

SECTION M

THE BRAKING SYSTEM

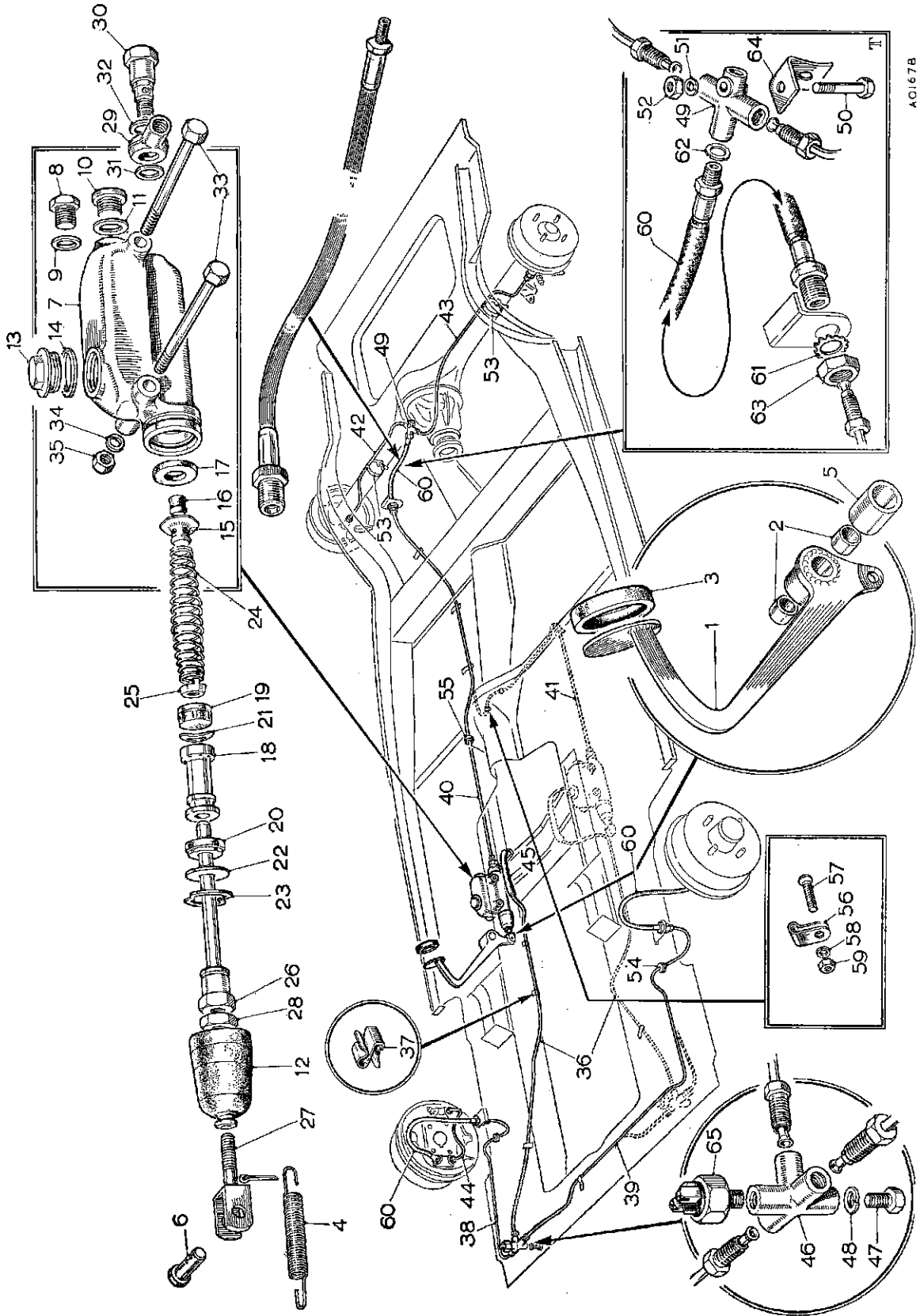
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ARRANGEMENT OF HYDRAULIC BRAKE SYSTEM



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KEY TO ARRANGEMENT OF HYDRAULIC BRAKE SYSTEM

No.	Description	No.	Description	No.	Description
1.	Brake pedal.	22.	Washer for retainer.	44.	Pipe—cylinder bridge.
2.	Bush for pedal shaft.	23.	Clip for retainer.	45.	Sleeve—pipe protecting (rubber).
3.	Rubber pad.	24.	Piston return spring.	46.	Three-way piece (front).
4.	Return spring.	25.	Retainer.	47.	Screw for front three-way piece.
5.	Spacer.	26.	Push-rod.	48.	Spring washer for screw.
6.	Clevis pin to master cylinder.	27.	Yoke—push-rod.	49.	Three-way piece for rear axle.
7.	Master cylinder and tank.	28.	Locknut for yoke.	50.	Bolt for rear axle three-way piece.
8.	Drain plug (earlier).	29.	Banjo connection.	51.	Spring washer for nut.
9.	Gasket (earlier).	30.	Bolt for banjo connection.	52.	Nut for bolt.
10.	Drain plug (later).	31.	Gasket for banjo bolt (small).	53.	Strap—pipe to rear axle.
11.	Gasket (later).	32.	Gasket for banjo bolt (large).	54.	Grommet for front wheel arch.
12.	Rubber boot.	33.	Bolt—master cylinder to frame.	55.	Grommet for centre cross-member.
13.	Filler plug.	34.	Spring washer for nut.	56.	Clip—pipe to cross-member.
14.	Gasket.	35.	Nut for bolt.	57.	Screw for clip.
15.	Body—valve assembly.	36.	Pipe—master cylinder to three-way front.	58.	Spring washer for nut.
16.	Cup—valve assembly.	37.	Clip—pipe to longitudinal member.	59.	Nut for screw.
17.	Washer—valve assembly.	38.	Pipe—three-way to R.H. front.	60.	Hose.
18.	Piston.	39.	Pipe—three-way to L.H. front.	61.	Washer.
19.	Cup—main.	40.	Pipe—master cylinder to rear hose.	62.	Gasket.
20.	Cup—secondary.	41.	Pipe—master cylinder to rear hose (L.H.D.).	63.	Locknut.
21.	Washer—dished.	42.	Pipe—hose to R.H. rear.	64.	Bracket for rear hose.
		43.	Pipe—hose to L.H. rear.	65.	Switch for stop-light.

GENERAL DESCRIPTION

The Lockheed hydraulic brake operating equipment comprises a combined fluid supply tank and master cylinder, in which the hydraulic pressure is generated, and wheel cylinders which operate the brake-shoes. Steel pipe lines, unions, and rubber hoses convey the hydraulic pressure from the master cylinder to each wheel cylinder.

Each brake-shoe on the front wheels has a separate wheel cylinder and thus provides two leading shoes. On the rear wheels a single wheel cylinder, operated both hydraulically and mechanically, floats on the brake-plate and operates the two shoes, giving one leading and one trailing shoe to provide adequate braking in reverse.

MASTER CYLINDER

The master cylinder is mounted on the driver's side of the car underneath the gearbox cover.

Within the cylinder is a piston, backed by a rubber cup, normally held in the 'off' position by a piston return spring. Immediately in front of the cup when it is in the 'off' position is a compensating orifice connecting the cylinder with the fluid supply. This port allows free compensation for any expansion or contraction of the fluid, thus ensuring that the system is constantly filled; it also serves as a release for additional fluid drawn into the system during brake applications. Pressure is applied to the piston by means of the push-rod attached to the brake pedal. The push-rod is adjustable and should have a slight clearance when

Fig. M.1 (right)

Diagrammatic illustration of the hydraulic brake system of the Morris Minor, showing the relative disposition of the component parts

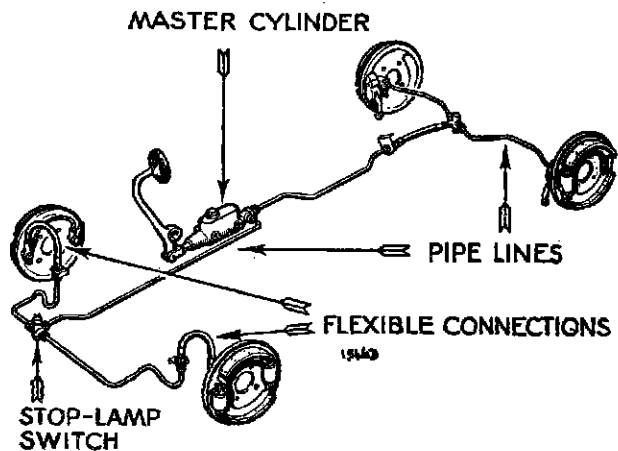
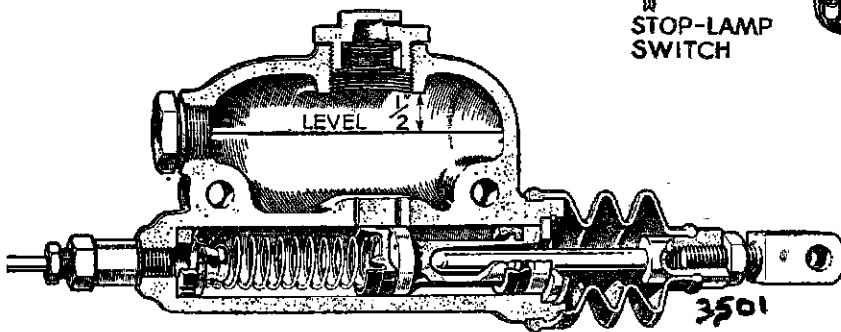


Fig. M.2 (left)

The master cylinder in section, showing its components and construction. The correct level for the hydraulic fluid is also shown clearly



MAINTENANCE

Periodically examine the quantity of brake fluid in the master cylinder. The level should be kept $\frac{1}{2}$ in. (13 mm.) below the bottom of the filler neck, but not higher. The necessity of frequent topping up is an indication of overfilling or a leak in the system which should at once be traced and rectified.

Adjust the brake-shoes to compensate for wear of the linings. For 'PREVENTIVE MAINTENANCE' see Section M.27.

the system is at rest to allow the piston to return fully against its stop. Without this clearance the main cup will cover the by-pass port, causing pressure to build up within the system and produce binding of the brakes on all wheels. The reduced skirt of the piston forms an annular space which is filled with fluid from the supply tank via the feed hole. Leakage of fluid from the open end of the cylinder is prevented by the secondary cup fitted to the flange end of the piston. On releasing the brake pedal after application the piston is returned quickly to its stop by the return spring, thus creating a vacuum in

the cylinder; this vacuum causes the main cup to collapse and pass fluid through the small holes in the piston head from the annular space formed by the piston skirt. This additional fluid finds its way back to the reserve supply under the action of the brake return springs, when the system finally comes to rest, through the outlet valve and compensating orifice. If the compensating orifice is covered by the piston cup when the system is at rest pressure will build up as a result of the brake application. The combination inlet and outlet check valve in the head of the cylinder is provided to allow the passage of fluid under pressure from the master piston into the pipe-lines, and controls its return into the cylinder, so that a small pressure of approximately 8 lb./sq. in. (.56 kg./cm.²) is maintained in the pipe-lines to ensure that the cups of the wheel cylinders are kept expanded; it also prevents fluid pumped out from the cylinder when "bleeding" from returning to the cylinder, thus ensuring a fresh charge being delivered at each stroke of the pedal. The open end of the cylinder is sealed by a rubber boot.

Section M.1

ADJUSTMENT OF THE BRAKE PEDAL

The correct amount of free movement between the master cylinder push-rod and piston is set during the erection of the vehicle and should never need alteration.

In the event of the adjustment having been disturbed, adjust the effective length of the rod connecting the

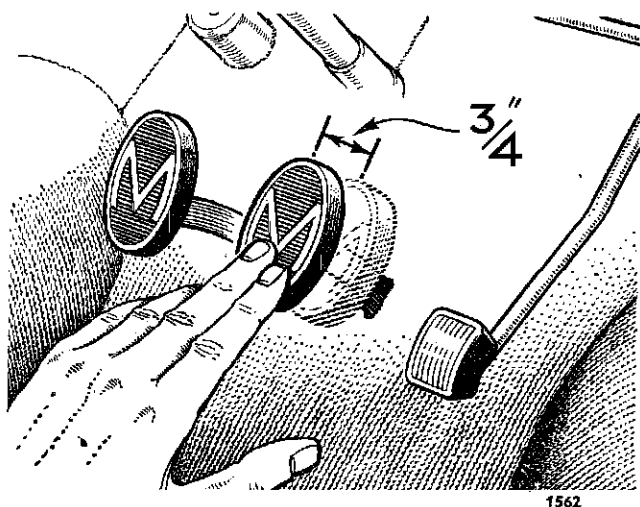


Fig. M.3

There must be 3/4 in. (19 mm.) of free movement at the pedal pad before resistance is felt. When this free movement becomes excessive and the pedal can be depressed so that it is close to the floorboard the need for adjustment is evident

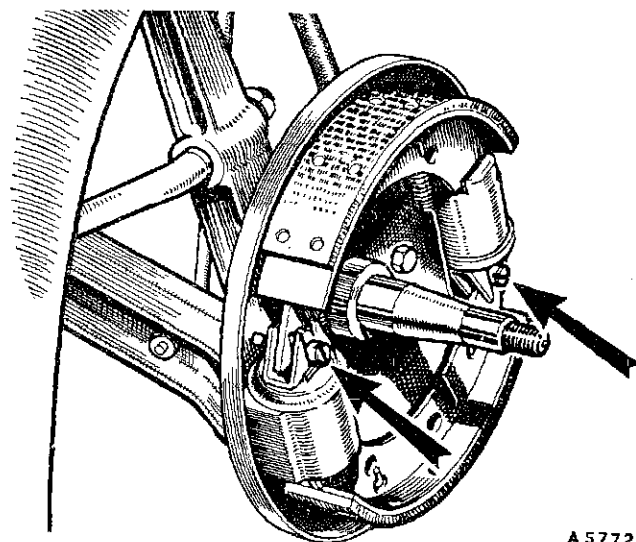


Fig. M.4

The front brake-shoes are adjusted by engaging the adjusting screws with a screwdriver through the holes provided in the brake-drum. There are separate adjusters for each shoe. On some models access to the adjusters can be obtained through a hole in the wheel closed by a rubber plug (see Fig. M.18)

cylinder to the pedal until the pedal pad can be depressed approximately 3/4 in. (19 mm.) before the piston begins to move. The clearance can be felt if the pedal is depressed by hand.

NOTE.—Before making any alteration it is important to ensure that neither the floorboard nor the floor carpet obstructs the pedal and that the piston has not stuck in the cylinder bore. In either case a false impression will be given, even though the adjustment is correct.

Section M.2

BRAKE-SHOE ADJUSTMENTS

When lining wear has reached a point where the pedal travels to within 1 in. (25 mm.) of the floorboards when the brakes are applied heavily it is necessary to adjust the brake-shoes.

Use the special jack provided in the tool kit to raise the wheel which is to be adjusted, placing suitable blocks beneath the wheels remaining in contact with the ground.

Front brakes

Remove the front hub cap and road wheel on earlier models or the rubber plug from the access hole in the wheel disc of later models, then rotate the brake-drum until both adjustment screws are visible through the holes provided in the face of the brake-drum. With a screwdriver turn the screws as far as they will go in a clockwise direction until the drum is locked solid, then

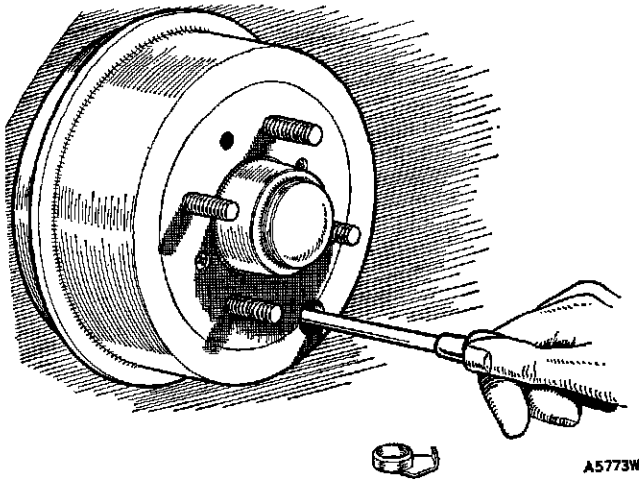


Fig. M.5

The rear brake-shoes are adjusted with a screwdriver through the hole in the brake-drum in a similar manner to the front brakes, but there is only one adjuster for both shoes and this adjusts the hand brake at the same time. Some models are fitted with an access hole in the wheel (see Fig. M.18)

turn them anti-clockwise **one** notch only. The brake-drum should then be free to rotate without the shoes rubbing, and the adjustment on this wheel is complete. The brake-shoes on the other front wheel must be adjusted by the same method.

Rear brakes

The procedure is similar to that detailed for the front brakes except that there is only one adjuster, and this controls both shoes.

Section M.3

TO BLEED THE SYSTEM (Expel Air)

Bleeding the system is not a routine maintenance job and should only be necessary when some portion of the hydraulic equipment has been disconnected or the fluid drained off.

Fill the master cylinder with Lockheed Super Heavy Duty Brake Fluid (if this fluid is not available an alternative fluid conforming to S.A.E. Specification 70.R3 should be used) and keep it at least half-full throughout the operation, otherwise air will be drawn into the system, necessitating a fresh start.

Attach the bleeder tube to the wheel cylinder bleeder screw and allow the free end to be submerged in a small quantity of fluid in a clean glass jar.

Open the bleeder screw one full turn.

Depress the brake pedal quickly and allow it to return without assistance. Repeat this pumping action with a slight pause before each depression of the pedal.

Watch the flow of fluid into the glass jar, and when air bubbles cease to appear hold the pedal firmly against the floorboards while the bleeder screw is securely tightened.

Repeat the operation on each wheel.

NOTE.—Clean fluid bled from the system must be allowed to stand until it is clear of air bubbles before it is used again. Dirty fluid should be discarded.

Section M.4

REMOVING THE MASTER CYLINDER

Lift out the front carpet and driving seat.

Remove the gear lever knob and rubber cover. Extract the brass bolts securing the floor panel above the gearbox and remove the panel.

Remove the torsion bar from the master cylinder side of the car (see Section K.2).

Remove the two bolts securing the master cylinder in the frame. (Note that they have special heads.)

Detach the return spring and remove the split pin and Belleville washer from the rear end of the clutch operating rod.

Slacken the nut on the clutch pedal lever cotter pin and tap the cotter pin from its seating. Remove the nut and withdraw the cotter pin.

Disconnect the speedometer cable from the gearbox drive.

Withdraw the clutch and brake pedal cross-shaft and lift out the clutch pedal.

Disconnect the front and rear brake supply pipes from the banjo union at the rear of the master cylinder.

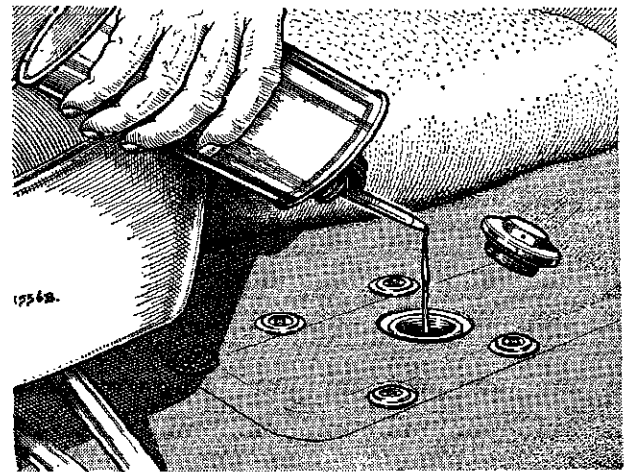
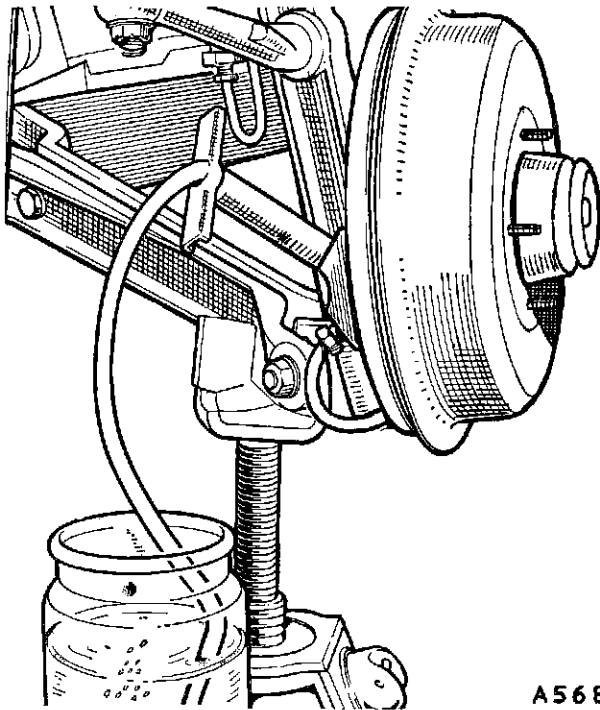


Fig. M.6

The master cylinder filler is accessible for replenishment through the aperture revealed when the carpet in front of the driver's seat is lifted



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Fig. M.7

The hydraulic system is bled by means of a bleeding tube attached to the bleeder screw nipple. The lower end of the tube is submerged in a glass jar so that the formation of bubbles can be observed

Unhook the brake pedal pull-off spring from the bracket on the frame and lift out the master cylinder and brake pedal assembly.

Release the rubber boot from the master cylinder and withdraw the pedal and push-rod assembly.

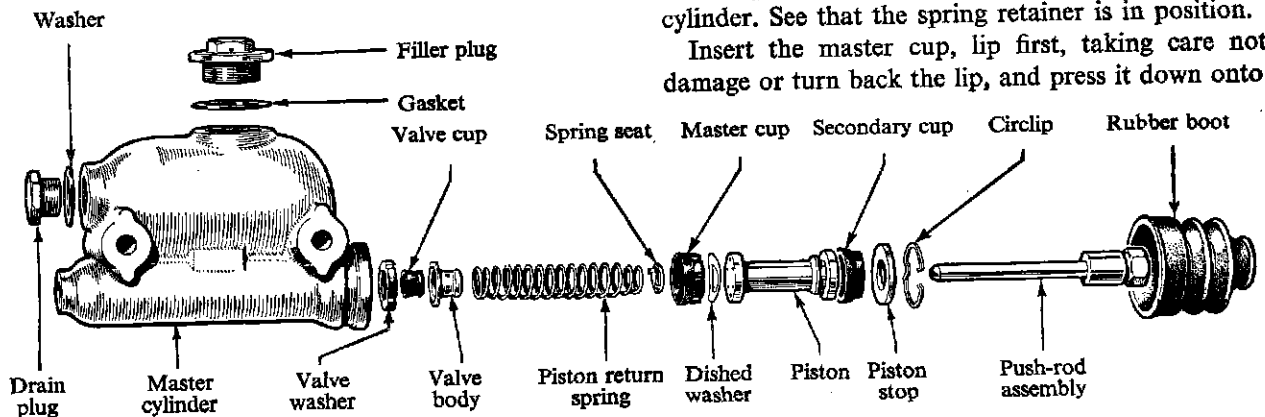


Fig. M.8

The component parts of the master cylinder

NOTE.—Later models have a thin dished copper washer between the end of the piston and the master cup which should be fitted with its convex side against the head of the piston. If this disc is found to be missing when dismantling takes place it is imperative to fit one on reassembly.

Section M.5

DISMANTLING THE MASTER CYLINDER

Remove the filler cap and drain the Lockheed Hydraulic Brake Fluid from the master cylinder.

Remove the union and copper washers.

Push the piston down the cylinder bore and remove the retaining stop washer and circlip.

Remove the remaining internal parts, i.e. the piston, piston master cup, return spring, valve cup assembly, and valve seating washer.

To remove the secondary cup from the piston carefully stretch it over the end flange, using the fingers only.

Section M.6

ASSEMBLING THE MASTER CYLINDER

Clean all parts thoroughly, using Lockheed Hydraulic Brake Fluid for all rubber components. All traces of petrol, paraffin, or trichlorethylene used for cleaning the metal parts must be removed before assembling.

Examine all the rubber parts for damage or distortion. It is usually advisable to renew the rubbers when rebuilding the cylinders.

Dip all the internal parts in brake fluid and assemble them wet.

Stretch the secondary cup over the end flange of the piston with the lip of the cup facing towards the opposite end of the piston. When the cup is in its groove work it round gently with the fingers to make sure it is correctly seated.

Fit the valve washer, valve cup, and body onto the return spring and insert the spring, valve first, into the cylinder. See that the spring retainer is in position.

Insert the master cup, lip first, taking care not to damage or turn back the lip, and press it down onto the

spring retainer. Insert the copper dished washer with its concave side in contact with the cup (see Fig. M.19). If this disc was not present on dismantling it is imperative to fit one on reassembly.

Insert the piston, taking care not to damage or turn back the lip of the secondary cup.

Push the piston down the bore slightly and insert the retaining washer. Refit the circlip in the groove in the cylinder bore.

Test the master cylinder by filling the tank and by pushing the piston down the bore and allowing it to return; after one or two applications fluid should flow from the outlet.

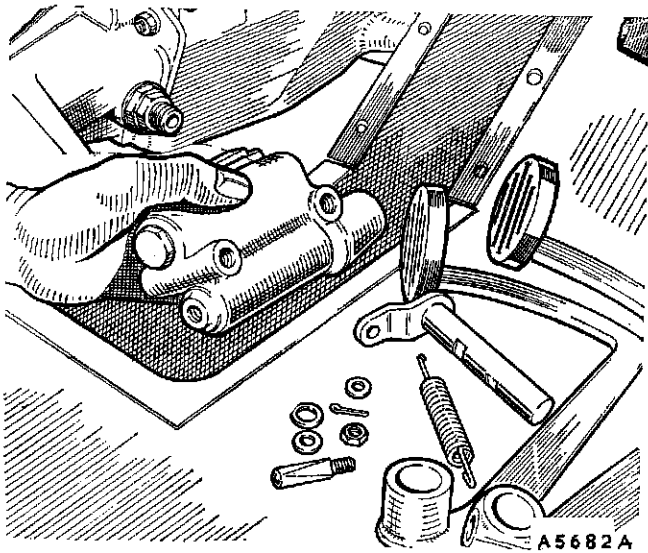


Fig. M.9

Withdrawing the master cylinder from its location under the gearbox cover-plate

Section M.7

REPLACING THE MASTER CYLINDER

The replacement procedure is the reverse of the removal instructions given in Section M.4, with the following additions.

Check the foot pedal as detailed in Section M.1.

Connect the fluid pipes and bleed the system as in Section M.3.

Check the system for leaks with the brakes fully applied. Renew the copper washers on the two-way outlet connection if necessary.

Section M.8

BRAKE ASSEMBLY

Two leading shoes are incorporated in the front wheel braking system and take the greater percentage of the braking load. The rear brakes are of the leading- and

M.8

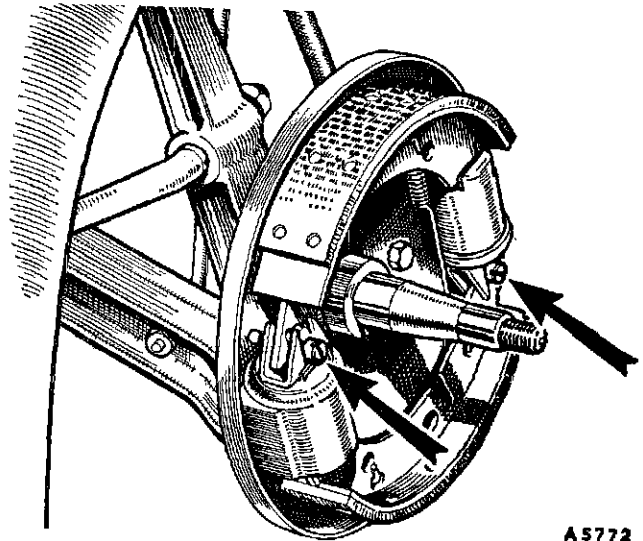


Fig. M.10

Two adjusters are provided on the front brakes, one for each shoe. They are of the serrated snail cam type.

trailing-shoe type, giving the advantage of one leading shoe when the brakes are used in reverse.

All the shoes have a floating anchorage, each front shoe utilizing the closed end of the other shoe actuating cylinder as its abutment. The two rear shoes share one common abutment stop.

The hand brake lever operates the rear brakes mechanically through a linkage operating on the piston of the rear wheel cylinder, which is made in two halves. The outer half of the piston applies the leading shoes when actuated by a lever pivoted in the cylinder body. The trailing shoe is applied by the movement of the

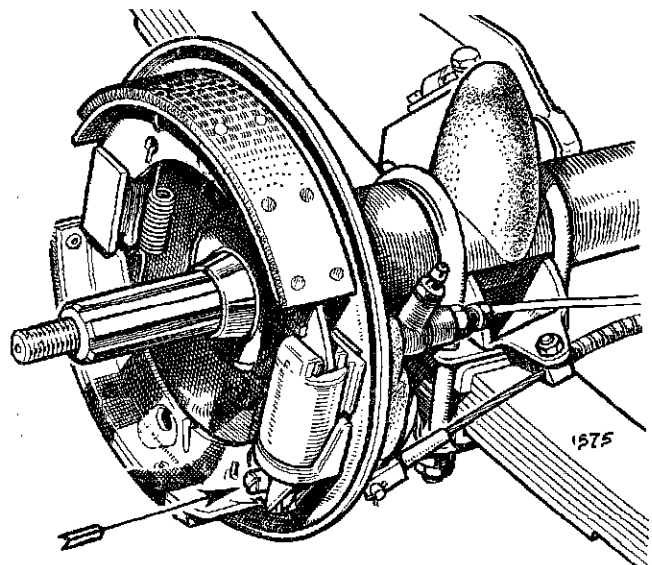


Fig. M.11

The single adjuster on the rear brakes adjusts both shoes simultaneously, including the hand brake

cylinder body, which slides on the backplate as a result of the reaction of the mechanically operated lever on the pivot.

When operated hydraulically the inner half of the piston is forced outwards, carrying with it the outer half, thus applying the leading shoe, and the trailing shoe is applied by the floating cylinder body as a result of the reaction of the fluid pressure on the body.

NOTE.—Under normal circumstances the adjusting nuts at the junction of the hand brake cables to the lever must never be disturbed. No attempt must be made to adjust the hand brake at this point to take up wear. If this is done the pistons in the rear wheel cylinders are displaced and their effective travel reduced, rendering both foot and hand brakes inefficient. Adjustments can only be made at the wheel cylinders.

Section M.9

REMOVING THE WHEEL CYLINDER

Front cylinders

Raise the front of the car and remove the hub cap and road wheel. Remove the brake-drum and hub assembly as detailed in Section K.7.

On later models the brake-drums can be removed independently of the hub assembly (see Section K.17, page K.13).

Draw the brake-shoes apart until the assembly can be lifted from the wheel cylinders and backplate.

Release the flexible hose as detailed in Section M.13. Remove the flexible hose union bolt from the wheel cylinder, observing that the copper washers on either side of the banjo union are of different sizes and that the small washer is next to the cylinder.

Remove the two 1/4 in. nuts and spring washers securing the wheel cylinder to the backplate and remove the cylinder.

The other cylinder is removed after extracting the 1/8 in. banjo union bolt and the two bolts securing the cylinder to the backplate.

On later models the flexible hose, bleed screw, and bridge pipe screw directly into the wheel cylinder and no banjo is fitted.

Rear cylinders

Raise the rear of the car and remove the hub cap and road wheel. Remove the brake-drum and hub assembly as detailed in Section H.1.

Draw the brake-shoes apart until the assembly can be lifted from the backplate.

Release the metal feed pipe from the wheel cylinder by undoing the 1/8 in. union nut. Remove the 5/8 in. adaptor securing the bleeder screw banjo union to the wheel cylinder, observing that the large copper washer is fitted away from the cylinder.

Remove the clevis pin from the hand brake cable yoke and disconnect the cable from the wheel cylinder lever. Remove the rubber boot and withdraw the lower half of the piston from the wheel cylinder. Extract the wheel cylinder from the backplate.

Section M.10

DISMANTLING THE WHEEL CYLINDER

Rear

Tap out the hand brake lever pivot pin and withdraw the lever. Withdraw the upper half of the piston, the rubber cup, and the bakelite filler.

Later models are fitted with a filler carrying a spiral spring.

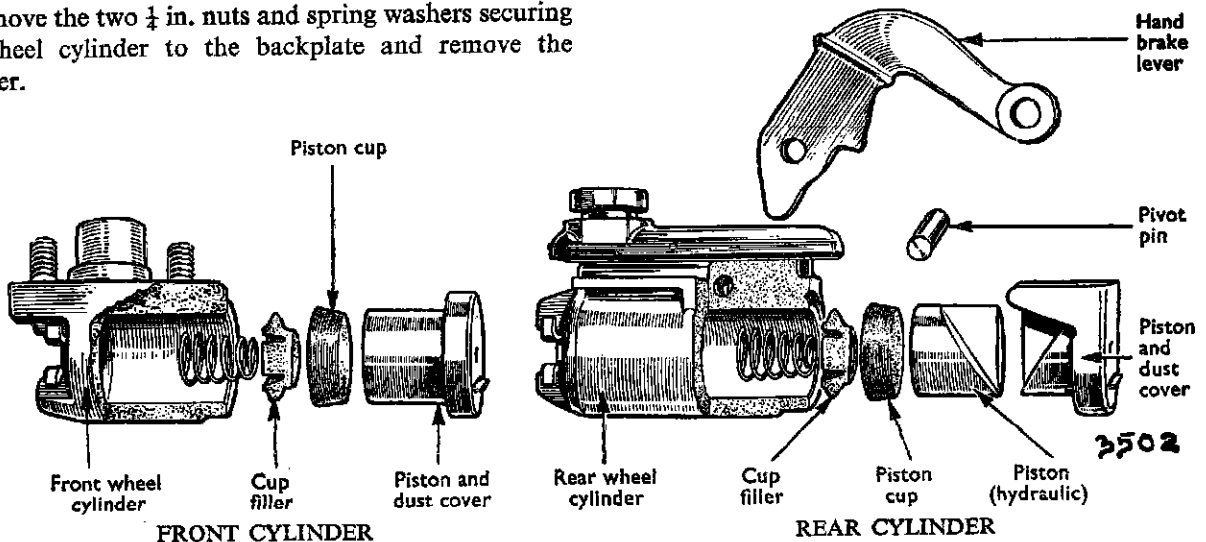


Fig. M.12

The front and rear wheel cylinder components, showing the later-type cup fillers with springs

Front

Withdraw the piston, the rubber cup, and the cup filler.

Later models are fitted with a filler carrying a spiral spring.

Section M.11**ASSEMBLING THE WHEEL CYLINDER**

Clean all parts thoroughly, using only Lockheed Super Heavy Duty Brake Fluid for the rubber components. All traces of petrol, paraffin, or trichlorethylene used for cleaning the metal parts must be completely removed before assembly.

Examine the rubber cups for damage, wear, or distortion. Dip all parts in brake fluid and assemble wet.

Insert the cup filler, shallow side first (this is important), and the rubber cup, concave side first.

Replace the piston, and in the case of the rear cylinders insert the hand brake lever and its pivot pin.

Section M.12**REPLACING THE WHEEL CYLINDER**

The procedure for replacing the wheel cylinder is a reversal of the sequence of operations given in Section M.9, but attention must be given to the important points detailed below.

Front

The front brake wheel cylinders are interchangeable but the link pipe banjo unions must be fitted to them so that the flexible hose is connected to the forward cylinder and the bleeder screw to the rear cylinder. The link pipe must pass above the backplate.

The brake-shoes are interchangeable but the recessed ends must engage the Micram shoe adjusters and the brake-shoe pull-off springs must be fitted between the shoes and the backplate.

Rear

The wheel cylinder must be fitted on the forward side of the axle casing with the bleeder screw vertical.

The brake-shoes are interchangeable but the recessed end of the lower or leading shoe must engage the Micram shoe adjuster. The other shoe should also be fitted with its recessed end against the wheel cylinder.

The light brake-shoe pull-off spring must be fitted away from the wheel cylinder, and both springs are fitted between the shoes and the backplate.

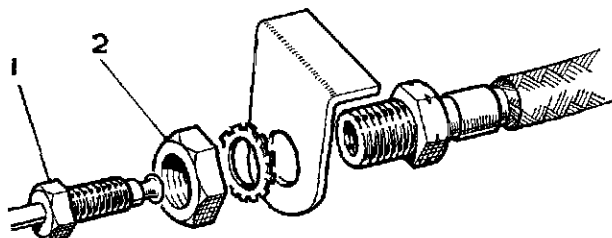
M.10**Section M.13****REMOVING THE FLEXIBLE HOSE**

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

Front

Unscrew the metal pipe-line union nut (1) (Fig. M.13) from its connection to the hose.

Remove the locknut securing the flexible hose union to the chassis and unscrew the hose from the wheel cylinder.



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Fig. M.13

The union nut (1) is the one which must be first unscrewed to release the flexible hose from the pipe-line. The attachment nut (2) can then be removed

The union on the master cylinder side also incorporates the stop lamp switch. Disconnect the two wires from their terminals and with a $\frac{1}{8}$ in. spanner undo the nut to release the switch and the two copper washers fitted either side of the two-way union.

Section M.14**REMOVING AND REPLACING THE BRAKE-SHOES**

Remove the rear brake-drum and hub as detailed in Section H.1. Instructions for removing the front brake-drum and hub are given in Section K.7.

Draw the brake-shoes apart until they can be removed from the backplate.

IMPORTANT.—When replacing the shoes the pull-off springs must be between the shoes and the backplate.

The brake-shoes are interchangeable but the recessed end must engage the Micram shoe adjuster on the wheel cylinder.

In the case of the rear brakes the light pull-off spring

is fitted away from the wheel cylinder. The recessed end of the upper or trailing shoe is fitted on the back of the cylinder.

Section M.15

RELINING THE BRAKE-SHOES

Owing to the need for the brake linings to be finished so that they are perfectly concentric with the brake-drums to obtain the best results, relining of the brake-shoes is not satisfactory without special precautions.

If renewal of the brake-shoes and linings is necessary on account of excessive wear or other cause it is most important that the material used for the lining is as specified by Morris Motors Limited. Any variations from this will give an unequal and unsatisfactory braking performance.

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

When new shoes and linings are fitted it must be appreciated that considerable adjustment has to be made to the foot brake mechanism, and it is necessary to return the Micram adjusters to their fully anti-clockwise position before attempting to refit the brake-drums over

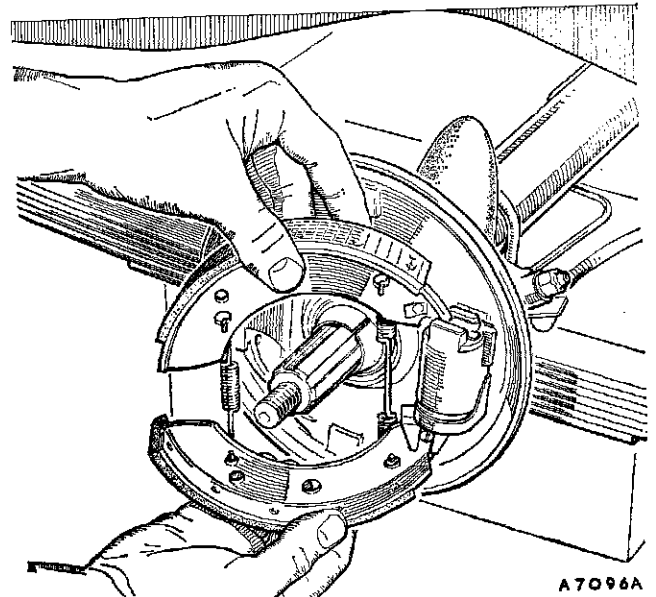


Fig. M.15

Removing the rear brake-shoes after releasing a return spring

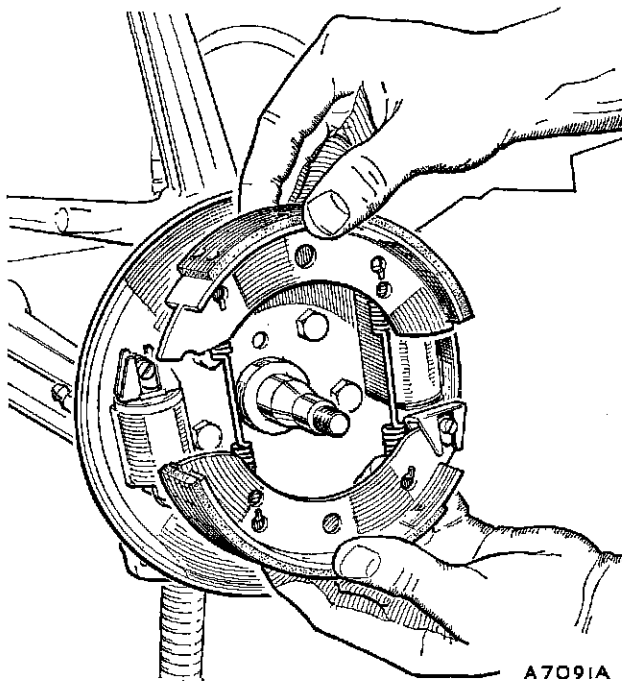


Fig. M.14

Removing the front brake-shoes after releasing a return spring

the new linings. The hand brake must also be in the fully released position.

IMPORTANT.—Do not use any substitute for Lockheed Super Heavy Duty Brake Fluid as a substitute will seriously affect the working of the system.

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

Do not clean the rubber parts with a fluid that is not Lockheed Super Heavy Duty Brake Fluid. All traces of petrol, paraffin, etc., used for cleaning metal parts must be removed before reassembly.

Do not reline the brake-shoes with different types of linings as this is bound to cause unequal braking.

Up to Car Nos. 90318 R.H. and 89910 L.H. M19 linings were fitted to the brakes. These and subsequent cars are fitted with MR11-type linings.

Do not allow the fluid in the master cylinder and supply tank assembly to fall below the half-full mark. When full the fluid should be 1/2 in. (13 mm.) from the bottom of the filler neck, with the brakes in the off position.

Section M.16

BRAKING IRREGULARITIES AND THEIR CAUSES

Pedal travel excessive (requires pumping)

- (1) Brake-shoes require adjusting.
- (2) Leak at one or more joints.
- (3) Master cylinder cup worn.

Pedal feels springy

- (1) System requires bleeding.
- (2) Linings not bedded in.
- (3) Master cylinder fixing loose.
- (4) Master cylinder cup worn.

Brakes inefficient

- (1) Shoes not correctly adjusted.
- (2) Linings not bedded in.
- (3) Linings greasy.
- (4) Linings wrong quality.
- (5) Drums badly scored.
- (6) Linings badly worn.
- (7) Wrongly fitted cup fillers.
- (8) Hand brake cables wrongly adjusted.

Brakes drag

- (1) Shoes incorrectly adjusted.
- (2) Shoe springs weak or broken.
- (3) Pedal spring weak or broken.
- (4) Hand brake mechanism seized.
- (5) Wheel cylinder piston seized.
- (6) Locked pipe line.
- (7) Filler cap vent hole choked.

Brakes remain on

- (1) Shoes over-adjusted.
- (2) No free movement on pedal.
- (3) Compensator port in master cylinder covered by swollen rubber cup, or incorrect adjustment of push-rod.
- (4) Swollen wheel cylinder cups.
- (5) Choked flexible hose.

Unbalanced braking

- (1) Greasy linings.
- (2) Distorted drums.
- (3) Tyres unevenly inflated.
- (4) Brake-plate loose on the axle.
- (5) Worn steering connections.
- (6) Worn suspension linkage.
- (7) Different types or grades of lining fitted.

Brakes grab

- (1) Shoes require adjusting.
- (2) Drums distorted.
- (3) Greasy linings.
- (4) Broken or loose road spring.
- (5) Scored drums.
- (6) Worn suspension linkage.

M.12

Section M.17**BRAKE SQUEAK**

In cases where excessive brake squeak is encountered this trouble may be alleviated by drilling a hole in the brake-shoe flange and making a saw-cut connecting it to the inner radius of the flange in the manner indicated in Fig. M.16.

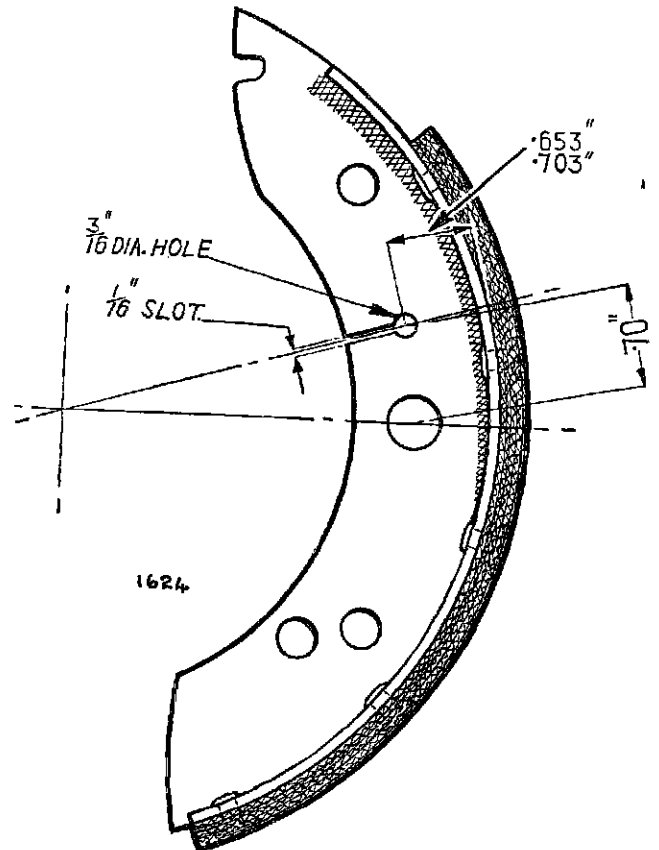


Fig. M.16

The location of the hole and saw-cut in the brake flange which relieves brake squeak

Section M.18**HAND BRAKE**

The hand brake is of the central type with the conventional ratchet and pawl locking device. It operates on the rear wheels only by means of cables carried in protective casings. These casings are anchored at their rear ends to the spring brackets, in their centres with clips to the chassis, and at their front ends in the trunion of the hand brake assembly.

The rear end of each cable engages the end of the brake-shoe actuating lever.

The forward ends of the cables are provided with adjusting nuts which are locked by locking washers of the tab type. They should never be disturbed after initial fitting.

Section M.19

HAND BRAKE ADJUSTMENT

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.

Raise the rear of the car until both wheels are clear of the ground.

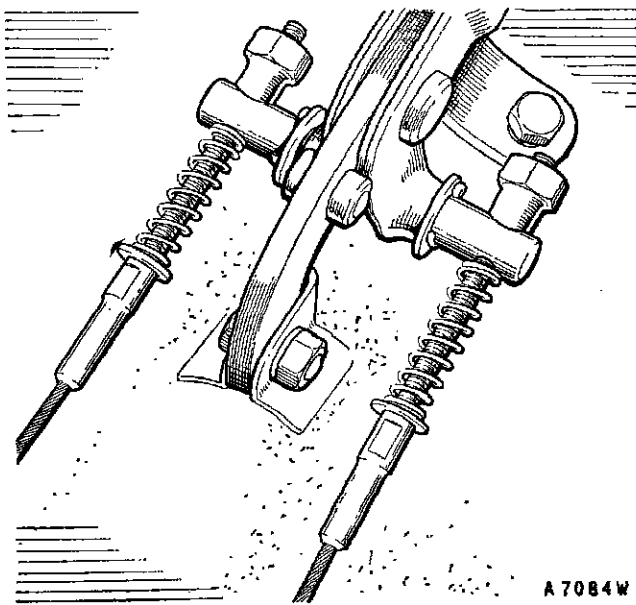


Fig. M.17

The anchorage nuts for the hand brake cables on the hand brake lever trunnion should never be disturbed. Adjustment must normally be made at the brake-shoes

Set the hand brake to the 'off' position and see that the two wheels rotate quite freely.

NOTE.—A slight resistance will be felt on the differential mechanism when turning the wheels by hand.

Remove the wheels and adjust the shoes by means of the adjusting screws as detailed in Section M.2.

Check the hand brake action, and if excessive travel is still present which 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.

If excessive brake lever travel is still present with new shoes or linings it is permissible to take up the excess

travel at the hand brake lever trunnion provided the following procedure is strictly adhered to.

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.

●Apply the hand brake until the pawl engages with the third notch on the ratchet, and adjust the nuts at the hand brake lever until it is just possible to rotate the wheel by hand under heavy pressure. It is important that the road wheels offer equal resistance in order to get full braking power.●

Return the lever to the 'off' position and check that both wheels are perfectly free. If they are not, remove the brake-drum of the brake that tends to bind and check that the brake-shoe pull-off springs are correctly fitted and that the wheel cylinder has not seized. Remove any stiffness present, readjust, and check.

Section M.20

BRAKE FLUID

The correct fluid for replenishment of the hydraulic brake system is Lockheed Super Heavy Duty Brake Fluid for all conditions.

Should Lockheed Fluid be unobtainable, a fluid to Specification S.A.E. 70.R3 must be used.

Section M.21

ACCESS TO BRAKE ADJUSTMENT

In order to facilitate brake adjustment some models are provided with wheels having an access hole in the wheel centre which can be fitted so as to coincide with the adjustment hole in the brake-drum. This obviates removing the wheel to adjust the brakes.

The hole in the wheel centre is normally closed by a rubber plug to provide protection.

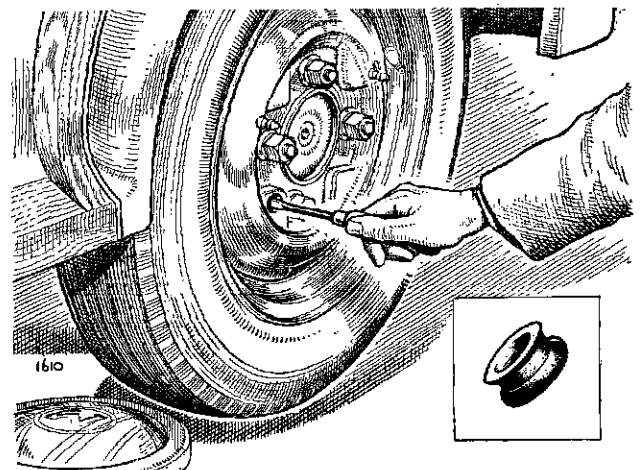
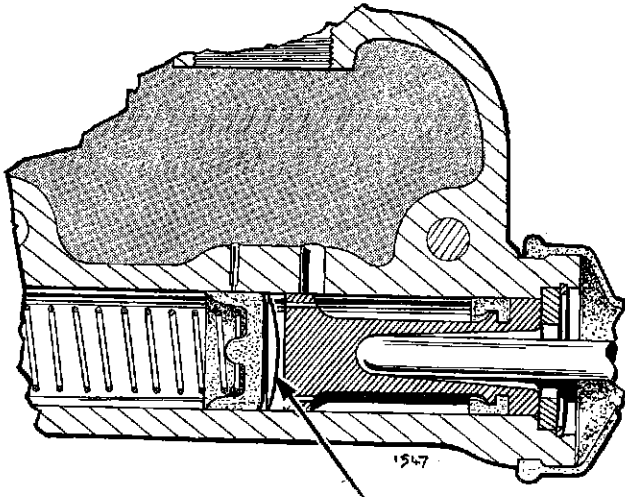


Fig. M.18

The aperture in the wheel on some models which provides easy access to the brake adjustment



Dished washer
Fig. M.19

The illustration of the master cylinder in part section clearly shows the correct position of the dished washer with its concave side in contact with the main cup

With the introduction of the Minor 1000 a modified wheel (Part No. ACA 8000) was used, eliminating the brake adjustment hole. The wheels must, therefore, be removed when the brakes are adjusted.

Section M.22

MASTER CYLINDER (Later Type)

Later master cylinder assemblies are fitted with a dished copper washer between the piston head and the main cup to ensure that the transfer holes in the piston are kept clear.

The washer must be assembled with its concave side against the main cup and its convex side in contact with the piston if it is to function correctly. It is imperative that this washer should be fitted to all assemblies.

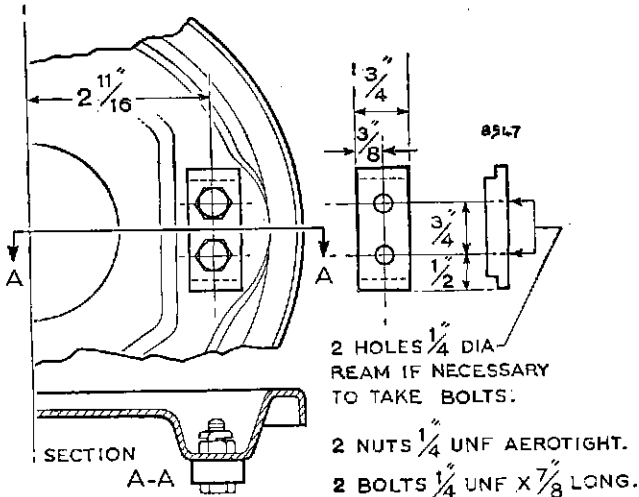


Fig. M.20

M.14

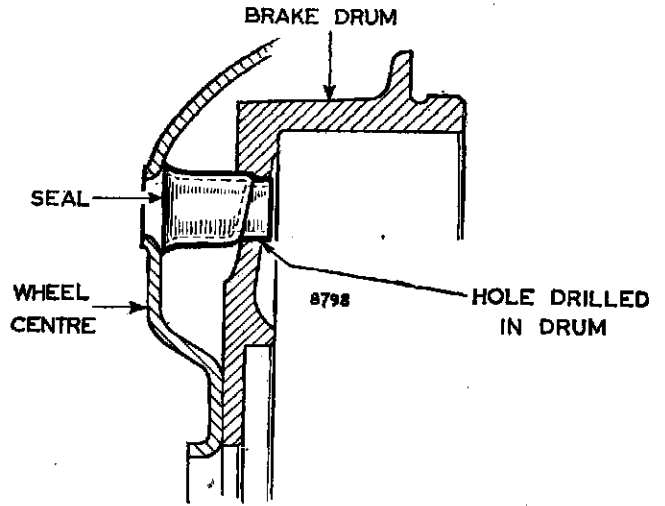


Fig. M.21

Showing the seal held tightly in position by the wheel

Section M.23

REAR BRAKE BACKPLATE ABUTMENT PAD

The rear brake backplate abutment pad is, on later models, being arc-welded along both top and bottom edges. Any of the earlier type which show a tendency to tear away from the backplate should be drilled and bolted into position in the manner shown in Fig. M.20.

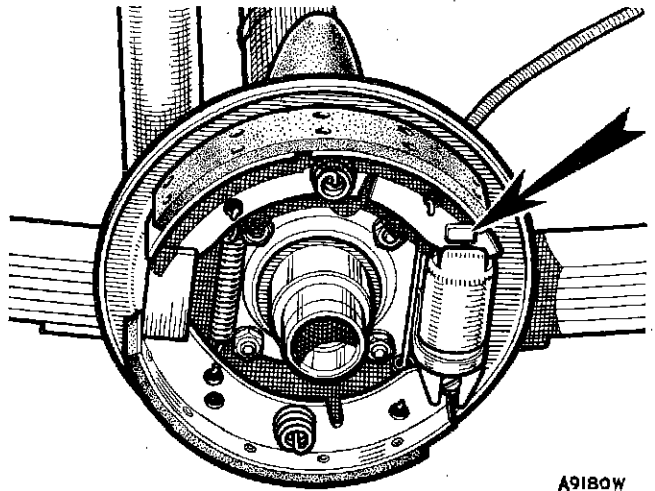


Fig. M.22

The assembly of the rear shoes and springs. Note the shoe identification boss indicated by the arrow. On later models this identification boss is not fitted, but the different positioning of the lining on the trailing (upper) shoe will be noted

Section M.24

BRAKE-DRUM SEALS

From Car No. 228267 seals are fitted in the brake-drum shoe adjusting holes to prevent the ingress of dust and water. The seals (Part No. ACA 5070) are made to fit the oval-shaped holes.

From Car No. 240493 the holes in the brake-drums were changed in shape from oval to round and modified dust seals (Part No. ACA 5102) are fitted.

The seals are securely held in position by the wheel, but care should be taken when removing and refitting a wheel that the seals have not become dislodged.

Section M.25

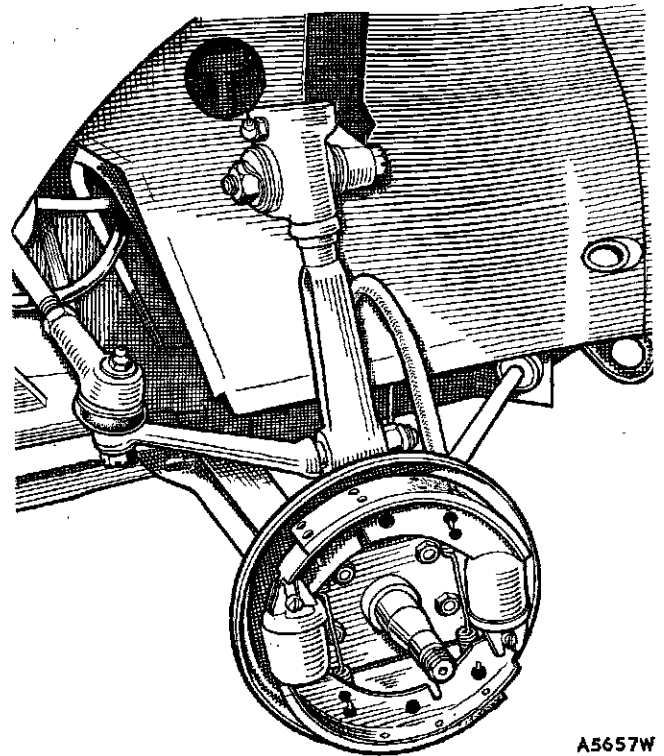
**REMOVING AND REPLACING
BRAKE-SHOES (Later Models)**

The procedure for removing and replacing the brake-shoes on later models, commencing Car No. 228267, fitted with the standardized 'A' type rear axle and modified front brake-drums and hubs is detailed below.

Rear

Remove the drum as detailed in Section HH.1.

Extract the steady springs; draw the shoes apart and remove them from the back-plate.



A5657W

Fig. M.23

A front brake-shoe assembly. Front shoes are interchangeable with the rear leading shoes

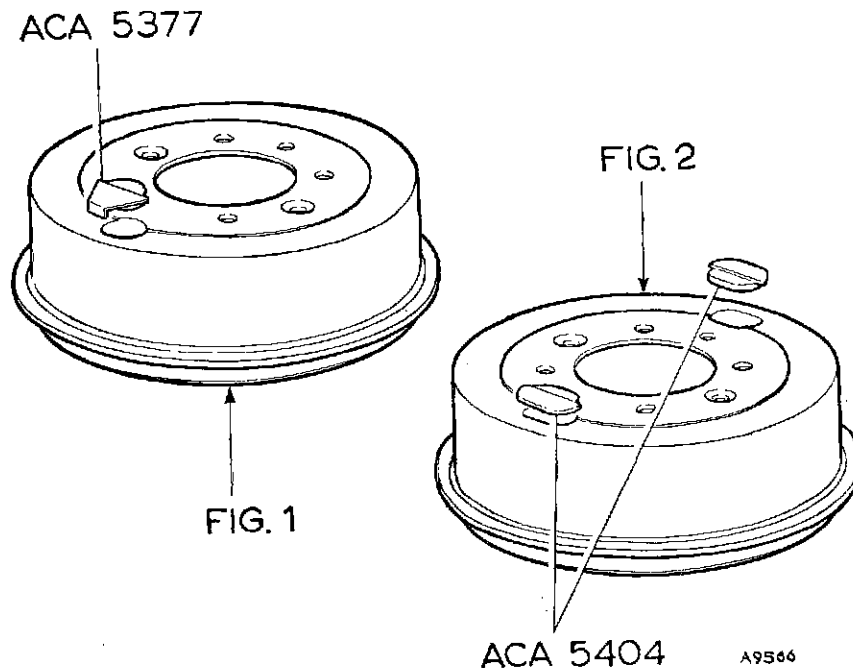


Fig. M.24

The two types of brake-drum seal are clearly shown in this illustration

When replacing the shoes note the following important points.

- (1) The trailing shoe is identified by a rectangular boss at one end of the web (Fig. M.22).
- (2) The trailing shoe must be fitted uppermost with the identification boss at the cylinder end.
- (3) The leading (lower) shoe must be fitted with the recessed end engaged with the Micram shoe adjuster on the wheel cylinder.
- (4) Fit the longer spring at the cylinder end of the shoes.

Front

Remove the drum as detailed in Section K.17.

Draw the shoes apart and withdraw them from the back-plate.

The shoes are interchangeable but the recessed end must engage the Micram adjuster on the wheel cylinder.

Section M.26

BRAKE-DRUM DUST SEALS

On later models, and for service purposes, a strengthened road wheel (Part No. ACA 8004) is introduced. The modified wheel has no hole to facilitate brake-shoe adjustment, and it must be removed to carry out this operation.

When fitting the later-type road wheel on earlier cars it will be necessary to fit a dust seal (see Fig. M.24) to the brake adjustment holes in the brake drum in place of the grommet previously used. On no account must the original grommet be used with the modified road wheel as this will prevent the wheel from fitting against the brake-drum.

The new road wheel is completely interchangeable with the original but it is advisable to fit the dust seals to all

brake-drums when a new wheel is fitted to eliminate the danger of a road wheel seating incorrectly when a change-round of wheels is made to prolong tyre life.

The part numbers of the new dust seals are as follows:

Dust seal (for brake-drums with oval holes)	ACA 5404
Dust seal (for brake-drums with round holes)	ACA 5377

Section M.27

PREVENTIVE MAINTENANCE

To safeguard against the possible effects of wear or deterioration it is recommended that:

1. Disc brake pads, drum brake linings, hoses, and pipes should be examined at intervals no greater than those laid down in the Passport to Service.
2. Brake fluid should be changed completely every 18 months or 24,000 miles (40000 km.) whichever is the sooner.
3. All fluid seals in the hydraulic system and all flexible hoses should be examined and renewed if necessary every 3 years or 40,000 miles (65000 km.) whichever is the sooner. At the same time the working surface of the pistons and of bores of the master cylinder, wheel cylinders, and other slave cylinders should be examined and new parts fitted where necessary.

Care must be taken always to observe the following points:

- (a) At all times use the recommended brake fluid.
- (b) Never leave fluid in unsealed containers. It absorbs moisture quickly and this can be dangerous.
- (c) Fluid drained from the system or used for bleeding is best discarded.
- (d) The necessity for absolute cleanliness throughout cannot be over-emphasized.