

Service Instruction Manual

Fourth Issue



SERIES I AND II
and
TRIUMPH "RENOWN" MODELS

BRAKES SECTION R

COPYRIGHT

THE STANDARD MOTOR COMPANY LTD., COVENTRY

BRAKES

INDEX

	<i>Page</i>		<i>Page</i>
Routine maintenance	1	Rear wheel cylinder	
Brake shoe adjustment	1	Description	4 & 5
Handbrake adjustment	1	To remove	5
Brake pedal adjustment	2	To dismantle	5
		To assemble	5
		To refit	5
Master cylinder		To remove a flexible hose	6
General description	2	Bleeding the system	6
To remove	2		
To dismantle	2	Girling Hi-Spot Hydrastatic ...	
To refit	4	Description of front and rear brakes	6 & 7
		Adjustment of rear brakes	7 & 8
Front wheel cylinders		Brake shoe balance control	8
To remove	3	Hand brake adjustment	8
To dismantle	4	Fitting replacement shoes	9
To assemble	4	Hydraulic master cylinder	9
To refit	4	Bleeding the system	9
		Vanguard Series II Supplement	11-12

ILLUSTRATIONS

<i>Fig.</i>		<i>Page</i>	<i>Fig.</i>		<i>Page</i>
1	Lockheed master cylinder	2	6	Triumph front brake arrangement	7
2	Method of assembling Dished Washer between Main Cup and Piston	2	7	Triumph rear brake arrangement	7
3	Lockheed front wheel cylinder	3	8	Triumph brake shoe adjuster	8
4	Lockheed rear wheel cylinder	4	9	Triumph master cylinder assembly	8
5	Bleeding Lockheed brakes	5	10	Bleeding Triumph brakes	9

Series II Supplement

<i>Fig.</i>		<i>Page</i>
1	Sectional view of twin-bore master cylinder	12

BRAKES

GENERAL DESCRIPTION

The Lockheed hydraulic brake equipment consists of an integral barrel type master cylinder, containing the reserve supply of fluid, in which the hydraulic pressure is generated; single ended internal wheel cylinders which operate the two leading shoe front brakes; single ended internal wheel cylinders, incorporating hand brake operating levers, which operate the leading and trailing rear brakes, and the necessary pipe lines and hoses connecting the units.

ROUTINE MAINTENANCE

Examine the fluid level in the master cylinder periodically, and replenish if necessary to keep the level $\frac{1}{2}$ " below the filler cap. Do not fill completely. The addition of fluid should only be necessary at extremely long intervals, and a considerable fall in fluid level indicates a leak at some point in the system which should be traced and rectified immediately.

Ensure that the air vent in the filler cap is not choked; blockage at this point will cause the brakes to drag.

Adjust the brakes when the pedal travels to within 1" of the floor board before solid resistance is felt; if it is desired, adjustment may be carried out before the brake linings have worn to this extent.

BRAKE SHOE ADJUSTMENT

Front wheels.

1. Remove the wheel dust cap and jack up one wheel until it is free to rotate.
2. Turn the wheel so that the hole in the brake drum is opposite the slotted head of one of the micram adjusters.
3. Using a screwdriver, turn the adjuster in a clockwise direction until the brake shoe is in contact with the brake drum, then turn the adjuster back one notch; this should provide the correct clearance between the shoe and the drum. If closer adjustment is required, spin the drum and apply the brake hard; this will correctly position the shoe, after which a further adjustment check should be carried out.
4. Repeat operations 1 to 3 on the second adjuster.

5. Repeat operations 1 to 4 on the opposite front wheel.

Rear wheels.

1. Place chocks under one of the front wheels and release the hand brake.
2. Remove the wheel dust cap and jack up one wheel until it is free to rotate.
3. Turn the wheel so that the hole in the brake drum is opposite the slotted head of the Micram adjuster.
4. Using a screwdriver, turn the adjuster in a clockwise direction until the brake shoes are in contact with the brake drum.
5. Apply the hand or foot brake hard, to ensure that the wheel cylinder is centralized, and release the brakes. If after doing this the wheel is still locked, turn back the adjuster one notch to provide the correct clearance between the shoes and the drum; if, however, the wheel is free to rotate after centralizing, turn the adjuster until the shoes contact the drum and then turn the adjuster back one notch.
6. Repeat operations 2 to 5 on the opposite rear wheel.

HANDBRAKE ADJUSTMENT

Adjustment of the brake shoes automatically re-adjusts the handbrake mechanism.

The brake rods on the back axle are correctly set at the works and, under normal conditions, these should not require any adjustment, as also is the case with the hand brake cables.

Where for any reason it is necessary to replace the brake rods or cables, or if it is necessary to remove these, the following procedure should be adopted:—

1. The approximate centres for the brake rods should be ensured and these should be $32\frac{11}{16}$ " and $16\frac{5}{16}$ " respectively for the long and short links.
2. The handbrake lever should be adjusted by altering the position of the nuts on yoke piece attached to the end of the longer of the two cables at the handbrake lever end. The normal cable adjustment should allow the handbrake lever to be fully on at 3 to 4 notches.

BRAKES—Maintenance

Brake pedal adjustment.

The correct amount of free play between the push rod (G) and the piston (L), Fig. 1, is set when the vehicle is assembled and should not be altered. If the adjustment has been disturbed, reset the length of the rod connecting the push rod to the pedal so that the pedal can be depressed approximately $\frac{1}{2}$ " before the piston (L) commences to move; this free play can readily be determined if the pedal pad is depressed by hand.

Note: An incorrectly positioned floor mat or floor board may foul the pedal preventing its complete return to the "off" position, and may take up this free play when the adjustment is actually correct.

BRAKES MASTER CYLINDER (See Fig. 1)

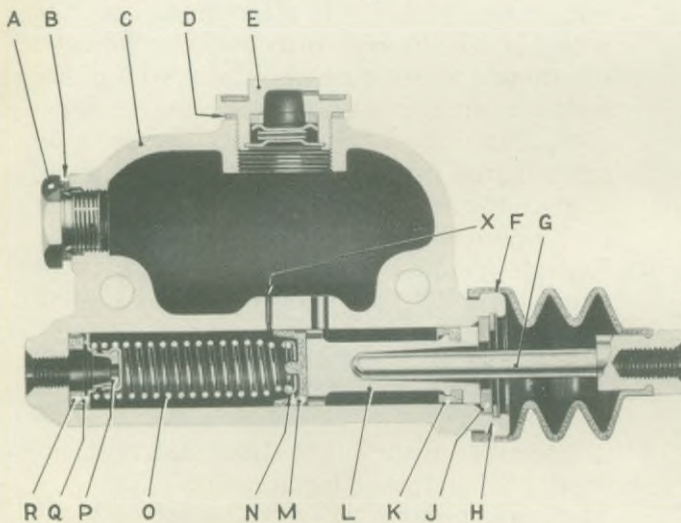


Fig. 1.

General Description.

The master cylinder is of the integral barrel type incorporating a fluid reservoir and a master cylinder. In the head of the cylinder is an inlet and outlet valve consisting of a metal body (Q) containing a rubber cup (P) and a rubber washer (R) on which the metal body is urged by the return spring (O). The function of the valve is to prevent the return, to the master cylinder, of fluid pumped into the line during the bleeding operation, thereby ensuring a charge of fresh fluid being delivered at each stroke of the foot pedal and a complete purge of air from the system. During normal operation, fluid returning under pressure and assisted by the effort of the brake shoe pull-off springs, lifts the valve off its seat,

thereby permitting fluid to return to the master cylinder, and the brake shoes to the "off" position.

Directly in front of the main rubber cup (M) when the system is at rest, is a by-pass port (X) which ensures that the system is maintained full of fluid at all times, and allows full compensation for expansion or contraction of the fluid to change of temperature. It also serves to release additional fluid drawn into the cylinder from the annular space formed by the reduced skirt of the piston (L), through the small holes in the piston head, as a result of the vacuum created by the rapid return of the piston after each brake application; a dished washer is interposed between the rubber cup and the piston face to prevent the adhesion of one to the other (See Fig. 2). If the aforementioned additional fluid is not released to the fluid reservoir through the by-pass port due, either to the hole being covered by the main cup as a result of incorrect pedal adjustment, or to the hole being choked by foreign matter, pressure will build up in the system and all brakes will drag.

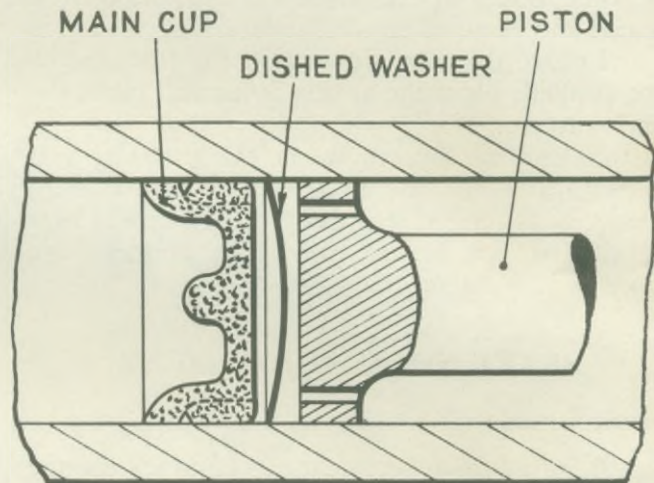


Fig. 2 Method of assembling dished washer between main cup and piston.

Removing the master cylinder.

Disconnect the pressure pipe from the cylinder barrel, remove the fixing bolts and detach the rubber boot (F) from the cylinder (C), leaving the boot and push rod attached to the brake pedal. Unscrew the filler cap (E) and drain the fluid into a clean container.

Dismantling.

Push the piston (L) down the bore of the cylinder to release the pressure on the piston stop (J), remove the circlip (H) and the piston stop. Withdraw the piston, the dished washer, the

BRAKES—Maintenance

rubber cup (M), the return spring (O), the valve body (Q) complete with the rubber cup (P) and the rubber washer (R). Using the fingers only, to prevent damage, remove the secondary rubber cup (K) by stretching it over the end flange of the piston.

Thoroughly clean all parts, using Lockheed brake fluid only for the rubber parts. All traces of petrol, paraffin or trichlorethylene, used for cleaning metal parts, must be removed before assembly. Examine all rubber parts for damage or distortion; it is usually advisable to renew all rubbers when rebuilding a master cylinder.

1. Ensure that the by-pass port (X) in the cylinder barrel is clear by probing with a piece of wire of 23 S.W.G. or smaller; access to the port is through the filler cap orifice.
2. Immerse all parts in brake fluid and assemble wet.
3. Fit the secondary cup (K) on the piston (L) so that the lip of the cup faces the piston head. Work the cup gently round the groove with the fingers to ensure that it is properly seated.
4. Place the rubber washer (R) in position in the bottom of the cylinder bore. Fit the rubber cup (P) in the metal body (Q) and assemble the body on the larger end of the return spring (O). Assemble the retainer (N) on the smaller end of the return spring and insert the assembly in the cylinder so that the valve body is in contact with the rubber washer.
5. Insert the main cup (M) in the cylinder, lip foremost, taking care not to damage or turn back the lip, and follow up with the dished washer (See Fig. 2).
6. Press the piston (L) into the cylinder taking care not to damage or turn back the lip of the secondary cup (K). Insert the piston stop (J) and fit the circlip (H) ensuring that it beds evenly in its groove.
7. Fill the reservoir with clean Lockheed brake fluid and test the master cylinder by pushing the piston inwards and allowing it to return unassisted; after a few applications, fluid should flow from the outlet connection in the cylinder head.

Refitting the master cylinder.

1. Insert the push rod (G) in the piston (L) and fit the boot (F) on the cylinder (C) so that the vent hole in the boot will be at the bottom when the cylinder is mounted on the

vehicle. If the boot is damaged or perished, a new boot should be fitted.

2. Attach the cylinder to the mounting bracket taking care to pick up the adjustable push rod attached to the pedal.
3. Check the pedal adjustment (see "Brake Pedal Adjustment" and bleed the system (see "Bleeding the System").
4. Check the system for leakage by applying a firm pressure to the foot pedal and inspecting the line and connections.

Front wheel cylinders (see Fig. 3).

The front wheel cylinders are mounted rigidly to the shoe backplates inside the brake drum and between the ends of the brake shoes. One cylinder is mounted at the top and the other cylinder at the bottom of each backplate, and each cylinder operates one shoe only. A single piston in each cylinder acts on the leading tip of its respective shoe, whilst the trailing tip of the shoe finds a floating anchor by utilizing the closed end of the actuating cylinder of the other shoe as

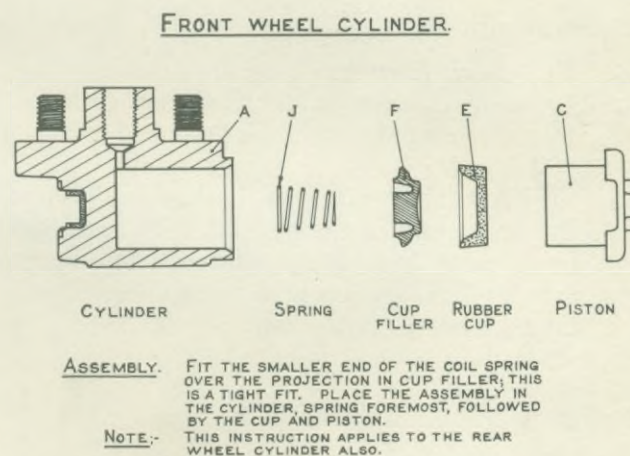


Fig. 3.

its abutment. Between the piston and the leading tip of each shoe is a "MICRAM" adjuster which is located in a slot in the shoe.

Each front wheel cylinder consists of a body (A) formed with a blind bore to accommodate a piston (C); a rubber cup (E) mounting a cup filler (F) is loaded upon the piston by a spring (J) which is located in the recess formed in the cup filler.

BRAKES—Maintenance

Removing the front wheel cylinders.

1. Jack up the vehicle, remove the wheel, back off all the available adjustments and remove the brake drums.
2. Pull one of the brake shoes, against the load of the pull-off springs away from its abutment on the closed end of the adjacent cylinder and slide the "MICRAM" mask off the piston cover of the operating cylinder; on releasing the tension of the pull-off springs, the opposite brake shoe will fall away.
3. Remove the flexible hose (see "Removing of Flexible Hose" below).
4. Unscrew the banjo bolts on both cylinders and remove the banjo adaptors complete with the bridge pipe.
5. Unscrew the nuts and withdraw the wheel cylinders from the backplate.

Dismantling. (See Fig. 2)

Withdraw the piston (C) complete with the piston cover from the cylinder (A) and apply a light air pressure to the fluid connection to blow out the rubber cup (E) and the cup filler (F) and the spring (J).

Assembling.

The earlier remarks concerning cleaning, etc., apply equally to the front and rear wheel cylinders.

1. Immerse all parts in brake fluid and assemble wet.
2. Fit the smaller end of the coil spring (J) over the projection in the cup filler (F) and insert both parts into the cylinder (A), spring foremost, follow up with the rubber cup (E) lip foremost, taking care not to damage or turn back the lip.

Refitting the front wheel cylinders.

1. Mount the wheel cylinder on the backplate and secure by means of the spring washers and nuts.
2. Assemble the bridge pipe and banjo connections on the wheel cylinders and fit the banjo bolts with new copper gaskets to ensure pressure tight joints.
3. Screw the flexible hose, with a new copper gasket, into the banjo connection and tighten securely. Mount the opposite end of the hose in the frame or bracket, secure by means of the shakeproof washer and nut, and screw the tube nut, attached to the pipe, into the hose end.

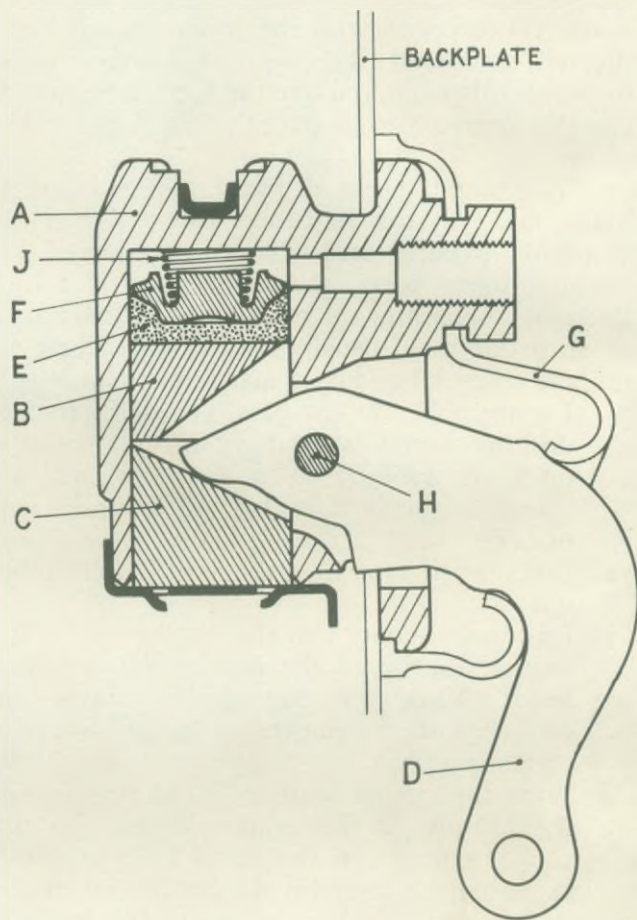


Fig. 4.

4. Assemble the brake shoes, taking care to locate the "MICRAM" adjusters in the slots in the leading tip of each shoe, with the masks in position.
5. Fit the brake drum, bleed the system (as indicated) and adjust the brake shoes (see "Brake Shoe Adjustment").
6. Check the system for fluid leakage by applying a firm pressure to the pedal and inspecting the line and connections. Fit the wheel.

REAR WHEEL CYLINDER

(See Fig. 4)

Description.

The rear wheel cylinder, which is fitted in an elongated slot in the rear backplate, is free to slide in the slot between the tips of the brake shoes which are of the leading and trailing shoe type. The cylinder has a single piston operating on the tip of the leading shoe and this shoe butts against a fixed anchor block at the bottom of the

BRAKES—Maintenance

backplate, the web of the shoe being free to slide in a slot in a block. The trailing shoe is located in a similar manner between the anchor block and the closed end of the cylinder, and is free to slide and therefore self-centring. The trailing shoe is operated by movement of the cylinder assembly as a result of the reaction of the leading shoe against the brake drum. A "MICRAM" adjuster is located in a slot in the top of the leading shoe.

The wheel cylinder (A) contains a single piston split in two, the inner piston (B) being hydraulically operated while the outer piston (C) is manually operated by the hand brake lever (D). A rubber cup (E) mounting a cup filler (F) is loaded upon the inner piston by a spring (J). When operated hydraulically, the inner piston butts against the outer piston, leaving the hand brake lever (D) undisturbed, and applies a thrust to the tip of the leading shoe through the dust cover, "MICRAM" adjuster and mask. When operated manually, an inward movement of the hand brake lever brings the heel of the lever into contact with the outer piston (C), thrusting it outwards against the leading shoe without disturbing the inner piston. A rubber boot (G) is fitted to exclude foreign matter.

Removing the rear wheel cylinder.

1. Jack up the vehicle, remove the wheel, back off all the available adjustment, disconnect the rod from the handbrake lever, then remove the brake drum.
2. Pull the trailing shoe, against the load of the pull-off springs, away from its abutment at either end; on releasing the tension of the pull-off springs the leading shoe will fall away, collect the "MICRAM" adjuster and the mask.
3. Unscrew the banjo bolt securing the banjo adaptor to the wheel cylinder, disconnect the rod from the hand brake lever (D) and remove the rubber boot (G).
4. Swing the hand brake lever until the shoulder is clear of the backplate and slide the cylinder casting forward. Pivot the cylinder about its forward end and withdraw the rear end from the slot in the backplate, a rearward movement of the cylinder will not bring its forward end clear of the backplate.

Dismantling.

Withdraw the piston (C) complete with cover from the cylinder (A). Withdraw the hand

brake lever pivot pin (H) and remove the lever (D). Apply a light air pressure to the fluid connection to expel the inner piston (B), the rubber cup (E) the cup filler (F) and the spring (J).

Assembling.

1. Fit the smaller end of the coil spring (J) over the projection in the cup filler (F) and insert both parts into the cylinder (A), spring foremost, follow up with the rubber cup (E), lip foremost, taking care not to damage or turn back the lip of the cup.
2. Insert the hydraulic piston (B), ensuring that the slot in the piston coincides with the lever slot in the cylinder casting.
3. Place the hand brake lever (D) in position and fit the pivot pin.
4. Insert the hand brake piston (C) complete with dust cover, ensuring that the lever is engaged in the slot in the piston.

Refitting the rear wheel cylinder.

1. Offer up the cylinder to the backplate with the hand brake lever through the slot. Engage the forward end of the cylinder in the slot and slide it well forward, taking care to position the lever so that its shoulder clears the backplate. Engage the rear end of the cylinder in the slot and slide it back to hold it in position. Fit the rubber boot.

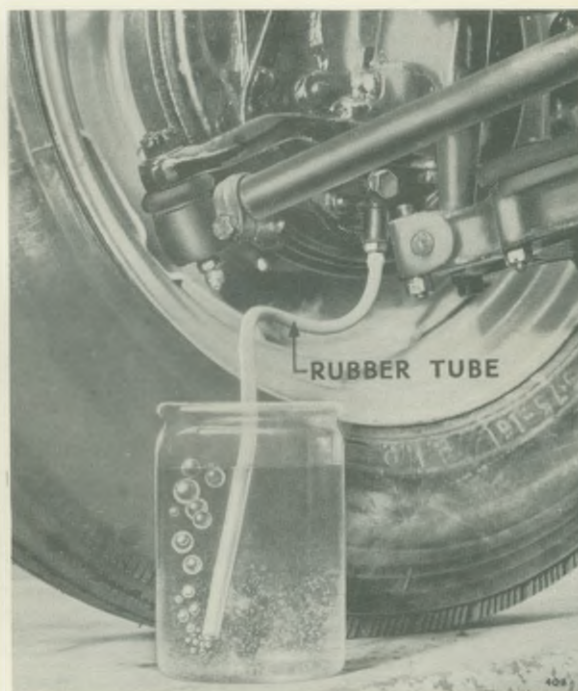


Fig. 5.

BRAKES—Maintenance

2. Mount the banjo connection on the cylinder and fit the banjo bolt with a new codper gasket.
3. Assemble the brake shoes, ensuring that the "MICRAM" adjuster is in the slot in the leading shoe with the mask in position.
4. Fit the brake drum, bleed the system (see "Bleeding the System" below) and adjust the brake shoes (see "Brake Shoe Adjustment" above).
5. Offer up the hand brake rod to the lever and fit the pin.
6. Check the system for fluid leakage by applying a firm pressure to the foot pedal and inspecting the line and connections. Fit the wheel.

Removing a flexible hose.

No attempt should be made to remove a flexible hose by turning either of the hose unions with a spanner.

1. Unscrew the tube nut from the hose union where it is attached to the frame or bracket.
2. Remove the nut and shakeproof washer securing the hose union to the frame or bracket and withdraw the hose assembly.
3. Unscrew the hose from the wheel cylinder, or unscrew the banjo bolt leaving the hose on the banjo connection.

Bleeding the system. (Fig. 5)

Bleeding the system, to expel all air, is not

a routine maintenance operation and should only be necessary when some portion of the equipment has been disconnected or fluid drained off, thereby allowing air to enter.

1. Fill the fluid reservoir of the master cylinder with Lockheed brake fluid and keep a quarter full throughout the whole of the bleeding operation, otherwise air will be drawn into the system defeating the object of the operation.
2. Attach a rubber tube to the bleeder screw on the banjo connection attached to one wheel cylinder and allow the free end of the tube to be submerged in a little fluid in a clean glass jar.
3. Unscrew the bleeder screw one complete turn.
4. Depress the brake pedal quickly and allow it to return without assistance; repeat this pumping operation, with a slight pause between each depression of the pedal. Observe the flow of fluid being discharged into the glass jar and, when all air bubbles cease to appear, hold the pedal firmly down and securely tighten the bleeder screw.
5. Repeat on all wheel cylinders.

Note: Clean fluid discharged from the system should be allowed to stand, protected from dust, for several hours until it is quite clear of air bubbles, before being used again. Dirty fluid should be discarded.

GIRLING "HI-SPOT" HYDRASTATIC BRAKES FITTED TO TRIUMPH ROADSTER (20TR).

GENERAL DESCRIPTION.

The brakes fitted to this model are the Girling 10" x 1½" "Hi-Spot" Hydrastatic.

The shoes are anchored at the bottom of the backing plate in the case of the front brake assemblies and in the case of those fitted at the rear, anchorage is at the front of the backing plate (see Figs. 5 and 6).

The brake shoes are free to float at the hydraulic expander unit, opposite to the anchor pins, and no shoe return springs are fitted. All lining wear is thus taken up by the action of the hydraulic expander unit, a bias spring being fitted adjacent to the anchor pin, to balance the pressure of the spring fitted between the tappets in the expander unit. From the foregoing remarks it will be appreciated that no adjustment should

be necessary for the front brakes and only for the hand brake, as is later explained, for the rear brakes.

The leading shoe on all four brake assemblies has a split lining, with a spring loaded high spot, which ensures that the rest of the shoe is clear of the drum; the high spot, which is of small area, being the only part of that brake liner which is in slight frictional contact with the drum.

FRONT BRAKES

Description (Fig. 5)

The front brakes are of simple construction having two brake shoes, a wheel cylinder comprising two seals separated by a spring, a pair of

BRAKES—Maintenance

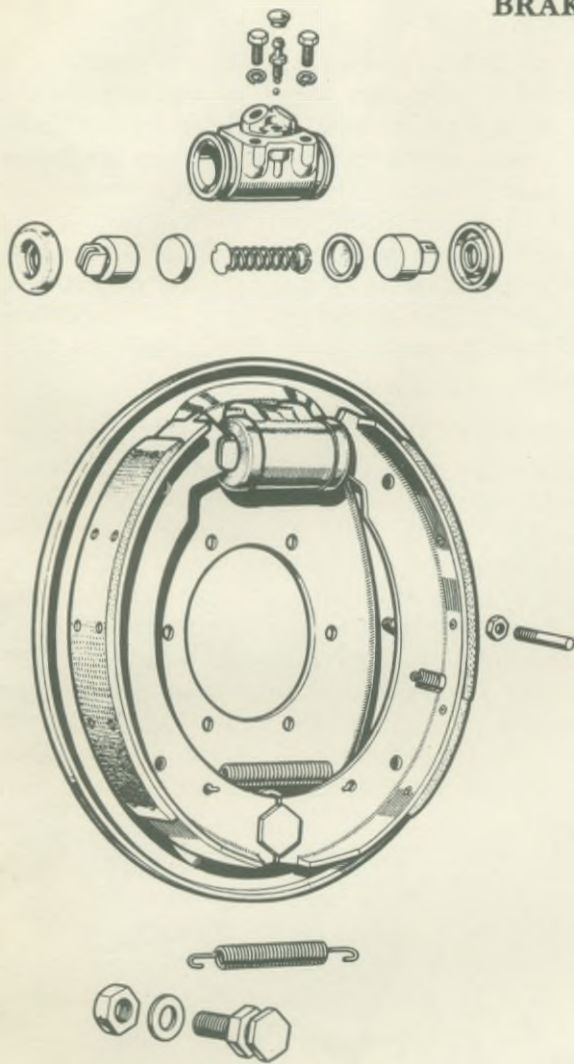


Fig. 6. Front brake arrangement

operating tappets upon which the shoe ends locate and two rubber dust covers. In addition each assembly has a pivot or anchor pin bolted to the backing plate, two steady rest posts situated under each shoe and one bias spring, which is hooked into a hole in the web of each brake shoe just short of the anchor pin.

The leading shoe is as previously explained fitted with a split lining and spring-loaded plunger.

No adjustment is provided or required as all lining wear is taken up by hydraulic action.

The pivot pin steady rest posts and shoe ends should be smeared with Girling brake grease.

REAR BRAKES

Description (Fig. 6)

The rear brakes are of slightly different

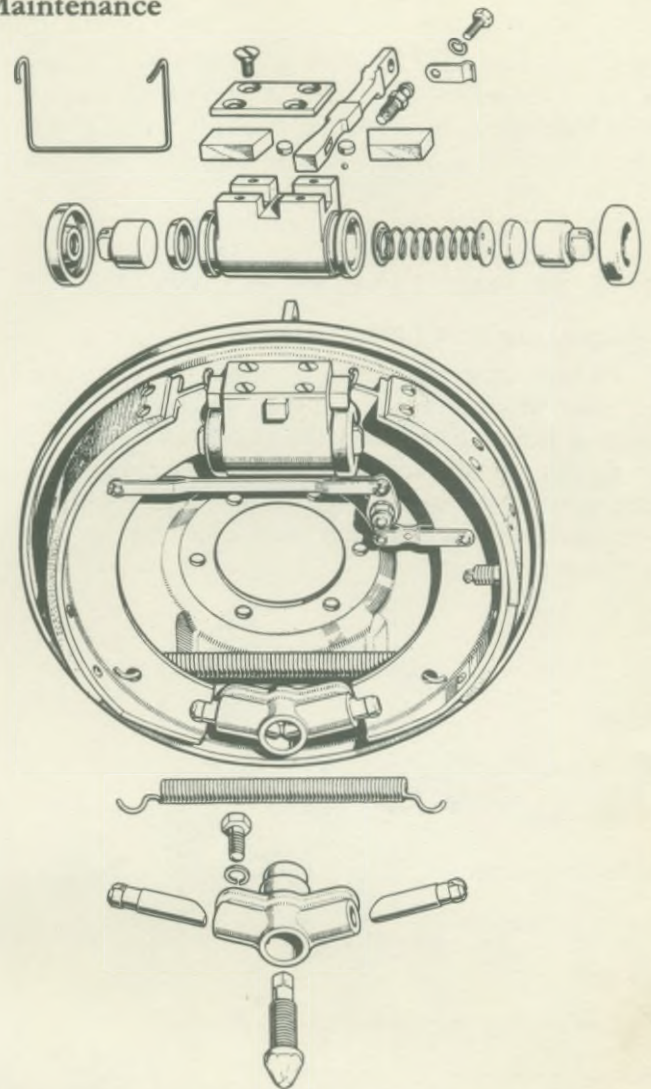


Fig. 7. Rear brake arrangement shown at right angles to its fitted position

construction to those at the front, inasmuch as they incorporate the internal mechanism for the handbrake. The wheel cylinder assembly is attached to the rear side of the backing plate, as opposed to the top with the front brakes, thus enabling the mechanically-operated handbrake to be fitted without fouling the low slung body.

Adjustment for lining wear is made at the brake shoe adjuster. This is shown in Fig. 6 and consists of a hardened steel wedge, the spindle of which is provided with a fine screw thread being mounted in a steel housing which is spigotted and bolted firmly to the back plate. On the outer extremity of the wedge spindle, flats are machined, which enables a spanner to be used, and on its inner face, four flats of a predetermined depth are cut. The wedge engages two links also accommodated in the housing and having inclined faces. On the outer end of these

BRAKES—Maintenance

links, grooves are formed in which the shoes locate. For adjustment the rotation of the wedge clockwise causes it to move inwards forcing the links apart and thus separating further the adjacent ends of the brake shoes. The adjuster should be tightened until a resistance is felt and then slackened back two clicks. **THIS ADJUSTMENT IS FOR HAND BRAKE ONLY.**

Centralizing rear brake shoes.

When centralizing new shoes, slacken off the two set bolts 1 to $1\frac{1}{2}$ turns holding the adjuster housing, expand the shoes in the drum by means of the adjuster and when expanded, fully tighten up the two set bolts. Subsequently slacken back the adjuster as described in the previous paragraph.

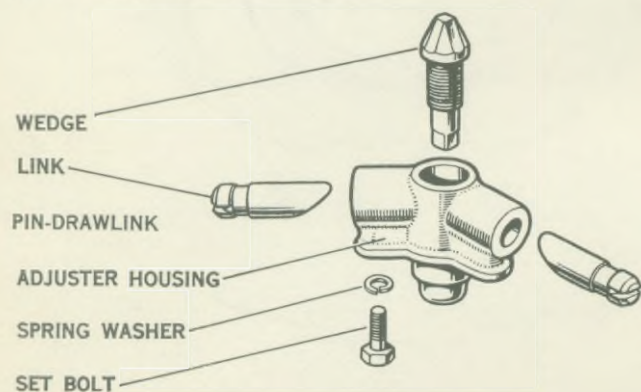


Fig. 8. Brake shoe adjuster

Brake shoe balance control (Fig. 7).

There is also incorporated in the brake a balance control for the bottom shoes. This consists of a balance beam which is fitted to a peg in the backing plate and held in position by a spring washer and Simmonds nut. The beam should be free to float on the peg for centralizing and lining wear. Connected to the beam are two links, one coupled to the bottom, or trailing shoe, and the other to the leading shoe. It is important that the link with the leading shoe is made to the longer side of the beam, the fulcrum point of which is offset, *i.e.*, $\frac{9}{32}$ " to the point of attachment for the leading shoe and $\frac{1}{2}$ " for that for the trailing one.

HANDBRAKE

The handbrake is operated by cable and rod via relay levers and compensators on the rear axle and is intended for parking purposes only.

Incorporated in the wheel cylinder is the

expander housing, Fig. 6, which consists of a hardened steel wedge which is actuated by the brake draw link, two hardened steel rollers, and two tappets which expand the shoes when the handbrake is applied. A return spring for the tappets is passed through two holes in the backing plate and held in position by clips. The whole expander mechanism is enclosed by means of a plate held to the wheel cylinder by four studs, and should be packed with GIRLING BRAKE GREASE.

Adjustment of handbrake.

To adjust the handbrake lock the shoes in the drum by means of the adjuster with the lever in the "off" position. The cables can then be set both from the handbrake control to the relay lever and from this lever to the compensator. On no account should the transverse rods be adjusted unless to deal with previous maladjustment, the longer rod should be $30\frac{3}{8}$ " and the shorter rod $14\frac{3}{8}$ ". As the lining wear and for further adjustment, lock the shoes in the drum and subsequently slacken off the adjustment two clicks.

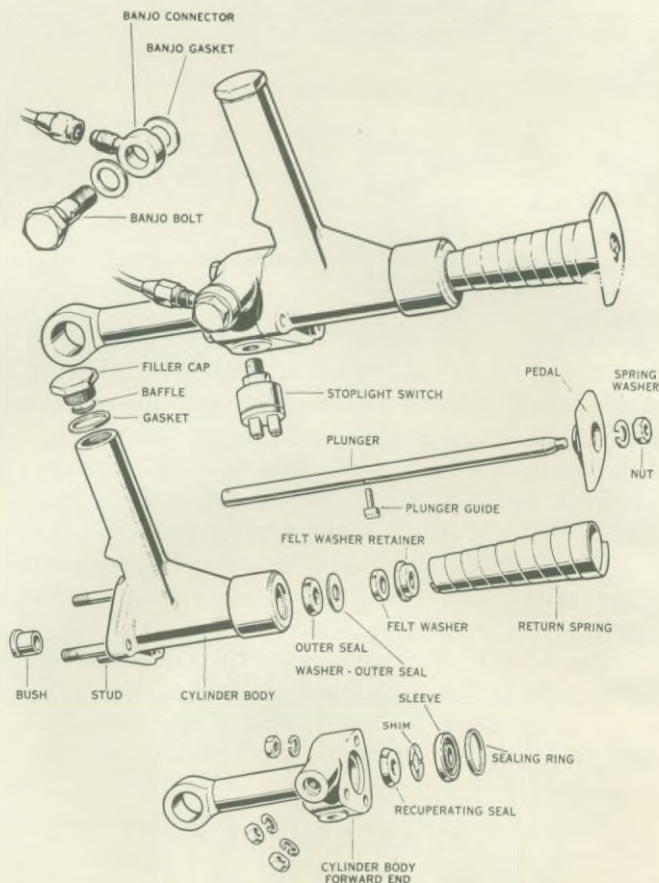


Fig. 9. Master cylinder assembly

FITTING REPLACEMENT SHOES

1. Jack up car and remove road wheels.
2. Remove brake drums.
3. Remove bias springs, taking care not to permanently extend these, and dismantle brake shoes. Whilst shoes are being changed and the backplates cleaned, it is advisable to slip a rubber band over the pistons in the hydraulic cylinder to prevent them being forced out with the consequent loss of fluid and admission of air into the system.
4. Having cleaned the backplate, fit new **FACTORY RELINED REPLACEMENT SHOES**, taking care that the bias spring between the shoe adjacent to the pivot end of the brake is refitted on the inside of the shoes. Pivot and steady posts should be lightly smeared with **GIRLING BRAKE GREASE**. Care should be taken that grease is not allowed to contact linings. Replace brake drums and road wheels and readjust brakes as previously described.
5. If, during the fitting of the shoes, fluid has inadvertently been allowed to escape from the cylinder, the system will have to be bled to expel air.

HYDRAULIC MASTER CYLINDER

This is the Girling direct acting type of unit (see Fig. 8). A particular feature of this is its position and form, the plunger carrying the pad, at its upper extremity, which is pressed by the driver's foot when it is wished to apply the brakes. The stroke and bore are so arranged that ample leverage is provided.

BLEEDING THE SYSTEM

Except for periodical inspection of the reservoir chamber in the master cylinder, no attention should be required. If, however, a joint is uncoupled at any time, or the cylinder pressure seals are inspected or replaced, then the system must be bled in order to rid it of any air admitted. Air is compressible and its presence in the system will affect the working of the brakes. The operation of bleeding the system is easy if the following sequence is carried out.

In order to bleed the brakes the following procedure should be carried out :—

1. Remove the rubber dust cover on the bleeder nipple, shown in Figs. 5 and 6, of the cylinder concerned. A length of rubber tube should be fitted over the nipple and

allowed to hang in a clean glass container half filled with Girling Crimson Brake Fluid as shown in Fig. 9.

2. Unscrew the bleeder nipple approximately three-quarters of a turn with a suitable spanner, subsequently working the pedal up and down a few times, allowing two or three seconds between each stroke. One or two strokes will cause the fluid to commence flowing but the pumping must be continued until the fluid appears entirely free from air bubbles. (See instructions below with regard to level of fluid in reservoir.)
3. Repeat this operation on each wheel.
4. The fluid reservoir should be filled before commencing the operation and must be replenished sufficiently afterwards to prevent the fluid sinking more than half-way down the reservoir, *i.e.*, approximately every five to six strokes. If the level of the fluid in the reservoir sinks to the bottom, more air will be drawn into the system and the whole operation will have to be performed again,

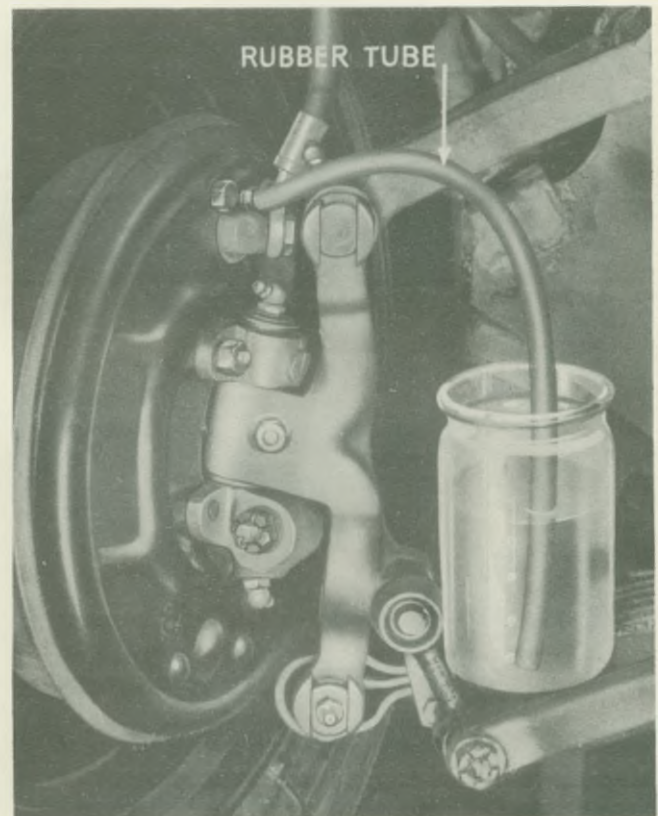


Fig. 10. Bleeding front brakes

BRAKES—Maintenance

until the air thus admitted is expelled. As soon as all air has been pumped out of the system, the bleeder nipple should be tightened up, the rubber pipe removed and the rubber dust cover refitted. After completion of "bleeding" there should be approximately $\frac{1}{8}$ " to $\frac{3}{16}$ " *free movement* at the pedal pad.

N.B.—It is important that only genuine GIRLING CRIMSON BRAKE FLUID is

used. When linings are worn down to the rivets replacement shoes should be fitted. Oil-or grease-soaked shoes should always be replaced by genuine Girling factory reconditioned parts, which have the correct type of lining and are ground to the proper radius. Girling replacement shoes may be obtained from the Standard Motor Co., Messrs. Girling, or from the latter's Service Agents or Stockists.

VANGUARD—SERIES II

BRAKES

SUPPLEMENT

TWIN BORE MASTER CYLINDER

(See Fig. 1)

Descriptive and Maintenance Notes. **Description.**

The unit consists of a body which has two identical bores, one connected to the brakes and the other to the clutch. Each of the bores accommodates a piston (9) having a rubber cup (6) loaded on to its head by a return spring (4); in order that the cup shall not tend to be drawn into the holes in the piston head, a piston washer (7) is interposed between the parts. At the inner end of the bore connected to the brakes, the return spring also loads a valve body (2), containing a rubber cup (3), against a valve seat (1); the purpose of this check valve is to prevent the return to the master cylinder of fluid pumped into the line whilst "bleeding" the brake system, thereby ensuring a charge of fresh fluid being delivered at each stroke of the brake pedal and a complete purge of air from the system.

During normal operation, fluid returning under pressure and assisted by the brake shoe pull-off springs, lifts the valve off its seat, thereby permitting fluid to return to the master cylinder and the brake shoes to the "off" position.

There is no check valve fitted in the bore connected to the clutch, this precludes the risk of residual line pressure which would tend to disengage the clutch and cause continual rubbing of the clutch carbon ring.

By-pass ports "X", which break into each bore, ensure that the systems are maintained full of fluid at all times and allow full compensation for expansion or contraction of fluid due to changes of temperature. They also serve to release additional fluid drawn into the cylinder through the small holes in the piston after a clutch or brake application. If this additional fluid is not released to the reservoir, due to the by-pass port being covered by the main cup (6) as a result of incorrect pedal adjustment, or to the hole being choked by foreign matter, pressure

will build up in the systems and the brakes will drag or the clutch tend to disengage.

Removing the master cylinder from the vehicle.

Disconnect the pipe and the hose from the master cylinder, remove the boot clips (12) and detach the two boots (13) from the boot fixing plate, leaving the push-rods and boots attached to the brake and clutch pedals. Remove the fixing bolts and detach the unit from the vehicle. Detach the cover plate (16) and drain the fluid into a clean container.

Dismantling.

The following procedure should be adopted to dismantle the master cylinder:—

1. Detach the boot fixing plate (11).
2. Withdraw the pistons (9) and the piston washers (7).
3. Apply a low air pressure at the by-pass ports "X" to blow out the rubber cups (6).
4. Tip out the return springs (4) and the check valve.
5. Ease the valve seat (1) out using a blunt hooked tool.
6. Ease the cup (3) out of the valve body (2) and the secondary cups (8) out of the pistons.

Assembling.

The following procedure should be adopted to assemble the master cylinder, using new parts where required; it is usually advisable to fit new cups throughout.

1. Fit a secondary cup (8) on each piston (9), so that the lip of the cup faces the piston head, gently work the cup round the groove with the fingers to ensure that it is properly seated.
2. Place the valve seat (1) in the bottom of the right-hand bore (looking from the open end of the master cylinder).
3. Ease the rubber cup (3) into the valve body

(2) and fit the body in one end of a return spring (4), fit a spring retainer (5) on the other end of the spring and insert the assembly, valve leading, into the bore which has the valve seat.

4. Fit the other spring retainer on the second return spring and insert the spring, plain end leading, into the other bore.
5. Insert a main cup (6), lip leading, into each bore, taking care not to damage or turn back the lip of the cup. Follow up with the piston washers (7), ensuring that the curved edges are towards the cup.
6. Insert the two pistons (9), taking care not to turn back or damage the lips of the secondary cups.
7. Secure the boot fixing plate (11) and a new gasket (10), using the two cheese-headed screws.
8. Spring the baffle plate into position inside the tank, if removed whilst dismantling, and secure the cover plate (16) and a new gasket (18), using the four hexagon-headed bolts.
9. Remove the filler cap (17) and fill the tank with clean Lockheed brake fluid to within half an inch of the filler orifice. Re-fit the filler cap.
10. Test the master cylinder by pushing each piston inwards and allowing it to return

unassisted; after a few applications fluid should flow from the outlet connections.

Refitting the master cylinder.

1. Insert the push-rods (15) into the pistons and fit the boots (13) on to the boot fixing plate and push rods, using the boot clips (12) and (14), ensuring that the vent hole in each boot is at the bottom. If the boots are damaged or perished, they should be replaced by the new ones.
2. Attach the master cylinder to the mounting bracket.
3. Check the brake pedal and clutch pedal adjustment and fit the hose and the pipe to the master cylinder. **IMPORTANT:—** THE CLUTCH HOSE MUST BE ATTACHED TO THE CONNECTION IN THE BORE WHICH HAS NO CHECK VALVE (i.e., THE LEFT-HAND BORE, LOOKING FROM THE PUSH-ROD END).
4. Top up with fluid to within half an inch of the filler orifice "bleed" the system and check for leakage by applying a firm pressure to the brake pedal and clutch pedal and inspecting the "line" and connections.

Bleeding.

As for normal type master cylinder and braking system.

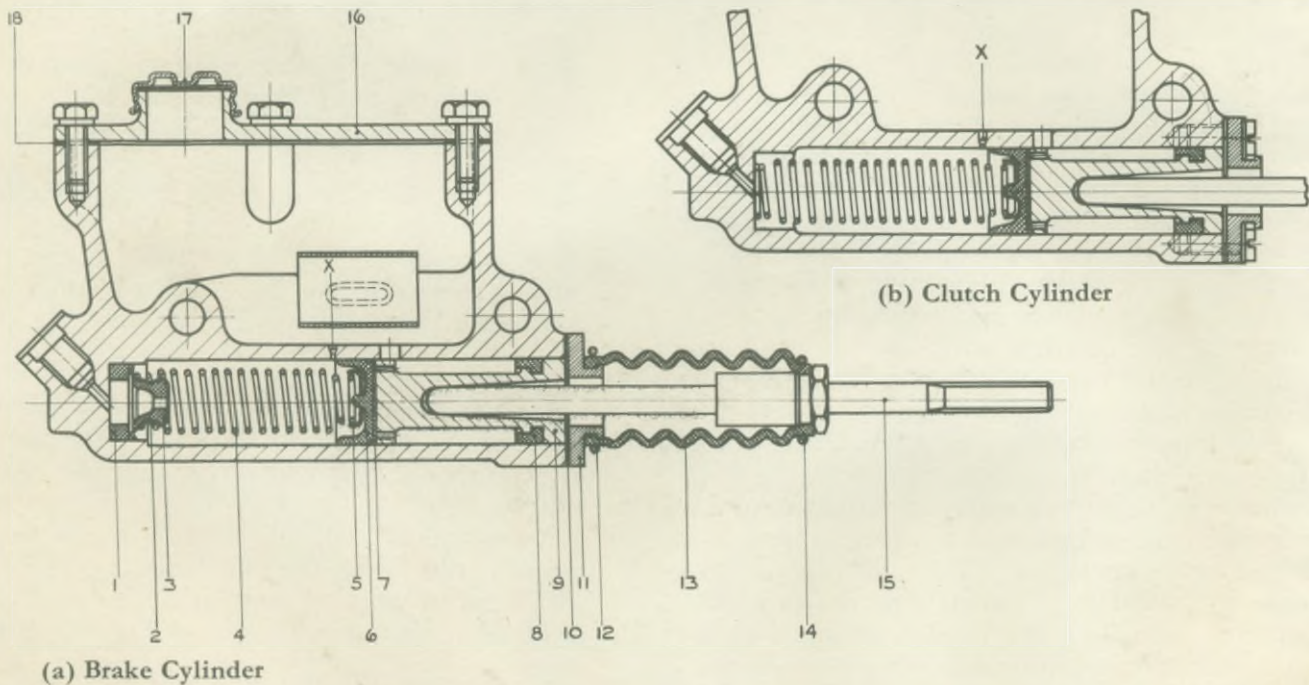


Fig. 1. Sectional view of Twin Bore Master Cylinder