

GENERAL DESCRIPTION

MASTER CYLINDER

This vehicle uses a composite master cylinder which has an aluminum body and a translucent nylon reservoir with minimum fill indicators.

The master cylinder employs a "Quick Take-Up" feature in the rear chamber, to reduce pedal travel which may result from increased fluid displacement required to move the "Low-Drag Caliper" piston out. The quick take-up master cylinder uses a spring loaded ball check valve to hold pressure in the large-diameter rear chamber so that when the brake is first applied, movement of the rear piston causes fluid to be displaced forward past the primary piston primary seal and into the primary high pressure chamber, which feeds the front brakes. At a predetermined pressure (70-100 psi) the ball unseats and fluid from the large rear bore is displaced past the ball and into the reservoir. The primary and secondary high pressure chambers then supply pressure to the front and rear brakes respectively, in the conventional manner. When the pedal is released, the large-bore chamber replenishes its fluid supply by drawing fluid from the reservoir around the quick take-up lip seal and also through a small orifice in the ball seat.

BRAKE FLUID LEVEL INDICATOR

The quick take-up nylon reservoir master cylinder has two windows incorporated into the master cylinder reservoir. These windows allow the brake fluid level to be checked without removal of the reservoir cover.

OPERATION OF DISC BRAKE

Upon application of the brakes, fluid pressure behind the caliper piston increases. Pressure is exerted equally against the bottom of the piston and also against the bottom of the piston bore. The pressure applied to the piston is transmitted to the inner shoe and lining, forcing the lining against the inner rotor surface. The pressure applied to the bottom of the piston bore forces the caliper to slide or move on the mounting bolts toward the inner side, or toward the car. Since the caliper is one piece, this movement toward the car causes the outer section of the caliper to apply pressure against the back of the outer shoe and lining assembly, forcing the lining against the outer rotor surface. As line pressure increases, the shoe and lining assemblies are pressed against the rotor surfaces with increased force, bringing the car to a stop. When line pressure is released, the seal and seal groove cause the piston to be slightly retracted, resulting in less drag on the rotor by the shoe and lining assembly.

Lining wear is automatically compensated for by the sliding action of the caliper.

OPERATION OF DRUM BRAKE

The drum brake assembly is a duo-servo design. In the duo-servo brake, the force that the wheel cylinder applies to the primary shoe is multiplied by the primary lining friction to provide a very high force applied to the secondary shoe. Torque from the brake

shoes is transferred through the anchor pin to the axle flange. Adjustment is automatic when the brakes are applied while the car is backing up.

OPERATION OF COMBINATION VALVE

The metering or hold off section of the combination valve limits pressure to the front disc brakes until a pre-determined front input pressure is reached, approximating the pressure to overcome the rear shoe and lining retractor springs. There is no restriction at inlet pressures below 3 psi to allow for pressure equalization during non apply periods.

The proportioning section of the combination valve proportions outlet pressure to the rear brakes after a pre-determined rear input pressure has been reached.

The valve is designed to have a "By-Pass" feature which assures full system pressure to the rear brakes in the event of a front brake system failure, also full front pressure is retained in the event of rear failure.

The pressure differential warning switch is designed to constantly compare front and rear brake pressure from the master cylinder and energize the warning light on the instrument panel in the event of a front or rear system failure. The valve and switch are so designed that the switch will latch in the "warning" position once a failure has occurred. The only way the light can be turned off is to repair the failure and apply a pedal force as required to develop up to 3100 kPa (450) psi line pressure.

DIAGNOSIS

INSPECTION AND TESTING BRAKES

Brakes should be tested on dry, clean, reasonably smooth and level roadway. A true test of brake performance cannot be made if roadway is wet, greasy or covered with loose dirt so that all tires do not grip the road equally. Testing will also be adversely affected if roadway is crowned so as to throw weight of car toward wheels on one side or if roadway is so rough that wheels tend to bounce.

Test brakes at different car speeds with both light and heavy pedal force; however, avoid locking the brakes and sliding the tires. Locked brakes and sliding tires do not indicate brake efficiency, since heavily braked, but turning wheels will stop the car in less distance than locked brakes. More tire-to-road friction is present with a heavily braked turning tire than with a sliding tire.

The brake system is designed and balanced to avoid locking the wheels except at very high deceleration levels. It is designed this way because the shortest stopping distance and best control is achieved without brake lock-up.

Because of high deceleration capability, a firmer pedal may be felt at higher deceleration levels.

EXTERNAL CONDITIONS THAT AFFECT BRAKE PERFORMANCE

1. Tires. Tires having unequal contact and grip on road will cause unequal braking. Tires must be