FIGURE 54.1 Hydraulic brake lines transfer the brake effort to each brake assembly attached to all four wheels.

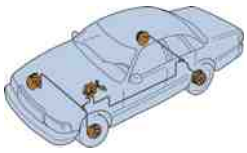

FIGURE 54.2 Typical master cylinder showing the reservoir and associated parts. The reservoir diaphragm lays directly on top of the brake fluid, which helps keep air from the surface of the brake fluid because brake fluid easily absorbs moisture from the air.

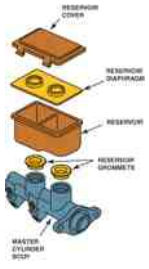

FIGURE 54.3 Master cylinder with brake fluid level at the "max" (maximum) line.

FIGURE 54.4 The typical brake pedal is supported by a mount and attached to the pushrod by a U-shaped bracket. The pin used to retain the clevis to the brake pedal is usually called a clevis pin.

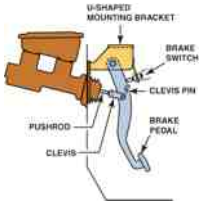

FIGURE 54.5 The composite master cylinder is made from two different materials—aluminum for the body and plastic materials for the reservoir and reservoir cover. This type of reservoir feeds both primary and secondary chambers, and therefore uses a fluid level switch that activates the red dash warning lamp if the brake fluid level drops.

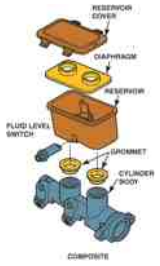

FIGURE 54.6 Note the various names for the vent port (front port) and the replenishing port (rear port). Names vary by vehicle and brake component manufacturer. The names vent port and replenishing port are the terms recommended by the Society of Automotive Engineers (SAE).

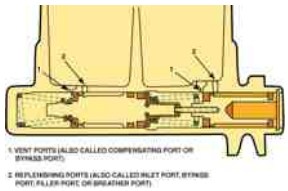

FIGURE 54.7 The vent ports must remain open to allow brake fluid to expand when heated by the friction material and transferred to the caliper and/or wheel cylinder. As the brake fluid increases in temperature, it expands. The heated brake fluid can expand and flow back into the reservoir through the vent ports.

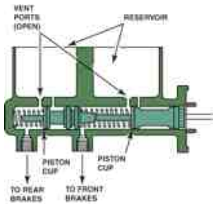

FIGURE 54.8 As the brake pedal is depressed, the pushrod moves the primary piston forward, closing off the vent port. As soon as the port is blocked, pressure builds in front of the primary sealing cup, which pushes on the secondary piston. The secondary piston also moves forward, blocking the secondary vent port and building pressure in front of the sealing cup.

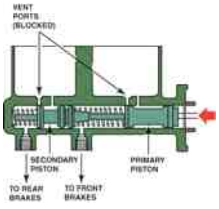

FIGURE 54.9 The purpose of the replenishing port is to keep the volume behind the primary piston filled with brake fluid from the reservoir as the piston moves forward during a brake application.

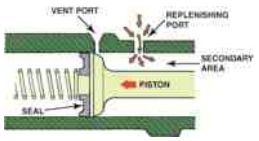

FIGURE 54.10 When the brake pedal is released, the master cylinder piston moves rearward. Some of the brake fluid is pushed back up through the replenishing port, but most of the fluid flows past the sealing cup. Therefore, when the driver pumps the brake pedal, the additional fluid in front of the pressure-building sealing cup is available quickly.

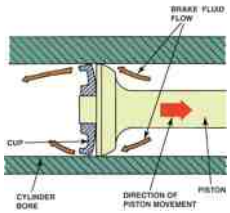

FIGURE 54.11 Rear-wheel-drive vehicles use a dual split master cylinder.

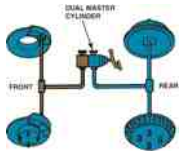

FIGURE 54.12 The primary outlet is the outlet closest to the pushrod end of the master cylinder and the second outlet is closest to the nose end of the master cylinder.

FIGURE 54.13 In the event of a primary system failure, no hydraulic pressure is available to push the second piston forward. As a result, the primary piston extension contacts the secondary piston and pushes on the secondary piston mechanically rather than hydraulically. The loss of pressure in the primary system is usually noticed by the driver by a lowerthan- normal brake pedal and the lighting of the red brake warning lamp.

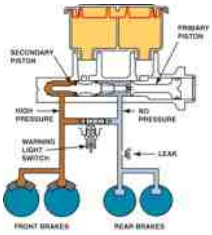

FIGURE 54.14 Front-wheel-drive vehicles use a diagonal split master cylinder. In this design, one section of the master cylinder operates the right front and the left rear brake and the other section operates the left front and right rear. In the event of a failure in one section, at least one front brake will still function.

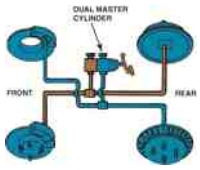

FIGURE 54.15 Quick take-up master cylinder can be identified by the oversize primary low-pressure chamber.

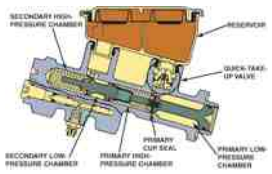

FIGURE 54.16 A brake pedal depressor like this can be used during brake service to block the flow of brake fluid from the master cylinder during service work on the hydraulic system.

FIGURE 54.17 Some seepage is normal when a trace of fluid appears on the vacuum booster shell. Excessive leakage, however, indicates a leaking secondary (end) seal.

FIGURE 54.18 Pedal height is usually measured from the floor to the top of the brake pedal. Some vehicle manufacturers recommend removing the carpet and measuring from the asphalt matting on the floor for an accurate measurement. Always follow the manufacturer's recommended procedures and measurements.

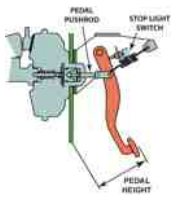

FIGURE 54.19 Brake pedal free play is the distance between the brake pedal fully released and the position of the brake pedal when braking resistance is felt.

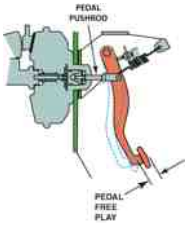

FIGURE 54.20 Brake pedal reserve is usually specified as the measurement from the floor to the top of the brake pedal with the brakes applied. A quick-and-easy test of pedal reserve is to try to place your left toe underneath the brake pedal while the brake pedal is depressed with your right foot. If your toe will not fit, then pedal reserve may not be sufficient.