SECTION M

THE BRAKING SYSTEM

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GENERAL DESCRIPTION

The brakes on all four wheels are hydraulically operated by pedal directly coupled to a master cylinder in which the hydraulic pressure of the brake operating fluid is generated. A supply tank cast integrally with the

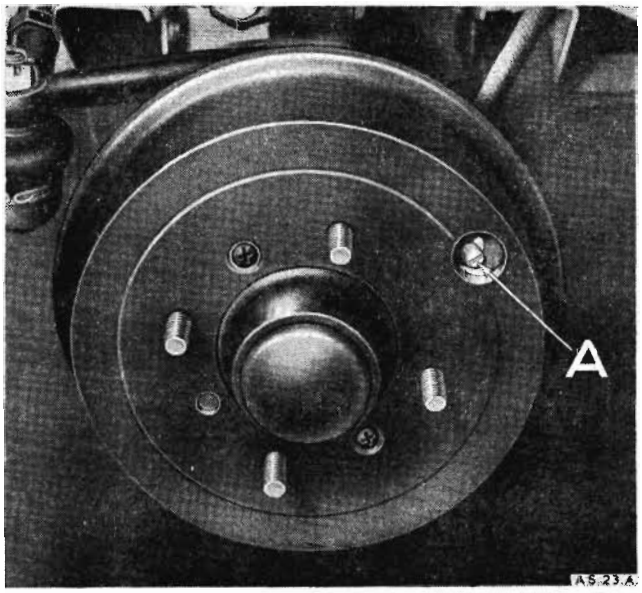


Fig. M.1
Showing front brake-drum with one of the brake-shoe adjusters (A)

master cylinder replenishes the fluid, and a pipe line consisting of tubes and flexible hoses interconnects the master cylinder and wheel cylinders.

The pressure generated in the master cylinder by application with the foot pedal is transmitted with equal and undiminished force to all wheel cylinders simultaneously. This moves the pistons outwards, which in turn expand the brake-shoes, thus producing automatic equalization and efficiency in direct proportion to the effort applied at the pedal.

When the pedal is released the brake-shoe springs return the shoes, which then return the wheel cylinder pistons, and therefore the fluid, to the pipe lines and master cylinder.

An independent mechanical linkage, actuated by a hand brake mounted alongside the propeller shaft tunnel, operates the rear brakes by mechanical expanders attached to the rear wheel cylinder bodies.

The front brakes are of the two-leading-shoe type with sliding shoes, which ensure automatic centralization of the brake-shoe in operation.

The rear brakes are also fitted with sliding shoes.

Section M.1

BRAKE MAINTENANCE

Periodically examine the quantity of brake fluid in the master cylinder. The level should be kept ½ in. (13 mm.) below the bottom of the filler neck, but not higher. The necessity for frequent topping up is an indication of overfilling or a leak in the system which should at once be traced and rectified.

IMPORTANT.—Serious consequences may result from the use of incorrect fluids, and LOCKHEED GENUINE BRAKE FLUID or a fluid conforming to Specification S.A.E. 70.R3 must be used. This fluid has been specially prepared and is unaffected by high temperature or freezing.

Adjust the brake-shoes to compensate for wear; the need for this is shown by excessive pedal travel before solid resistance is felt. For brake adjustments see Sections M.2 and M.3.

Section M.2

BRAKE-SHOE ADJUSTMENTS

The brakes are adjusted for lining wear **only** at the shoes themselves, and on no account should any alteration be made to the hand brake cable for this purpose.

Front brakes

A separate Micram adjuster is provided for each shoe. Jack up the car until the wheel concerned is clear of the ground. Remove the wheel disc and rubber dust plug from the adjusting hole. Rotate the wheel until the adjusting hole comes opposite one of the adjusters (located at eight and two o'clock). 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 correct clearance between the shoe and the drum. If closer adjustment is required, spin the drum and apply the brakes hard; this will correctly position the shoe, after which a further adjustment check should be made. Repeat these operations on the second adjuster. Adjust the other wheel shoes in similar manner.

Rear brakes

Place chocks under one of the front wheels and release the hand brake. Proceed as for the front brake adjustment

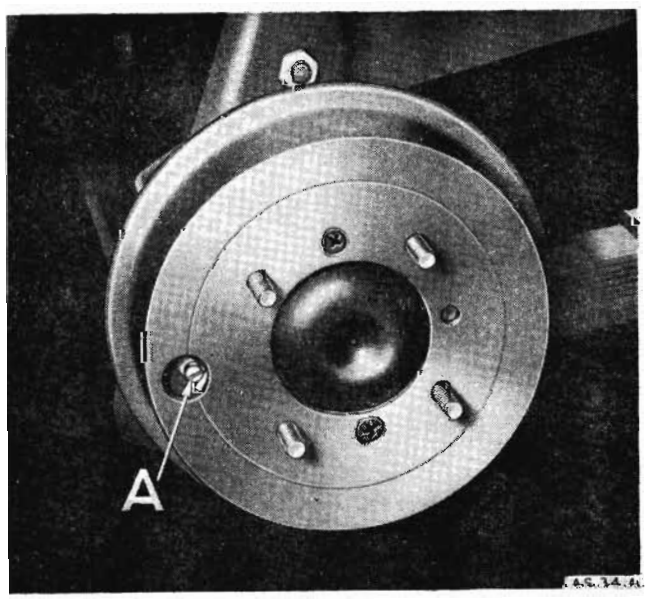


Fig. M.2
Showing rear brake-shoe adjuster (A)

but note that there is only one shoe adjuster for each rear wheel, and that it may be necessary to back off two notches to provide clearance for the two shoes.

Section M.3

HAND BRAKE ADJUSTMENT

The hand brake operates on the rear wheels only and is applied by a pull-up-type lever situated on the side of the propeller shaft tunnel. The Bowden cable from the control is attached to the compensator mounted on the rear axle. From compensator to the brake levers are transverse rods, which are non-adjustable.

Should the hand brake lack power or the lever show signs of reaching the end of its travel on the ratchet before the brake-shoes come into operation, readjustment is necessary; this will also be indicated by excessive pedal travel.

First make sure that the shoes are properly adjusted by means of the shoe adjusters as explained in Section M.2. This is most important.

Check the hand brake action, and if excessive travel still prevents proper application of the brakes it is probable that the brake-shoe linings are worn, or in exceptional cases the cables have stretched.

Examine the brake-shoe linings, and if worn renew or reline them if replacement shoes are not available.

The hand brake linkage is set when leaving the Works and should not require any attention. Only when a complete overhaul is necessary should the hand brake linkage require resetting.

To adjust the hand brake the rear shoes should be locked to the drums, the hand brake control just slightly applied, and the cable slackness just removed by adjusting the sleeve nut at the rear of the Bowden cable (Fig. M.4).

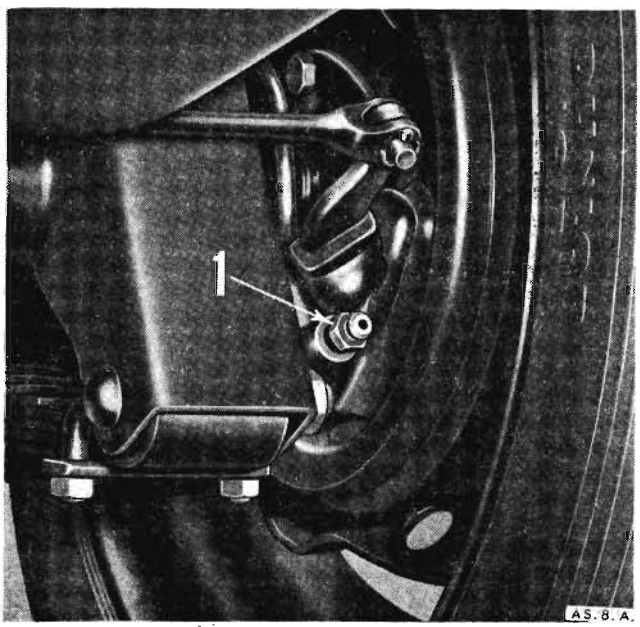


Fig. M.3
Illustrating a rear brake bleed nipple (1)

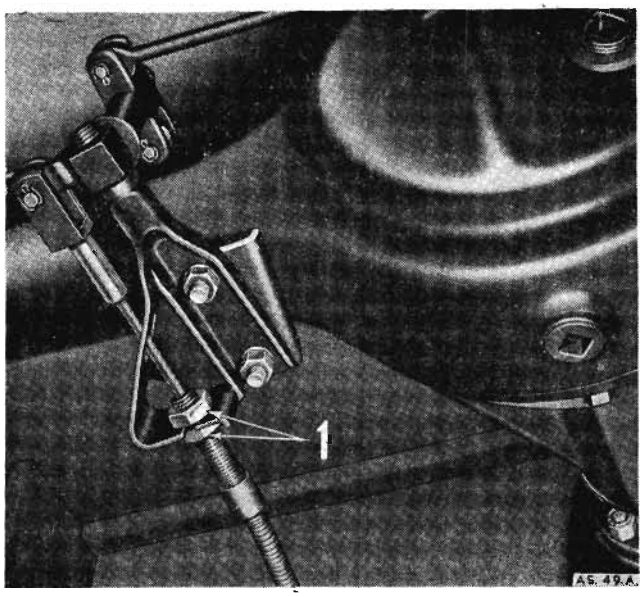


Fig. M.4
Shows location of hand brake cable adjustment (1) *on the rear axle*

The hand brake mechanism is lubricated by two grease nipples, one on the compensating mechanism and the other on the Bowden cable.

Section M.4

BLEEDING THE HYDRAULIC SYSTEM

Bleeding is necessary after any of the hydraulic lines or unions have been disconnected, or if the level of the brake fluid has been allowed to fall so low that air has entered the master cylinder.

With all the hydraulic connections secure and the supply tank topped up with the fluid, remove the rubber cap from the rear bleed nipple which is farthest away from the master cylinder and fit the bleed tube over the bleed nipple, immersing the free end of the tube in a clean jar containing a little brake fluid.

Unscrew the bleed nipple about three-quarters of a turn and then operate the brake pedal with a slow, full stroke until the fluid entering the jar is completely free of air bubbles. Then, during a down stroke of the brake pedal, tigthen the bleed screw sufficiently to seat the ball, remove the bleed tube, and replace the bleed nipple dust cap. **Do not use excessive force when tightening the bleed screws.**

Repeat this process with each bleed screw at each of the three remaining backplates, finishing at the wheel nearest the master cylinder. Always keep a careful check on the supply tank during bleeding since it is most important that a full level be maintained. Should air reach the master cylinder from the supply tank, the whole of the bleeding operation must be repeated.

After bleeding, top up the supply tank to its correct level.

Never use fluid that has just been bled from a brake system for topping up the supply tank, as this brake

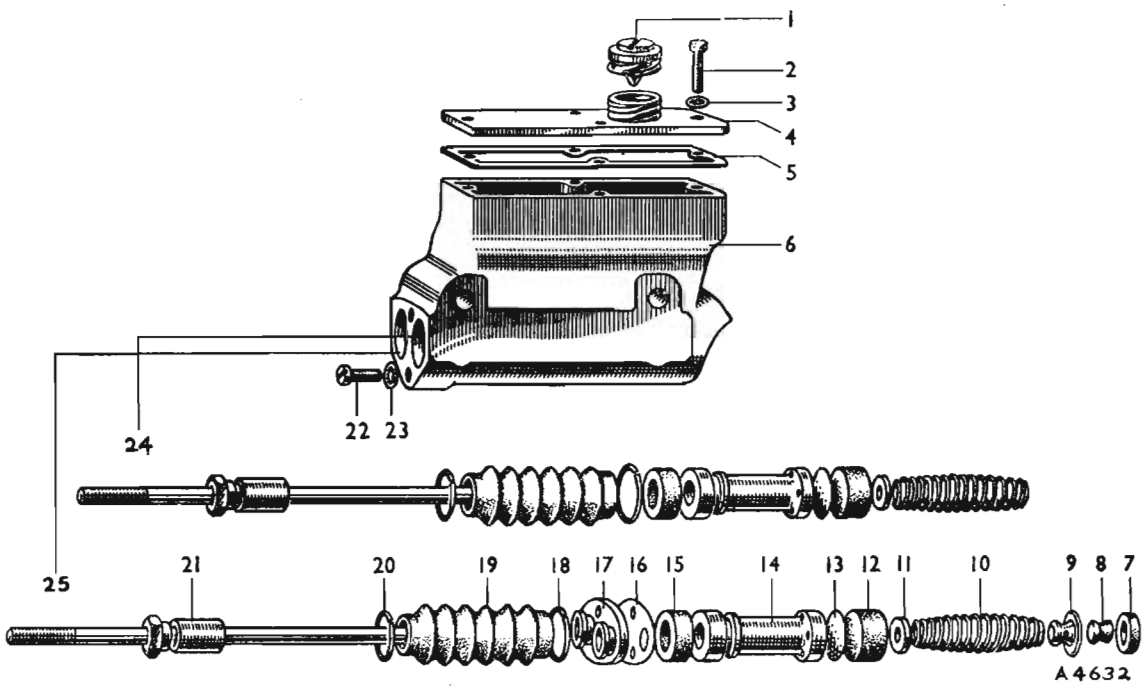


Fig. M.5

The master cylinder exploded

1. Filler cap.
2. Fixing screw.
3. Shakeproof washer.
4. Tank cover.
5. Tank cover gasket.
6. Cylinder barrel and tank.
7. Valve washer.
8. Valve cup.
9. Valve body.
10. Return spring.
11. Spring retainer.
12. Main cup.
13. Piston washer.
14. Piston.
15. Secondary cup.
16. Gasket.
17. Boot fixing plate.
18. Boot clip.
19. Boot.
20. Boot clip.
21. Push-rod.
22. Fixing screw.
23. Shakeproof washer.
24. Clutch bore.
25. Brake bore.

fluid may be to some extent aerated. Such fluid must be allowed to stand for **at least** 24 hours before it is used again. This will allow time for the air bubbles in the fluid to disperse.

Great cleanliness is essential when dealing with any part of the hydraulic system, and especially so where the brake fluid is concerned. Dirty fluid must never be added to the system.

Section M.5

MASTER CYLINDER

Construction

The master cylinder caters for operation of both brakes and clutch. It has two bores which are side by side and, except for the fact that one has no check valve, each bore accommodates normal master cylinder parts. The bore with the check valve serves the brakes, the other serves the clutch slave cylinder.

Removing

The following removal procedure involves the withdrawal of the master cylinder unit complete with clutch and brake pedals as it is not necessary to disconnect the pedals.

NOTE.—Before disconnecting the master cylinder ascertain, for assembly purposes, which bore communicates with the clutch slave cylinder.

Remove the heater blower unit (if fitted) by first releasing the two electrical connections, and then remove the set screws securing the heater blower bracket to the bulkhead. Remove the set screws securing the master cylinder mounting plate to the engine bulkhead. Disconnect the two hydraulic pipes at their unions with the rear of the master cylinder unit. Withdraw the master cylinder unit upwards and at the same time manipulate the clutch and brake pedals through the hole in the bulkhead.

Dismantling

Disconnect each pedal from its master cylinder push-rod by removing the spring clips and withdrawing the clevis pins.

Remove the bolts securing the master cylinder unit to its mounting plate and withdraw the complete unit.

Remove the set screws securing the boot fixing plate to the master cylinder.

Detach the fixing plate from the master cylinder and remove the boots and push-rods.

Remove the common filler cap and drain the fluid into a clean container.

Withdraw the piston, piston washer, main cup, return spring and valve body complete with rubber cup, and rubber washer.

Remove the secondary cup by stretching it over the end flange of the piston.

Examine all parts, especially the washers, for wear or distortion, and fit new parts where necessary.

Reassembling

Reassembly is the reverse of the removal procedure, with particular attention being paid to the fitting of the rubber boots. The vent hole in each boot should be at the bottom when the cylinder is mounted on the vehicle.

Refitting

The installation of the master cylinder unit is the reversal of the removal procedure.

If no further maintenance is necessary, remember to bleed the system.

Section M.6

BRAKE PEDAL

Removing

Working beneath the bonnet, disconnect the clutch and brake pedal levers from the master cylinder push-rods by removing the spring clips and withdrawing the clevis pins. From within the car, remove the nut and spring washer and withdraw the fulcrum pin. Note that a distance piece separates the two pedals. The pedals can now be removed.

The pedals together with the master cylinder assembly can be removed as one unit. This operation is described in the master cylinder removal section.

Refitting

When refitting reverse the removal procedure.

Section M.7

FRONT BRAKE ASSEMBLIES

Removing

Disconnect the hydraulic pipe from the master cylinder at the backplate.

Remove the front brake backplate from the front suspension as described in Section K.2.

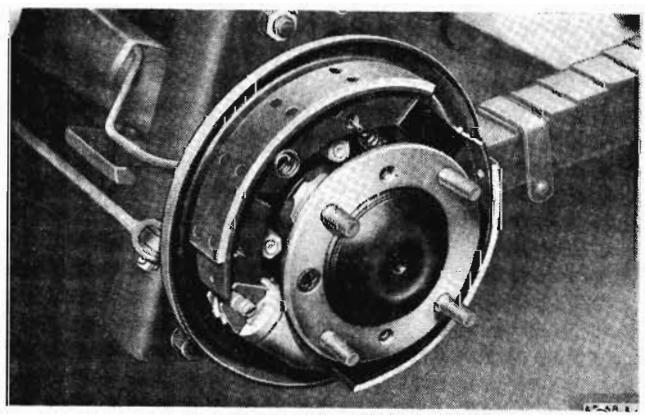


Fig. M.6
The rear brake assembly

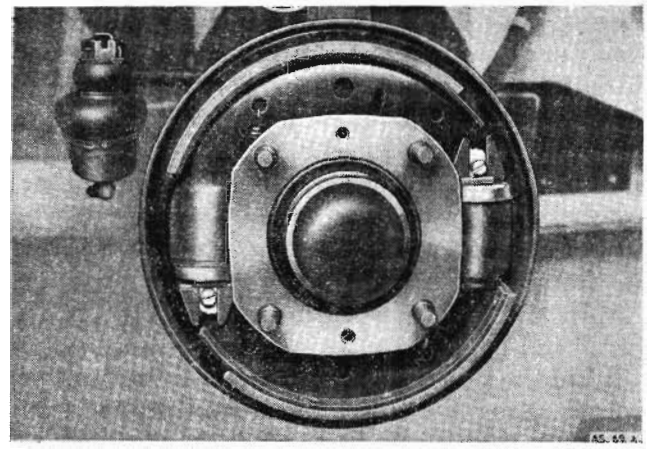


Fig. M.7
The front brake assembly

Dismantling

Pull one of the brake-shoes against the load of the return springs, away from the abutment on the closed end of a brake cylinder, and slide the Micram mask off the piston cover of the operating cylinder; on releasing the tension of the return springs the opposite brake-shoe will fall away.

Disconnect the bridge pipe between the two brake cylinders complete with the banjo adaptors. Unscrew the nuts and withdraw the brake cylinders from the backplate.

To dismantle a brake cylinder withdraw the piston complete with the piston cover from the cylinder and apply a gentle air pressure to the fluid connection to blow out the rubber cup and cup filler.

Reassembling

Clean all components with Lockheed Brake Fluid and renew all rubber cups and washers before reassembly. Take care to fit the small end of the coil spring over the projection in the cup filler.

Reassemble by reversing the dismantling sequence.

Refitting

Reverse the removal procedure when refitting.

Section M.8

REAR BRAKE ASSEMBLIES

Removing

Remove the wheel, drum, and axle shaft as described in Section H.2. Remove the hub assembly (see Section H.3).

Disconnect the hydraulic pipe from the wheel cylinder and the hand brake lever rod, both situated at the back-plate.

Remove the securing nuts and bolts and lift off the backplate.

Dismantling

Pull the trailing shoe against the load of the return springs and away from its abutment at either end. On

releasing the tension of the return springs the leading shoe will fall away together with the Micram adjuster and mask. Remove the bolt securing the banjo adaptor to the wheel cylinder and remove the rubber boot.

Remove the wheel cylinder piston, 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 now bring its forward end clear of the backplate.

Withdraw the piston complete with cover from the cylinder. Remove the hand brake pivot pin and lever. Apply a gentle air pressure to the fluid connection and blow out the hydraulic piston, rubber cup, and cup filler.

Reassembling

Reassemble by reversing the dismantling procedure, giving special care to ensure that the slot in the piston coincides with the lever slot in the cylinder casting.

Also ensure that the Micram adjuster is in the slot in the leading shoe with the mask in position, and that the return springs lie between the brake-shoes and the backplate. It should be noted that the unlined end of the leading shoe is to be nearest to the brake cylinder, whilst the unlined end of the trailing shoe is to be nearest the abutment block.

Refitting

Before reversing the removal procedure ensure that all the adjusters are backed off.

Section M.9

BRAKE-SHOE RELINING

If it becomes necessary to renew the full set of brake linings due to excessive wear it is essential to use the same material as originally specified or of an approved alternative, otherwise the present front-to-rear brake balance will be adversely affected.

Do not reline the brake-shoes with different types of lining.

Any divergence from these stipulations may give rise to serious consequences due to out-of-balance braking.

For information as to approved lining materials refer to **'GENERAL DATA'.**

Owing to the need for the brake linings to be perfectly concentric with the brake-drums, special precautions must be taken when relining the shoes. It is not recommended that relining be undertaken unless all the specialist facilities are available. We advise the use of replacement shoes, and renewal should be carried out in sets to ensure even braking conditions.

After riveting the new linings to the brake-shoes it is essential that any high-spots should be removed before replacement on the backplate.

When new linings are fitted considerable adjustment must be made to the foot brake mechanism; turn the adjusters to their fully 'off' position before attempting to refit the brake-drums over the new linings. The hand brake must also be in the fully released position.

Do not allow grease or paint to come into contact with the brake linings.

Section M.10

REMOVING A FLEXIBLE HOSE

Do not attempt to release a flexible hose by turning either end with a spanner; it should be removed as follows.

Unscrew the metal pipe line union nut from its connection to the hose.

Hold the hexagon on the flexible hose and remove the locknut securing the flexible hose union to the bracket.

Unscrew the flexible hose from the cylinder.