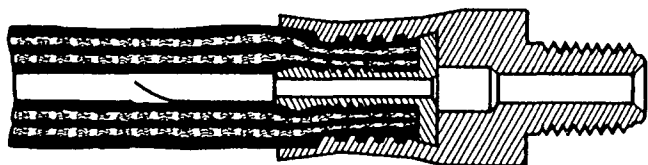


without damage. Brake hoses come in a variety of sizes and lengths for specific applications.

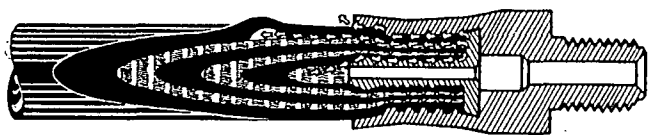
Probable Sources of Line or Hose Failure

Damage to brake hoses or lines will often result in a total or partial brake failure. Generally, a kinked or deteriorated line will leak, but the damage may just show up as a constriction in the line, causing unevenness in the application and release of the brakes. Damage to steel brake lines can generally be found by visual inspection; check for dents or missing routing clips.



(Figure 25) A brake hose with a torn inner lining. The lining can act as a valve, restricting the flow of brake fluid.

Unfortunately, visual inspection doesn't usually detect damage to brake hoses. Hoses that look fine on the outside can be contaminated or deteriorated on the inside. These internal problems can restrict the flow of brake fluid to and from the hydraulic cylinders, causing unevenness in braking or decreasing braking efficiency.



(Figure 26) A damaged brake hose with a leak at the fitting. Note the bubble developing on the top of the hose.

External leaks, caused by cracking or chafing, may develop at end fittings or hoses. The chafing may be due to the substitution of longer hoses, improper installation, or missing tube clips, any of which will allow the hose to rub against the vehicle's suspension. Leaks may result in a visible loss of brake fluid or in the formation of bubbles between the hose layers. (See Figure 26)

HYDRAULIC VALVES

Many brake systems use hydraulic valves to vary hydraulic line pressure to the disc or drum brakes, balancing the pressure to them. Depending on the vehicle design, it may use a metering valve for the front disc brakes or a proportioning valve for the rear drum brakes.

Some early models with front disc and rear drum brakes only had a proportioning valve that limited rear brake pressure during hard braking. This prevented rear wheel lockup.

Later disc brake systems have a metering valve for the front brakes. This valve holds off pressure during light braking conditions and helps prevent premature wear on the front pads as well as front brake lockup.

Following the addition of the metering valve, many systems incorporated three valves: a metering valve, a proportioning valve, and a third one that activated a warning light on the dashboard. This third switch, called a pressure differential switch, senses a low brake fluid level or a loss of pressure in half of the system (as separated by the tandem master cylinder). The brake warning light is connected to the parking brake and may be connected to a low-vacuum switch (vacuum booster), or low pressure switch (electric booster). If the warning light comes on, it may not indicate a hydraulic brake failure; it may indicate a problem with the booster or the switch itself.

In the early 1970's, all three of these valves—metering, warning light, and proportioning valve—were put into a combination valve. (See Figure 27)

Hydraulic Valve Function

Since disc and drum brakes require different hydraulic pressures to make them work (disc more than drum), almost all vehicles with front disc brakes and self-energizing rear drum brakes use proportioning valves. This allows the front brakes to get the pressure they need without locking up the rear brakes.

If front disc brakes drag or lock up under light braking, the metering valve may be defective and should be replaced. If the rear brake locks up under hard braking the proportioning valve may be defective and should be replaced.