Housing (22) holds the locking ring (5), the stop washer (4), the first vacuum sealing ring (6), the intermediate ring with runoff groove (7), the second vacuum sealing ring (6) and the bearing ring (8). The anular space between the two vacuum sealing rings has an outward drain through leak hole (A), so that no brake fluid can enter the brake unit.

Filler disc (9) and the primary sleeve (10) are mounted on piston (3) of the pushrod circuit. The supporting ring (11) which enters the primary sleeve is peened to the piston shaft. Compression spring (17) forces the piston via. spring retainer (19) to the bearing ring (8).

Piston (3) is coupled with the intermediate piston (20) of the floating circuit by means of the connecting bolt (14) and the spring supporting disc (12). The intermediate piston holds the ring sleeves (18) which are sealing the two chambers of the tandem master cylinder in relation to each other, in addition to the filler disc (9) and the primary sleeve (10). The intermediate piston is forced by the compression spring (21) against the stop groove (15) via spring retainer (19).

The stroke of the pushrod circuit is 13 mm, that of the floating circuit 19 mm.

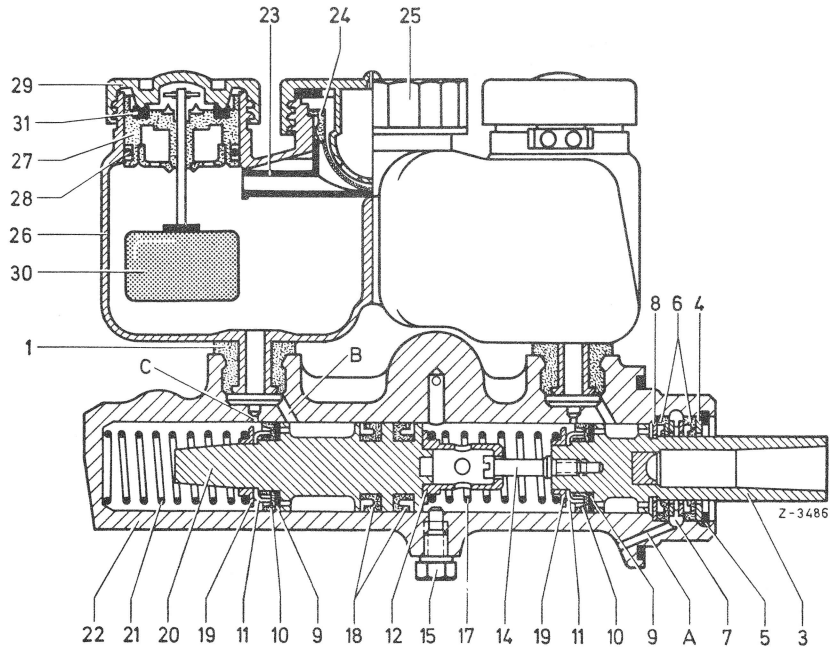

Fig. 1

1 Tank plug
3 Piston (pushrod circuit)
4 Stop washer
5 Locking ring
6 Vacuum seal
7 Intermediate ring
8 Bearing ring
9 Filler disc
10 Primary sleeve
11 Supporting ring
12 Spring supporting disc
14 Connecting bolt
15 Stop screw
17 Compression spring
18 Ring sleeve
19 Spring retainer
20 Piston (intermediate piston)
21 Compression spring
22 Housing
23 Splash guard
24 Strainer
25 Closing cover
26 Compensating tank
27 Contact insert
28 O-ring
29 End cover
30 Float
31 Sealing ring
A Leak hole
B Compensating bore
C Filler hole

The housing carries the transparent compensating tank (26) which is attached to the housing (22) by means of two pipe connections via container plug (1). In the center of the compensating tank is a partition with a raised overflow and a splash guard (23), so that a separate supply space is available for each chamber. Inside the compensating tank are two contact inserts (27). If the fluid drops below a given level, these inserts indicate via a red warning light in the instrument cluster that the braking system has developed a leak.

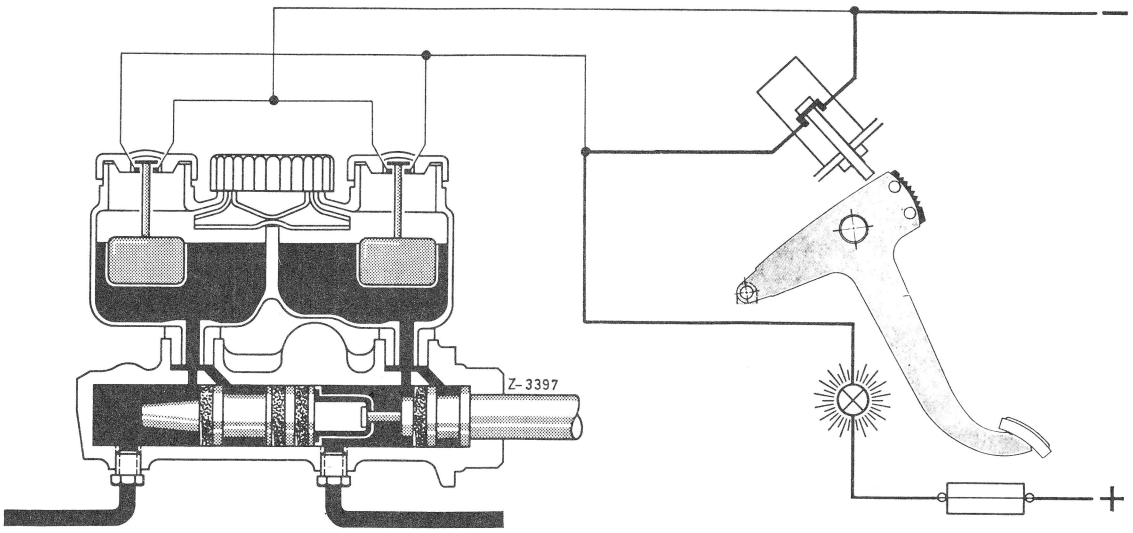

Fig. 2
Tandem master cylinder in inoperative position, parking brake actuated; warning lamp will light up.

When the brake pedal is depressed the following happens: Piston (3) and the intermediate piston (20) are jointly moving forward. As soon as the primary sleeves (10) are overriding the compensating bores (C), the two brake circuits will be building up pressure (Fig. 3).

If, for example, the leak develops in the brake circuit which is connected with the rear pressure chamber (pushrod circuit) (such as a burst brake hose or a chafed brake line), no pressure can be established in this area, since the brake fluid escapes through the leak. Piston (3) is moved forward until it rests on the spring support plate (12) and pushes the intermediate piston (20) forward via this plate. Pressure will then build up in the front pressure area in accordance with the foot pressure against the brake pedal and the power support established by the booster, which will then act on the front wheel brakes (Fig. 4).

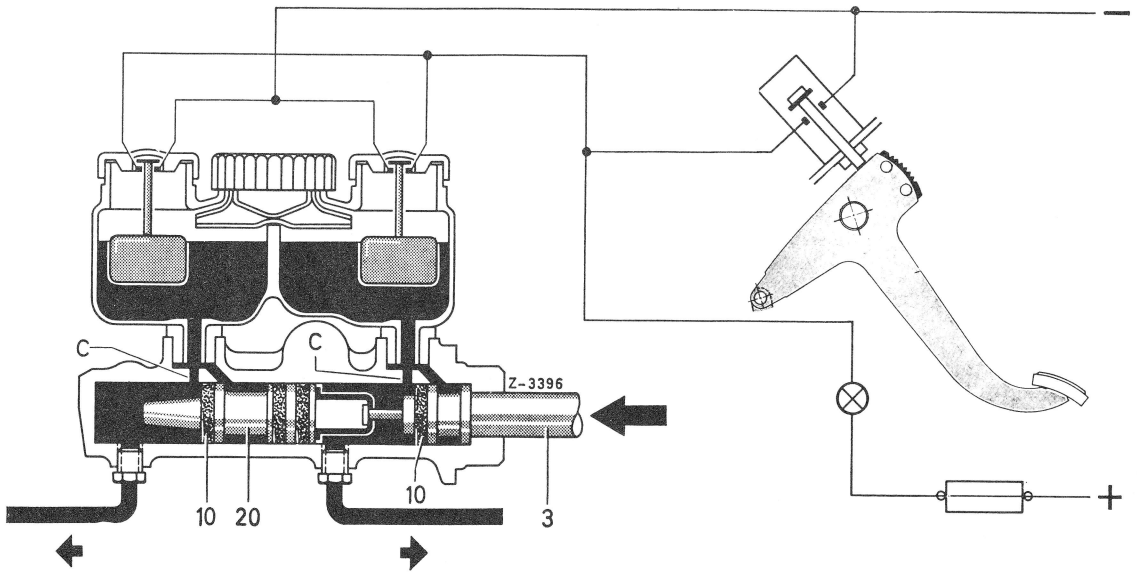

Fig. 3
Actuation of both brake circuits, parking brake released, warning light extinguished.

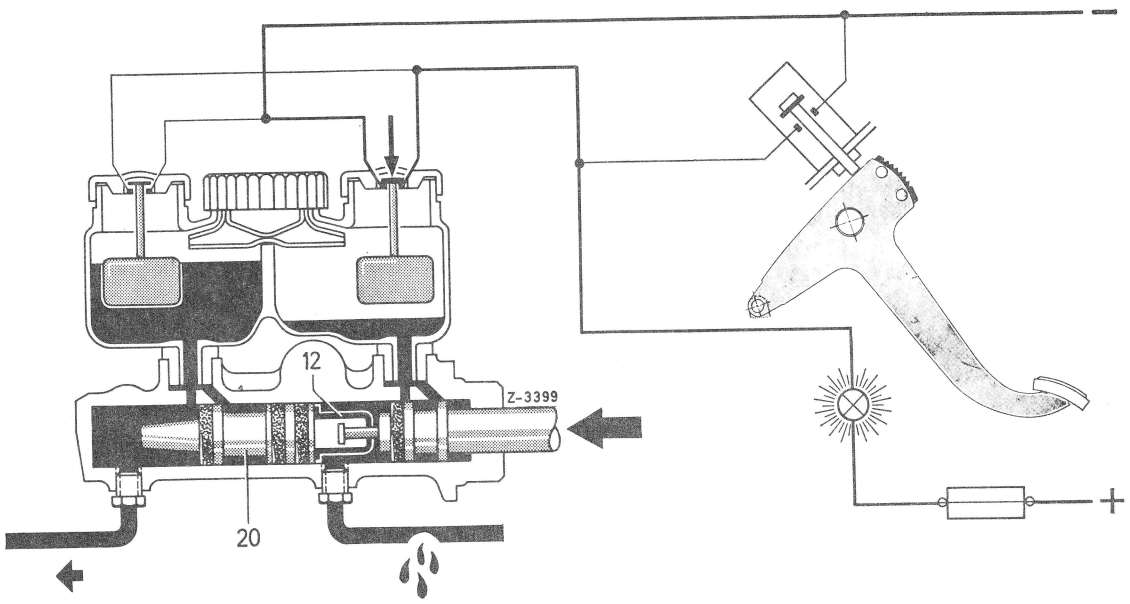

Fig. 4
Leak in brake circuit connected to rear pressure chamber; warning lamp lights up.

If the brake circuit connected to the front pressure chamber develops a leak , the piston package will move forward until the pin of the intermediate piston (20) rests against the housing. Pressure then building up in the rear pressure chamber will act against the wheel brake via the line system (Fig. 5).

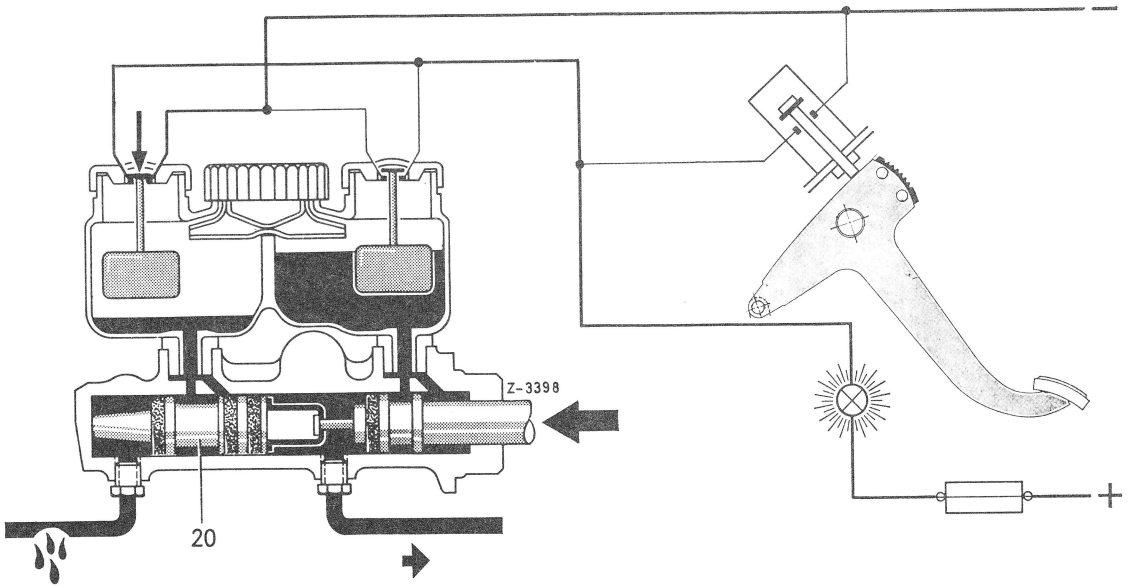

Fig. 5
Leak in brake circuit connected to the front pressure chamber; warning lamp lights up

The loss of one brake circuit is felt by a substantially longer brake pedal travel.

This longer travel develops because with the leak in the brake circuit connected to the rear pressure chamber the piston of the pushrod circuit must be moved at first to the point where it rests against the intermediate piston (Fig. 4).

When the brake circuit connected to the front pressure chamber is lost, the intermediate piston of the floating circuit must be moved first under no load conditions until it rests against the housing of the tandem master cylinder (Fig. 5).

In the event of a leak, no matter whether it shows up in the front or rear wheel brake circuit, hydraulic pressure in the brake circuit which is still intact can be established only when the idle travel caused by the leak has been overcome.

Obviously, the brake effect is pertinently reduced when one circuit fails. Such a reduction is particularly noticed when as a result of a failure of the front wheel brake only the rear wheel brake can be used for braking.