

Hydraulic Brake Systems (Continued)

This gives right and left hand cylinders which are not interchangeable as such. Accordingly, in case of removal of these cylinders care must be exercised in their replacement.

On 1935 Studebaker models the large bore is always assembled toward the front of the car. (See maintenance note under Hydraulic Brakes.)

On the Chrysler cars the large bore is always assembled toward the rear of the car. The cylinders are marked (R) to indicate the reverse acting shoe connection.

As the front wheel brake cylinders are different from the rear wheel brake cylinders in their cylinder bore sizes, they should never be interchanged front and rear, as it would cause badly unbalanced brakes.

Maintenance Suggestions

1. Master cylinder supply tank should be kept full of fluid.
2. Air vent at top of vent cap (N) should be kept open and free from dirt.
3. Compensating port hole (C) must be kept open. Locked brakes, spongy pedal, and no brakes at all may all be caused by blocking of the compensating port hole.
4. ONE HALF-INCH FREE MOVEMENT OF ROD (A) IS NECESSARY WHEN PEDAL IS RELEASED. Should rod be adjusted tightly against piston (B) then compensating port hole (C) will be blocked by cup (D) and compensating action of master cylinder will be destroyed.
5. Examine cups (D) and (F) occasionally and, if swelled, replace.
6. Leakage of fluid past piston (E) may be partially remedied by the replacement of cups (F) but, if cylinder walls are scratched, re honing is necessary.
7. Bleeding the system.
(Whenever system has been disconnected or when air is found in the system it is necessary to bleed the lines.)
 - (a) Fill supply tank with fluid. (An automatic refiller bottle like Fig. 1, Page 36, will prevent master cylinder from running dry during bleeding.)
 - (b) Remove cap from bleeder valve (G) and screw in bleeder drain—brass fitting with rubber tube attached—the end of which is immersed in clean container partially filled with brake fluid.
 - (c) Allow tube to hang in clean container—unscrew bleeder connection $\frac{1}{4}$ turn and depress foot pedal slowly by hand to half the limit of its travel, allowing spring to return pedal to off position. End of rubber hose should be kept below surface of liquid in container. When all air bubbles cease to appear (approximately 6 to 10 half strokes of pedal will be necessary to bleed each wheel cylinder) close bleeder connection.
 - (d) Repeat on each wheel cylinder—making sure that supply tank is filled after bleeding each wheel. Fluid withdrawn in the bleeding should not be used again.
 - (e) When bleeding operation is completed, the fluid reservoir must be refilled to within $\frac{1}{8}$ " of the top.
8. Conditioning Hydraulic system for extreme cold weather conditions. (This procedure should be followed in all sections of the country where zero temperatures are experienced during winter months.)
 - (a) Use light metal cup expander inside rubber cups (F) to hold skirts of cup more closely to the cylinder walls. (Extreme cold weather causes slight shrinkage of rubber cups. The expander is of no value to increase the piston seal until the skirt of the rubber cup contracts due to cold.)
 - (b) Use stiffer coil spring (D) between the two wheel cylinder pistons. These heavier springs are usually dull in finish in contrast to the standard spring, which is quite shiny.
 - (c) Drain and refill system with special cold weather hydraulic fluid.
9. Use genuine hydraulic brake fluid. Engine or any mineral oil will render the brakes inoperative and will necessitate replacement of all rubber parts in the system.

VACUUM POWER BRAKES

THERE are two types of Vacuum Brake Systems now in use:

1. Air Suspended Type:
This system utilizes the vacuum created in the intake manifold to operate (within a cylinder) a piston which is connected to a lever on the brake cross shaft. The air suspended system is always used in conjunction with an external valve, either pull or pusher type, depending upon room for installation.
2. Vacuum Suspended Type:
 - (a) Plain cylinder with external valve.
This system also utilizes the vacuum created in the intake manifold but differs from the air suspended type insofar as the entire system is constantly under vacuum. Admission of air to one side of the booster cylinder by means of the external valve applies the pressure to the braking system.
 - (b) Internal Valve Type Cylinder:
This system is under vacuum at all times when the engine is running and is similar to (a) except that the valve controlling intake of air to the cylinder is built within the cylinder itself.

Irrespective of the type of vacuum system, the following principles apply:

Pressure on the foot pedal operates a valve that allows air to enter the booster cylinder in the case of the vacuum suspended type, or air to be drawn from the cylinder in the case of the air suspended type.

The thrust, caused by the difference in pressure at the piston surfaces, is transferred by means of a piston rod either to a single cross shaft actuating both front and rear brakes or to separate cross shafts mounted at front and rear of car operating the front and rear brakes respectively. (When a hydraulic system is used the piston rod is attached directly to the master cylinder.)

The booster valve (or cylinder with internal valve) is so mounted on the frame that when pedal is only partially depressed the brake will be only partially applied. This is the so-called "holding" position. The mechanism of the system is such that the port hole in the valve is closed after the brake rods have travelled a prescribed distance as controlled by the foot pedal. This arrangement allows partial brake application for stopping slowly or holding back loads on steep grades.

Certain booster systems (air suspended type) have a dash control valve to prevent overbraking in wet, icy, and snowy weather. This valve regulates the amount of vacuum taken from the manifold.

A relay valve is used in tractor trailer installations to overcome the "time lag" which would be encountered if no relay valve were used. The connection between control valve and relay valve is a $\frac{1}{4}$ " pipe. Immediately upon operation of the control valve, air is admitted through this line to the relay valve which operates the separate booster system on the trailer. In synchronism with the control valve on the tractor the relay valve allows perfect control of the braking system no matter how long the trailer train may be.

Maintenance Suggestions

As a general statement, there should be no occasion to adjust any power unit or brake assister unless it has been tampered with or damaged in an accident or removed and disassembled. All adjustments to power units are external. For complete details on the different brakes we refer you to Mr. Paul Dumas's book entitled "Brakes."

In case of trouble or replacement of the internal parts it is recommended that the power unit should be taken to an official service station for repairs (BK, Bestler, or car distributor).