SECTION K

THE BRAKING SYSTEM

The Master Cylinder.

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

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 application. 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 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 control its return into the cylinder, so that a small pressure of approximately 8 lb. per square inch 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 the system from returning to the cylinder, thus ensuring a fresh charge being delivered at each stroke of the pedal.

Adjustment of the Brake Pedal.

The correct amount of free movement between the master cylinder push-rod and piston is set during 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 cylinder to the pedal until the pedal pad can be depressed approximately .50 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 obstruct 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.

Brake Shoe Adjustment.

When lining wear has reached a point where the pedal travels to within 1.00 of the floorboards before the brakes come into action, it is necessary to adjust the brake shoes.

The Front Brakes.

Jack up the wheel on which it is desired to set the brake.

Remove the front hub cap and road wheel and 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 both screws as far as they will go in a clockwise direction until the drum is locked solid, then turn them semi-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.

The 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 and the handbrake operation.

Dismantling the Master Cylinder.

Remove the filler cap and drain the Lockheed hydraulic brake fluid from the master cylinder. Remove the main feed pipe, union and copper washers.

Push the piston down the cylinder bore and remove the retaining 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.

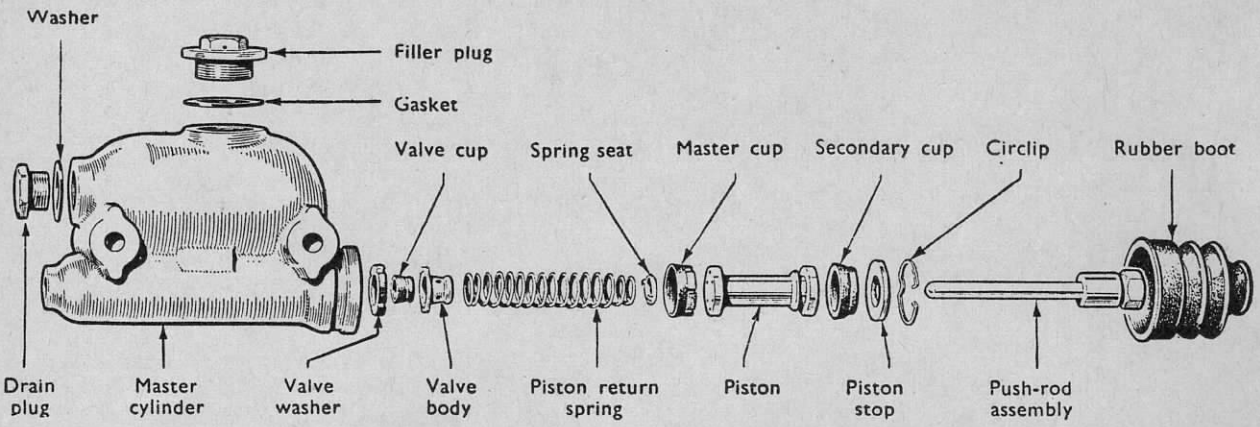

FIG. 39.—The component parts of the master cylinder. Later models have a thin protecting copper washer between the end of the piston and the master cup.

Assembling the Master Cylinder.

Clean all parts thoroughly, using Lockheed Orange Brake Fluid in the UK and Lockheed No. 5 Overseas for all rubber components. All traces of petrol, paraffin or trichlorethylene used for cleaning the metal parts must be removed before assembly.

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

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 on to 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. Place the flat washer in place on the end of the master cup.

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 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.

Removal of the Wheel Cylinder.

Front.

Raise the front of the car and remove the hub cap and road wheel. Then remove the brake drum and hub assembly.

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

Release the flexible hose and 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 $\frac{1}{4}$ nuts and spring washers securing the wheel cylinder to the brake plate and remove the cylinder.

The other cylinder is removed after extracting the 5/16 banjo union bolt and the two bolts securing the cylinder to the brake back plate.

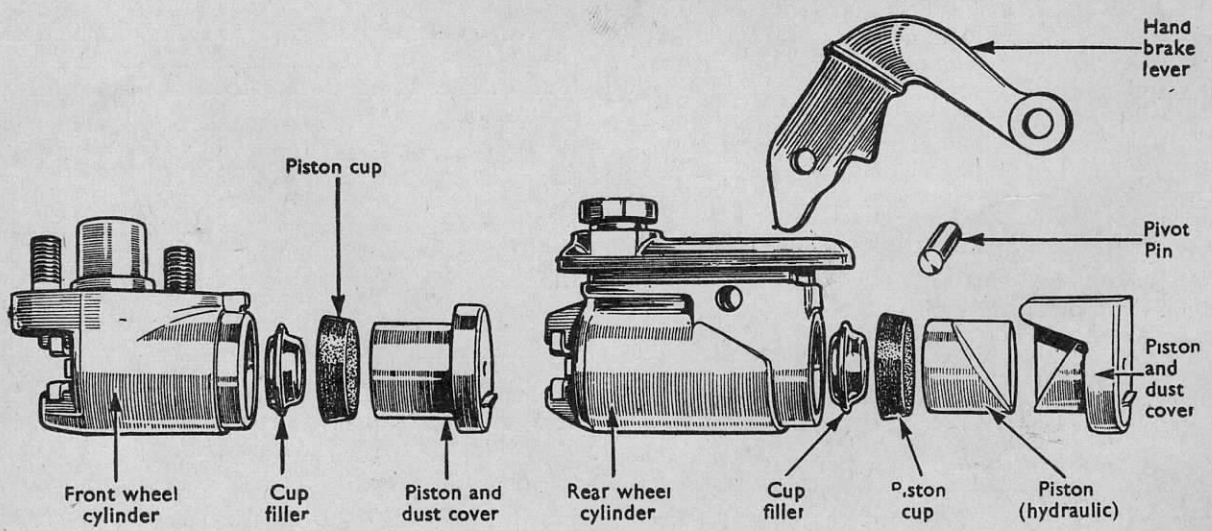

FIG. 40.—The front and rear wheel cylinder components.

Rear.

Raise the rear of the car and remove the hub cap and road wheel. Remember the brake drum and hub assembly and draw the brake shoes apart until the assembly can be lifted from the brake back plate.

Release the metal feed pipe from the wheel cylinder by undoing the 3/16 union nut. Remove the 5/16 adaptor securing the bleed 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 handbrake 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 brake plate.

The Handbrake.

The handbrake is of the quick-release type, the ratchet knob being depressed after the lever has been pulled up. A slight upward pull on the lever will allow it to move to the "off" position without depressing the ratchet knob.

It operates the rear brakes by means of cables, and no adjustment is necessary, as adjustment of the hydraulic brake automatically adjusts the handbrake. If the two brass nuts on the lever are removed the whole braking system will be upset.

Sufficient movement is allowed at the lever to deal with full wear at the linings.

If the wheel cylinder operating cables have been disconnected, they should be readjusted after reassembly in the following manner:—

Return the handbrake pull lever to the fully released position.

Remove the split pin and clevis retaining the brake cable to each wheel cylinder lever. Adjust the brake shoes.

Screw up the cable adjusting nuts by equal amounts until the cable clevis pins will fall into position in the cable forks without moving the wheel cylinder lever. Replace the split pins.