Chapter 1 Girling brakes

In the 25 years after the war Girling were one of the two major braking firms and shared with Lockheed the major slice of original equipment contracts. Although this was a period when motor car braking was gradually being improved, it pre-dated the years when frequent minor modifications made the whole scene complicated. The vast array of cars was in fact served by very few different brakes. The one innovation that was particularly notable, however, was the disc brake, particularly for the front wheels. Eventually every manufacturer made the change from drum to disc, but some took longer than others.

Front drum brakes

Between 1945 and 1949 brakes were mainly systems inherited from pre-war and some were even hydro-mechanical systems with hydraulic brakes on the front and cable-operated at the rear. One brake that was still in use up until 1949 was the non-servo brake. Although it was cable-operated and had been around since 1930, it can be seen now to have some features recognizable as Girling many years later (Fig. 1:1).

Another early drum brake, used on postwar Armstrong Siddeley Sapphire, Rover, Daimler, Humber Super Snipe and Jaguar, was known as the 'autostatic two trailing shoe.' Whereas most more modern brakes are of a twin-leading design, this one, shown in Fig. 1:2, has wheel cylinder pistons which operate against the forward rotation of the drum. Normally requiring a high input force, it is a lot less afflicted by brake fade when hot.

Many of its features appear in later versions, but perhaps

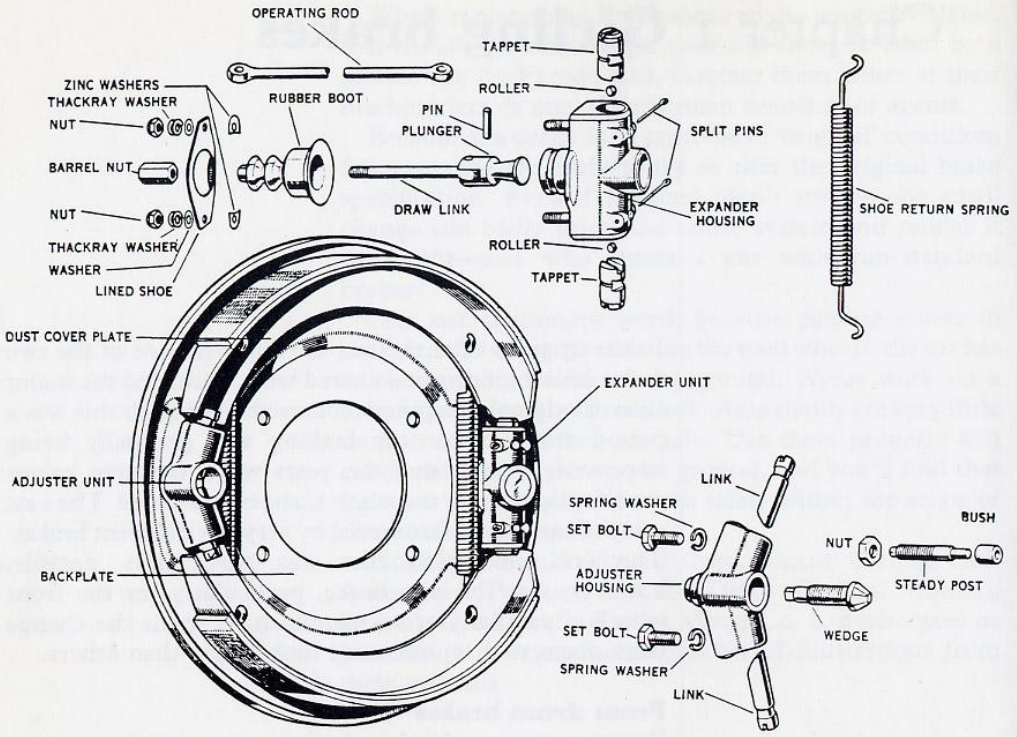


Fig. 1:1. Introduced in 1930 and first of a long line, this is the Girling non-servo brake

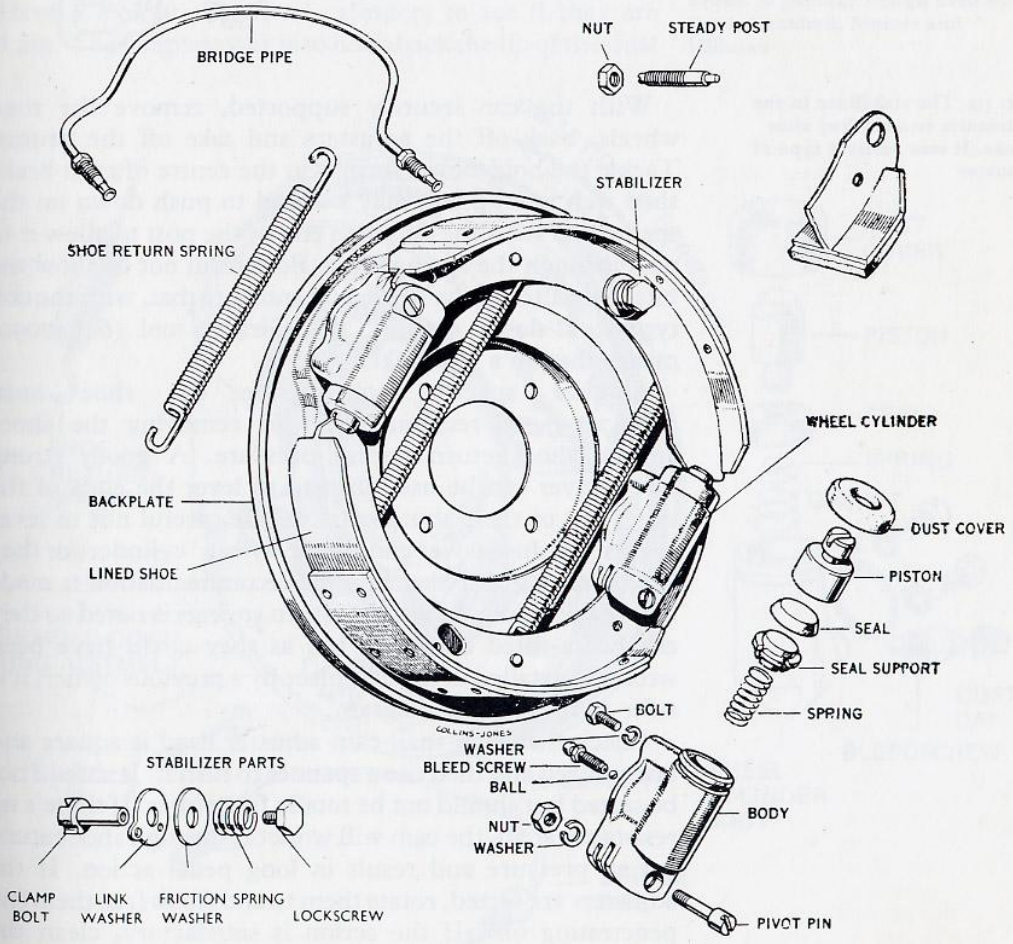
the only one that does not is the stabilizer (Fig. 1:3) which occupies the position of the hold-down spring in later designs. This was, in fact, a primitive form of adjuster. The shoe web is slotted and while movement of the brake overcomes the grip of the friction washer, the pull of the return spring does not. Hence the shoes are retained in close proximity to the drum.

The design that was popularly used from about 1953, particularly by Ford and Vauxhall, but also by Morris on the Oxford and 1.3 Marina and by Hillman for the Imp, was the twin-leading shoe H.L.S.S. (hydraulic leading shoe, sliding). All this means is that each brake shoe is operated by its own wheel cylinder and the ends of the shoes are designed to slide in the abutments in the wheel cylinders to provide more efficient use of the whole lining.

Adjustment is by means of two snail cams—one for each shoe. See Fig. 1:4.

Assuming that nothing is known of the car's braking system and a complete overhaul is envisaged, you will obviously be prepared to change parts and also realise that it may not be just a simple couple of hours' job. Support the front end of the car on axle stands; don't leave it on a jack, and if you can beg, borrow or steal a Girling service tool set, or even buy one from your local main Girling agent, it will be found very useful.

Fig. 1:2. Another early Girling brake, used on a number of different makes, is this autostatic two trailing shoe design



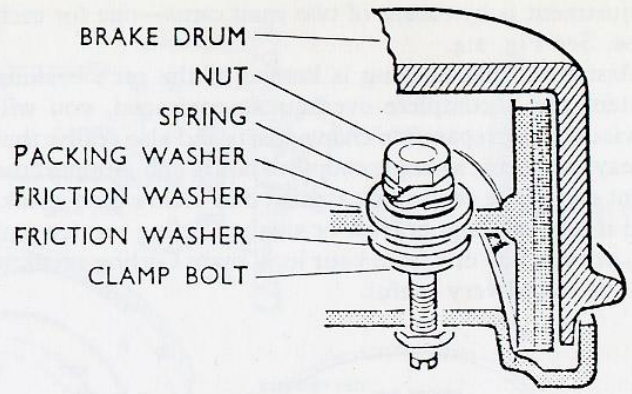


Fig. 1:3. The stabilizer in the autostatic two trailing shoe brake. It was really a type of adjuster

With the car securely supported, remove the road wheels, back off the adjusters and take off the drums. Tackle the hold-down springs in the centre of each brake shoe web next; pliers may be used to push down on the spring and twist the flattened end of the post to allow it to pass through the spring plate. Be careful not to allow the bits to fly all over the workshop and note that, with the coil type hold-down springs, the Girling tool (64947090) makes the job a lot easier.

Another special tool—private car shoe horn (64947019)—is recommended for removing the shoes against shoe return spring pressure. A good, strong screwdriver can be used instead to lever the ends of the shoes out of their abutments, but be careful not to lever against the dust-cover ends of the wheels' cylinders or they can be damaged. Normally, the recommendation is made that the position of the shoe return springs is noted so they can be re-fitted correctly, but as they could have been wrongly installed in the first place by a previous owner, it is safer to refer to the diagram.

Check that each snail cam adjuster head is square and undamaged and then use a spanner to turn it. It should not be seized but should not be totally free either. If there's no resistance at all, the cam will work off through shoe return spring pressure and result in long pedal action. If the adjusters are seized, rotate them to and fro to free them (no penetrating oil). If the action is satisfactory, clean the

outside of the backplate and put a smear of Girling brake grease at the point of movement.

If the adjuster is loose or won't free off, a replacement will have to be fitted, using an adjuster Service Kit. Note the position of the old adjuster and then gently file away the riveted head and remove it. Don't use excessive force or you'll damage the backplate. Smear the new adjuster stem with brake grease and fit it. Hold it firm with a brake spanner, slip the new spring washer over, fit the new cam in the position of the old one, and screw on the locking nut tightly (Fig. 1:5).

Have a look at the wheel cylinders to see if they are leaking. The simplest way is to hook back the lip of the dust

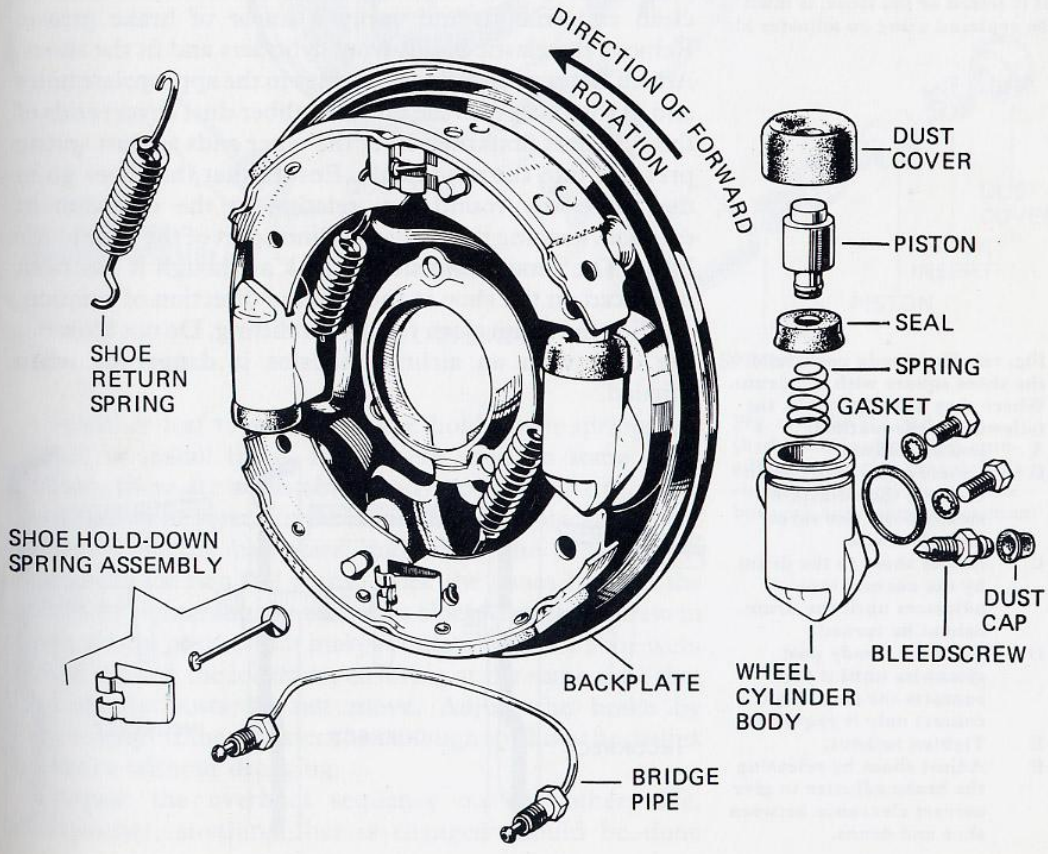


Fig. 1:4. The Girling H.L.S.S. (hydraulic leading shoe, sliding) brake. A popular design used by Ford, Vauxhall, Morris and Hillman

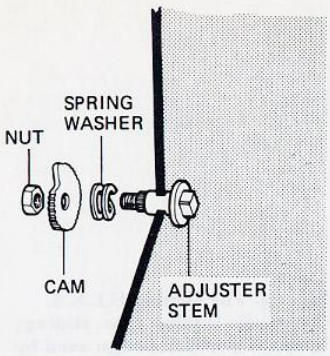


Fig. 1:5. An exploded view of the parts in a snail cam adjuster. If it is seized or too loose, it must be replaced using an adjuster kit

covers; if there is fluid escaping, new cylinders should be fitted on both sides. Try the pistons to ensure they are moving freely, and if all is well, secure them with elastic bands to ensure they aren't accidentally shifted.

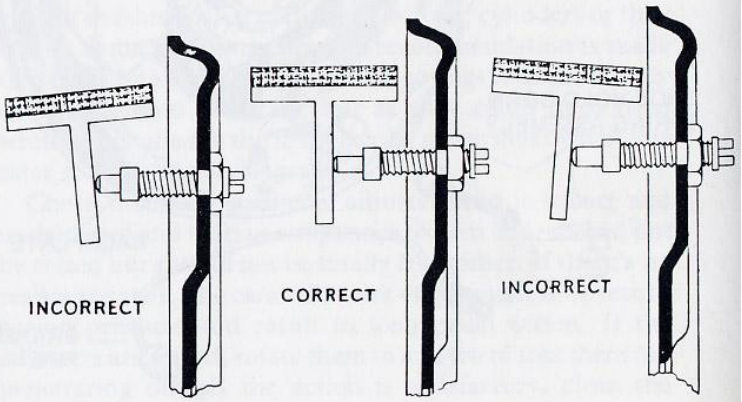
Wash down the backplate with Girling cleaning fluid. It's recommended because it's safe and petrol and paraffin most definitely are not. Any corrosion can be removed with a wire brush, but make sure you don't damage the rubber dust covers on the cylinders. Locate the platforms on the backplate against which the brake shoes move and smooth them off with emery cloth. Wipe them clean and apply a thin smear of brake grease, keeping it well away from both wheel cylinders and brake shoe linings.

Use emery cloth to ensure the tips of the new shoes are clean and smooth and apply a smear of brake grease. Remove the elastic bands from cylinders and fit the shoes. Attach the new shoe return springs in the appropriate holes and fit the shoes into the piston (rubber dust cover) ends of the cylinders first; then lever the other ends against spring pressure into the abutments. Ensure that the shoes go in the right way round, i.e. relating to the direction of rotation, keeping the longest unlined part of the shoe at the back. The shoe lining should look as though it has been displaced on the shoe in the forward direction of rotation.

Wipe the drum clean ready for refitting. Do not blow out the dust with an airline; asbestos is dangerous when inhaled.

Fig. 1:6. The steady posts hold the shoes square with the drum. Where they are adjustable, the following is the method:

A Loosen locknut.
B Unscrew (screwdriver in the slot) the adjustable steady posts two turns anti-clockwise.
C Adjust shoes to the drum by the normal shoe adjusters until the drum cannot be turned.
D Turn the steady post clockwise until it just contacts the shoe. Light contact only is required.
E Tighten locknut.
F Adjust shoes by releasing the brake adjuster to give correct clearance between shoe and drum.



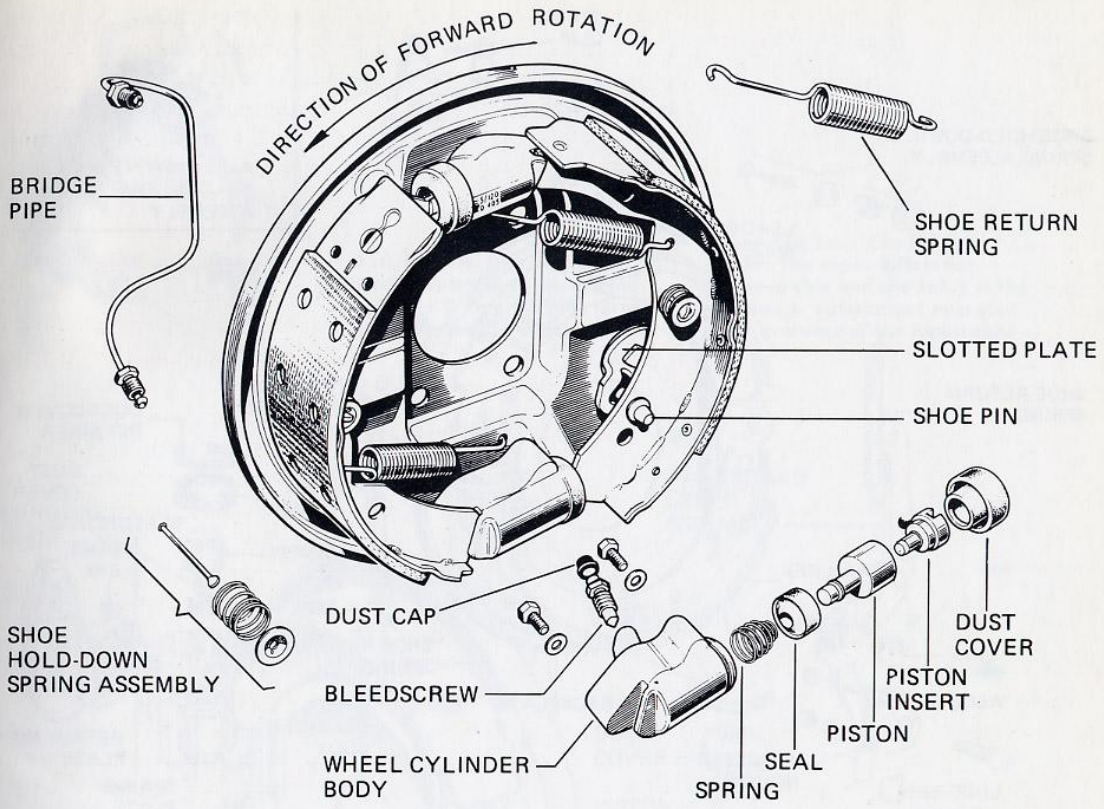


Fig. 1:7. The H.L.S.A.S. (hydraulic leading shoe auto-adjust by service brake). This is similar to the previous brake but with automatic adjustment

If either leaf type or coil type hold-down springs are fitted, re-install these. If, as were used on some older brakes, there are adjustable steady posts (Fig. 1:6), these will have to be reset. Fit the drum first, then slacken off the locknuts on the backplate, and screw the steady posts outwards for two full turns. Lock the shoes hard in the drum by tightening the adjusters clockwise, then screw in each steady post until it makes contact with the shoe web. Then tighten the locknuts, ensuring at the same time that the steady posts do not move. Adjust the brake by slackening off the adjusters just enough to allow the drums to move without dragging.

Repeat the overhaul sequence on the other side. Remember, anything that is changed should be done

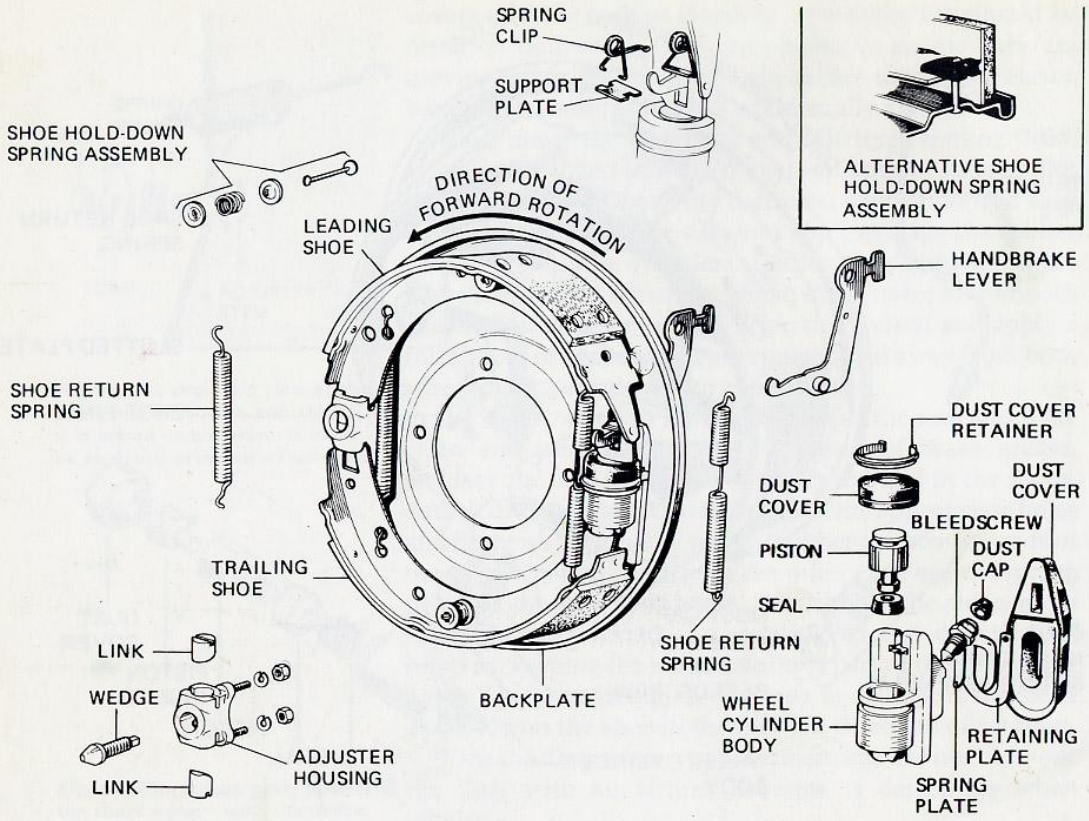
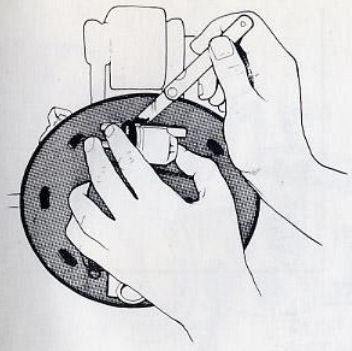


Fig. 1:8. The H.L.3 (hydraulic lever Mk 3) brake. The main difference between this rear brake and the foregoing front ones is that this has leading and trailing brake shoe arrangement

'across the axle'. If new shoes are fitted, install them on both sides, and the same with new wheel cylinders.

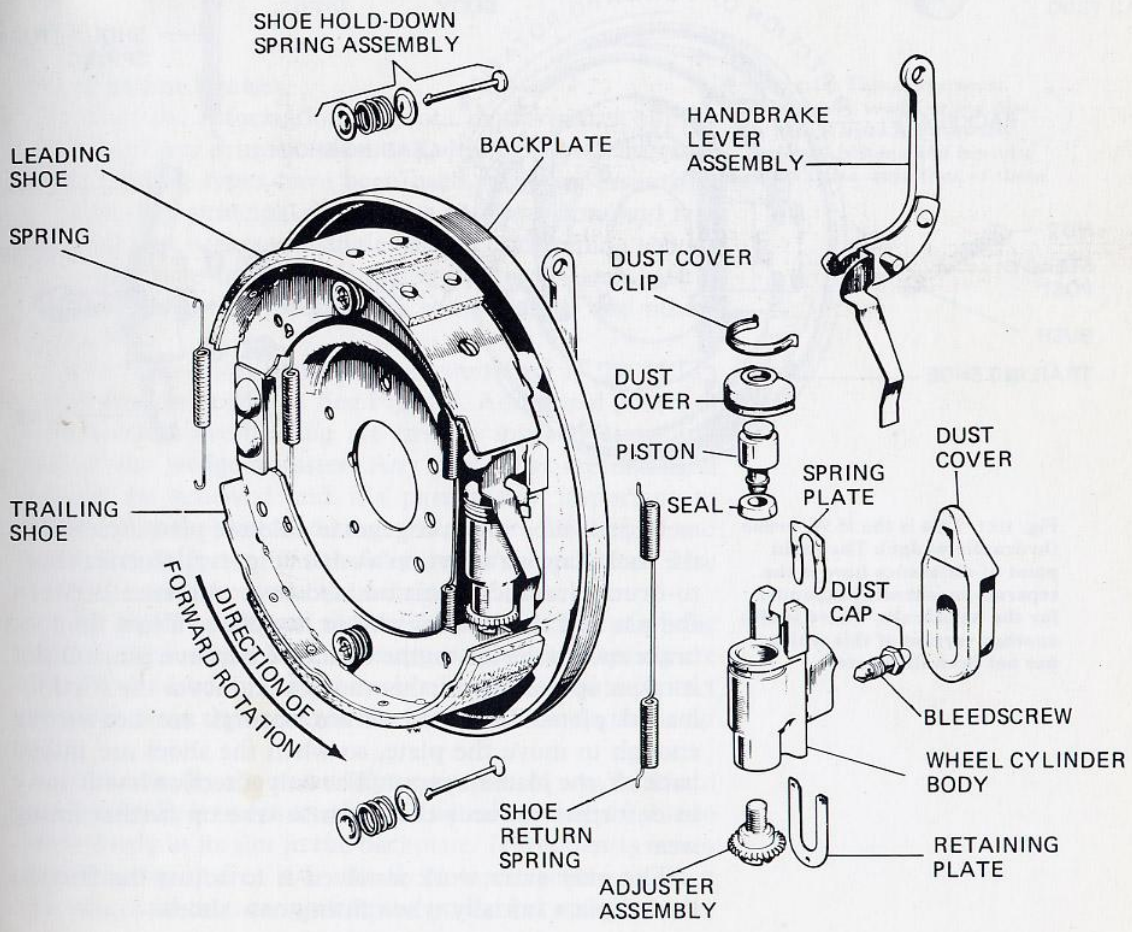
One final note. The makers always recommend that new shoe return springs are fitted. In practice this is not done in every case, but if the existing springs are of totally unknown age and condition, new ones could be a sound move.

The only variation of this popular brake was the addition of a simple automatic adjustment device to replace the snail cams. This was the H.L.S.A.S. (hydraulic leading shoe auto-adjust by service brake) and it was fitted to the Vauxhall Victor FC. It consisted of an actuating pin on the



Left **Fig. 1:9. It is important with this brake to ensure the cylinder is free to slide. Grease is applied using a feeler blade**

Below **Fig. 1:10. The H.L.3A brake. The main difference between this and the H.L.3 is the automatic adjustment operated by movement of the handbrake**



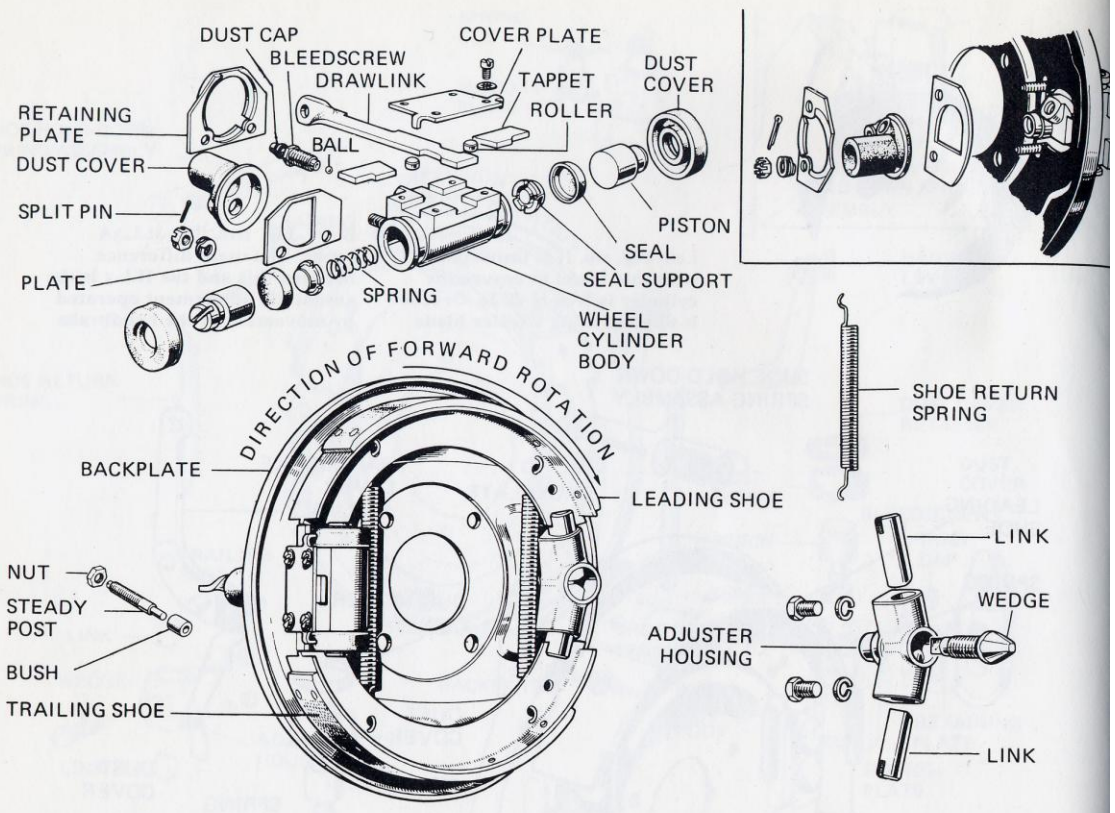


Fig. 1:11. This is the H.W. brake (hydraulic wedge). The main point of difference here is the separate mechanical expander for the handbrake. There is also another version of this which has not been illustrated

web of the shoe which engages in a slotted plate attached to the back plate via a friction washer (Fig. 1:7). Correct shoe-to-drum clearance is maintained by a clearance between the pin and the locating slot in the plate. When the foot brake moves the shoes, the clearance between pin and slot is taken up and any further movement moves the friction-loaded plate. The shoe return springs are not strong enough to move the plate, so when the shoes are pulled back off, the plate stays put. The only direction it will move in is further towards the drum to take up further lining wear.

The only extra work involved is to adjust the friction loaded plate initially when fitting new shoes.

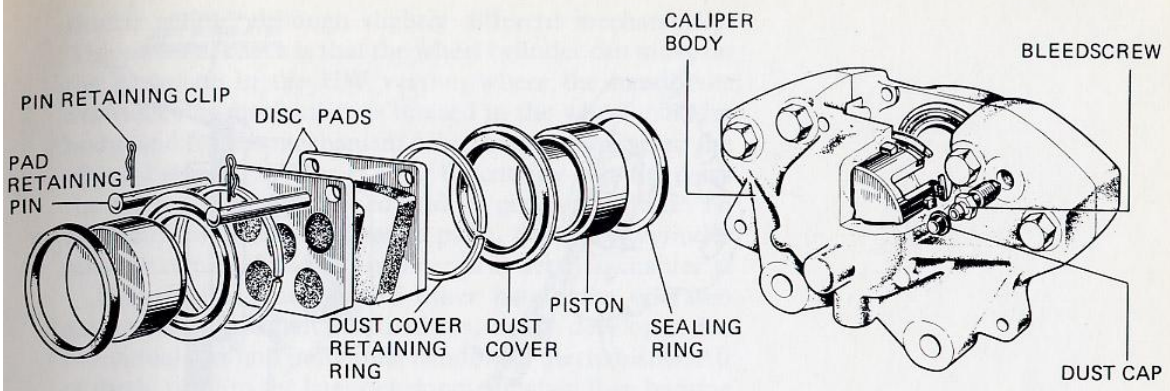


Fig. 1:12. This is the most commonly used Girling disc brake. It used horizontally opposed pistons and in some cases there were four of them

Rear drum brakes

Much of the information on front drum brakes applies equally to rear drums brakes, and although three different main Girling types have been used, they are essentially similar. The principal differences between front and rear are that rear brakes are single leading and trailing shoe—i.e. they have one double-acting cylinder—and have a different adjusting mechanism; some manual and others automatic.

The brake most commonly encountered is the H.L.3 (hydraulic lever Mk 3). See Fig. 1:8. Additional points to watch when overhauling are first to inspect, clean and grease the wedge adjuster. Any parts that are damaged should be renewed and it's particularly important to ensure that the threaded stem will run its full length and leave the adjuster in the fully retracted position. Use Girling brake grease as the lubricant.

The other additional feature is the attachment of the handbrake linkage. Where a support plate and spring are fitted to the leading shoe, they should be retained to protect the shoe from the action of the hardened handbrake lever tip.

Undoubtedly the most important part of any overhaul on this brake is to ensure that the wheel cylinder is able to slide freely in its slot in the backplate. It frequently seizes and the way to free it is usually to tap it gently to get it moving, and then to work brake grease between cylinder

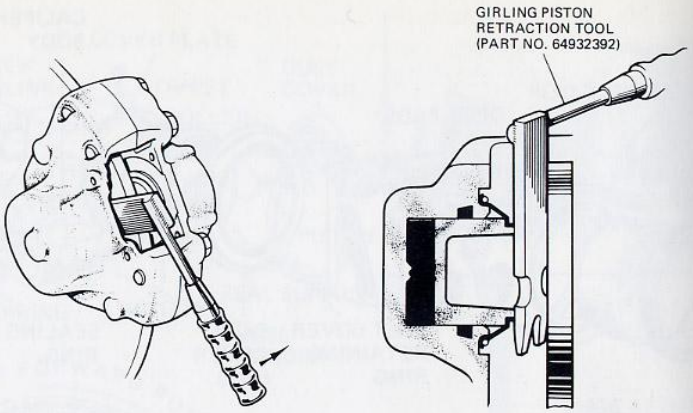


Fig. 1:13. Using the Girling tool to lever back the pistons to make space for the new pads

and backplate using a feeler gauge (Fig. 1:9). It may be necessary to remove it to clean out corrosion, but whatever it takes, it must be free or partial braking and uneven lining wear will result.

Developed from the H.L.3 was the H.L.3A which is similar except that it has an automatic adjustment mechanism (Fig. 1:10). There has been a lot of controversy over this mechanism in the past. Many people maintain it has never worked satisfactorily. Girling say that provided it is properly maintained and adjusted, there is no problem.

Check first that the wheel cylinder slides on the backplate. Then ensure that the ratchet wheel is not worn, turns easily on the adjustment screw and will travel freely the full length of the thread. Clean the threads and smear with brake grease.

When reassembled, turn the adjuster ratchet wheel until it is just possible to slide the brake drum over the shoes. Do the same thing on the other side. Operating the handbrake 20 or 30 times should achieve correct adjustment.

Remember that correct handbrake lever operation on an automatically adjusting system is six or seven clicks; not the normal three or four of a manually adjustable system.

The third commonly used Girling system is the HW (hydraulic wedge) a generally larger assembly for use on more powerful cars (Fig. 1:11), the main mechanical variation in this brake is the separate mechanical expander for handbrake operation. There are two versions which are

similar acting, although slightly different mechanically. The essential check is that the wheel cylinder can move on the backplate in the HW version where the handbrake drawlink and mechanism is housed in the wheel cylinder body; and for the mechanism components to move on the wheel cylinder in the H.W2. Essentially all the parts should be clean, lubricated and in good condition. To overhaul completely or change parts, the wheel cylinder must be removed and this is covered in detail in chapter 5.

There were a number of other handbrake operated automatic adjustment mechanisms, many developed for individual cars and individual handbrake mechanisms. All of them, prior to the later development when they became service brake operated, used a small lever to operate a ratchet adjustment which moves on a threaded rod to expand the shoes to take up wear. A clean and lubricated thread, an unworn ratchet, and free but not worn pivot points are what to look for when overhauling. Correct

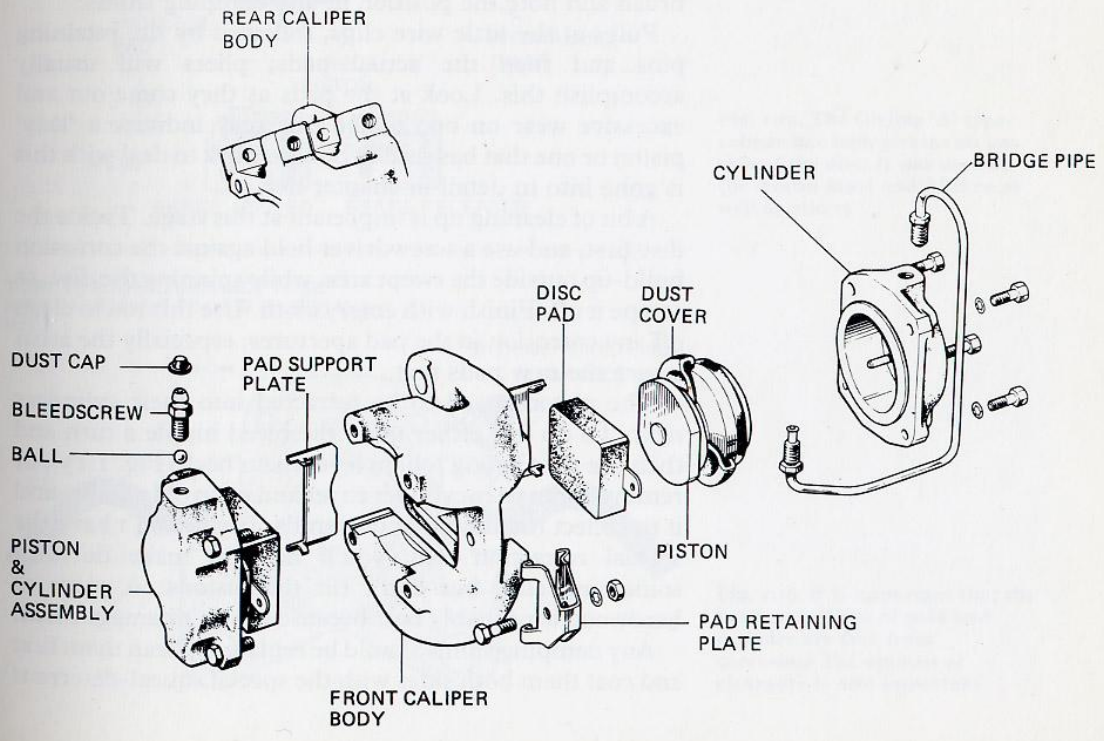


Fig. 1:14. There are differences on this Girling-Dunlop Mk 2 caliper. It was less used than Girling's own, but could be encountered

handbrake adjustment is also important but that is dealt with in chapter nine.

Disc front brakes

Probably the era's greatest braking advance, discs began to come into general use during the 1950s. The Girling caliper used on a wide variety of cars of the day had horizontally opposed pistons (Fig. 1:12). The number of pistons varied between two and four and there were different sizes, but the general principle of this unit was the same throughout the range. Never unbolt the two caliper halves.

An overhaul, whether motivated by some specific fault or carried out as preventive maintenance, would start by fitting new pads. This is an operation probably familiar to most people, but the following is a brief summary.

Ensure the car is firmly supported on axle stands and remove the front wheels. Clean up the caliper with a wire brush and note the position of any damping shims.

Pull out the little wire clips, followed by the retaining pins and then the actual pads; pliers will usually accomplish this. Look at the pads as they come out and excessive wear on one of the pair may indicate a 'lazy' piston or one that has seized, but the work to deal with this is gone into in detail in chapter five.

A bit of cleaning up is important at this stage. Tackle the disc first, and use a screwdriver held against the corrosion build-up outside the swept area, while spinning the disc, to scrape it off. Finish with emery cloth. Use this too to clean off any corrosion in the pad apertures, especially the areas where the new pads seat.

The pistons need to be retracted into their cylinders next. To do this either undo the bleed nipple a turn and then use the Girling tool to lever them back (Fig. 1:13), or remove the master cylinder cover and wrap old rags around it to collect the fluid that overspills. If you don't have the special retraction tool, you'll have to make do with something else, but don't tilt the pistons. A piece of hardwood is probably best because it won't damage them.

Any damping shims should be replaced. Clean them first and coat them both sides with the special squeal-deterrent

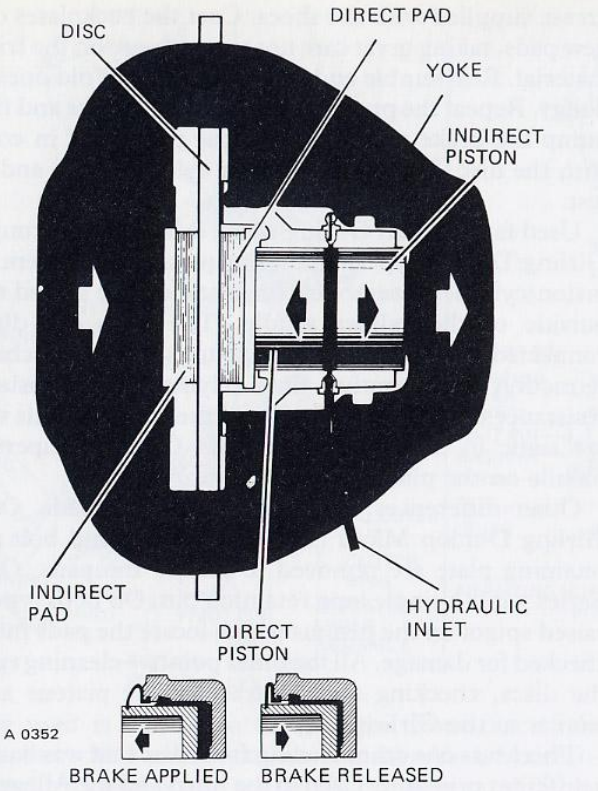


Fig. 1:15. The Girling 'A' type caliper has both pistons on one side of the disc. It was used on the Austin Maxi and Allegro as well as others

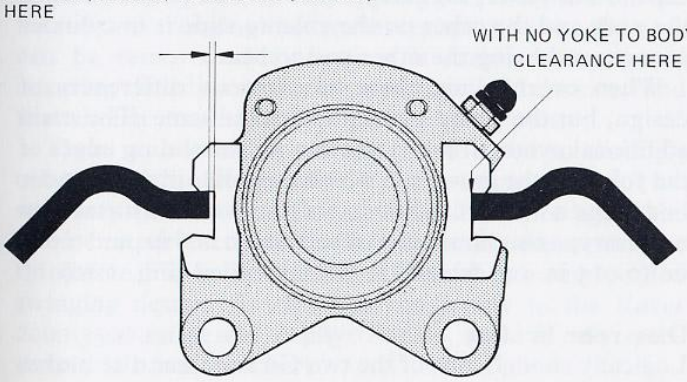


Fig. 1:16. It is important that the mating surfaces of yoke and cylinder are free from corrosion. The amount of clearance is also important

grease supplied with the shoes. Coat the backplates of the new pads, taking great care not to get grease on the friction material. Reassemble and fit new clips if the old ones look dodgy. Repeat the procedure on the other brake and finally pump the brake pedal to bring the pads back in contact with the disc. Top up the master cylinder level and road test.

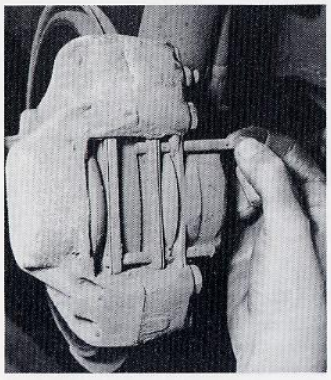
Used far less than Girling's own caliper were a couple of Girling/Dunlop types. These are quite a lot different. The piston/cylinder assemblies, for instance, are bolted to the outside of the caliper saddle; The pads are directly connected to the pistons; the pistons have a mechanical retraction device rather than relying on the distortion resistance of the dust covers; and the pistons' seals which are static in the cylinder walls in Girling calipers, are mobile on the piston in the Dunlop.

Other differences occur when changing pads. On the Girling Dunlop Mk. 2 (Fig. 1:14), a nut and bolt and a retaining plate are removed to release the pads. On the Series 3 it is a single long retaining pin. On both types the raised spigot on the pistons which locate the pads must be checked for damage. All the other points—cleaning rust off the discs, checking seals, retracting the pistons are all similar to the Girling caliper.

There was one other Girling front disc that was based on a different principle. Used in the Maxi and the Allegro, the 'A' type caliper consists of a yoke, cylinder assembly and pads. The pistons are both on one side of the disc and expand outwards (Fig. 1:15). One acts directly on one of the pads and the other on the yoke to slide it in cylinder grooves and bring the other pad to bear.

When overhauling, there are obvious differences of design, but the broad principles are the same. The main additional overhaul job is to clean up the sliding edges of the yoke and the grooves in which they slide in the cylinder body. Use a wire brush but do not remove more metal than necessary; a maximum gap of between 0.006 in. and 0.012 in. (0.015 in. top whack) is recommended (Fig. 1:16).

Fig. 1:17. A typical view of the Girling disc brake in service. This is the most commonly used type with horizontally opposed pistons



Disc rear brakes

Logically enough, one of the two Girling, rear disc brakes

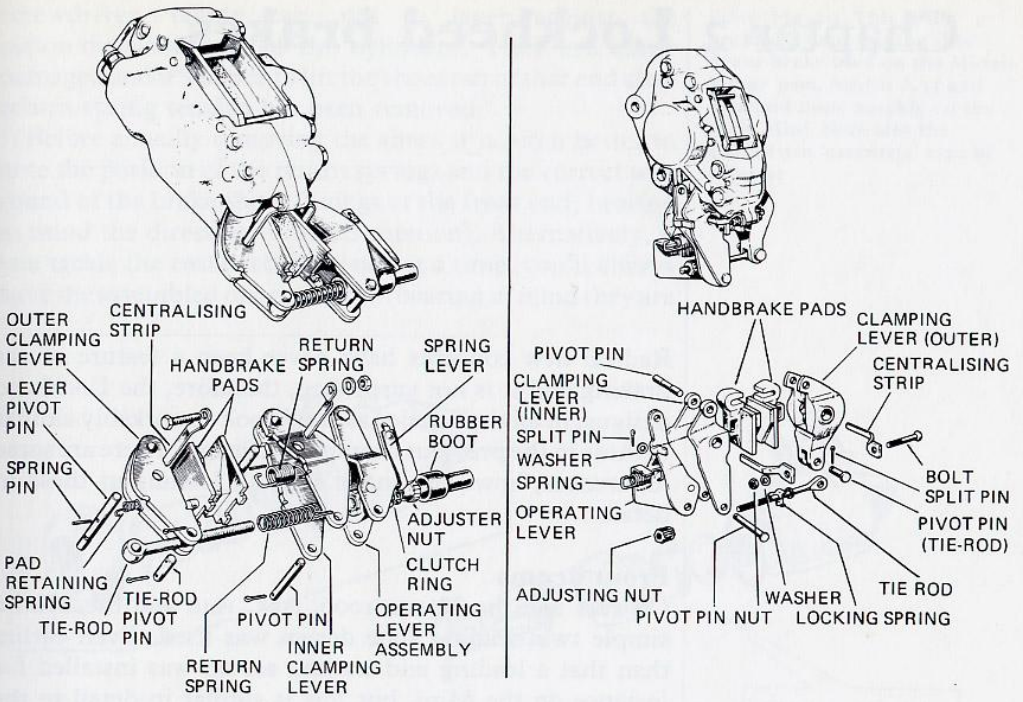


Fig. 1:18. The only added complication to a rear disc brake is the handbrake mechanism. Two types are shown here, but the main requirement is that they should be clean and lubricated

mostly used is similar to the popular front disc brake design, but with a handbrake mechanism added. Maintenance and overhaul of the actual disc brake is no different from the front version; only the handbrake mechanism adds any complication. See Fig. 1:18. It involves taking off the centralizing strips, withdrawing the pivot pin from the tie rod and swinging the two levers apart before the pads can be removed. Maintenance is mainly a matter of ensuring the adjuster threads are clean and lubricated and that similar conditions apply to the pivot pins.

There is also another rear disc brake based on Girling's other front disc design, the 'A' type sliding caliper. This was only fitted to the Peugeot 504, but once again the service requirements of the actual disc are the same. The third rear disc brake is the S.1H, which is a single-sided swinging design. As this was fitted only to the Rover 2000/3500 range and Zephyr/Zodiac, there is only space simply to mention it here.