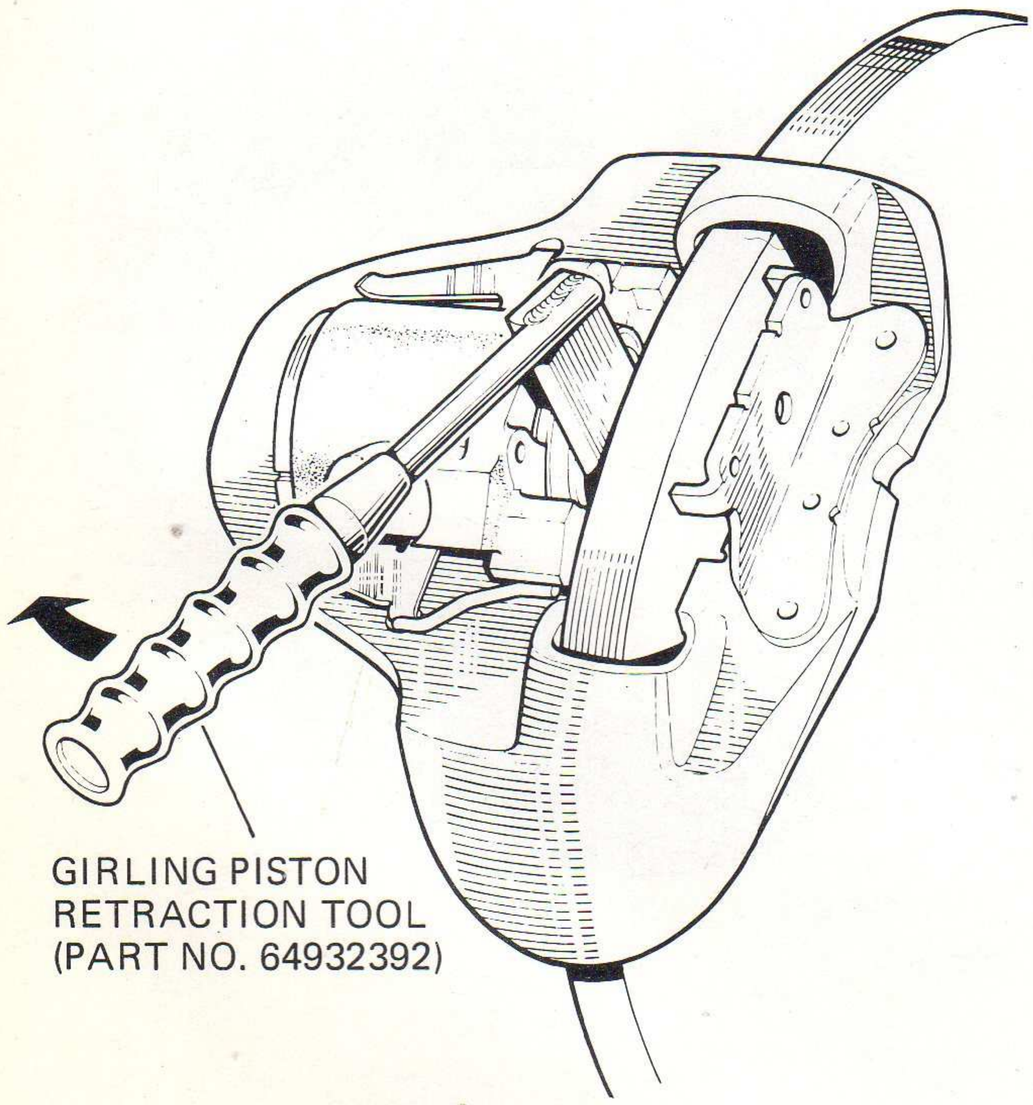

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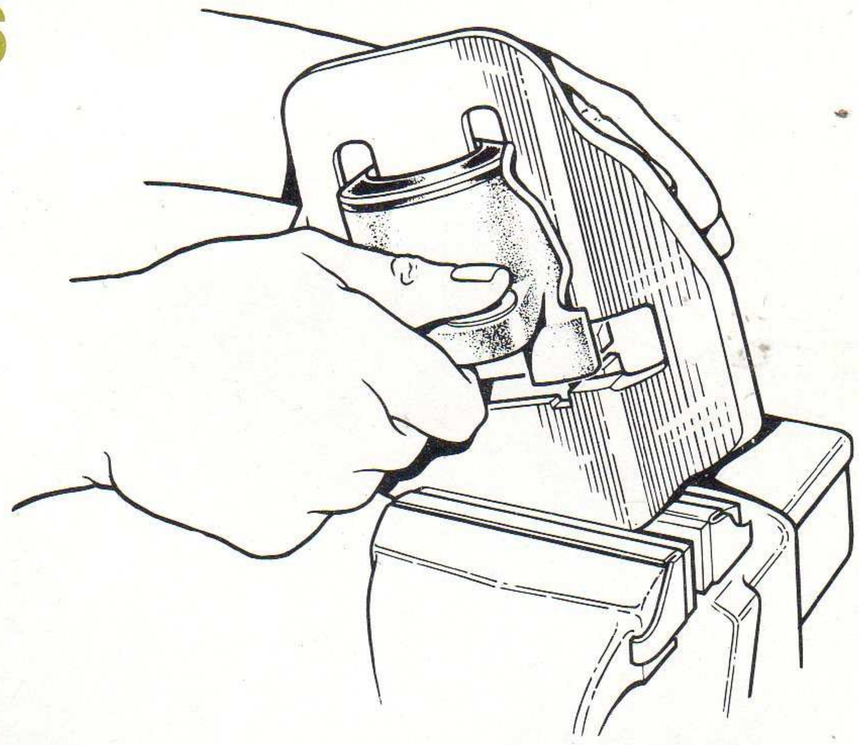

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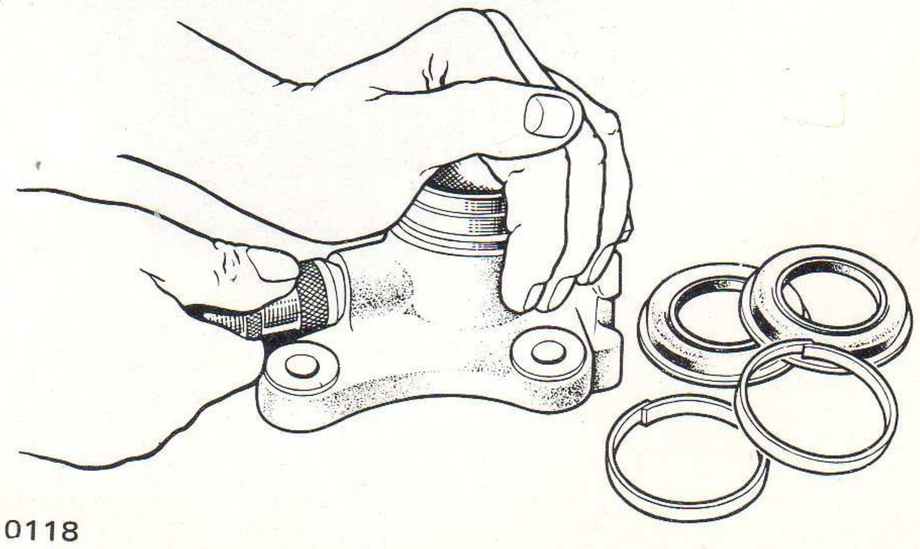


A 0118

Girling 'A' type caliper 2A 6c

Fitting new pads

Apply the handbrake and chock the rear wheels. Jack up the front of the car and remove the front wheels. Remove the anti-rattle spring, pad clips and retaining pins and extract the worn pads.

Ensure the dust covers protecting the pistons are secure and in good condition. If loose, damaged or cracked, examine the pistons for signs of corrosion and, if evident, fit new pistons and seals. No attempt should be made to clean-up corroded or seized pistons. If the pistons are in good working order and not corroded, then new dust covers from a Girling Service Kit can be fitted.

Examine the disc and if there is evidence of wear on one side only, one of the pistons may be seized, or the yoke may not be sliding on the cylinder. It's best to fit a new complete caliper, but provided the cylinders are in good working order and not damaged, new pistons and seals can be fitted. If the condition of the disc is satisfactory, remove all scale and rust from around the edge with a scraper or an old screwdriver. Support the scraper on the yoke and hold it against the disc whilst rotating the disc by hand. Finish off the cleaning operation with emery-cloth.

Unscrew the bleedscrew one turn and with the Girling Piston Retraction Tool, lever back the piston and yoke (Fig. 5). Ensure the dust covers are in good condition and the retaining rings are secure and fit the new pads. If one of the pads has an electrical cable attached, this pad should be fitted nearer the cylinder and the cable re-connected.

Tighten the bleedscrew, repeat procedure with the other caliper and jack down the vehicle.

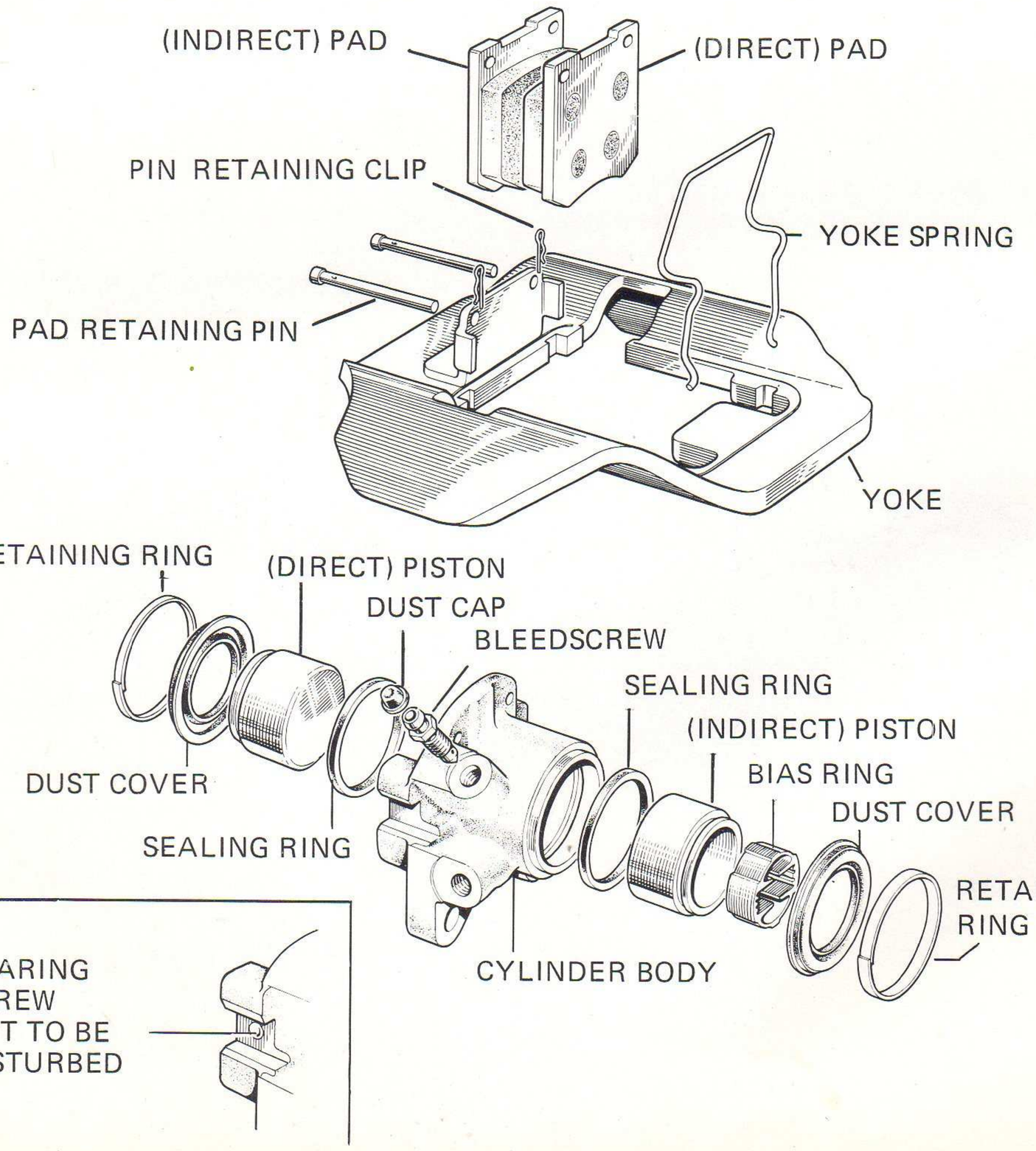
Top up the master cylinder reservoir with unused Castrol-Girling Brake Fluid and pump the foot pedal to push the new pads against the disc. Re-check the fluid level and road test the vehicle.

Dismantling

Remove the pads and remove the caliper from the vehicle; if necessary, refer to the vehicle manufacturer's instructions.
Clamp the yoke in a bench vice (Fig. 6). Press the top piston fully into the cylinder and then press the cylinder body downwards to separate it from the yoke. Note the position of the yoke and spring plates (if fitted) and remove.
Remove the retaining rings and dust covers from the cylinder.
Place the cylinder on the work bench and eject the uppermost piston with compressed air (Fig. 7) then push out the other piston.

NOTE: A small number of units were fitted with a bearing screw (Fig. 8) which must not be disturbed.

Taking care not to damage the internal surfaces, remove the piston seals from the cylinder.
Unscrew the bleedscrew.



A 0351

Girling 'A' type caliper

Cleaning

Clean all parts with Girling Cleaning Fluid or unused Castrol-Girling Brake Fluid.

Examine all parts for signs of wear, damage and corrosion, paying particular attention to the pistons and the cylinder bores. Also ensure the sliding edges of the yoke and the grooves in the cylinder body are smooth and free from corrosion. If necessary, remove corrosion using a wire-brush or wire-wool, but material removal must be avoided if the small gap between the two components when assembled is to be maintained within design limits.

All parts must be in good working order and where doubt exists new parts should be fitted.

Reassembly

Reassemble the unit using the new parts from the relevant Girling Service Kit.

Lubricate the new seals with unused Castrol-Girling Brake Fluid and fit into the grooves in the cylinder bore. Lubricate the pistons with unused Castrol-Girling Brake Fluid and push the pistons into the cylinder (the piston with the bias ring should be fitted farthest from the cylinder mounting lugs).

Fit the dust covers and retaining rings to the pistons (the wider retaining ring should be fitted to the piston with the bias ring).

Screw in the bleedscrew, but do not overtighten.

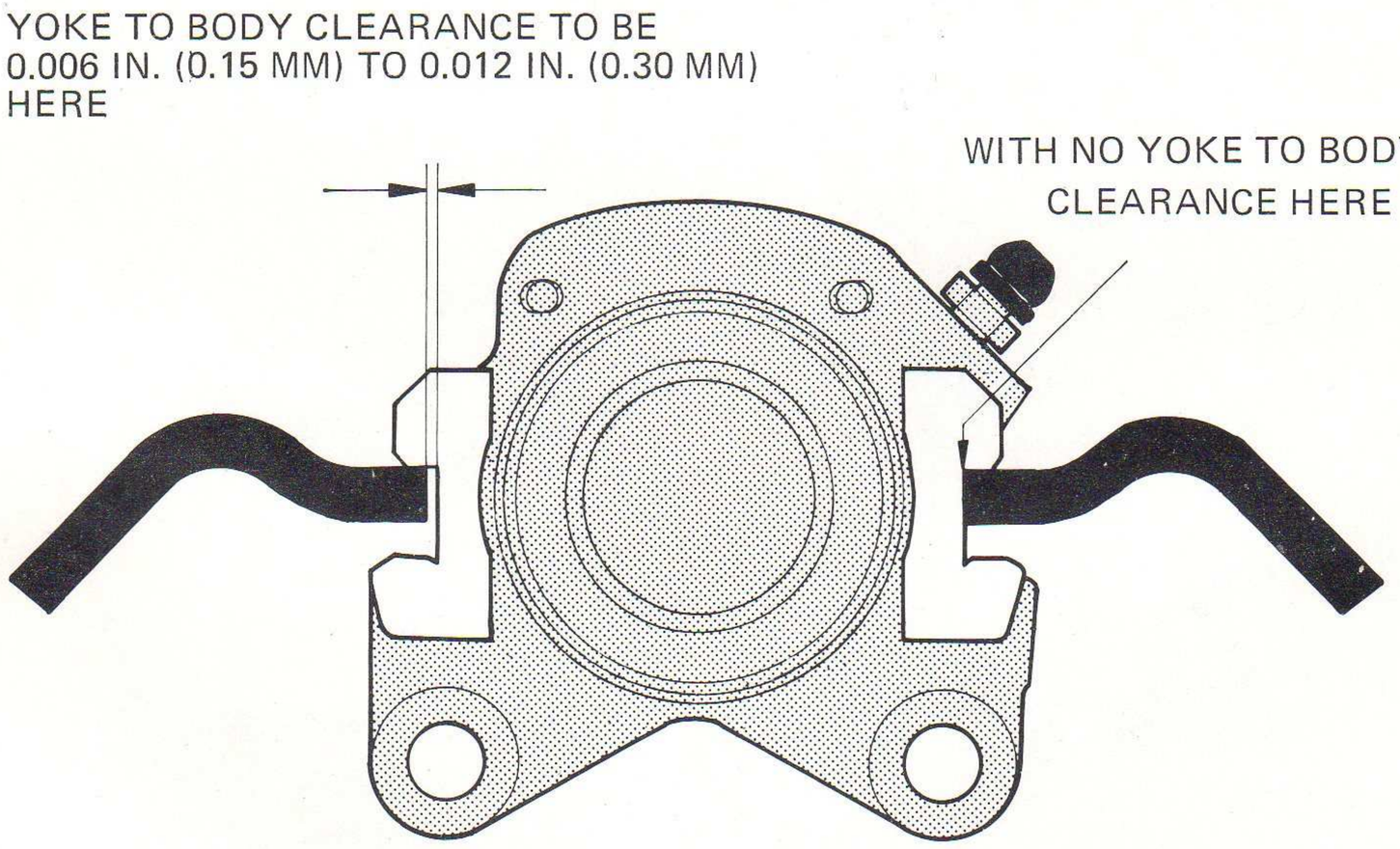
Clamp the yoke in a bench vice as when dismantling (Fig. 6).

If the caliper is the type shown on Fig. 8; fit the yoke spring to the yoke so that the angled leg of the spring will be on the same side of the cylinder as the bleedscrew when the cylinder is fitted. Position the cylinder on the yoke (Fig. 6) and pull upwards, engaging the grooves in the cylinder with the yoke and checking the bias ring in the piston will align with the yoke as the cylinder moves upwards. Settle the angled leg of the yoke spring into the groove in the cylinder.

If the caliper is the type shown on Fig. 3 and 4; the yoke and spring plates should be fitted to the yoke in the position noted before dismantling. Position the cylinder on the yoke (Fig. 6) and pull upwards, checking that the plates, spring and bias ring in the piston settle in position as the cylinder moves upwards.

If the mating surfaces of the yoke and cylinder were corroded and have been cleaned, refer to Fig. 8 and check the gap with feeler gauges. The measurement should be 0.006 in. (0.15 mm) to 0.012 in. (0.30 mm). However, a gap of up to 0.015 in. (0.38 mm) maximum is permissible as the caliper will still work efficiently, but calipers with large gaps have a tendency to be noisy during brake operation.

Reverse the dismantling procedure and refit the caliper to the vehicle. Insert pads and fit retaining pins and clips. Fit anti-rattle spring and connect electrical wear indicator if applicable. Repeat procedure with opposite caliper and bleed system as described in Section 1, Page 1D1.



A 0379

Girling 'A' type caliper 2A 6e

disc brakes

Discs

The condition of the disc (Fig. 10) is a vital factor in the efficient functioning of the brake.

The disc should run true between the pads. The maximum run-out permissible on the disc is 0.004 in. (0.1 mm) and if this tolerance is exceeded it will cause knock back of the pistons which will be recognised by pedal flutter. If there is any doubt concerning this condition the disc should be replaced.

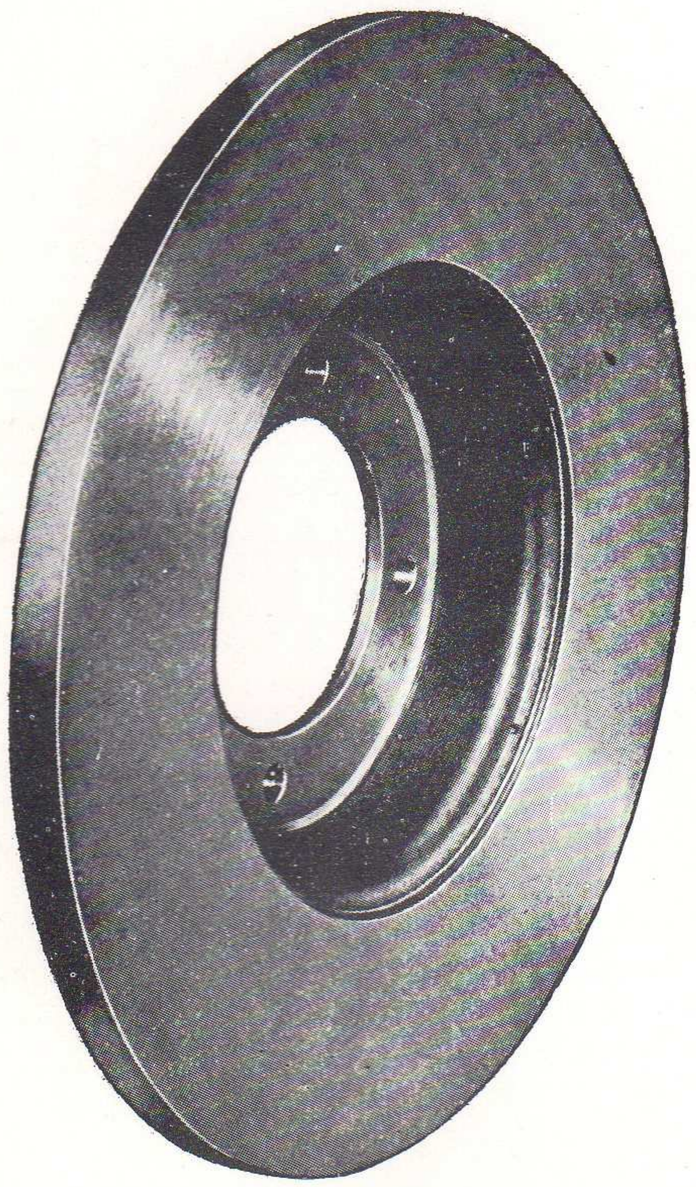
The surface of the disc should be smooth. The scratches and the light scoring which appear after normal use are not detrimental, but a heavily scored disc will impair efficiency and increase pad wear. Again if there is doubt a new disc should be fitted.

If replacement of the disc is impossible it is permissible to regrind but great care has to be exercised, and it should be done only by competent engineers with suitable grinding equipment. The disc must be rotary ground with the vertically mounted grinding wheel traversing the horizontal disc. The ground surface should be quite flat and parallel to the mounting face, with a fine finish. Special care should be taken to avoid sharp corners at the inner circumference of the ground surface. Both sides must be ground equally but the thickness of the disc should not, under any circumstances, be reduced below 0.050 in. (1.2 mm) of the original thickness.

There are three thicknesses of disc being manufactured at the present time, these are 3/8 in. (0.5 mm), ½ in. (12.7 mm) and 9/16 in. (14.3 mm). The importance of the accuracy of this work cannot be over-emphasised and regrinding should only be considered if a new disc cannot be obtained.

When fitted, the disc must run equidistant between the pad abutments and the disc (Fig. 11).
This ensures that the caliper is in line and the pads and pistons are square with the discs.
Shims should be used at the caliper mounting to correct any discrepancy.

10



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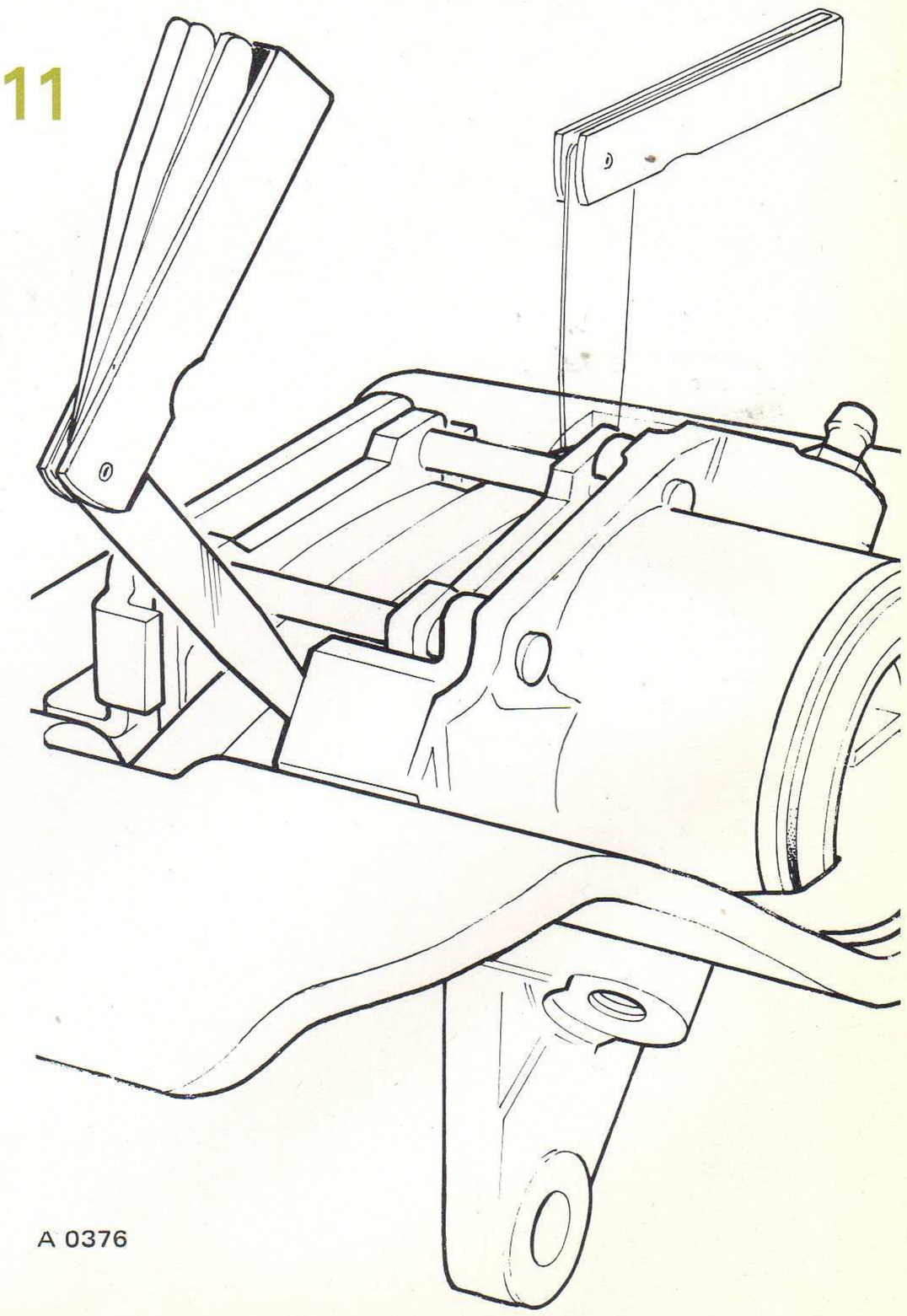


A 0376

S.1H. caliper (single sided swinging)

Introduction

The Girling Swinging Caliper rear disc brake (Fig. 1), combines in one unit all the advantages of the Girling front disc brake with an efficient and reliable handbrake.

The caliper has two friction pads, one moving and one fixed (Fig. 2) and when pressure is applied to the moving pad the caliper reacts so that the force is equalised on both sides of the disc. The caliper is pivoted on its mounting to allow the movement which is necessary, hence the title 'Swinging Caliper', although the movement when the brake is applied is barely visible.

The moving pad is operated by a cup assembly containing an adjustable push rod, which contacts and is moved by the cam face of the lever,which in turn is operated by either the hydraulic piston or handbrake tappet. This arrangement provides high ratio of mechanical advantage and places the hydraulic cylinder remote from the source of heat and this is the reason why the pads can be allowed to wear down thinner than the front caliper pads.

The automatic adjustment is controlled by a robust but ingenious mechanism. The adjustable push rod is held in the position shown by an 'S' spring. The cam face of the lever slides on the head of the push rod, or when the load is too great the push rod rocks with the moving cam. When the pads are moving towards the disc there is little or no load on the push rod and the cam slides on the push rod head. The pawl moving with the cam clicks over one of the teeth (if the movement is sufficient) on the push rod head.

When the pads contact the disc the load immediately becomes too great for the cam to slide and the push rod and cam move together.

On releasing the brake the push rod returns to the original position and the remaining movement of the lever and pawl (if sufficient) rotates the push rod head one click.

Thus every application of the brake whether by foot or by hand,automatically checks the condition of the adjustment of the pads and if necessary correction is made.

Servicing

To maintain the efficiency of the brake system, preventive maintenance is essential and the following recommendations should be observed at the intervals stated. Full details of preventive maintenance are incorporated in Section 1, Page 1A1.

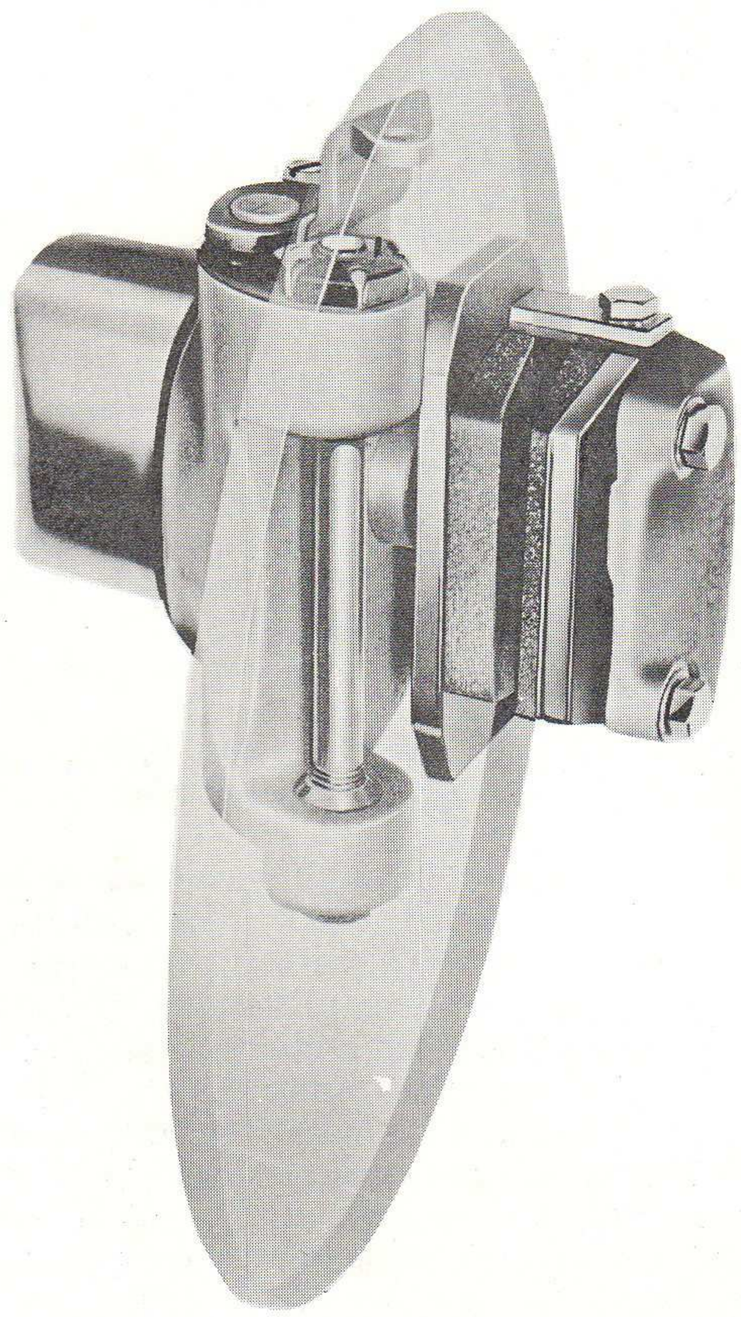
1. Check the pads for wear every 5,000 miles (8,000 km) and fit new pads when the lining thickness has worn to 1/16 of an inch (1.5 mm). If electrical wear indicators are incorporated the examinations should be unnecessary.

2. Every 10,000 miles (16,000 km) examine all brake pipes and flexible hoses for corrosion, fretting and signs of damage. Renew suspect parts and take action where applicable to prevent a recurrence of the trouble.

3. Change the Brake Fluid every eighteen months.

4. Every 40,000 miles (64,000 km) or three years, whichever occurs first, the caliper should be overhauled. All other hydraulic parts on the vehicle should also be replaced or overhauled and new hydraulic hoses should be fitted.

1



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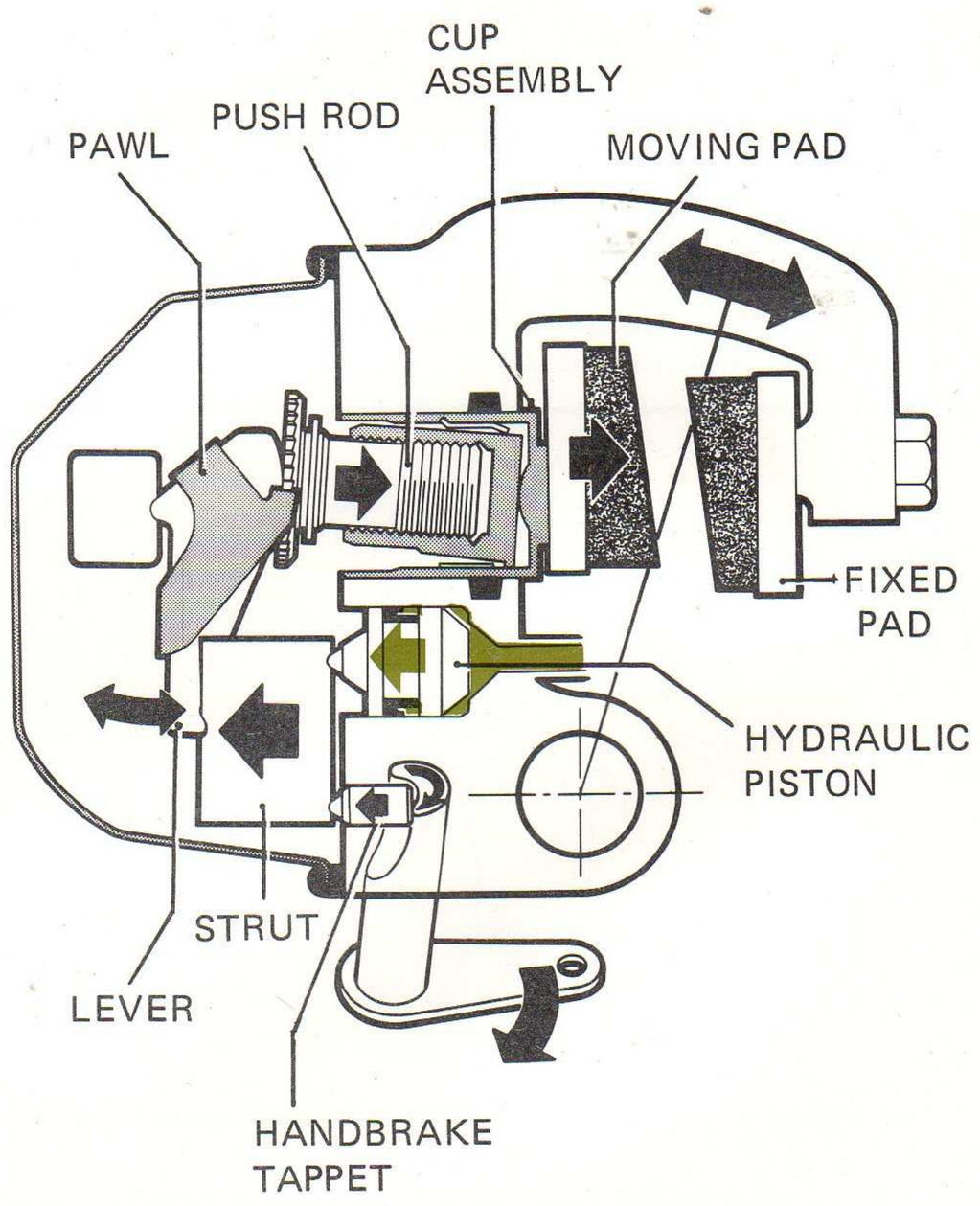


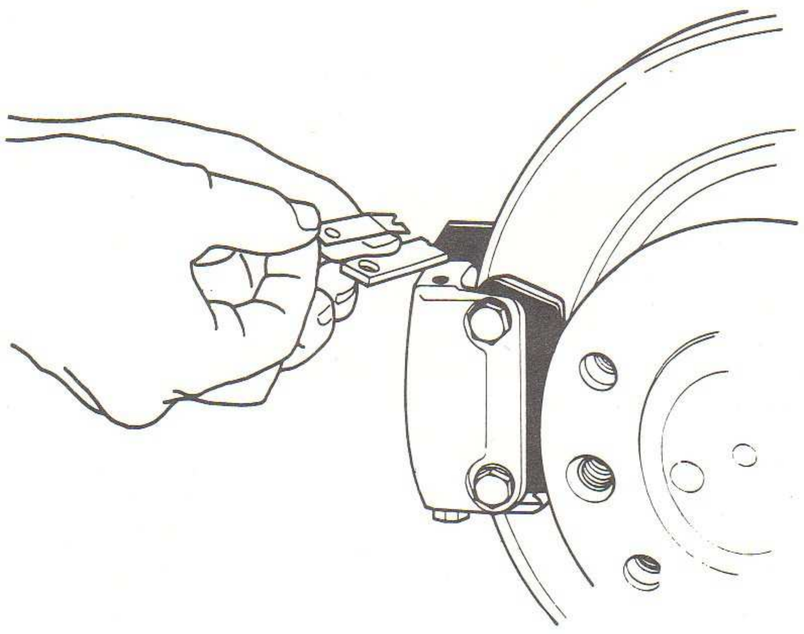
AO705

S.1H. caliper (single sided swinging)

Fitting New Pads

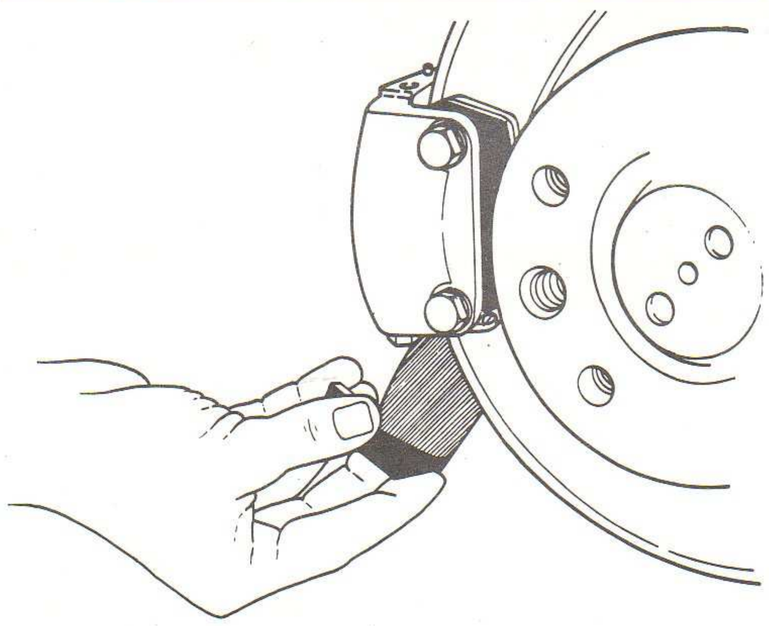
When the lining material has worn to 1/16th of an inch (1.5 mm) new pads should be fitted.

3 Unscrew the bolt and remove the plate and spring.



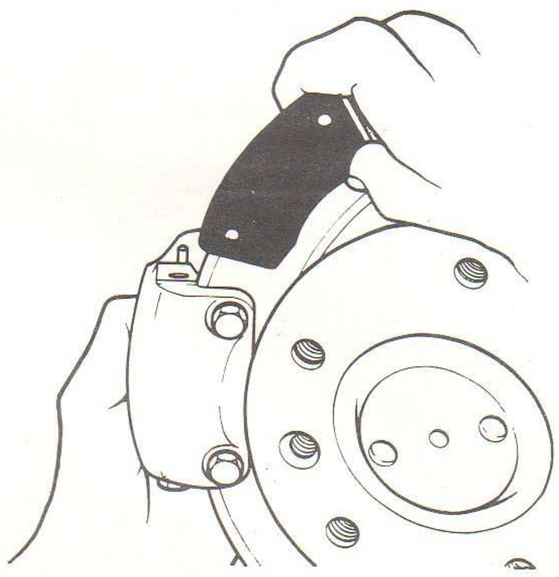
A0677/1

4 Swing the top of the pad forward and withdraw.



A0677/2

5 Pull the caliper onto the disc and remove the outer pad from the drag pins.

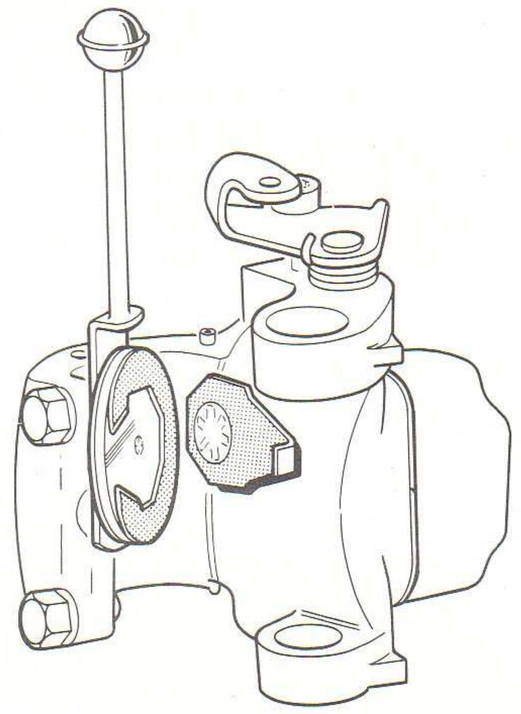


A0677/3

IMPORTANT :

After removing the old pads, check that the handbrake lever operates smoothly and the caliper pivots easily on the pivot pin. If necessary, lubricate the bearing surfaces with the special GRC grease number 64932047.

6 Fit the Girling tool number 64932048 on to the projecting cup as shown, with the red spot on the rear face of the tool aligned with the cup tab, as indicated by the arrow (6B). The first movement of the tool will lock it on the cup tab. Operate the tool by pushing the handle inwards to engage on the serrations and turn in the direction required. On some vehicles it may be necessary temporarily to disturb the brake linkage to operate the tool.



A

B

A0706

Turn the cup anti-clockwise one complete turn only. Remove the tool, clean the projecting area of the cup and smear with special GRC grease number 64932047. Refit the tool and turn the cup clockwise until it is right back and the clicking of the ratchet can be heard, or there is room to fit new pads.

To prevent binding, pivot the caliper to keep a small gap between disc and tool.

Before removing the tool, turn the cup until the red spot on the tool and the projecting cup tab are in the position indicated on picture number 6B.

If the pads have been allowed to wear exceptionally thin, it may not be possible to fit the tool on the cup because of insufficient clearance between the cup and the disc. In such instances, press back the cup to take up any end float and follow the procedure detailed previously, except that the cup will have to be turned by hand until there is sufficient clearance to fit the tool. Examine the ends of the drag pins and if they are round and true do not disturb them. If they are distorted fit new ones. Fit the new pads in reverse order to that shown above, refit the retaining plate and spring (dome uppermost), secure the tab washer, operate the footpedal or handbrake 20 to 30 times to move the pads to the correct operating position and road test.

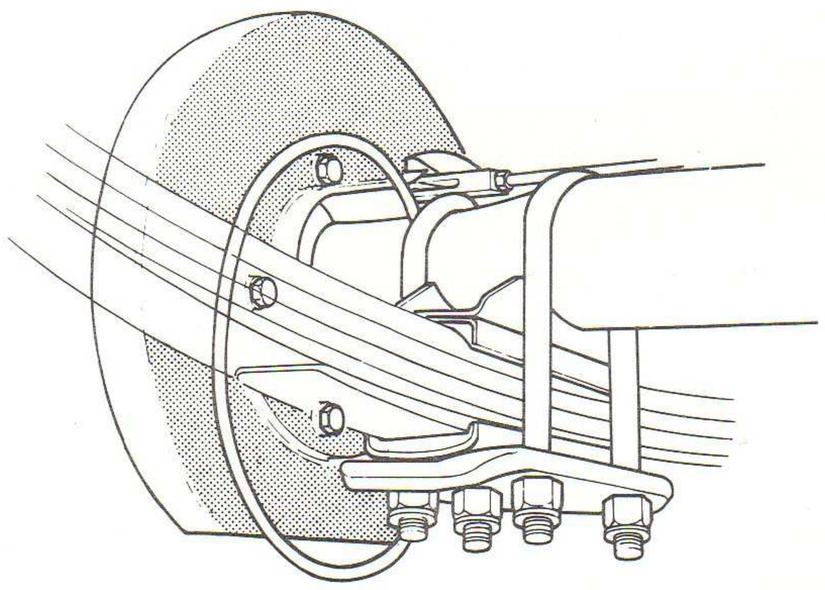
S.1H. caliper (single sided swinging)

Removing the Caliper

It should be unnecessary to touch the unit except for fitting new pads until it has been in use three years or travelled 40,000 miles, whichever is the sooner, and it is wise at this time to replace all seals and gaskets, and generally examine the components to make sure the brake is fit for another period of service. The flexible hoses should also be replaced. The overhaul will be timed to occur when pads need replacing and the following illustrations take it from the stage when the old pads have been removed.

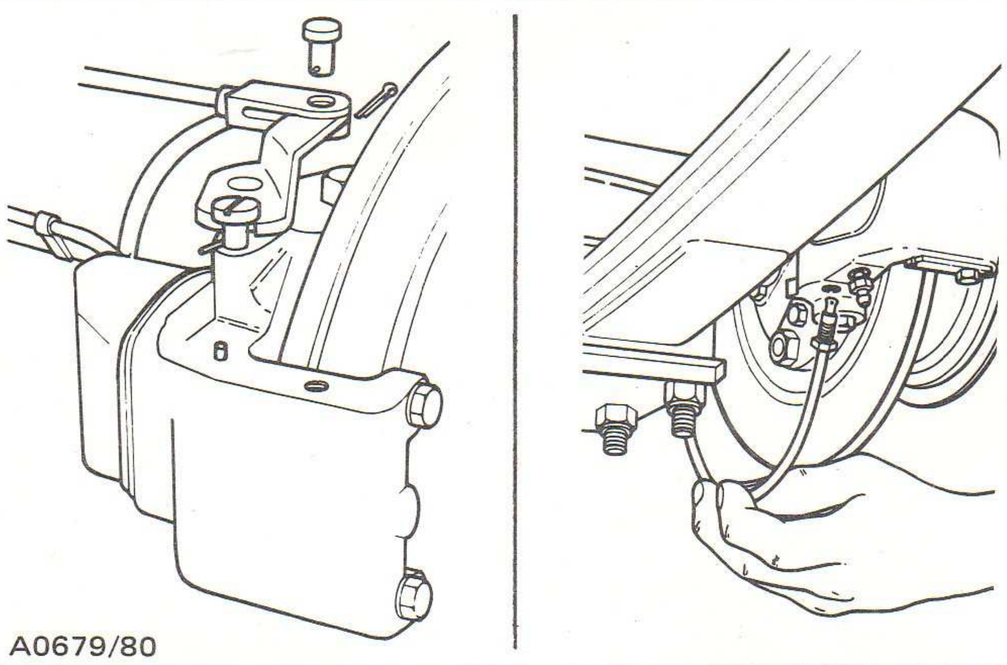
On some installations, some details may be different from those shown but the general procedure must be followed.

7 Remove the disc dirt shield.



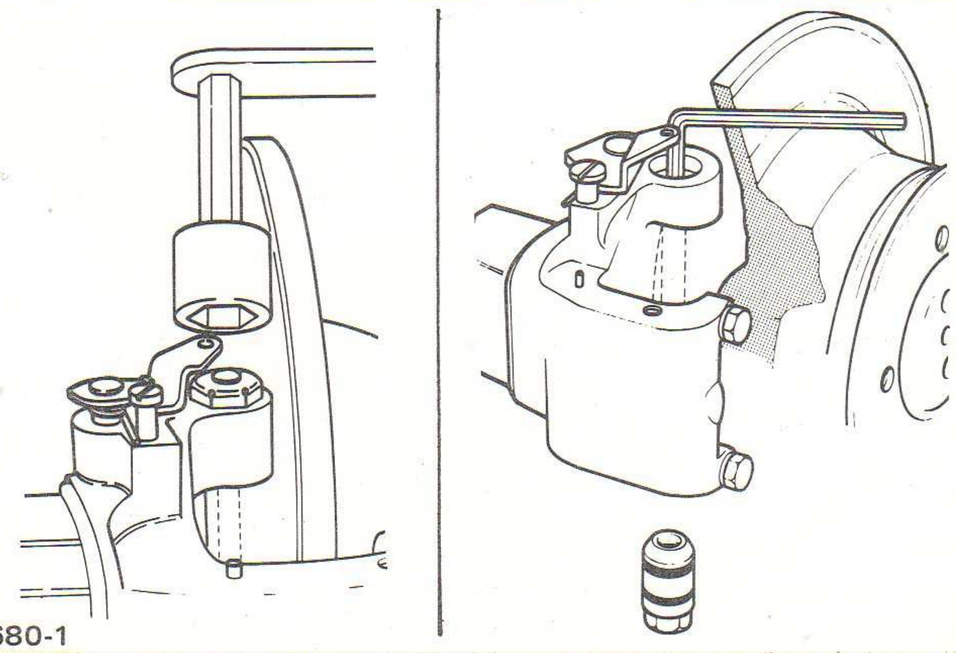
A0678

8 Disconnect the handbrake rods and the hydraulic pipe in the usual manner.



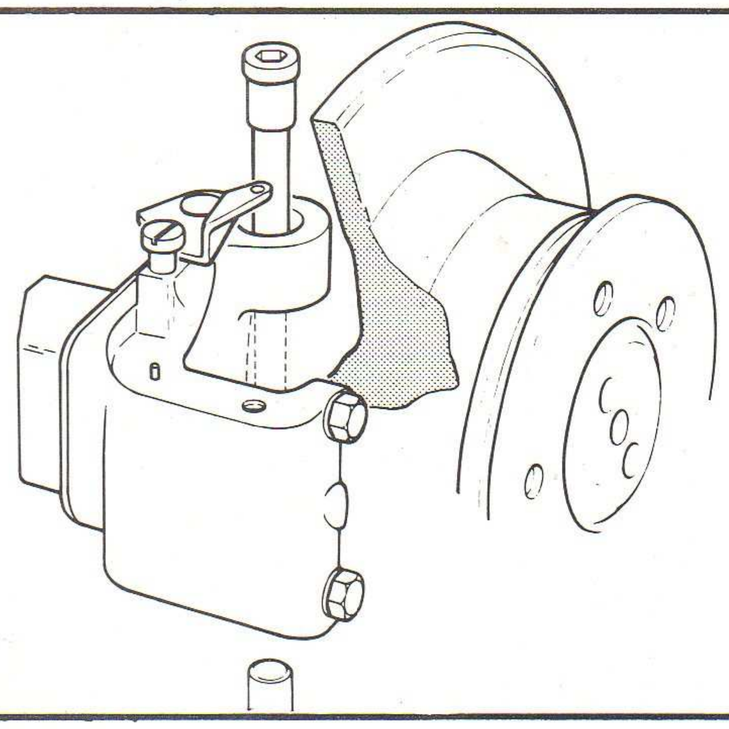
A0679/80

9 Turn handbrake lever clear (do not lift) and unscrew plug. Hold pivot pin with Allen key whilst unscrewing bottom bearing.



A0680-1

10 Push the pivot pin upwards and remove, which releases the caliper from the vehicle.

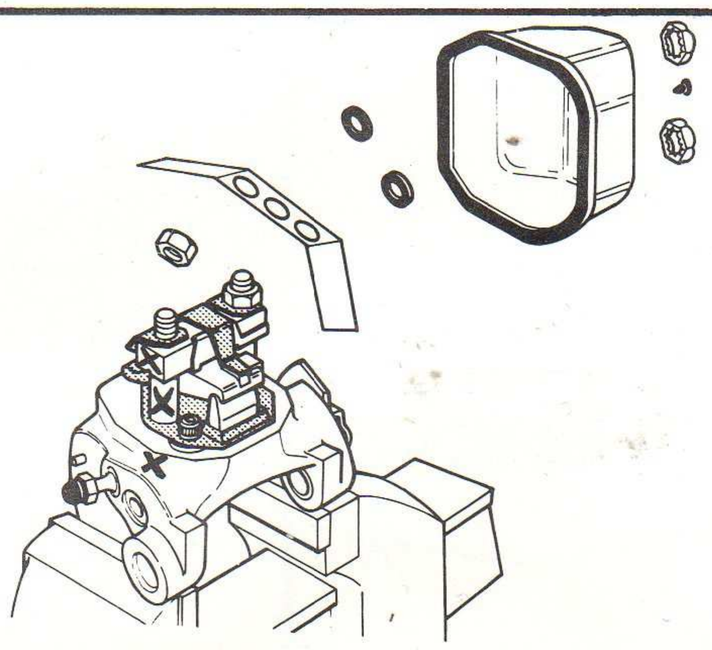


A0683

Dismantling

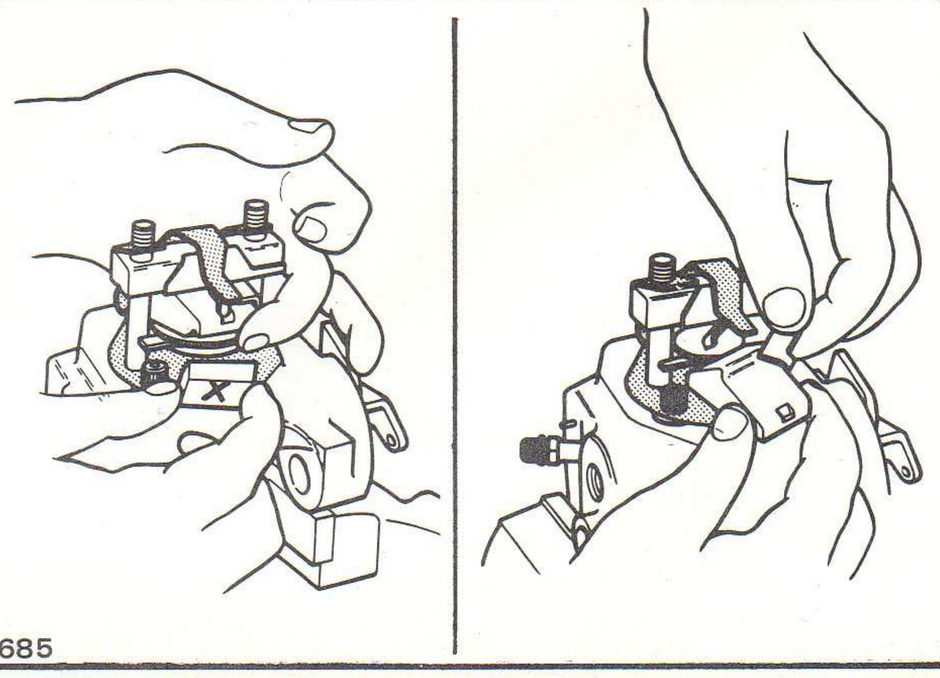
Since the caliper was first introduced a number of modifications have been incorporated. The copy and illustrations refer to the original unit but where necessary the difference in parts are shown. The instructions detail the correct procedure for the complete dismantling, cleaning and reassembling of the caliper once the pads have been removed. Several kits are available to service the unit and reference to Fig. 18 will indicate the parts and kits to which they belong. Wash the hands and place a clean piece of paper on the bench to receive the parts. Taking care not to damage the projecting dowels, clamp the caliper in a bench vice with padded jaws, as indicated on Fig. 11 and follow the instructions.

11 Remove the cover and washers. Mark the parts as shown and unscrew the nuts from the beam.



A0684

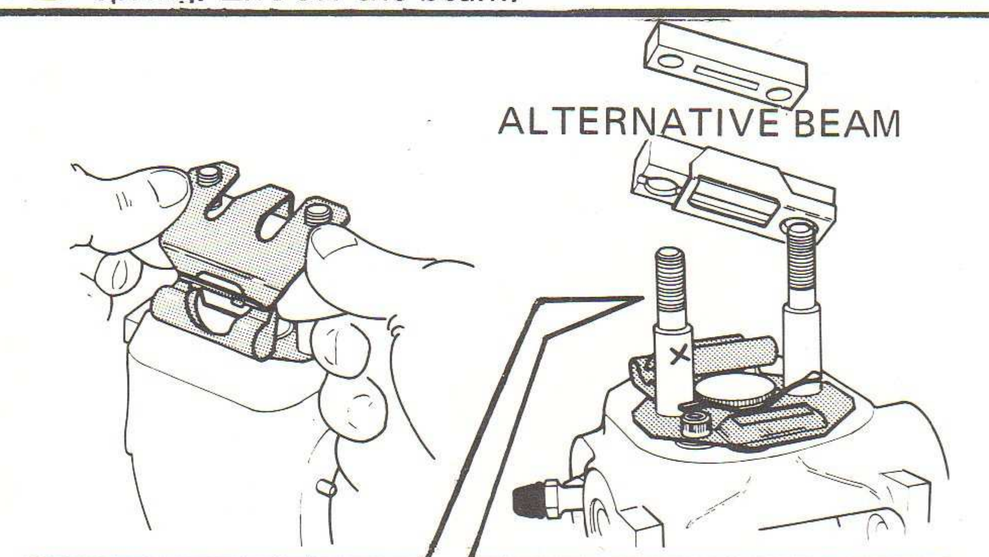
12 Mark the strut and remove. Press down the lever and withdraw.



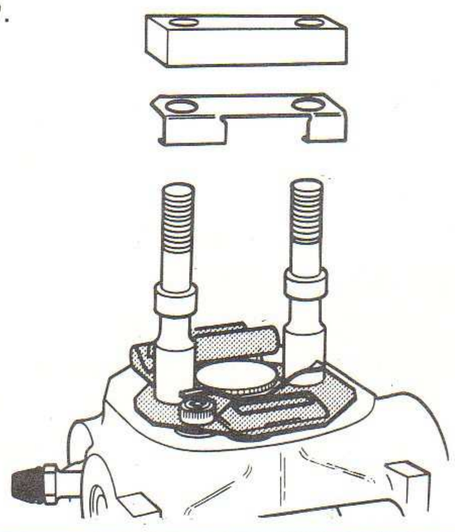
A0685

S.1H. caliper (single sided swinging)

13 Push up the cup from below and ease off the main spring. Lift off the beam.

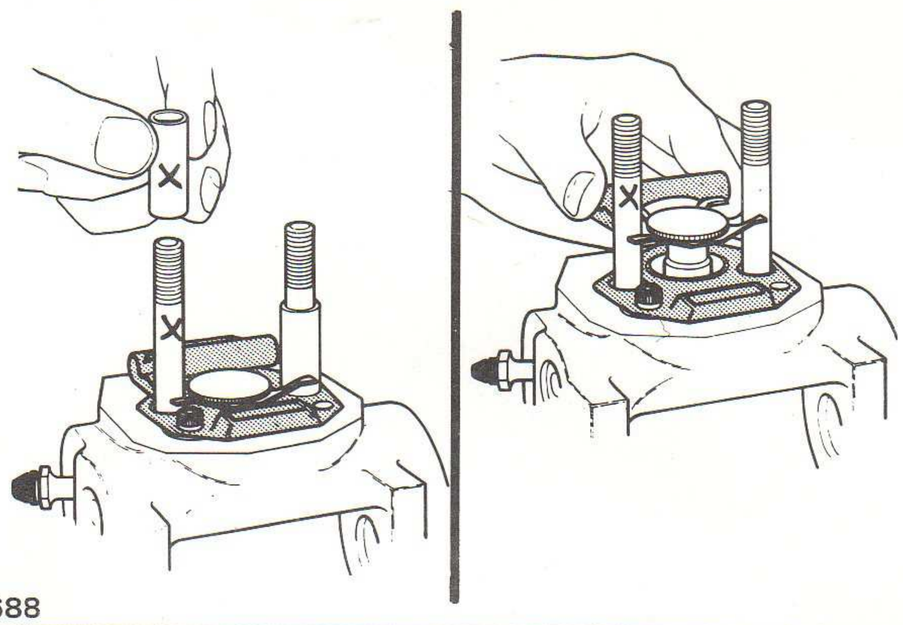


IMPORTANT:
View of shouldered studs, showing correct position of lever locator. If plain studs are replaced by shouldered studs, discard the old studs, sleeves and beam and fit the new parts as shown below.



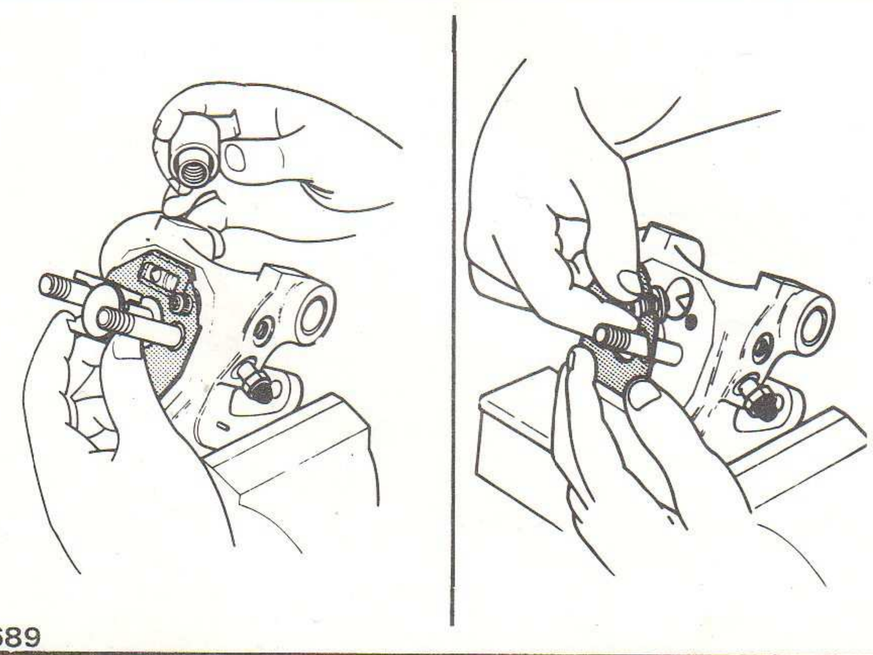
A0686-7

14 Remove both sleeves (current units have shouldered studs). Detach the 'S' spring.



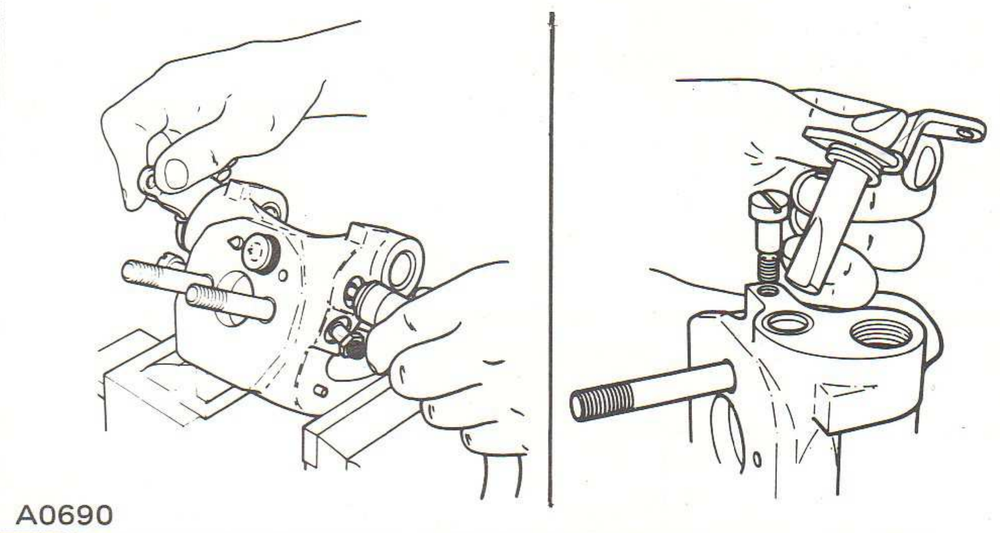
A0688

15 Unscrew the push rod and withdraw the cup assembly from below. Unscrew the Allen screw and remove the location plate and stop washer.



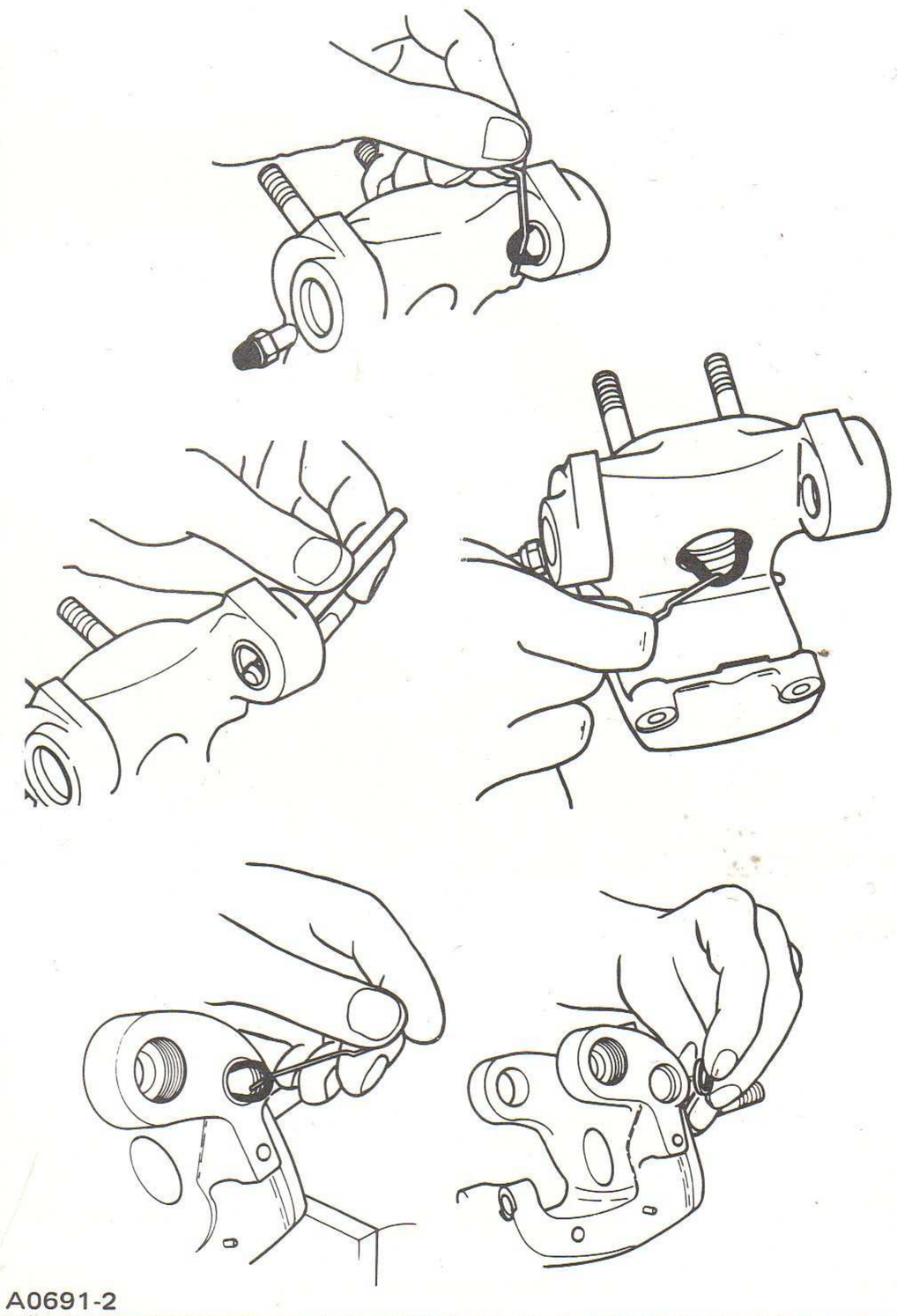
A0689

16 Rotate the handbrake lever to eject the tappet and blow out the hydraulic piston. Unscrew stop pin, turn the handbrake lever and withdraw.



A0690

17 Remove the remaining 'O' rings. Replace retainers only if damaged. Unscrew bleedscrew.



A0691-2

Cleaning

Clean all parts and the caliper thoroughly with Girling Cleaning Fluid or unused Castrol-Girling Universal Brake and Clutch Fluid.

Examine the hydrualic bore and piston for visible score marks, ridges and corrosion. Ensure the bore is smooth to the touch. Unless in perfect condition, fit a new guaranteed caliper.

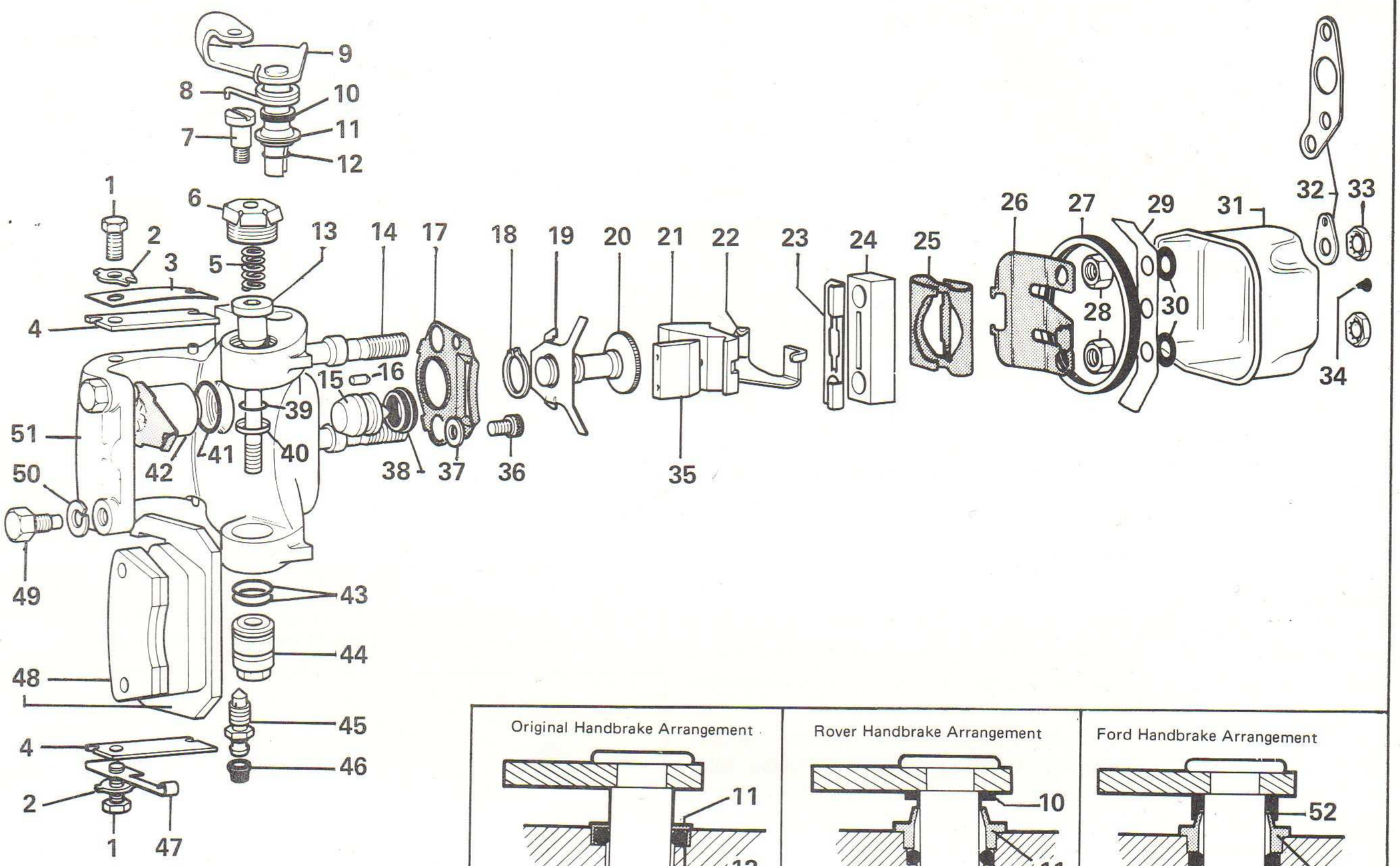
Check the ends of the drag pins which locate the pads are round and true. If in doubt fit new ones.

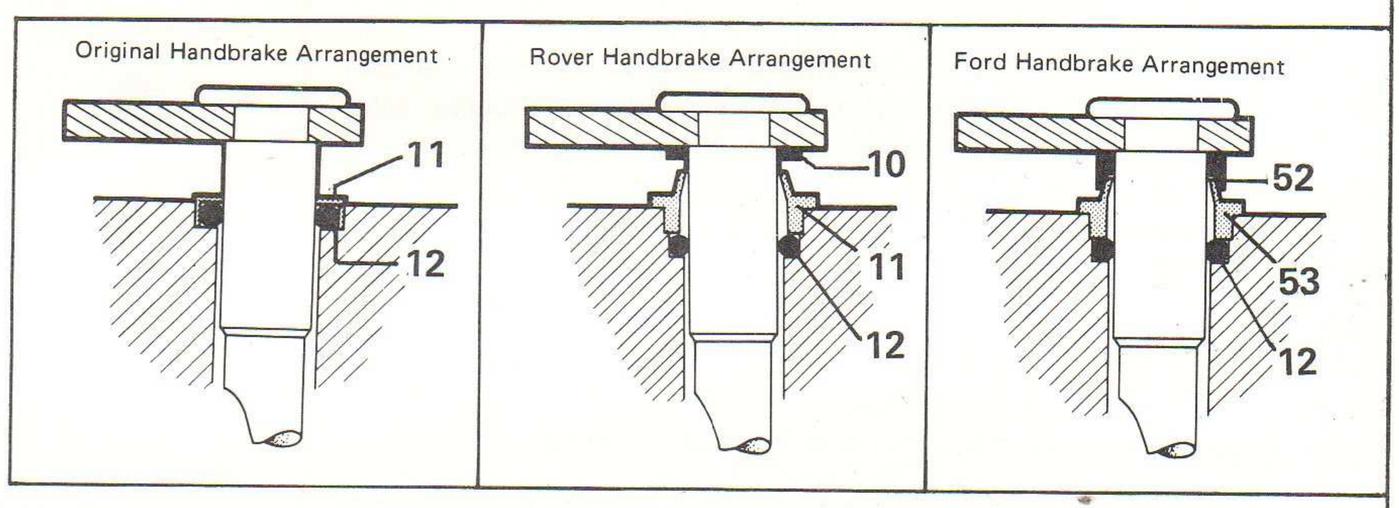
Ensure all other parts are in good working order and replace if necessary.

Several kits are available to service the unit and reference to Fig. 18 will indicate the parts and the kits to which they belong.

S.1H. caliper
(single sided swinging)

18





KEY

1.	PAD SET BOLT	*	27.	COVER GASKET	A
2.	TABWASHER	H	28.	STUD NUT	*
3.	PAD SPRING PLATE	H	29.	INHIBITOR	A
4.	PAD RETAINING PLATE	H	30.	RUBBER WASHER	A
5.	SPRING	J	31.	COVER	D
6.	PLUG	J	32.	RETAINING PLATE	*
7.	STOP PIN	*	33.	PALNUT	A
8.	HANDBRAKE LEVER SPRING	E and F	34.	RUBBER PLUG	A
9.	HANDBRAKE LEVER	E and F	35.	STRUT	D
10.	NYLON WASHER	A	36.	ALLEN SCREW	D
11.	SEAL RETAINER	A	37.	PISTON STOP WASHER	A
12.	'O' RING	A	38.	HYDRAULIC PISTON SEAL	A
13.	HINGE PIN	J	39.	'O' RING	A and J
14.	STUD	B	40.	RETAINER	A
15.	HYDRAULIC PISTON	A	41.	'O' RING	A
16.	TAPPET	D	42.	PISTON CUP ASSEMBLY	D
17.	LOCATION PLATE	D	43.	'O' RING	A and J
18.	CIRCLIP	*	44.	BEARING NUT	J
19.	COLLAR	D	45.	BLEEDSCREW	*
20.	PUSH ROD	D	46.	DUST CAP	A
21.	LEVER	B	47.	PAD SPRING	H
22.	PAWL	D	48.	PADS	H
23.	LEVER LOCATOR	B	49.	DRAG PIN	*
24.	BEAM	B	50.	SPRING WASHER	*
25.	'S' SPRING	C	51.	CALIPER BODY	NS
26.	MAIN SPRING	C	52.	SHROUD	A
			53.	RETAINER	A

* Supplied as separate item. NS Non Serviceable.

A0628

S.1H. caliper (single sided swinging)

Service Kits

	DESCRIPTION	PART NUMBER
KIT 'A'	CALIPER KIT	SP 2538
KIT 'B'	BEAM & STUD KIT	SP 2889
KIT 'C'	SPRING KIT	SP 2890
KIT 'D'	MECHANICAL KIT	SP 2891
KIT 'E'	HANDBRAKE LEVER KIT	SP 2892 (Ford only)
KIT 'F'	HANDBRAKE LEVER KIT	SP 2893 (Rover only)
KIT 'H'	PAD KITS	64932040 PA (Ford only)
		64932040 MD (Rover only)
KIT 'J'	HINGE PIN KIT	SP 2711 (Rover only)

It is important to note that kits 'B' 'C' and 'D' service single calipers only, whereas all other kits contain enough parts to service both rear calipers.

Reassembly

Fig. 18 shows all the parts ready for reassembly. Make sure the caliper and parts are clean, that the work area is clean and that no foreign matter or grease inadvertently contaminates the parts.

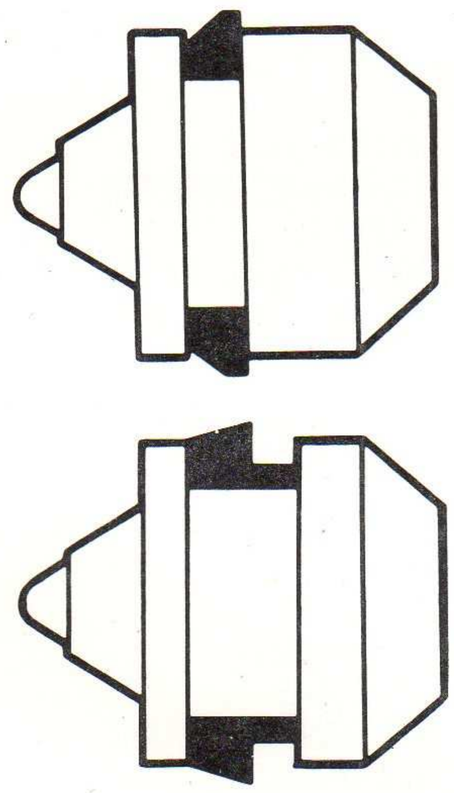
Fit the new seal to the hydraulic piston (as shown below) ensuring the seal does not twist whilst so doing. Also take care that the seal does not twist when the piston and seal are pressed into the bore (see Fig. 19).

If the retainers were damaged and therefore removed it is advisable to use metal drifts of the same diameter when fitting new ones.

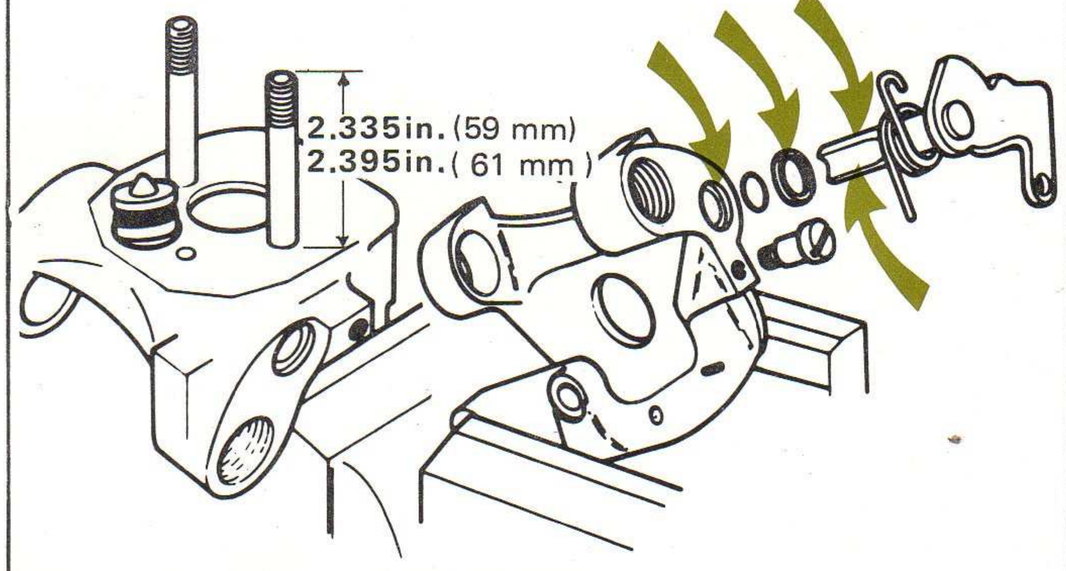
A number of parts require lubricating with the special GRC grease number 64932047 during reassembly. The arrows thus → indicate the parts and applicable areas.

OLD TYPE PISTON & SEAL

NEW TYPE PISTON & SEAL

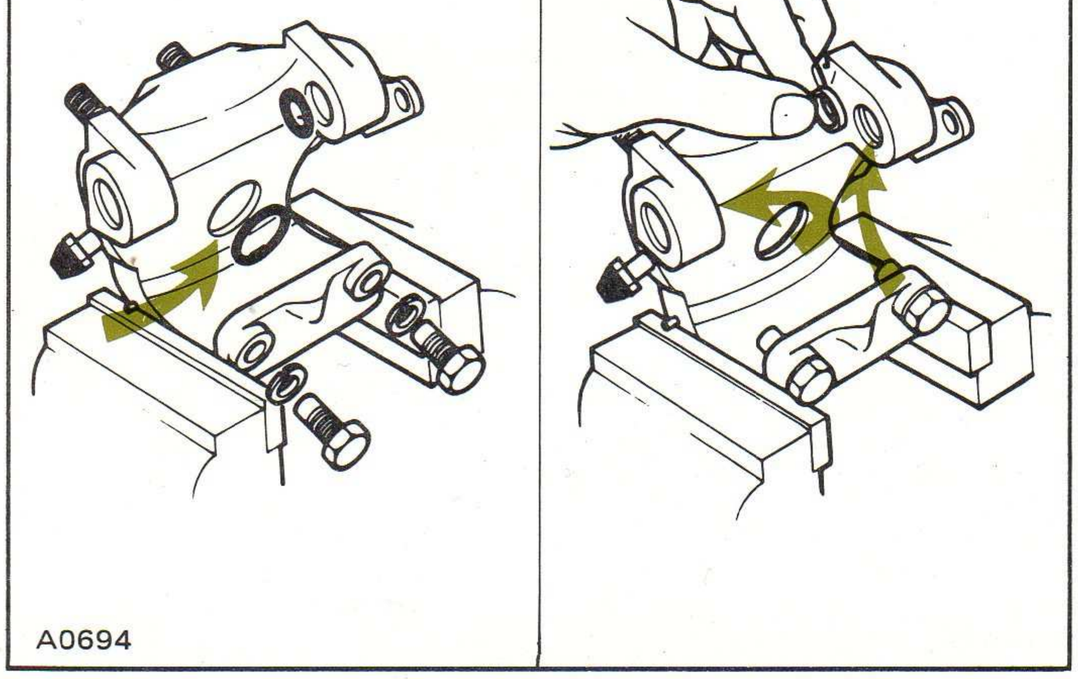


19 Carefully press home the hydraulic piston with seal. Insert retainer and 'O' ring. Refit the handbrake lever and refit stop pin. Check height of plain studs.



A0693

20 Fit retainer and 'O' rings. Screw in the bleedscrew and drag pins.



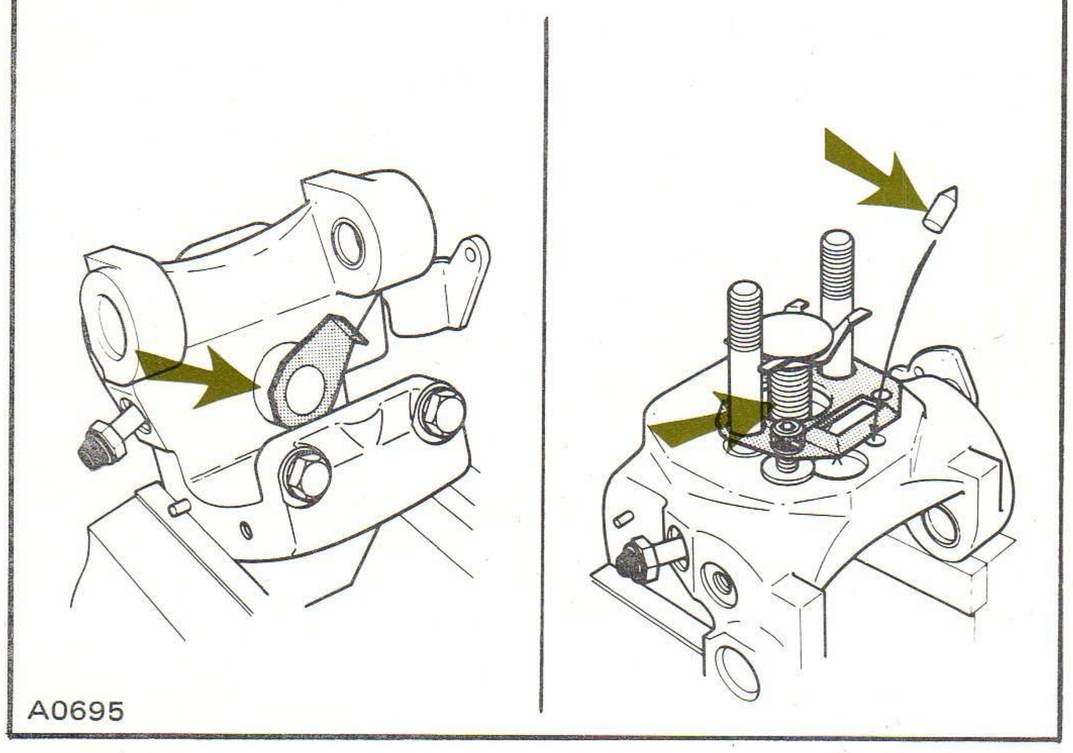
A0694

TORQUE WRENCH SETTINGS

ALLEN SCREW	9 lb. ft.	12Nm
DRAG PINS	11 lb. ft.	15Nm
BEAM NUTS	28 lb. ft.	38Nm
PAD SET BOLTS	9 lb. ft.	12Nm
COVERNUTS	3 lb. ft.	4Nm
BLEEDSCREW	4 lb. ft.	5Nm
PIVOT PIN	35 lb. ft.	47Nm
PLUG	28 to 35 lb. ft.	38 to 47Nm

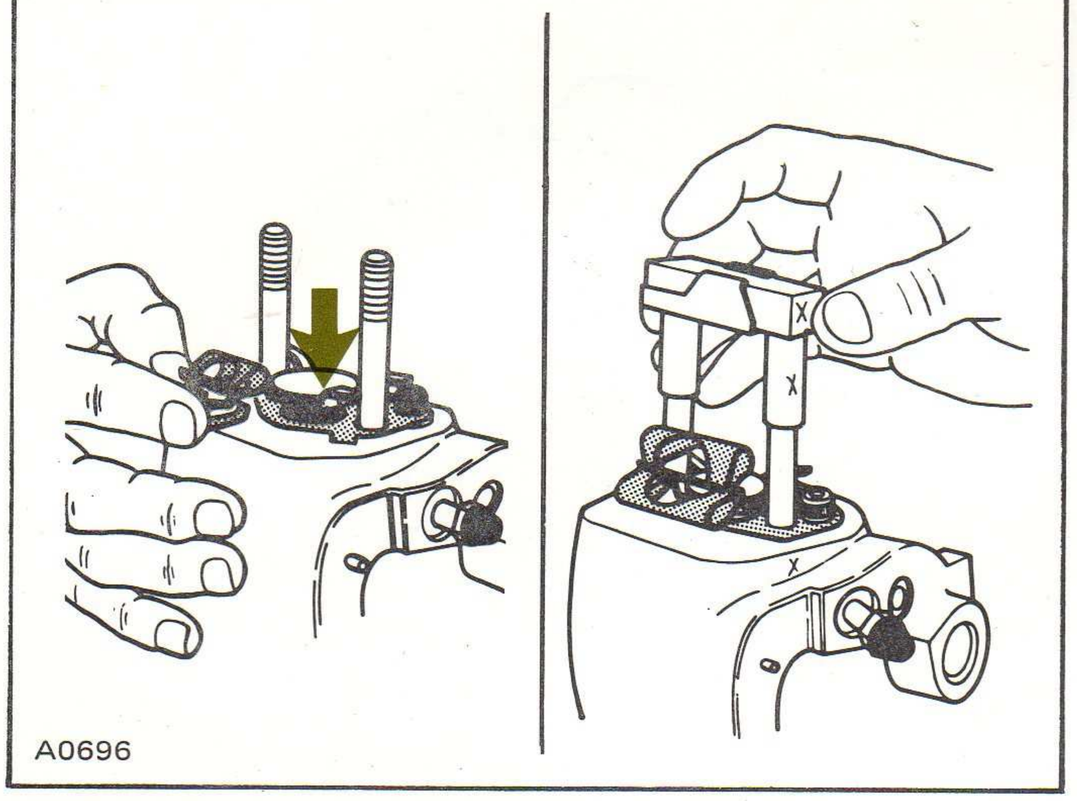
S.1H. caliper (single sided swinging)

21 Insert the cup assembly. Position the special hardened steel piston stop washer and location plate; loosely screw home the Allen screw. Insert the handbrake tappet, and screw in the push rod three complete turns only.



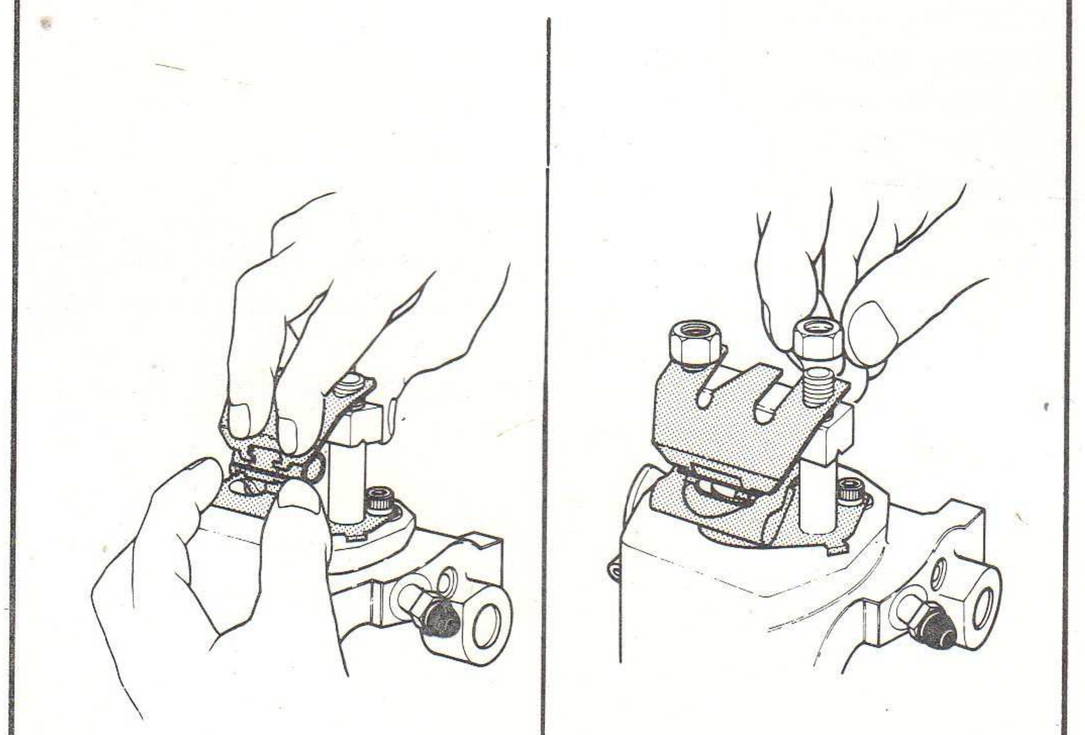
A0695

22 Attach the 'S' spring. Refit the sleeves to the appropriate studs and locate the beam as previously marked - refer to inset on Fig. 13 if shouldered studs are fitted.



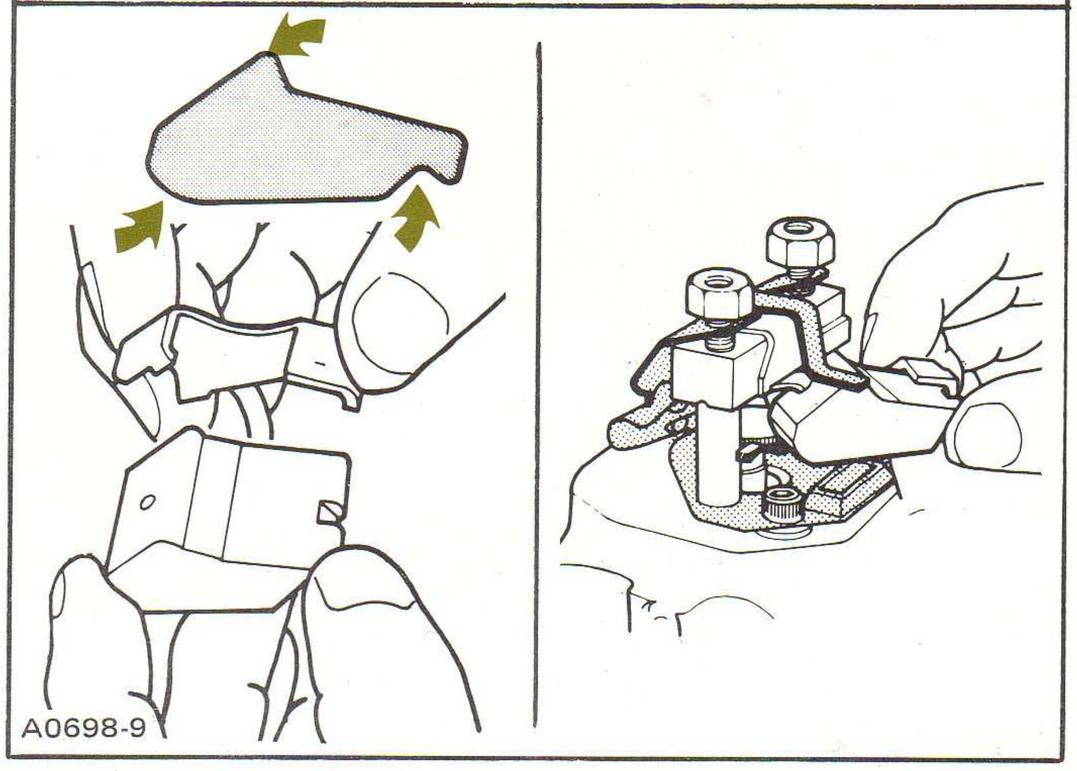
A0696

23 Attach the main spring and loosely screw on the nuts. Tighten the Allen screw.



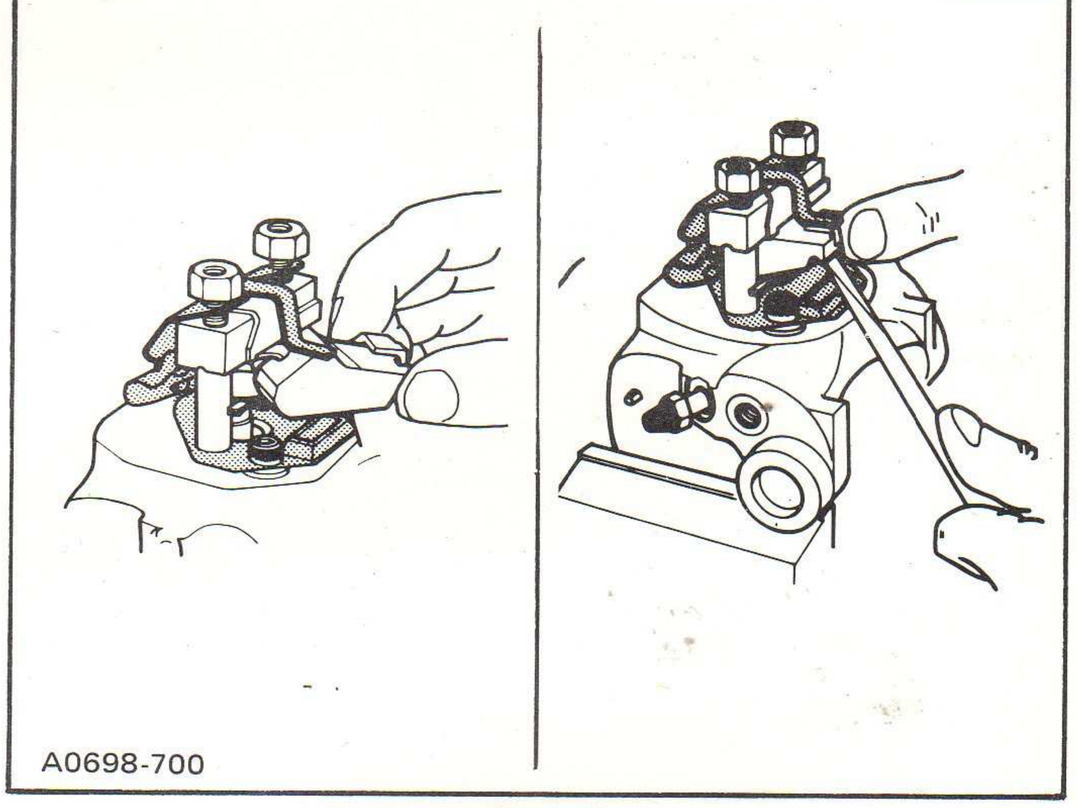
A0697

24 Fit the pawl on the lever and insert slantwise from the right, between the beam and the head of the push rod. To assist pull the cup down from below.



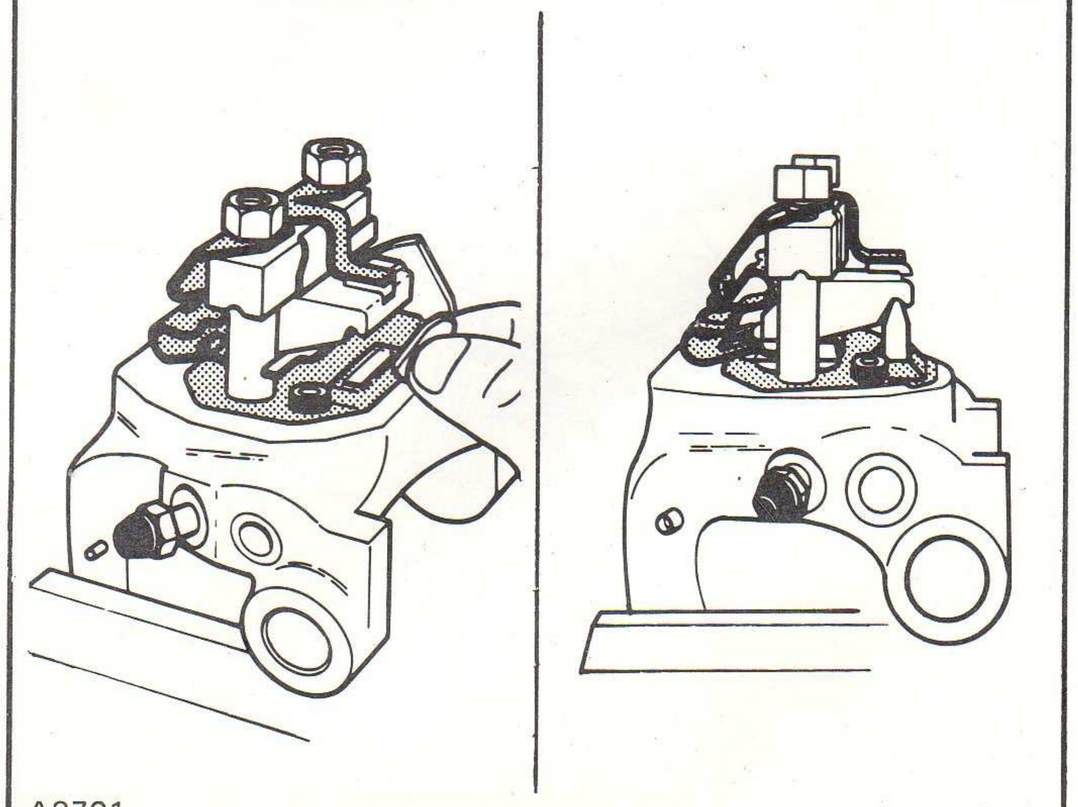
A0698-9

25 Swing the lever square and press in. Lift the end of the lever whilst rocking to locate.



A0698-700

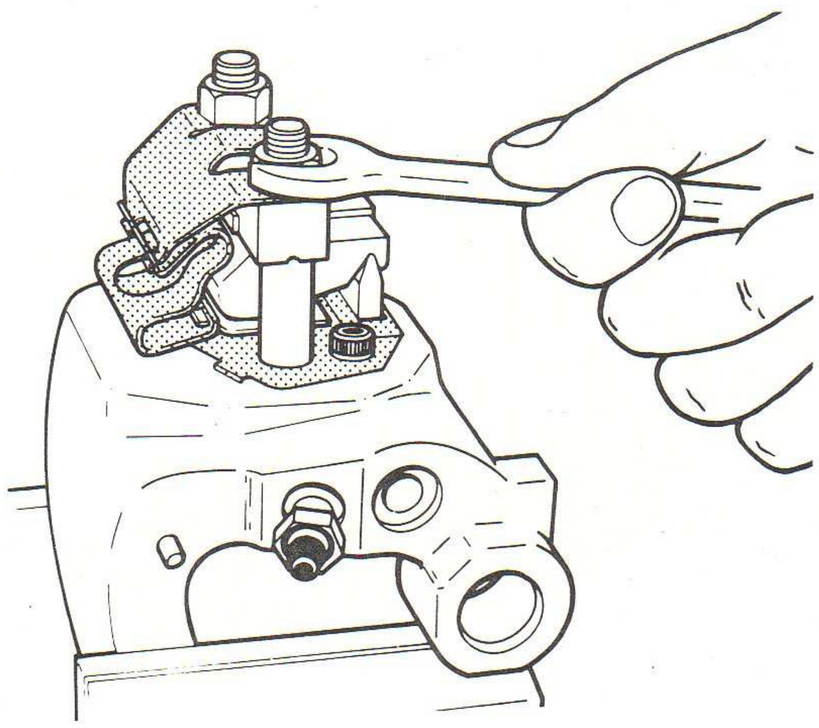
26 Fit the strut as marked and press under the lever. This is the side view of the unit.



A0701

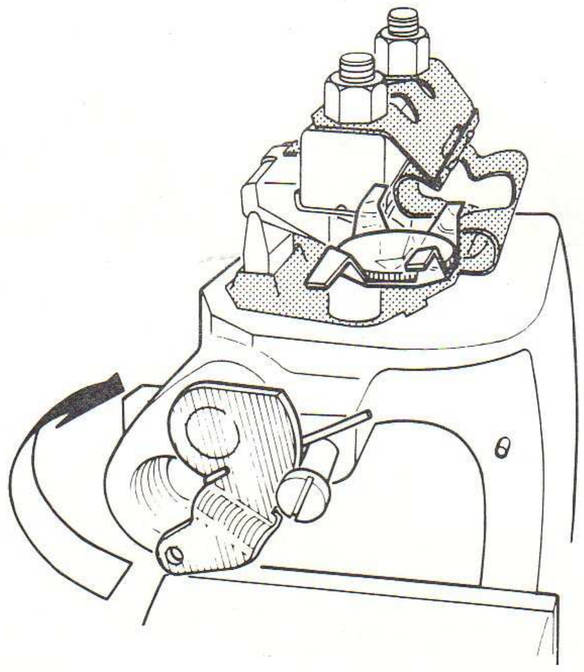
S.1H. caliper (single sided swinging)

27 Screw down the nuts.



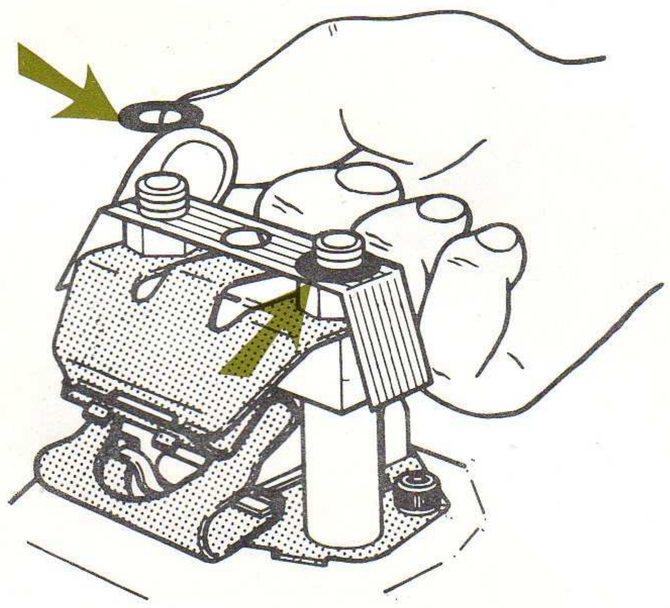
A0702

28 Test the action by operating the handbrake lever. The pawl should click as the lever moves and the serrated head should rotate on the return. If not, the lever with pawl is not correctly located.



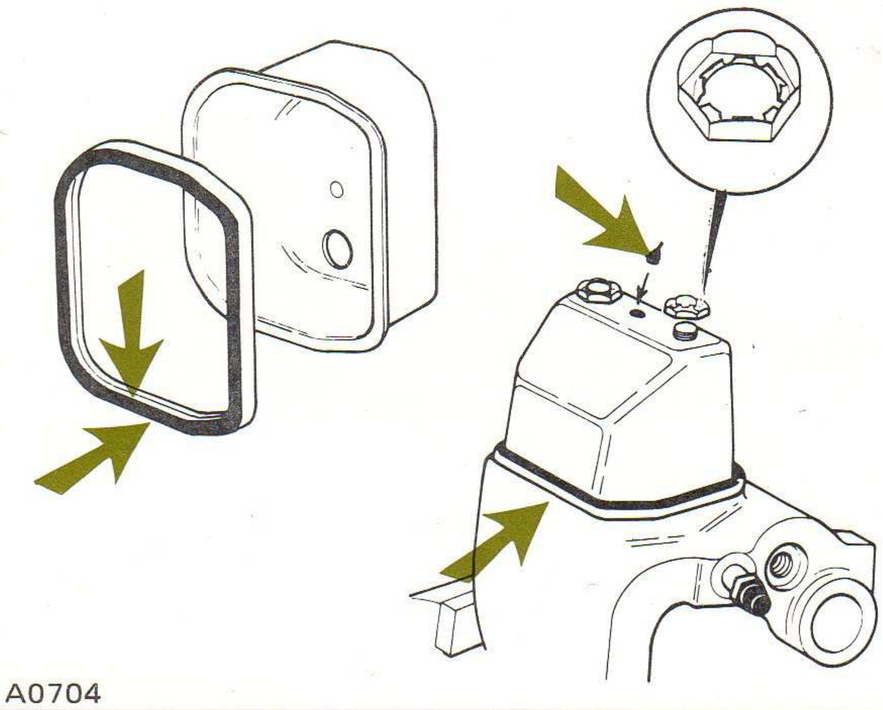
A0703

29 Place inhibitor paper in position, with light side facing caliper body. Follow with rubber washers.



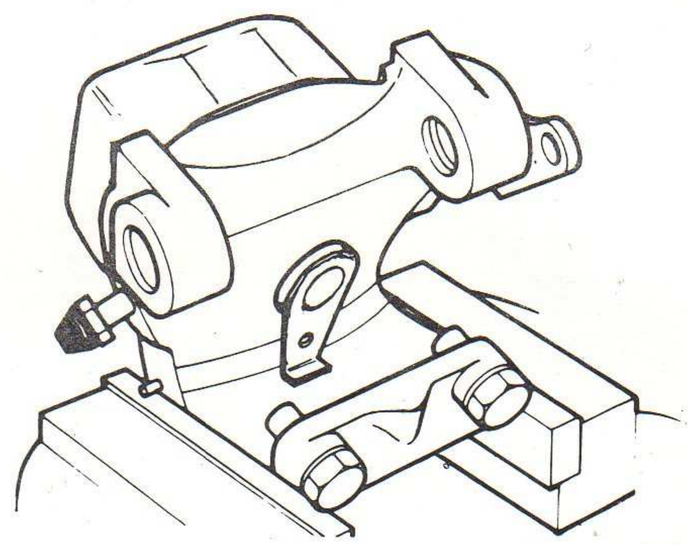
A0702

30 Fit new gasket to the cover and fit the cover. Fit plate and tighten the nuts. Fit the new rubber plug.



A0704

31 Screw in the cup and turn to the position shown. The unit is now ready to be fitted to the car.



A0687

Refitting the Caliper

Ensure the hinge pin and associated parts are in good working order and, if necessary, replace them with new parts from a Hinge Pin Service Kit.

Liberally apply the special grease to the bottom bearing and the bearing surface of the hinge pin, then proceed in reverse order to that shown in illustrations 7 to 10. Fit the new pads as described in illustrations 3 to 6.

Bleed the system in the recommended manner, using Castrol-Girling Universal Brake and Clutch Fluid. Apply the brake 20 to 30 times by foot or hand, to push the pads to the correct operating position and road test.

After a short bedding in period both foot and handbrake should be as good as when new.

S.1H. caliper (single sided swinging)

Fault Finding

FAULT	CAUSE	ACTION
1. Inefficient handbrake and footbrake. Wear on one pad only.	Caliper hinge pin seized.	Remove caliper hinge pin and associated parts. Ensure inside area of caliper mounting lugs are clean and liberally lubricate bolt lugs with special GRC grease (Part No. 64932047). Clean and refit parts, or fit new parts as necessary.
2. Loss of fluid. Check by removing rubber plug from caliper cover, or removing cover.	Hydraulic piston seal failure	Fit new caliper.
3. Hard pedal and/or brake squeal.	Incorrect pads fitted or lining glazed. Rust on disc. Oil on disc or pads.	Check front and rear pads and replace if necessary with axle sets of correct friction material. If pads correct, lightly rub friction material with fine emery-paper to remove glazing. Remove rust from disc or replace disc as necessary. Clean oil from disc and replace pads.
4. Very little handbrake and footbrake movement with brakes tending to bind.	Insufficient clearance between pads and disc (see fault No. 6) caused by over-adjustment of handbrake linkage, or caliper has been over-adjusted manually.	Remove pads and wind back piston cup assembly (see Page 2A 7b). Operate footbrake or handbrake until the disc is just free to rotate. Check handbrake linkage is adjusted in accordance with vehicle manufacturer's instructions and the handbrake lever rests against its stop when the handbrake is in the fully off position.
5. Handbrake efficiency gradually deteriorates and the brakes then bind.	Handbrake lever seized in caliper.	Remove handbrake lever stop pin, handbrake lever, 'O' ring and retainer from Caliper. Clean and inspect parts for wear and damage. If necessary, fit new parts from Service Kits. Lubricate parts with special GRC grease (Part No. 64932047) before fitting and ensure lever is free to pivot.
6. Excessive handbrake and footbrake travel — rear brakes not auto-adjusting.	Excessive clearance between pads and disc caused by lack of automatic adjustment. To measure clearance pull caliper onto disc and, whilst maintaining pressure, check gap between opposite pad and disc is between 0.008in. to 0.012in. (0.2 mm to 0.3 mm). The gap must be checked over whole of pad area.	If measurement is below minimum, caliper has been over-adjusted manually. Remove pads and wind back the piston cup. If measurement is above maximum, ensure the handbrake lever rests against its stop when the handbrake is in the fully off position. To check the auto-adjuster, remove pads and operate handbrake lever manually. A clicking noise should be heard and the piston cup assembly should move out towards the disc. If test proves negative, remove cover plate and examine the ratchet teeth on the push rod for signs of damage and see if the lever and pawl are correctly located. If necessary, remove caliper and ensure all parts are in good working order and replace, or fit new caliper as necessary.
7. Brakes pulling.	One rear caliper not operating.	See faults 1 and 6.

Dunlop handbrake attachments

disc brakes

Adjusting the Handbrake Cable

Automatic adjustment with Mk 11 assemblies and manual adjustment with Mk. 1 assemblies will usually adjust the handbrake lever travel. But, if there is excessive handbrake lever movement, reset in the following manner.

Place chocks under the front wheels, jack up the rear wheels and release the handbrake.

Disconnect the handbrake cable connecting the operating levers and move the pads up to the disc by working the operating levers with automatic Mk. 11 assemblies, but with Mk. 1 assemblies rotate the adjusting bolt until the pads are tight on the disc.

Adjust the handbrake cable so that the clevis can just be connected to the operating lever without strain, i.e. the cable should just be taut without pulling the operating levers from the fully off position.

Unscrew the adjusting bolt one third to one half turn with Mk. 1 assemblies to allow a minimum working clearance between pads and disc.

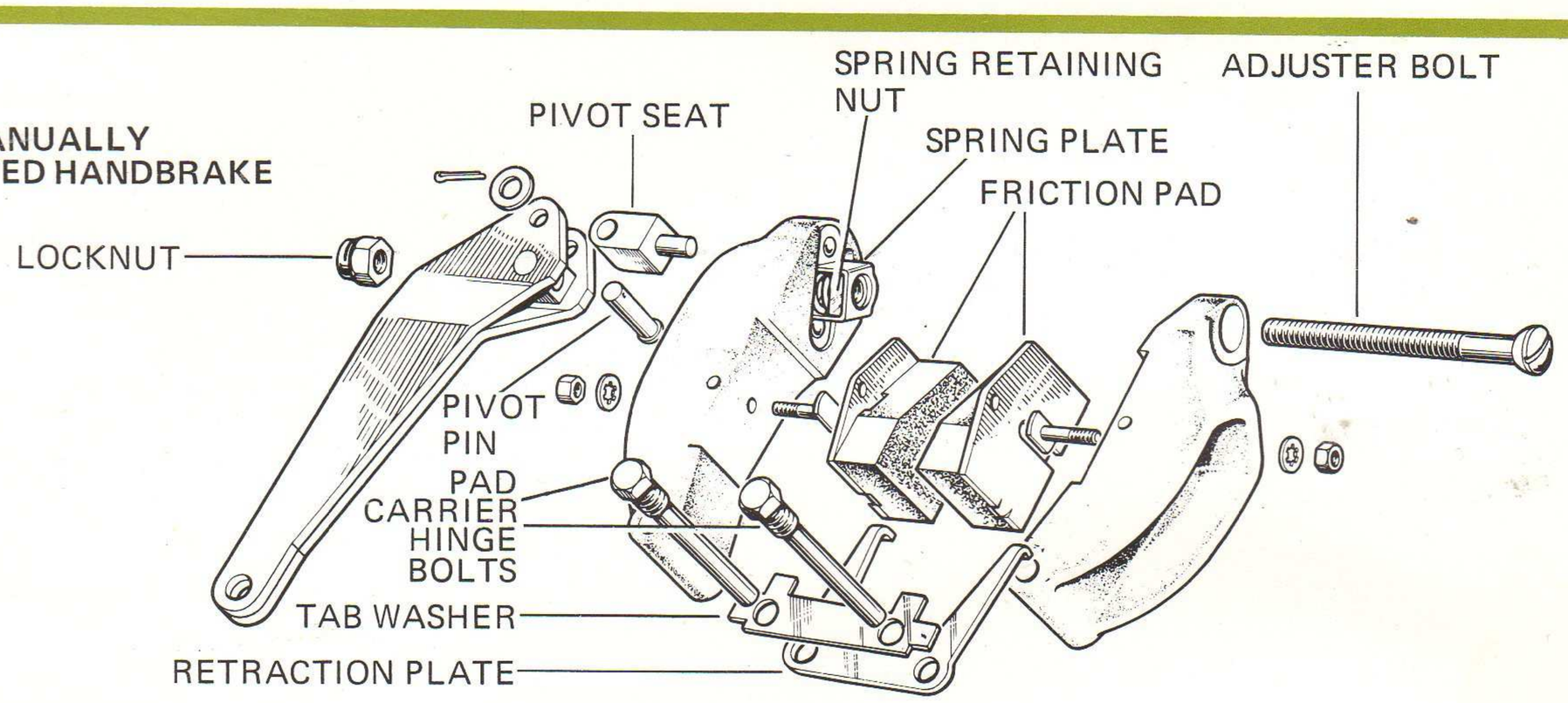
Check handbrake travel and road test.

Discs

A certain amount of disc scoring and wear is to expected in service but this is not detrimental to brake efficiency. Discs need only be regarded as unsatisfactory when this condition has reached an advanced stage.

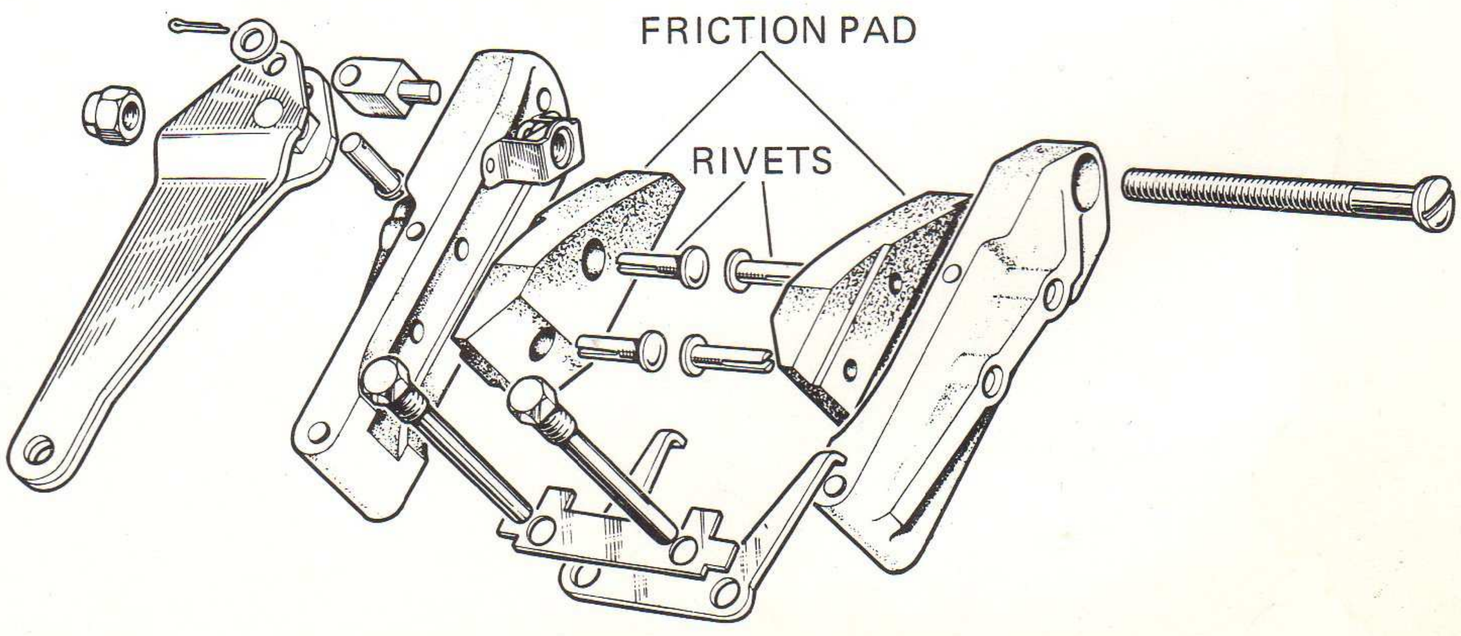
For further details refer to Page 2A 4, this Section.

5 **MK.I MANUALLY ADJUSTED HANDBRAKE**



A 0080/2

6 **EARLY MK.I HANDBRAKE**



A 0080/3

Dunlop handbrake attachments

disc brakes

Introduction

Separate mechanically operated handbrake assemblies (Figs. 1 and 2), provide parking and emergency braking on rear discs. The handbrake assemblies are secured to the mounting lugs of rear calipers by hinge bolts. Each assembly consists basically of two pad carriers which straddle the disc and an operating lever which pivots on a pin fitted through the fork end of the inner carrier. A threaded adjustment bolt passes through the carriers and a trunnion mounting in the operating lever.

The Mk. 1 handbrake (Fig.3) is manually adjusted and to maintain peak efficiency it is necessary to adjust the pads at frequent intervals. The Mk. 1 brake was superseded by the Mk 11 brake (Fig. 3) which is self-adjusting.

The operating lever of the Mk. 11 handbrake incorporates a ratchet mechanism which consists of an adjusting nut with ratchet teeth and a spring loaded pawl attached to the lever. As the pads wear, movement of the operating lever increases until it exceeds a predetermined amount, the adjusting nut is then turned the equivalent of one tooth by the pawl as the brake is released. Adjustment is therefore automatic throughout the life of the pads.

A constant minimum clearance between pads and disc is maintained by a retractor plate, the fingers of which locate in the pad carriers. Some retraction plates are handed and the shorter finger should always be fitted to the pad carrier adjacent to the operating lever. The illustration (Fig. 3) shows how handed plates can be identified. It should be noted that some early Mk. 1 handbrakes did not incorporate retraction plates and therefore the pad carriers do not incorporate the small holes to locate the retraction plate fingers.

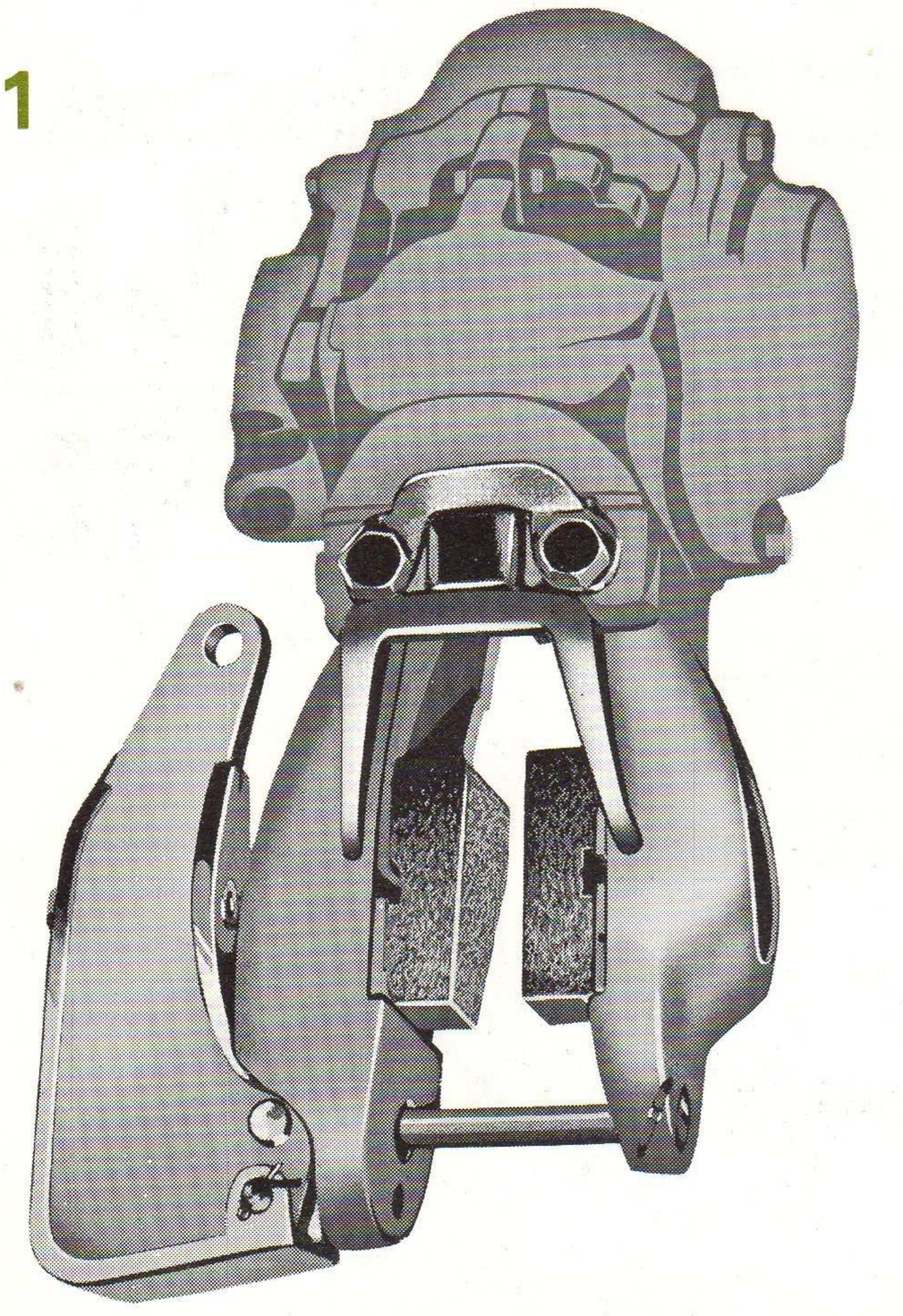
Servicing

Adjust the Mk. 1 handbrake assemblies when the handbrake travel becomes excessive.

Check the pads for wear every 5,000 miles (8,000 km). It is time to consider replacing the pads when the minimum lining thickness is one eighth of an inch (3 mm) for rivetted pads and one quarter of an inch (6 mm) for pads with backing plates. The pads must not be allowed to wear until the rivets or backing plate contact the disc.

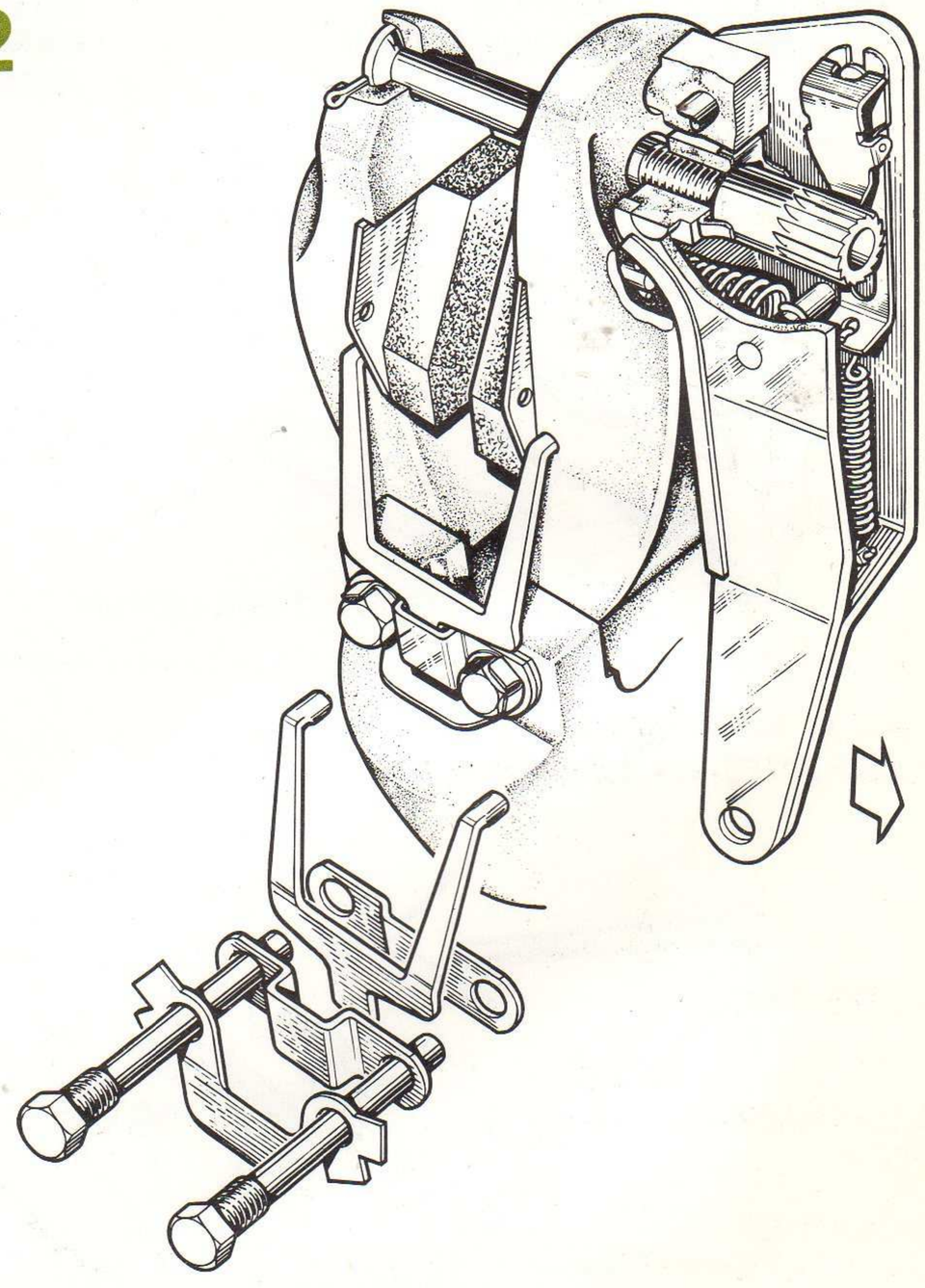
Lubricate the handbrake linkage in accordance with the Vehicle Manufacturer's Instructions and, at the same time, lightly smear the operating lever pivot pin and adjusting bolt with Girling Brake Grease.

1



A 0426

2



A 0077

Dunlop handbrake attachments

Fitting New Pads (Mk. 1 Handbrake Assemblies)

Unscrew and remove the adjuster bolt and locknut (Figs. 5 and 6).

Remove the split pin and withdraw the lever pivot pin.

Remove the bifurcated rivets from pad carriers and prise off the worn pads. If bolts are fitted, slacken the locknuts and withdraw the pads.

Position new pads and secure with new bifurcated rivets or tighten bolts, as applicable.

Lightly smear the pivot pin and the threads of the adjuster bolt with Girling Brake Grease.

Place the lever against the inner carrier and hold the locknut firmly against the outer face of the trunnion.

Screw in the adjuster bolt three or four threads. It may be necessary to temporarily disconnect the handbrake cable to tilt the lever sufficiently to engage the threads correctly.

Align holes in lever and pivot seat, fit pivot pin and secure with split pin.

Reset pad clearance by tightening adjustment bolt until the pads are lightly in contact with the disc, then slacken back one third to one half turn. This clearance must be reset when the handbrake travel becomes excessive after use.

Check handbrake lever travel, if excessive adjust cables as described on Page 2A 8c.

Fitting New Pads (Mk. 11 Handbrake Assemblies)

Remove the split pin and slacken adjuster bolt (Fig. 4).

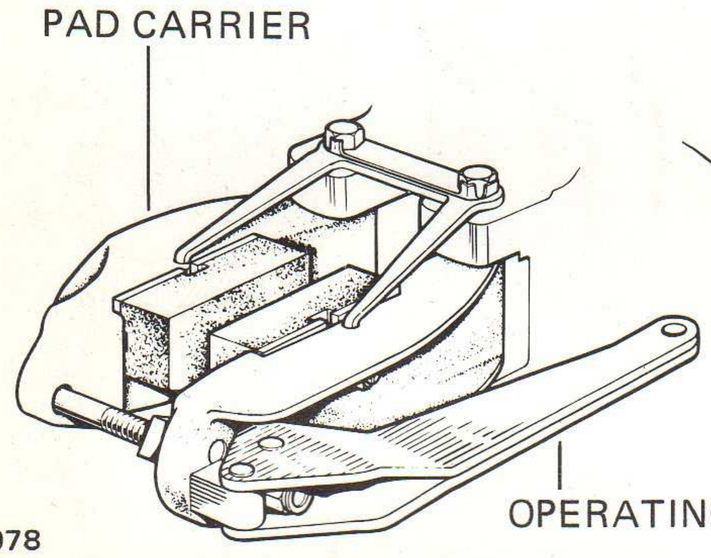
Slacken locknuts on pad fixing bolts and withdraw worn pads.

Fit new pads and tighten locknuts on fixing bolts.

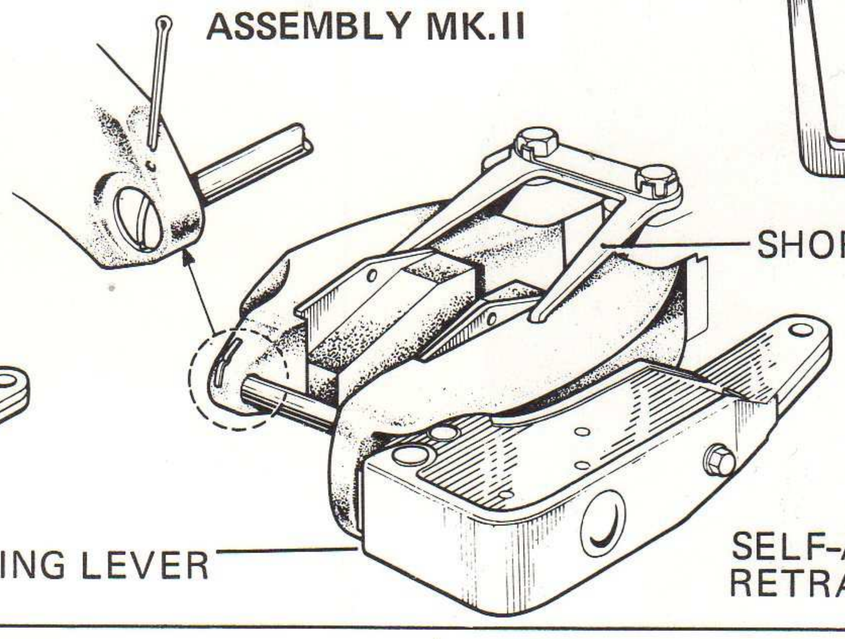
Screw in adjuster bolt and fit split pin to secure. Operate the handbrake to reset the minimum clearance between pads and disc. If handbrake lever travel is still excessive, adjust linkage as described on page 2A 8c.

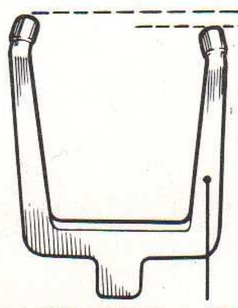
ILLUSTRATIONS SHOWING THE DIFFERENCE BETWEEN MK. I AND MK. II HANDBRAKES

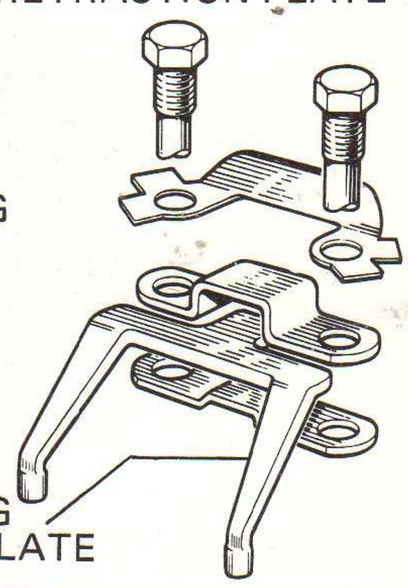
3 **MANUALLY ADJUSTED HANDBRAKE ASSEMBLY MK.I**



AUTOMATICALLY ADJUSTED HANDBRAKE ASSEMBLY MK.II

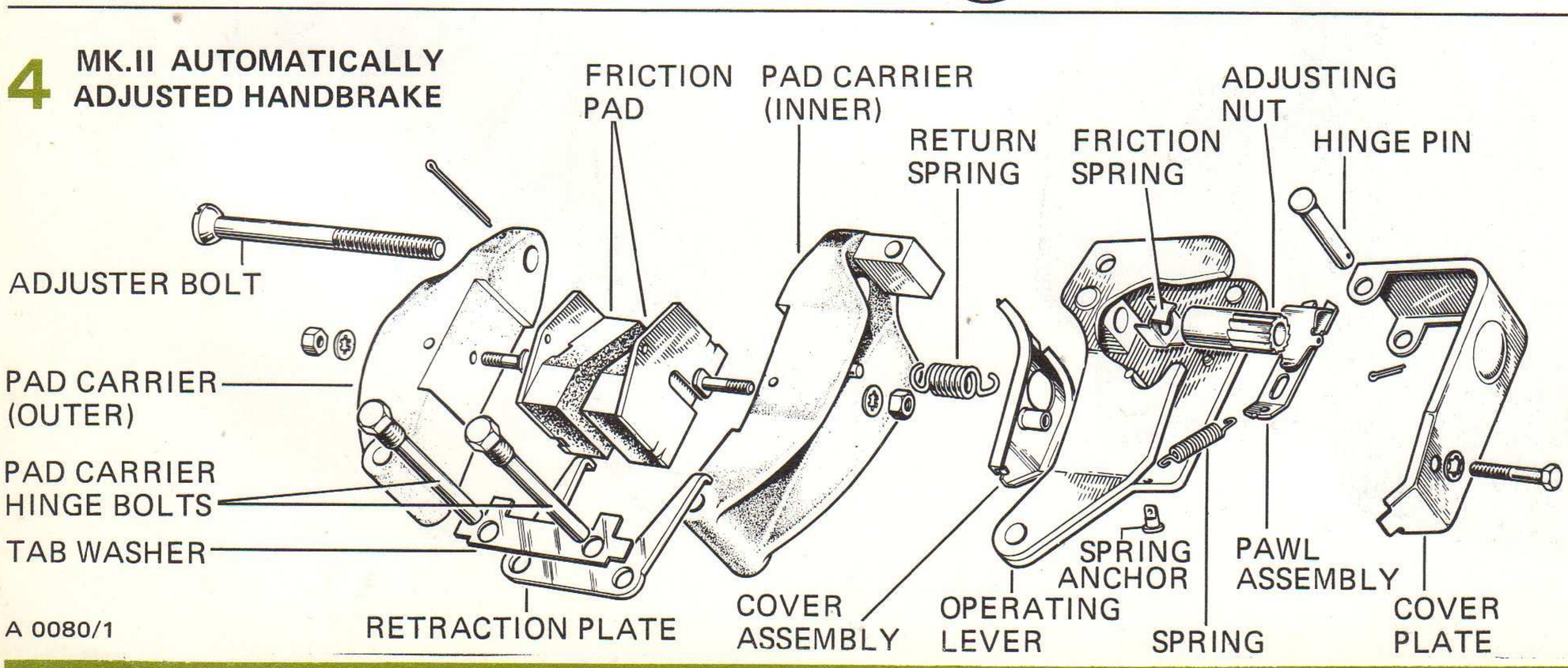






A 0078

4 **MK.II AUTOMATICALLY ADJUSTED HANDBRAKE**

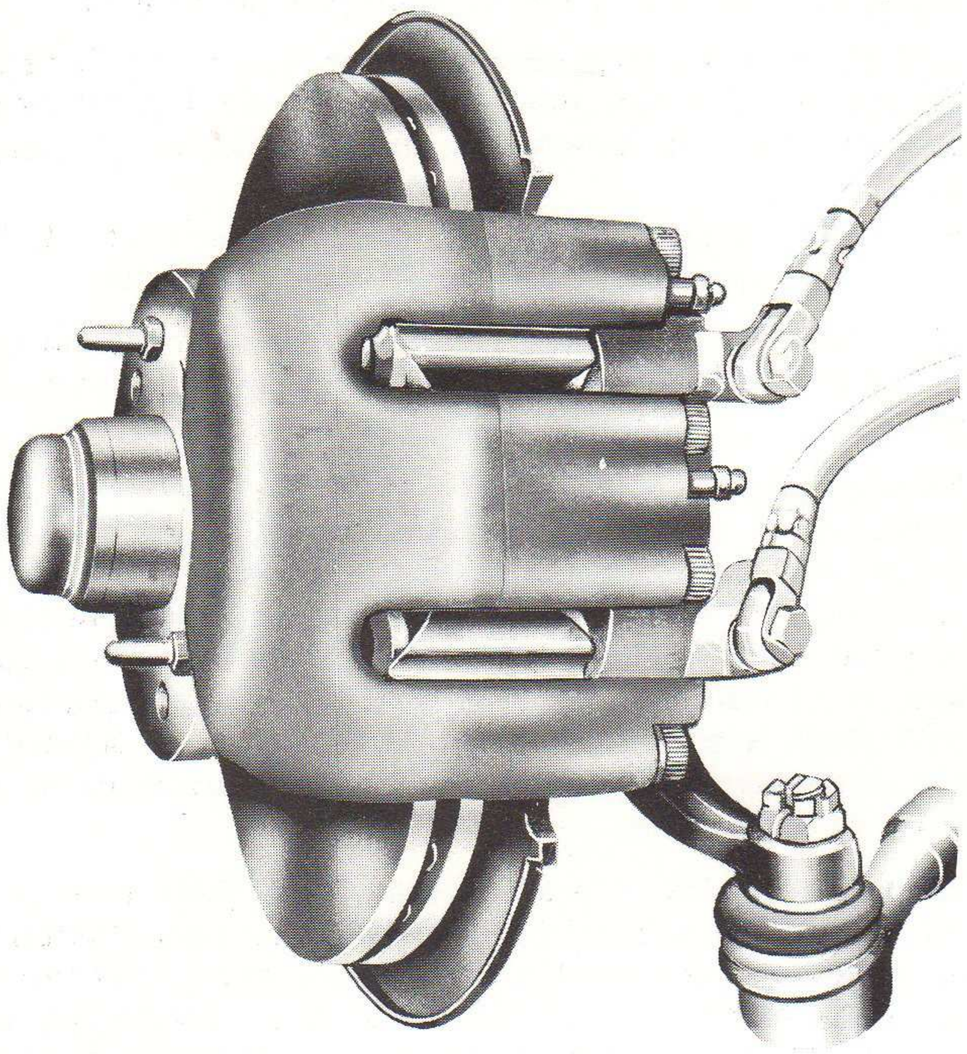


A 0080/1

Q.P.D. & Q.D. calipers

2A 9a

1 Q.P.D. CALIPER



A0623

Introduction

The Q.P.D. and Q.D. Calipers (Figs. 1 and 2), are designed for dual hydraulic braking systems and they combine all the advantages of the conventional Girling disc brake with several outstanding features.

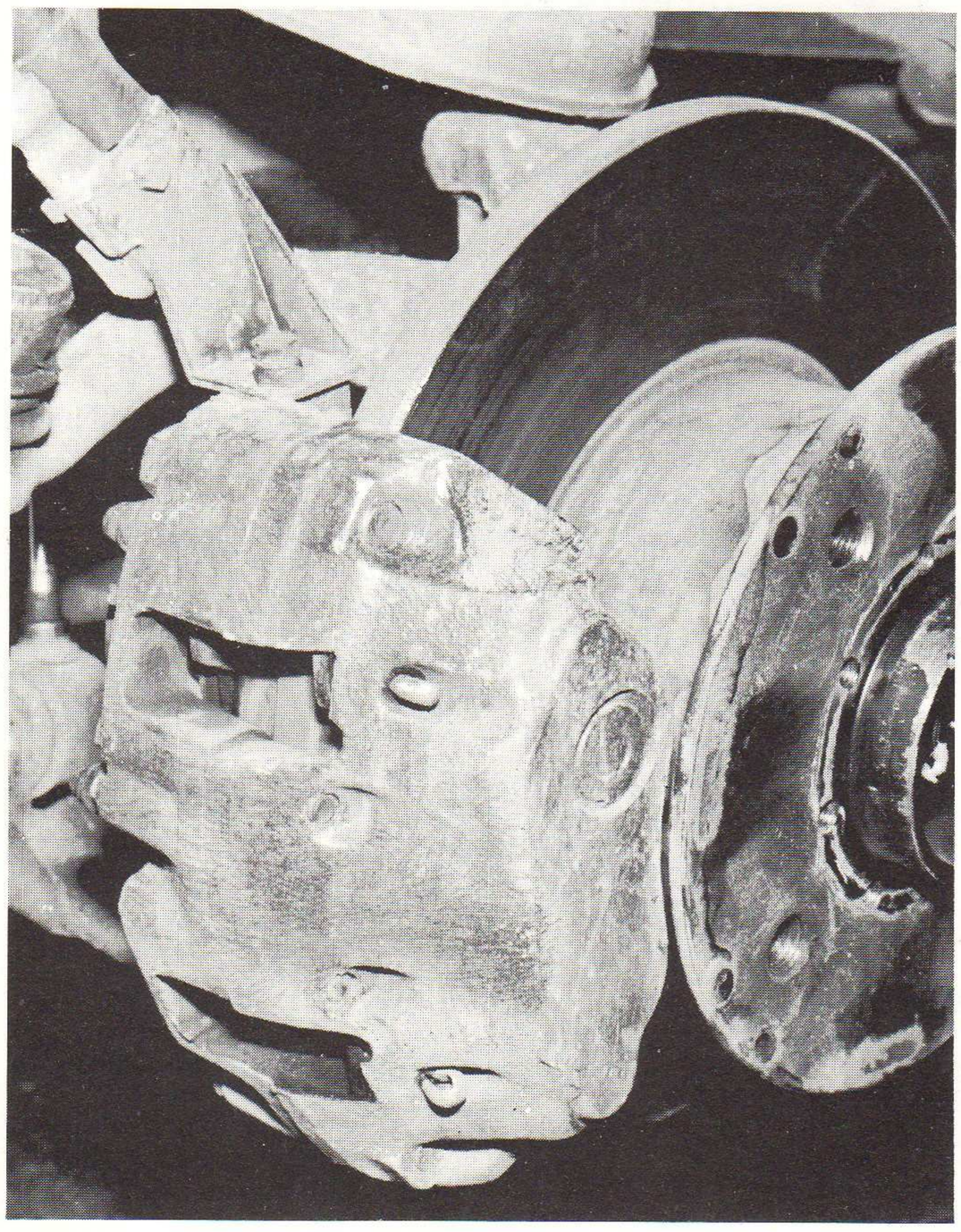
These include two sets of unequal diameter pistons. Arranged so that the leading smaller pistons are connected to the rear brakes, thus forming one circuit, whilst the larger trailing pistons provide the secondary circuit. Maximum emergency braking is therefore assured, should a fault develop in one of the two separate systems.

Connecting the two halves of the caliper is a three part bridge structure and this results in a very rigid caliper. The internal hydraulic connecting passages go through the centre and upper bridge and therefore only two bleedscrews are required. Bleeding and therefore maintenance is easier than similar calipers with more than two bleedscrews.

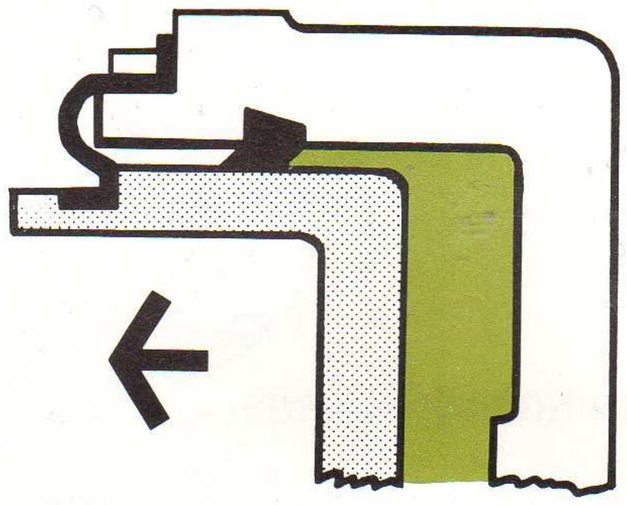
The style of the caliper, and the specially developed pad, makes it possible to increase the pad area and this helps to make pad life longer.

When the brake pedal is depressed the hydraulic pressure generated moves the pistons and clamps the disc between the pads with equal and opposite force. When the pressure is released, the piston seals retract the pistons a sufficient amount for them to remain in a relaxed position in the cylinders with the pads in close proximity to the disc, ready for the next brake application as shown on the illustration (Fig. 2). Adjustment for lining wear is therefore automatic and no manual adjustment is required.

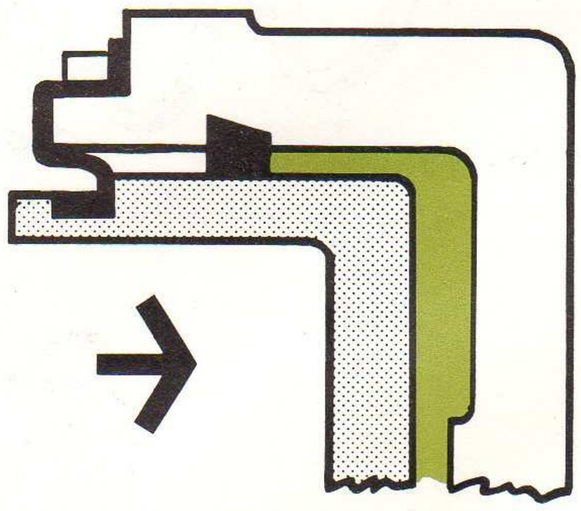
2 Q.D. CALIPER



A0622



BRAKE APPLIED



BRAKE RELEASED

Q.P.D. & Q.D. calipers

Servicing

To maintain the efficiency of the brake system, preventive maintenance is essential and the following recommendations should be observed at the intervals stated. Full details of preventive maintenance are incorporated in Section 1, Page 1A1.

1. Check the pads for wear every 5,000 miles (8,000 km) and fit new pads when the lining thickness has worn to 1/8 of an inch (3 mm). If electrical wear indicators are incorporated the examinations should be unnecessary.
2. Every 10,000 miles (16,000 km) examine all brake pipes and flexible hoses for corrosion, fretting and signs of damage. Renew suspect parts and take action where applicable to prevent a recurrence of the trouble.
3. Change the Brake Fluid every eighteen months.
4. Every 40,000 miles (64,000 km) or three years, whichever is reached first, the caliper should be replaced or overhauled and new hydraulic hoses should be fitted.

Fitting New Pads

When the lining has worn to 1/8 of an inch (3 mm), or if the electrical wear indicator lights up, the pads should be replaced. Always fit new pads in sets on both sides of the axle.

Jack up the car and remove the front wheels. To fit new pads the caliper must be removed from the axle, but the retaining bolts must not be unscrewed until the caliper is completely cool.

NOTE: No attempt should be made to unscrew the bolts and separate the two halves of the caliper body.

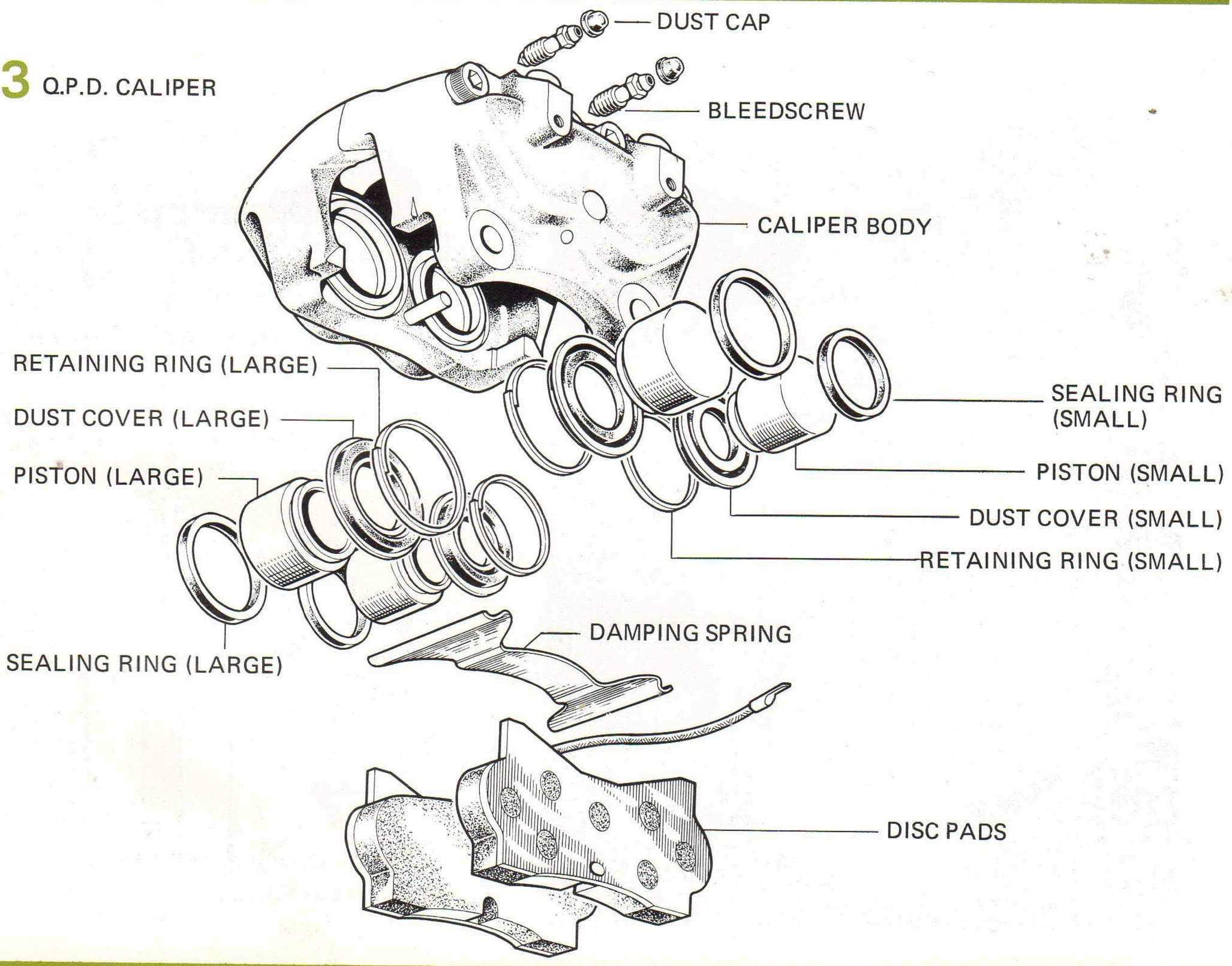
Clean the exterior of the caliper with a wire brush and remove the caliper from the vehicle. The caliper must be supported to prevent it hanging on the flexible hoses.

Examine the disc and if there is evidence of wear on one side only, one of the pistons is seized and it is best to fit a new caliper and a new disc immediately. But provided the cylinders are in good working order and undamaged new pistons and seals may be fitted. If the condition of the disc is satisfactory remove all scale and rust from around the edge — particularly that which is creeping over the braking area. A scraper or an old screwdriver will remove most of the corrosion and finish off with emery-cloth.

Illustrated on Fig. 4 is a tool made from 4mm wire which is required to remove and fit pads to Q.P.D. calipers. Insert the tool as shown and remove the pads. To remove pads from Q.D. calipers withdraw the pad retaining pins. Taking care not to damage the dust covers on the pistons, clean the inside of the caliper, especially the areas where the new pads will seat.

To finish the cleaning operation, wash the caliper, the pistons and dust covers using only Girling Cleaning Fluid. The use of other fluids can be dangerous, use only recommended fluids.

3 Q.P.D. CALIPER



A0203

Q.P.D. & Q.D. calipers

disc brakes

Ensure the dust covers on the pistons are in good condition and fitted securely. If misplaced, damaged, or cracked, examine the pistons for signs of corrosion and, if evident, fit new pistons and seals. No attempt should be made to clean up seized or corroded pistons. If the pistons are in good working order and not corroded, new dust covers can be fitted.

Using hand pressure, slowly and evenly press each piston back into its cylinder.

Check that each bleedscrew can be slackened one full turn and retighten.

To ensure the pads slide easily, check the pad locating pins are smooth and undamaged.

Fit the damping spring to Q.P.D. calipers and insert the special tool (Fig. 4). Fit the new pads ensuring the pad with the electrical wear indicator is adjacent to the caliper mounting lugs. Remove the tool. With Q.D. calipers, position the pads in the caliper body and fit the pad retaining pins; open up the ends of the pins to secure.

Refit the caliper to the vehicle ensuring that any shims originally fitted between the mounting faces are correctly positioned. Repeat procedure with the caliper on the opposite wheel and bleed the system in the recommended manner. Before road testing, ensure the fluid in the fluid reservoir is at the correct level and pump the pedal until a solid resistance is felt to reposition the pads against the disc. Check all new and disturbed connections for leakage.

When road testing, apply the brakes lightly at varying speeds up to 50 m.p.h. (80 km). If satisfactory, allow the brakes to cool down before applying maximum braking.

Whenever possible with new pads heavy periods of braking should be avoided until a short bedding-in period is completed.

Cylinder Maintenance

Jack up the car and remove the front wheels.

To replace the seals and dust covers, the flexible hoses must be disconnected and the calipers removed from the vehicle. Always service calipers in axle sets.

NOTE: No attempt should be made to unscrew the the bolts and separate the two halves of the caliper body.

Clean the exterior of the caliper with a wire brush.

Drain the fluid from the system by attaching a bleed tube to a bleedscrew on the caliper, hang the other end of the tube in a container and unscrew the bleedscrew one turn. Pump the brake pedal to discharge the fluid and repeat with the second bleedscrew.

Disconnect the brake pipes from the flexible hoses and the hoses from the adjacent braket. Unscrew the bolts retaining the caliper to the axle and remove complete with flexible hoses. Take note of any shims between the mounting faces so they can be replaced in the same position when refitting the caliper to the vehicle.

Remove the pads, examine and clean the disc as described previously – Refer to 'Fitting New Pads'.

Remove the retaining rings and dust covers and pack a clean piece of rag between the pistons.

4

A0621

Q.P.D. & Q.D. calipers

Eject the pistons by applying compressed air to the inlet connections.

The sealing rings may now be removed from the cylinders, but take care not to damage the bores or locating grooves

Unscrew the bleedscrews and remove the dust caps.

Cleaning

Clean all parts thoroughly with Girling Cleaning Fluid or unused Castrol-Girling Brake Fluid. The use of other fluids can be dangerous, use only recommended fluids.

Examine the cylinder bores and pistons carefully for signs of damage, abrasion, scuffing or corrosion. The pistons may be replaced, but if a cylinder is damaged a new caliper must be used.

Assembly

Lubricate the cylinders and the new sealing rings with clean, unused Castrol-Girling Brake Fluid and fit the sealing rings into the grooves.

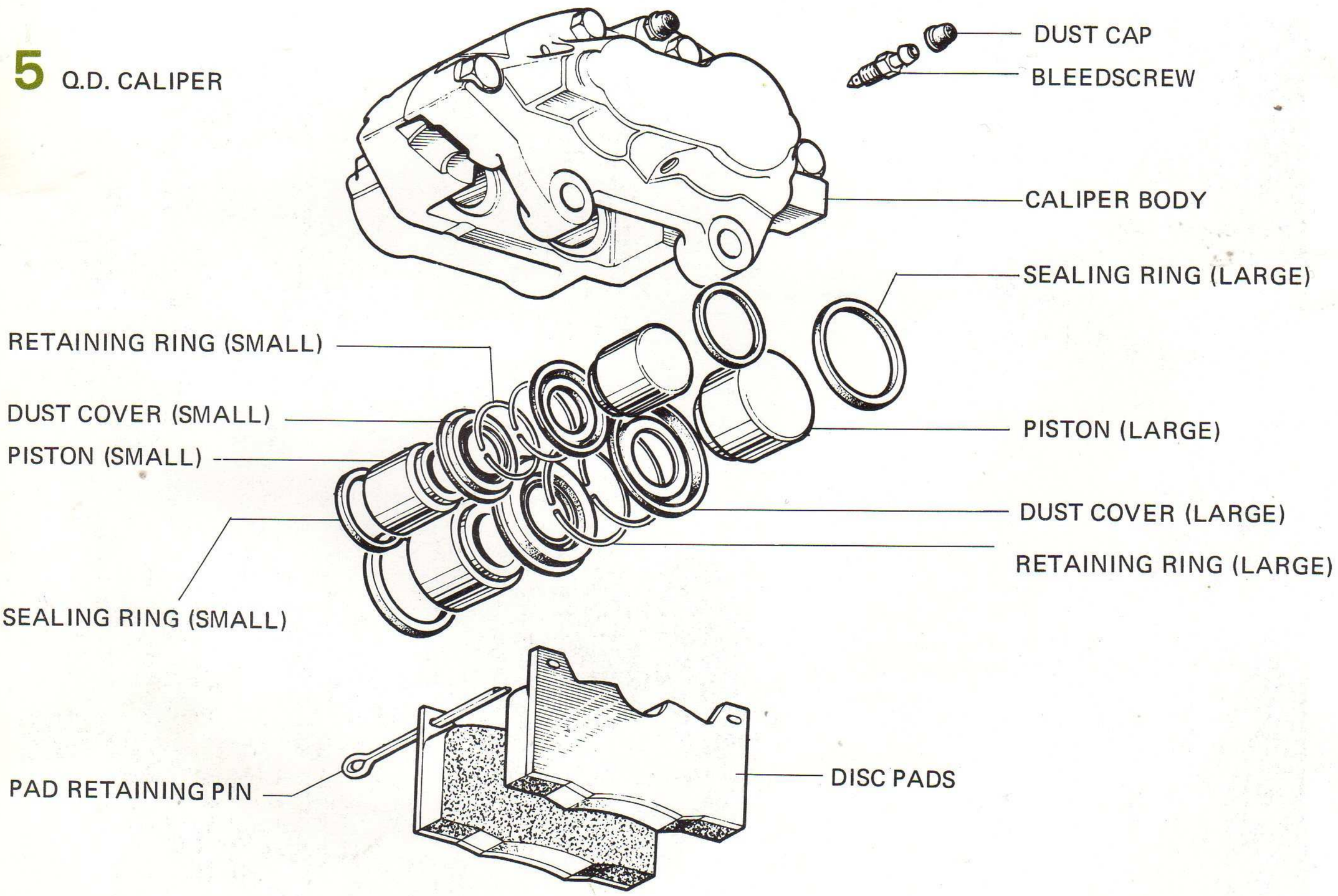
Lubricate the pistons with clean, unused Castrol-Girling Brake Fluid and press into the cylinders.

Fit the new dust covers and retaining rings.

Screw in the bleedscrews and fit the new dust caps.

Refit the pads and the caliper to the vehicle, ensuring that any shims originally fitted are correctly positioned. Repeat procedure with the caliper on the opposite wheel and bleed the system in the recommended manner. Before road testing, ensure the fluid in the fluid reservoir is at the correct level and pump the pedal until a solid resistance is felt to reposition the pads against the disc. Check all new and disturbed connections for leakage and road test.

5 Q.D. CALIPER



A0301

Girling 'AH' type caliper 2A 10a

disc brakes

Introduction

The rear 'AH' Type Caliper (Fig. 1) is similar in design to the front 'A' Type Caliper, but provision has been made for a handbrake mechanism which adjusts automatically when the footbrake is applied. As all Girling disc brakes are self-adjusting, operation of the footbrake therefore adjusts the pads for wear for both foot and handbrake operation.

The cylinder assembly is bolted rigidly to the axle and a steel yoke straddles the disc and slides in grooves in the cylinder body. Hydraulic pressure actuates both pistons, one of which acts directly onto the adjacent pad (Fig. 2). The opposite (indirect) piston acts against the yoke which slides in the cylinder grooves to bring the indirect pad into contact with the disc.

The pressure both sides of the disc is then equal. When the pressure is released, the piston seals fitted in the walls of the cylinder retract the pistons a small amount, which allows the moving parts to relax sufficiently for the pads to remain in close proximity to the disc ready for the next brake application. Adjustment for lining wear is therefore automatic.

The auto-adjust handbrake mechanism is incorporated with the pistons (Fig. 3). The lever rotates a cam which moves a push rod and this action pushes the two pistons apart and so applies the brake. When a pre-determined amount of pad wear has occurred and the pistons are pushed apart hydraulically, the pawls (A) click over the teeth on the rod (B) and so keeps the handbrake in constant adjustment.

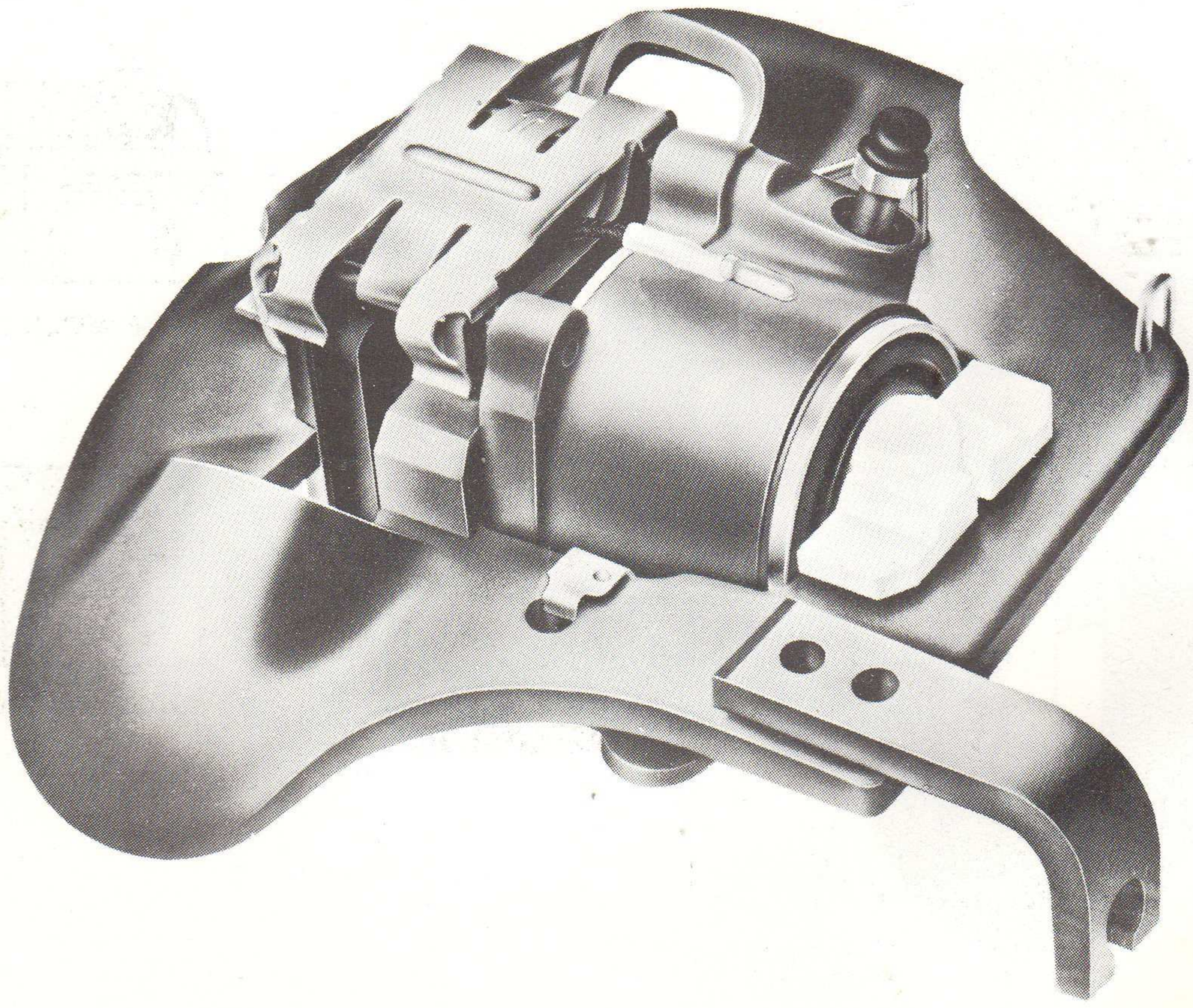
A small amount of lost motion is permitted in the adjusting mechanism which prevents over-adjustment and permits proper relaxation of the pads after each brake application

Servicing

To maintain the efficiency of the brake system, preventive maintenance is essential and the following recommendations should be observed at the intervals stated. Full details of preventive maintenance are incorporated in Section 1, Page 1A1.

1. Check the pads for wear every 5,000 miles (8,000 km) and fit new pads when the lining thickness has worn to 1/16 of an inch (1.5 mm). If electrical wear indicators are incorporated the examinations should be unnecessary.
2. Every 10,000 miles (16,000 km) examine all brake pipes and flexible hoses for corrosion, fretting and signs of damage. Renew suspect parts and take action where applicable to prevent a recurrence of the trouble.
3. Change the Brake Fluid every eighteen months.
4. Every 40,000 miles (64,000 km) or three years, whichever occurs first, the caliper should be overhauled. All other hydraulic parts on the vehicle should also be replaced or overhauled and new hydraulic hoses should be fitted.

1



A 0349

Girling 'AH' type caliper

Fitting new pads

Chock the front wheels and release the handbrake. Jack up the rear of the car and remove the rear wheels.
Remove the stabilizer. Unscrew the nut and bolt and remove the pad guide. Remove the worn pads.

Ensure the dust covers protecting the pistons are secure and in good condition. If loose, damaged or cracked, examine the pistons for signs of corrosion and, if evident, fit new pistons and seals. No attempt should be made to clean-up corroded or seized pistons. If the pistons are in good working order and not corroded, then new dust covers from a Girling Service Kit can be fitted.

Examine the disc and if there is evidence of wear on one side only, one of the pistons may be seized, or the yoke may not be sliding on the cylinder. It's best to fit a new complete caliper, but provided the cylinders are in good working order and not damaged, new pistons and seals can be fitted. If the condition of the disc is satisfactory, remove all scale and rust from around the edge with a scraper or an old screwdriver. Support the scraper on the yoke and hold it against the disc whilst rotating the disc by hand. Finish off the cleaning operation with emery-cloth.

Unscrew the bleedscrew one turn.
Fit the piston rotation tool 'C' against the piston and insert the piston retraction tool 'D' as shown on Fig. 5. Turn the tool 'C' 45 degrees to disengage the toothed rod (refer to Fig. 3) and press the pistons back by levering with the tool 'D' Remove the tool 'D' and insert on the opposite side of the disc and lever the yoke right back to make room for the indirect pad. Insert the indirect pad and the direct pad (with the electrical wear indicator), turn the tool 'C' back to vertical and remove the tool. Ensure the pad backplate settles in the groove in the piston and re-connect the electrical wear indicator. Fit the pad guide and tighten the nut and bolt. Fit the stabilizer.

Tighten the bleedscrew, repeat procedure with the other caliper and jack down the vehicle.
Top up the master cylinder reservoir with unused Castrol-Girling Brake Fluid and pump the foot pedal to push the new pads against the disc. Re-check the fluid level and road test the vehicle.

Dismantling

Remove the pads and remove the caliper from the vehicle; if necessary, refer to the vehicle manufacturer's instructions.
Note the position of the handbrake lever and the slot in the direct piston in relation to the yoke, then clamp the yoke in a vice as shown (Fig. 6).

Press the cylinder downwards separating it from the yoke. Note the position of the spring plates and yoke springs.
Clamp the cylinder in a vice by a mounting lug, remove the circlip from the handbrake lever pivot and remove the spring.
Pull the handbrake lever to the "ON" position and remove the supporting beam and the dust cover and retaining ring.

Remove the dust cover and retaining ring from the direct piston and push on the piston to remove both pistons from the bore. Turn the direct piston 45 degrees to disengage the teeth and separate the two pistons.
Taking care not to damage the internal surfaces, remove the seals from the cylinder bore.
Unscrew the bleedscrew.

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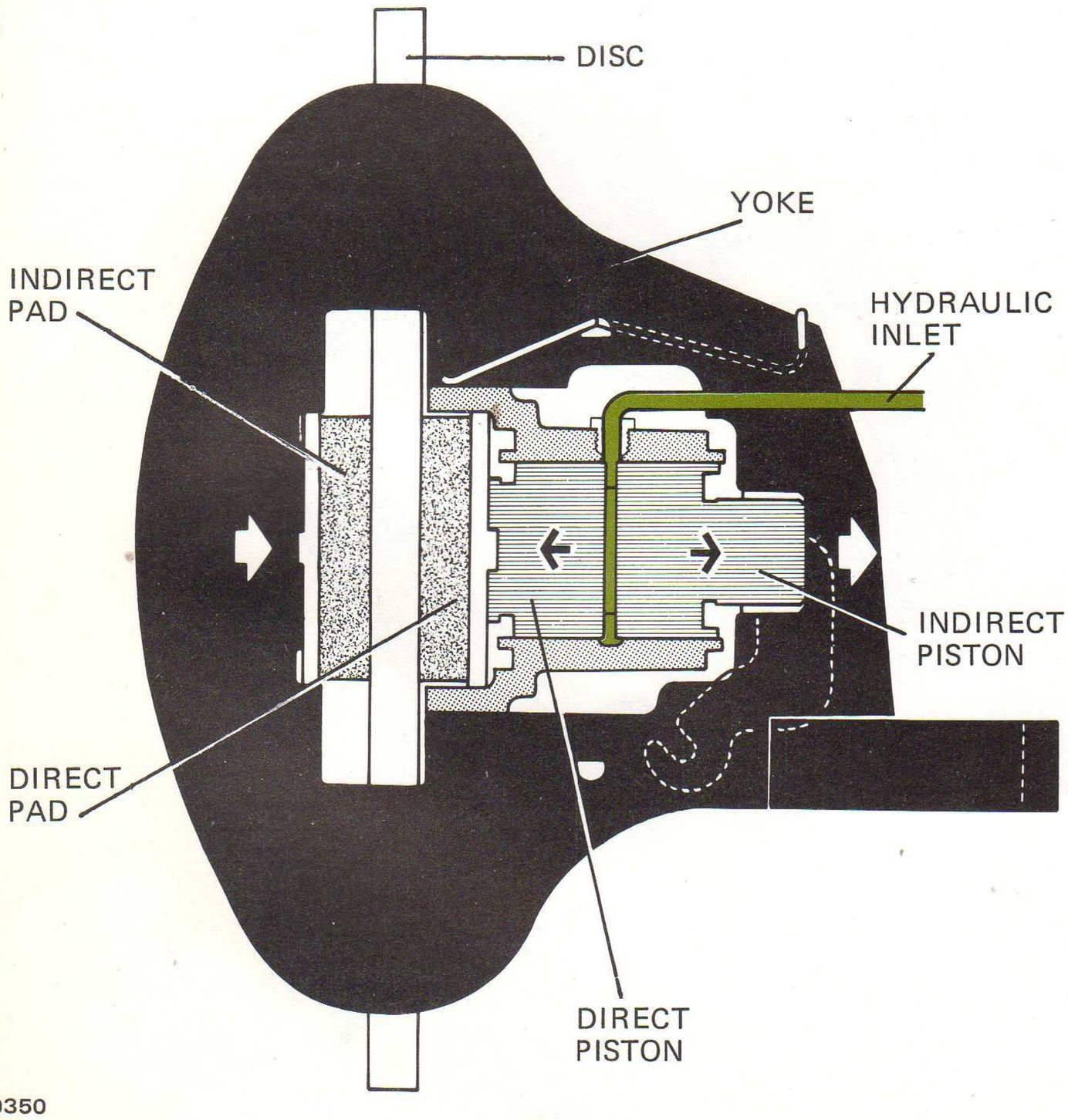
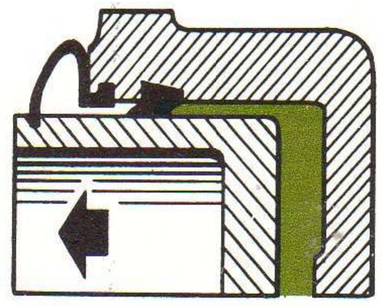


A 0350



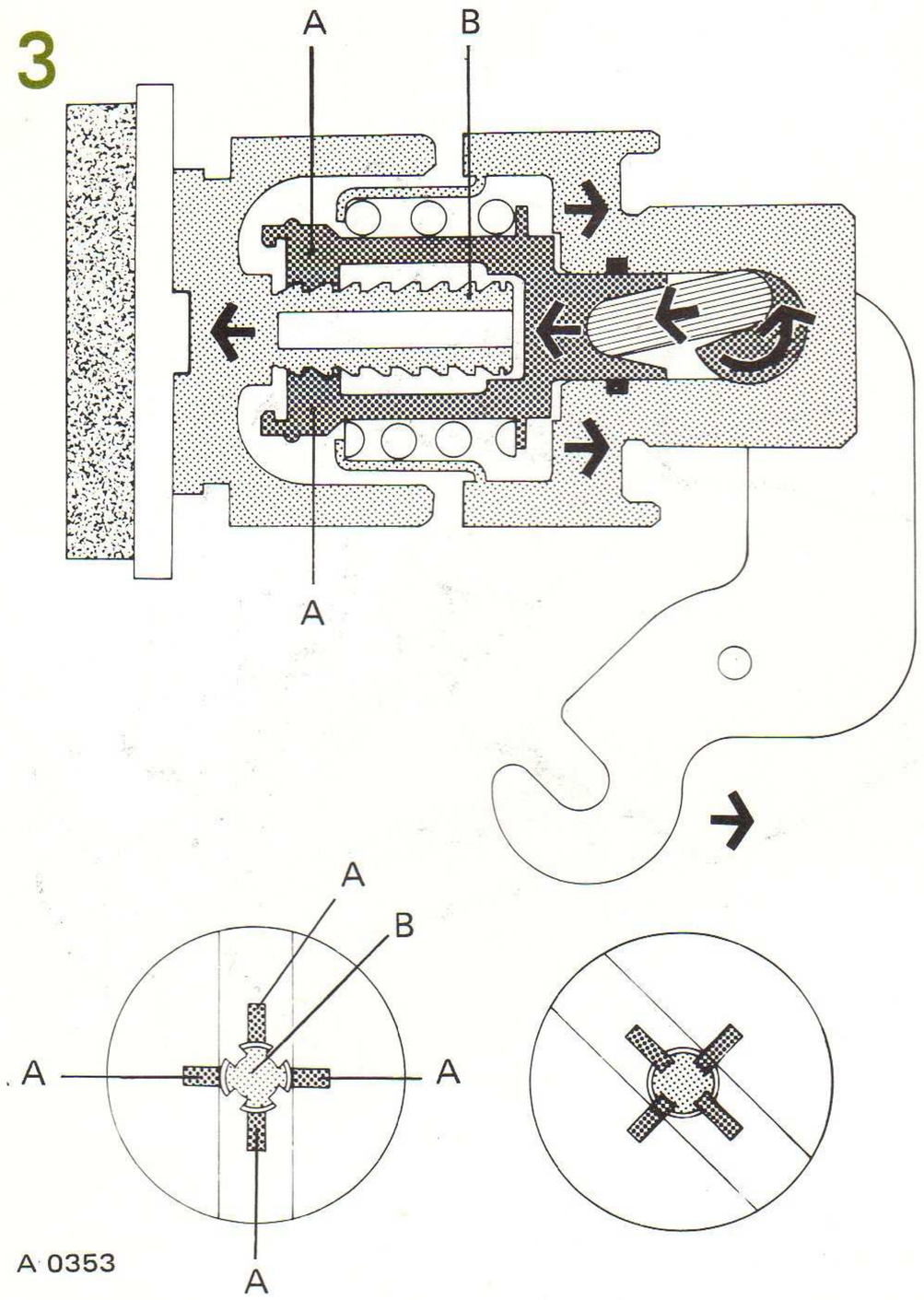
BRAKE APPLIED

BRAKE RELEASED

Girling 'AH' type caliper 2A 10c

disc brakes

3



Cleaning

Clean all parts with Girling Cleaning Fluid or unused Castrol-Girling Brake Fluid.

Examine all parts for signs of wear, damage and corrosion, paying particular attention to the pistons and the cylinder bores. Also ensure the sliding edges of the yoke and the grooves in the cylinder body are smooth and free from corrosion. If necessary, remove corrosion using a wire-brush or wire-wool, but material removal must be avoided if the small gap between the two components when assembled is to be maintained within design limits.
All parts must be in good working order and where doubt exists new parts should be fitted.

Re-assembly

Re-assemble the unit using the new parts from the relevant Girling Service Kit.

Lubricate the new seals with unused Castrol-Girling Brake Fluid and fit into the grooves in the cylinder bore.
Clamp the cylinder in a vice by a mounting lug, as when dismantling and lubricate the pistons and the cylinder bore seals liberally with unused Castrol-Girling Brake Fluid. Fit the pistons ensuring the piston with the handbrake is in the correct position (refer to Fig. 4 if necessary) and the opposite piston is 45 degrees from the vertical so they slide together in the cylinder bore.

Pull the handbrake lever to the "ON" position and fit the new dust cover with wide retaining ring; follow with the supporting beam.
Screw in the bleedscrew.

Fit the dust cover and retaining ring to the direct piston and remover the cylinder from the vice.

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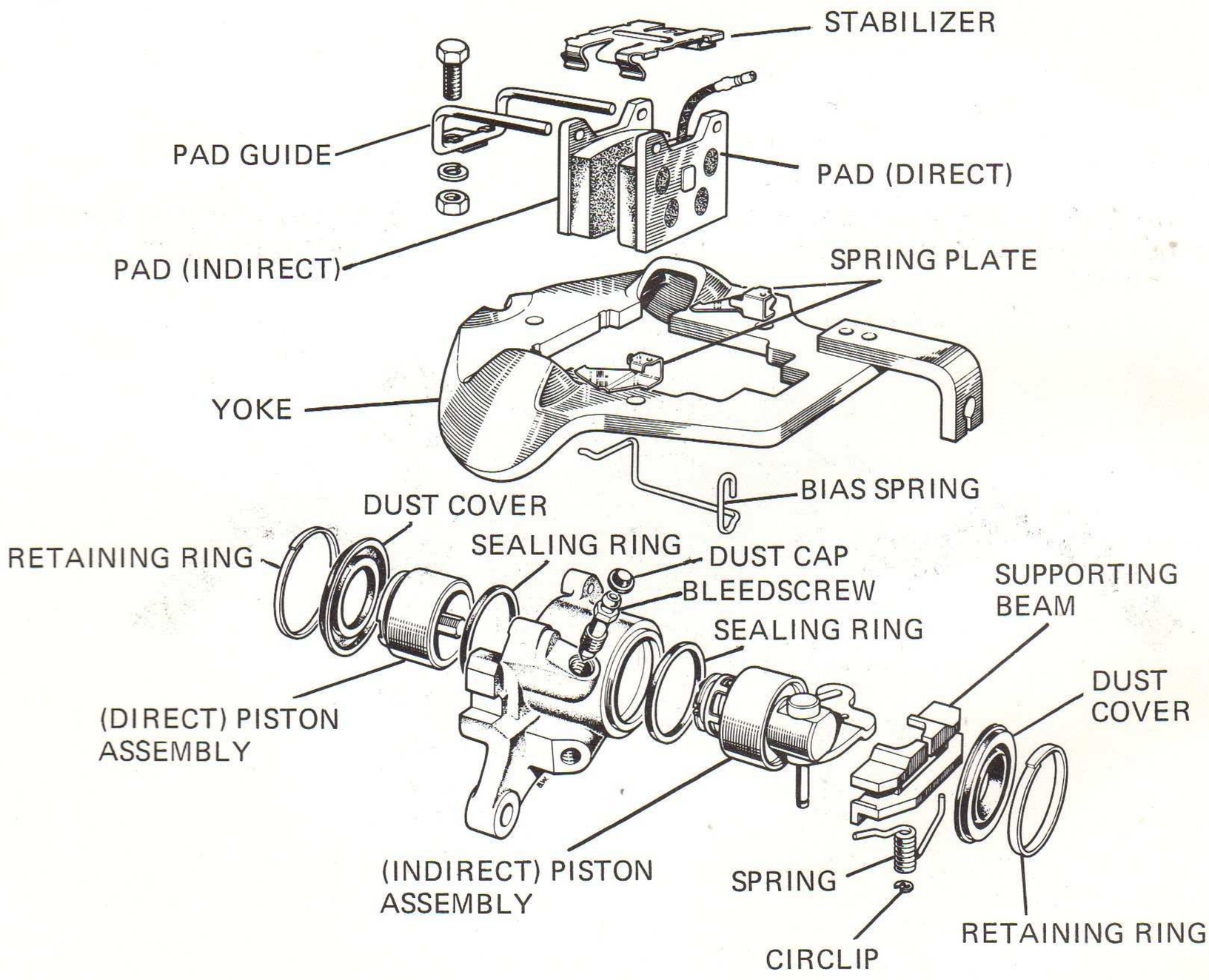

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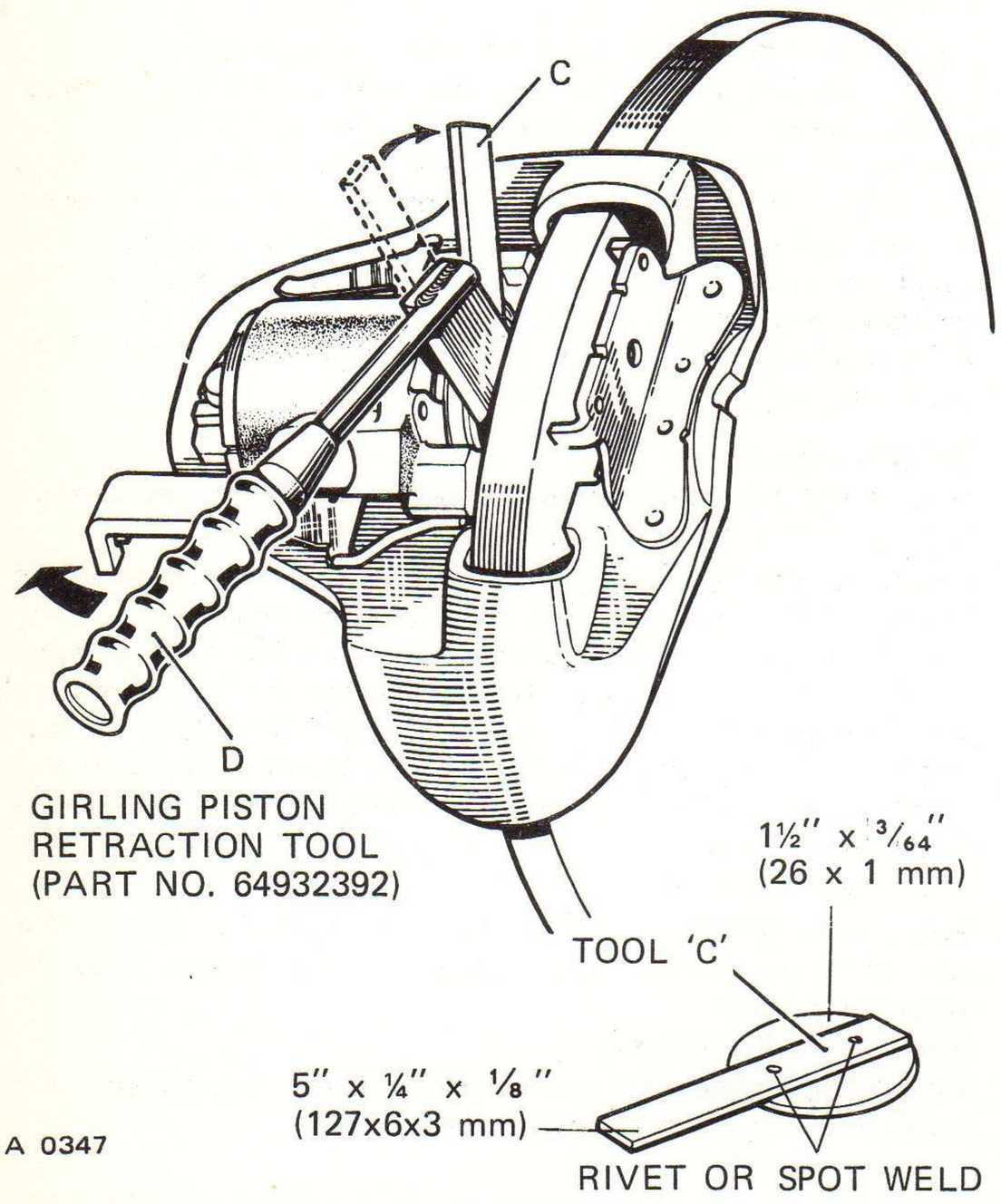

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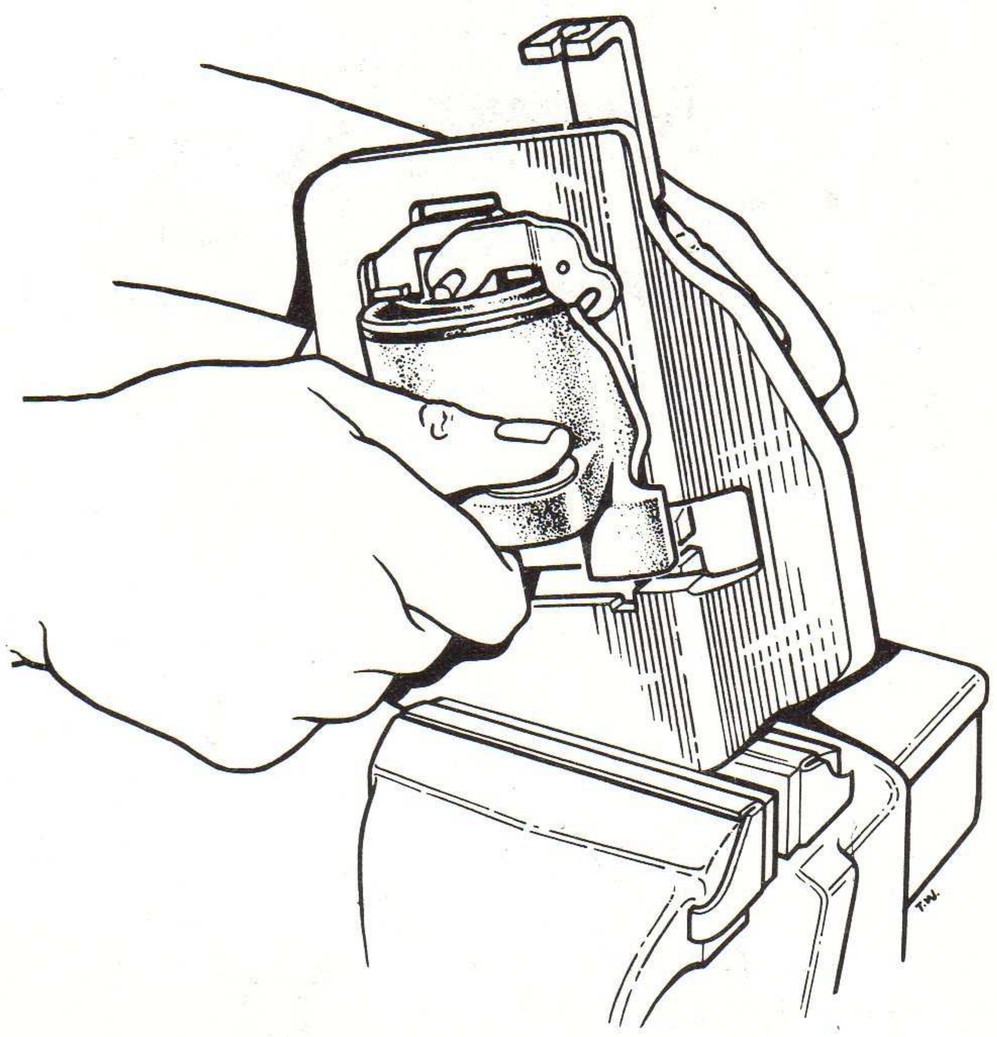

A 0348

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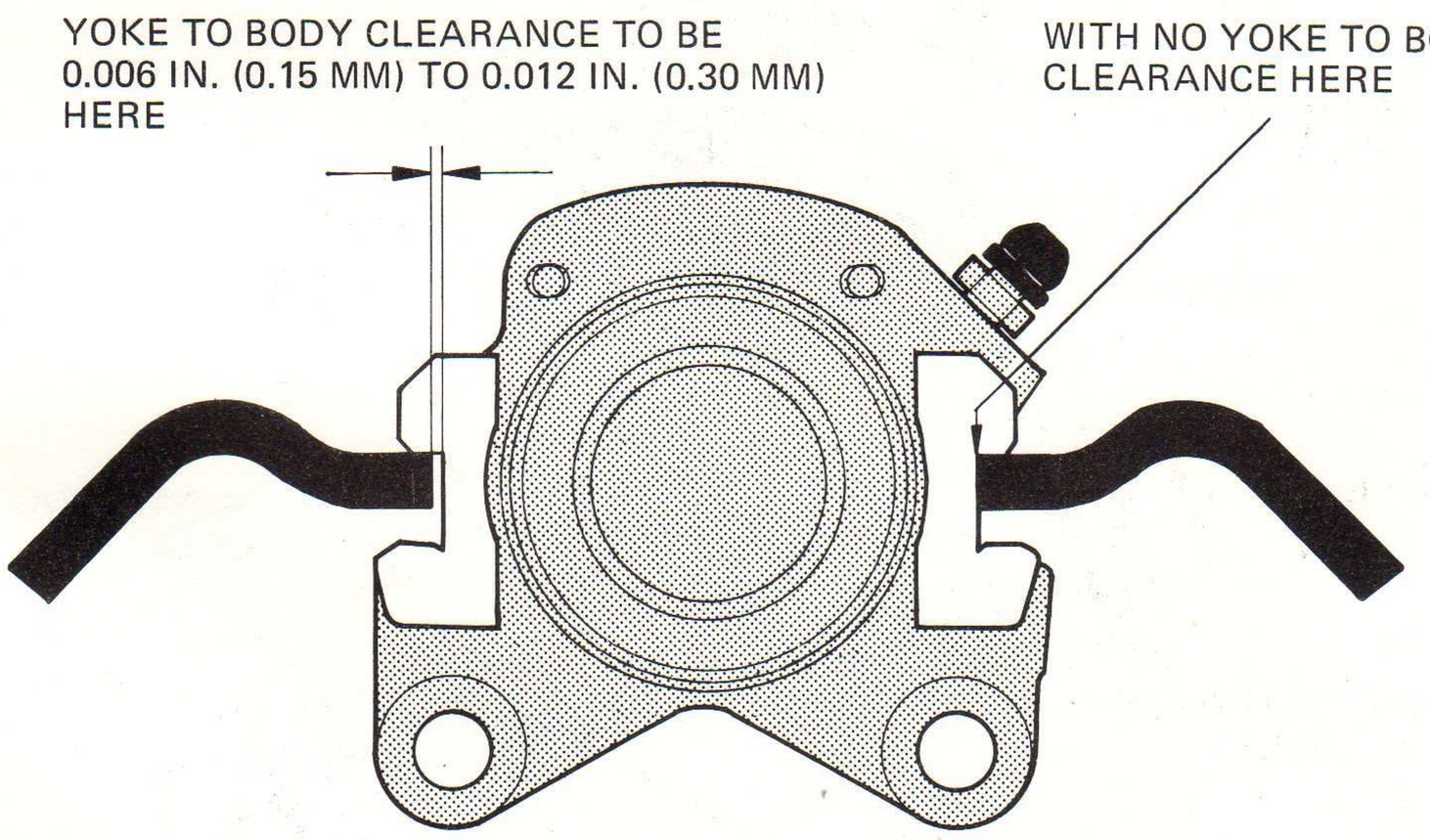


A 0379

Girling 'AH' type caliper 2A10e

disc brakes

Refer to Fig. 6 and clamp the yoke in the vice and position the spring plates and bias spring on the yoke. Reverse the dismantling procedure and manipulate the cylinder into position on the yoke.
Fit the spring and the retaining circlip to the handbrake lever.
Ensure the groove in the direct piston is in the correct vertical position so the two pistons are locked together. Also ensure the dust covers are secure and the retaining rings are correctly fitted.
If the mating surfaces of the yoke and cylinder were corroded and have been cleaned, refer to Fig. 7 and check the gap with feeler guages. The measurement should be 0.006 in. (0.15 mm) to 0.012 in. (0.30 mm). However, a gap of up to 0.015 in. (0.38 mm) maximum is permissible as the caliper will still work efficiently, but calipers with large gaps have a tendency to be noisy during brake operation.
Reverse the dismantling procedure and refit the caliper to the vehicle. Insert pads ensuring the pad backplate settles in the groove in the piston and re-connect electrical wear indicator. Fit the pad guide and tighten the nut and bolt. Fit the stabilizer. Repeat procedure with opposite rear caliper and bleed system as described in Section 1, Page 1D1. Refit wheels jack down the vehicle and road test.

Discs

The condition of the disc (Fig. 8) is a vital factor in the efficient functioning of the brake.
The disc should run true between the pads. The maximum run-out permissible on the disc is 0.004 in. (0.1 mm) and if this tolerance is exceeded it will cause knock back of the pistons which will be recognised by pedal flutter. If there is any doubt concerning this conditon the disc should be replaced.

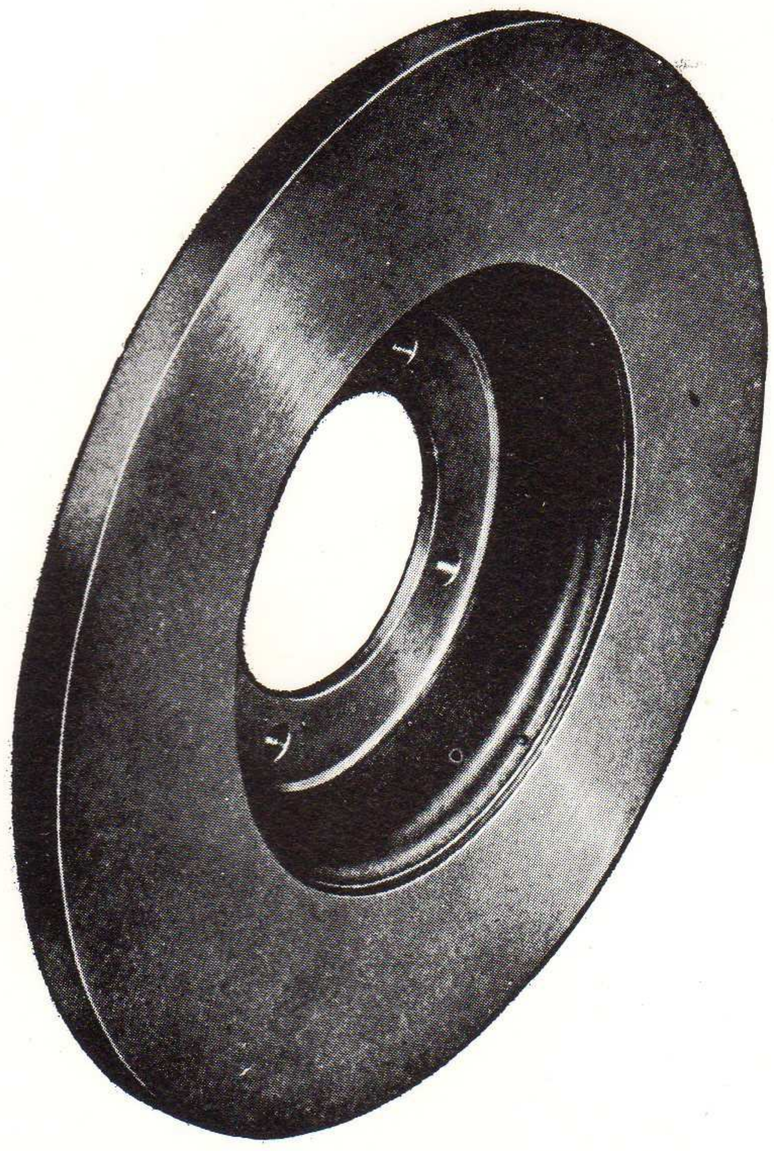
The surface of the disc should be smooth. The scratches and the light scoring which appear after normal use are not detrimental, but a heavily scored disc will impair efficiency and increase pad wear. Again if there is doubt a new disc should be fitted.

If replacement of the disc is impossible it is permissible to regrind but great care has to be exercised, and it should be done only by competent engineers with suitable grinding equipment. The disc must be rotary ground with the vertically mounted grinding wheel traversing the horizontal disc. The ground surface should be quite flat and parallel to the mounting face, with a fine finish. Special care should be taken to avoid sharp corners at the inner circumference of the ground surface. Both sides must be ground equally but the thickness of the disc should not, under any circumstances, be reduced below 0.050 in. (1.2 mm) of the original thickness.

There are three thicknesses of disc being manufactured at the present time, these are 3/8 in. (0.5 mm), ½ in. (12.7 mm) and 9/16 in. (14.3 mm). The importance of the accuracy of this work cannot be over-emphasised and regrinding should only be considered if a new disc cannot be obtained.
When fitted, the disc must run equidistant between the pad abutments and the disc (Fig. 9).

This ensures that the caliper is in line and the pads and pistons are square with the discs.
Shims should be used at the caliper mounting to correct any discrepancy.

8



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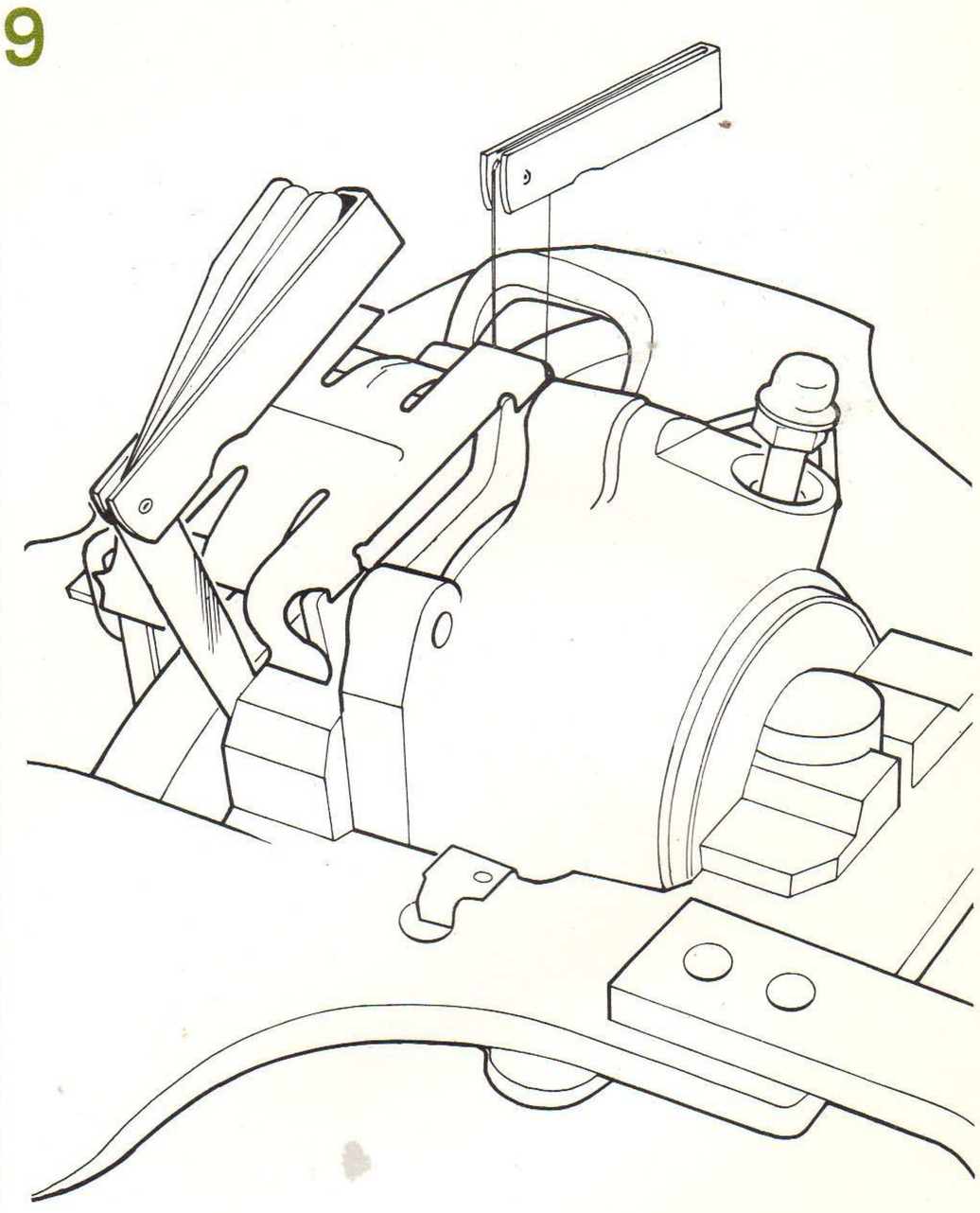


A 0377

Q.T. caliper

disc brakes

Introduction

The Q.T. Caliper (Fig. 1) is a further addition to the extensive range of disc brakes produced by Girling to meet world-wide demands.

The special shape of the caliper is a feature of the design, providing a compact, rigid caliper with a large friction area pad.

Each of the two cylinders contains a piston and a seal. The seal is positioned in a groove in the cylinder wall and the piston is protected by a rubber dust cover retained by a metal ring.

Inserted between each piston and the disc is a squeal deterrent shim, and a lined friction pad. The pad is bonded to a steel plate, which is retained in the caliper body by a 'U' shaped pin and a spring clip. Fitted between the pin and the pads is a damping spring.

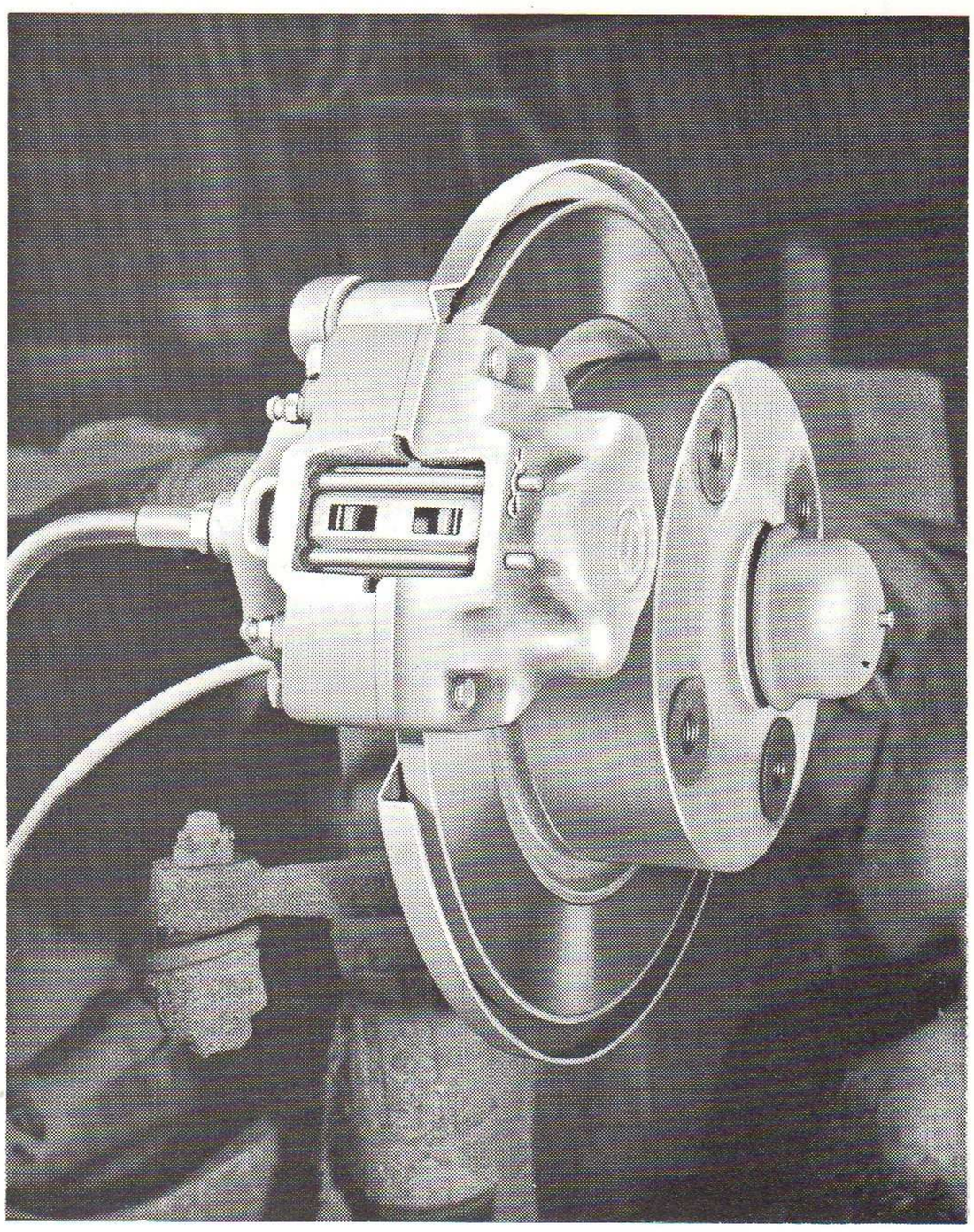
When the brake pedal is depressed, the hydraulic pressure generated moves the pistons and clamps the disc between the pads with equal and opposite force. When the pressure is released, the piston seals retract the pistons a sufficient amount for them to remain in close proximity to the disc, ready for the next brake application. This action is shown on the illustration (Fig. 1). Adjustment for lining wear is therefore automatic and no manual adjustment is required.

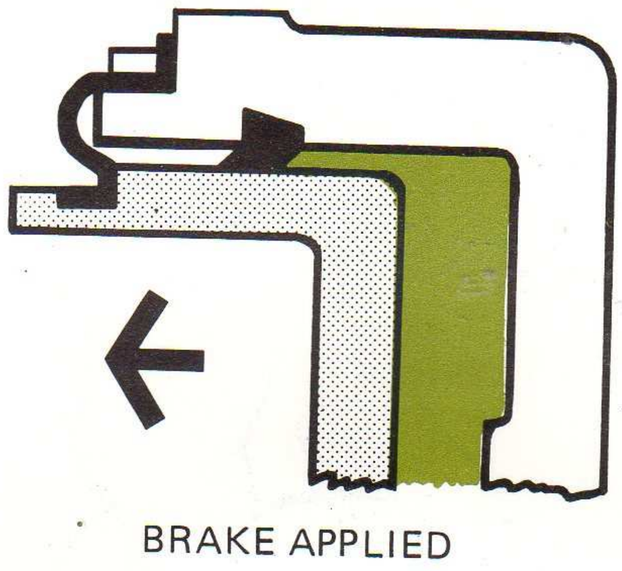
Servicing

To maintain the efficiency of the brake system preventive maintenance is essential and the following recommendations should be observed at the intervals stated. Full details of preventive maintenance are incorporated in Section 1, Page 1A1.

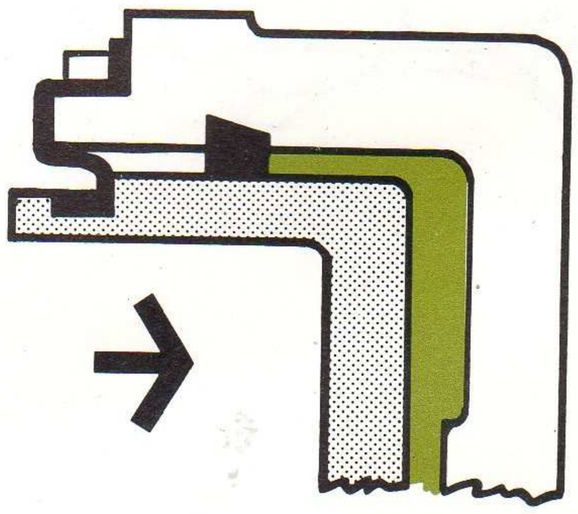
1. Check the pads for wear every 5,000 miles (8,000 km) and fit new pads when the lining thickness has worn to 1/8 of an inch (3 mm).
2. Every 10,000 miles (16,000 km) examine all brake pipes and flexible hoses for corrosion, fretting and signs of damage. Renew suspect parts and take action where applicable to prevent a recurrance of the trouble.
3. Change the Brake Fluid every eighteen months.
4. Every 40,000 miles (64,000 km) or three years, whichever occurs first, the caliper should be overhauled. All other hydraulic parts on the vehicle should also be replaced or overhauled and new hydraulic hoses should be fitted.

1





BRAKE APPLIED



BRAKE RELEASED

Fitting New Pads (Refer to Fig. 4)

When the lining has worn to 1/8 of an inch (3 mm), the pads should be replaced. Always fit new pads in sets on both sides of the axle. Fit new squeal deterrent shims and a new damping shim when replacing the pads.

Jack up the car and remove the front wheels. To fit new pads the caliper must be removed from the stub axle flange.

NOTE: No attempt should be made to unscrew the bolts and separate the two halves of the caliper body.

Clean the exterior of the caliper with a wire brush.

Pull out the clip and remove the pad retaining pin and damping spring. Unscrew the two bolts and remove the caliper from the vehicle; taking note of any shims between the mounting faces so that they can be replaced in the same position.

NOTE: The caliper must be supported to prevent it hanging on the brake hose.

Turn the pads and anti-squeal shims 90 degrees (Figs. 2 and 3) and remove from the caliper.

Examine the disc and if there is evidence of wear on one side only, one of the pistons is seized and it is best to fit a new caliper and a new disc immediately. But provided the cylinders are in good working order and undamaged, new pistons and seals may be fitted. If the condition of the disc is satisfactory, remove all scale and rust from around the edge — particularly that which is creeping over the braking area. A scraper or an old screwdriver will remove most of the corrosion and finish off with emery-cloth.

To finish the cleaning operation, clean the inside of the caliper — especially the areas where the new pads seat — but take care not to damage the dust covers. Wash the caliper, the pistons and dust covers using only Girling Cleaning Fluid. The use of other fluids can be dangerous, use only the recommended fluids.

Ensure the dust covers on the pistons are in good condition and fitted securely. If misplaced, damaged, or cracked examine the pistons for signs of corrosion and, if evident, fit new pistons and seals. No attempt should be made to clean up seized or corroded pistons. If the pistons are in good working order and not corroded, new dust covers can be fitted.

Open the bleedscrews one full turn. Using hand pressure, slowly and evenly press each piston back into its cylinder. Retighten the bleedscrews.

Fit the new squeal deterrent shims with the arrows facing the forward direction of disc rotation.

Fit the new pads and refit the caliper to vehicle; ensuring that any shims originally fitted between the mounting faces are correctly positioned. Check the mounting clamp keeps the brake hose secure.

Position the new pad damping shim in the caliper window, fit the 'U' shaped pad retaining pin and secure with the clip.

Repeat procedure with the opposite caliper and pump the pedal, until a solid resistance is felt, to reposition the pads against the disc.

Ensure the fluid in the reservoir is at the correct level and road test.

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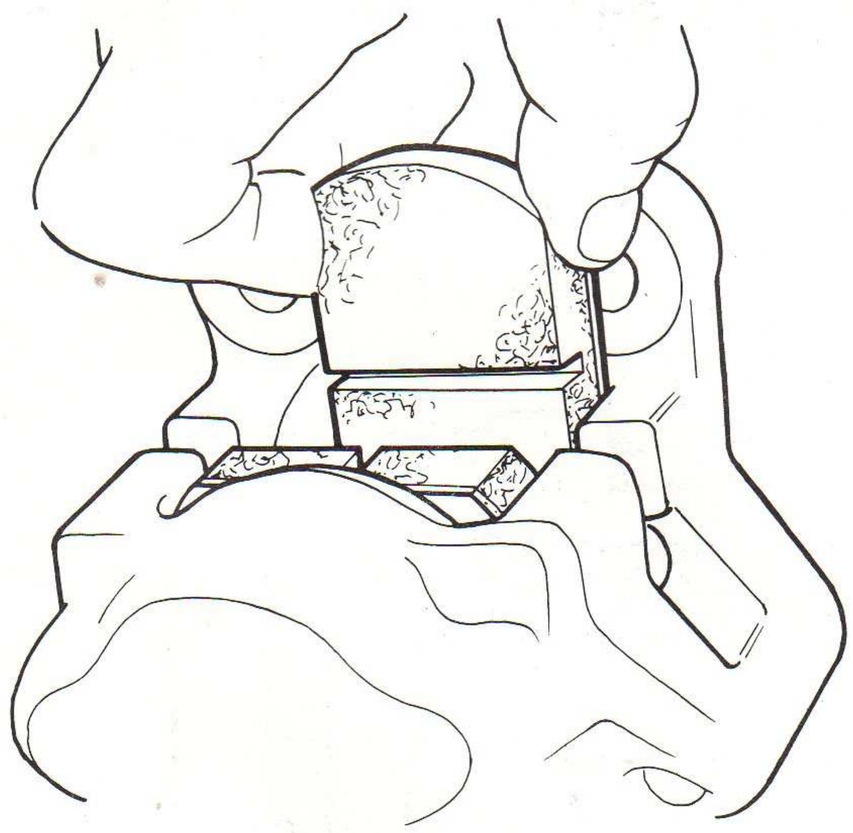

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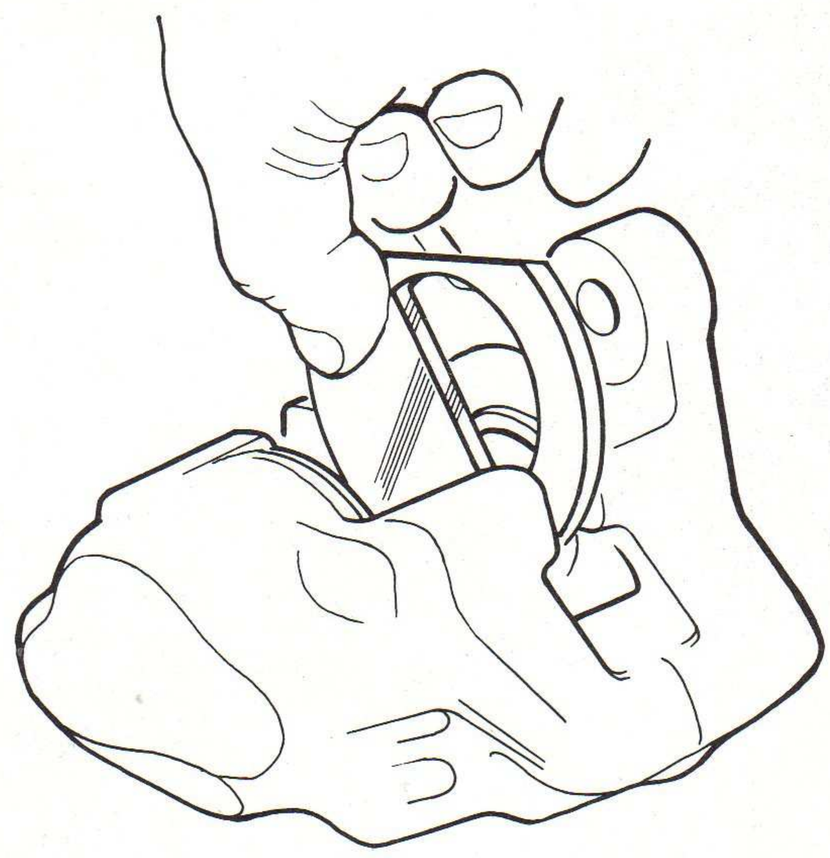


A0597

Q.T. caliper

2A 11c

Cylinder Maintenance

Jack up the car and remove the front wheels.

To replace the seals and dust covers the flexible hoses must be disconnected and the calipers removed from the vehicle. Always service calipers in axle sets.

NOTE: No attempt should be made to unscrew the bolts and separate the two halves of the caliper.

Clean the exterior of the caliper with a wire brush.

Drain the fluid from the system by attaching a rubber bleed tube to a bleedscrew on the caliper. Hang the other end of the tube in a container and unscrew the bleedscrew one turn. Pump the pedal to discharge the fluid and repeat with the second bleedscrew.

Disconnect the brake pipe from the flexible hose and the hose from the adjacent bracket.

Pull out the clip and remove the pad retaining pin and damping spring. Unscrew the two bolts and remove the caliper from the vehicle; taking note of any shims between the mounting faces so that they can be replaced in the same position.

Remove the pads and examine the disc as described — Refer to 'Fitting New Pads'.

Remove the retaining rings and dust covers and pack a clean piece of rag between the pistons.

Eject the pistons by applying compressed air to the inlet connection.

The sealing rings may now be removed from the cylinders, but take care not to damage the bores or locating grooves.

Unscrew the bleedscrews and remove dust caps.

Cleaning

Clean all parts thoroughly with Girling Cleaning Fluid or unused Castrol-Girling Brake Fluid. The use of other fluids can be dangerous, use only the recommended fluids.

Examine the cylinder bores and pistons for signs of damage, abrasion, scuffing or corrosion. The pistons may be replaced, but if a cylinder is damaged, a new caliper must be used.

Assembly

Lubricate the cylinders and the new sealing rings with clean, unused Castrol-Girling Brake Fluid and fit the sealing rings into the grooves.

Lubricate the pistons with clean, unused Castrol-Girling Brake Fluid and press into the cylinders.

Fit the new dust covers and retaining rings.

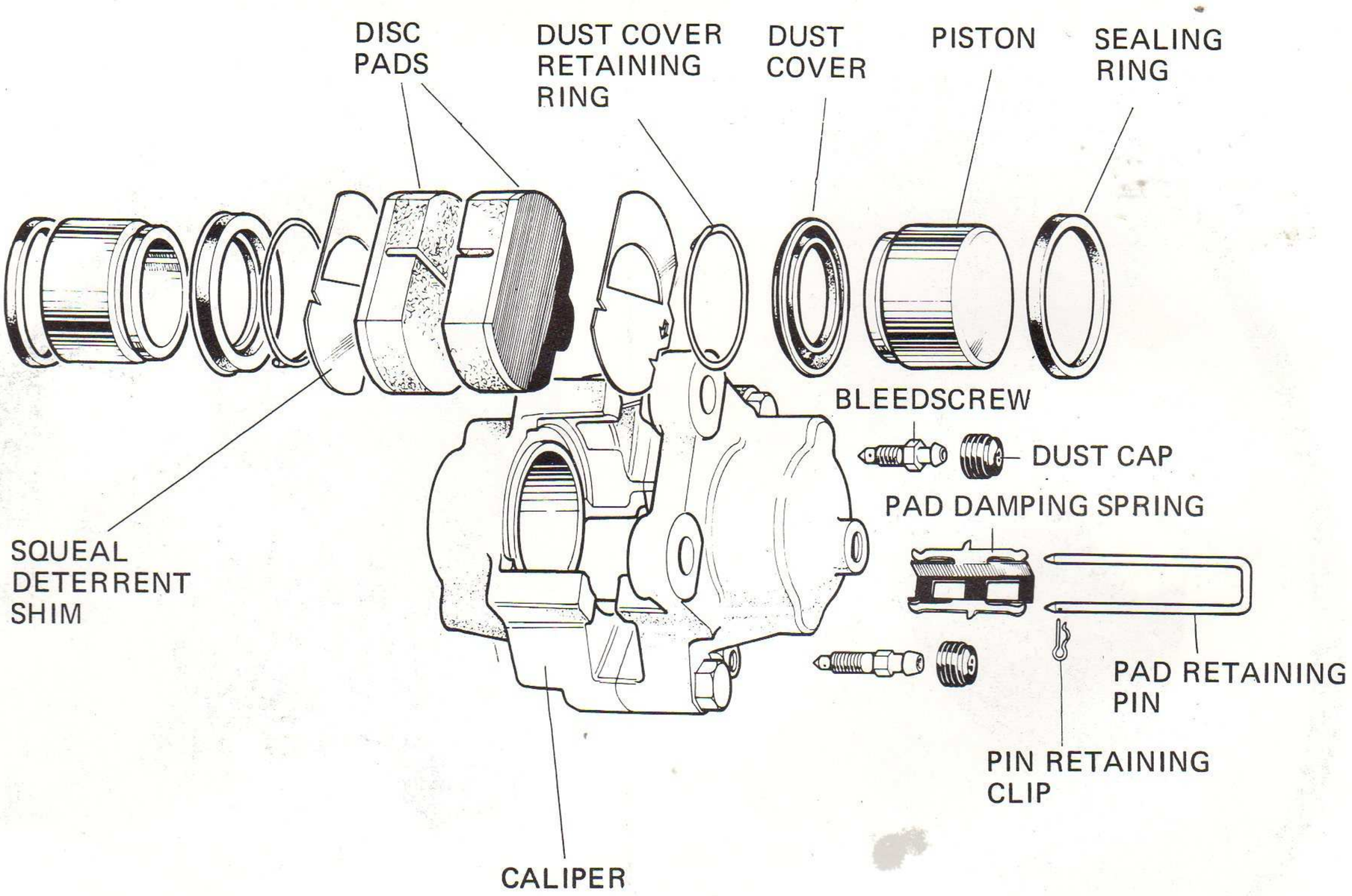
Screw in the bleedscrews and fit the new dust caps.

Refit the anti-squeal shims, with the arrows facing the forward direction of disc rotation. Refit the pads.

Refit the caliper to the vehicle, ensuring that any shims originally fitted are correctly positioned. Check the mounting clamp keeps the reconnected brake hose secure.

Position the pad damping shim in the caliper window, fit the 'U' shaped pad retaining pin and secure with the clip.

Repeat procedure with the opposite caliper and bleed the system in the recommended manner. Before road testing, ensure the fluid in the reservoir is at the correct level and pump the pedal until a solid resistance is felt to reposition the pads against the disc. Check all new and disturbed connections for leakage and road test.



A0510

Discs

The condition of the disc (Fig. 5) is a vital factor in the efficient functioning of the brake.

The disc should run true between the pads. The maximum run-out permissible on the disc is 0.004 in. (0.1 mm) and if this tolerance is exceeded it will cause knock back of the pistons which will be recognised by pedal flutter. If there is any doubt concerning this condition the disc should be replaced.

The surface of the disc should be smooth. The scratches and the light scoring which appear after normal use are not detrimental, but a heavily scored disc will impair efficiency and increase pad wear. Again if there is doubt a new disc should be fitted.

If replacement of the disc is impossible it is permissible to regrind but great care has to be exercised, and it should be done only by competent engineers with suitable grinding equipment. The disc must be rotary ground with the vertically mounted grinding wheel traversing the horizontal disc. The ground surface should be quite flat and parallel to the mounting face, with a fine finish. Special care should be taken to avoid sharp corners at the inner circumference of the ground surface. Both sides must be ground equally but the thickness of the disc should not, under any circumstances, be reduced below 0.050 in. (1.2 mm) of the original thickness. There are three thicknesses of discs being manufactured at the present time, these are 3/8 in. (9.5 mm), 1/2 in. (12,7 mm) and 9/16 in. (14.3 mm). The importance of accuracy of this work cannot be over-emphasised and regrinding should only be considered if a new disc cannot be obtained.

When fitted, the disc must run equidistant between the caliper cylinders and this condition should be checked by feeler gauges between the pad abutments (highlighted in green, Fig. 6) and the disc face. The gap on opposite sides of the disc may differ by 0.010 in. (0.25 mm) but there should be no difference between the gaps at the two abutments on the same side.

This ensures that the caliper is in line and the pads and pistons are square with the discs.

Shims should be used at the caliper mounting to correct any discrepancy.

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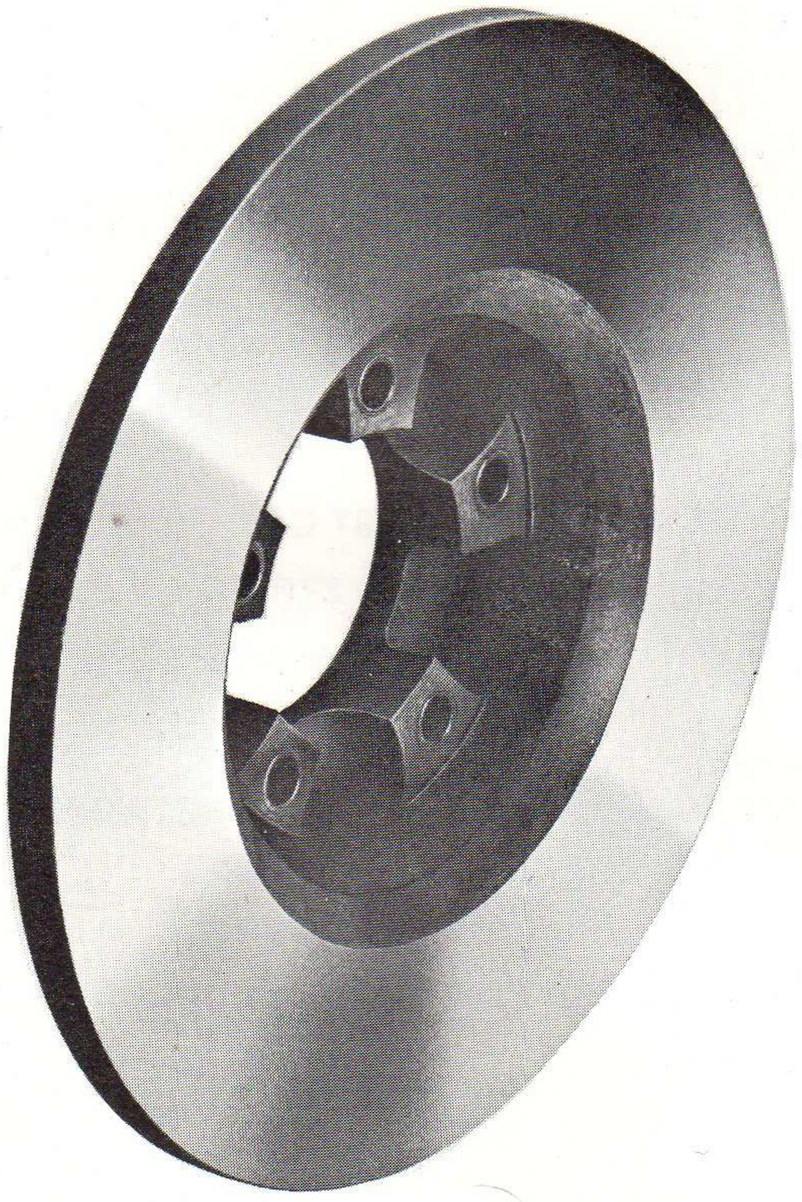

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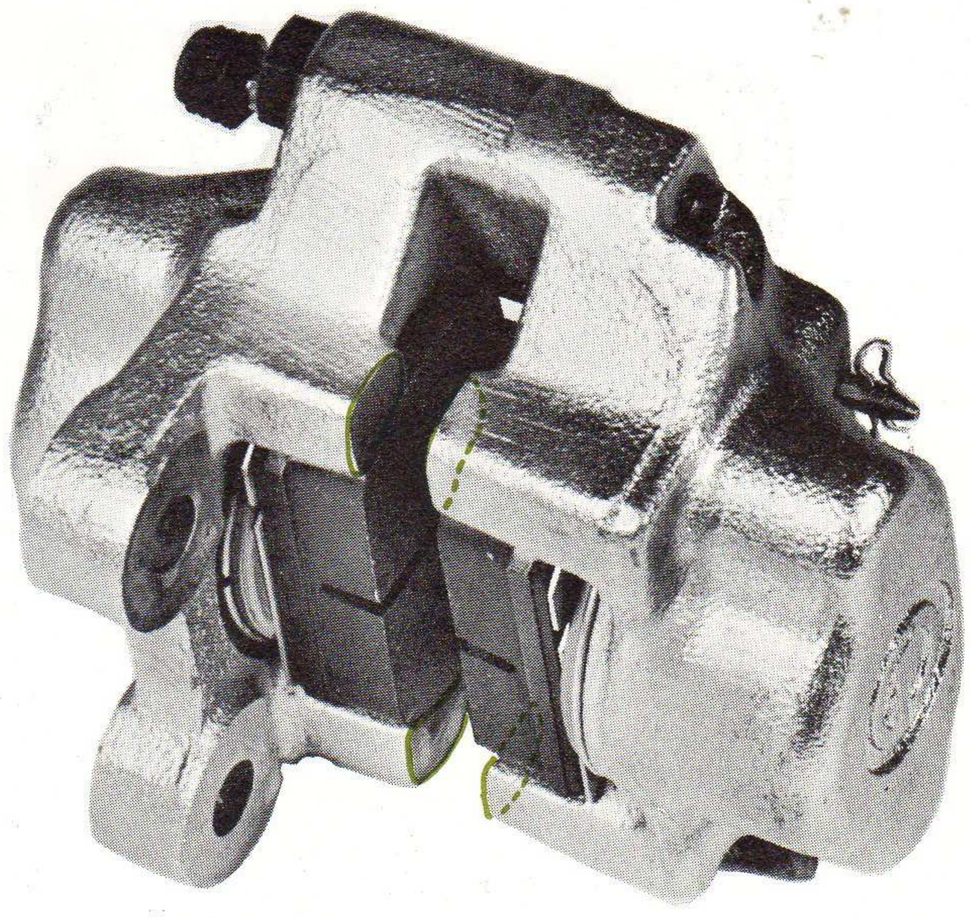

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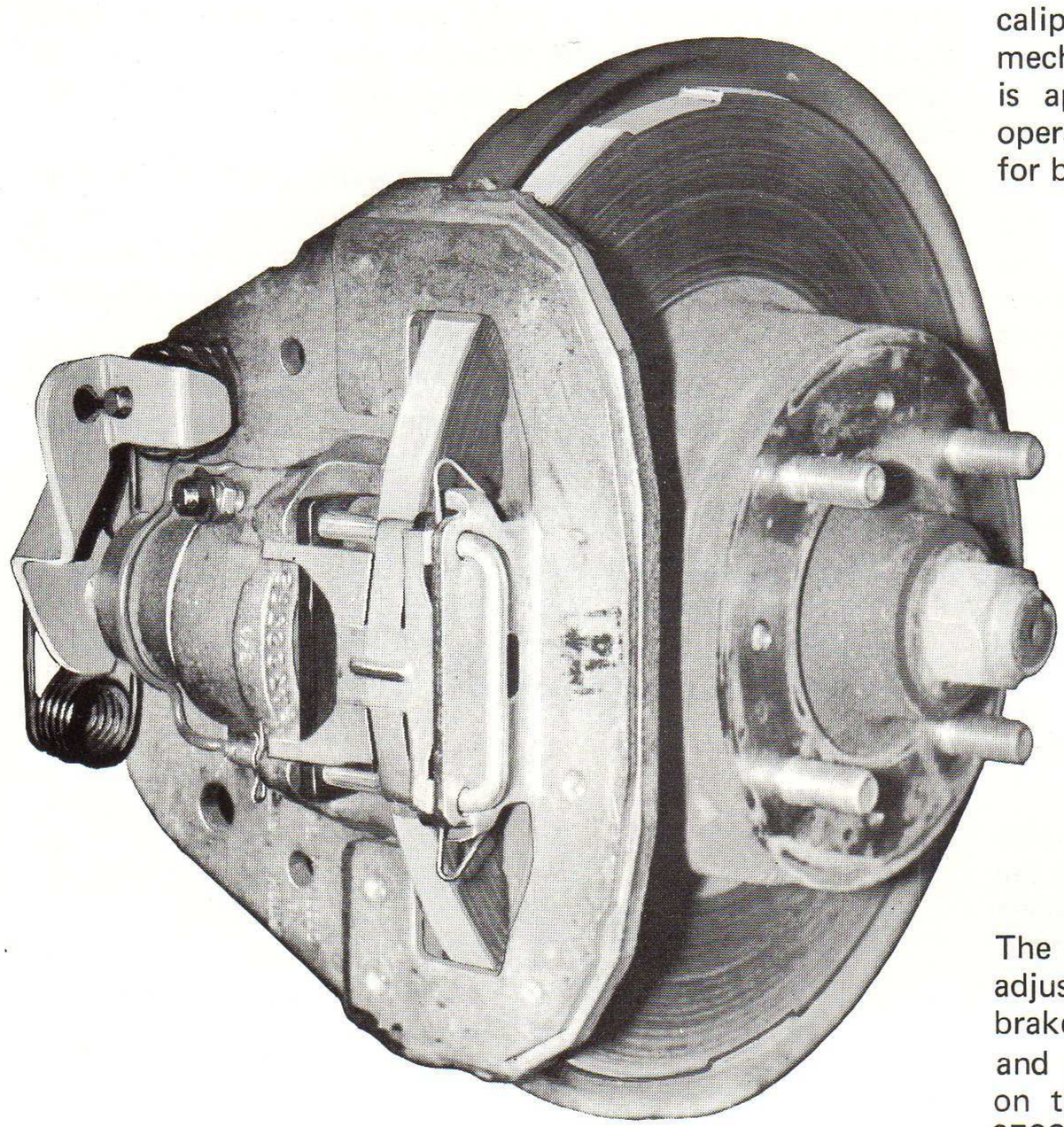
Girling M16 'AH' caliper

2A 12a

1



A0778

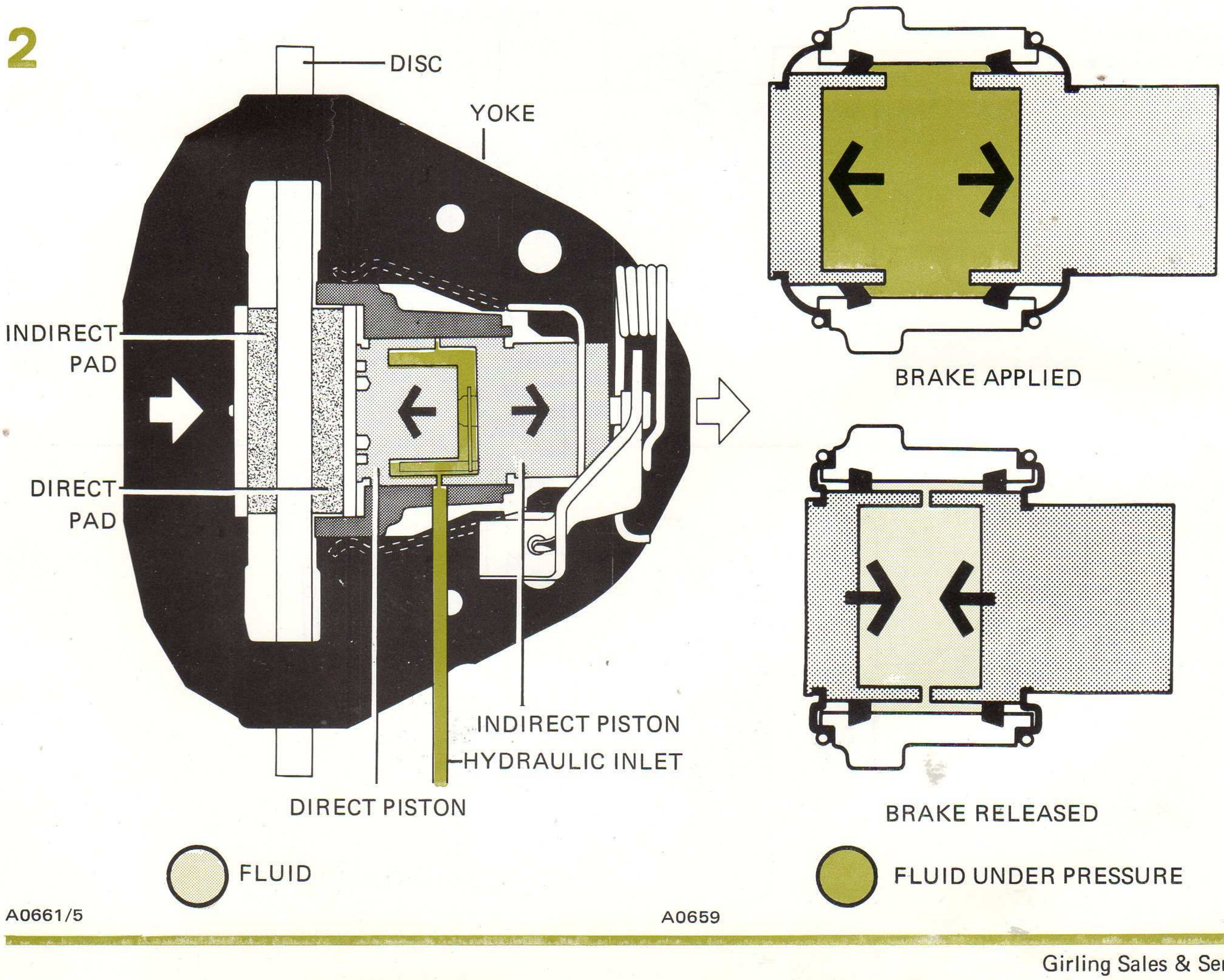
Introduction

The M16 AH Caliper (Fig. 1), is similar in design to the M4A caliper, but provision has been made for a handbrake mechanism which adjusts automatically when the footbrake is applied. As all Girling disc brakes are self-adjusting, operation of the footbrake therefore adjusts the pads for wear for both foot and handbrake operation.

The cylinder assembly is bolted rigidly to the axle and a steel yoke straddles the disc and slides in grooves in the cylinder body. Hydraulic pressure actuates both pistons, one of which acts directly onto the direct pad (Fig. 2). The opposite (indirect) piston acts against the yoke which slides in the cylinder grooves to bring the indirect pad into contact with the disc. The pressure both sides of the disc is then equal. When the pressure is released, the piston seals fitted in the walls of the cylinder retract the pistons a small amount, which allows the moving parts to relax sufficiently for the pads to remain in close proximity to the disc ready for the next brake application. Adjustment for lining wear on footbrake operation is therefore automatic.

The direct and indirect pistons are interconnected by an adjustment mechanism which automatically adjusts the hand-brake during footbrake operation. When the pads are worn and require replacing, the direct piston must be wound back on the threaded push rod and a special tool Part Number 67932001) is required.

2



A0661/5

A0659

Girling M16 'AH' caliper

In principle the adjuster (Fig. 3) depends on a nut with a 'fast thread', or a helix screw having a large pitch. Screwed onto the thread is a drive ring, which seats in a coned bore in the adjuster housing. The housing is peened into the direct piston and these two parts form an assembly and cannot move independently.

On footbrake operation, the two pistons are forced apart and the nut and push rod are moved in opposite directions. The clearance between the thread of the push rod and the inner thread of the nut is taken up, and so too is the clearance between the helix thread and the drive ring. The ring is then held firmly in its cone seating and as the outward movement of the pistons continues, this causes the nut to rotate on the push rod and so keep the handbrake in constant adjustment by taking up any clearance caused by pad wear. When the footbrake is released, the pistons are retracted by the seals (Fig. 2). The nut and push rod also move inwards and the drive ring engages the opposite side of the helix thread. The final return movement of the nut lifts the drive ring off its cone seating and the ring rotates on the nut. The built in clearance between the parts ensures the small gap necessary between pads and disc is maintained.

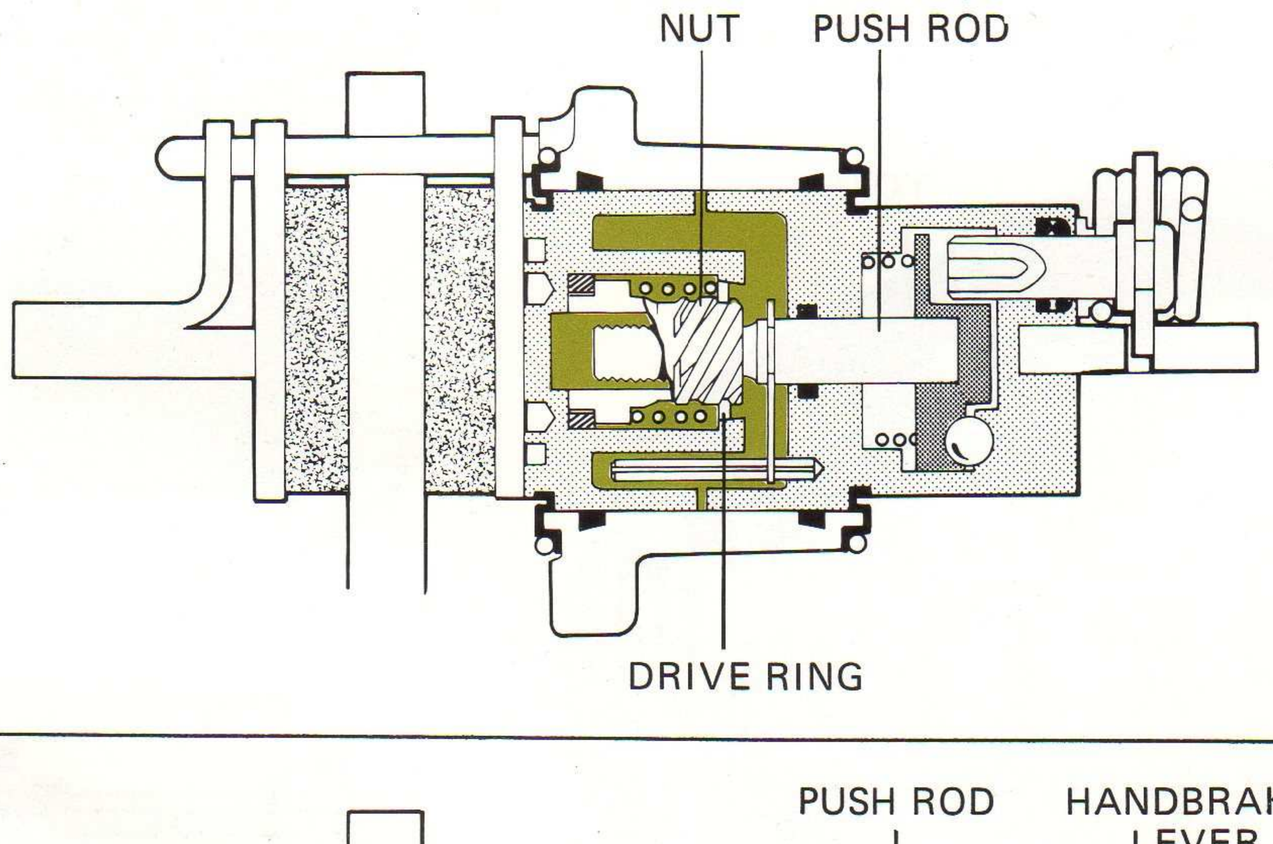
On handbrake operation (Fig. 4), the lever assembly rotates in the cam housing, turns the actuation plate and causes the ball bearings to ride up the ramp. Thus moving the actuation plate and push rod axially and so applying a purely mechanical force to the pistons without automatic adjustment.

Servicing

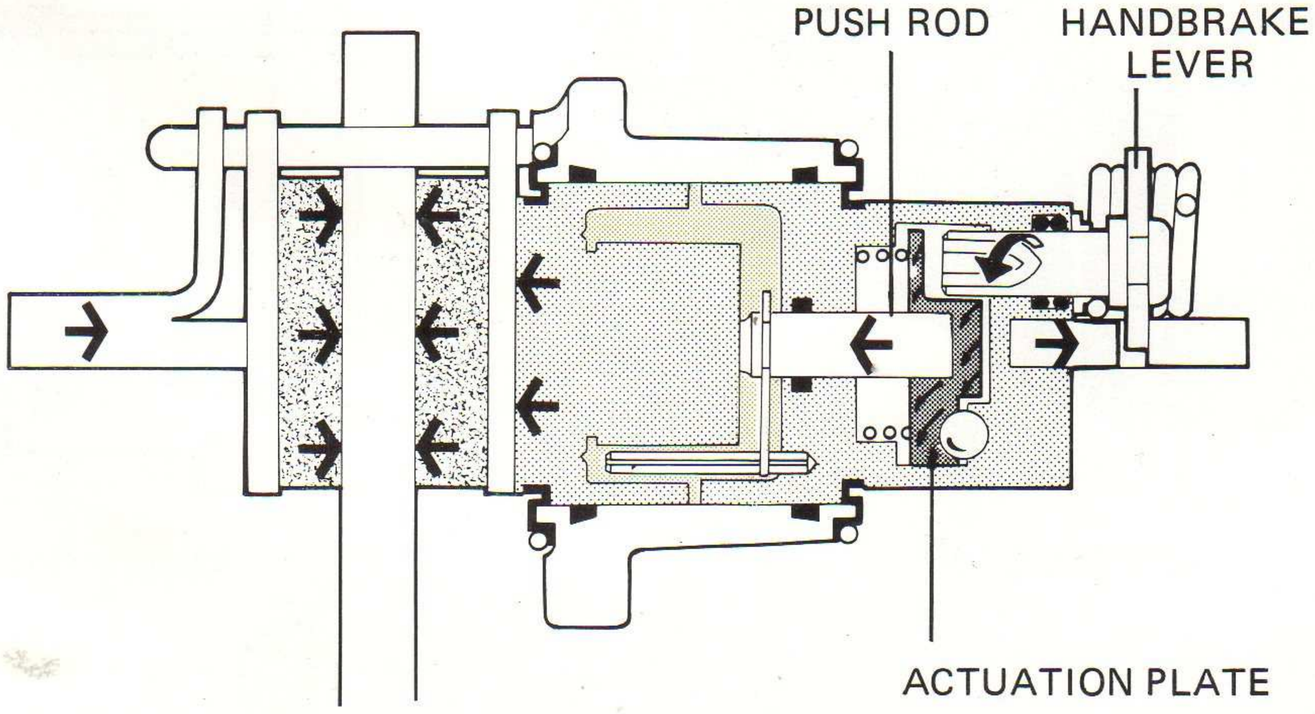
To maintain the efficiency of the brake system, preventive maintenance is essential and the following recommendations should be observed at the intervals stated. Full details of preventive maintenance are incorporated in Section 1, Page 1A1.

1. Check the pads for wear every 5,000 miles (8,000 km) and fit new pads when the lining thickness has worn to 1/16 of an inch (1.5 mm). If electrical wear indicators are incorporated the examinations should be unnecessary.
2. Every 10,000 miles (16,000 km) examine all brake pipes and flexible hoses for corrosion, fretting and signs of damage. Renew suspect parts and take action where applicable to prevent a recurrence of the trouble.
3. Change the Brake Fluid every eighteen months.
4. Every 40,000 miles (64,000 km) or three years, whichever occurs first, the caliper should be overhauled. All other hydraulic parts on the vehicle should also be replaced or overhauled and new hydraulic hoses should be fitted.

3 FOOTBRAKE OPERATION



4 HANDBRAKE OPERATION



A0661/4

Girling M16 'AH' caliper

2A 12c

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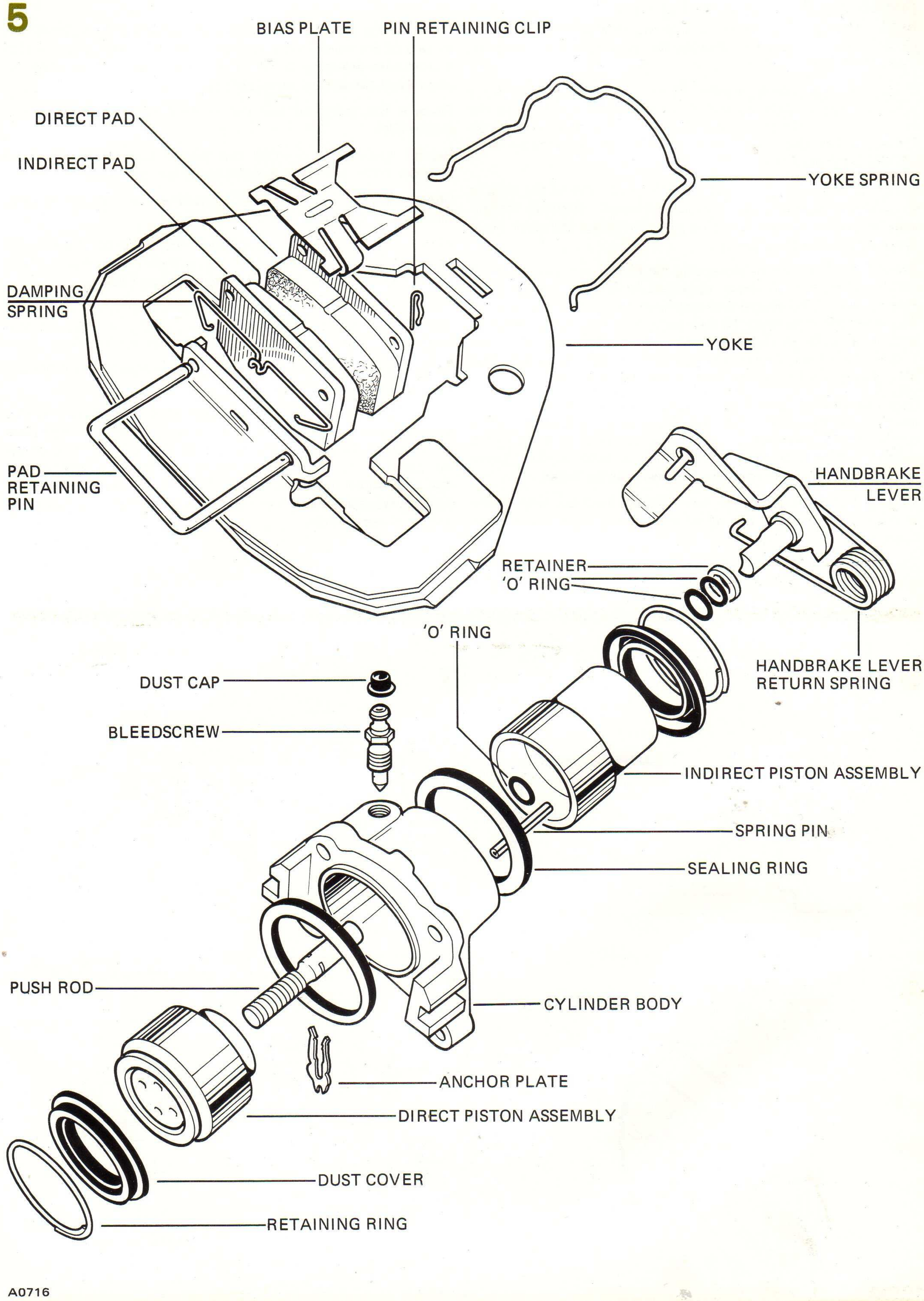

A0716

Fitting New Pads (Refer to Fig. 5)

When the lining has worn to 1/16 of an inch (1.5 mm), the pads should be replaced. Always fit new pads in sets on both sides of the car.

Chock the rear wheels, loosen the front wheel nuts and release the handbrake. Jack up the front of the car and remove the front wheels. Remove the bias plate. Use a wire brush to remove road dirt and wash the caliper thoroughly with Girling Cleaning Fluid.

To assist pad removal, rotate the disc until one of the slots in the outer edge aligns with the pad aperture. Remove the pin retaining clip and pad retaining pin. Withdraw the worn pads. Remove the damping spring.

Ensure the dust covers protecting the pistons are secure and in good condition. If loose, damaged or cracked, remove the caliper from the vehicle and examine the pistons for signs of corrosion and, if evident, fit new pistons and seals. No attempt should be made to clean-up corroded or seized pistons. If the pistons are in good working order and not corroded, then new dust covers from a Girling Service Kit can be fitted.

Examine the disc and if there is evidence of wear on one side only, one of the pistons may be seized, or the yoke may not be sliding on the cylinder. It is best to fit a new complete caliper, but provided the cylinders are in good working order and not damaged, new pistons and seals can be fitted.

Unscrew the bleedscrew one turn. Attach a rubber tube to the bleedscrew and place the other end of the tube into a clean glass jar.

To make room for the new pads use the special Girling Piston Wind-Back Tool (Fig. 6) to WIND and PUSH the piston back:

Refer to the illustration and locate the lugs of the special tool in two of the holes in the face of the piston. WIND the tool in a clockwise direction as far as possible, remove tool, re-locate and repeat the action several times.

Reverse the tool and use the cranked handle to PUSH the piston back.

Repeat both actions until the piston is fully back in the cylinder body and there is room to fit the new pads.

Check the dust covers are not twisted and are secure on both pistons and the cylinder body.

Before fitting the new pads, push the yoke backwards and forwards to ensure it slides on the cylinder; if necessary, clean the cylinder slideways with Girling Cleaning Fluid.

Fit the damping spring (Fig. 6). Position the pads and, with shorter leg opposite the bleedscrew, push the retaining pin through the holes until the securing clip can be fitted.

Pull the pin back until the securing clip is against the cylinder. Fit the bias plate.

Repeat procedure with the opposite front caliper, fit wheels and jack-down vehicle. Top up the master cylinder reservoirs with unused Castrol-Girling Universal Brake Fluid and pump the pedal 60 to 80 times to reposition the pads against the disc and adjust the handbrake. Recheck the brake fluid level, confirm handbrake and footbrake lever movement is satisfactory and road test vehicle.

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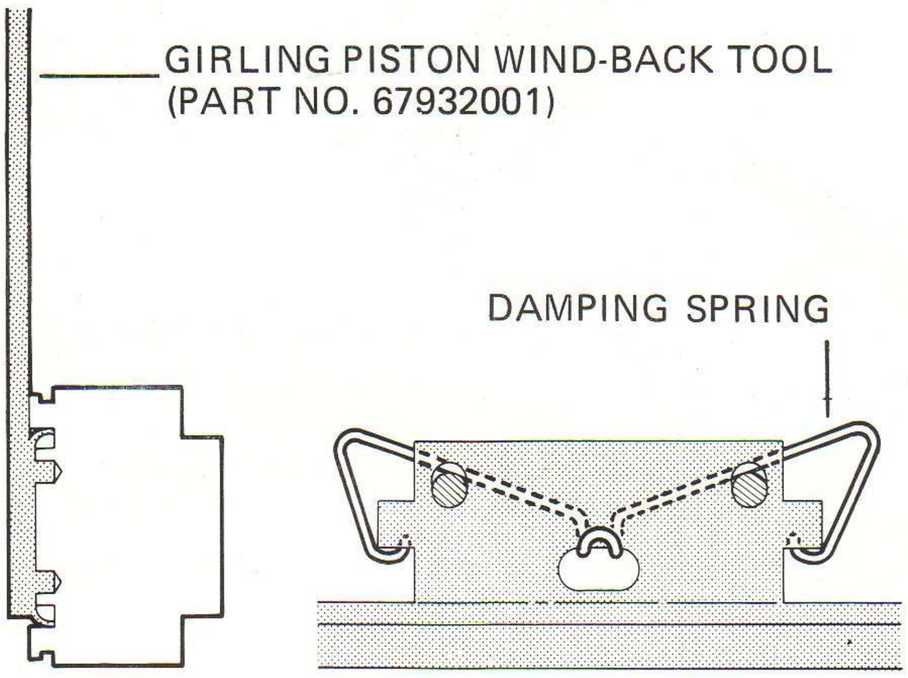

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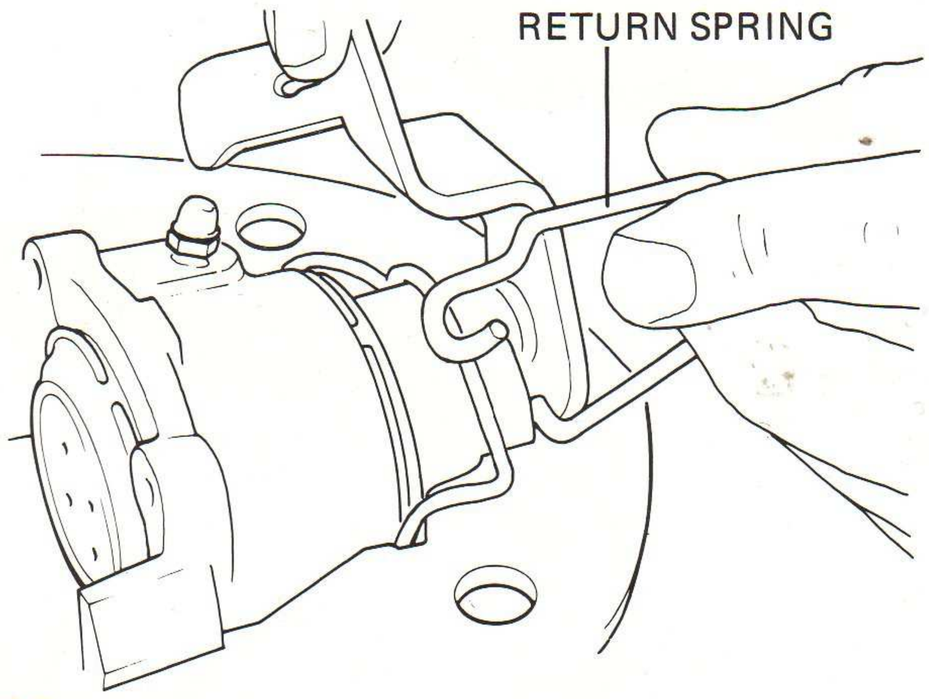

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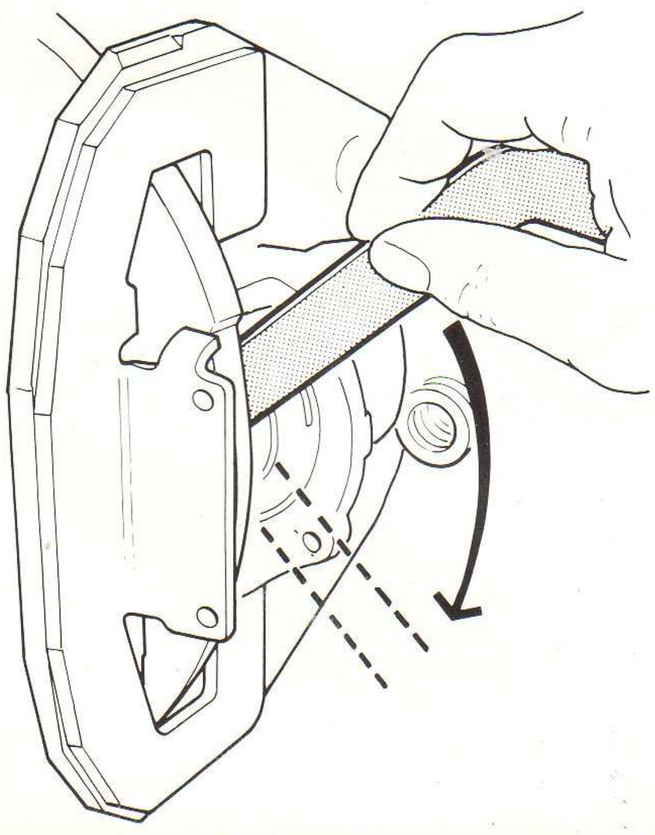

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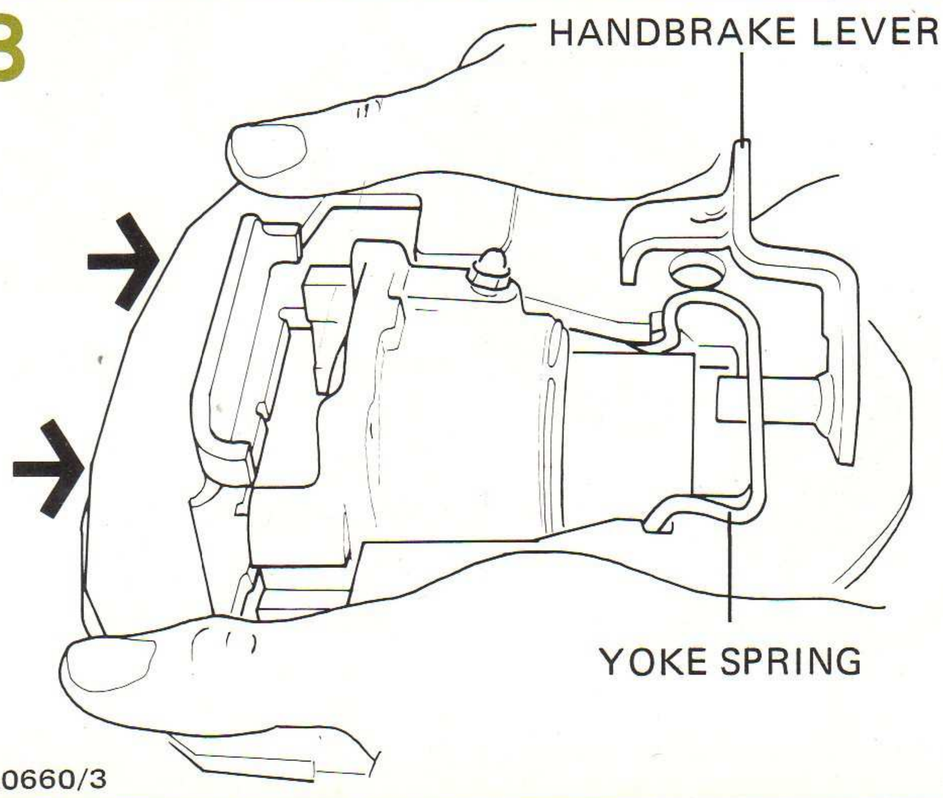


A0660/3

Girling M16 'AH' caliper

2A 12e

Dismantling (Refer to Fig. 5)

Remove the pads and clean the caliper as previously described, disconnect the handbrake cable and remove the caliper from the vehicle.

Clamp the cylinder mounting lugs in a bench vice (fitted with padded jaws) and remove the handbrake lever return spring (Fig. 7).

Slide the yoke off the cylinder (Fig. 8) and remove the yoke spring and handbrake lever.

Remove the retaining rings and dust covers.

Remove cylinder from bench vice, place on the bench and eject one of the pistons by applying compressed air to the inlet connection (Fig. 9). Taking care not to damage the internal surfaces, push out the remaining piston.

Taking care not to damage the internal surfaces, remove the seals from the cylinder bore.

Unscrew the bleedscrew.

Cleaning

Clean all parts with Girling Cleaning Fluid or unused Castrol-Girling Universal Brake Fluid.

NOTE: The indirect piston should be wiped clean, as washing or immersing with fluid will tend to wash out the internal grease lubricating the ball bearings and actuation plate.

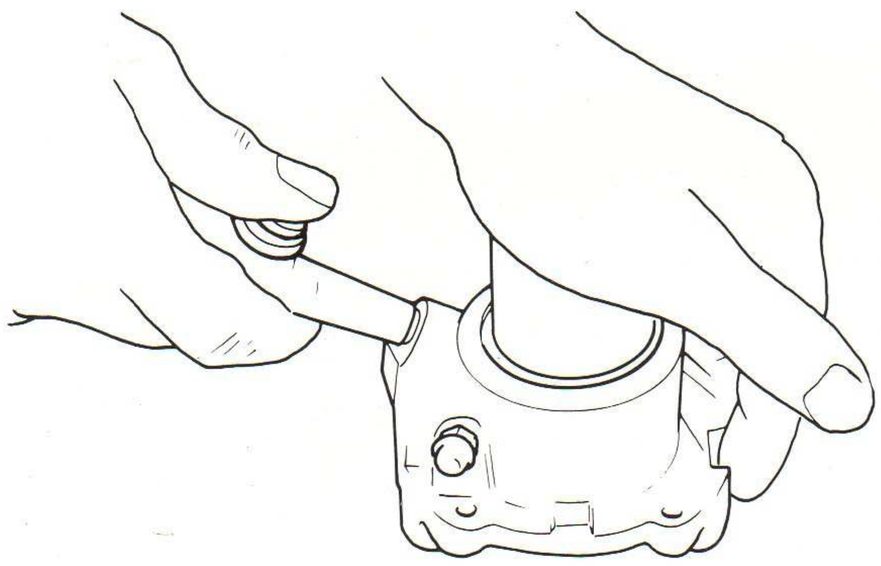
Examine all parts for signs of wear, damage and corrosion, paying particular attention to the piston assemblies and the cylinder bore.

Check the spring pin fitted to the indirect piston is not bent or damaged and is secure in the piston. Also ensure the push rod screws easily into the adjuster assembly fitted in the direct piston.

Check the sliding edges of the yoke and the grooves in the cylinder body are smooth and free from corrosion. If necessary, remove corrosion using a wire brush or wire-wool, but material removal must be avoided if the small gap between the two components when assembled is to be maintained within design limits.

All parts must be in good working order and where doubt exists new parts should be fitted.

9



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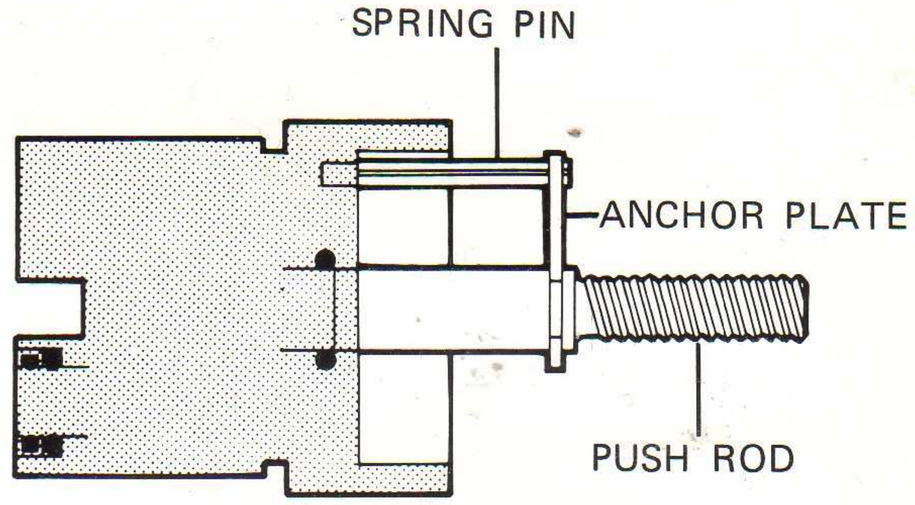

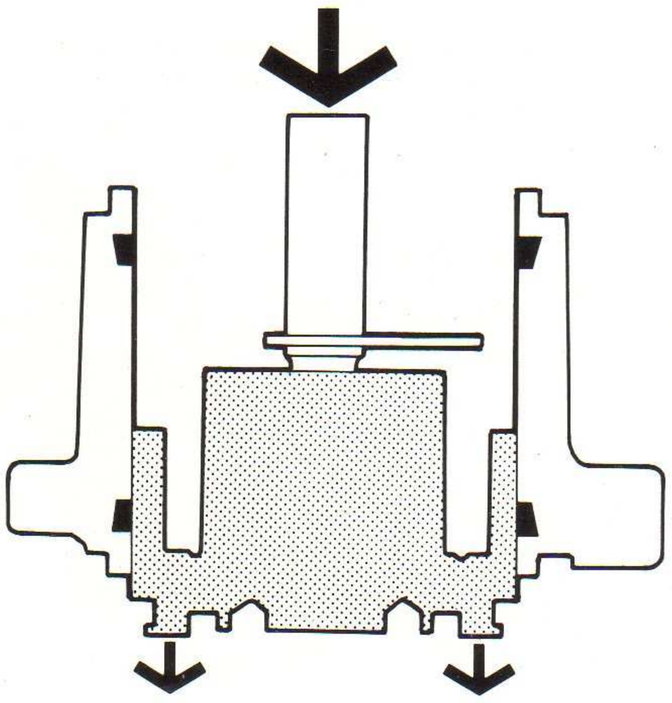

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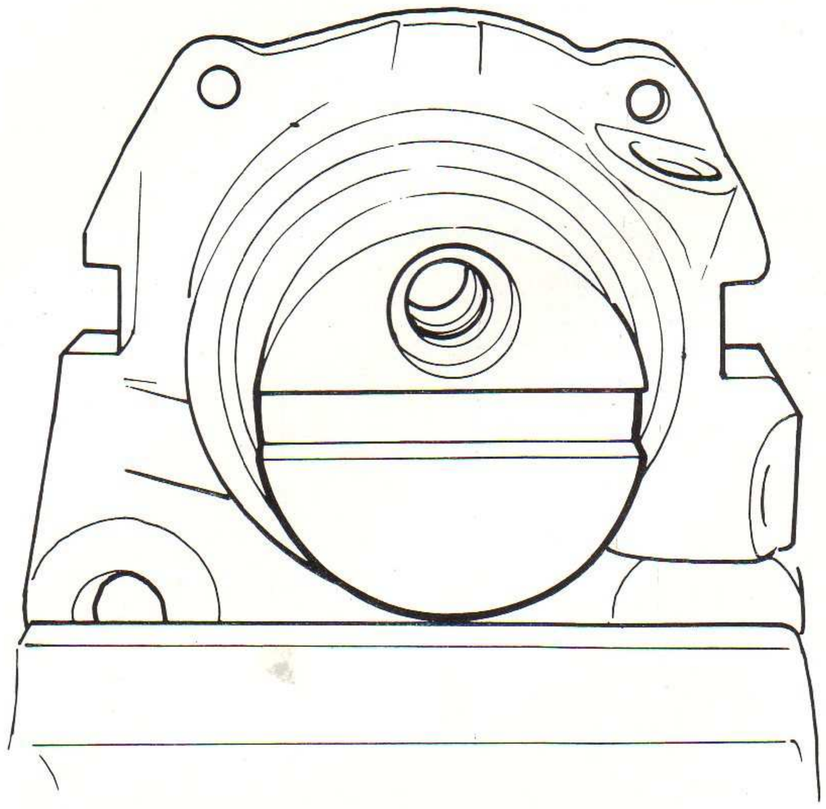

A0660/8

Girling M16 'AH' caliper

Reassembly (Refer to Fig. 5)

Reassemble the unit using the new parts from the relevant Girling Service Kit.

Lubricate the new seals with unused Castrol-Girling Universal Brake Fluid and fit into the grooves in the cylinder bore.

IMPORTANT:

IN ADDITION TO THE OTHER PARTS, THE KIT CONTAINS SIX SMALL 'O' RINGS, THREE FOR EACH INDIRECT PISTON. TO HELP WITH IDENTIFICATION REFER TO THE ILLUSTRATION FIG. 12; THE TWO 'O' RINGS WITH THE WHITE PAINT SPOT ARE FOR USE WITH THE PUSH RODS AND THE FOUR 'O' RINGS WITH THE RED PAINT ARE FOR USE WITH THE HANDBRAKE LEVER CAMS. WHERE DOUBT EXISTS CHECK THE SIZE, THE TWO 'O' RINGS FOR USE ON THE PUSH RODS ARE SLIGHTLY LARGER THAN EITHER OF THE OTHER 'O' RINGS.

NOTE: When fitting the new 'O' rings to the indirect piston, care must be used to ensure the 'O' rings do not slip down the bore and into the cam housing.

Fit the selected 'O' rings into the indirect piston assembly as indicated on Fig. 12; fit a new retainer if the old one was damaged and removed. Lubricate the piston with unused Castrol-Girling Universal Brake Fluid.

Fit the anchor plate onto the push rod. Lubricate the rod with unused Castrol-Girling Universal Brake Fluid and push into the bore of the indirect piston, locating the anchor plate on the spring pin (Fig. 10).

Clamp the cylinder in a vice (Fig. 10).

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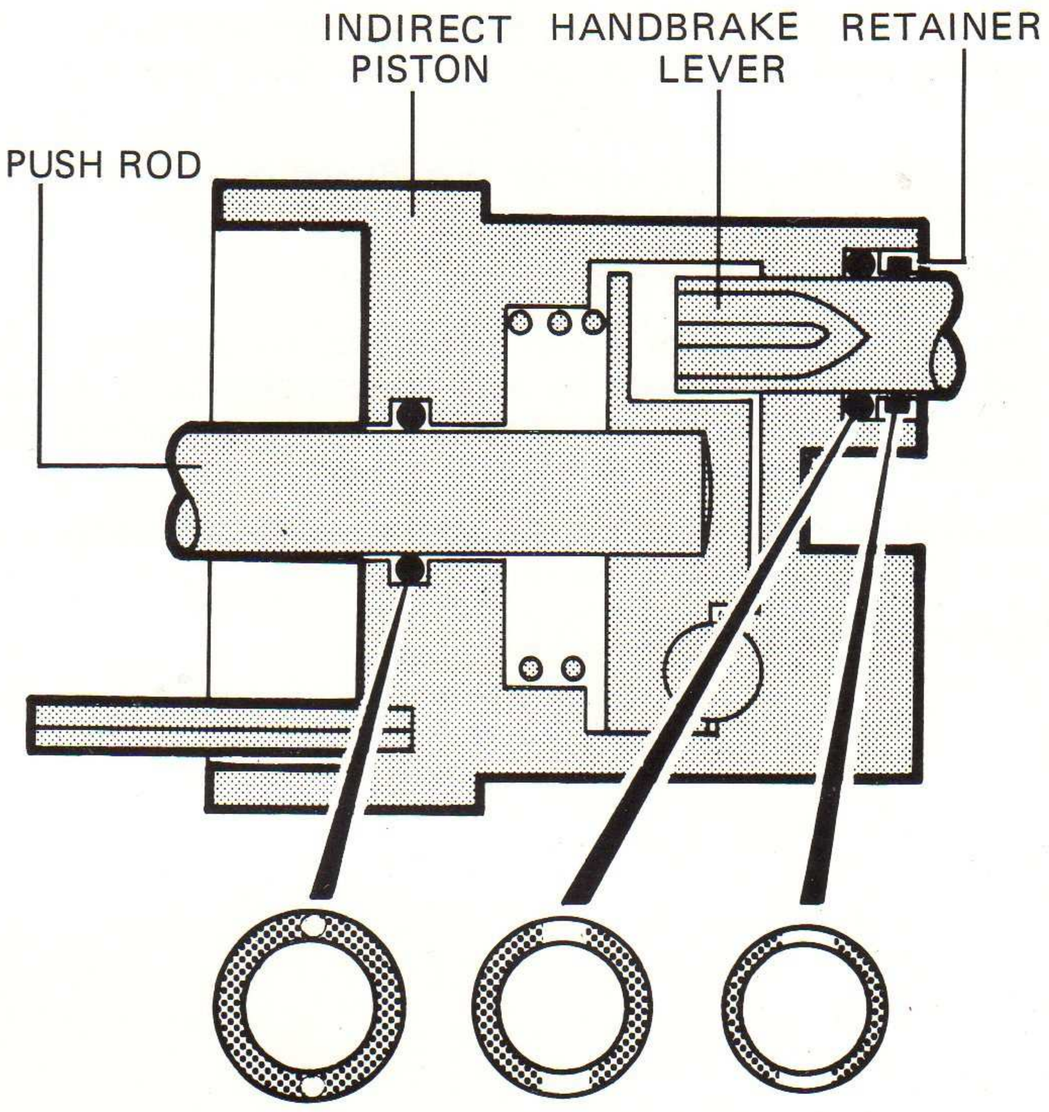

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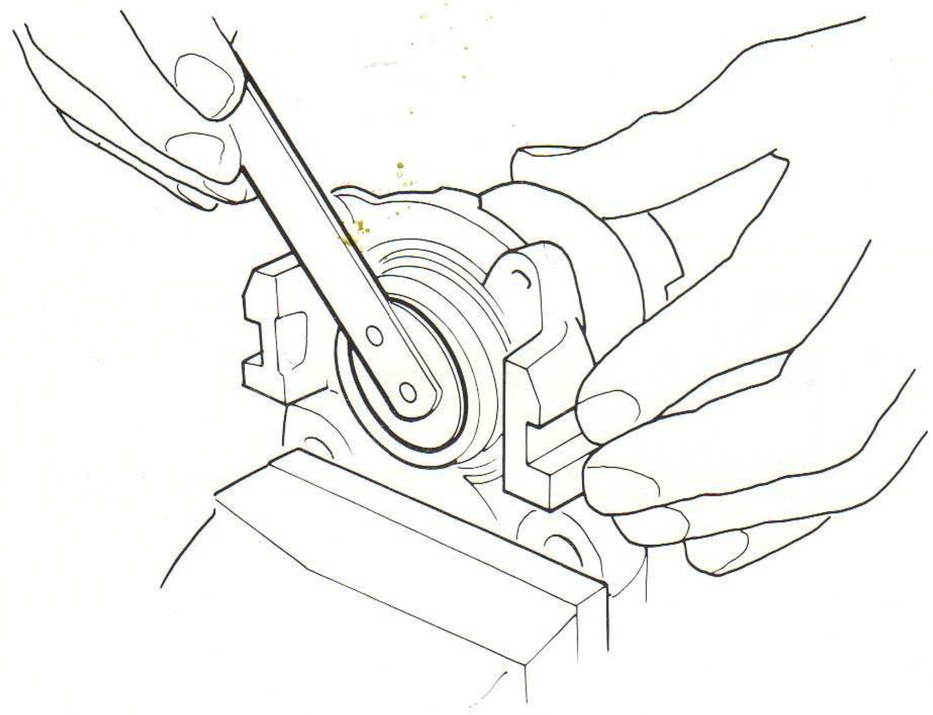

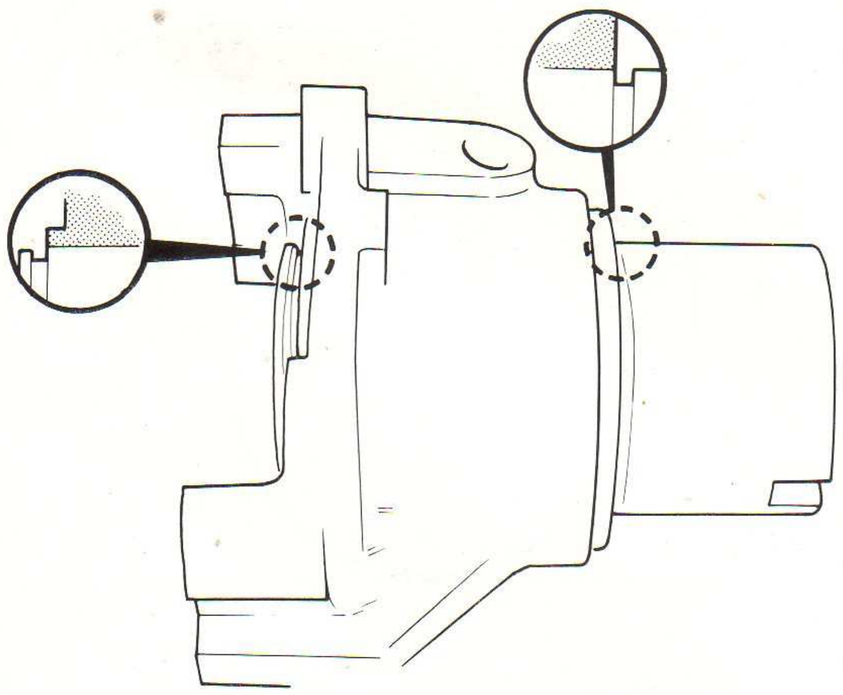

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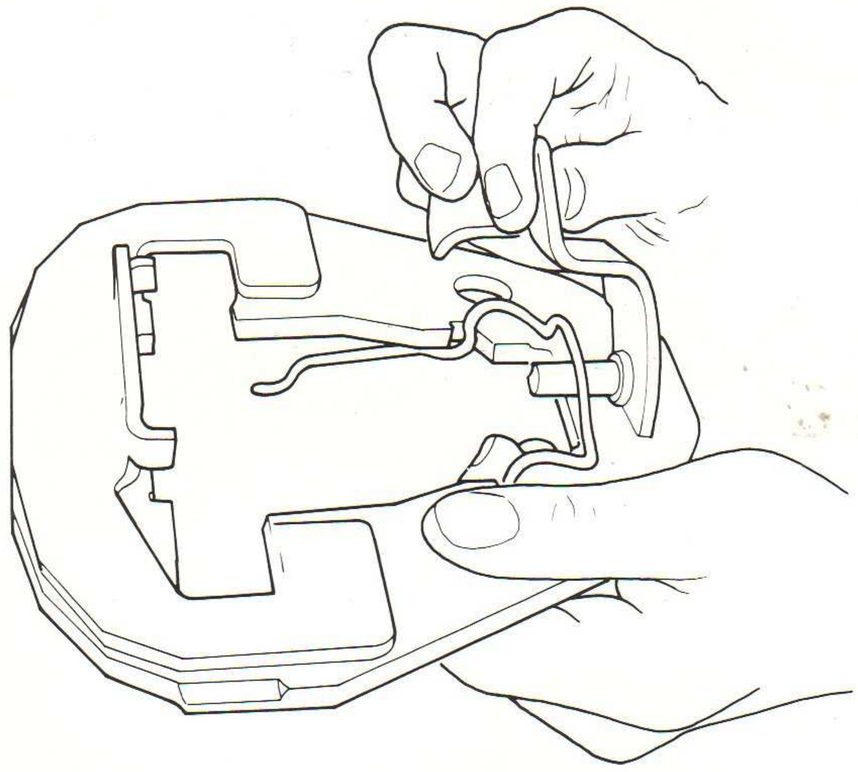

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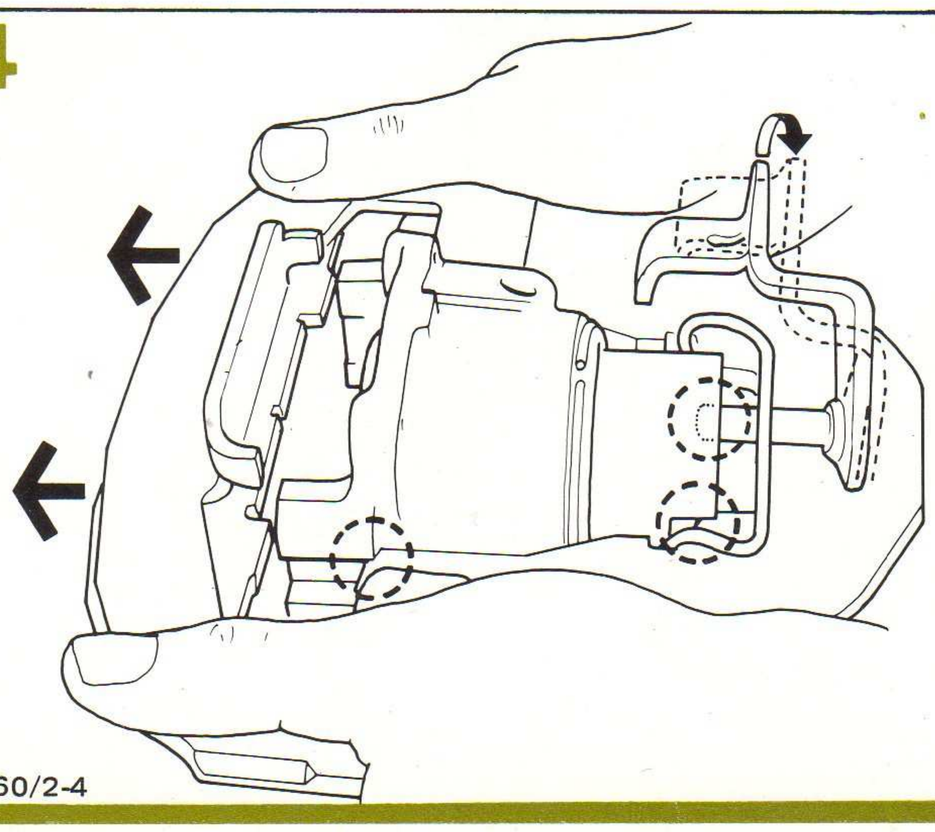


A0660/2-4

Girling M16 'AH' caliper

2A 12g

disc brakes

Lubricate both pistons and the cylinder sealing rings with unused Castrol-Girling Universal Brake Fluid. Offer the indirect piston assembly to the cylinder, ensuring the slot in the piston is parallel with the sliding grooves in the cylinder as shown (Fig. 10) and push the piston home. Offer the direct piston to the cylinder and threaded end of push rod, and using the special tool WIND the direct piston onto the push rod (Fig. 11). WIND and PUSH both pistons together until the piston faces are level with the body as illustrated (Fig. 11).

Fit dust covers and retaining rings to both pistons; ensure the dust cover is seated in the groove in the indirect piston and that damage does not ensue when fitting the cover over the slot in the piston.

Fit the yoke spring to the yoke so that the angled leg of the spring will be on the same side of the cylinder as the bleedscrew when fitted. Fit the handbrake lever with cable connection also adjacent to the bleedscrew (Fig. 13). Offer the yoke with spring to the cylinder and manipulate the edge of the yoke and the spring ends into the cylinder grooves (Fig. 14); take care to align the yoke with the slot in the indirect piston as shown and lift the handbrake lever to locate the cam shaft in the indirect piston cam housing. When aligned, push fully home, but take care not to push the indirect piston into the cylinder (Refer to Fig. 11) as damage will ensue to the cylinder seal.

Slide the handbrake lever return spring under the cam shaft as shown (Fig. 15) and press into position on the lever.

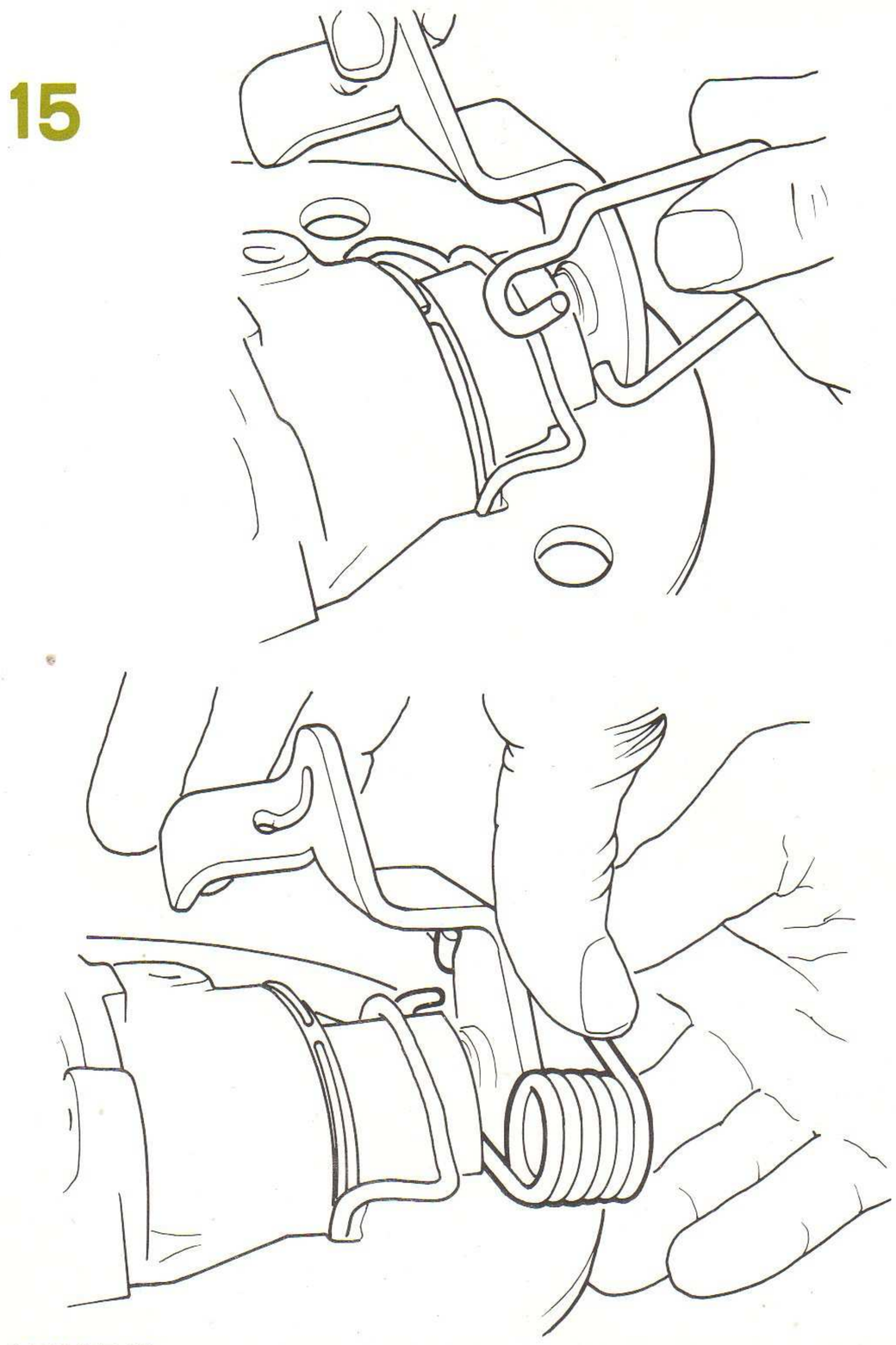
Screw in bleedscrew.

Check the dust covers are not twisted and that they are secure with the retaining rings correctly fitted.

If the mating surfaces of the yoke and cylinder were corroded and have been cleaned, check the gap with feeler gauges (Fig. 16). The measurement should be 0.006 in. (0.15 mm) to 0.012 in. (0.30 mm). However, a gap of up to 0.015 in. (0.38 mm) maximum is permissible as the caliper will still work efficiently, but calipers with large gaps have a tendency to be noisy during brake operation.

Reverse the removal procedure and refit the caliper to the vehicle. Fit new pads as previously described and repeat procedure with opposite front caliper. Top up the master cylinder reservoirs with unused Castrol-Girling Universal Brake Fluid and pump the pedal 60 to 80 times to reposition the pads against the disc and adjust the handbrake. Apply maximum pressure to the foot pedal for a period of two minutes and check all new and disturbed connections for leakage. Recheck the brake fluid level, confirm handbrake and footbrake lever movement is satisfactory and road test vehicle.

15



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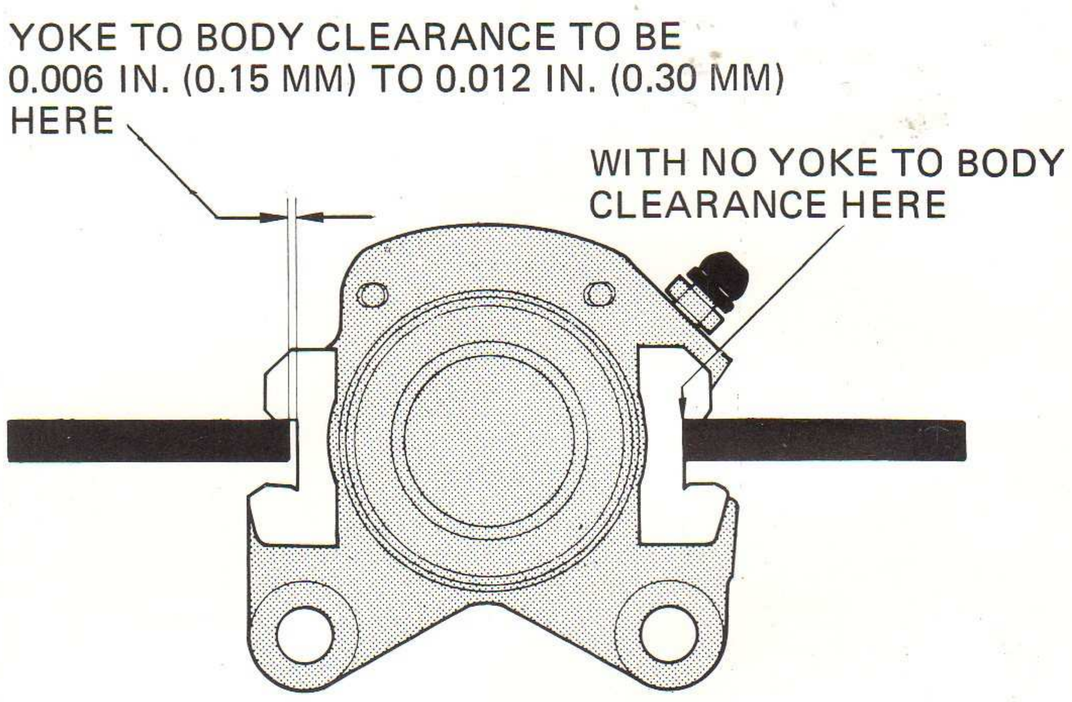
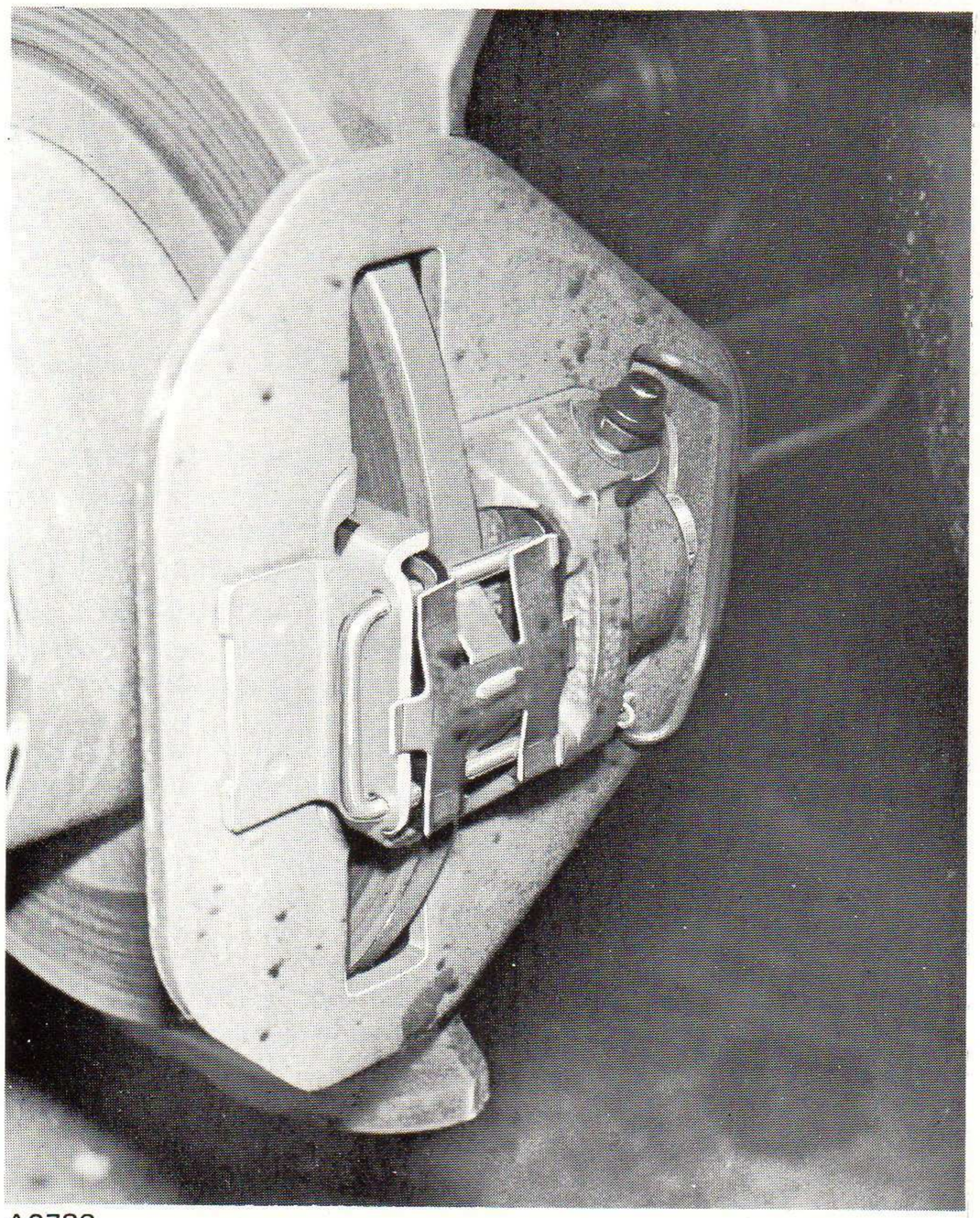


A0661/1

M4A caliper

1



A0783

Introduction

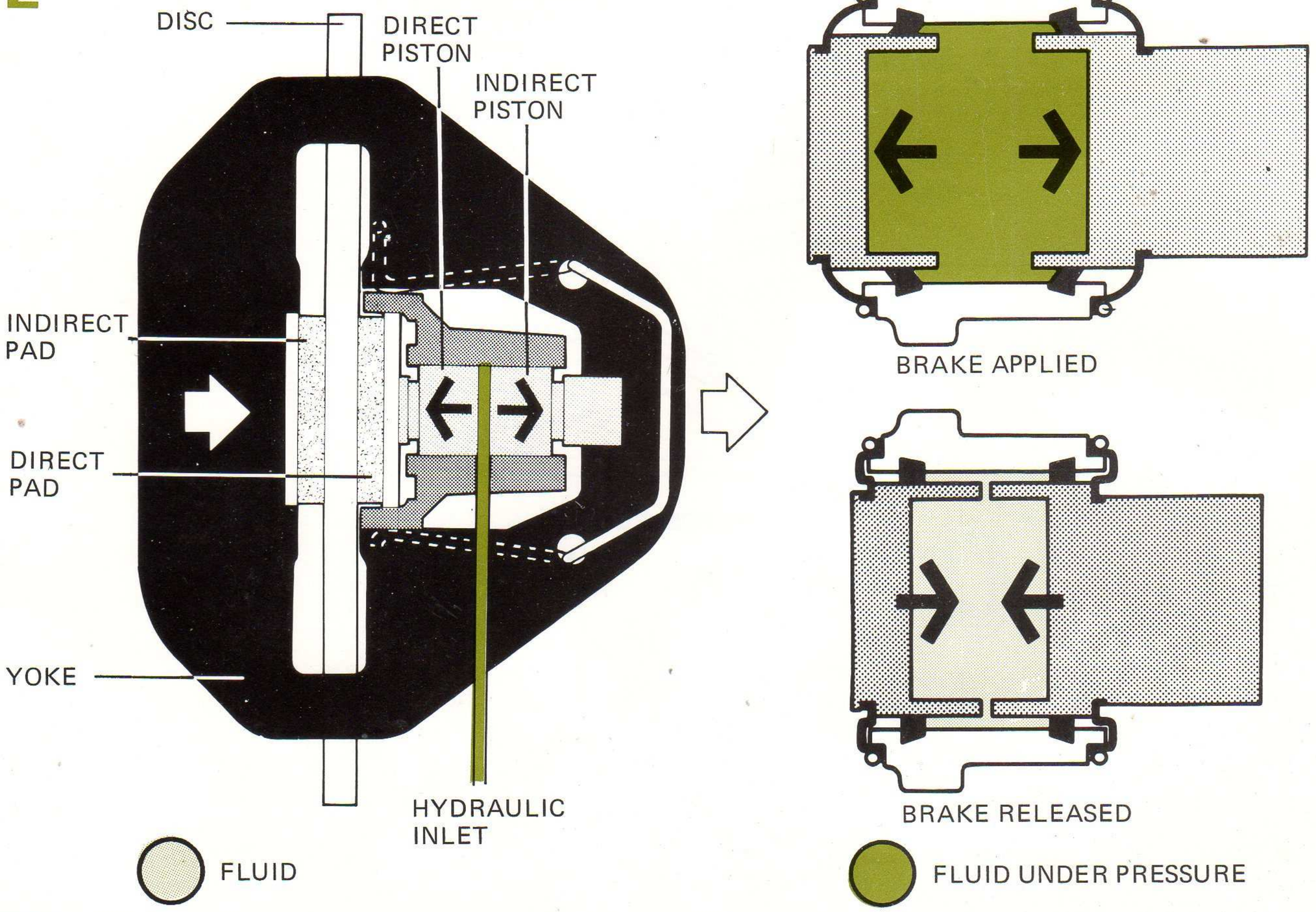
The caliper (Fig. 1) consists of a cylinder assembly, a yoke and two pads. The cylinder is rigidly fixed to the axle whilst the yoke slides in grooves incorporated in the cylinder body.

Hydraulic pressure is directed between the two pistons in the cylinder and the pistons move outwards (Fig. 2). The direct pad is pushed against the disc by the one piston whilst the opposite piston pushes against the yoke which slides in the cylinder grooves to bring the indirect pad against the disc.

The pressure both sides of the disc is then equal. When the pressure is released, the piston seals fitted in the walls of the cylinder retract the pistons a small amount, which allows the moving parts to relax sufficiently for the pads to remain in close proximity to the disc ready for the next brake application. Adjustment for lining wear is therefore automatic.

To reduce the tendency of the yoke to rattle on the cylinder, the gap between the yoke and the grooves in the cylinder body is kept to a minimum and the yoke is spring loaded to the body in the forward direction of disc rotation.

2



A0784

A0659

Servicing

To maintain the efficiency of the brake system, preventive maintenance is essential and the following recommendations should be observed at the intervals stated. Full details of preventive maintenance are incorporated in Section 1, Page 1A1.

1. Check the pads for wear every 5,000 miles (8,000 km) and fit new pads when the lining thickness has worn to 1/16 of an inch (1.5 mm). If electrical wear indicators are incorporated the examinations should be unnecessary.
2. Every 10,000 miles (16,000 km) examine all brake pipes and flexible hoses for corrosion, fretting and signs of damage. Renew suspect parts and take action where applicable to prevent a recurrence of the trouble.
3. Change the Brake Fluid every eighteen months.
4. Every 40,000 miles (64,000 km) or three years, whichever occurs first, the caliper should be overhauled. All other hydraulic parts on the vehicle should also be replaced or overhauled and new hydraulic hoses should be fitted.

Fitting New Pads (Refer to Fig. 3)

When the lining has worn to 1/16 of an inch (1.5 mm), the pads should be replaced. Always fit new pads in sets on both sides of the car.

Apply the handbrake and chock the front wheels. Loosen the rear wheel nuts, jack up the rear of car and remove the rear wheels.

Use a wire brush to remove road dirt and wash the caliper thoroughly with Girling Cleaning Fluid.

Remove the pin retaining clip, pad retaining pin and bias plate. Withdraw the worn pads.

Ensure the dust covers protecting the pistons are secure and in good condition. If loose, damaged or cracked, remove the caliper from the vehicle and examine the pistons for signs of corrosion. If evident, fit new pistons and seals. NO ATTEMPT SHOULD BE MADE TO CLEAN UP CORRODED OR SEIZED PISTONS. If the pistons are in good working order new dust covers from a Girling Service Kit can be fitted.

Examine the disc to see if there is evidence of wear on one side only. This can be caused by piston seizure, or failure of the yoke to slide on the cylinder body. It is best to fit a new complete caliper, but provided the cylinders are in good working order and not damaged, new pistons and seals can be fitted.

Unscrew the bleedscrew one turn. Attach a rubber tube to the bleedscrew and place the other end of the tube into a clean glass jar.

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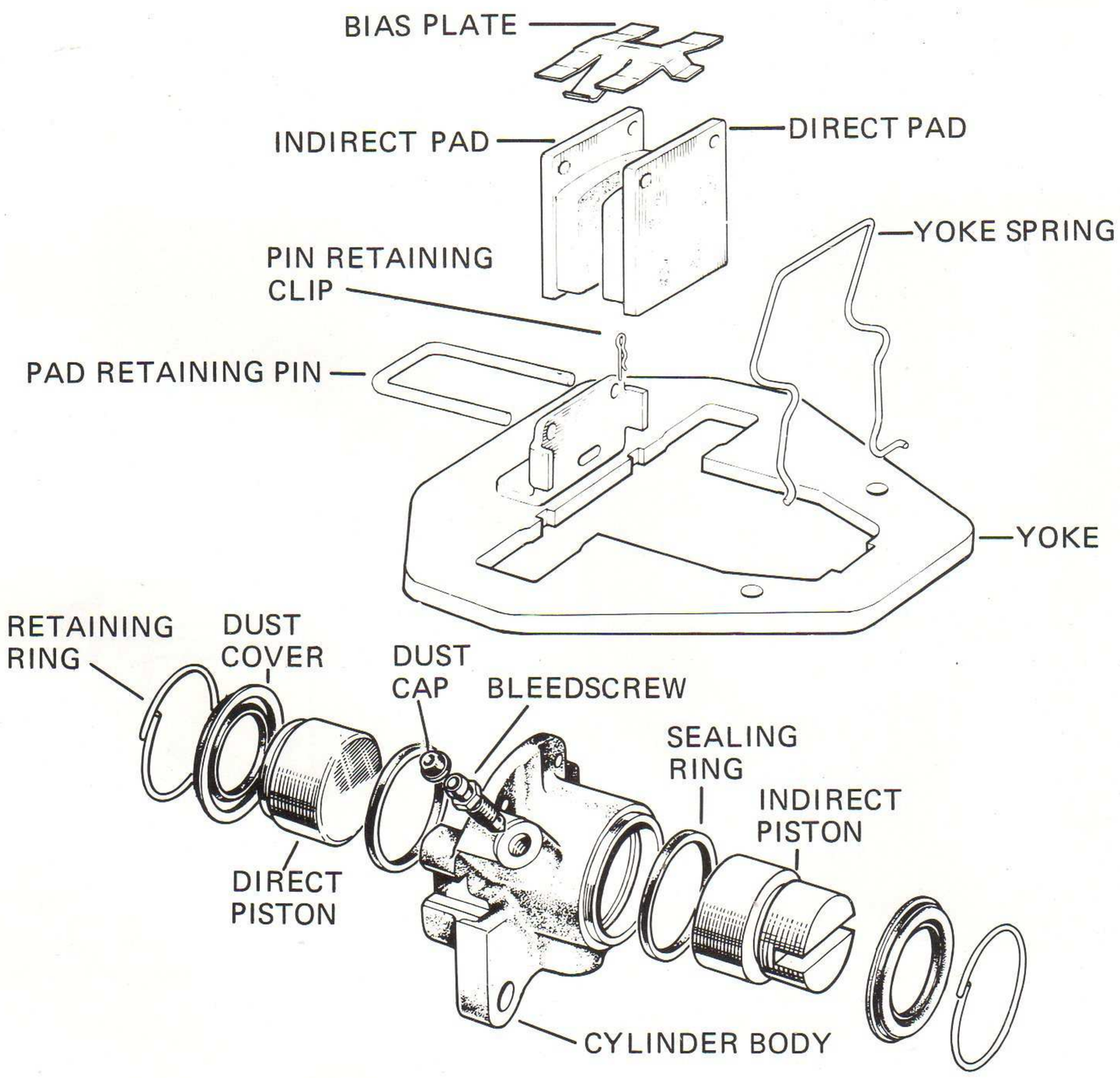


A0782

M4A caliper

disc brakes

To make room for the new pads PUSH back the pistons and yoke (Fig. 4); use the cranked handle of the special Girling Piston Wind-Back Tool for the front M16AH Calipers. Remove the tool, tighten the bleedscrew and remove the rubber tube. Check the dust covers are not twisted and are secure on both pistons and the cylinder body. Before fitting the new pads, push the yoke backwards and forwards to ensure it slides on the cylinder; if necessary, clean the cylinder slideways with Girling Cleaning Fluid.

To fit the new pads refer to the illustrations (Figs. 1 and 3); position the parts as shown and reverse the removal procedure. Pull back the pad retaining pin until the clip is against the caliper body.

Repeat procedure with the opposite rear caliper, fit wheels and jack-down the vehicle. Top up the master cylinder reservoirs with unused Castrol-Girling Universal Brake Fluid and pump the pedal to reposition the pads against the disc. Recheck the brake fluid level, confirm footbrake movement is satisfactory and road test.

Dismantling (Refer to Fig. 3)

Clean the caliper and remove pads as previously described, then remove the caliper from the vehicle.

Clamp the cylinder in a bench vice fitted with padded jaws (Fig. 5).

Slide the yoke off the cylinder (Fig. 6) and lift towards bleedscrew to remove. Before removal, note how the yoke spring is fitted to the yoke.

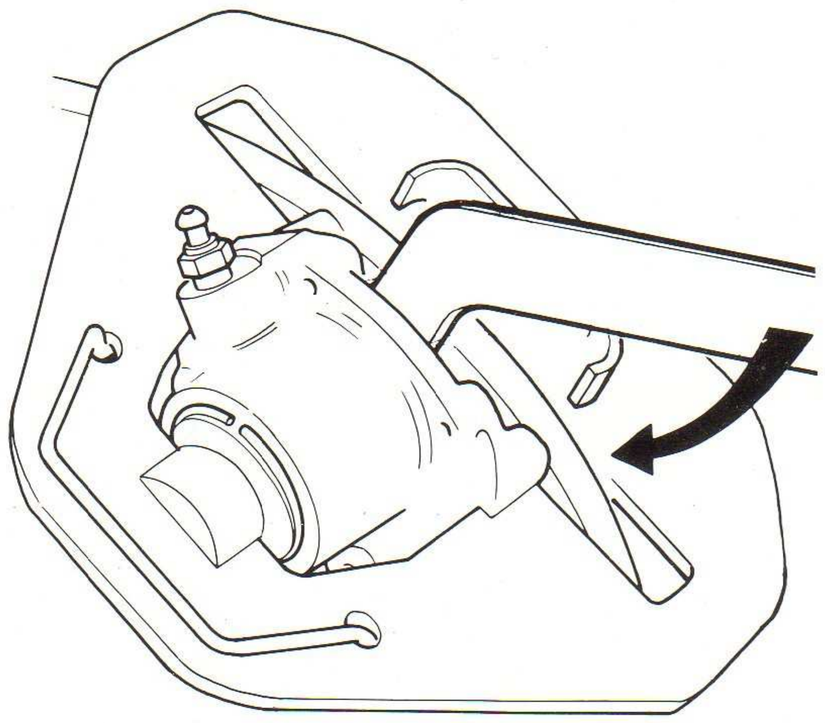
Remove retaining rings and dust covers.

Remove the cylinder from bench vice, place on bench and blow out one of the pistons (Fig. 7). Hold cylinder and push out the remaining piston (Fig. 8).

Taking care not to damage, the internal surfaces, remove the seals from the cylinder bore.

Unscrew the bleedscrew.

4



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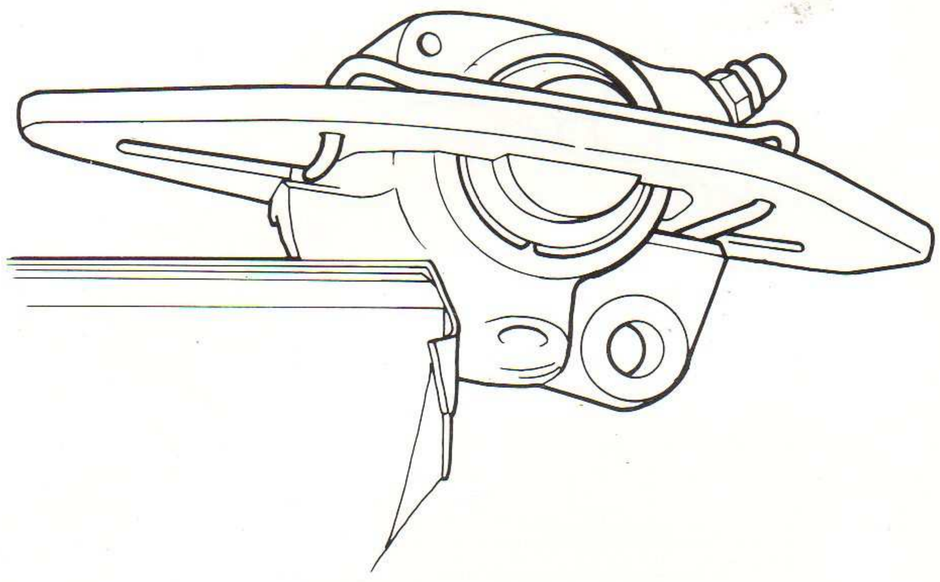


A0658/1

M4A caliper

Cleaning

Clean all parts with Girling Cleaning Fluid or unused Castrol-Girling Universal Brake Fluid.

Examine all parts for signs of wear, damage and corrosion, paying particular attention to the pistons and the cylinder bore. Also ensure the sliding edges of the yoke and the grooves in the cylinder body are smooth and free from corrosion. If necessary, remove corrosion using a wire-brush or wire-wool, but material removal must be avoided if the small gap between the two components when assembled is to be maintained within design limits.

All parts must be in good working order and where doubt exists new parts should be fitted.

Re-assembly (Refer to Fig. 3)

Reassemble the unit using the new parts from the relevant Girling Service Kit.

Lubricate the new seals with unused Castrol-Girling Universal Brake Fluid and fit into the grooves in the cylinder bore.

Clamp the cylinder in a bench vice (Fig. 9). Lubricate the pistons with unused Castrol-Girling Universal Brake Fluid and push into the cylinder; the indirect pistons should be fitted as illustrated, with the slot in the piston aligned with the grooves in the cylinder.

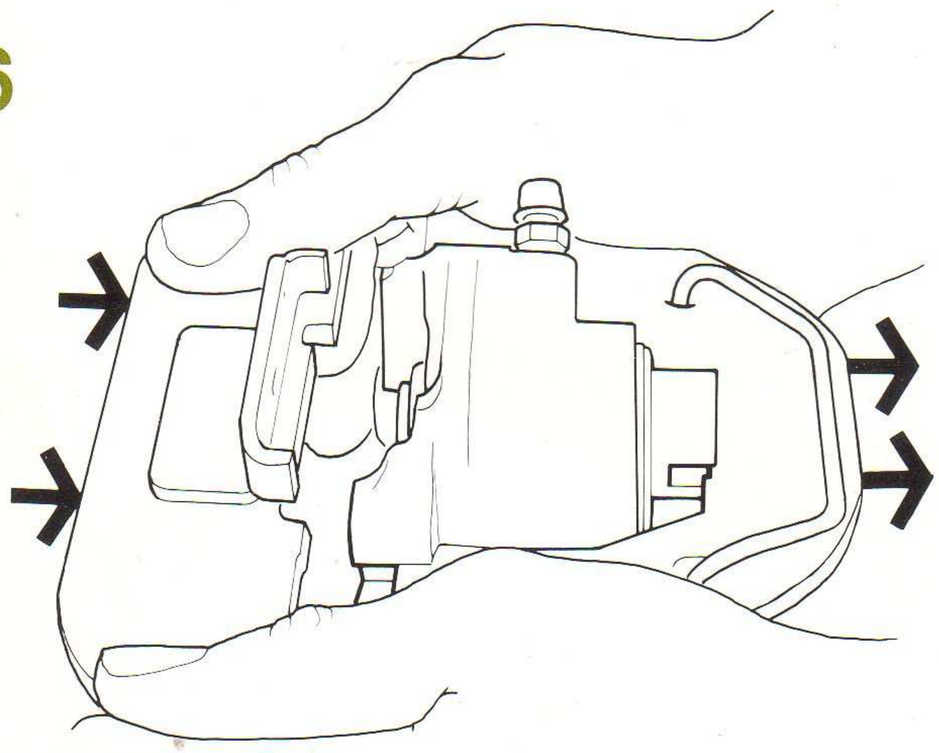
Fit dust covers and retaining rings to both pistons. Ensure the dust cover is seated in the groove in the indirect piston and the damage does not ensue when fitting the cover over the slot in the piston.

Fit the yoke spring to the yoke (Fig. 10), so that the angled leg of the spring will be on the same side of the cylinder as the bleedscrew when the cylinder is fitted; the spring leg with the 'foot', should be on the opposite side of the cylinder to the bleedscrew. Offer the yoke with spring to the cylinder (Fig. 11) and manipulate the edge of the yoke and spring ends into the cylinder grooves; ensure the yoke also aligns with the slot in the indirect piston as illustrated and slide the yoke fully into position on the cylinder.

Screw in bleedscrew.

Ensure the dust covers are secure and the retaining rings are correctly fitted.

6



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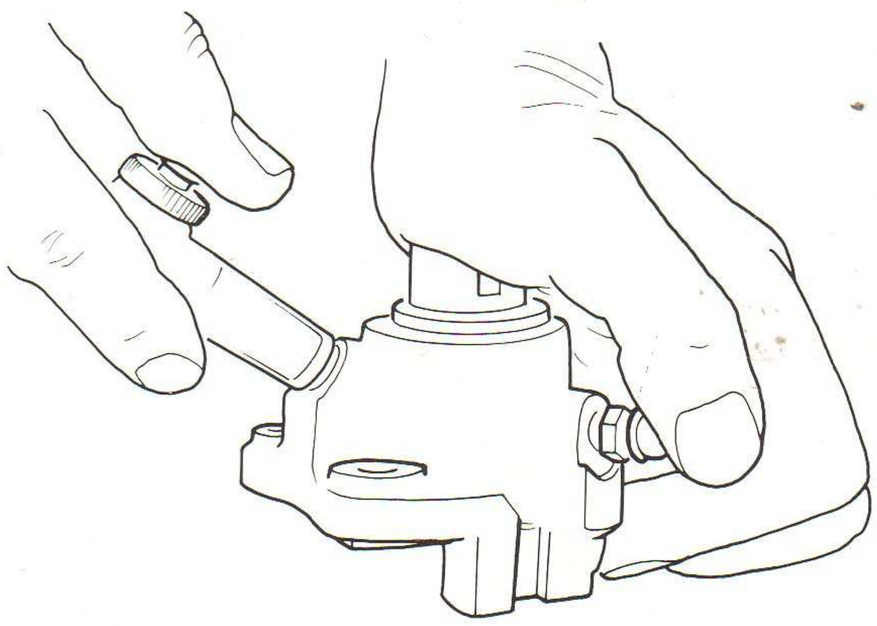

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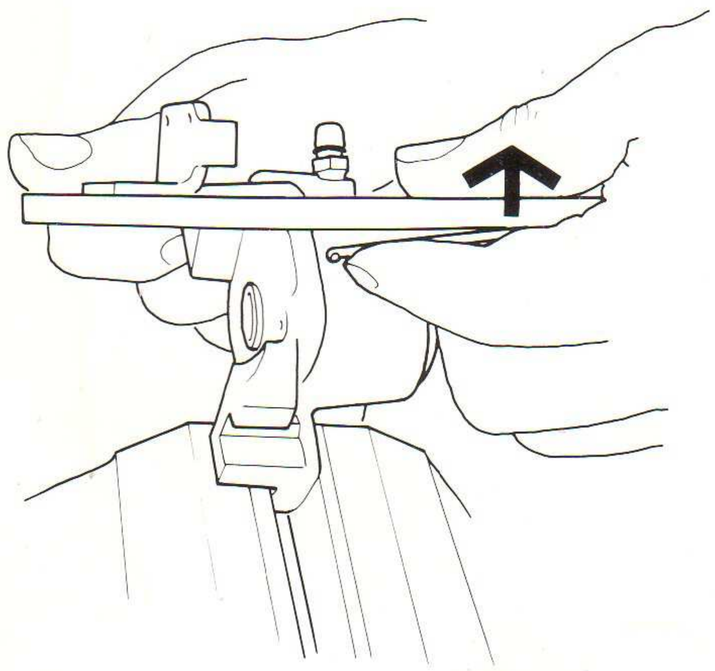

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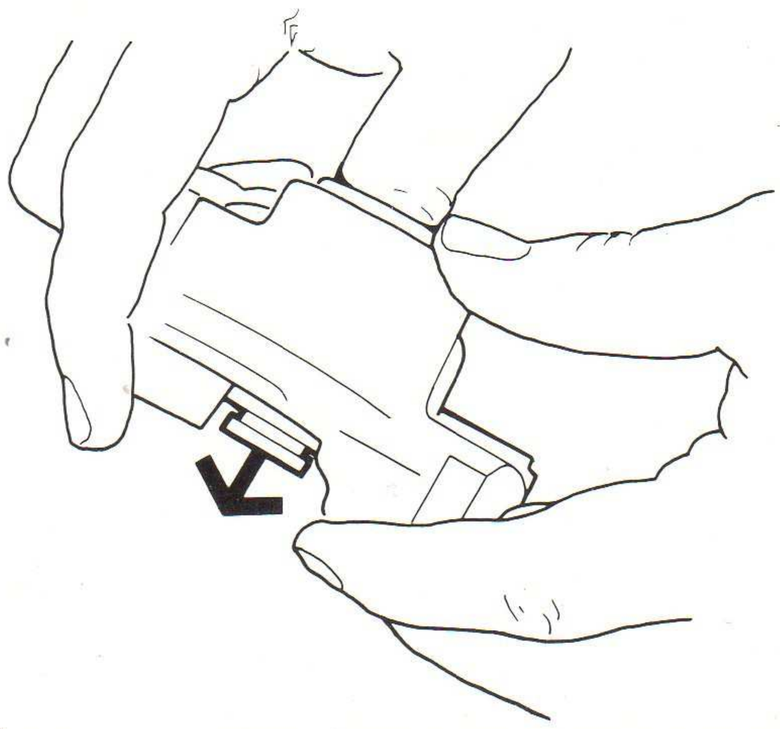


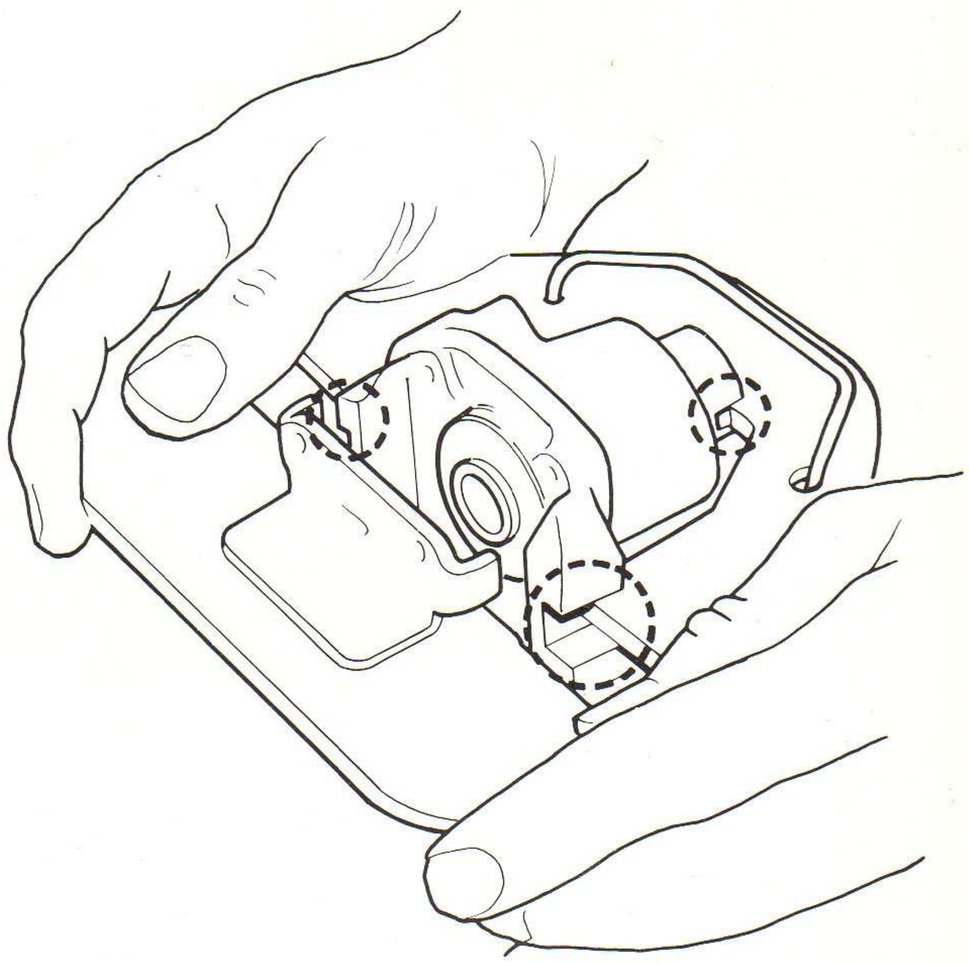
A0658/5

disc brakes

If the mating surfaces of the yoke and cylinder were corroded and have been cleaned, check the gap with feeler gauges (Fig. 12). The measurement should be 0.006 in. (0.15 mm) to 0.012 in. (0.30 mm). However, a gap of up to 0.015 in. (0.38 mm) maximum is permissible as the caliper will still work efficiently, but calipers with large gaps have a tendency to be noisy during brake operation.

Reverse the removal procedure and refit the caliper to the vehicle. Fit new pads as previously described and repeat procedure with opposite rear caliper. Top up the master cylinder reservoirs with unused Castrol-Girling Universal Brake Fluid and bleed the system in the recommended manner. Before road testing, ensure the fluid in the reservoirs is at the correct level and pump the pedal until a solid resistance is felt to reposition the pads against the disc. Check all new and disturbed connections for leakage and road test vehicle.

11



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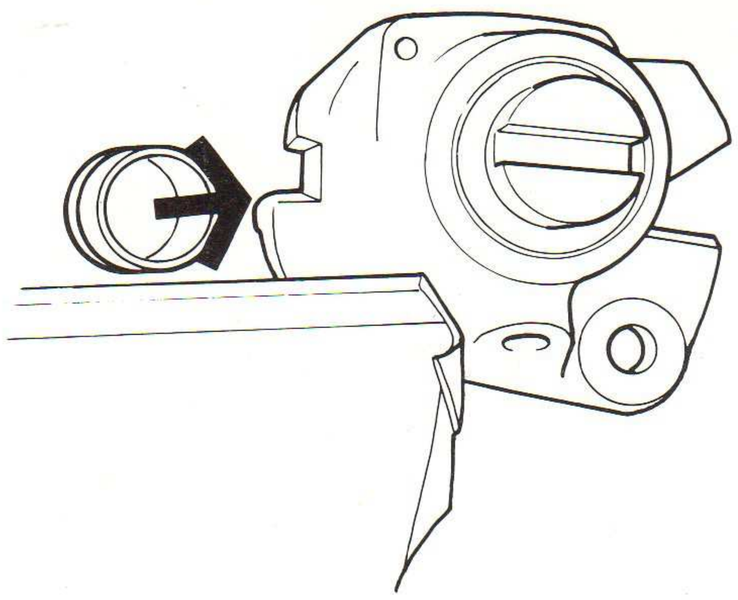

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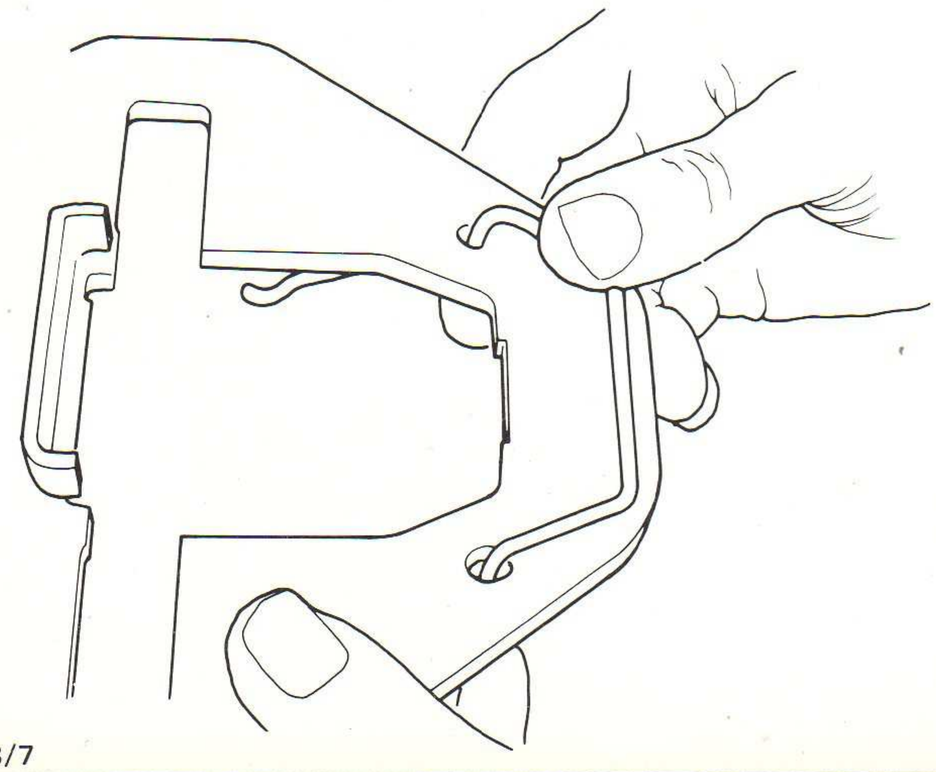

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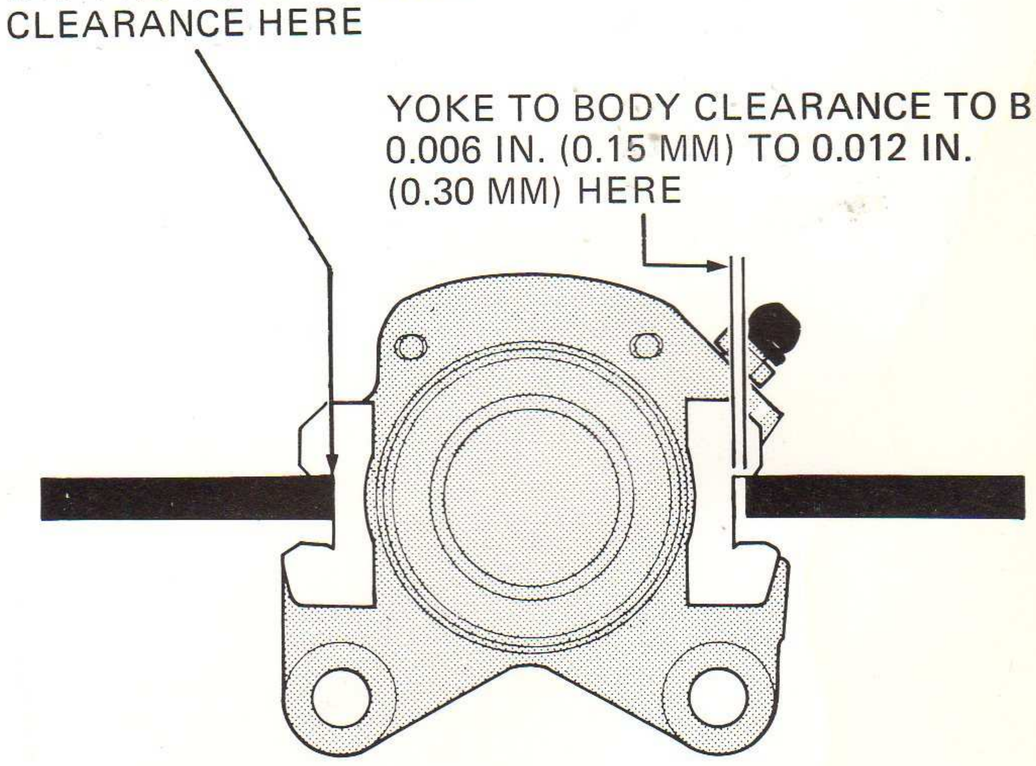
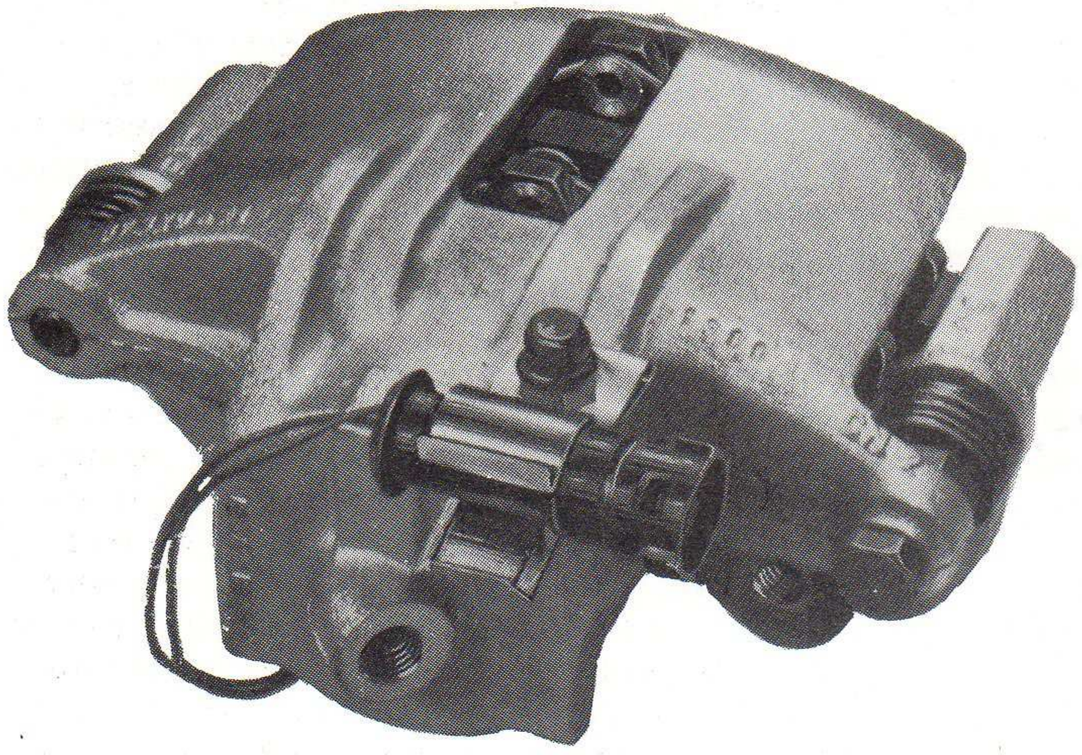


A0785

Girling Colette type caliper 2A14
Supplement 2 Page a

1



A1968

Introduction

A variant of the Colette caliper (Figs. 1 and 2) utilizes a guide pin which screws directly into the hydraulic body and this, coupled with squeal deterrent shims fixed to the pad backplate, affects the servicing procedures. The principles of operation and servicing remain identical to those explained on Pages 2A14 a to g. The information below covers only those areas that differ and should be read in conjunction with those pages.

Fitting New Pads

When the lining has worn to 3mm (1/8 in.) or if the electrical pad wear indicator bulb, on the instrument panel, illuminates the pads should be replaced.

Jack up the vehicle, make safe and remove the wheels. Push back the piston by pulling the body assembly toward you. If necessary, open the bleedscrew first to allow the fluid to be pushed back more easily from behind the piston. Close the bleedscrew.

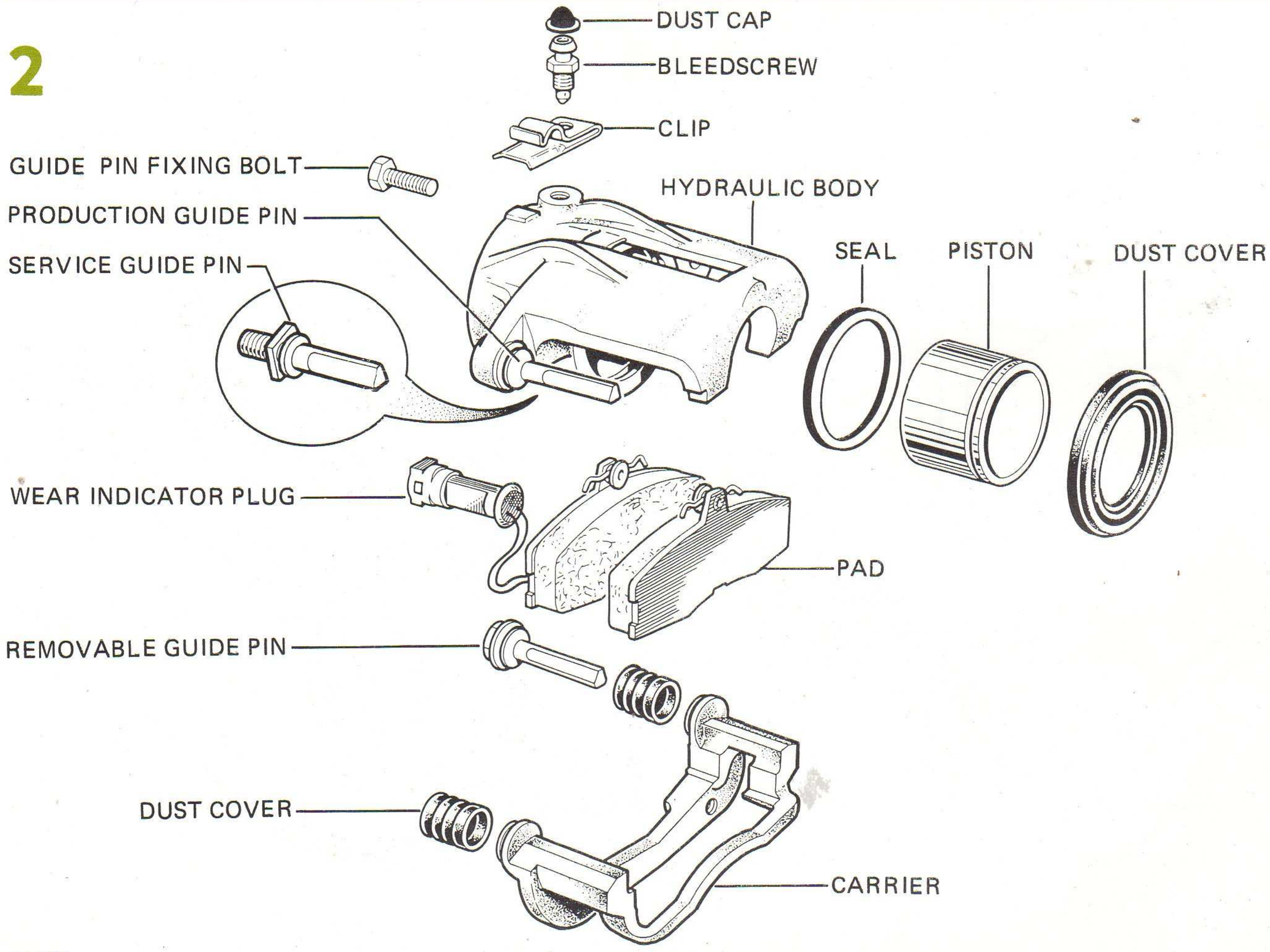
Disconnect the pad wear indicator plug if fitted.

Some calipers (Type A) utilize four adhesive backed pads whilst others (Type B) have only the inboard pad adhesive backed. It is therefore necessary to break the bond, where appropriate, as described.

Prior to removing the guide pin bolt, lever gently between the spring lug of the outboard pad and the window of the hydraulic body (Fig. 3). This will break any bond between that pad and the "fingers" of the hydraulic body.

NOTE: Never lever directly against the disc.

2



A1435

Girling Colette type caliper Supplement 2

Hold the "removable" guide pin steady by placing an open ended spanner across the flats provided. Using a ring or socket spanner remove the guide pin bolt. Do not allow the guide pin to rotate as this may damage the guide pin dust covers. If necessary turn the steering wheel to move the caliper closer to the inside of the vehicle to give sufficient movement of the hose to allow the hydraulic body to pivot. Swing the body away from the disc and carrier by rotating around the "fixed" pin.

If the body will not swing away than a bond exists between the adhesive backed inboard pad and piston. This must be broken by steadily applying more force when swinging the hydraulic body. Ensure the hydraulic body does not hang on the flexible hose. Remove both pads.

Completely push back the piston using a piston retraction tool (Fig. 4) or alternatively, with care, a 'G' clamp may be used.

WARNING: NEVER USE AN AIRLINE TO REMOVE ASBESTOS DUST. IF INHALED ASBESTOS DUST CAN DAMAGE HEALTH. WHENEVER POSSIBLE REMOVE DRY DUST WITH A VACUUM BRUSH.

Thoroughly clean the pad abutment areas, avoiding damage to the piston and dust covers. Inspect the piston dust cover and the guide pin dust covers for signs of damage. If these are damaged they must be replaced to prevent corrosion. It is advisable to inspect the condition of the piston or guide pins if the dust cover(s) prove to be damaged. If in doubt replace with new parts.

Inspect the carrier and compare with Fig. 5. If type A continue below - if type B move on to the relevant section.

Type A: The four pads (two with pad wear indicators, if fitted) will have squeal deterrent shims fixed to the metal backplate. The outer face of the shim is protected by a strip of paper, before fitting peel off this paper strip. Avoid contact with dirt or any object that may adhere to . Fit the pads into the carrier.

Type B: Two of the pads (with pad wear indicators, if fitted) will have squeal deterrent shims fixed to the metal backplate. These pads must be positioned in the inboard or piston side of the carrier. The outer face of the shim is protected by a strip of paper, before fitting peel off this paper strip. Avoid contact with dirt or any object that may adhere to the exposed sticky surface of the shim. Using the grease from the kit smear it onto the inside of the hydraulic body "fingers" (Fig. 6). Avoid contact with the pads and disc. Fit the new pads into the carrier, with the shims on the backplate, in contact with the piston.

Types A and B: Rotate the body to its normal position on the carrier. Ensure that the integral pad spring is located correctly against the body and is not twisted in the viewing aperture. Press the body against the spring effort to line up with the hole in the guide pin and refit the guide pin bolt. Tighten to a torque of 34 to 38 Nm (25 to 28 lbf.ft). Clip and reconnect the pad wear indicator, if fitted, ensuring that it cannot foul or chafe, then pump the brake pedal several times to move the pads to their correct operating position. Check fluid level and top up if necessary with Castrol Girling Universal Brake and Clutch Fluid.

Refit road wheels, remove axle stands, jack down, check footbrake movement and, if satisfactory, road test.

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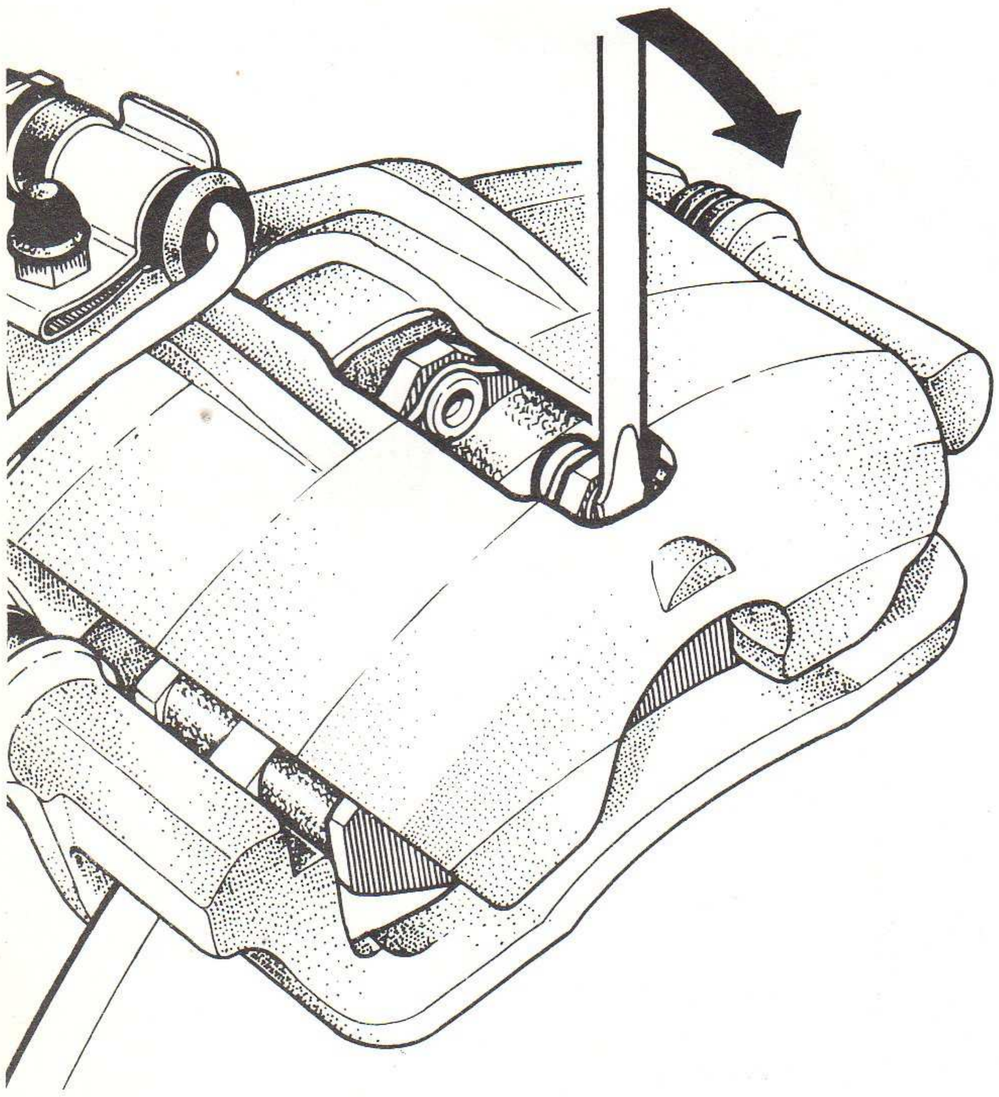

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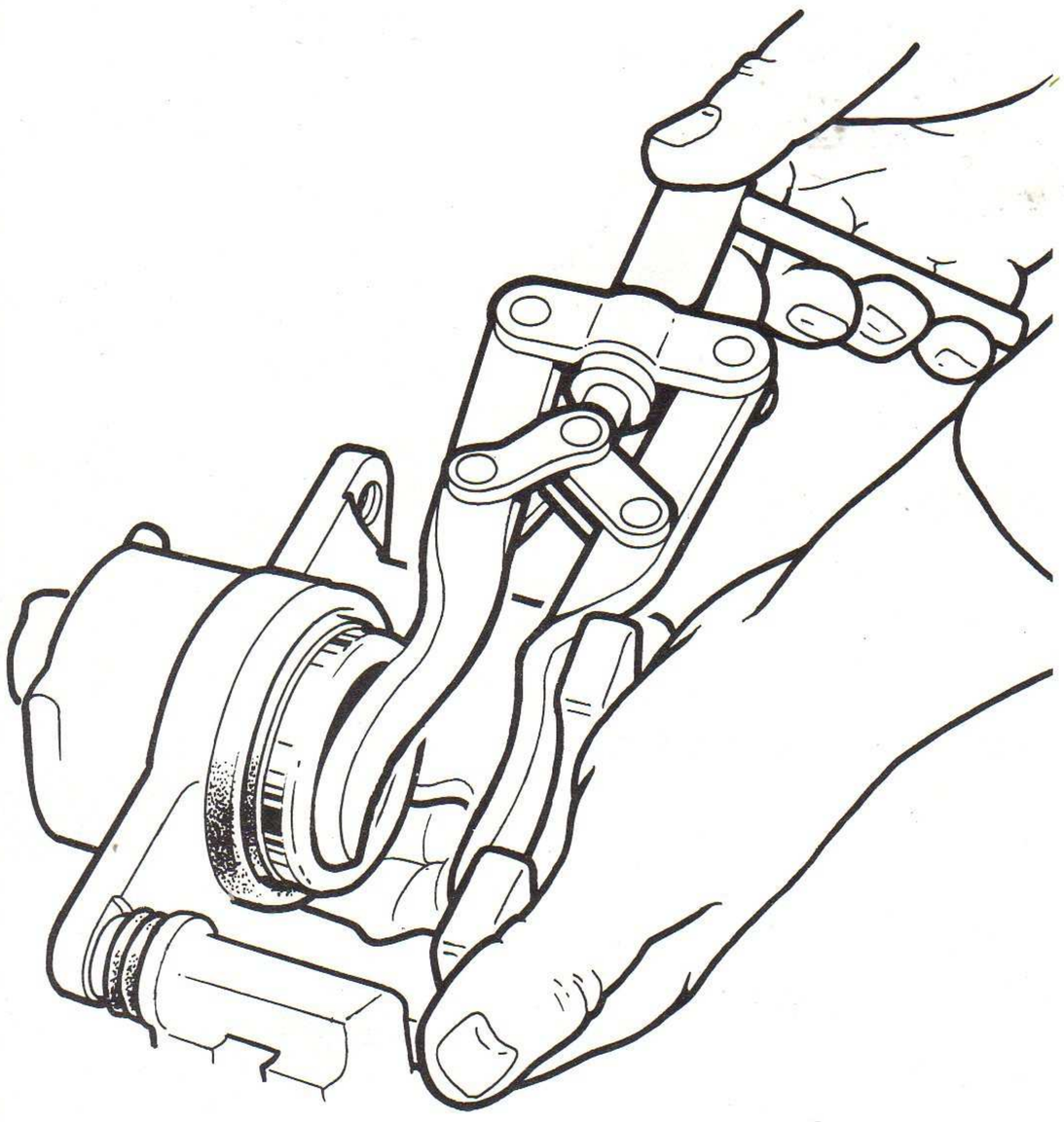

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Girling Colette type caliper 2A14a

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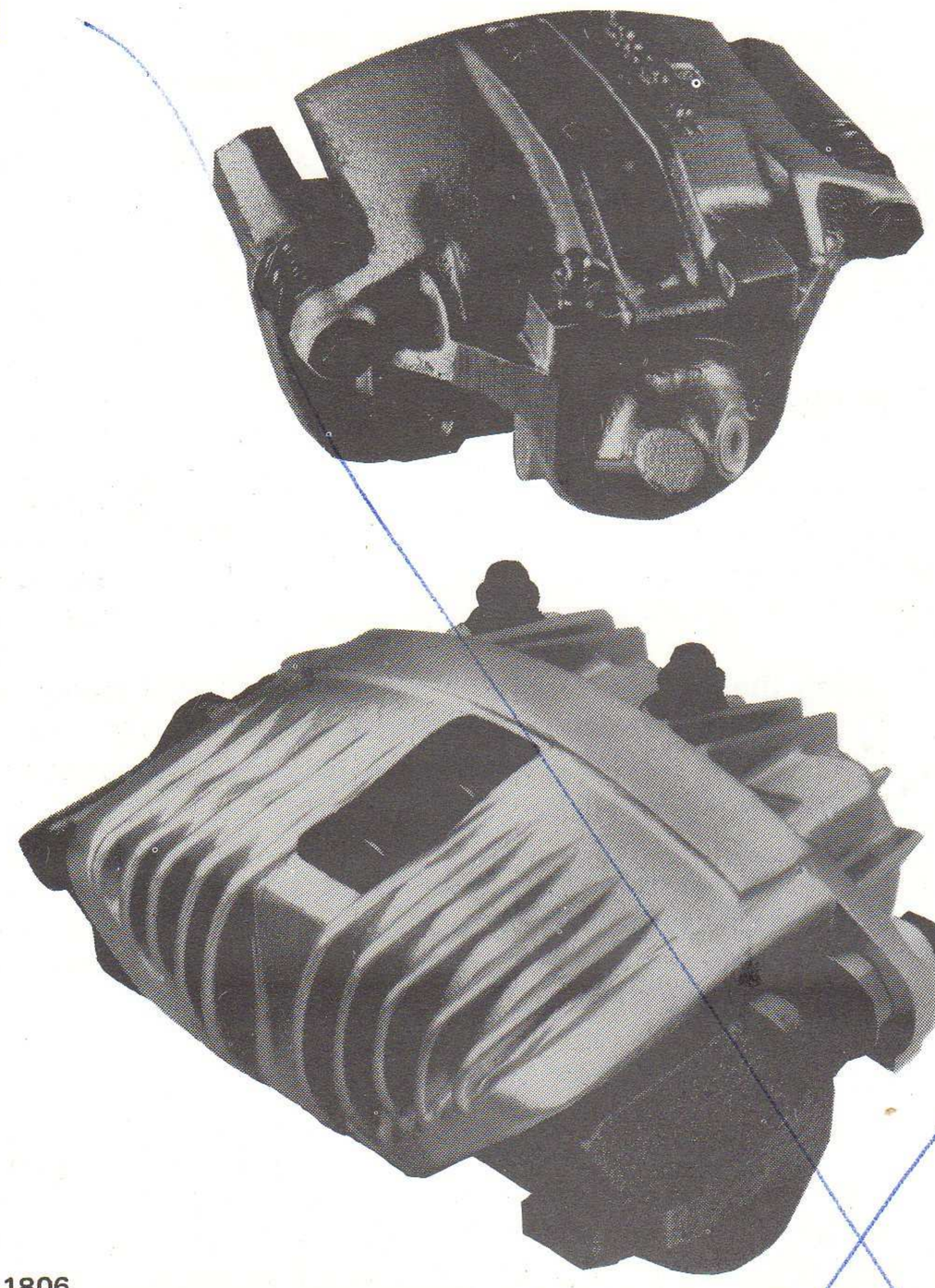


A1806

Introduction

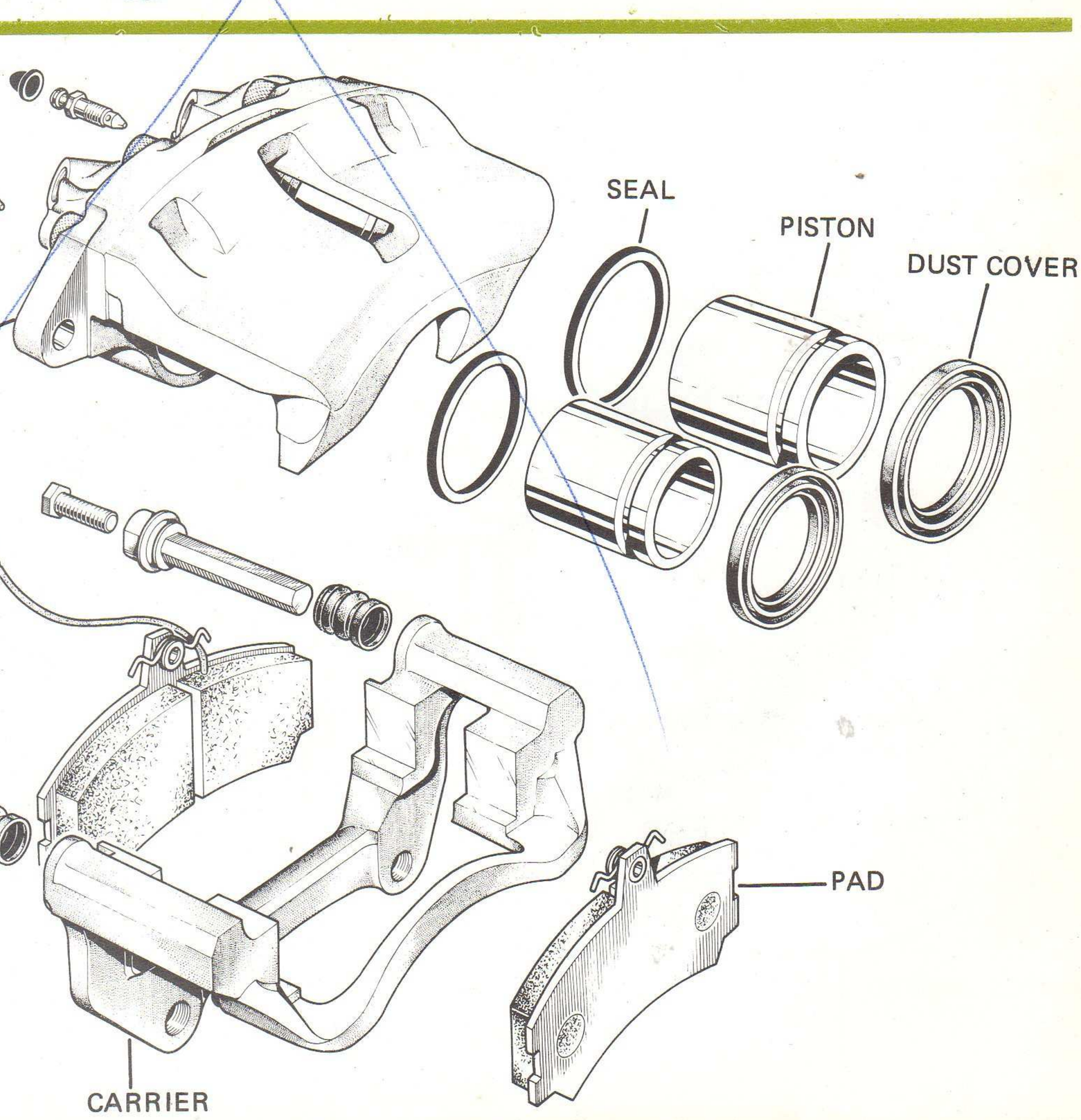
The Colette type caliper (Fig. 1) is a further addition to the extensive range of disc brakes produced by Girling to meet the increasingly stringent demands of world wide markets. As with all products the basic caliper has a number of variants but all Colettes function on the same principle, whether they contain one piston, two equal diameter pistons or two un-equal diameter pistons. For this reason illustrations of various caliper types are used throughout the text.

The information contained in this section is applicable in general to the range of calipers. Where there are differences affecting servicing procedures the appropriate supplementary manual pages should be referred to.

Each complete caliper assembly (Fig. 2 and 11) consists of two main components; a carrier bolted to the suspension upright in the same way as a conventional opposed piston caliper, and a hydraulic body assembly which slides on two greased guide pins housed in the carrier. The guide pins are sealed against corrosion by the dust covers, thereby avoiding unequal sliding loads caused by dirt, corrosion or spring friction. Some early calipers have a rubber bush fitted to one guide pin (refer to supplementary manual pages). Upon braking, the drag load on both pads is taken directly by the carrier, consequently the guide pins are only loaded by the weight of the cylinder body. On two piece calipers no attempt should be made to remove any bolts holding the hydraulic body to a separate bridge piece (Fig. 3).

All Colette calipers operate in the same way (Fig. 4). When the footbrake is applied the hydraulic pressure created pushes the piston and, with it, the inboard pad onto the disc. The body

2 TYPICAL TWO PISTON TYPE



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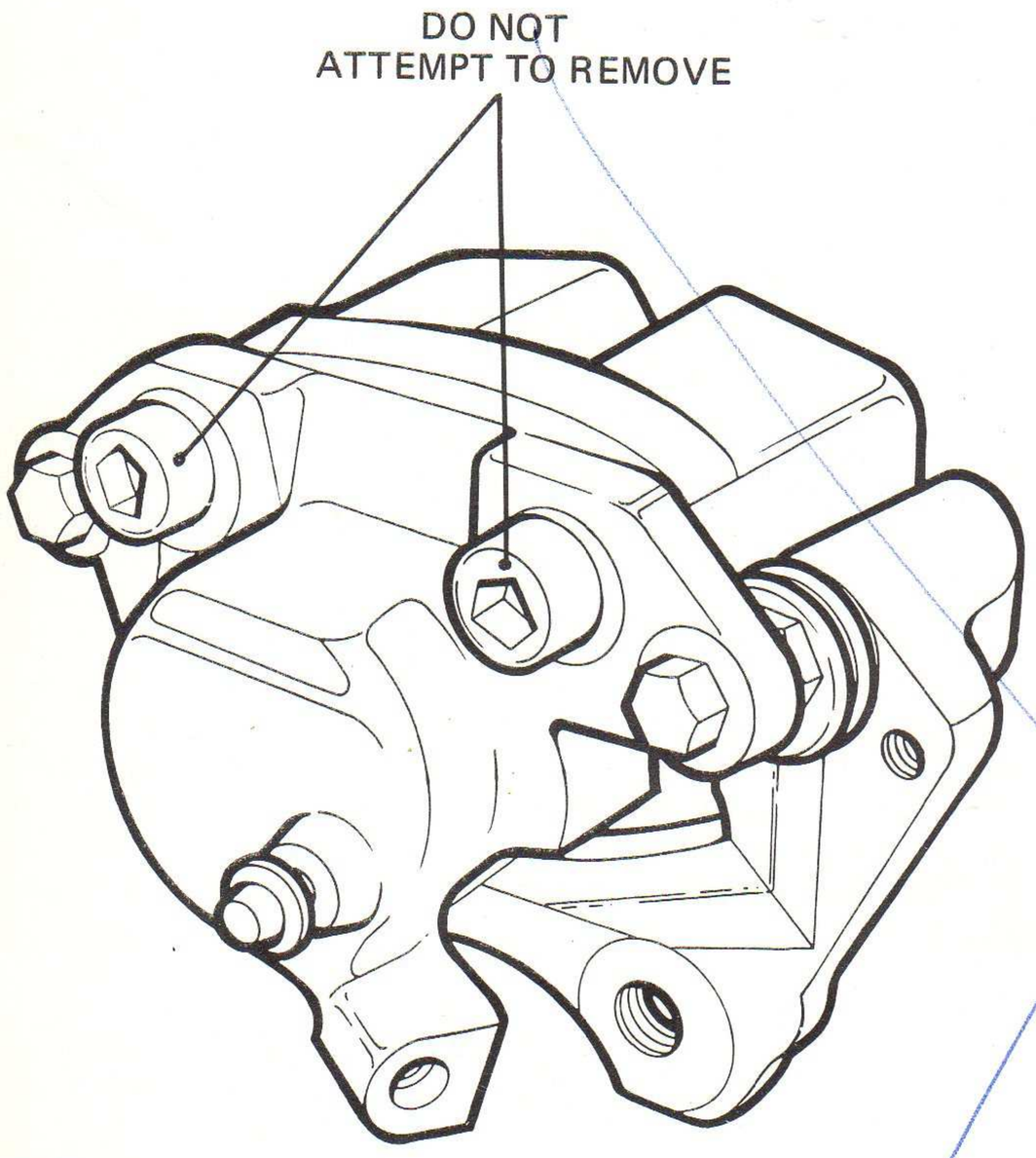


A0984

reacts and slides on the guide pins to bring the outboard pad into contact with the disc. The clamp on both sides of the disc is then equal.
When the hydraulic pressure is released the piston seal, fitted in the wall of the cylinder, retracts the piston a small amount. This allows the moving parts to relax sufficiently for the disc pads to remain in close proximity to the disc ready for the next brake application.

Servicing

To maintain the efficiency of the braking system, preventive maintenance is essential and the following recommendations should be observed at the intervals stated. Full details of preventive maintenance are incorporated in Section 1, Page 1A1.

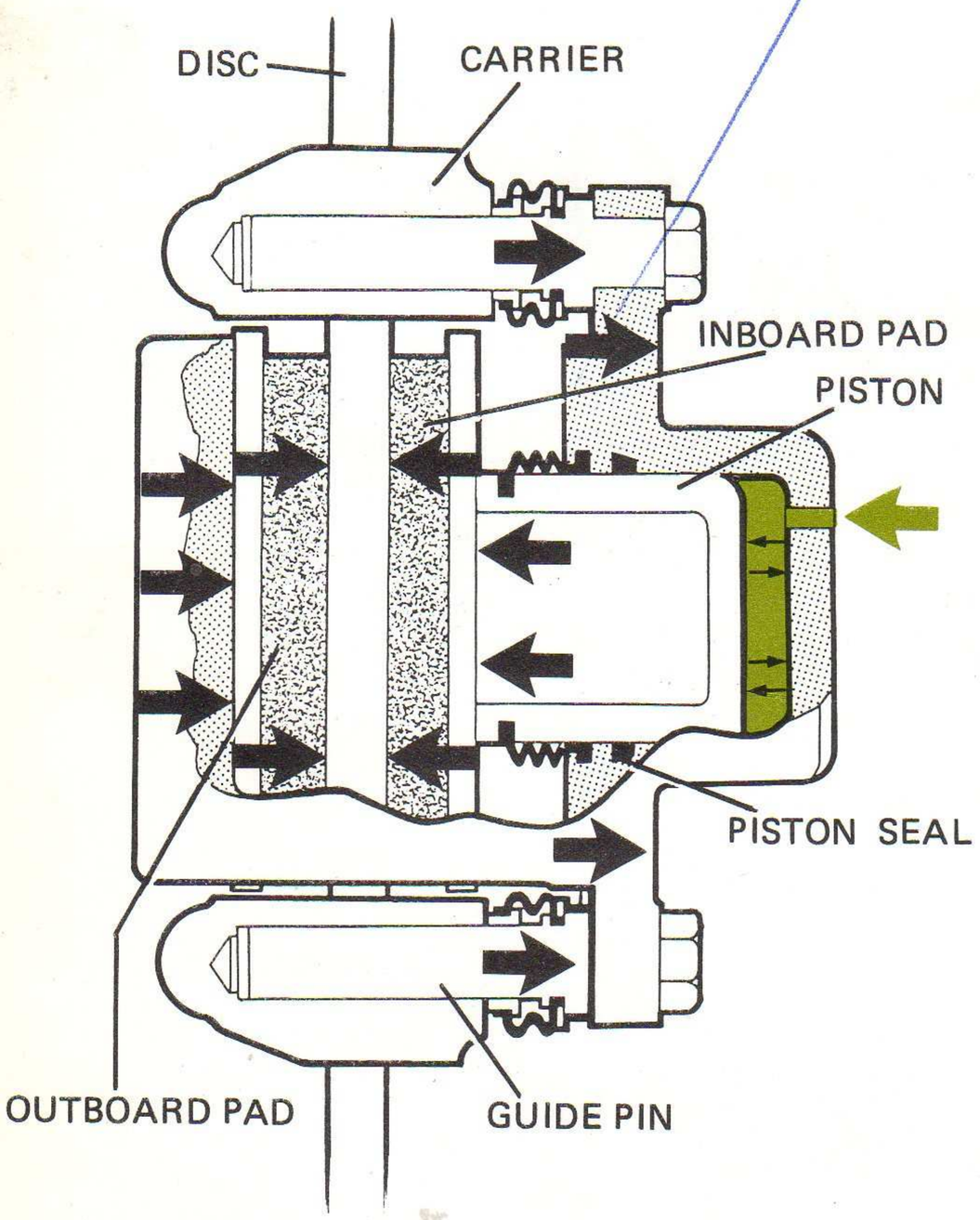
1. Check the pads for wear every 8,000 km (5,000 miles) and fit new pads when the lining thickness has worn to 3 mm (1/8 in). If electrical wear indicators are incorporated, the examination should be unnecessary.

2. Every 16,000 km (10,000 miles) examine all brake pipes and flexible hoses for corrosion, fretting and signs of damage. Renew suspect parts and take action where applicable to prevent a recurrence of the trouble.

3. Change brake fluid every eighteen months.

4. Every 64,000 km (40,000 miles) or three years whichever occurs first the caliper should be overhauled. All other hydraulic parts on the vehicle should also be replaced or overhauled and new hydraulic hoses should be fitted.

4



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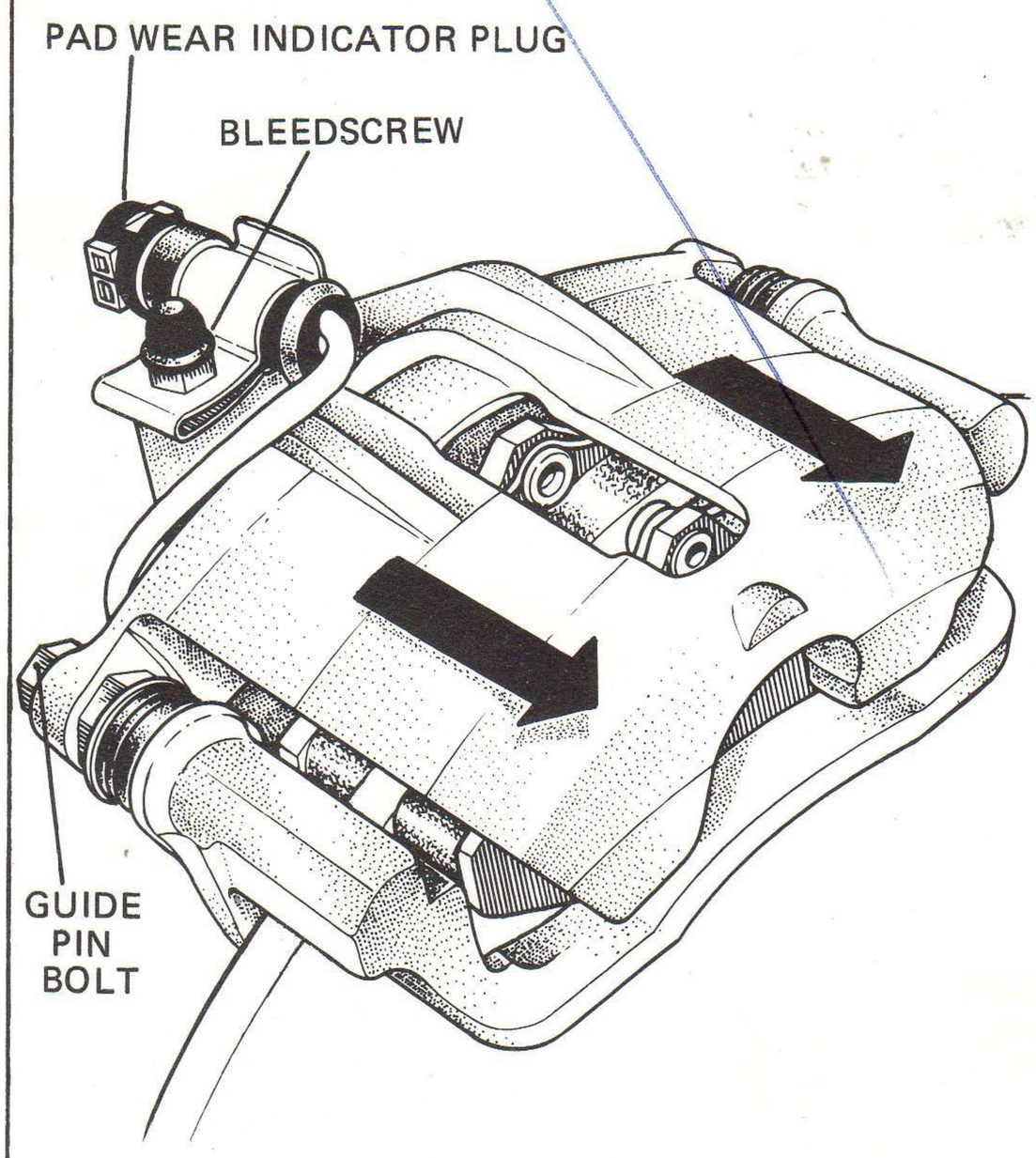

A1480

Girling Colette type caliper 2A14
Supplement 2 Page c

Dismantling
Refer to procedure and precautions on Page 2A 14e and also to the instructions in 'Fitting New Pads", this supplement, with particular reference to the removal of adhesive backed pads.

Cleaning & Inspection
Some kits contain a sachet of special grease (Part No.74947191) required for lubrication of the guide pins and guide pin holes. If the kit does not include the grease then do not remove the existing grease from the pins or holes. However, should re-greasing be necessary sachets are available separately. Refer to Page 2A14e for further details.

Re-Assembly
Procede as for standard Colette(Pages 2A14f to g) but fit pads as described under "Fitting New Pads", this supplement.

Fitting New Guide Pins
The efficiency of the caliper is dependant on the free sliding of the guide pins in the carrier. It is therefore important that the guide pins are not damaged, that the guide pin dust covers are not damaged, causing possible water ingress and corrosion of the pins, and that the correct type of lubricant (Part No. 74947191) is used on the guide pins.

If the pins are not free to move or are corroded in any way they must be replaced. Remove the hydraulic body from the carrier (refer to "Fitting New Pads", Page b of this supplement and "Dismantling", Page 2A14e). Pull the remaining guide pin dust cover off the carrier and extract the pin.

Ensure there is no excessive corrosion in the carrier guide pin bores, if in doubt fit a new unit.

With the hydraulic body secured in a soft jaw vice remove the "fixed" guide pin. Screw the new service guide pin into the hydraulic body, tightening to a torque of 20 to 25 Nm (13 to 15 lbf.ft), refer to Fig. 2.

Fit the guide pin dust covers to the new pins. Using only the special grease provided in the kit, liberally smear both pins and holes. Push the "removable" pin into the carrier hole, fitting the dust cover over the lip on the carrier. Whilst pushing the pin fully home slightly pucker the dust cover to expel any trapped air.

Supporting the weight of the hydraulic body insert the "fixed" pin into the carrier hole and fit the dust cover over the lip. Again pucker the dust cover whilst pushing the pin fully home.

Fit pads and fix the hydraulic body as described under "Fitting New Pads", Supplement 2, Page a.
If the hydraulic system has been disturbed, bleed the brakes as previously described (Refer to "Re-Assembly", Page 2A14g).

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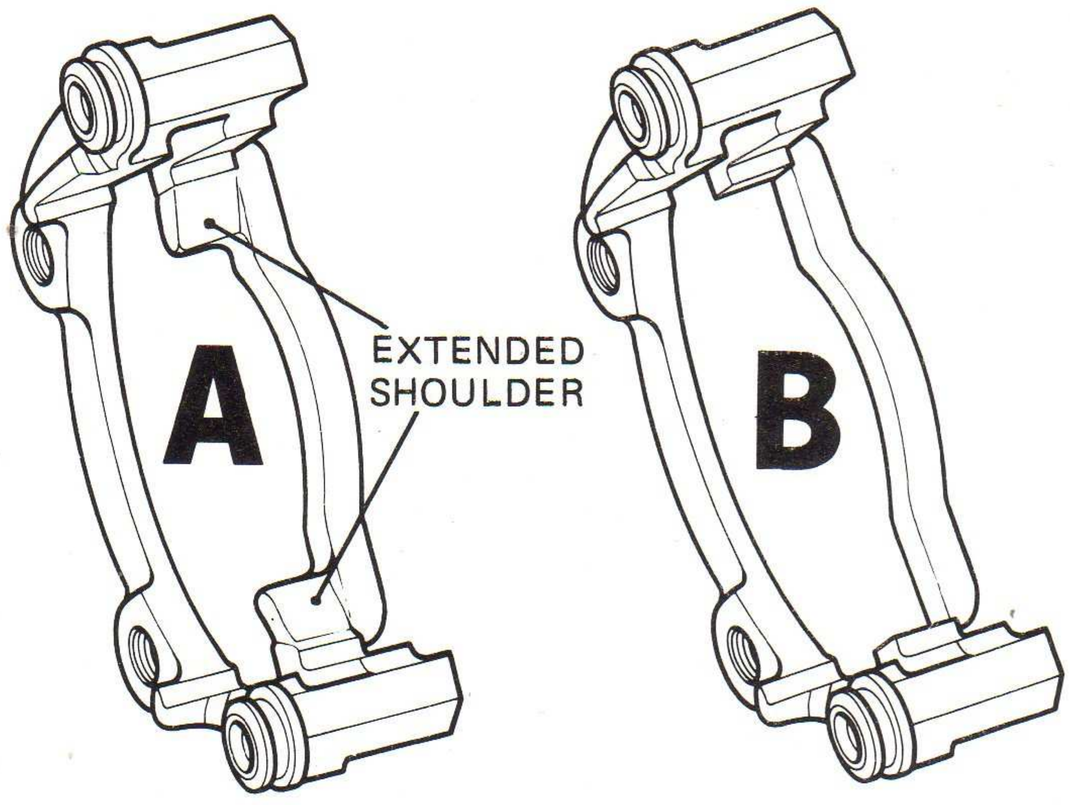

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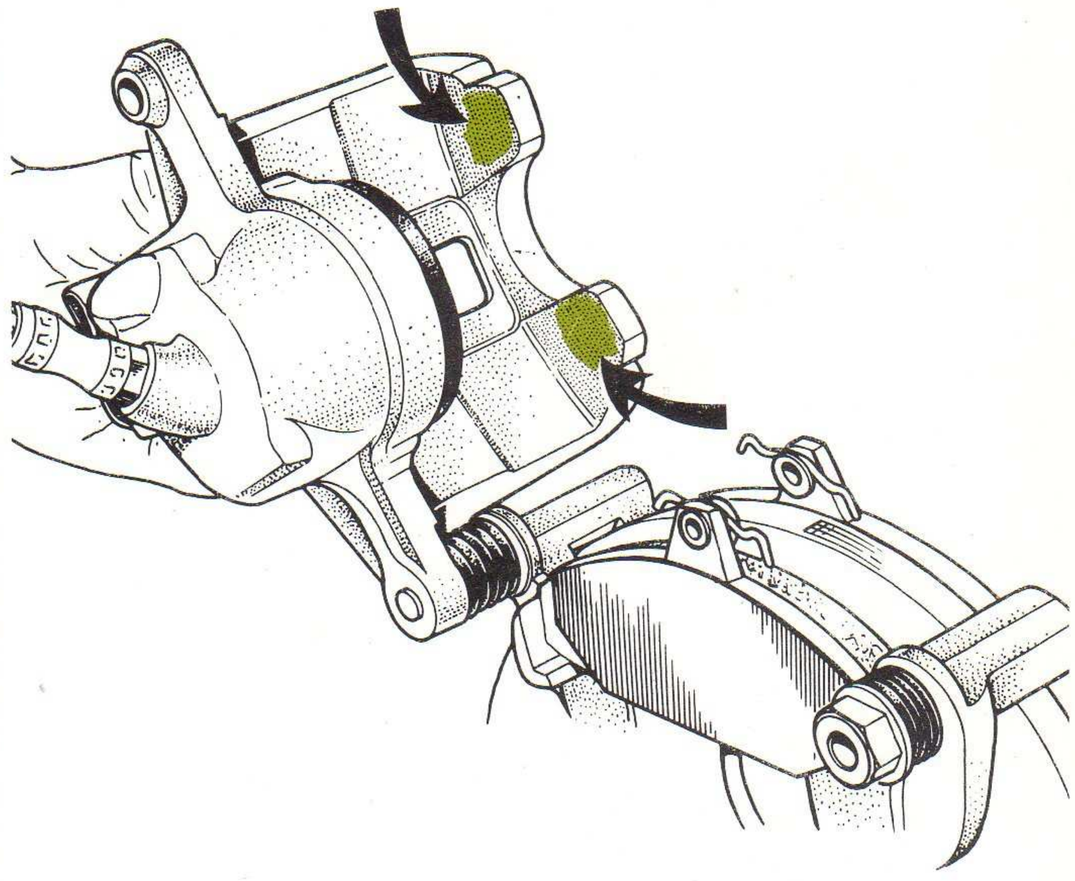

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Girling Colette type caliper 2A14c

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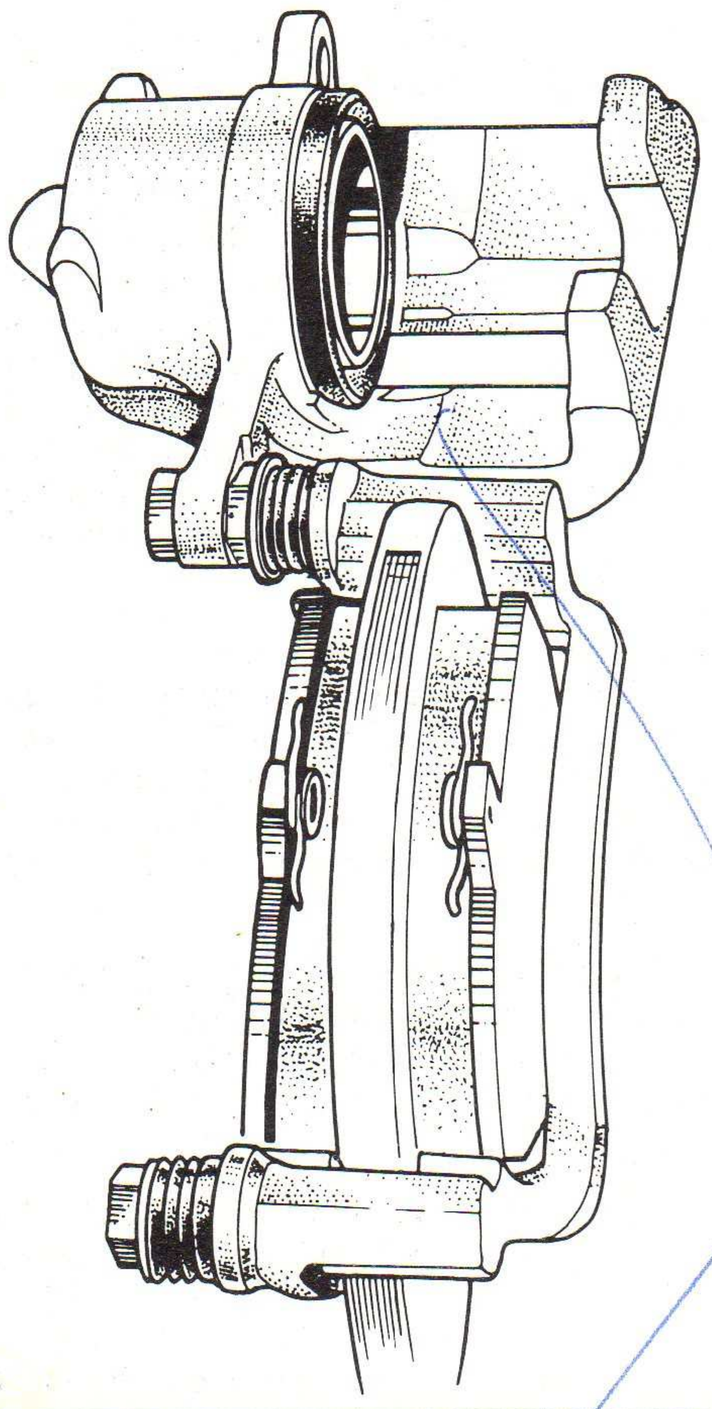

A1793

Fitting New Pads

The simplicity of pad removal and replacement on the Colette range of calipers is governed by the installation on a vehicle and the restrictions imposed by the available movement of the flexible brake hose.

Jack up the car and remove the front wheels. Push back the piston by pulling the body assembly towards you (Fig. 5). If necessary, open the bleedscrew first to allow the fluid to be pushed back more easily from behind the piston. Close the bleedscrew once the piston has been pushed fully back.

Disconnect the pad wear indicator plug, if fitted, and note the cable route.

Normally it is only necessary to remove one of the two guide pin bolts and pivot the caliper, up or down, around the remaining bolt (Fig. 6) to gain access to the pads. Where this is not possible both guide pin bolts should be removed and the hydraulic body lifted off.

It is worthwhile noting that turning the steering onto full lock in the appropriate direction can give sufficient movement of the hose to allow the caliper body to pivot.

Always fit new pads in axle sets.

WARNING: NEVER USE AN AIR LINE TO REMOVE ASBESTOS DUST. IF INHALED ASBESTOS DUST CAN DAMAGE HEALTH. WHENEVER POSSIBLE, REMOVE DRY DUST WITH A VACUUM BRUSH.

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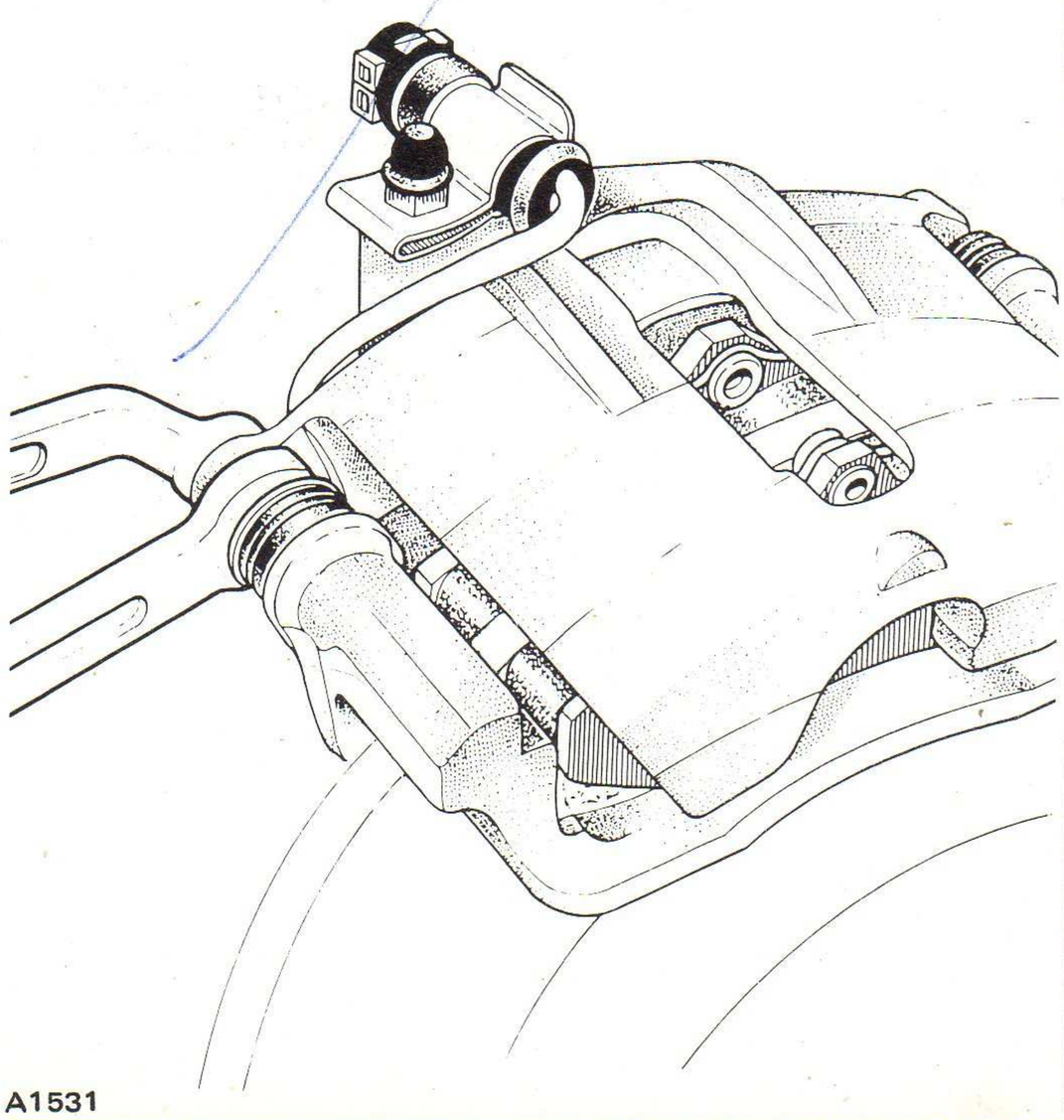

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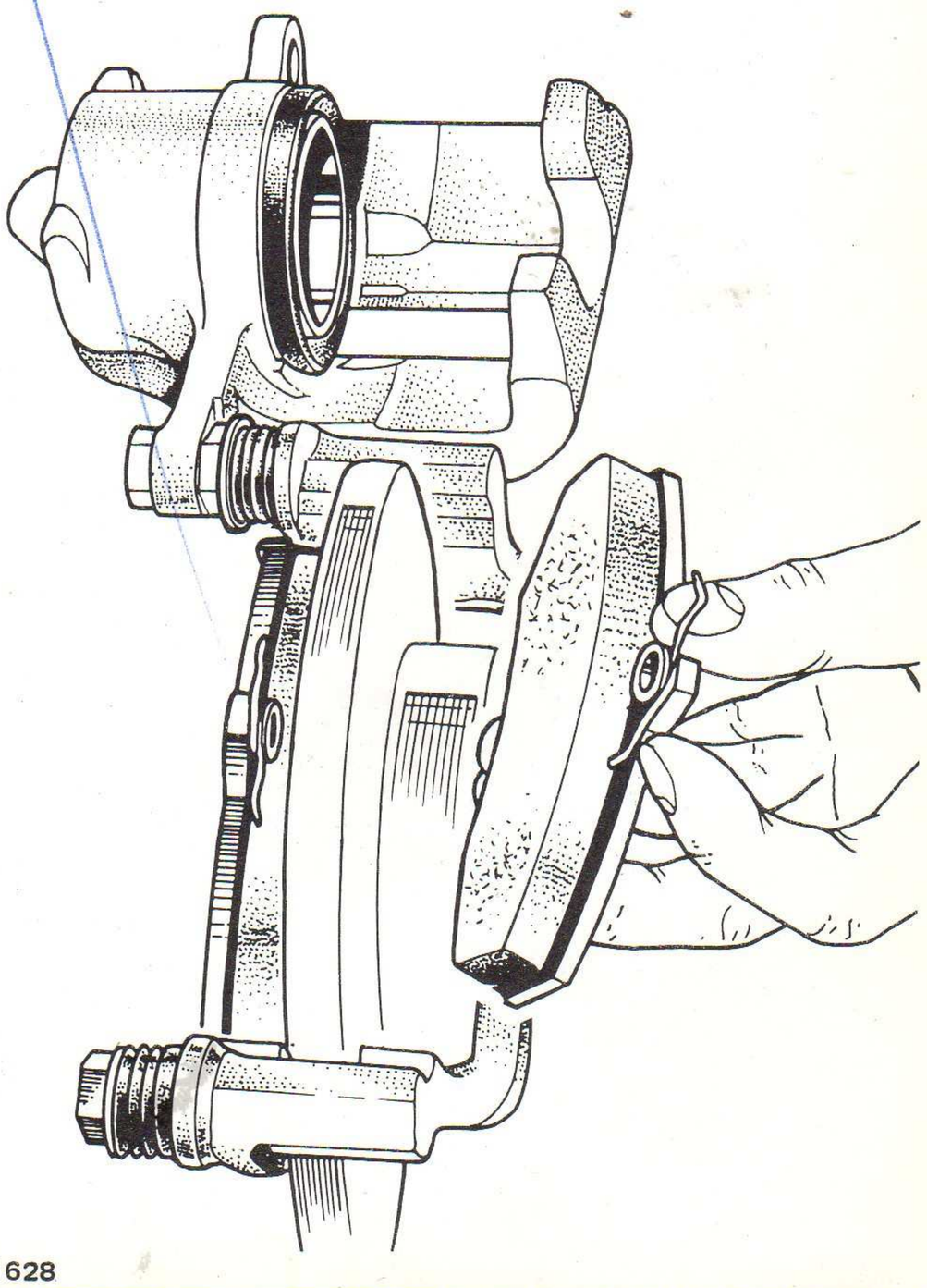

A1628

Girling Colette type caliper

To prevent the guide pin from rotating and damaging the dust cover, hold the guide pin steady by placing an open ended spanner across the flats provided. Using a ring or socket spanner remove the guide pin fixing bolt (Fig. 7). Swing the body away from the disc and carrier by rotating around the remaining pin (Fig. 6). Ensure the body does not hang on the flexible hose. Remove the pads together with any anti-squeal shims (Fig. 8). If a separate damping spring is present refer to the appropriate supplementary manual page.

Thoroughly clean the pad abutment areas, avoiding damage to the piston and piston dust covers. If the piston dust covers are damaged they must be replaced to prevent corrosion within the cylinder body. It is also advisable to inspect the condition of the piston if the dust cover does prove to be damaged. If in doubt replace with new parts.

Providing the guide pin dust covers are not damaged or have not been mis-fitted the guide pins should be completely satisfactory, however, it is possible to inspect the pins by withdrawing them, complete with their dust covers, from the carrier (Fig. 9).

If the pins are difficult to remove or are corroded in any way they must be replaced together with their dust covers. See 'Fitting New Guide Pins' if they have to be replaced. No attempt should be made to clean up corroded pins.

If the pins are found to be in good condition lubricate them with the special grease which is in the kits or available in separate sachets (Part No. 74947191).

IMPORTANT: DO NOT USE ANY OTHER TYPE OF GREASE.

Push the pins fully into the carrier. Fit the dust cover over the lip on the carrier, puckering the dust cover to expel any trapped air from the hole (Fig. 10).

Where anti-squeal shims were originally fitted then these should be replaced with new ones. Some shims are self-adhesive and require the protective paper backing to be removed and the shims to be pressed firmly into place on the metal backplate of the pad. Position the pads in the carrier (as noted during dismantling - refer to Fig.11) with, if appropriate, the anti-squeal shims either stuck on the backplate or just in contact with the backplate. Pads with pad wear indicator plugs are normally fitted next to the piston and the cable should be correctly routed.

Rotate the hydraulic body to it's normal position on the carrier. Ensure that the integral pad springs are located correctly against the body and are not twisted or jammed in the viewing aperture. Press the body, against the spring effort, to line up with the guide pin hole and fit the guide pin fixing bolt. Tighten fixing bolt to a torque of 31 to 40 Nm (23 to 30 lbf.ft.).

Fit the pad wear indicator plug into its clip and reconnect ensuring the cable cannot foul or chafe.
Repeat procedure for the opposite brake.
Pump the brake pedal several times to move the pads to their operating positions (Fig. 4).

IMPORTANT: APPLICATION OF THE BRAKE PEDAL MUST NOT BE OVERLOOKED AS THE BRAKES WILL NOT OPERATE EFFICIENTLY UNTIL THE PADS ARE IN THE CORRECT POSITION.

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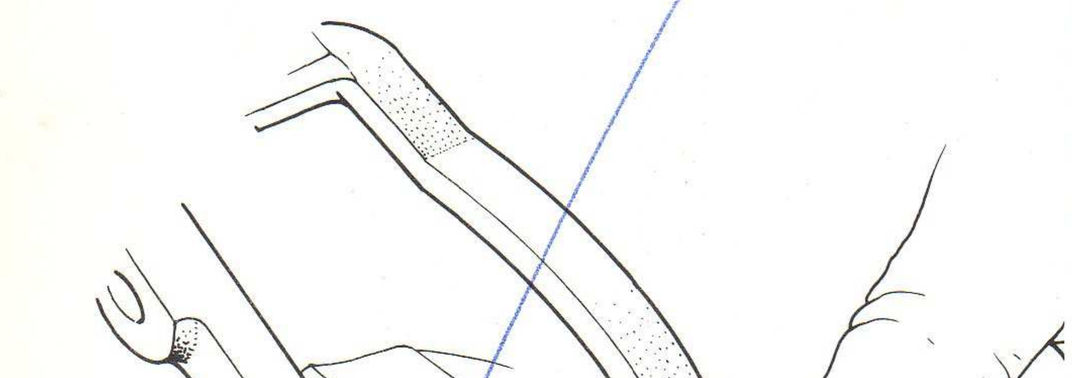

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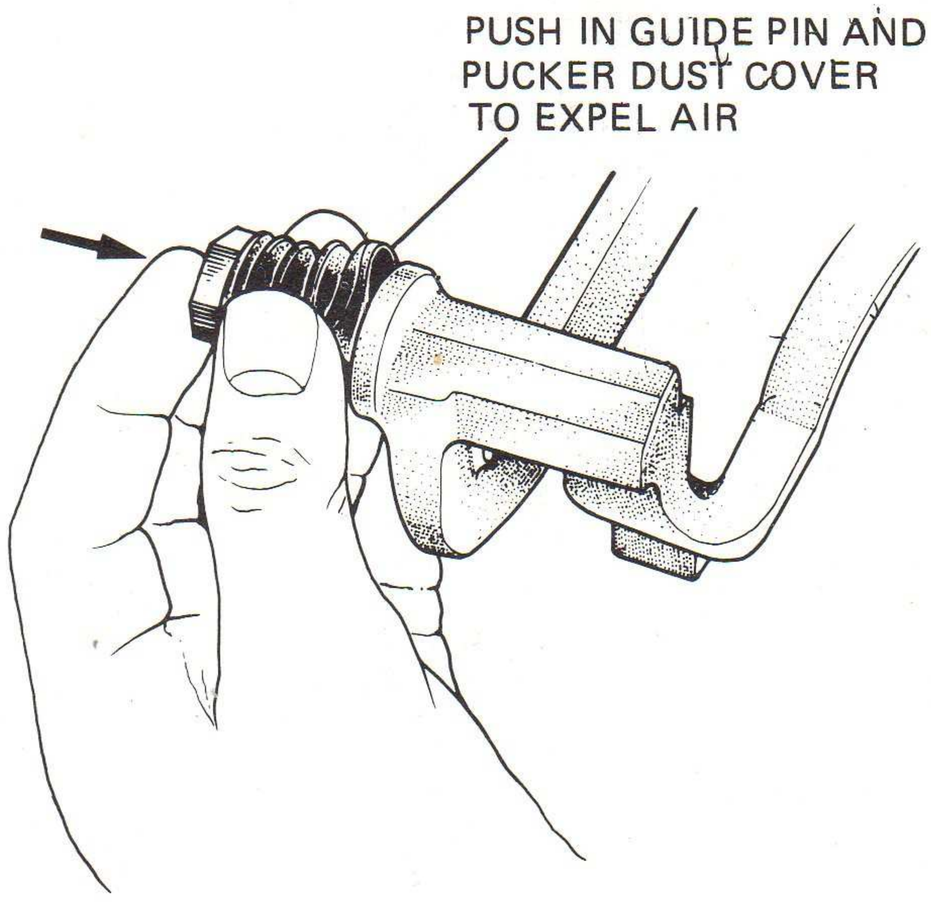


A1481

Girling Colette type caliper 2A14e

disc brakes

Check the fluid level in the fluid reservoir and top up, if necessary, with Castrol/Girling Universal Brake and Clutch Fluid. Refit road wheels, remove axle stands, jack down, check foot-brake movement and, if satisfactory, road test.

NOTE: After fitting new pads care should be taken in braking. Brake gently several times from 80 to 50 k.p.h. (50 to 30 m p h) and only brake fully when the pads have bedded fully to the disc surface. Prolonged and heavy braking should be avoided for the first 80 km (50 miles) until the new pads are bedded.

Dismantling

Disconnect the flexible hose from the chassis end first and then from the caliper. Block off the brake pipe at the chassis connection to prevent loss of brake fluid. This can be done by refitting the hose to the chassis and clamping it off with a Girling Hose Clamp (Part No. 64947017). Remove the pads as described under "Fitting New Pads". Pull the guide pin dust cover off the carrier and, supporting the weight of the body, slide the body and pin out of the carrier (Fig. 12). Release the other guide pin dust cover from the carrier and extract the pin (Fig. 9). Remove the dust covers from the pins. Do not mix up the left and right hand cylinder bodies if they are both removed from the vehicle at the same time.

Eject the piston(s) by gently applying low pressure air to the inlet port (Fig. 13). Use a piece of wood to prevent the piston(s) from being damaged.

WARNING: KEEP YOUR HANDS CLEAR.

The piston dust cover cannot be removed until the piston has been ejected (Fig. 14). Remove the piston, pull out the dust cover and extract the piston seal from the bore.

Remove the bleedscrew and clip, if fitted, from the hydraulic body.

Cleaning & Inspection

Clean all parts with clear methylated spirits or unused Castrol-Girling Universal Brake Fluid.

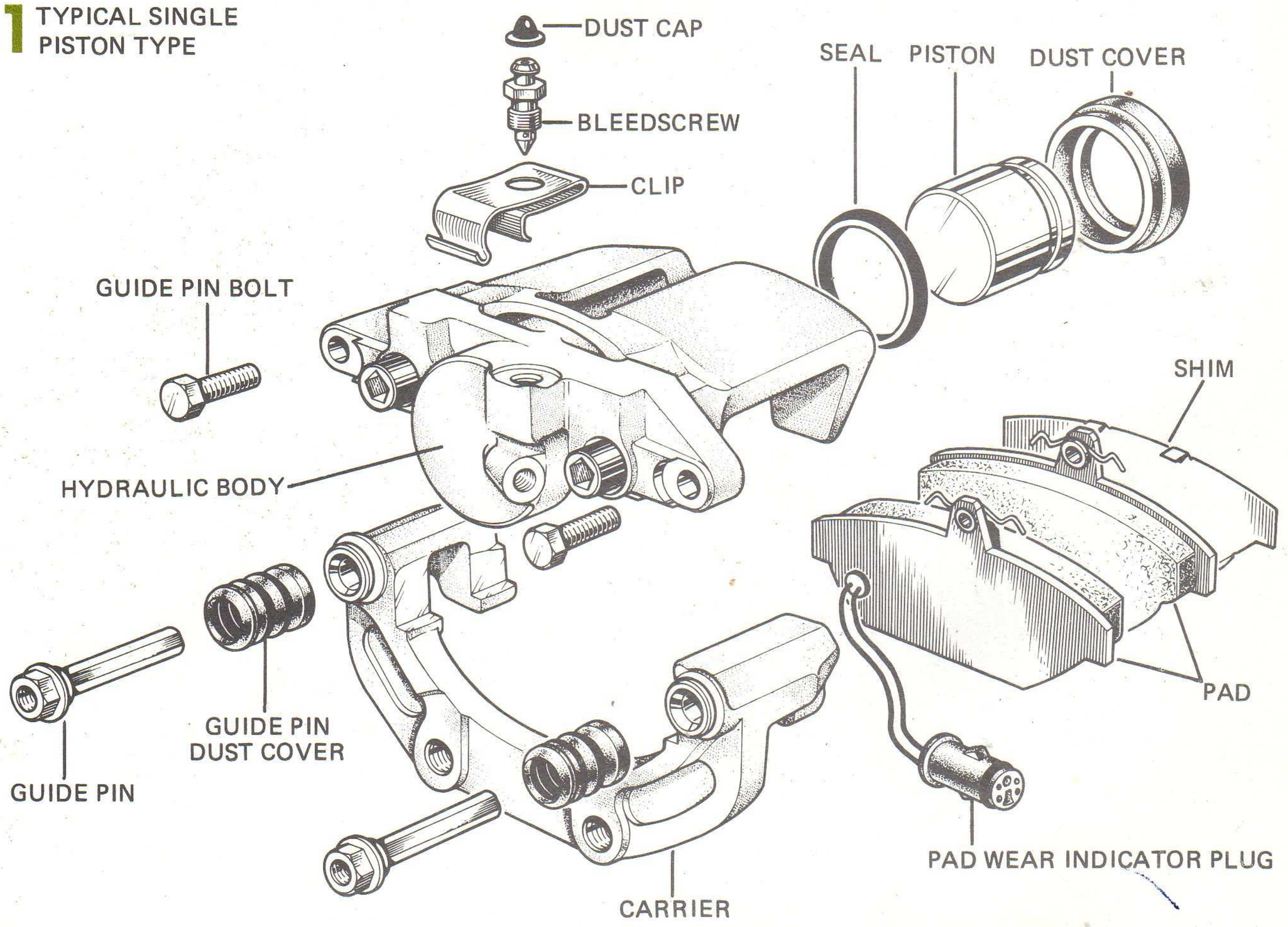
WARNING: WHEN CLEANING BRAKE PARTS, USE ONLY THE RECOMMENDED FLUID. USE OF PETROL, PARAFFIN OR OTHER MINERAL BASED FLUIDS IS DANGEROUS.

Examine all parts for signs of wear, damage and corrosion, paying particular attention to the piston(s) and cylinder bore(s). Remove body corrosion with a wire brush or wire wool. No attempt should be made to clean up a badly corroded piston(s).

Inspect the guide pins to ensure that they are not corroded or seized in any way within the carrier bracket. They must be free to move. If doubt about their condition exists replace them with new pins and dust covers. See 'Fitting New Guide Pins'.

All parts must be in good working order, and where doubt exists new parts should be fitted.

11 TYPICAL SINGLE PISTON TYPE



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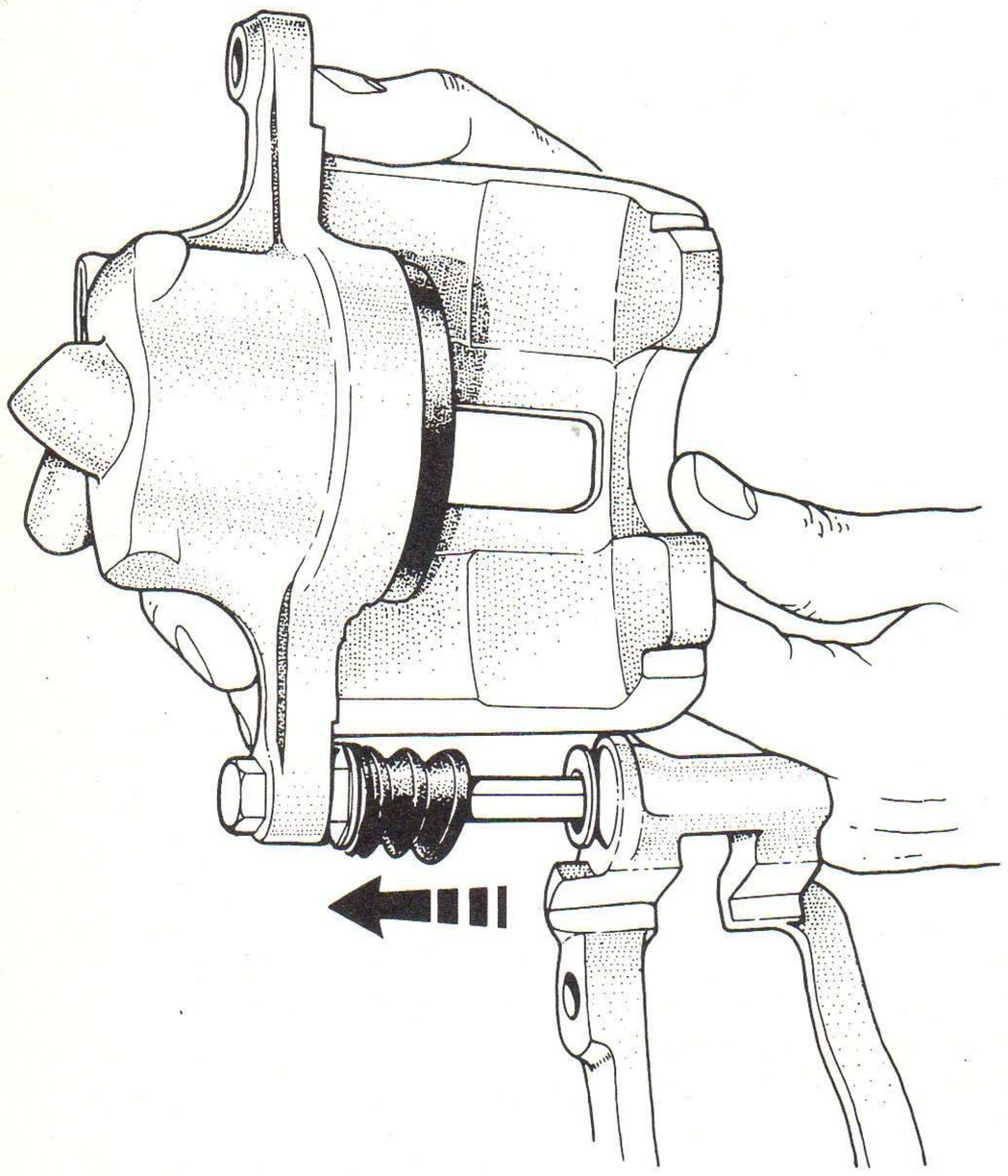

A1626

Re-Assembly

IMPORTANT: ENSURE WORKING SURFACES AND HANDS ARE CLEAN.

Using the parts from a Service Kit fit a new piston seal in its groove in the cylinder body after lubricating with new unused Castrol Girling Universal Brake Fluid.

Lubricate the piston and dust cover. Fit the dust cover over the piston from the direction shown (Fig. 15). Continue pulling the dust cover along the piston, extending the convolutions until the inner sealing lip is almost at the end of the piston. Offer the piston and dust cover assembly into the bore, locating the dust cover in the caliper groove, and then gently but firmly push the piston fully home through the dust cover (Fig. 16). Ensure the dust cover is not trapped between the piston and the bore, and that the inner lip of the dust cover is located in the piston groove.

Replace bleedscrew and clip, if fitted. Grease guide pins and their bores. Fit guide pin dust covers onto guide pins. Push the removed guide pin into the carrier bore, fitting the dust cover over the lip on the carrier. Whilst pushing the pin fully home, slightly pucker the dust cover (Fig. 10) to allow any trapped air to be expelled.

Supporting the weight of the hydraulic body, insert the guide pin into it's bore and slide the body into position on the carrier. Fit the dust cover and push the assembly fully home. Remove hose clamp from the flexible hose and disconnect it from the chassis. Reconnect it to the caliper and then to the chassis.

If the integral pad spring is damaged or the pads are worn to within 3 mm (1/8 in.) of metal backplate, fit new pads. Position the pads, with any anti-squeal shims, in the carrier with the pad wear electrical cable, where fitted, correctly routed.

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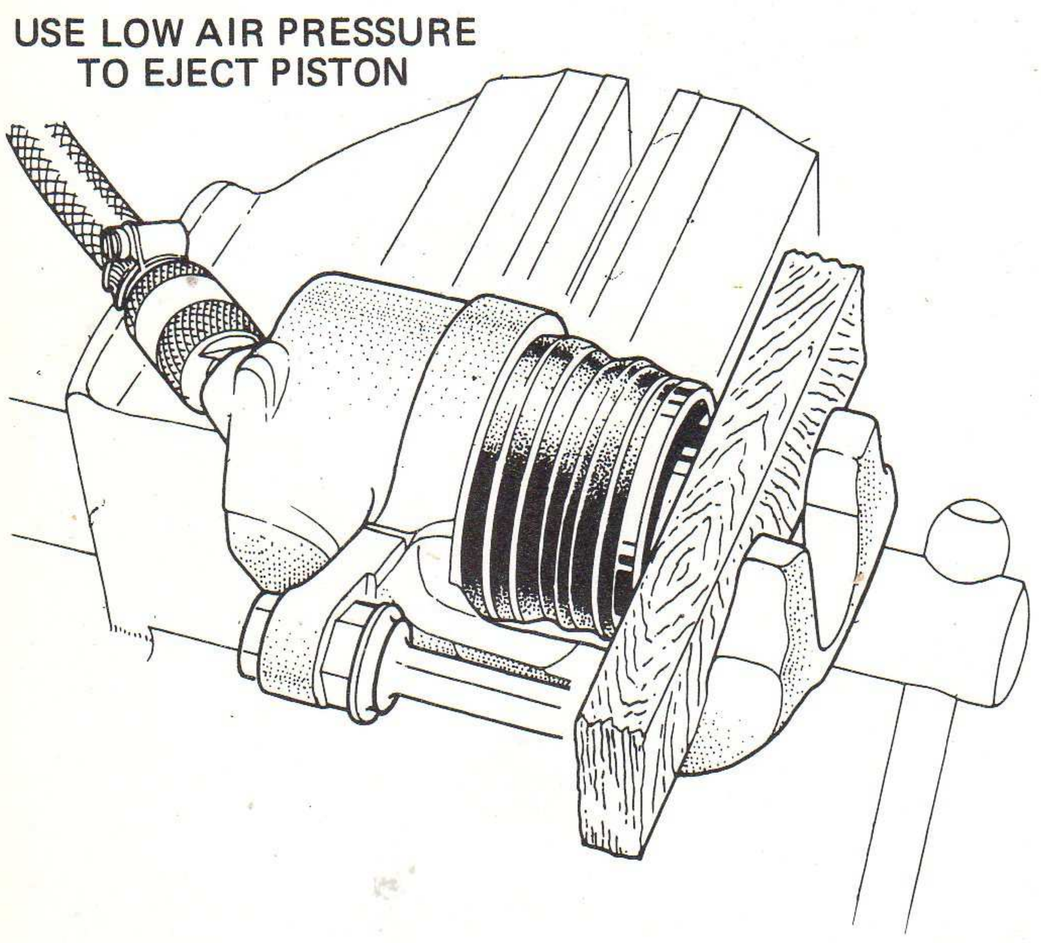

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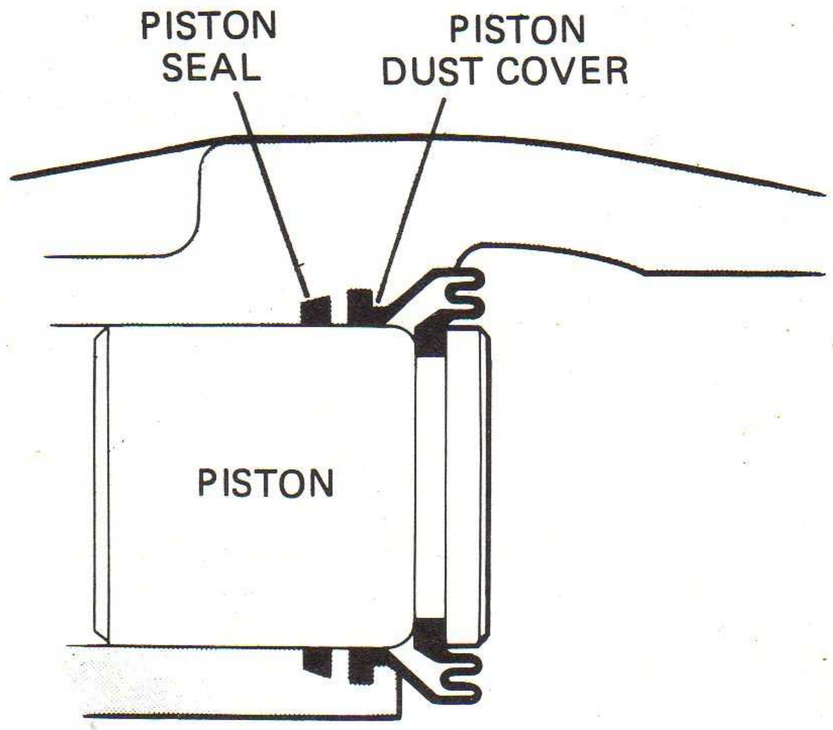

A1329

Girling Colette type caliper 2A14g

Pivot the hydraulic body around the guide pin and over the pads. Ensure that the integral pad springs are located correctly and not twisted or jammed. Press the body, against the spring effort, to line up with the hole in the guide pin and refit the guide pin fixing bolt. Tighten both fixing bolts to 31 to 40 Nm (23 to 30 lbf.ft.). Clip into position the pad wear indicator plug and reconnect the cable.

Repeat procedure for the opposite brake.
Bleed the system as recommended by the vehicle manufacturer, topping up only with new unused Castrol/Girling Universal Brake Fluid.

Operate the brake pedal several times to move the piston to the operating position (Fig. 4).

IMPORTANT: APPLICATION OF THE BRAKE PEDAL MUST NOT BE OVERLOOKED AS THE BRAKES WILL NOT OPERATE EFFICIENTLY UNTIL THE PADS ARE CORRECTLY POSITIONED.

Apply an effort to the brake pedal and inspect all disturbed connections etc. for leaks. Refit road wheels, remove axle stands, jack down, check brake pedal movement and, if satisfactory, road test.

Fitting New Guide Pins

The efficiency of the caliper is dependant on the free sliding of the guide pins in the carrier. It is therefore important that the guide pins are not damaged, that the guide pin dust covers are not damaged causing possible water ingress and corrosion of the pins, and that the correct type of lubricant (Part No. 74947191) is used on the guide pins.
If the pins are not free to move or are corroded in any way they must be replaced. Remove the hydraulic body from the carrier (see 'Dismantling'). Remove the guide pins and dust covers from the bracket. Ensure there is no excessive corrosion in the carrier guide pin bores, if in doubt fit a new unit.

Fit new dust covers onto the new pins, lubricate with the grease supplied (Part No. 74947191) and insert into the carrier. Push the dust covers over the lip on the carrier and before pushing the pins fully home slightly pucker the dust covers to expel any trapped air (Fig. 10). Refit the hydraulic body and pads and, if the hydraulic system has been disturbed, bleed the brakes as previously described (see 'Re-assembly').

Fitting New Carriers

Remove the hydraulic body, without disconnecting the hydraulic system, and support the body weight to prevent damage to the flexible hose. Remove the pads. Unscrew the bolts retaining the carrier to the stub axle, noting the position of any shims fitted between the mounting faces. Fit the new carrier, replacing any shims in their correct positions. Refit the hydraulic body and pads (refer to 'Re-assembly').

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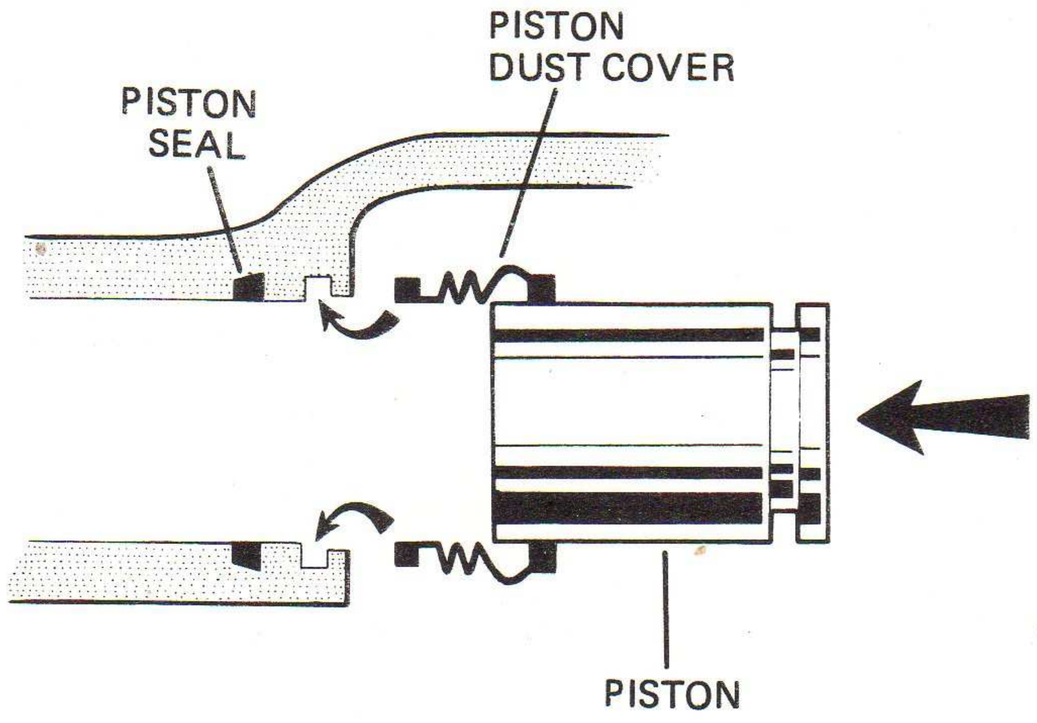

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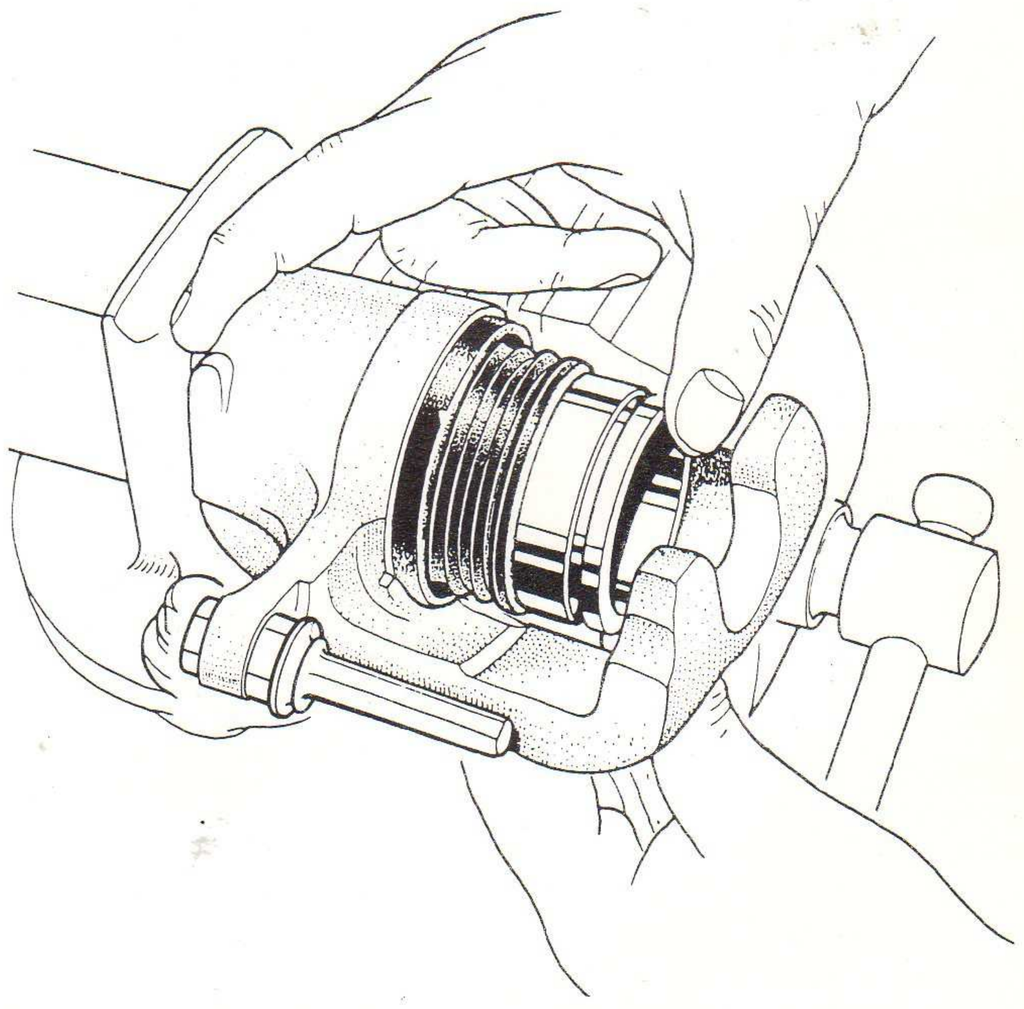

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Girling Colette type caliper 2A14a

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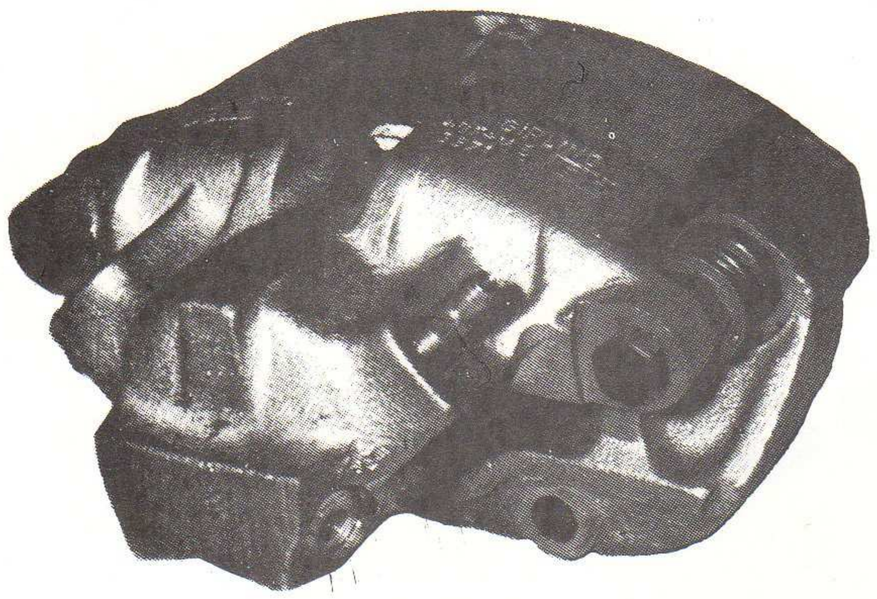
45C



14C

A1008

Introduction

The Colette caliper (Figs.1 and 2) is a further addition to the extensive range of disc brakes produced by Girling to meet the demands of world wide markets. The illustrations show three front calipers, the 45C, 14C and the 12+8C, and one rear caliper, the 9CH, which incorporates a handbrake with automatic adjustment mechanism built in.

Each complete caliper assembly consists of a carrier bracket bolted to the spindle and a body assembly which slides on two guide pins housed in the bracket. The guide pins are sealed against corrosion by dust covers, thereby avoiding possible unequal sliding loads caused by dirt, corrosion and spring friction. Drag of the pads is taken direct by the carrier bracket, consequently the pins are only loaded by the weight of the cylinder body. The 45C, 12+8C and 9CH have a rubber bush fitted to one guide pin to prevent noise and take up brake deflection. The 14C may have one rubber coated pin and a plain pin or two plain pins.

All Colette calipers operate in the same way (Fig.3). When the footbrake is applied, the hydraulic pressure created pushes the piston and with it the inboard pad onto the disc. The body reacts and slides on the guide pins to bring the outboard pad into contact with the disc. The clamp on both sides of the disc is then equal.

When the hydraulic pressure is released, the piston seal fitted in the wall of the cylinder retracts the piston a small amount, which allows the moving parts to relax sufficiently for the disc pads to remain in close proximity to the disc ready for the next brake application.

The 12+8C front caliper (Fig.5) is designed specifically for split-line hydraulic systems and, as its title suggests, employs

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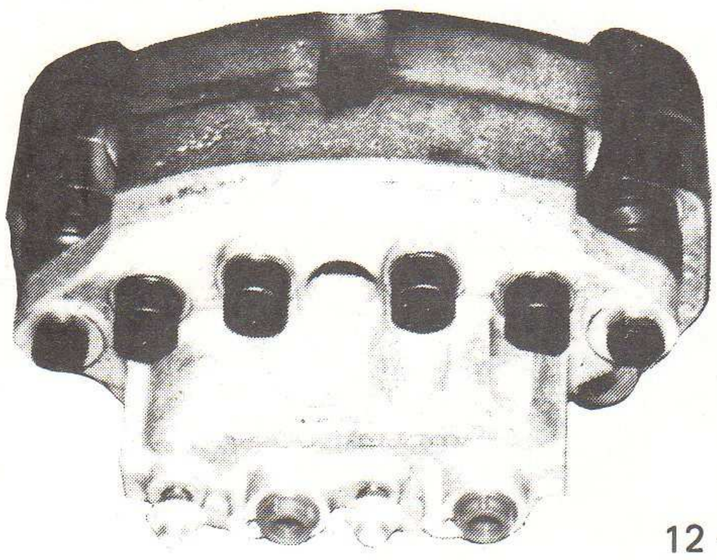
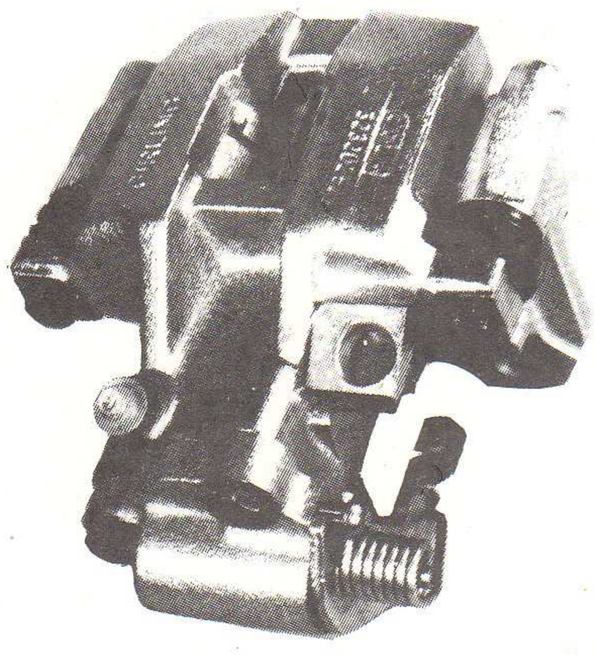


12 + 8C



9CH.

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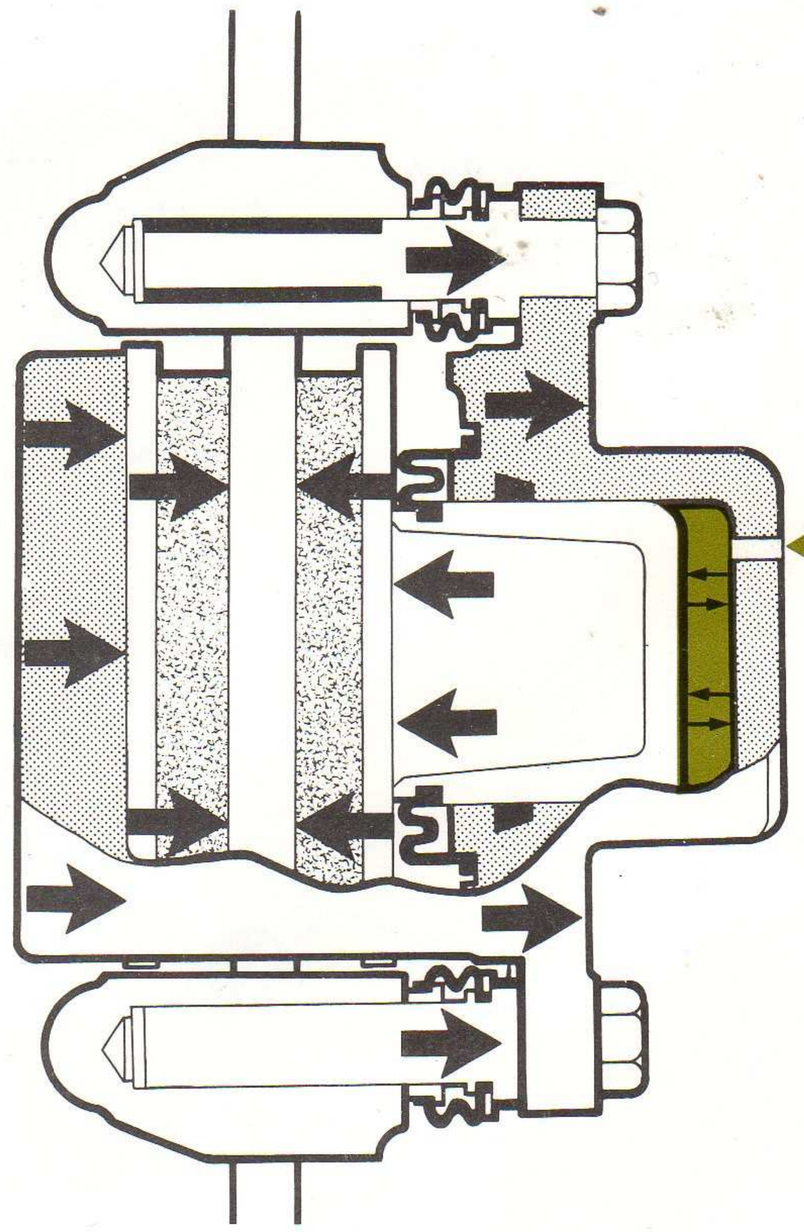

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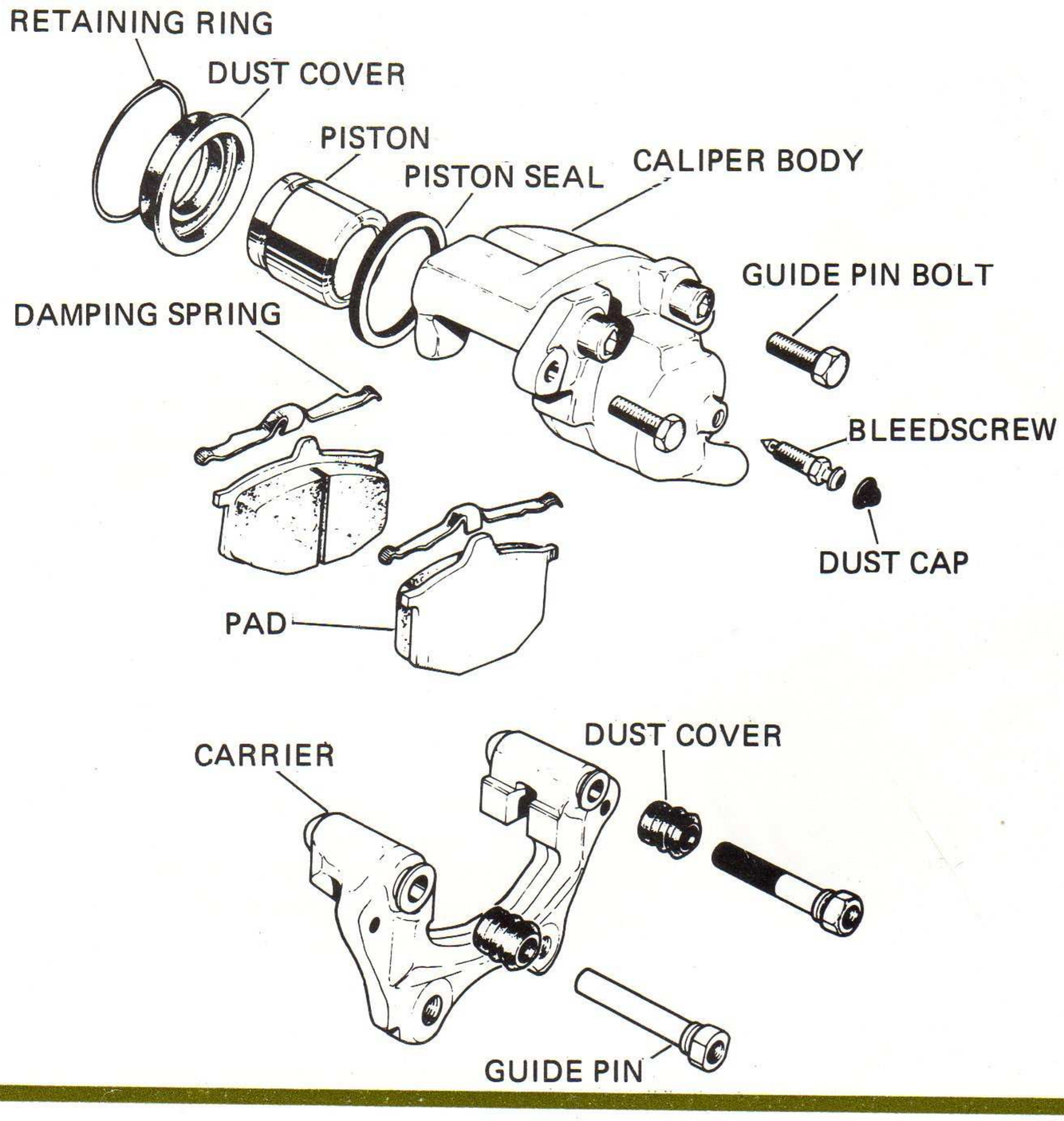
4 45C



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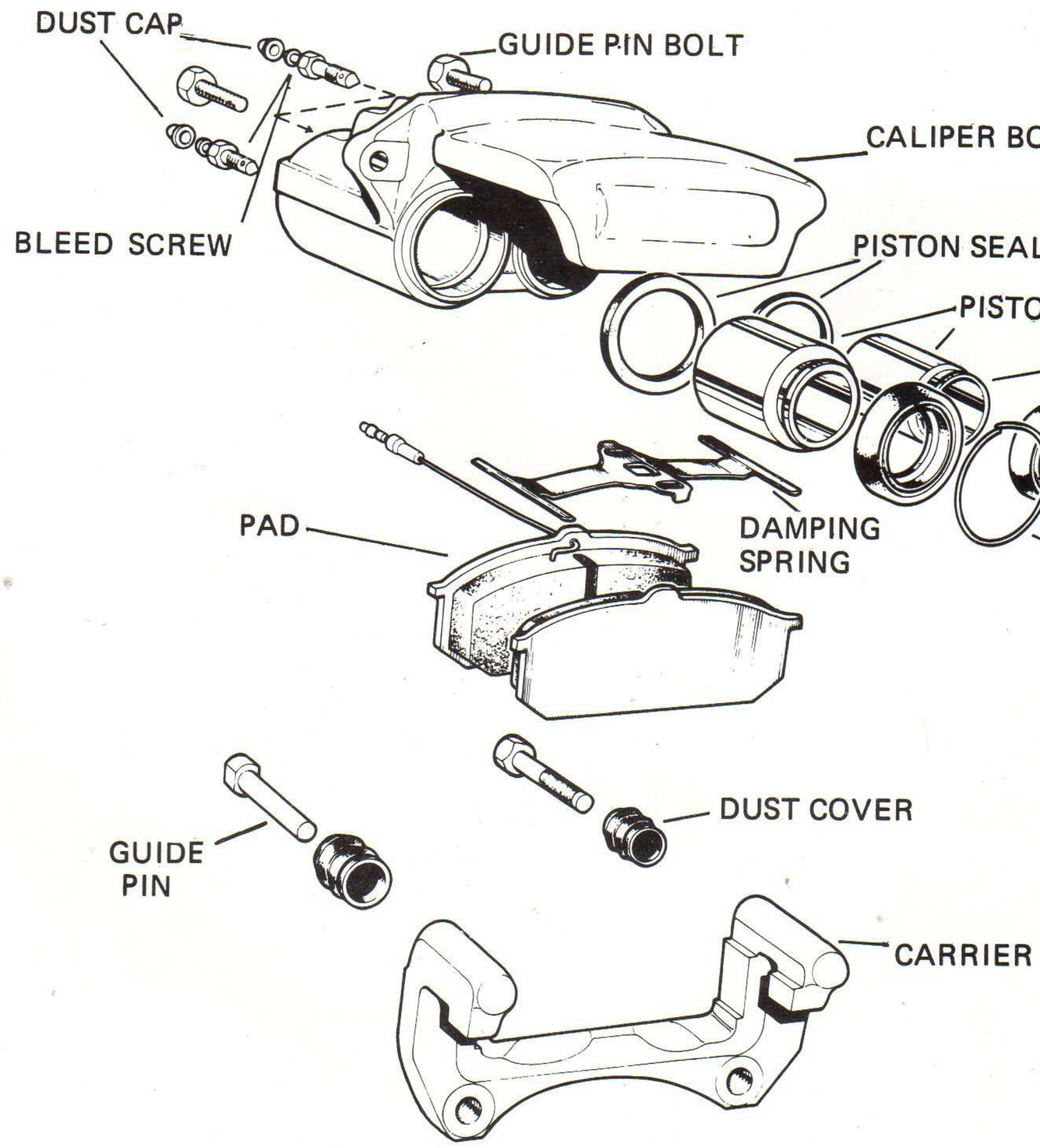
5 12+8C



A0912

Girling Colette type caliper 2A14c

two pistons of unequal diameter which operate independently of each other. This arrangement enables the larger pistons from both front calipers to be connected to one brake system and the smaller pistons to be connected to the other, to suit the vehicle manufacturer's requirements.

The 45C (Fig.4) is used throughout as the basis of the service procedures. Where these procedures differ the appropriate calipers are referred to. For details on the 9CH rear caliper refer to Page 2A14g.

Servicing

To maintain the efficiency of the braking system, preventive maintenance is essential and the following recommendation should be observed at the intervals stated. Full details of preventive maintenance are incorporated in Section 1, Page 1A1.

1. Check the pads for wear every 5,000 miles (8,000 km) and fit new pads when the lining thickness has worn to 1/8" (3 mm). If electrical wear indicators are incorporated the examination should be unnecessary.
2. Every 10,000 miles (16,000 km) examine all brake pipes, and flexible hoses for corrosion, fretting and signs of damage. Renew suspect parts and take action where applicable to prevent a recurrence of the trouble.
3. Change brake fluid every eighteen months.
4. Every 40,000 miles (64,000 km) or three years whichever occurs first the caliper should be overhauled. All other hydraulic parts on the vehicle should also be replaced or overhauled and new hydraulic hoses should be fitted.

Fitting New Front Pads

When the lining has worn to 1/8" (3 mm) or if the electrical pad wear indicator bulb on the instrument panel lights up, the pads should be replaced. Always fit new pads in axle sets.

WARNING: NEVER USE AN AIR LINE TO REMOVE ASBESTOS DUST. IF INHALED ASBESTOS DUST CAN DAMAGE HEALTH. WHENEVER POSSIBLE REMOVE DRY DUST WITH A VACUUM BRUSH.

Jack up the car and remove the front wheels. Push back the piston by pulling the body assembly towards you. If necessary open the bleedscrew first to allow the fluid to escape from behind the piston. Close the bleedscrew once the piston has been pushed fully back.

Hold a guide pin steady by placing an open ended spanner across the flats provided. Using a ring or socket spanner, remove the pin retaining bolt (See Fig.6). When doing this take care not to damage the guide pin dust cover, by allowing the guide pin to rotate. Swing the body away from the disc and carrier bracket by rotating around the remaining pin (See Fig.7). Ensure the body does not hang on the flexible hose. Remove pad springs if separate from the pads, or remove the pad and spring assembly. Disconnect the pad wear indicator electrical cable.

Thoroughly clean the pad abutment areas, avoiding damage to the piston and piston dust covers. If the retaining rings or piston dust covers are damaged they must be replaced to prevent corrosion within the cylinder body.

NOTE: No retaining ring is fitted to the piston dust cover on the 14C type calipers. To remove and replace the dust cover see Dismantling, Page 2A14e.

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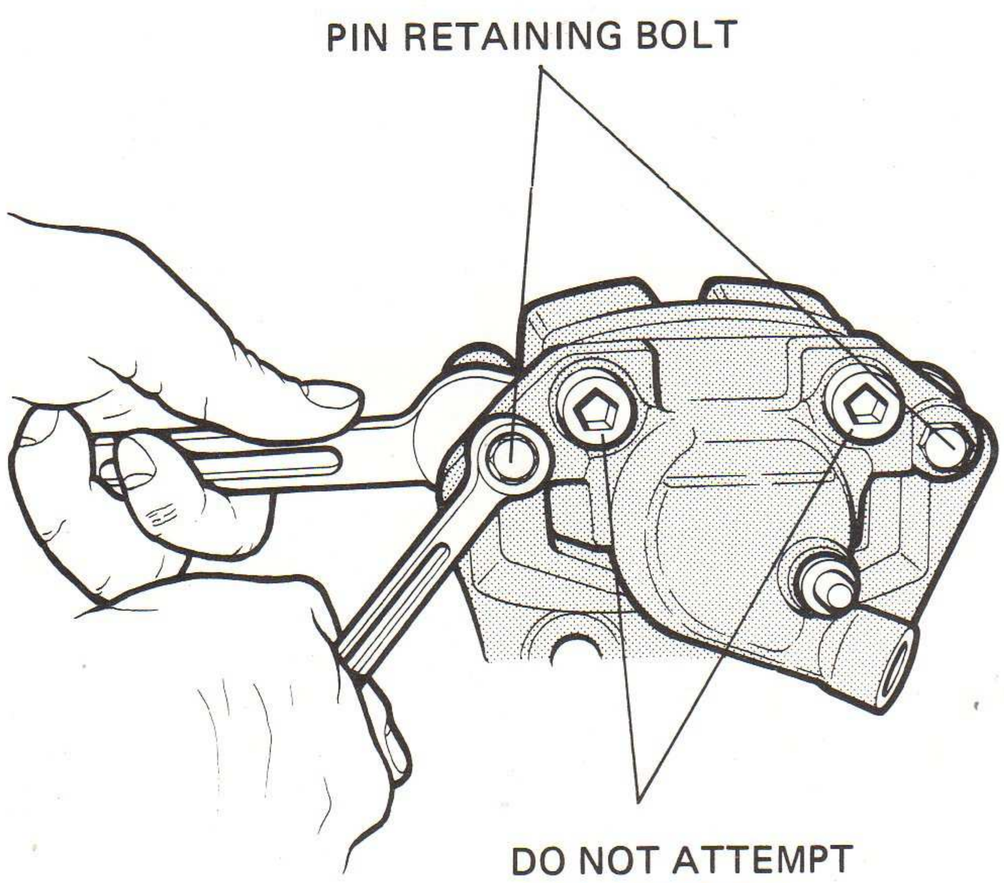

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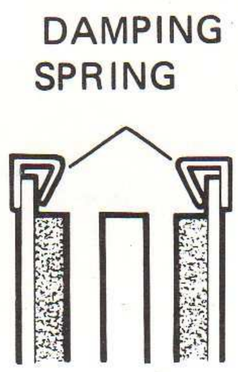
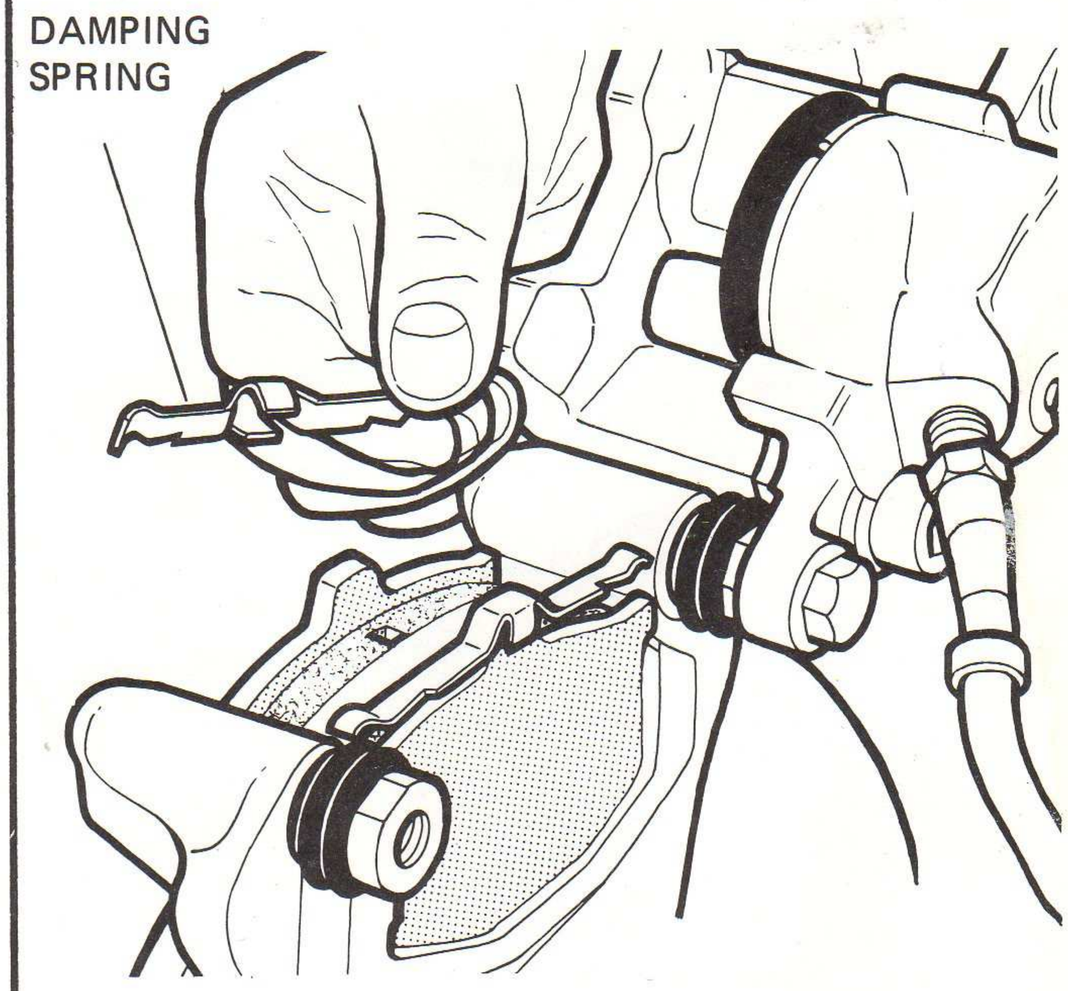




A0988

2A14d Girling Colette type caliper

There are several types of pad springs in use. Determine which type is in use in your caliper and replace them as follows:—

1. 45C calipers have separate pad springs for each pad. They must be located on the new pad as shown in (Fig.7).
2. 12+8C and 9CH calipers have one spring for both pads. This spring is clipped into the pad wear viewing aperture in the cylinder body. (See Fig.8).
3. 14C calipers have a spring fitted as an integral part of each pad. Do not attempt to remove or replace these springs. If the spring is found to be faulty a new pad complete with spring should be fitted. (See Fig.8).

   Always replace the pad springs when replacing the pads.

Inspect the guide pins by withdrawing them from the carrier bracket. Mark the hole which held the rubber bushed pin, (if fitted), to ensure correct replacement. If the pins are difficult to remove or are corroded in any way they must be replaced along with their dust covers. See Fitting New Guide Pins if they have to be replaced. No attempt should be made to clean up corroded pins.

If the pins are found to be in good condition lubricate them with B.P.OLEX 9136 grease.

WARNING: FREQUENT PROLONGED SKIN CONTACT WITH B.P. OLEX GREASE SHOULD BE AVOIDED AND A HIGH STANDARD OF PERSONAL HYGIENE PRACTISED.

Fit the dust cover over the lip of the guide pin. Re-fit into the carrier bracket and pucker the dust cover to expel any trapped air from the hole in the carrier bracket. When the pins are fully down fit the dust cover over the lip on the carrier bracket.

Fit new pads and springs. If pads carrying wear indicator cables are fitted they should be placed on the inboard side of the calipers. Guide the electrical cable through the pad wear viewing aperture in the cylinder body and rotate the body to its normal position on the carrier bracket. Ensure that the pad springs are not twisted or in the case of the 14C that the integral spring is not twisted into the pad wear viewing aperture. Refit the guide pin retaining bolt. Pressure will have to be applied against the cylinder body to line up the holes in the pin and body to achieve this.

Tighten the bolts to torque 31 to 36Nm (23 to 26 lbf.ft.).

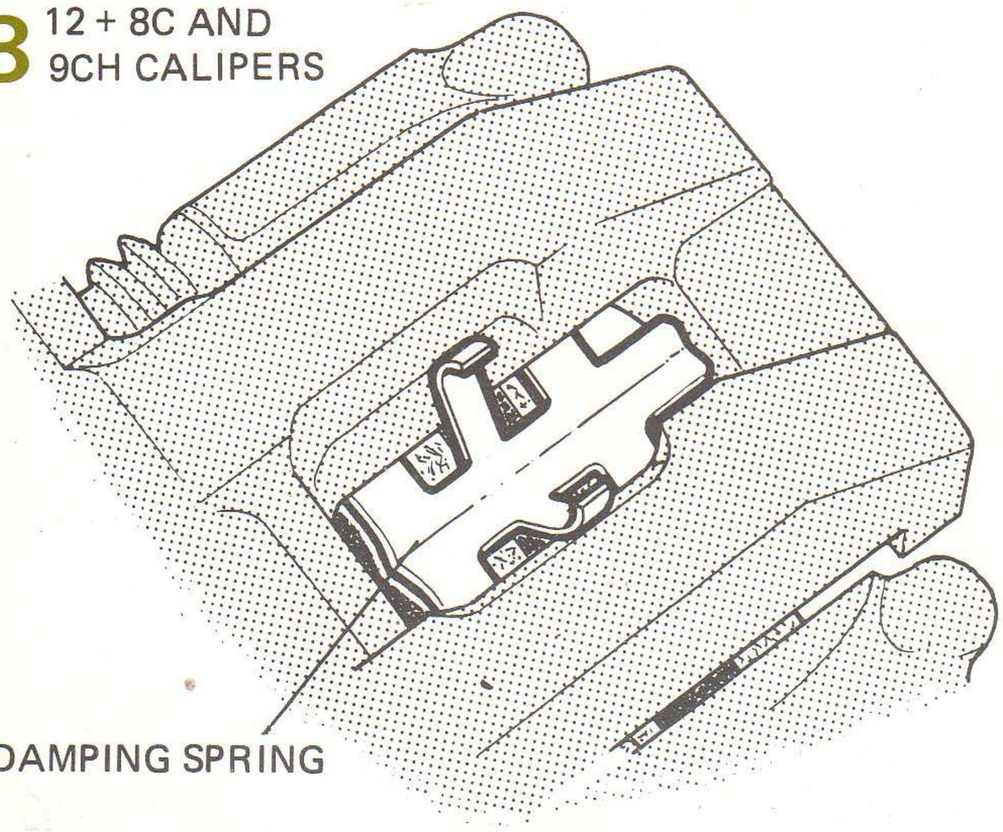
Reconnect the warning cable, then pump the brake pedal several times to move the pads to the correct operating position. Bleed the brakes (refer to Section 1D1). Check fluid level and top up if necessary,

IMPORTANT: APPLICATION OF THE BRAKE PEDAL MUST NOT BE OVERLOOKED AS THE BRAKES WILL NOT OPERATE EFFICIENTLY UNTIL THE PADS ARE IN THE CORRECT POSITION.

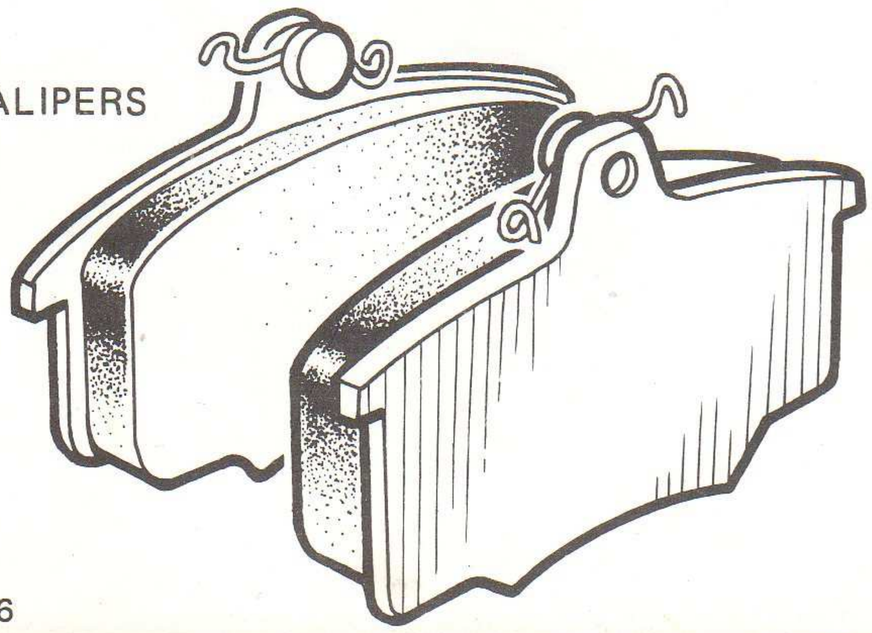
Refit road wheels, jack down, check footbrake movement and road test if satisfactory.

NOTE: After fitting new pads care should be taken in braking. Brake gently several times from 80 km/h to 50 km/h (50 mph to 30 mph) and only brake fully when the pads have cooled down and bedded onto the disc. Braking heavily from high speeds and prolonged heavy braking should be avoided for the first 160 Km (100m) until the new pads are fully bedded in.

8 12 + 8C AND 9CH CALIPERS



14C CALIPERS



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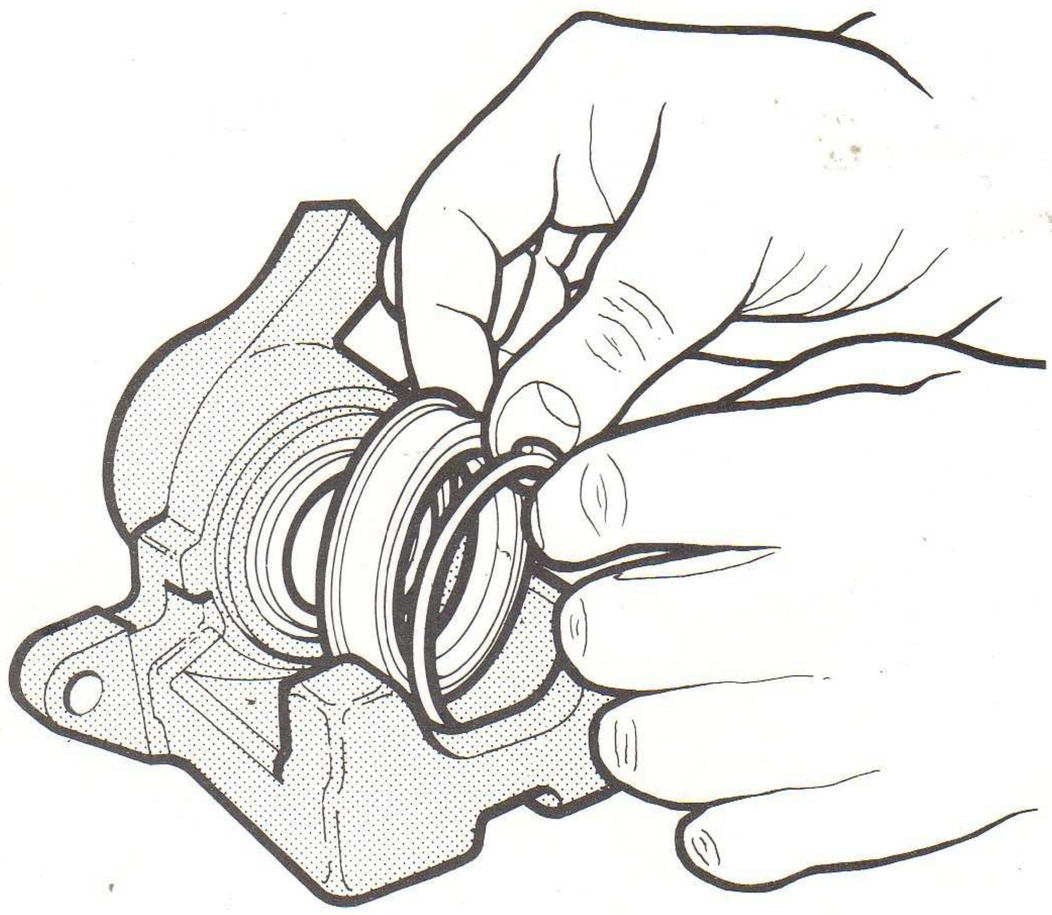

A0987/2

Girling Colette type caliper 2A14e

disc brakes

Dismantling

Disconnect the flexible hose, from the chassis end first and then the caliper. Block off the brake pipe at the chassis connection to prevent loss of brake fluid. This can be done by refitting the hose to the chassis and clamping it off with a Girling hose clamp (Part No.64947017). Disconnect the pad wear electrical cable and then remove the guide pin retaining bolts (See Fitting New Pads).

Remove the cylinder body, pads and springs, from the carrier bracket. Do not mix up the left and right hand cylinder bodies if they are both removed from the vehicle at the same time.

45C and 12+8C Calipers — Remove the retaining ring(s) and piston dust cover(s). See Fig.9. Eject the piston from the cylinder body by gradually applying compressed air to the inlet port. Use a piece of wood to prevent the piston from being damaged by hitting the cylinder body (See Fig.10). Keep the hands clear.

IMPORTANT: DO NOT ATTEMPT TO SEPARATE THE TWO HALVES OF THE CYLINDER BODY (SEE FIG.6).

14C. Eject the piston by applying compressed air to the inlet port. Use a piece of wood to prevent the piston from being damaged by hitting the cylinder body. The piston dust cover cannot be removed until the piston has been ejected (See Fig.11).

Remove the bleedscrew from the cylinder body and examine carefully the piston bore for signs of damage, scuffing or corrosion.

Cleaning

Clean all parts with Girling Cleaning Fluid or unused Castrol-Girling Universal Brake Fluid.

Examine all parts for signs of wear, damage and corrosion paying particular attention to the piston and cylinder bore. Remove body corrosion with a wire brush or wire wool. No attempt should be made to clean up a badly corroded piston. It must be replaced from the appropriate Girling Service Kit.

All parts must be in good working order and where doubt exists new parts should be fitted.

Inspect the guide pins to ensure that they are not corroded or seized up in any way within the carrier bracket. They must be free to move. If doubt about their condition exists replace them with new pins and dust covers. See Fitting New Guide Pins, Page 2A14f.

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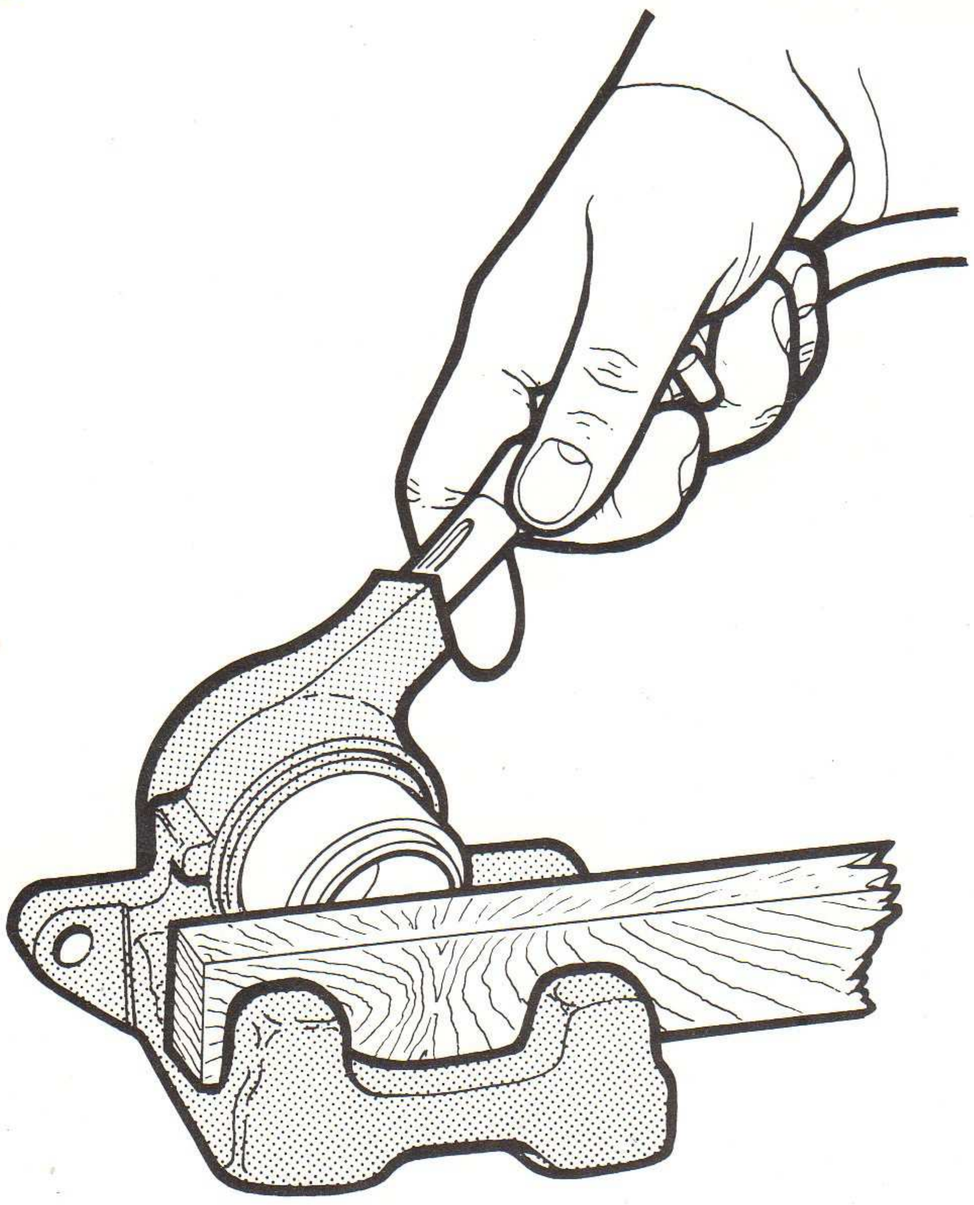

KEEP THE HANDS CLEAR

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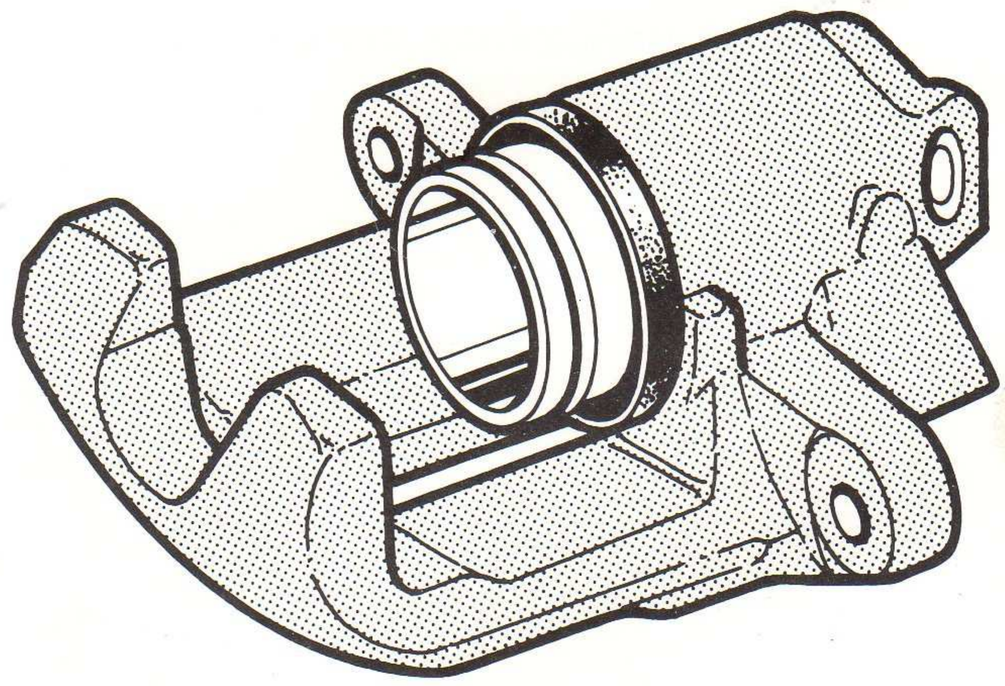


A1007

Girling Colette type caliper

Reassembly

Using the parts from a Service Kit fit a new piston seal in its groove in the cylinder body, lubricate with Girling red rubber grease, unused brake fluid or liberally smear on the seal lubricant provided in the Kit. If a sachet of seal lubricant is provided the seal MUST be smeared before fitting.

45C and 12+8C. Insert the piston(s) into the bore and fit dust cover into the lip around the cylinder bore. Push the piston fully down the bore ensuring the piston does not tip or become off set. Then locate the other edge of the dust cover in the piston groove, and fit the dust cover retaining ring(s).

14C. Place the dust cover over the cylinder bore and then push the piston through it, into the cylinder body. This should then hold the dust cover in the correct place around the piston (See Fig.11).

Replace the bleedscrew and refit pads and springs, place the cylinder body on the carrier bracket and refit guide pin retaining bolts (See Fitting New Pads to complete re-assembly).

Remove hose clamp from the flexible hose and disconnect it from the chassis. Re-connect it to the caliper and then to the chassis. Connect pad wear warning light cable if fitted. Operate the brake pedal several times to move the piston(s) to operating position. Bleed the brakes and check the brake fluid level. See Section 1D1.

IMPORTANT: APPLICATION OF THE BRAKE PEDAL MUST NOT BE OVERLOOKED AS THE BRAKES WILL NOT OPERATE EFFICIENTLY UNTIL THE PADS ARE IN THE CORRECT POSITION.

Fitting New Guide Pins

The efficiency of the caliper is dependent on the free sliding of the guide pins in the bracket. It is therefore important that the guide pins are not damaged, that the guide pin dust covers are not damaged, causing possible water ingress and corrosion of the pins, and that the correct type of lubricant is used on the guide pins.

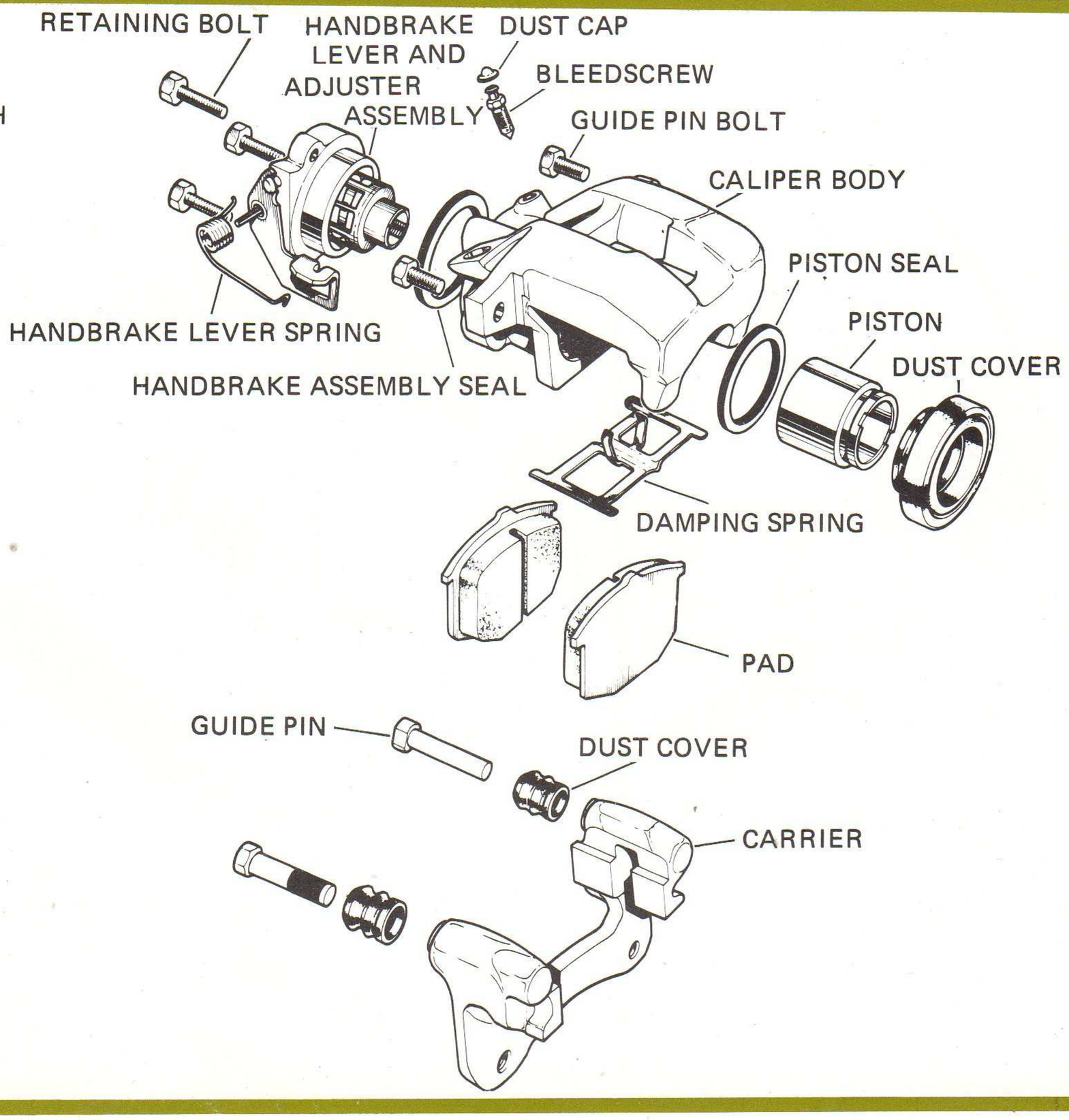
If the pins are not free to move or are corroded in any way they must be replaced. Remove the cylinder body from the carrier bracket (See Dismantling). Remove the guide pins and dust covers from the bracket. Mark the hole containing the rubber bushed pin, if fitted, since it is important that the replacement pin goes back into that hole.

Fit new dust covers onto the new pins, lubricate with B.P. OLEX 9136 grease and insert into the bracket. Push the dust covers over the lip on the bracket, and to push the pins fully home slightly pucker the dust covers to expel any trapped air. Refit the cylinder body, pads and springs and bleed the brakes (See Re-assembly).

WARNING: FREQUENT PROLONGED SKIN CONTACT WITH B.P. OLEX GREASE SHOULD BE AVOIDED AND A HIGH STANDARD OF PERSONAL HYGIENE PRACTISED.

NOTE: It is the service policy of certain vehicle manufacturers that the guide pins can only be replaced by the fitting of a new carrier bracket, complete with new guide pins and new dust covers.

Unscrew the bolts retaining the carrier to the stub axle noting the position of any shims fitted between the mounting faces. Fit the new carrier placing any shims in their correct positions. Refit the cylinder body, pads and springs and bleed the brakes. (See Re-assembly).



Girling Colette type caliper 2A14g

Colette Rear Calipers (9CH)

The 9CH caliper (Fig.12) is designed specifically for rear brakes and provision has been made for a handbrake mechanism which adjusts automatically when the footbrake is applied. As all Girling disc brakes are self-adjusting, operation of the footbrake therefore keeps the disc pads in constant adjustment up to the disc for both foot and handbrake operation.

The automatic handbrake mechanism is incorporated within the cover assembly (Fig.13). The lever rotates a cam which moves a push rod and this action is transferred via the adjusting parts to the piston which applies the brake. When a pre-determined amount of pad wear has occurred, and the piston is operated hydraulically, the pawl 'A' clicks over the teeth 'B' (Fig.13) and so keeps the handbrake in constant adjustment. A small amount of lost motion is permitted which prevents over-adjustment and permits proper relaxation of the pads after each brake application.

Servicing

See standard recommendations on Page 2A14c.

Fitting New Rear Pads

Follow the same procedure in removing pads as for Colette type front calipers. Disconnect handbrake linkage.

Before fitting new pads the auto-adjust handbrake mechanism must be fully returned. Fit a screwdriver (Fig 14) against the piston and turn the piston 45° to disengage the piston ratchet. Press back the piston, and then turn back 45° to re-engage piston ratchet. Fit new pads and pad springs. Line up the lug on pad backing plate with slot in piston. Fit the cylinder body on to the pads and fit the upper retaining bolt. Press on the housing and fit the lower retaining bolt. The upper bolt should be tightened first. Tighten to 31 to 35 Nm (23 to 26lbf.ft.) torque.

reconnect the handbrake cable. Pump the pedal to push the new pads against the disc. If the bleedscrew has been opened bleed the system and top up the fluid reservoir.

Dismantling

Follow the same procedure as for Colette front calipers. Before removing the cylinder body from the bracket disconnect the handbrake linkage.

To eject the piston from the cylinder body turn the piston 45° to disengage from the auto-adjust mechanism (Fig.14). Then apply compressed air to inlet to remove the piston. The auto-adjust handbrake mechanism can then be separated from the cylinder body by unscrewing the three bolts on its cover plate (See Fig.15 and Fig.16).

IMPORTANT: NO ATTEMPT SHOULD BE MADE TO DISMANTLE THE AUTO-ADJUST MECHANISM. IF IT IS FAULTY A COMPLETE NEW UNIT MUST BE FITTED.

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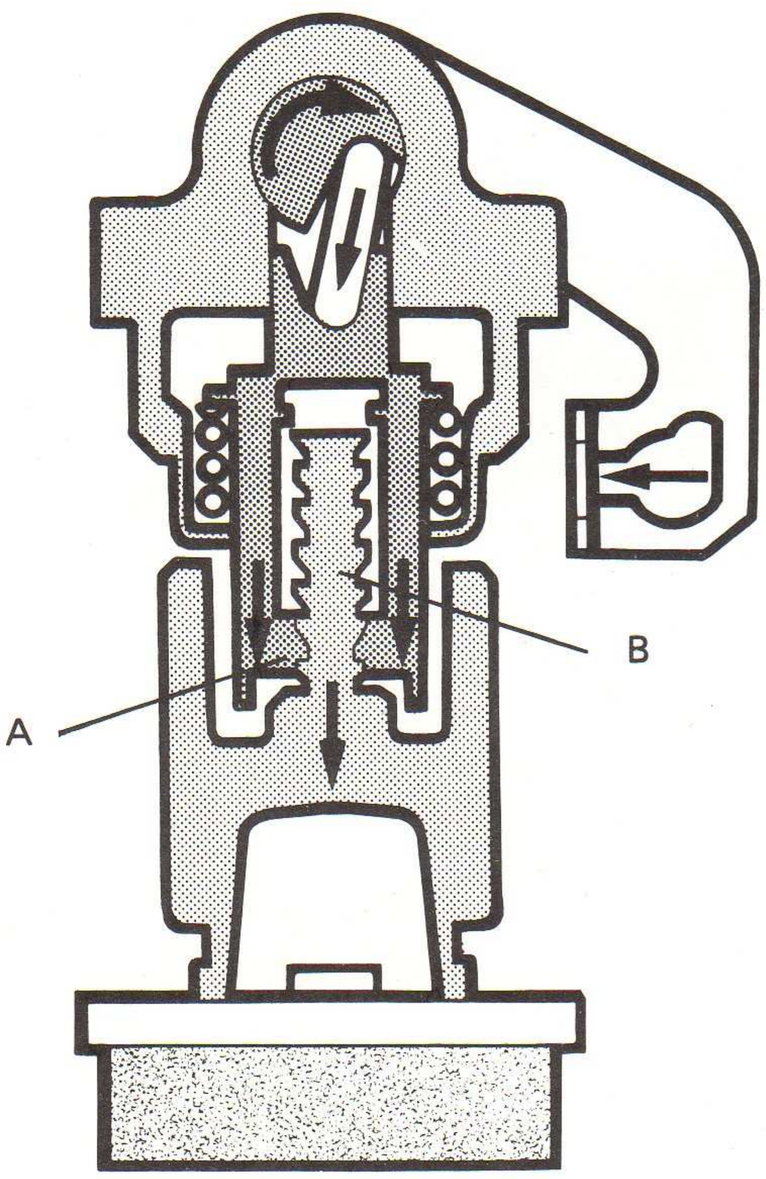

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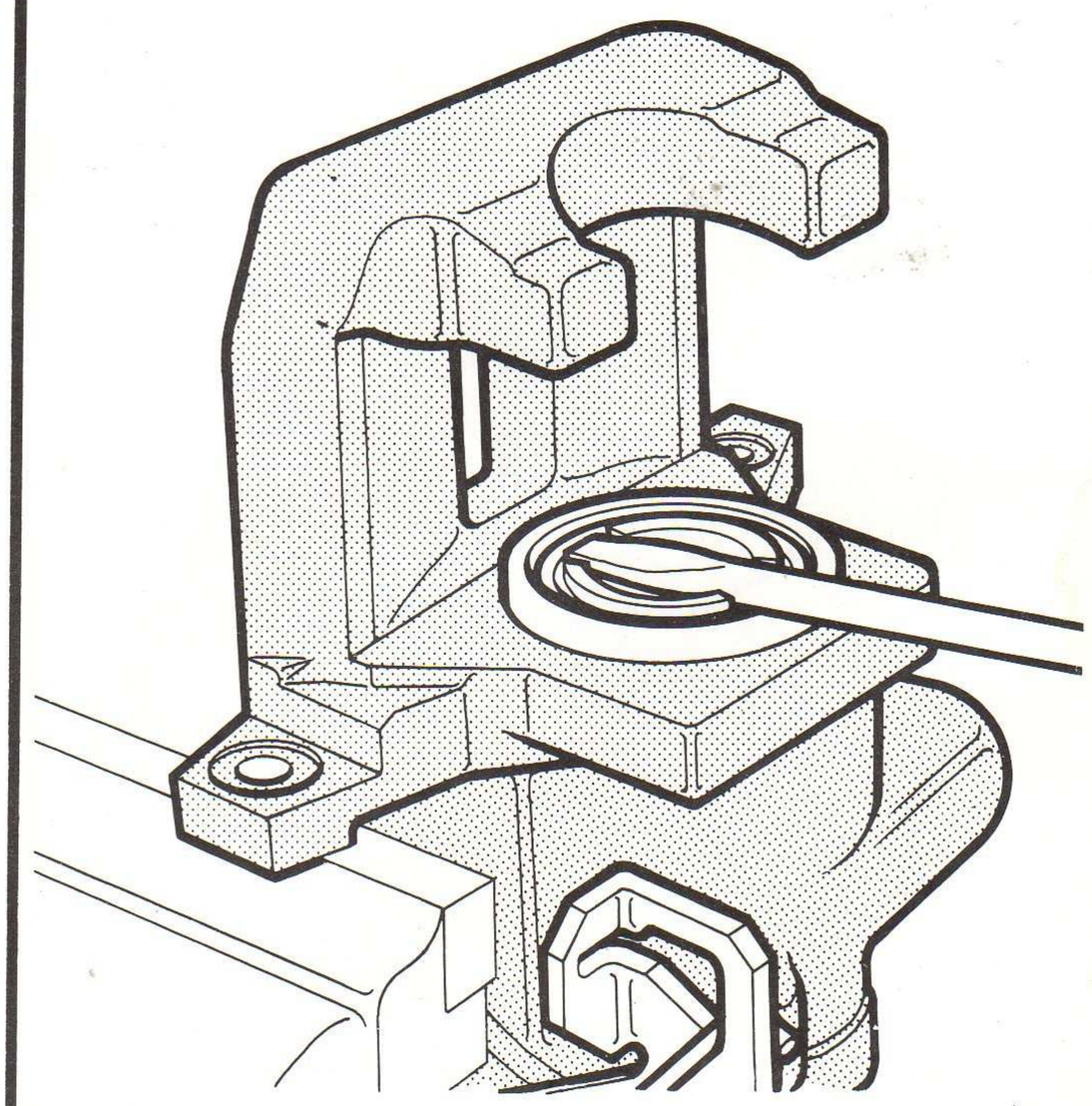


A0991

Girling Colette type caliper

Cleaning

Clean all parts with Girling Cleaning Fluid or unused Castrol-Girling Brake Fluid.

Examine all parts for signs of wear, damage and corrosion paying particular attention to the piston and cylinder bore. Remove corrosion with a wire brush or wire wool. No attempt should be made to clean up a badly corroded piston. It must be replaced from the appropriate Service Kit.

All parts must be in good working order and where doubt exists new parts should be fitted.

Re-assembly

Follow same procedure as for Colette type front calipers.

Replace the auto-adjust handbrake mechanism before replacing the piston. Ensure when fitting that the handbrake lever is parallel with the handbrake cable transit hole in the cylinder body.

When re-fitting the piston, push it fully back down the bore and then turn 45° to re-engage the auto-adjust mechanism (Fig.14). Line up the lug on the pad backing plate with the slot in the piston when fitting pads.

Re-connect the handbrake cable to the handbrake lever.

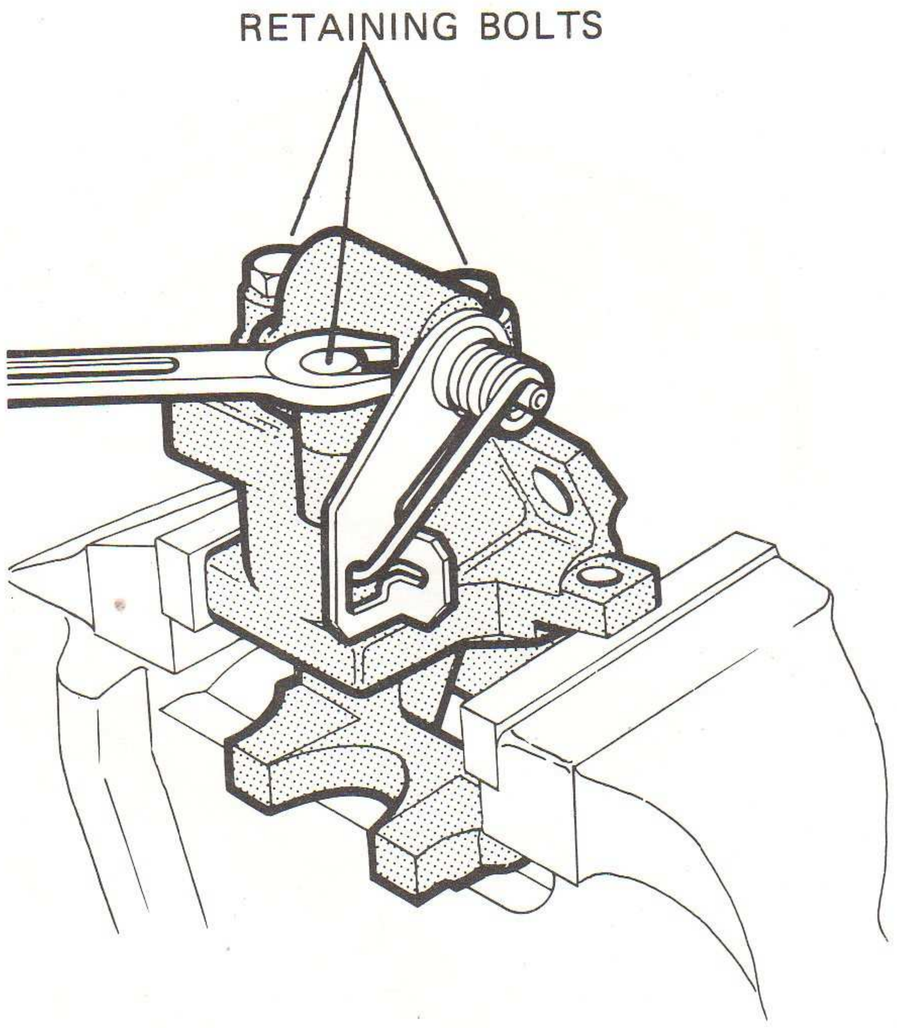
Fitting New Guide Pins

Follow the same procedure as for Colette type front calipers. Refer to Page 2A.14f.

IMPORTANT: ON COLETTE TYPE REAR CALIPERS THE RUBBER BUSHED GUIDE PIN SHOULD BE FITTED ON THE LOWER SIDE OF THE BRACKET.

WARNING: FREQUENT PROLONGED SKIN CONTACT WITH B.P. OLEX GREASE SHOULD BE AVOIDED AND A HIGH STANDARD OF PERSONAL HYGIENE PRACTISED.

15



A0990/1

16

A0990/2

XD 48 caliper

disc brakes

Introduction

The XD 48 Caliper (Fig.1), consists of a bracket bolted to the hub and a cylinder body with a single piston protected by a dust cover. All hydraulics are contained within the cylinder, which slides on guides fitted between the body of the cylinder and the bracket.

When the footbrake is applied the hydraulic pressure created pushes the piston and with it the direct pad onto the disc (Fig.2). The cylinder reacts and slides on the guides to bring the indirect pad into contact with the disc. The clamp on both sides of the disc is then equal.

When the hydraulic pressure is released, the piston seal fitted in the wall of the cylinder retracts the piston a small amount, which allows the moving parts to retract sufficiently for the disc pads to remain in close proximity to the disc ready for the next brake application.

Servicing

To maintain the efficiency of the brake system, preventive maintenance is essential and the following recommendations should be observed at the intervals stated. Full details of preventive maintenance are incorporated in Section 1, Page 1A1.

1. Check both pads for wear every 8,000 km (5,000 miles) and fit new pads when the lining thickness has worn to 1.5 mm (1/16 in.). If electrical wear indicators are incorporated, the examination should be unnecessary. Always fit new pads in sets on both sides of the car.
2. Every 16,000 km (10,000 miles) examine all brake pipes and flexible hoses for corrosion, fretting and signs of damage. Renew suspect parts and take action where applicable to prevent a recurrence of the trouble.
3. Change the Brake Fluid every eighteen months.
4. Every 64,000 km (40,000 miles) or three years, whichever occurs first the caliper should be overhauled. All other hydraulic parts on the vehicle should be replaced or overhauled and new hydraulic hoses should be fitted.

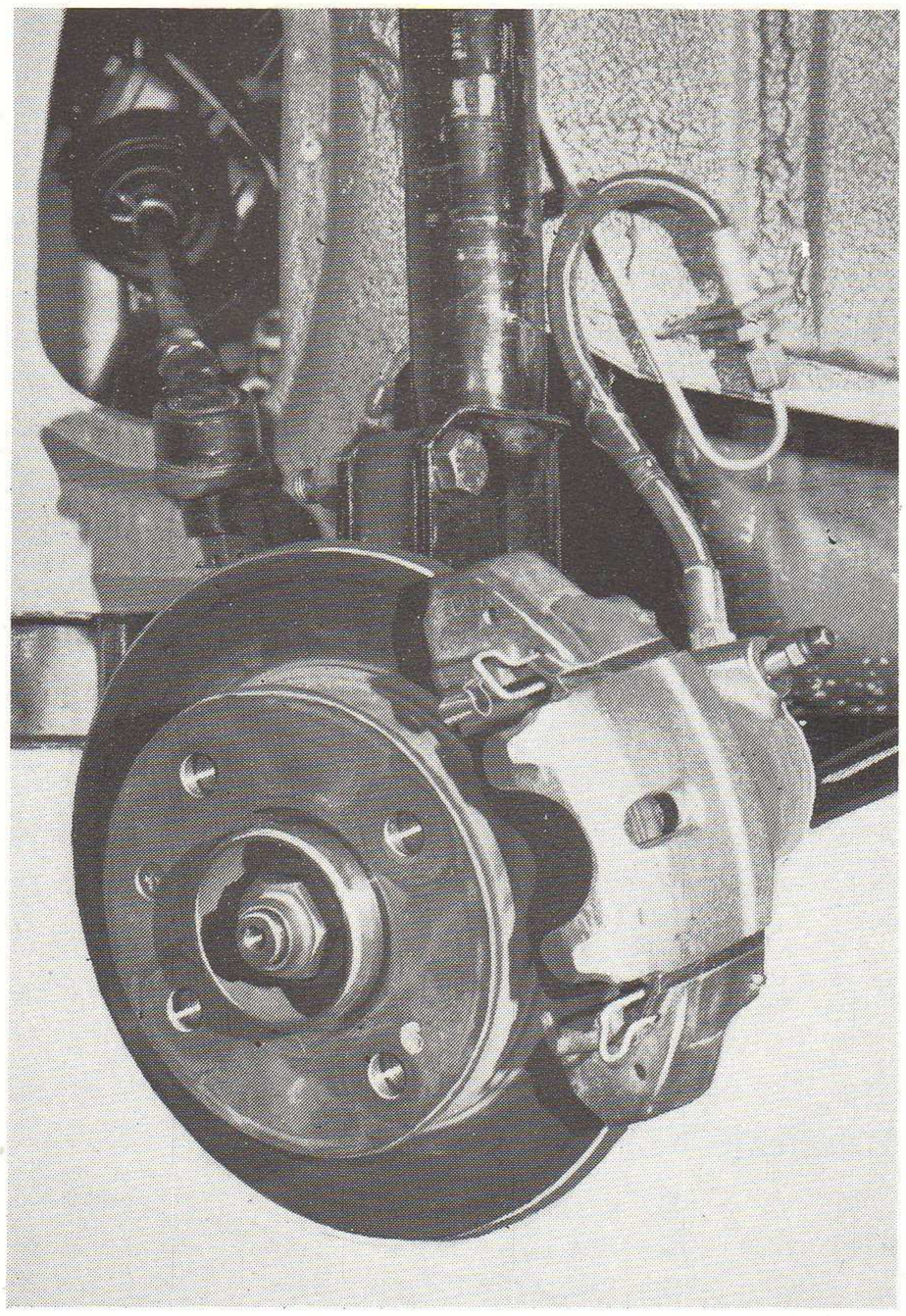
Fitting New Pads (Refer to Fig. 3)

When the lining has worn to 1.5 mm (1/16 in.) the pads should be replaced. Always fit new pads in sets on both sides of the car.

Chock the rear wheels, loosen the front wheel nuts and release the handbrake. Jack-up the front of the car and remove the front wheels.

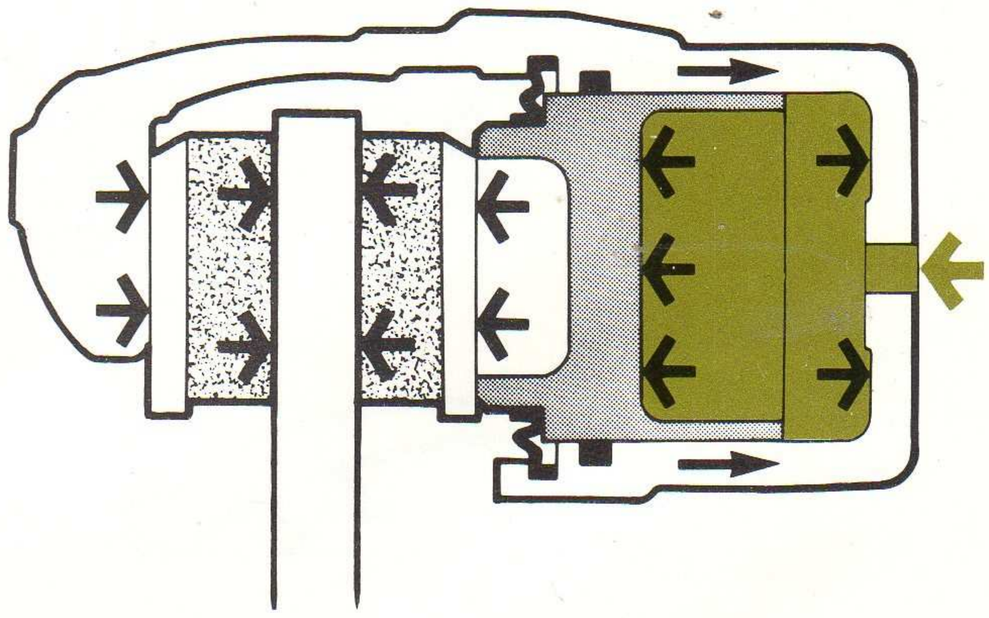
WARNING: NEVER USE AN AIR LINE TO REMOVE ASBESTOS DUST. IF INHALED, ASBESTOS DUST CAN DAMAGE HEALTH. WHENEVER POSSIBLE, REMOVE DRY DUST WITH A VACUUM BRUSH.

1



AO926

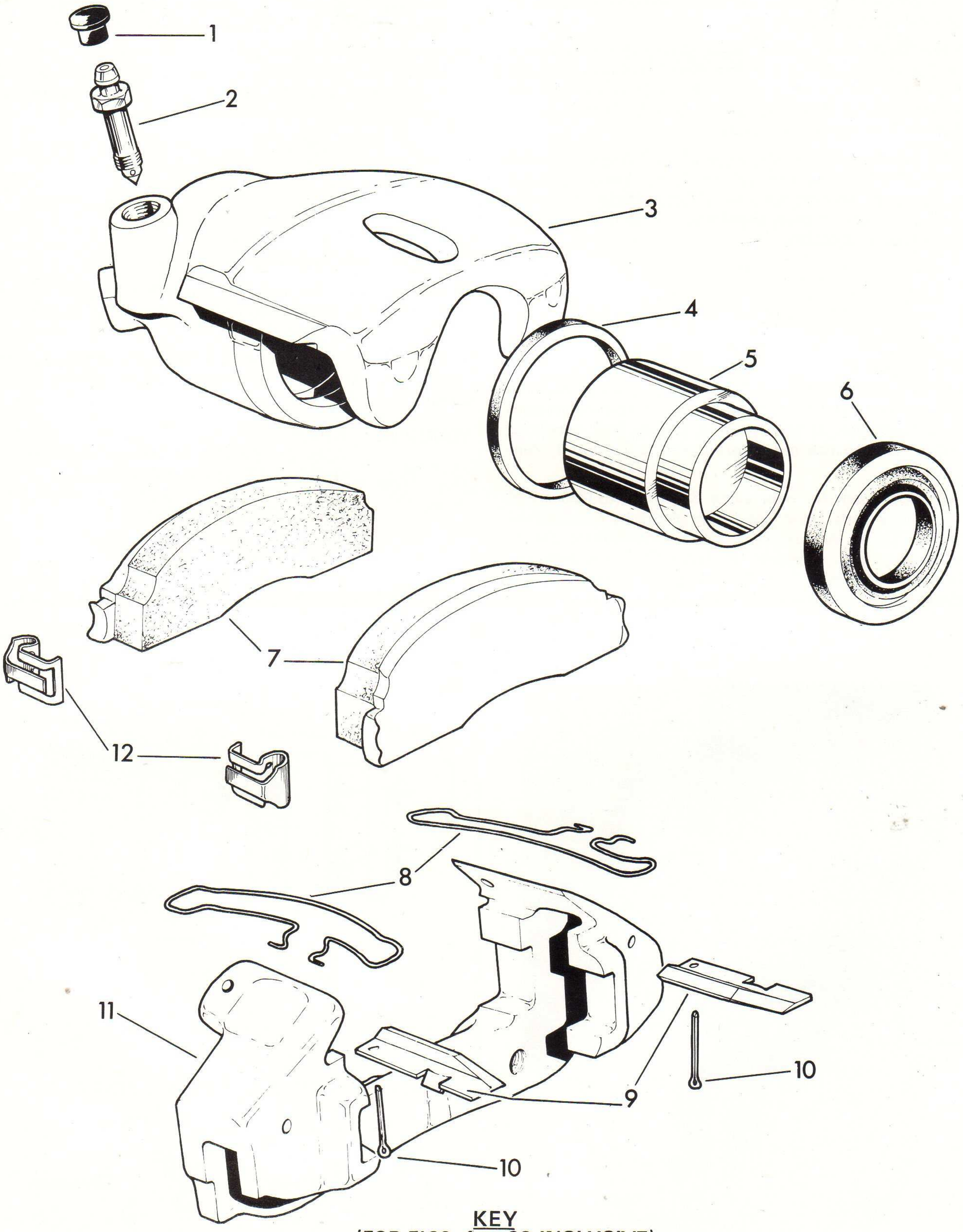
2



AO899

XD 48 caliper

3 EXPLODED VIEW OF CALIPER



KEY
(FOR FIGS. 1 TO 22 INCLUSIVE)

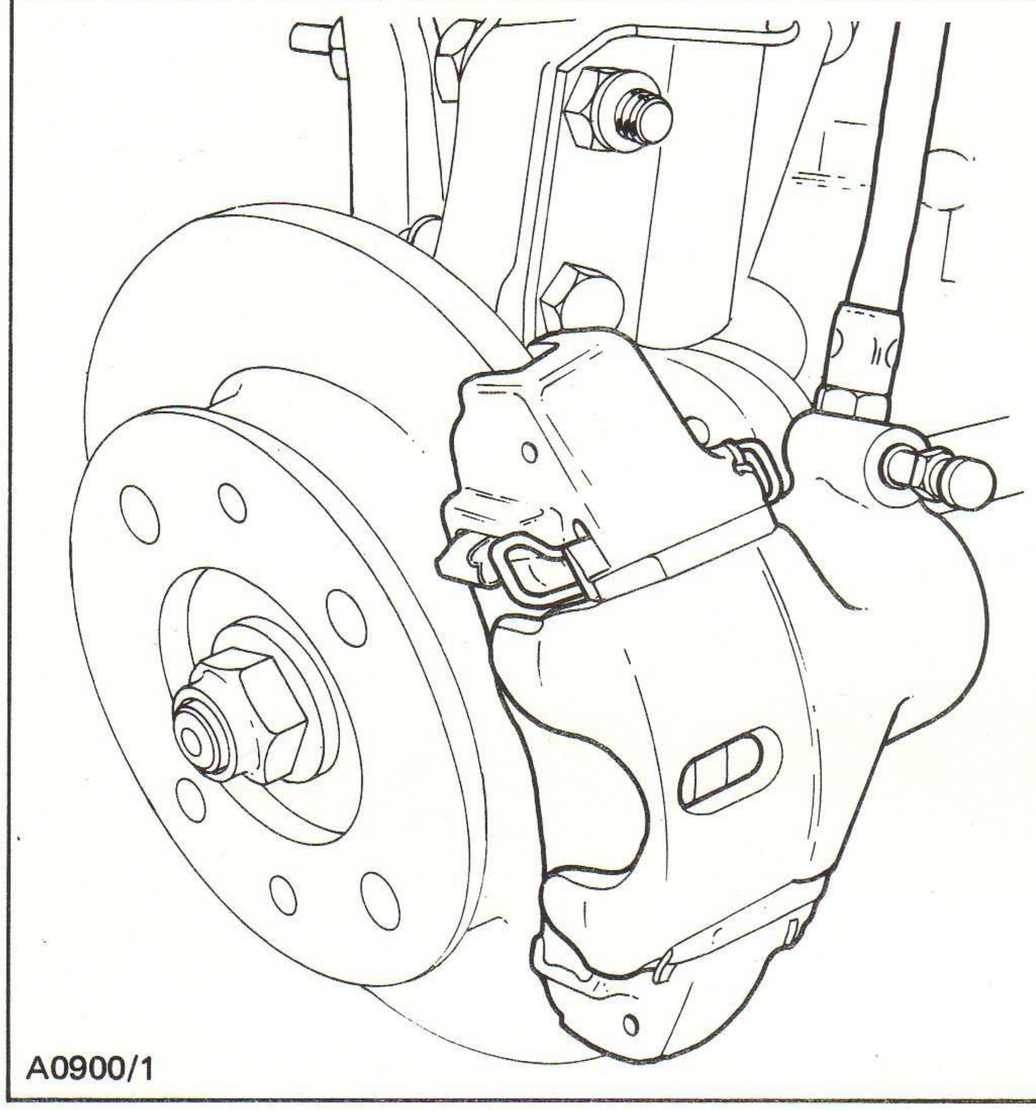
1. DUST CAP
2. BLEEDSCREW
3. CYLINDER BODY
4. SEALING RING
5. PISTON
6. DUST COVER
7. DISC PADS
8. CALIPER SPRING
9. GUIDE
10. SPLIT PIN
11. BRACKET
12. PAD SPRING

AO898

XD 48 caliper

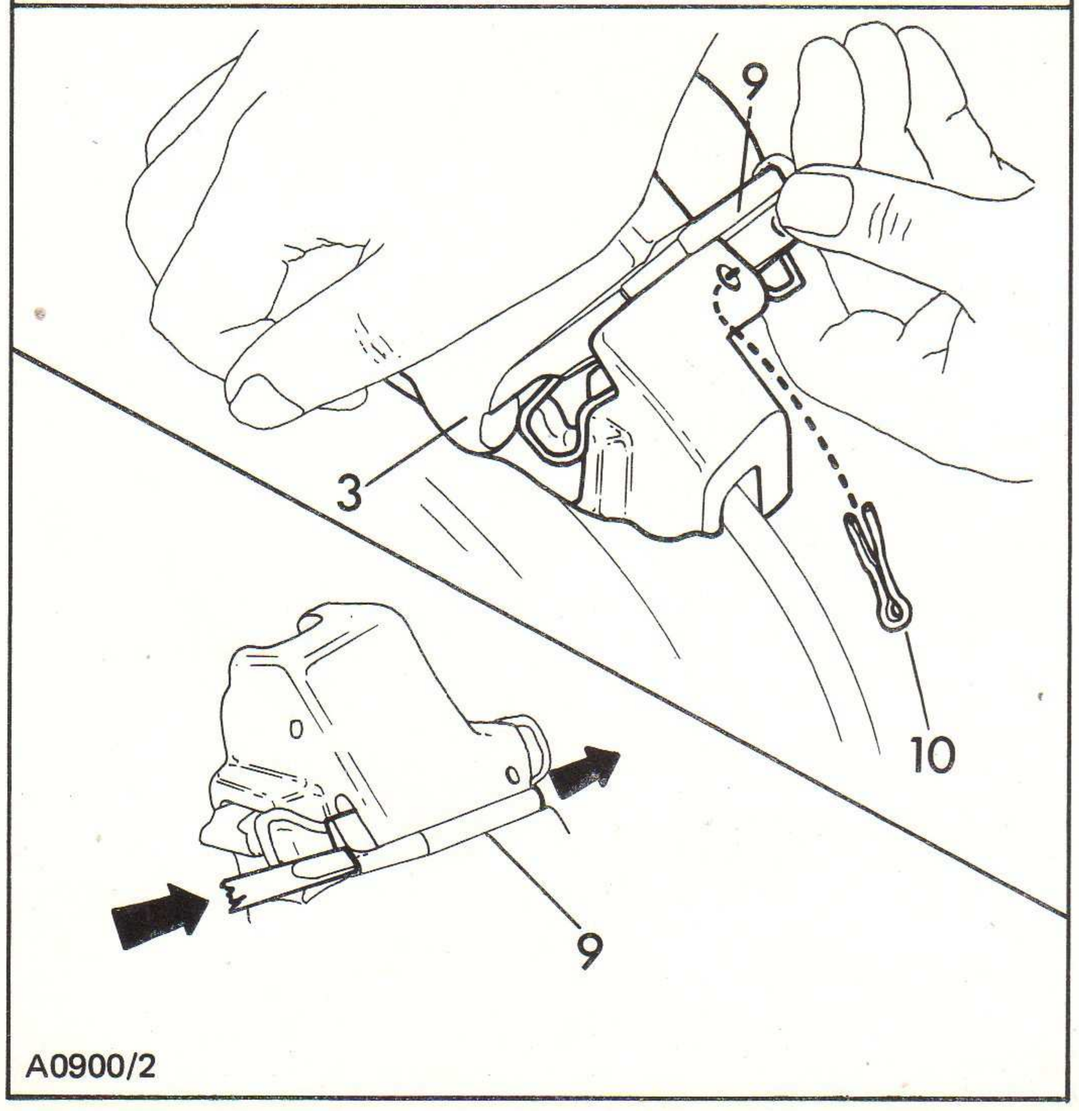
disc brakes

4 Wash down the caliper with Girling Cleaning Fluid. DO NOT USE PETROL, PARAFFIN OR OTHER MINERAL BASED FLUIDS. THESE ARE DANGEROUS TO HYDRAULIC COMPONENTS. Remove excessive road dirt with a wire brush.



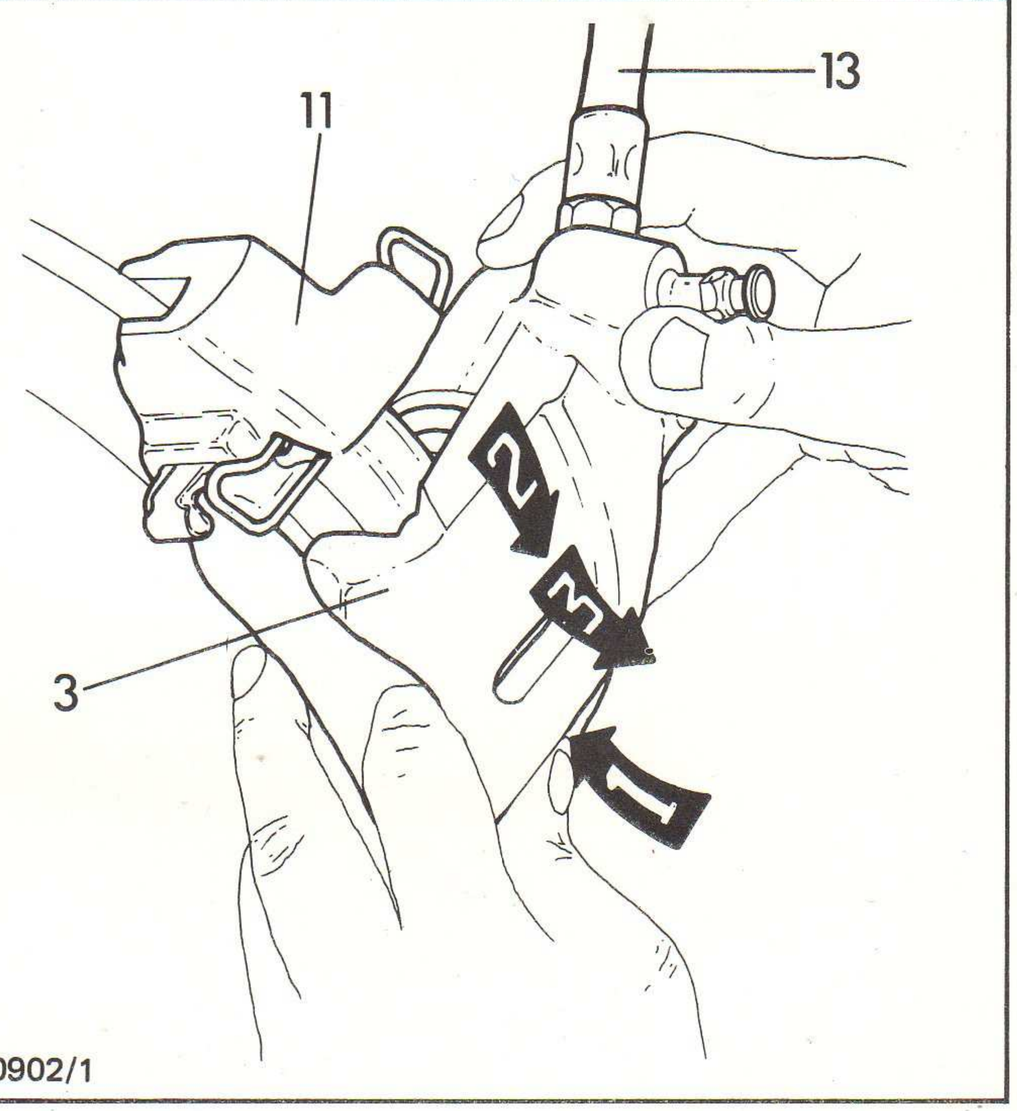
A0900/1

5 Remove the split pins (10). Push down on the cylinder body (3) to remove the guides (9). If necessary, drift out the guides using a soft metal drift. CARE MUST BE TAKEN NOT TO DAMAGE THE END FACE OF THE GUIDE AS THIS MAY SUBSEQUENTLY DAMAGE THE SLIDING SURFACES OF THE CYLINDER AND BRACKET. Examine the guides for signs of wear or damage and replace if necessary.



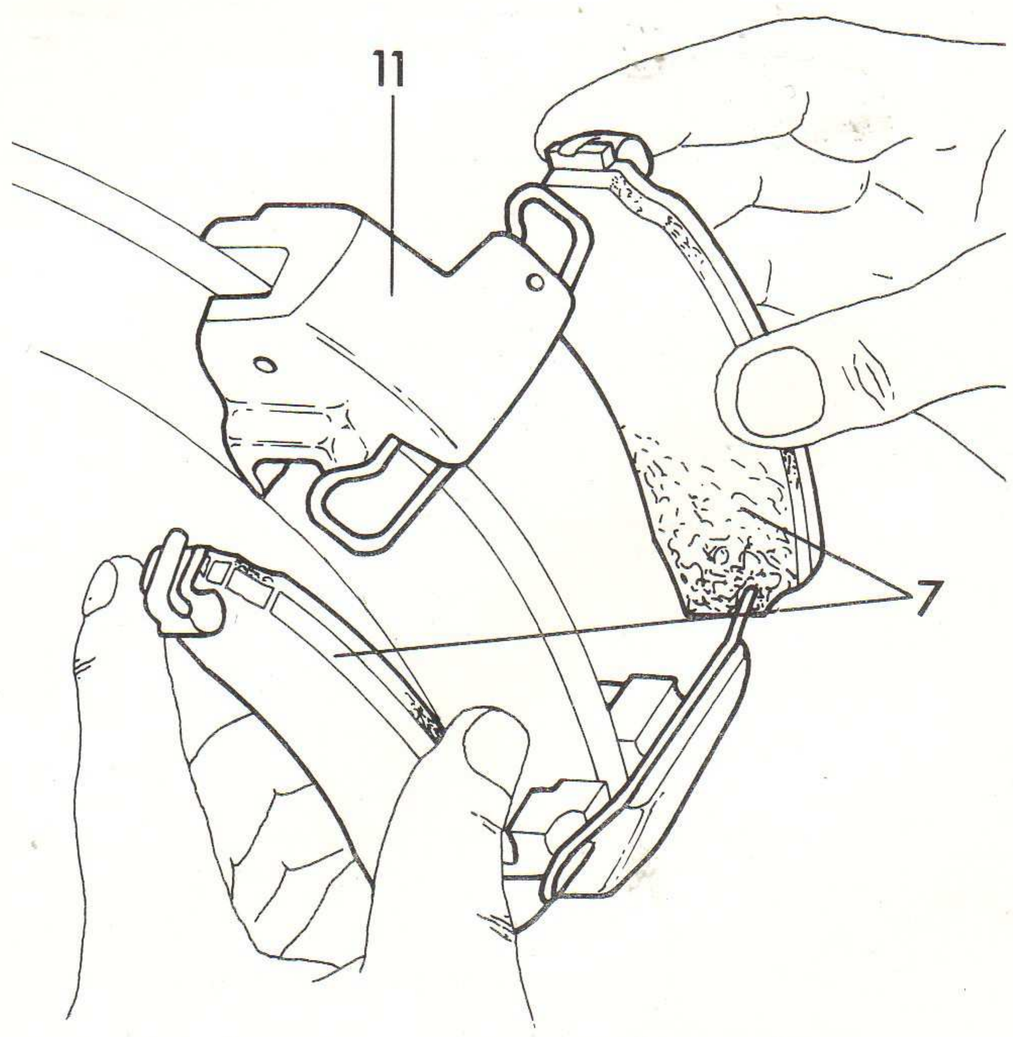
A0900/2

6 To remove the cylinder body (3) from the bracket (11), push down on one end of the body then lift the other end clear. SUPPORT THE CYLINDER TO PREVENT STRAIN ON THE FLEXIBLE HOSE (13).



A0902/1

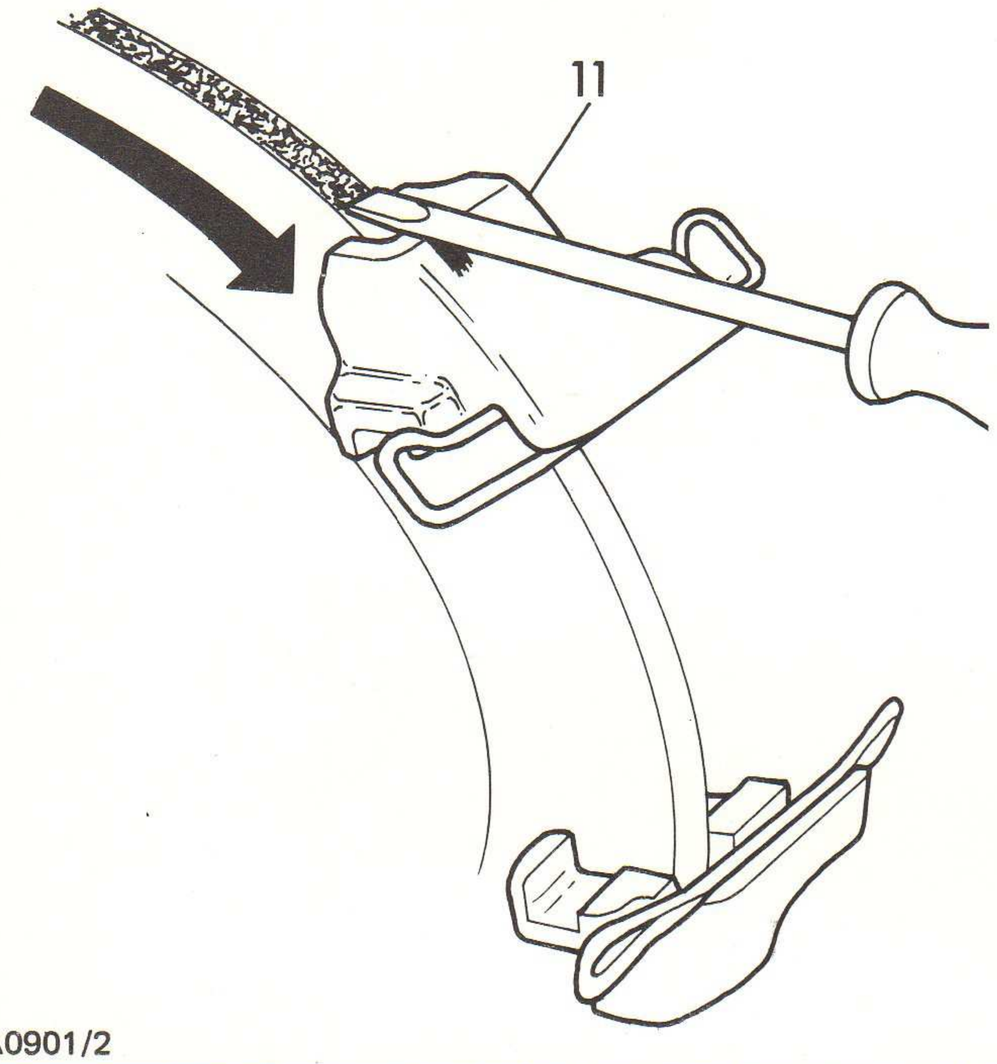
7 Slide out pads (7) clear of bracket (11).



A0901/1

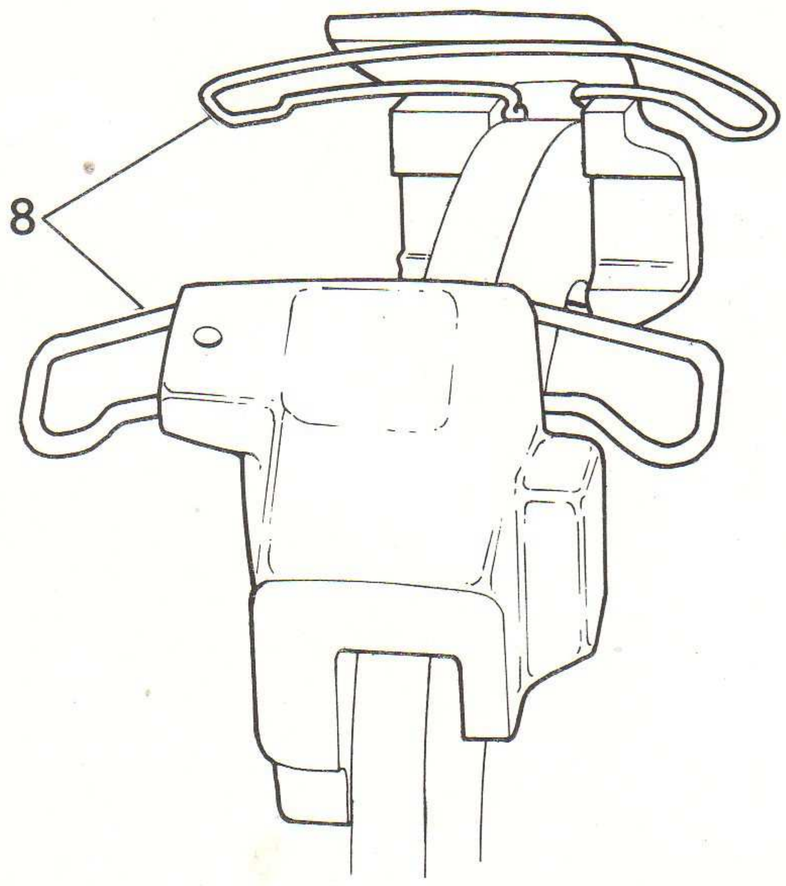
XD 48 caliper

8 Examine the disc for signs of wear, damage or corrosion. Remove scale and rust by supporting a scraper on the bracket (11) and rotating the disc. Complete the cleaning operation with emery-cloth. If the condition of the disc gives cause for doubt it is best to fit a new disc.



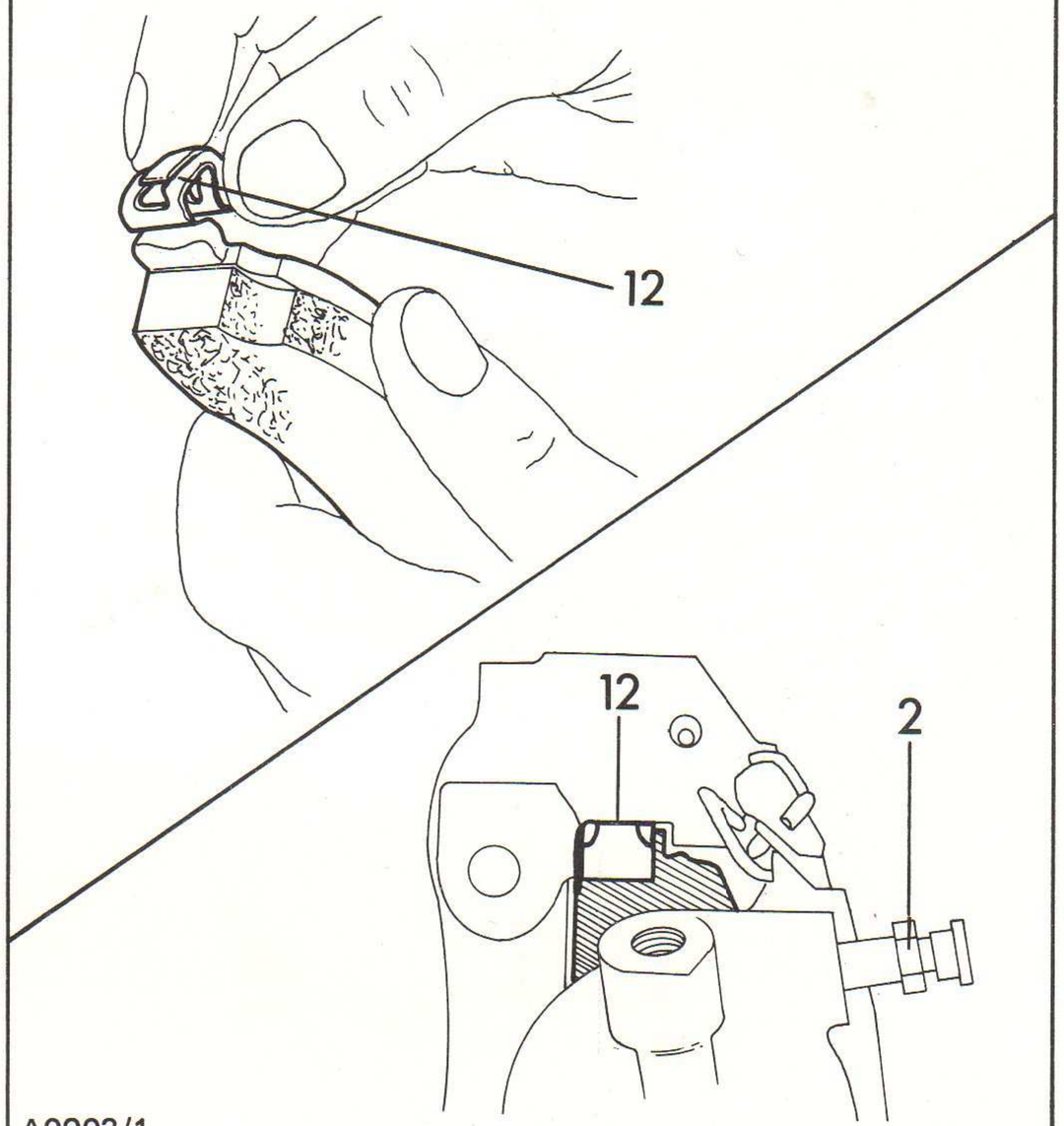
A0901/2

9 Use a suitable wire brush to remove dirt or signs of corrosion from the sliding surfaces of the cylinder (3) and bracket (11). MATERIAL REMOVAL MUST BE AVOIDED IF THE TOLERANCES BETWEEN THE CYLINDER AND BRACKET ARE TO BE MAINTAINED WITHIN DESIGN LIMITS. Complete the cleaning operation by washing the parts with Girling Cleaning Fluid. Check the caliper springs (8) are in good condition. If necessary replace as shown on picture 22.



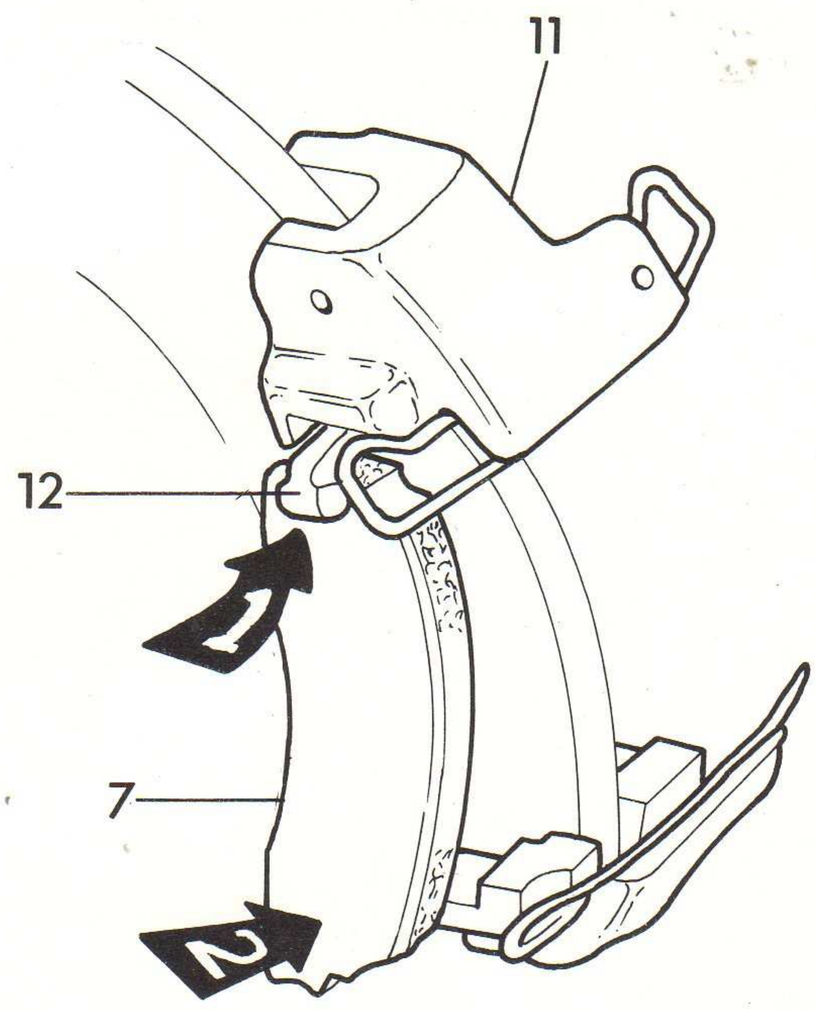
A0902/2

10 The pad springs (12) locate on the edge of the pads fitted nearest to the bleedscrew (2). Fit as shown.



A0903/1

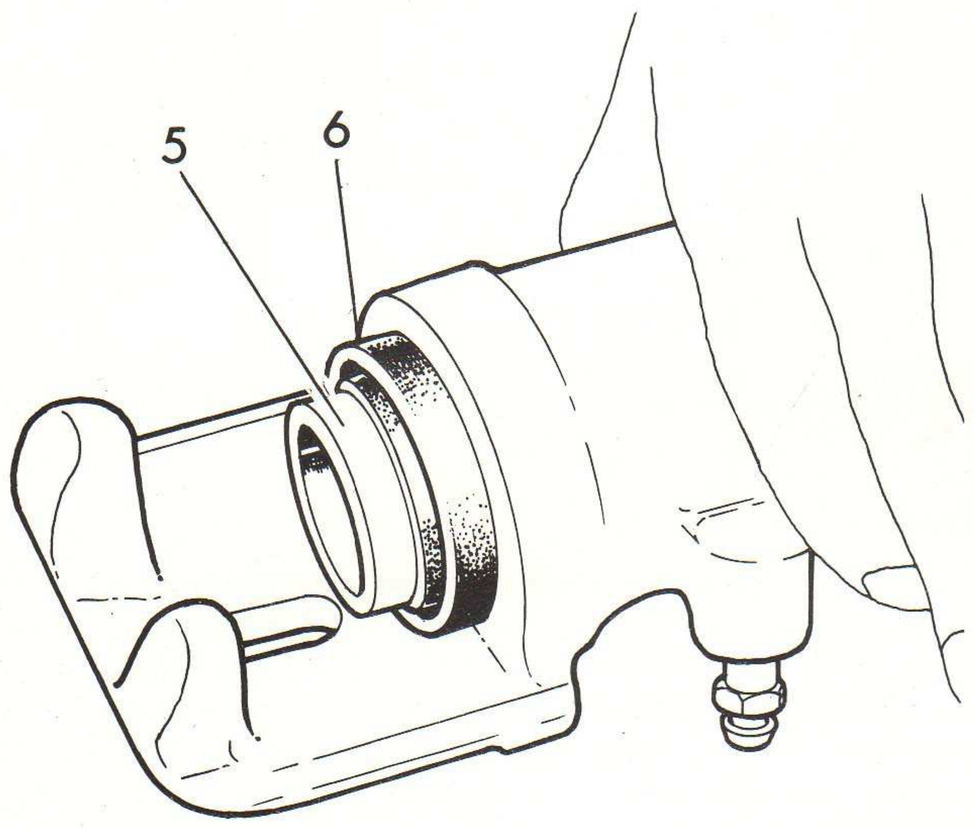
11 Taking care not to damage the tongues of the pad springs (12), fit the pads (7) into position on the bracket (11).



A0904/1

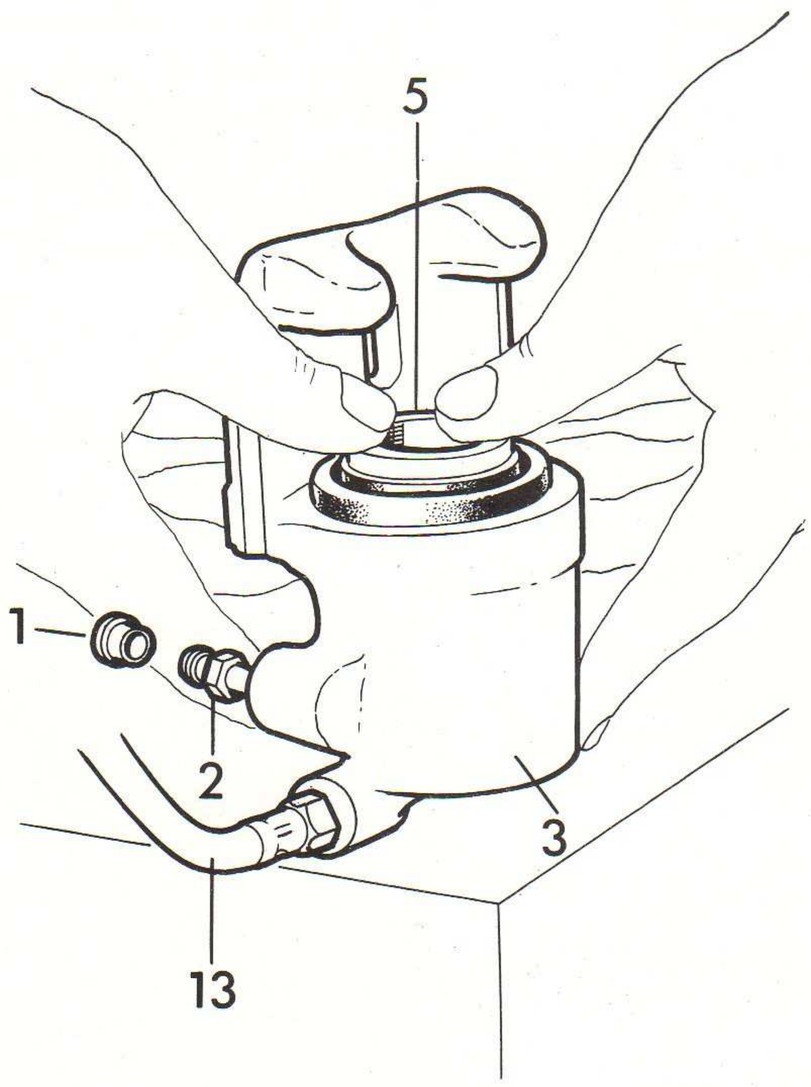
XD 48 caliper

12 Examine the dust cover (6) on the piston (5) for signs of damage. If damaged or cracked, inspect the piston for signs of corrosion and, if evident, fit a new piston and sealing ring (4). NO ATTEMPT SHOULD BE MADE TO CLEAN UP A CORRODED OR SEIZED PISTON. If the piston is in good working order and not corroded, fit a new dust cover.



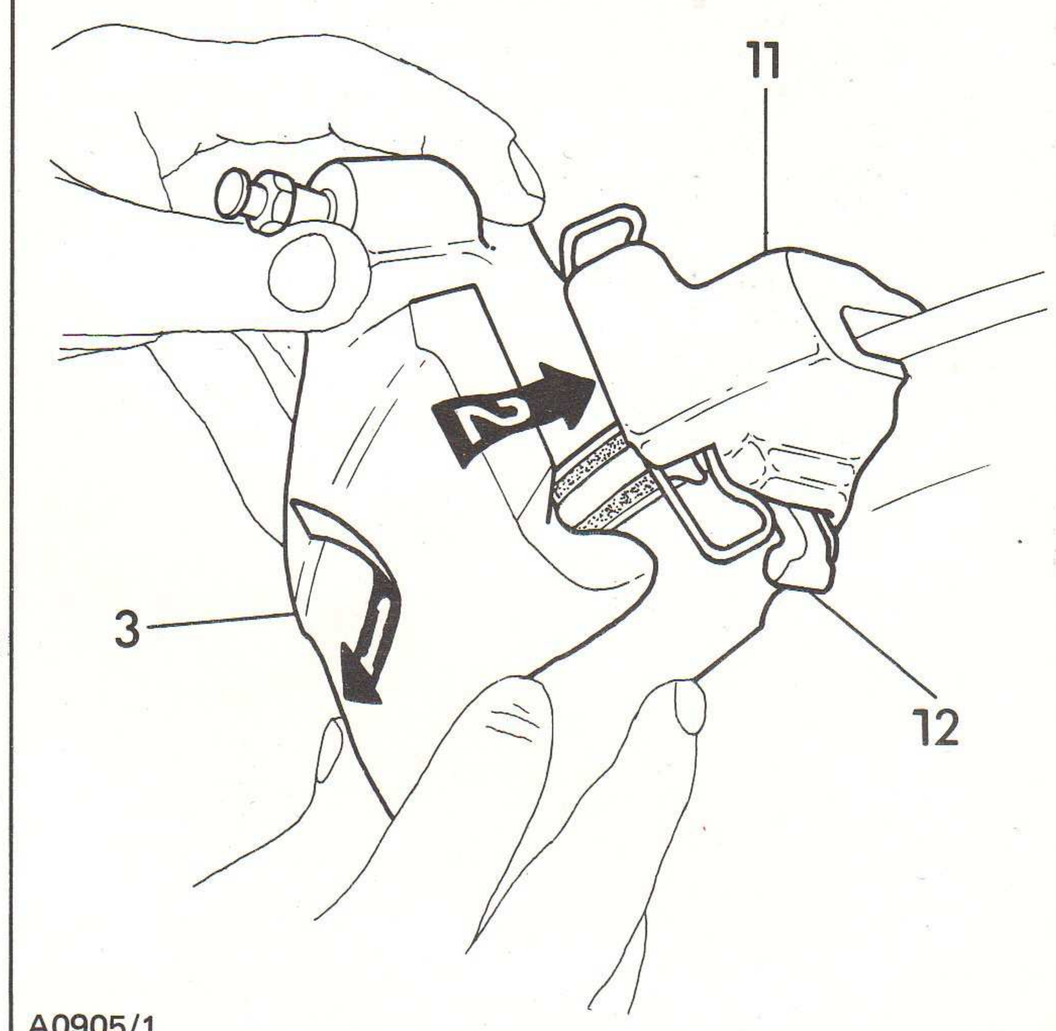
A0904/2

13 Remove the dust cap (1) and loosen the bleedscrew (2). Ensure the cylinder (3) is supported to avoid strain on the hose (13) and push the piston (5) fully back into the cylinder. Tighten the bleed-screw and refit the dust cap.



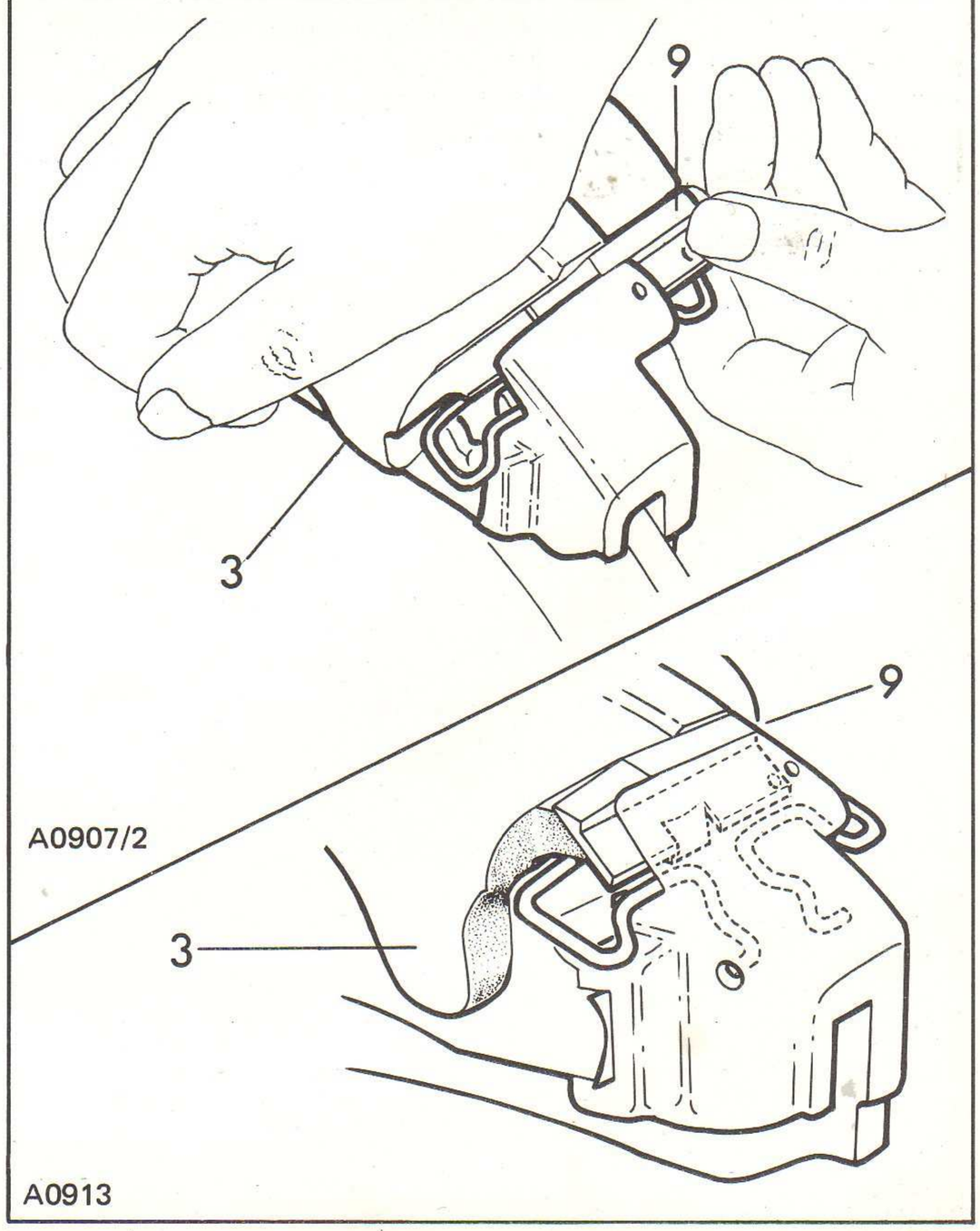
A0906/3

14 Reverse the removal procedure and refit the cylinder body (3) to the bracket (11). Check the pad springs (12) are at the bleedscrew end of the cylinder.



A0905/1

15 Push down on the cylinder body (3) to fit the guides (9). Ensure the holes in the guides align with the holes in the cylinder body. The lower illustration shows the correct fitment of the parts.

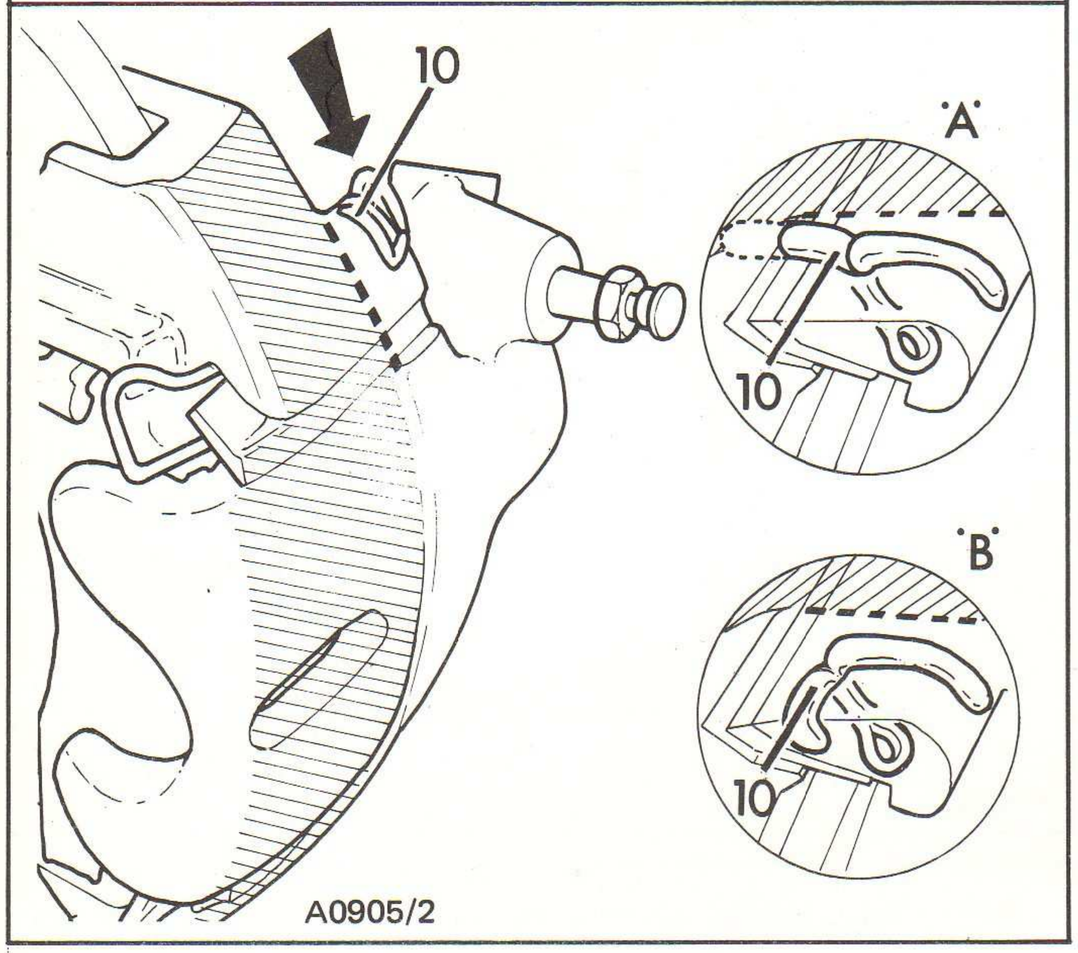


A0907/2

A0913

XD 48 caliper

16 Insert new split pins (10) through the holes in the cylinder body and guides and bend over the ends as indicated. IT IS ESSENTIAL THE PINS ARE FITTED AS SHOWN 'A' OR 'B' AND ARE SECURE. LOOSELY FITTED PINS MAY WORK LOOSE AND MOVE INTO THE SWEPT (SHADED) PATH OF THE WHEEL, WHICH DUE TO THE VERY SMALL TOLERANCE BETWEEN WHEEL AND CYLINDER CAN RESULT IN THE SPLIT PIN LEG BEING SHEARED OFF, RESULTING IN LOSS OF THE GUIDE AND POSSIBLE BRAKE FAILURE.

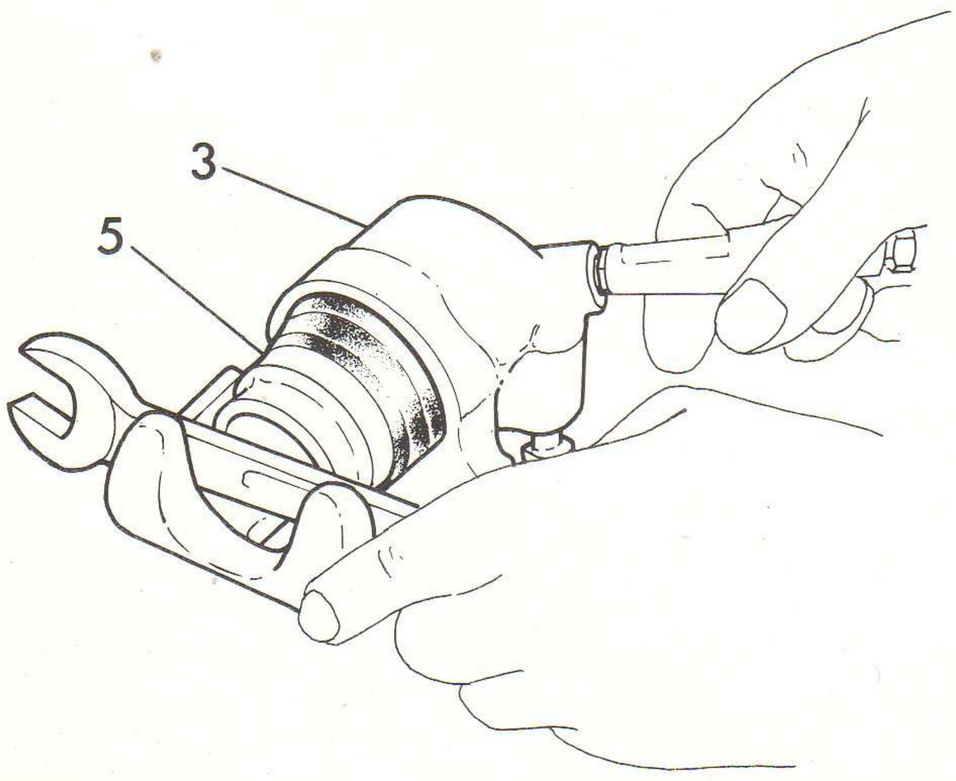


A0905/2

Cylinder Maintenance

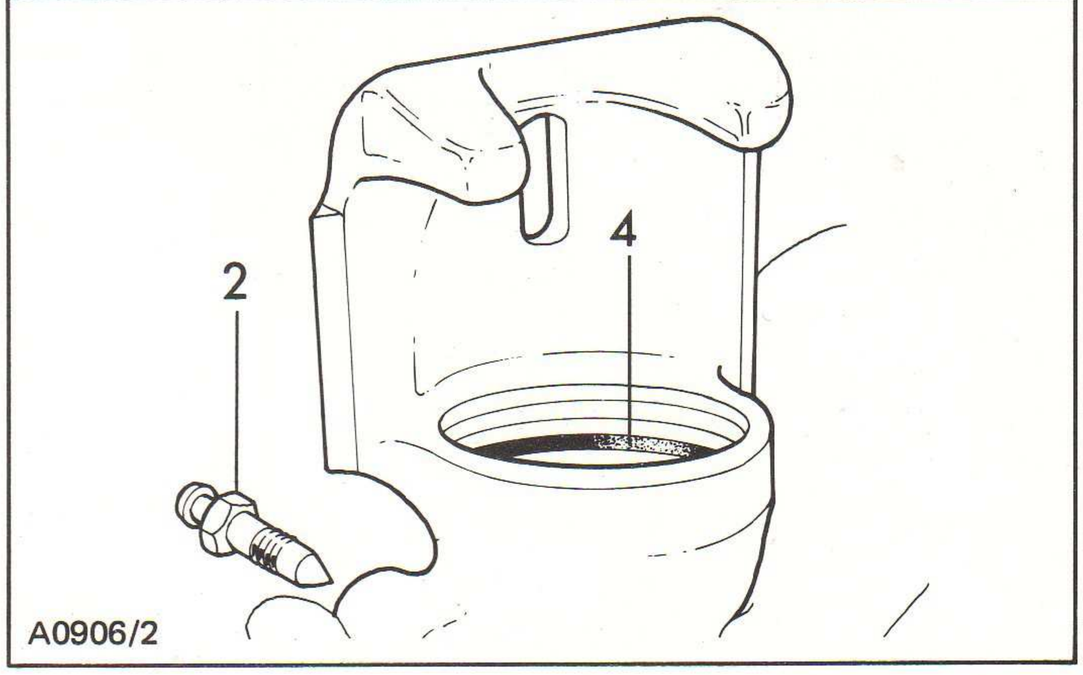
To service the piston and cylinder, proceed as described in operations 4 to 12, but disconnect the flexible hose connecting the cylinder to the bracket on the vehicle (picture No.6) then remove the hose from the cylinder. With the cylinder on the workbench proceed as follows:—

17 Position a spanner as shown and carefully eject the piston (5) from the cylinder (3) with compressed air pressure.



A0906/1

18 Unscrew the bleedscrew (2) and taking care not to damage the internal surfaces, remove the sealing ring (4).



A0906/2

Cleaning

Examine all parts for signs of wear, damage and corrosion. Particular attention should be paid to the piston and cylinder bore. Also ensure the sliding surfaces of the cylinder body are smooth and free from corrosion. If necessary, remove corrosion with a wire brush or wire-wool, but material removal must be avoided if the tolerances between the body and carrier are to be maintained within design limits.

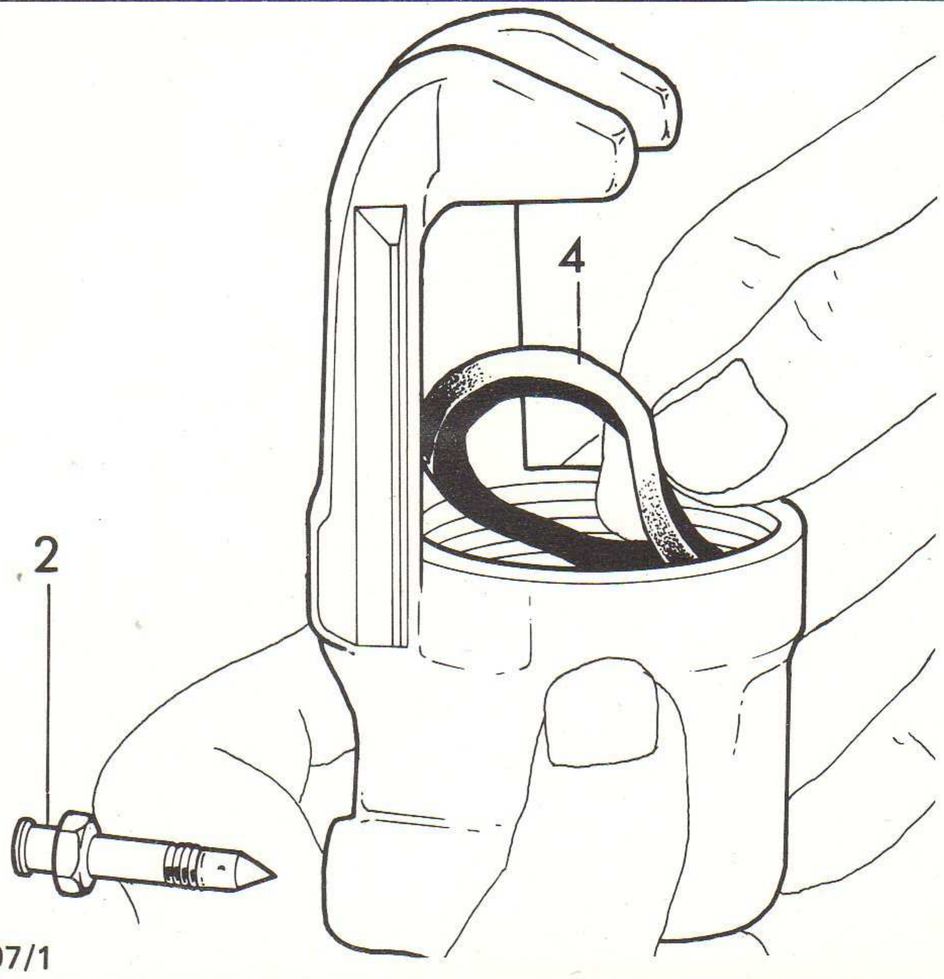
All parts must be in good working order and where doubt exists new parts should be fitted.

Clean all parts with Girling Cleaning Fluid or unused Castrol-Girling Universal Brake Fluid.

Using the new parts from the relevant Girling Service Kit, reassemble the unit.

Reassembly

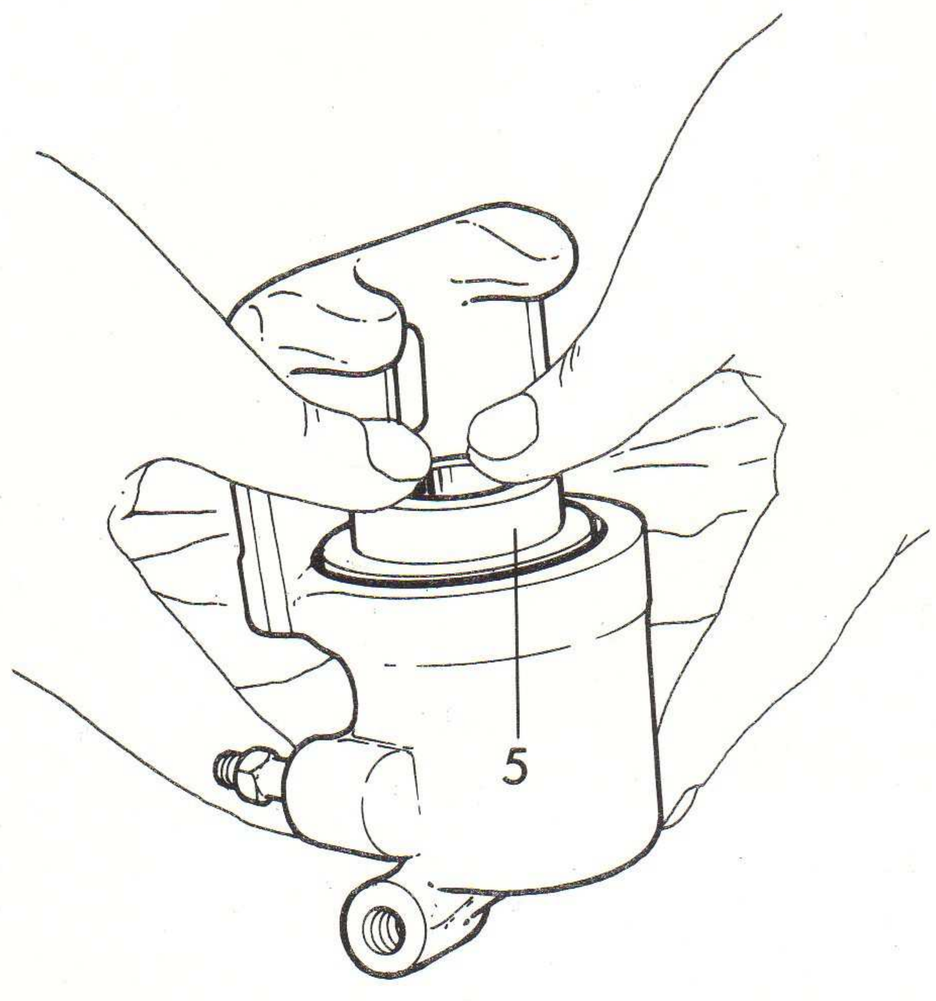
19 Lubricate the new sealing ring (4) with unused Castrol-Girling Universal Brake Fluid and fit into the groove in the cylinder bore. Screw in bleedscrew (2) but do not overtighten.



A0907/1

XD 48 caliper

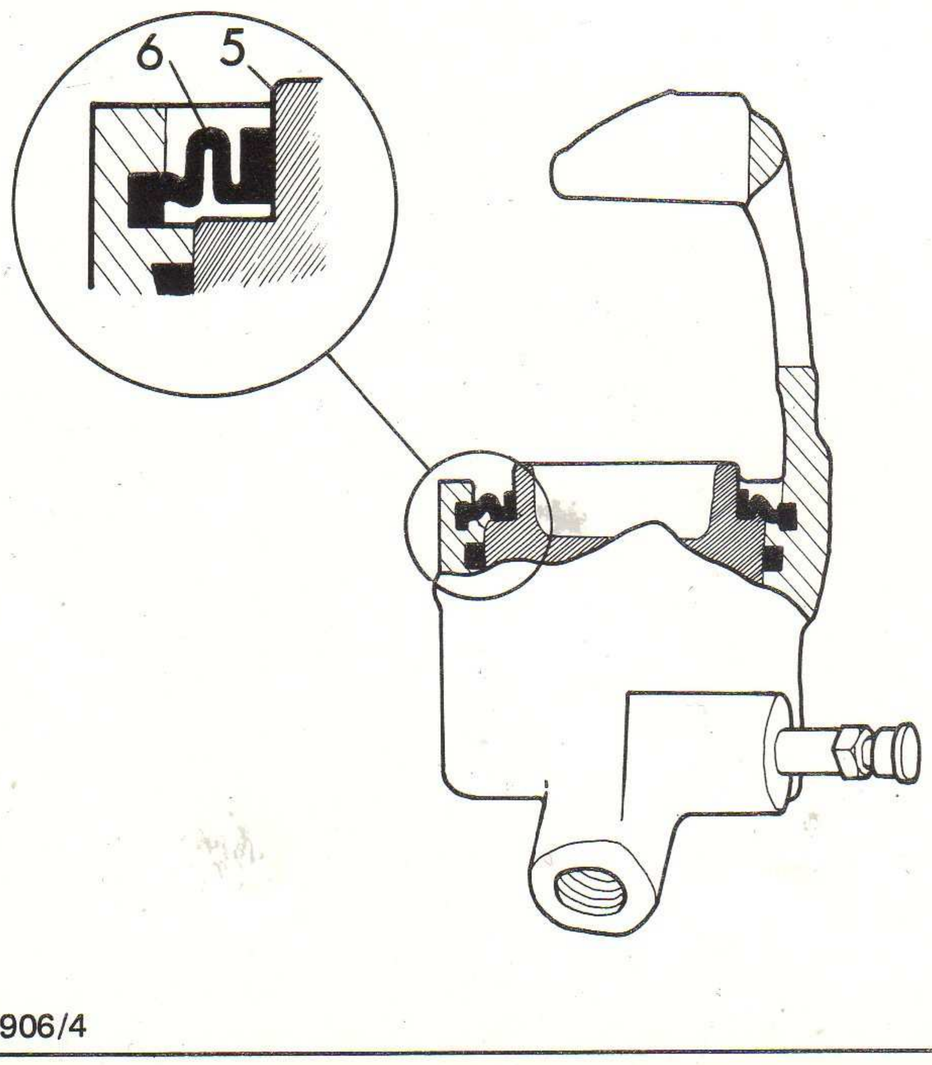
20 Lubricate the piston (5) and sealing ring (4) with unused Castrol-Girling Universal Brake Fluid and press the piston fully into the cylinder.



A0903/2

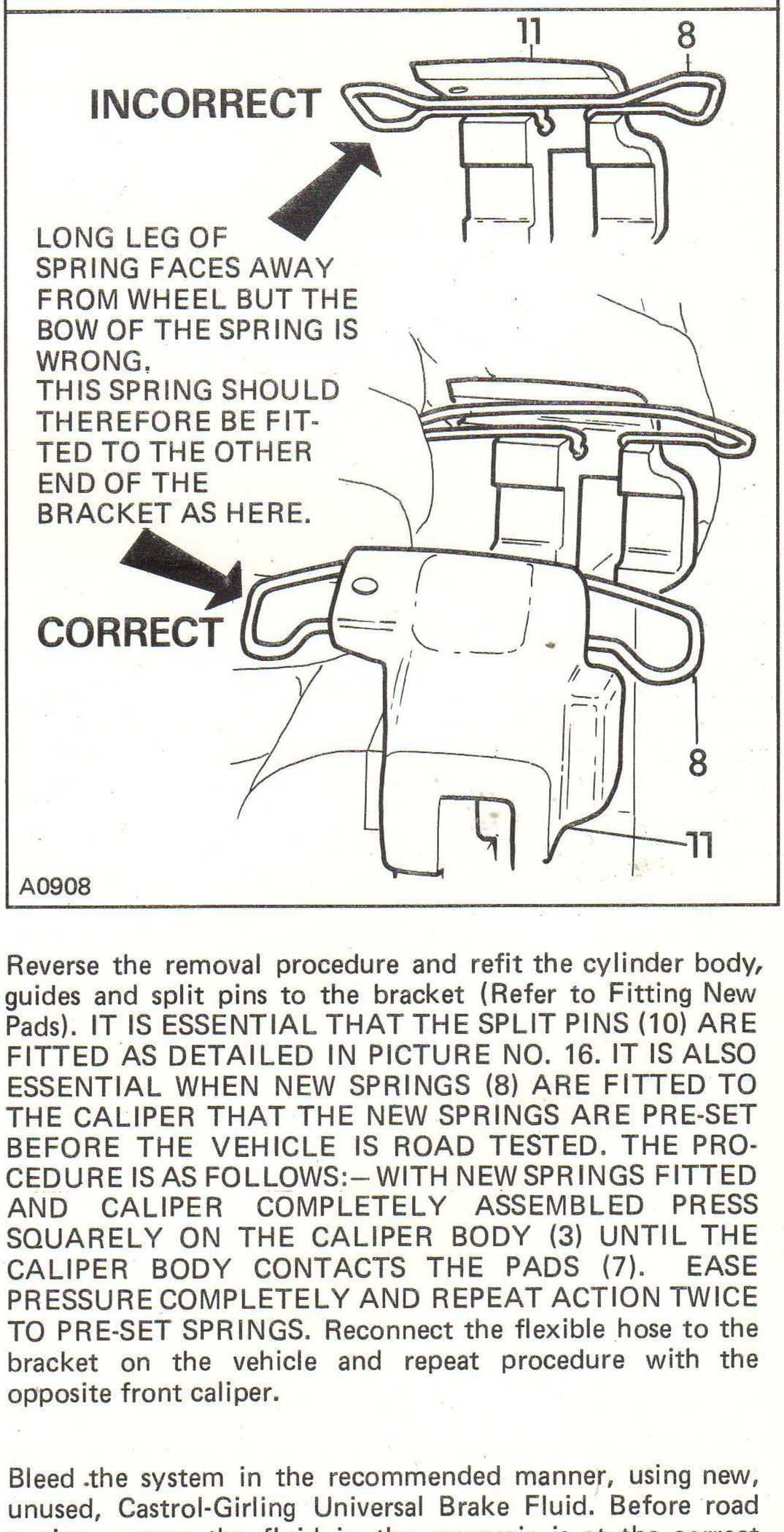
21 IT IS ESSENTIAL THE DUST COVER (6) IS FITTED CORRECTLY AND REFERENCE SHOULD BE MADE TO THE SECTION VIEW SHOWN ON THE INSET.

Lubricate the sealing areas of the dust cover (6) with Girling Rubber Grease. Fit the cover to the piston (5) then ease the cover into its location groove in the cylinder. When fitted correctly the piston and dust cover should look like this.



A0906/4

22 To replace the caliper springs (8) it is necessary to remove the bracket (11) from the vehicle. NOTE THE WAY THE SPRINGS ARE FITTED, I.E. WITH THE BOW OF THE SPRING HIGH AT THE CENTRE AND DOWN AT THE ENDS AND WITH THE LONGER SIDE OF THE SPRING FACING AWAY FROM THE WHEEL. Remove the bracket from the vehicle and clamp in a bench vice as illustrated. Press one end of the spring inwards to release the spring leg from its location in the hole in the bracket. Free the other spring leg in a similar manner. Repeat with the second spring. ENSURE THE SLIDING SURFACES OF THE BRACKET ARE CLEAN AND IN GOOD CONDITION—REFER TO CLEANING, PAGE 2A15f Reverse the removal procedure and refit the bracket to the vehicle.



A0908

Reverse the removal procedure and refit the cylinder body, guides and split pins to the bracket (Refer to Fitting New Pads). IT IS ESSENTIAL THAT THE SPLIT PINS (10) ARE FITTED AS DETAILED IN PICTURE NO. 16. IT IS ALSO ESSENTIAL WHEN NEW SPRINGS (8) ARE FITTED TO THE CALIPER THAT THE NEW SPRINGS ARE PRE-SET BEFORE THE VEHICLE IS ROAD TESTED. THE PRO-CEDURE IS AS FOLLOWS:—WITH NEW SPRINGS FITTED AND CALIPER COMPLETELY ASSEMBLED PRESS SQUARELY ON THE CALIPER BODY (3) UNTIL THE CALIPER BODY CONTACTS THE PADS (7). EASE PRESSURE COMPLETELY AND REPEAT ACTION TWICE TO PRE-SET SPRINGS. Reconnect the flexible hose to the bracket on the vehicle and repeat procedure with the opposite front caliper.

Bleed the system in the recommended manner, using new, unused, Castrol-Girling Universal Brake Fluid. Before road testing, ensure the fluid in the reservoir is at the correct level and pump the pedal until a solid resistance is felt to reposition the pads against the disc. Check all new and disturbed connections for leakage and road test.

Girling Janette type caliper 2A17a

Introduction

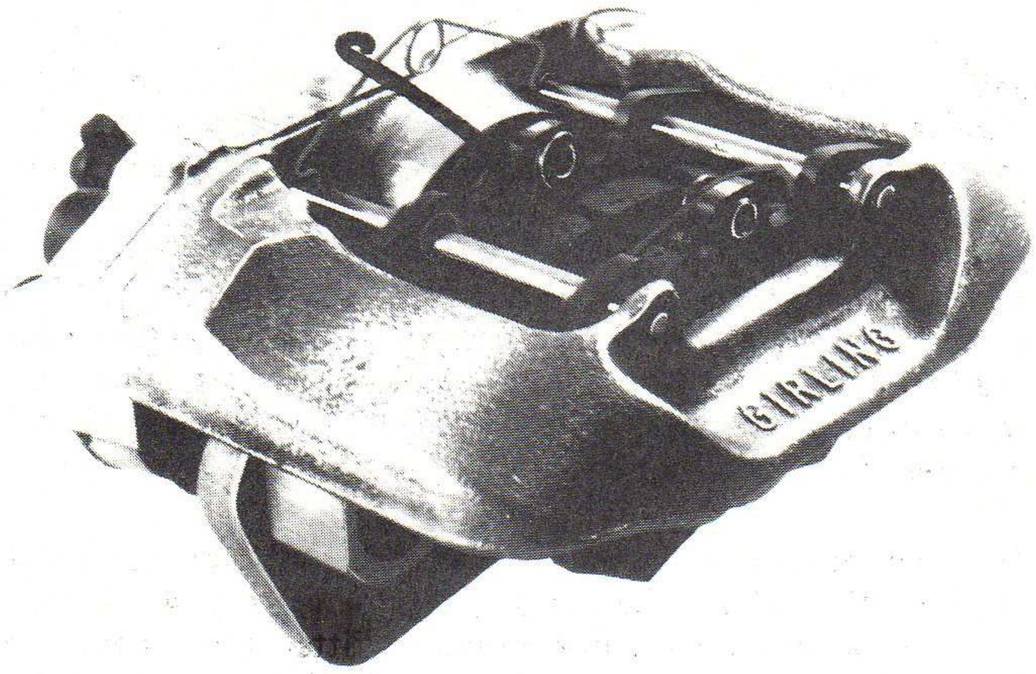
The J.48 caliper Fig. 1 is a pin slider type caliper designed for front wheel applications. It consists of three main components, a cast bridge piece, carrier and cast alloy body which, together with the abutment blocks and guide pins, are all bolted together. Fig. 2.

The caliper is aligned when assembled at the factory and must under no circumstances be dismantled. The guide pins are sealed against water or dirt ingress by dust covers, thereby avoiding possible unequal sliding loads caused by corrosion. Inboard pad torque is taken by abutment blocks bolted to the carrier. Outboard pad torque is taken by the bridge. The pads are located by pins holding down integral pad springs. The pins are held in place by a spring clip which also serves to guide the pad wear warning indicator wire (s) (if fitted).

The caliper works in the following manner. When the footbrake is applied, the hydraulic pressure created pushes the piston and with it the inboard pad onto the disc. The body reacts and slides on the guide pins to bring the out-board pad into contact with the disc. The pressure on both sides of the disc is then equal. Fig. 3

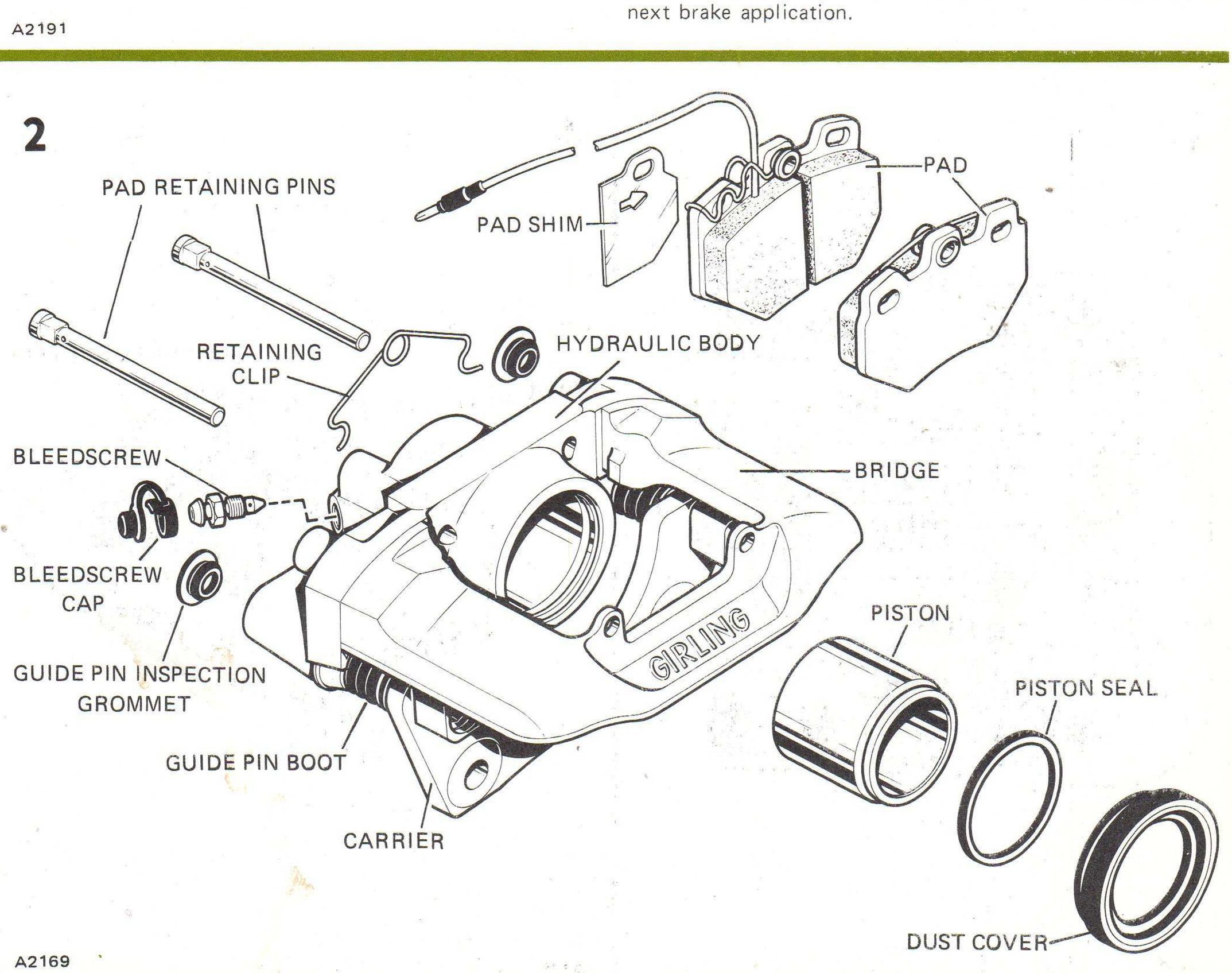
When the hydraulic pressure is released, the piston seal fitted in the wall of the cylinder retracts the piston a small amount, which allows the moving parts to relax sufficiently for the disc pads to remain in close proximity to the disc ready for the next brake application.

1



A2191

2



A2169

Girling Janette type caliper

Servicing

To maintain the efficiency of the braking system, preventive maintenance is essential and the following recommendation should be observed at the intervals stated. Full details of preventive maintenance are incorporated in Section 1, Page 1A1.

1. Check the pads for wear every 5,000 miles (8,000km) and fit new pads when the lining thickness has worn to 1/8" (3 mm). If electrical wear indicators are incorporated the examination should be unnecessary.

2. Every 10,000 miles (16,000 km) examine all brake pipes, and flexible hoses for corrosion, fretting and signs of damage. Renew suspect parts and take action where applicable to prevent a recurrence of the trouble.

3. Change brake fluid every eighteen months.

4. Every 40,000 miles (64,000 km) or three years whichever occurs first the caliper should be overhauled. All other hydraulic parts on the vehicle should also be replaced or overhauled and new hydraulic hoses should be fitted.

Fitting New Pads

When the lining has worn to 1/8" (3 mm) or if the electrical pad wear indicator bulb on the instrument panel lights up, the pads should be replaced. Always fit new pads in axle sets.

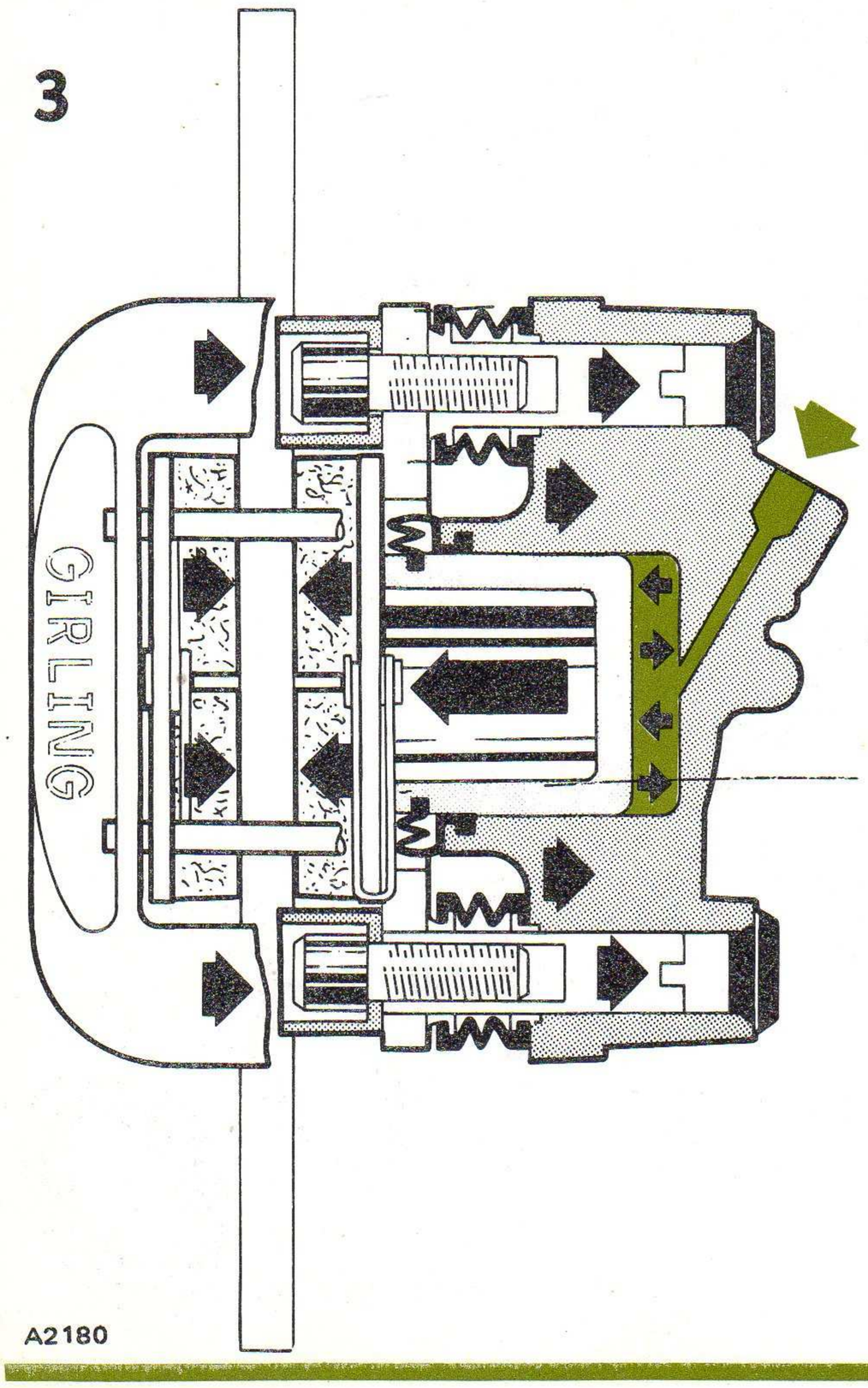
WARNING: DO NOT USE AN AIR LINE TO BLOW DUST FROM THE BRAKE. IF INHALED ANY FORM OF DUST CAN BE AT BEST AN IRRITANT, AT WORST DANGEROUS WHEREVER POSSIBLE REMOVE DRY DUST WITH A VACUUM BRUSH. ALTERNATIVELY, WIPE THE BRAKE WITH A DAMP RAG BUT NEVER TRY TO ACCELERATE THE DRYING TIME BY USING AN AIR LINE.

Jack up the car. Ensure the vehicle is safely supported and remove the front wheels. Push back the piston as far as possible, by pulling the body assembly towards you. Ensure sufficient capacity exists in the reservoir to accommodate the displaced fluid. If it is found necessary to open the bleedscrew, to allow fluid to be pushed out from behind the piston, first attach a bleed tube to the bleedscrew, putting the open end of the bleed tube in a clean jar to catch the expelled fluid. Never re-use old brake fluid. Close the bleedscrew once the piston has been pushed fully back.

Remove the pad retaining pins clip and withdraw the pad retaining pins from the caliper assembly Fig. 4 Disconnect the pad wear indicator wire(s) if fitted then remove the pads, paying attention to the anti-squeal shim fitted to back of the pad on the piston side.

Thoroughly clean the pad abutment areas, avoiding damage to the piston and piston dust covers. If the piston dust cover is damaged it must be replaced.

3



A2180

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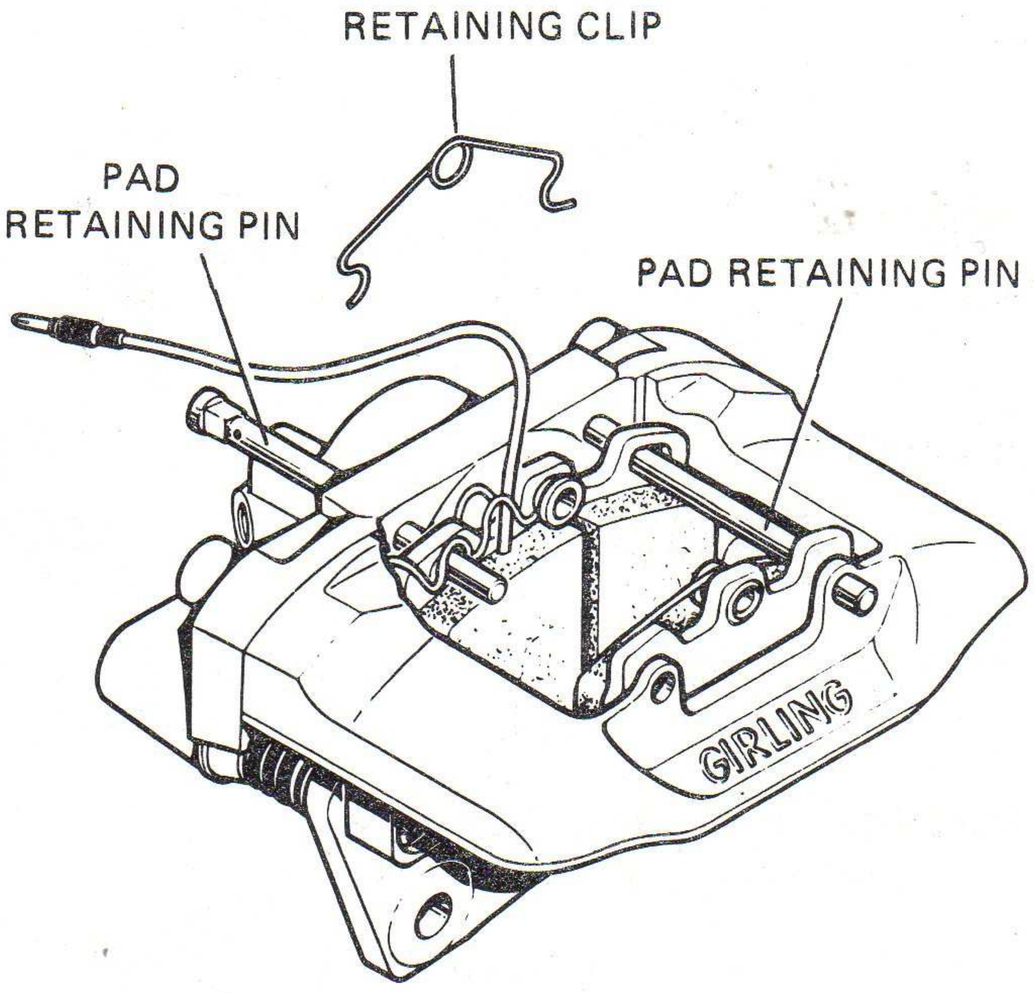

A2176

Girling Janette type caliper 2A|17.c

Pad springs are fitted as an integral part of each pad. No attempt should be made to remove or replace these springs. If a spring is found to be faulty a new pad, complete with spring should be fitted.

No attempt should be made to remove guide pins or abutment blocks as they are assembled and jig aligned at the factory. If the guide pins are worn in any way a new caliper assy must be fitted.

IMPORTANT: DO NOT ATTEMPT TO SEPARATE THE BRIDGE FROM THE CYLINDER BODY.

To check guide pins remove the pads (see relevant section) and slide the body and bridge slowly backwards and forwards on the guide pins. They should slide smoothly with no rough spots. Peel back the guide pin boots and remove the rubber plugs in order to check for corrosion or damage Fig. 5. If either is evident a new caliper assy must be fitted.
If the guide pins are in a satisfactory condition clean with a recommended fluid (see cleaning section) and lubricate them with either Molykote III or B.P. Olex 9136 grease. DO NOT USE ANY OTHER GREASE.

WARNING: FREQUENT PROLONGED SKIN CONTACT WITH B.P. OLEX GREASE SHOULD BE AVOIDED.

Fit the guide pin boots over the carrier bracket flanges and pucker the boots to expel any trapped air then fit them over the body flanges. Replace the rubber plugs. Grease the steel shim in the pad kit, on both sides with P.B.C. grease provided.
This shim fits between the piston and pad backing plate Fig. 6. Place the pads and shim into the caliper locating them with the 2 pad retaining pins. The arrow on the shim indicates the direction of forward wheel rotation. Ensure that the correct pad spring is in the correct position. Fig. 6. The outer pad spring should be underneath the retaining pins and the inner pad spring should be hooked onto the upper retaining pin. Fit the pin retaining clip through the holes in the 2 pins. If lining wear indicator(s) are fitted the cables should be routed as shown. Fig. 6.
Pump the brake pedal several times to move the pads to the correct operating position. Bleed the brakes (refer to Section 1D1). Check fluid level and top up if necessary.

IMPORTANT: APPLICATION OF THE BRAKE PEDAL MUST NOT BE OVERLOOKED AS THE BRAKES WILL NOT OPERATE EFFICIENTLY UNTIL THE PADS ARE IN THE CORRECT POSITION.

Refit road wheels, jack down, check footbrake movement and if satisfactory, road test.

NOTE: After fitting new pads care should be taken in braking. Brake gently several times from 80 km/h to 50km/h (50 mph to 30 mph) and only brake fully when the pads have bedded onto the disc. Braking heavily from high speeds and prolonged heavy braking should be avoided for the first 160 km (100m) until the new pads are fully bedded in.

Piston Replacement

Disconnect the flexible hose, from the chassis end first and then from the caliper. Block off the brake pipe at the chassis connection to prevent loss of brake fluid. This can be done

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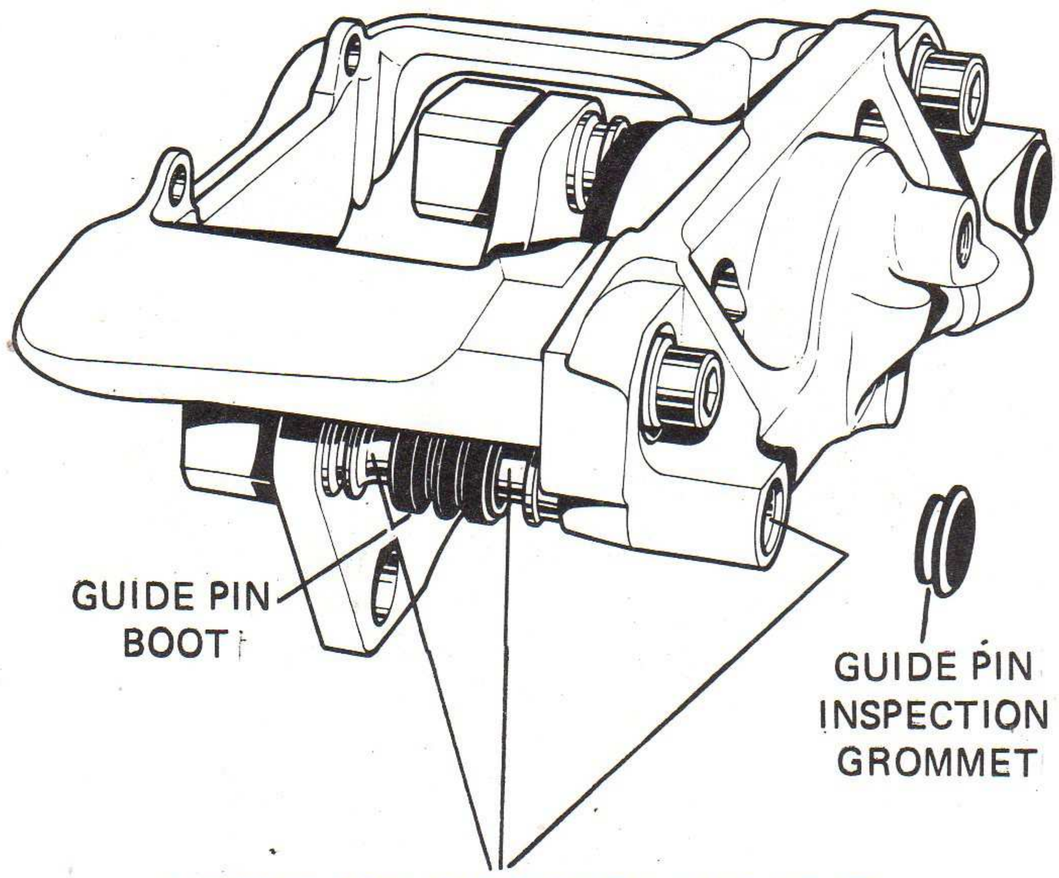

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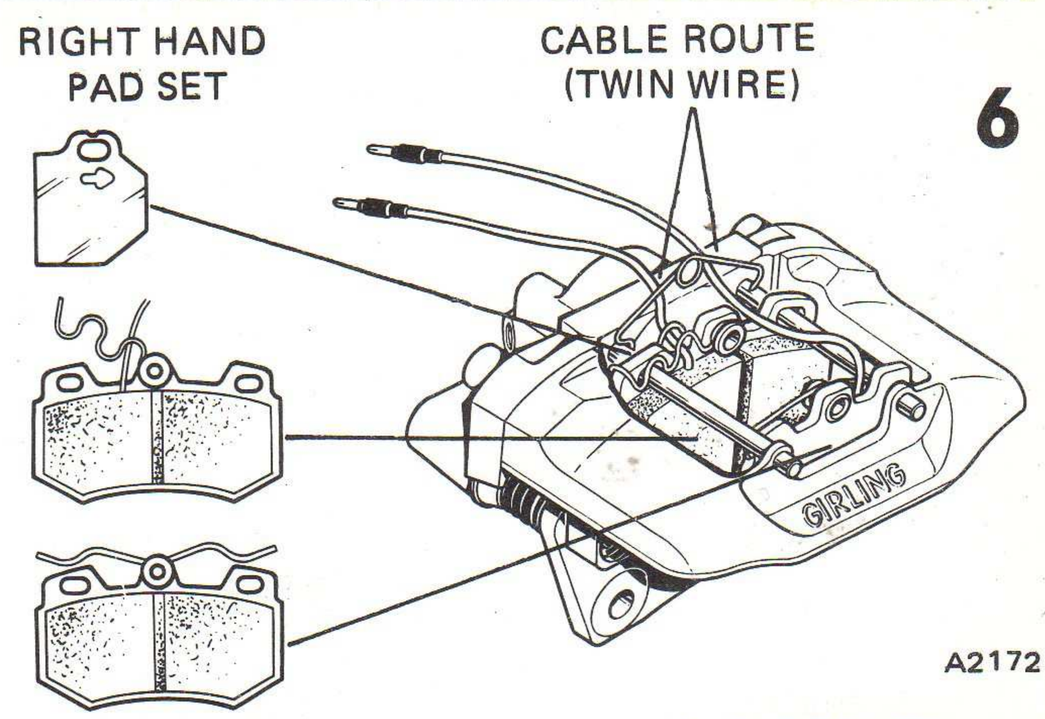

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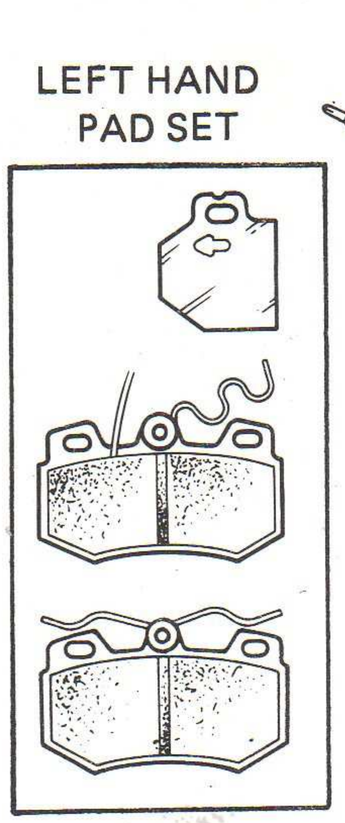

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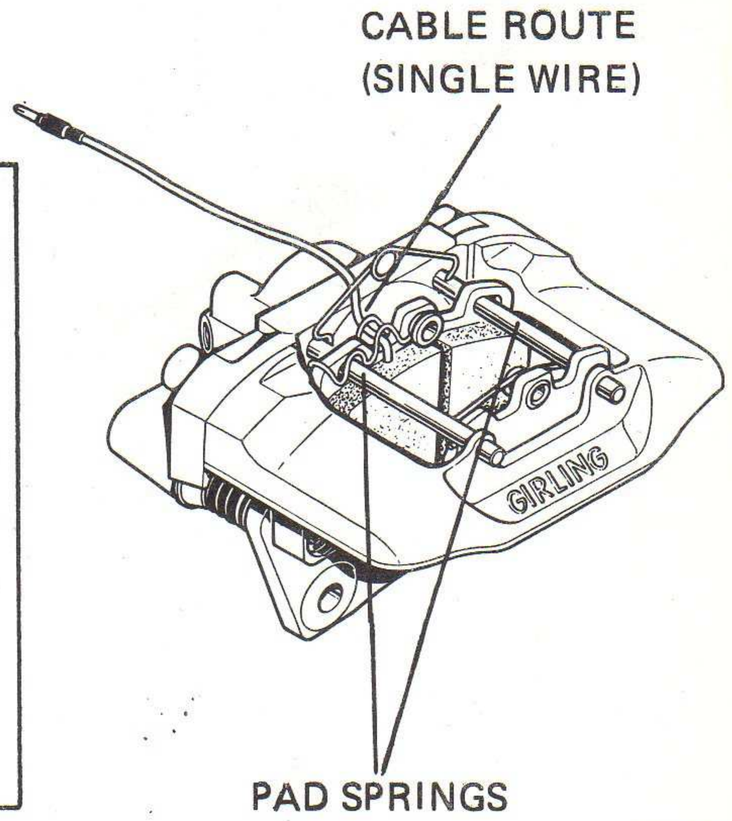

A2173

Girling Janette type caliper

by refitting the hose to the chassis and clamping it off with a Girling hose clamp (Part No. T.3.). Disconnect the pad wear electrical cable(s). Remove the clip, pins and pads from the caliper. Do not mix up the left and right hand assys if they are both removed from the vehicle at the same time.

Eject the piston from the cylinder body by gradually applying compressed air to the inlet port. Use a piece of wood to prevent the piston from being damaged by hitting the bridge Fig. 7 . Keep hands clear. The piston dust cover cannot be removed until the piston has been ejected.

Remove the bleedscrew from the cylinder body and examine carefully the piston bore for signs of damage, scuffing or corrosion.

Cleaning

Clean all parts with Girling Cleaning Fluid or unused Castrol-Girling Universal Brake Fluid.

WARNING: FOR CLEANING PURPOSES USE GIRLING CLEANING FLUID, OR UNUSED CASTROL-GIRLING BRAKE FLUID' FOR FLUSHING OUT CONTAMINATED SYSTEMS USE GIRLING CLEANING FLUID. NO PETROL, PARAFFIN, TRICHLORETHYLENE OR MINERAL FLUID OF ANY KIND SHOULD BE USED. USE ONLY THE RECOMMENDED FLUIDS.

Examine all parts for signs of wear, damage and corrosion paying particular attention to the piston and cylinder bore. Remove body corrosion with a wire brush or wire wool. No attempt should be made to clean up a badly corroded piston. It must be replaced from the appropriate Girling Service Kit.

All parts must be in good working order and where doubt exists new parts should be fitted.
Inspect the guide pins to ensure that they are not corroded or seized in any way within the body Fig. 5 . They must slide freely. If doubt about their condition exists a new caliper assy must be fitted.

Reassembly

Using the parts from a service kit fit a new piston seal in its groove in the cylinder body, lubricate with Girling red rubber grease, unused brake fluid or liberally smear with the seal lubricant where provided in the kit.

DO NOT USE ANY OTHER TYPE OF FLUID OR GREASE.

IMPORTANT: FIT THE BOOT OVER THE PISTON WITH THE CONVOLUTIONS TOWARDS THE PISTON GROOVE FIG. 8 AND OFFER THEM INTO THE CALIPER. PUSH THE BOOT TOWARDS THE MOUTH OF THE BORE GENTLY LOCATING IT INTO THE BORE GROOVE WITH THE END OF THE FINGER WHILST TURNING THE BOOT AND PISTON SIMULTANEOUSLY. Fig. 9 .

IMPORTANT: ENSURE THAT THE PISTON DOES NOT TRAP THE BOOT DURING ASSY AND THAT THE PISTON IS FREE TO MOVE.

Push the piston through the boot into the bore with a Lucas Girling Piston Retraction Tool, Part No. T.2. Fig. 10, then locate the mouth of the boot into the groove on the end of the piston. Finally check that the boot is correctly fitted into piston and bore grooves then push the piston fully home Fig. 11

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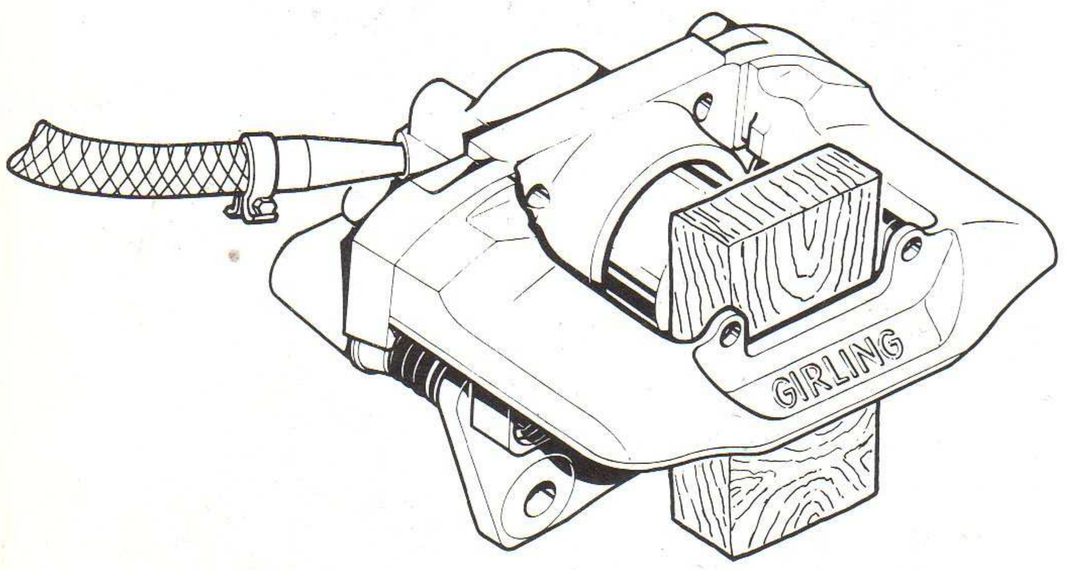

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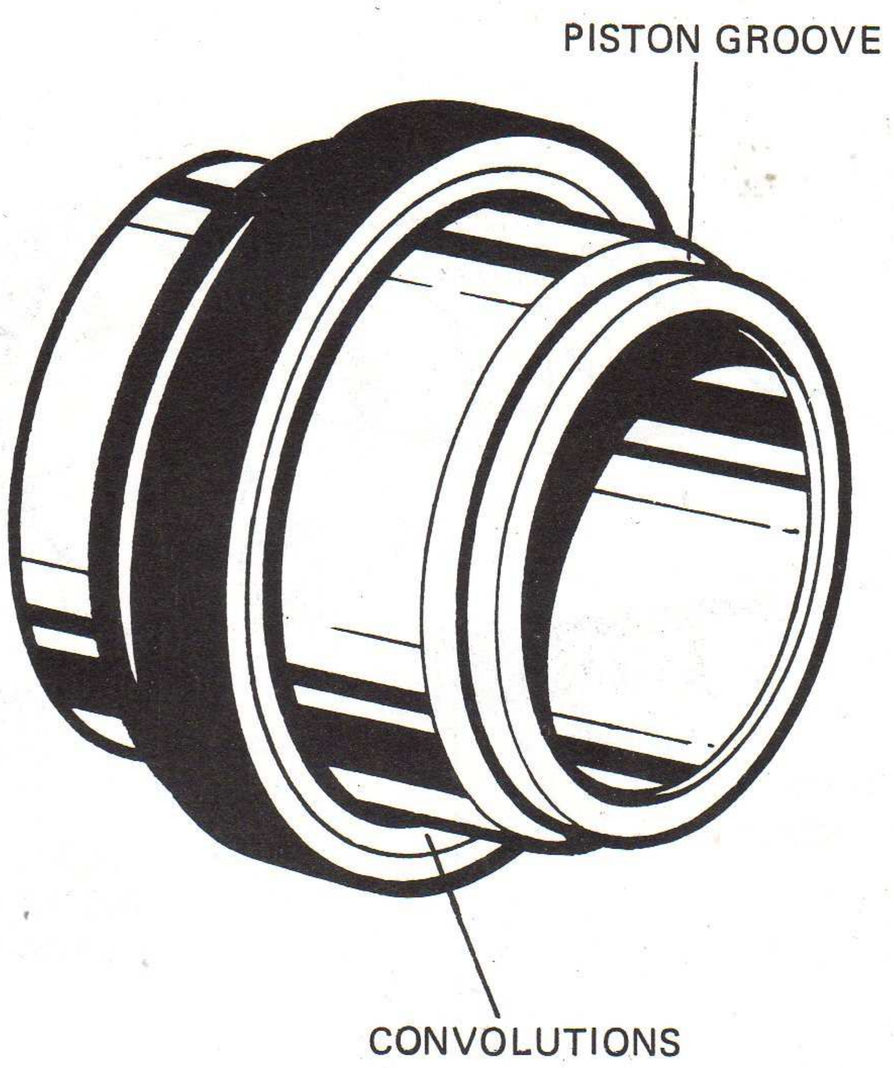

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Girling Janette type caliper 2A17e

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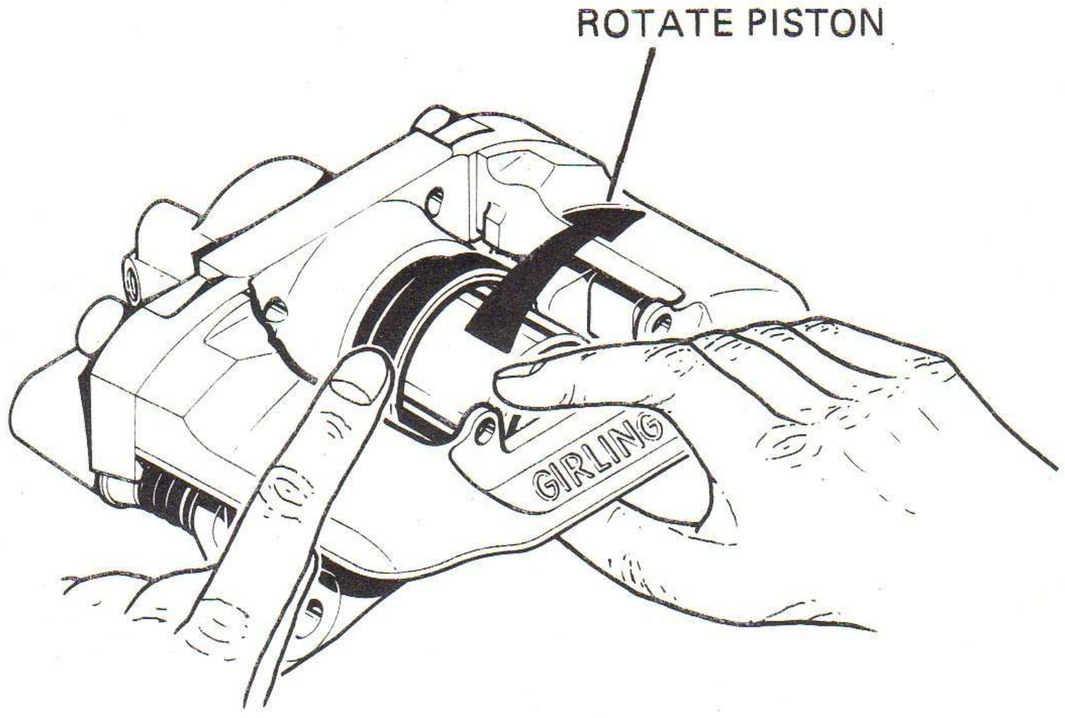

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Remove the hose clamp from the flexible hose then disconnect the hose from the chassis. Connect the hose to the caliper and finally to the chassis.
Refit the pads, (see "Pad Fitting"), bleed the brakes and check the brake fluid level. See section 1.D.1. Operate the brake pedal several times to move the piston(s) to its operating position

IMPORTANT: APPLICATION OF THE BRAKE PEDAL MUST NOT BE OVERLOOKED AS THE BRAKES WILL NOT OPERATE EFFICIENTLY UNTIL THE PADS ARE IN THE CORRECT POSITION.

Refit road wheels, jack down, check footbrake movement and if satisfactory, road test.

Discs

A certain amount of disc scoring and wear is to be expected in service, but this is not detrimental to brake efficiency. Discs need only be regarded as unsatisfactory when this condition has reached an advanced stage and difficulty is experienced in withdrawing the pad past the disc periphery.

The disc run-out must not exceed 0.0004 in. (0.15 mm) and check the disc runs parallel to piston housing.

Correct any discrepancy with shims at the caliper mounting to ensure the caliper is in line and the pads and piston are square with the disc.

When renewing a defective disc, ensure the hub end float is within the limits specified by the vehicle manufacturer.

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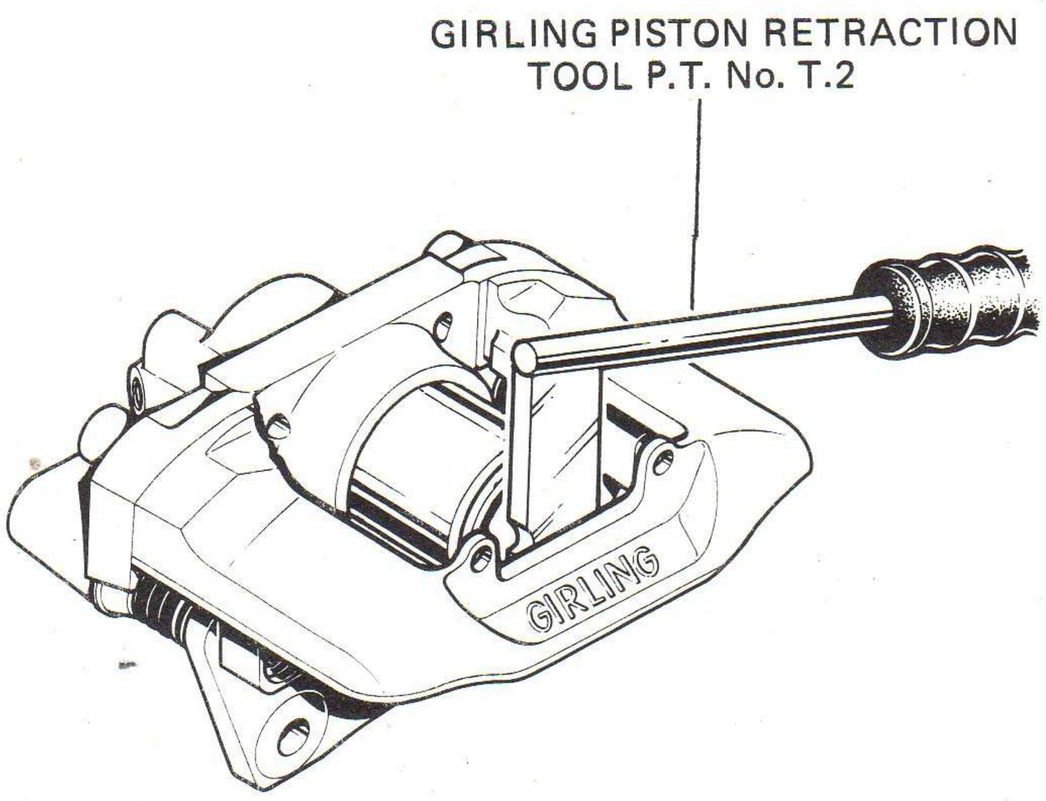

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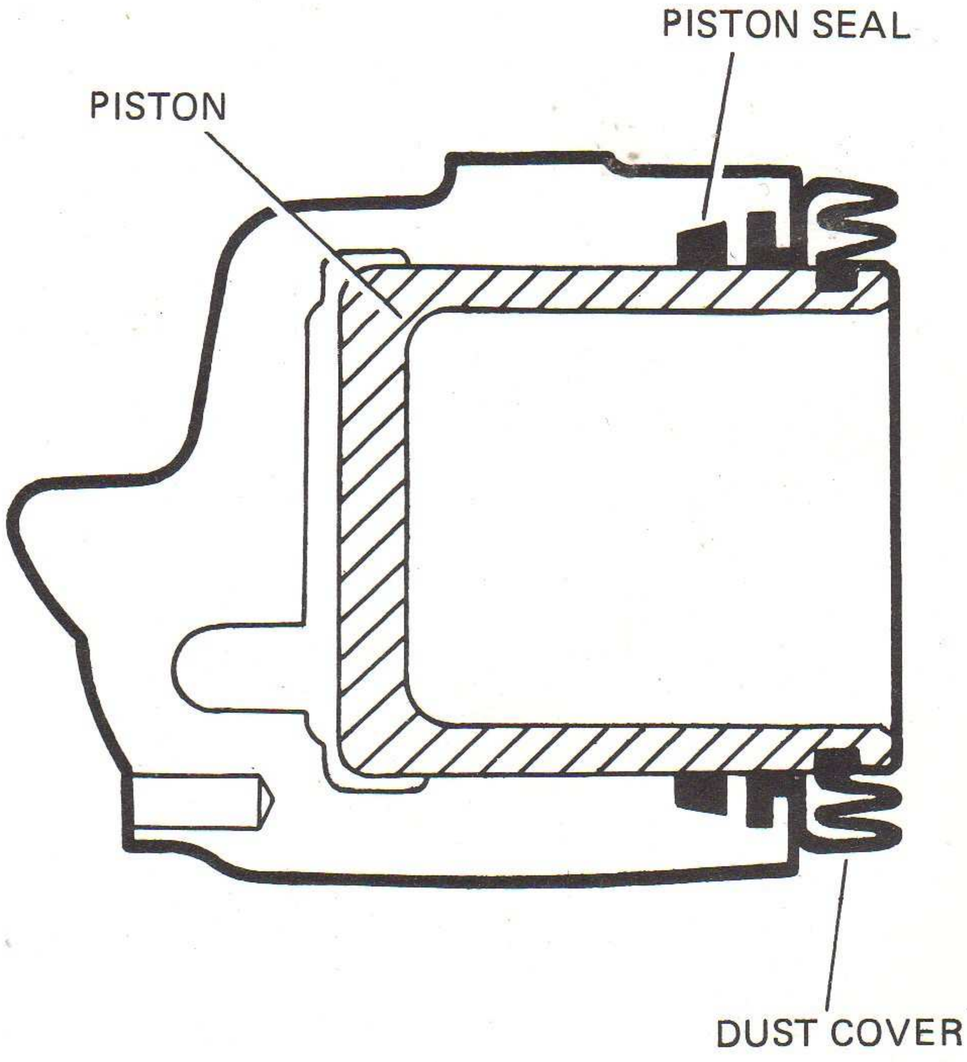

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