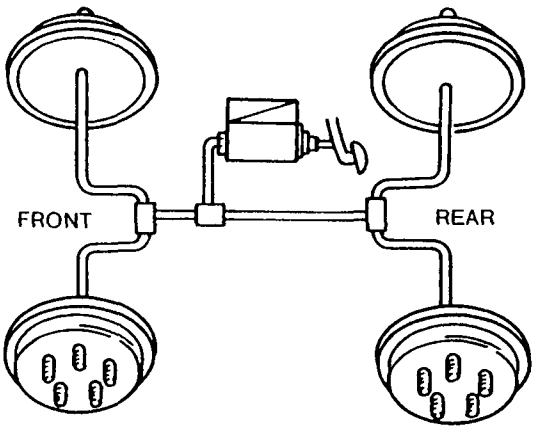
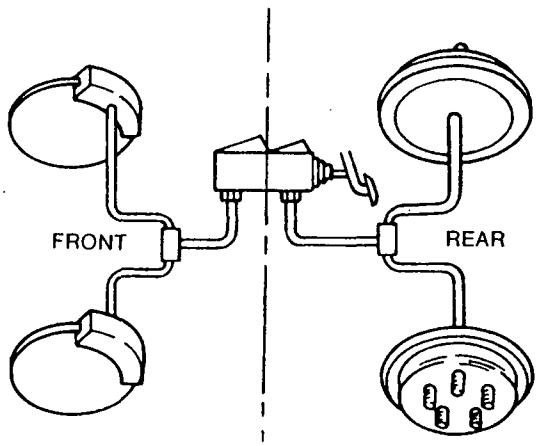
Types of Hydraulic Brake Systems

There are basically three types of hydraulic brake systems in automobiles:



(Figure 2) Single Hydraulic System

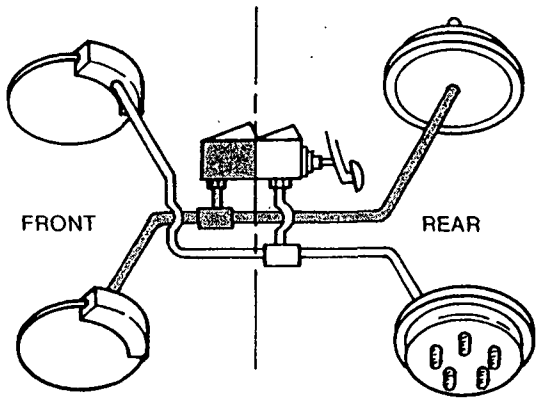
Single System—A four-wheel hydraulic system with a single piston master cylinder. The single system is found on vehicles manufactured before 1967 and on a lot of trucks over 1½-ton manufactured before 1985.



(Figure 3) Dual Hydraulic System

Dual System—A four-wheel hydraulic system with a dual-piston master cylinder. As you can see in the illustration, the front and rear systems are independent of each other, separated at the master cylinder. This type of system is found on most vehicles manufactured after 1967.

Dual Diagonal System—Like the dual system, this one uses a dual-piston master cylinder and two independent braking systems. The dual diagonal system, however, links the right front and left rear wheels on one part of the system and the left front and right rear are on the other.



(Figure 4) Dual Diagonal Hydraulic System

The Application of Friction

Now let's consider what the second physical principle we mentioned has to do with automotive brake systems. In a sense, a brake system is a energy conversion machine. It takes one type of energy—motion—and converts it into another —heat. That heat is dissipated into the atmosphere. More important to our point here is the fact that the heat is generated by friction.

Friction is defined as the resistance to motion between two surfaces touching each other. In terms of our subject, the two surfaces are the brake shoes and linings and brake drums in drum brakes and the brake pads and rotors in disc brakes. And it is this "resistance to motion" that actually stops the vehicle.

It's not enough, however, just to think in terms of friction. Understanding how that works in brake systems involves understanding what creates it and what it does. Let's look at that by considering the parts of this "stopping equation:"

Pressure + Friction Material + Contact Area = Heat

Pressure: The brake system is designed to press the friction material against the braking surface, stopping the vehicle. The amount of hydraulic pressure is determined by the pedal force, the bore size of the hydraulic cylinder and the size of the brake line.